KUSAM-MECO®

An ISO 9001:2008 Company

AC TRUE RMS DIGITAL CLAMPMETER

MODEL KM 175D

SPECIAL FEATURES :

- AmpTip™ low-current range.
- Backlighted LCD display.
- Duo-Core to simultaneously measure clamp-on Amps + A DMM functions.
- VFD-V & Hz for fundamental V/Hz of most Variable-Frequency-Drives
- Display Hold & Non-Contact EF-Detection (NCV)
- AC True RMS Voltage & Current functions.
- Fast 80ms Peak-RMS mode to capture in-rush currents
- Probe contact EF-Detection for more precise indication of live.
- Line level ACV frequency 10.00Hz to 999.9Hz.
- Cx ranges 200.0μF to 2500μF for start & Run Motor Capacitors.

GENERAL SPECIFICATIONS :

- ✶ **Sensing :** True RMS
- ✶ **Jaws Opening size & conductor diameter :** 30mm Max.
- ✶ **Display :** 3-5/6 digits 6000 counts; dual display
- ✶ **Update Rate :** 5 per second nominal
- ✶ **Polarity :** Automatic
- ✶ **Operating Temperature :** 0ºC to 40ºC
- ✶ **Relative Humidity :** Maximum 80%R.H. for temperature upto 31°C decreasing linearly to 50% R.H. at 40°C.
- ✶ **Altitude :** Operating below 2000m
- ✶ **Storage Temperature :** -20°C ~ 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.
- ✶ **Power Supply :** Standard 1.5V AAA Battery x 2
- ✶ **Power Consumption :** typical 6.2mA
- ✶ **Low Battery :** Below approx. 2.85V for Capacitance & Hz
  Below approx. 2.5V for other functions
- ✶ **APO timing :** Idle for 32 minutes approx.
- ✶ **APO Consumption :** typical 5μA.
- ✶ **Dimension :** 217(L) x 76(W) x 37(H)mm
- ✶ **Weight :** approx. 189 gms.

SAFETY :

- **Safety :** Double insulation per UL/IEC/EN61010-1 Ed. 3.0, CAN/CSA C22.2 No. 61010-1 Ed. 3.0, UL/IEC/EN61010-2-032 Ed. 3.0 & UL/IEC/EN61010-2-033 Ed. 1.0 CAT III 600V & CAT Iv 300V AC & DC.
- **E.M.C. :** Meets EN61326-1 : 2013
  Temperature function at 80MHz ~ 150MHz :
  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
- **Overload Protection :**
  Clamp-on jaws : 600A rms continuous
  "+" & COM Terminals (all other functions): 600VDC/VAC rms
- **Pollution Degree :** 2
- **Transient Protection :** 6.0kV (1.2/50μs surge)
- **Rugged Fire retarded casing.**
- **LVD EN61010-2-032 / EN61010-1 to CAT III 600V & CAT IV 300V**

ACCESSORIES : Test leads set, Users Manual, Carrying Case, Bkp60 banana plug K-type thermocouple.

OPTIONAL ACCESSORIES : BKB32 banana plug to type-K socket plug adaptor.

All Specifications are subject to change without prior notice

KUSAM-MECO®
An ISO 9001:2008 Company

G-17, Bharat Industrial Estate, T. J. Road, Sewree (W), Mumbai - 400 015. INDIA.
Sales Direct.: 022-24156638, **Tel. :** 022-24124540, 24181649, **Fax :** 022-24149659
Email : kusam_meco@vsnl.net, **Website :** www.kusamelectrical.com

ELECTRICAL SPECIFICATIONS : KM 175D

Accuracy is ± (% of reading digits + number of digits) or otherwise specified, at 23°C ± 5°C
Maximum Crest Factor <2.5:1 at full scale & <5:1 at half scale or otherwise specified, and with frequency components within the specified frequency components within the specified frequency bandwidth for non-sinusoidal waveforms.

AMPTIP™ CLAMP-ON AC CURRENT

Range	Resolution	Accuracy[1) 2) 3) 4)]
50Hz ~ 60Hz		
60.00 A	0.1 A	±(1.5%rdg + 5dgts)

[1)] **Induced error from adjacent current-carrying conductor :** < 0.06A/A
[2)] Induced error from ACV measurement <0.60A / kV @ 50 / 60Hz
[3)] Add 10d to the specified accuracy @ < 6A
[4)] Induced non-zero residual while beeper turns on : <20d

REGULAR CLAMP-ON AC CURRENT

Range	Resolution	Accuracy[1) 2) 3) 4)]
50Hz ~ 100Hz		
60.00 A[5)]	0.01 A	±(1.8%rdg + 5dgts)
600.0 A	0.1 A	
100Hz ~ 400Hz		
60.00 A[5)]	0.01 A	±(2.0%rdg + 5dgts)
600.0 A	0.1 A	

[1)] **Induced error from adjacent current-carrying conductor :** < 0.06A/A
[2)] Induced error from ACV measurement <0.60A / kV @ 50 / 60Hz.
[3)] Specified accuracy is for measurements made at the jaw center. When the conductor is not positioned at the jaw center,add 2% to specified accuracy for position errors.
[4)] Induced non-zero residual while beeper turns on : < 20d
[5)] Add 10d to specified accuracy @ < 6A.

DCμA

Range	Resolution	Accuracy
200.0 μA	0.1 μA	±(1.0%rdg + 5dgts)
2000 μA	0.1 μA	

Burden Voltage : 3.5mV/μA

TEMPERATURE

Range	Accuracy[1) 2)]
-40.0ºC ~ 99.9ºC	1.0% ~ 0.8ºC
100.0ºC ~ 400ºC	1.0% ~ 1ºC
-40.0ºF ~ 99.9ºF	1.0% ~ 1.5ºF
100ºF ~ 752ºF	1.0% ~ 2ºF

[1)] K-type thermocouple range & accuracy not included
[2)] Accuracies assume meter interior has the same temperature of the ambient (isothermal stage) for a correct junction voltage compensation. Allow enough time to reach the isothermal stage for a signficant change of ambient temperature. It can take up to an hour for changes > 5°C.

DIODE TESTER

Range	Resolution	Accuracy
3.000 V	1 mV	±(1.5%rdg + 5dgts)

Test Current : 0.3mA typically **Open Circuit Voltage :** < 3.5VDC typical.

80ms PEAK-RMS for Clamp-on ACA

Response	80ms to > 90% of specifications, & is specified from 2% of range.

AUDIBLE CONTINUITY TESTER

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

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

RESISTANCE

Range	Resolution	Accuracy
600.0Ω	0.1 Ω	±(1.0%rdg + 5dgts)
6.000KΩ	0.001kΩ	
60.00KΩ	0.01 kΩ	
600.0KΩ[1)]	0.1 kΩ	±(1.2%rdg + 5dgts)
6000KΩ[2)]	1 kΩ	

Open Circuit Voltage : 1.7VDC typical
[1)]**Test Current :** 2μA typical
[2)]**Test Current :** 0.2μA 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 (Sine RMS)[1)]	Range
600 V	50 V	5.00Hz~999.9Hz

Accuracy : 1% + 5d
[1)] DC-bias, if any, not more than 50% of Sine RMS.

NON-CONTACT EF-DETECTION

Bar-Graph Indication	EF-H (High Sensitivity)	EF-L (Low Sensitivity)
	Typical Voltage (Tolerance)	
-	10V (5V ~ 25V)	40V (32V ~ 70V)
- -	25V (20V ~ 66V)	110V (55V ~ 165V)
- - -	55V (50V ~ 125V)	220V (130V ~ 265V)
- - - -	110V (90V ~ 200V)	400V (250V ~ 500V)
- - - - -	220V (>180V)	550V (>430V)

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 direct contact testing with one single test-probe via an input terminal. The COM terminal (Black) has the test sensitivity.

All Specifications are subject to change without prior notice.

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LIST OF PRODUCTS

- ✶ Digital Multimeter
- ✶ Digital AC & AC/DC Clampmeter
- ✶ AC Clamp Adaptor
- ✶ AC/DC Current Adaptor
- ✶ Thermo Anemometer
- ✶ Thermo Hygrometer
- ✶ Distance Meter
- ✶ Digital Lux Meter
- ✶ Network Cable Tester
- ✶ Power Factor Regulator
- ✶ Earth Resistance Tester
- ✶ Digital Panel Meters
- ✶ DC Power Supplies
- ✶ High Voltage Detector
- ✶ Calibrators
- ✶ Gas Analysers
- ✶ Frequency Counter
- ✶ Function Generator
- ✶ Phasing Sticks
- ✶ Battery Tester
- ✶ Waterproof Pen Testers
- ✶ Solar Power Meter
- ✶ EMF Detector
- ✶ 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

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KUSAM-MECO®

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AC TRUE RMS
DUAL DISPLAY
DIGITAL CLAMPMETER

MODEL - KM 175D

OPERATION MANUAL

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.

KUSAM-MECO®

AC TRMS
DUAL DISPLAY
DIGITAL CLAMPMETER
MODEL - KM 175D

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.

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.

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 meter or UL Listed Probe Assembly to the same meter ratings or better.

IEC 61010-031 requires exposed conductive test probe tips to be < 4mm for CAT III & CAT IV ratings. Refer to the category markings on your probe assemblies as well as on the add-on accessories (like detachable Caps or Alligator Clips), if any, for applicable rating changes.

Observe proper safety precautions when working with voltages above 33 Vrms, 46.7Vpeak or 70 VDC. These voltage levels pose a potential shock hazard to the user. Before and after hazardous voltage measurements, check the voltage function on a known source such as line voltage to determine proper meter functioning.

KUSAM-MECO®

MUMBAI

TEST CERTIFICATE

AC 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 175D**

SERIAL NO. _____

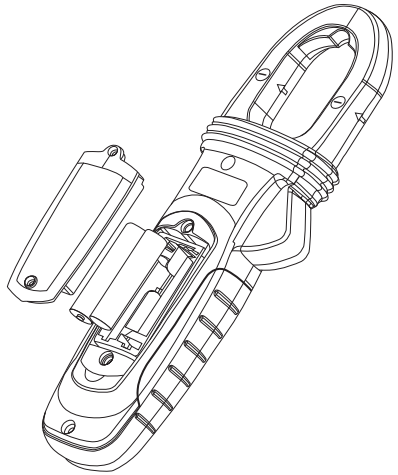
DATE: _____

ISO 9001
REGISTERED

QC
KUSAM-MECO
PASS

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.



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.

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
3~	Three-phase Alternating Current
ϟ	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 & RoHS directive 2011/65/EU.

BRIEF INFORMATION ABOUT MEASUREMENT CATEGORIES

Measurement Category IV is applicable to test and measuring circuits connected at the source of the building's low-voltage MAINS installation. Examples are measurements on devices installed before the main fuse or circuit breaker in the building installation.

Measurement Category III is applicable to test and measuring circuits connected to the distribution part of the building's low-voltage MAIHS installation. Examples are measurements on distribution boards (including secondary meters), circuit-breakers, wiring, including cables, bus-bars, junction boxes, switches, socket-outlets in the fixed installation, and equipment for industrial use and some other equipment such as stationary motors with permanent connection to the fixed installation.

Measurement Category II is applicable to test and measuring circuits connected directly to utilization points (socket outlets and similar points) of the low-voltage MAINS installation. Examples are measurements on MAINS CIRCUITS of household appliances, portable tools and similar equipment.

IV. SPECIAL FEATURES :

- AmpTip™ low-current range.
- Backlighted LCD display.
- Duo-Core to simultaneously measure clamp-on Amps + A DMM functions.
- VFD-V & Hz for fundamental V/Hz of most Variable-Frequency-Drives
- Display Hold & Non-Contact EF-Detection (NCV)
- AC True RMS Voltage & Current functions.
- Fast 80ms Peak-RMS mode to capture in-rush currents
- Probe contact EF-Detection for more precise indication of live.
- Line level ACV frequency 10.00Hz to 999.9Hz.
- Cx ranges 200.0μF to 2500μF for start & Run Motor Capacitors.

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 or battery door. Do not operate with open case or battery door.

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.

Using the Complementary Beeper feature:

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

Hold feature

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

80ms PEAK-RMS mode for Clamp-on ACA functions

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

LCD display Backlight

Press the **SELECT** button for 1 second or more to toggle the LCD backlight on/off. The backlight will also be turned off automatically after 20 minutes to extend battery life.

Intelligent Auto-Power Off (APO)

The Auto-Power-off (APO) mode turns 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

V. SPECIFICATIONS :

GENERAL SPECIFICATIONS :

Display	**:** 3-5/6 digits 6000 counts, dual display.
Polarity	**:** Automatic
Jaw opening & Conductor diameter :	30mm 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 approx.
Power Consumption	**:** 6.2mA Typical.
APO Consumption	**:** 5μA typical
Power Supply	**:** 1.5V AAA Size battery X 2
Dimension	**:** 217(L) x 76(W) x 37(H)mm
Weight	**:** Approx. 186gm.

Accessories : Test leads set, User Manual, Carrying case & Bkp60 banana plug K-type Thermocouple.

Optional Accessories : BKB32 banana plug to type-K socket plug adaptor.

SAFETY :

Safety : Double insulation per UL/IEC/EN61010 -1 Ed. 3.0, CAN/CSA C22.2 No. 61010-1 Ed. 3.0, UL/IEC/EN61010-2-032 Ed.3.0, UL/IEC/EN61010-2-033 Ed.1.0 to CAT III 600V & CAT IV 300V AC & DC.

Transient Protection : 6.0kV (1.2/50μs surge).

Overload Protection :

Clamp-on jaws : 600A rms continuous.

"+" & COM Terminals (all other functions) : 600VDC/VAC rms

E.M.C. : Meets EN61326-1 : 2013

Temperature function at 80MHz ~ 150MHz :

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

DCμA Current function:

Inputs are made via the test lead terminals **COM/+.**

Application Notes on Flame Sensors:

The **DCμA** function is designed especially for HVAC/R flame sensor applications. The 0.1 μA 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 2μA for a rectification type, or 1,5μA for an ultraviolet type (8μA 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:

For gas or oil flames (Minipeeper):

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

For oil flames (Photocell):

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

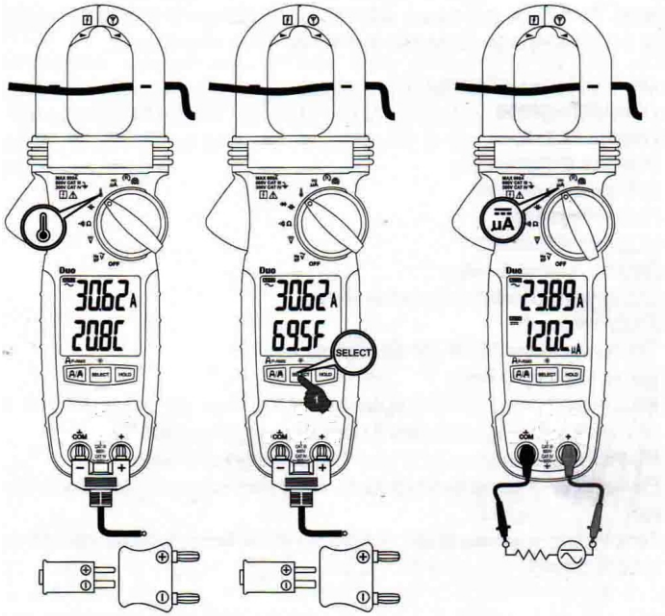
For gas flames (Flame Rod):

- Ignition interference (A flame signal current difference with the ignition both on & off greater than 0.5μA indicates the presence of ignition, interference)
- Insufficient ground (must be at least 4 times the detector area)
- Flame lifting 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.

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

TEMPERATURE FUNCTION :

Inputs are made via the test lead terminals COM/+. Press SELECT button momentarily to toggle between °C (celsius) &°F (Fahrenheit).



Note : Be sure to insert the banana plug type-K temperature bead probe Bkp60 with correct **+ -** polarities. 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.

ELECTRICAL SPECIFICATIONS :

Accuracy is ± (% of reading digits + number of digits) or otherwise specified, at 23°C ± 5°C.

Maximum Crest Factor <2.5:1 at full scale & <5:1 at half scale or otherwise specified, and with frequency components within the specified frequency components within the specified frequency bandwidth for non-sinusoidal waveforms.

AMPTIP™ CLAMP-ON AC CURRENT

Range	Resolution	Accuracy[1) 2) 3) 4)]
50Hz ~ 60Hz		
60.00 A	0.1 A	±(1.5%rdg + 5dgts)

[1)] **Induced error from adjacent current-carrying conductor :** < 0.06A/A

[2)] Induced error from ACV measurement <0.60A / kV @ 50 / 60Hz

[3)] Add 10d to the specified accuracy @ < 6A

[4)] Induced non-zero residual while beeper turns on : <20d

REGULAR CLAMP-ON AC CURRENT

Range	Resolution	Accuracy[1) 2) 3) 4)]
50Hz ~ 100Hz		
60.00 A[5)]	0.01 A	±(1.8%rdg + 5dgts)
600.0 A	0.1 A	
100Hz ~ 400Hz		
60.00 A[5)]	0.01 A	±(2.0%rdg + 5dgts)
600.0 A	0.1 A	

[1)] **Induced error from adjacent current-carrying conductor :** < 0.06A/A

[2)] Induced error from ACV measurement <0.60A / kV @ 50 / 60Hz.

[3)] Specified accuracy is for measurements made at the jaw center. When the conductor is not positioned at the jaw center,add 2% to specified accuracy for position errors.

[4)] Induced non-zero residual while beeper turns on : < 20d

[5)] Add 10d to specified accuracy @ < 6A.

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

DCμA

Range	Resolution	Accuracy
200.0 μA	0.1 μA	±(1.0%rdg + 5dgts)
2000 μA	0.1 μA	

Burden Voltage : 3.5mV/μA

RESISTANCE

Range	Resolution	Accuracy
600.0Ω	0.1 Ω	±(1.0%rdg + 5dgts)
6.000KΩ	0.001kΩ	
60.00KΩ	0.01 kΩ	
600.0KΩ[1)]	0.1 kΩ	±(1.2%rdg + 5dgts)
6000KΩ[2)]	1 kΩ	

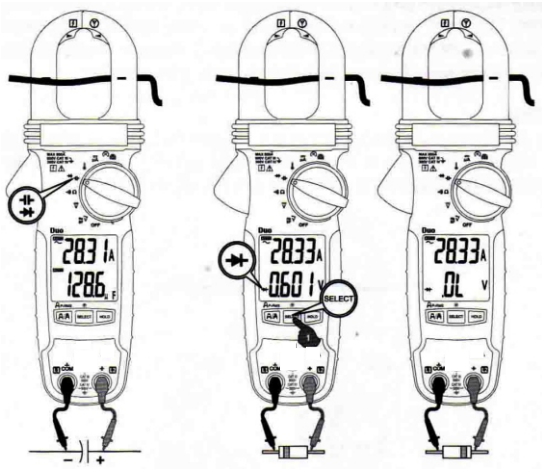
Open Circuit Voltage : 1.7VDC typical

[1)]**Test Current :** 2μA typical

[2)]**Test Current :** 0.2μA typical

⊣⊢ Capacitance & ⇻ Diode functions :

Inputs are made through the test lead terminals **COM/+**. Defaults at **⊣⊢ Capacitance**. Press **SELECT** button momentarily to toggle between the subject functions.



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 Capacitance 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.

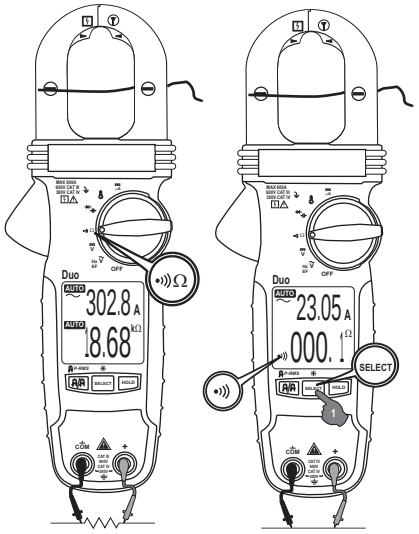
Ω Resistance & •))) Continuity functions :

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

•))) Continuity function is convenient for checking wiring connections & operation of switches. The meter provides Audible as well as visible results. A continuous beep tone, together with two flashing LCD icons •))) & Ω, indicates a complete wire. This further improves ease of use especially in noisy working environments.

CAUTION :

Using Resistance, Continuity 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

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

TEMPERATURE

Range	Accuracy[1] [2]
-40.0ºC ~ 99.9ºC	1.0% ~ 0.8ºC
100.0ºC ~ 400ºC	1.0% ~ 1ºC
-40.0ºF ~ 99.9ºF	1.0% ~ 1.5ºF
100ºF ~ 752ºF	1.0% ~ 2ºF

[1] K-type thermocouple range & accuracy not included

[2] Accuracies assume meter interior has the same temperature of the ambient (isothermal stage) for a correct junction voltage compensation. Allow enough time to reach the isothermal stage for a signficant change of ambient temperature. It can take up to an hour for changes > 5°C.

HZ LINE LEVEL FREQUENCY

Function	Sensitivity (Sine RMS)[1]	Range
600 V	50 V	5.00Hz~999.9Hz

Accuracy : 1% + 5d

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

80ms PEAK-RMS for Clamp-on ACA

Response	80ms to > 90% of specifications, & is specified from 2% of range.

NON-CONTACT EF-DETECTION

Bar-Graph Indication	EF-H (High Sensitivity)	EF-L (Low Sensitivity)
	Typical Voltage (Tolerance)	
-	10V (5V ~ 25V)	40V (32V ~ 70V)
- -	25V (20V ~ 66V)	110V (55V ~ 165V)
- - -	55V (50V ~ 125V)	220V (130V ~ 265V)
- - - -	110V (90V ~ 200V)	400V (250V ~ 500V)
- - - - -	220V (>180V)	550V (>430V)

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 direct contact testing with one single test-probe via an input terminal. The COM terminal (Black) has the test sensitivity.

DIODE TESTER

Range	Resolution	Accuracy
3.000 V	1 mV	±(1.5%rdg + 5dgts)

Test Current : 0.3mA typically **Open Circuit Voltage :** < 3.5VDC typical.

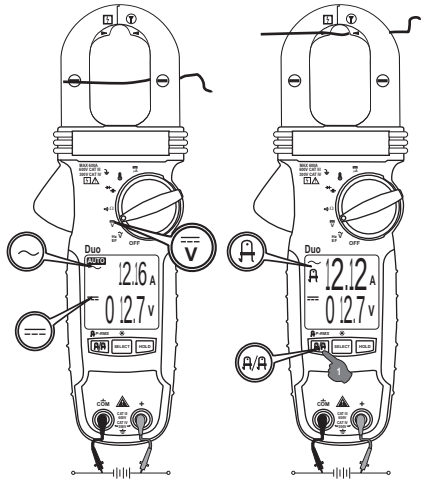
AUDIBLE CONTINUITY TESTER

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

- **Non-Contact EF-Detection (NCV):** An antenna is located along the top-right end of the stationary clamp jaw, which detects electric field surrounding energized conductors. It is ideal for tracing live wiring connections, locating wiring breakages and to distinguish between live and earth connections.
- **Probe-Contact EF-Detection:** For more precise indication of live wires, such as distinguishing between Live and Ground connections, use direct contact testing with one single test-probe via an input terminal. The COM terminal (Black) has the best sensitivity.

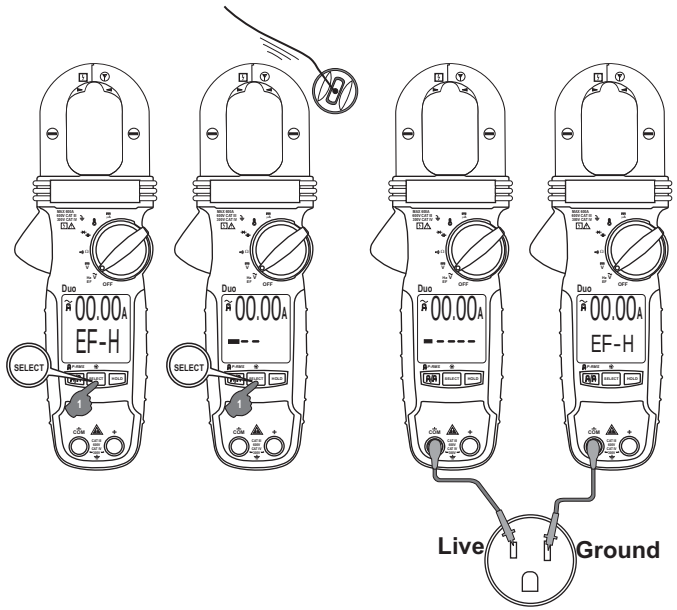
DCV FUNCTION: Inputs are made via the test lead terminals COM / +.

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



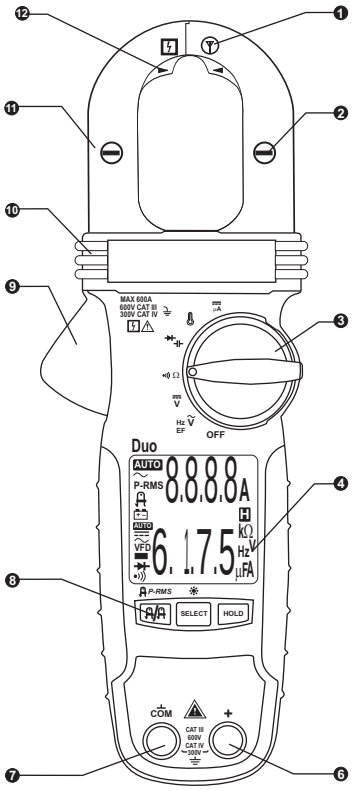
EF-Detection function with EF-H & EF-L Sensitivities

The detected Electric Field strength is indicated as a series of bar-graph segments on the display together with variable beep tones. Two user selectable sensitivities are available. In High Sensitivity range, the meter displays **"EF-H"** when it is ready. It is set to better detect lower voltage signals. If it is too sensitive for your applications, press **SELECT** button momentarily to use the Lower Sensitivity **"EF-L"** range



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 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 Dual numeric LCD display.
6. Input Jack for all functions EXCEPT non-invasive ACA current function.
7. Common (Ground reference) Input Jack for all functions EXCEPT non-invasive 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 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 :

INTRODUCTION

To realize swift simultaneous dual measurements, the meter uses two Analog-to-Digital Converters (Duo) for its **Clamp-on ACA** functions (Upper-display readings) as well as its **Rotary-switch** functions (Lower-display readings) separately. **Clamp-on ACA** functions turn ON whenever the **Rotary-switch** function is turned ON.

REGULAR & AMPTIP™ CLAMP-ON ACA FUNCTIONS

Defaults at **Regular ACA** function where best accuracy is specified at the jaw center area. Press ⍓/⍓ button momentarily to toggle to **AmpTip™ ACA** function where best accuracy is specified near the jaw tip area for low-current small conductors below 10mm in diameter.

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.*

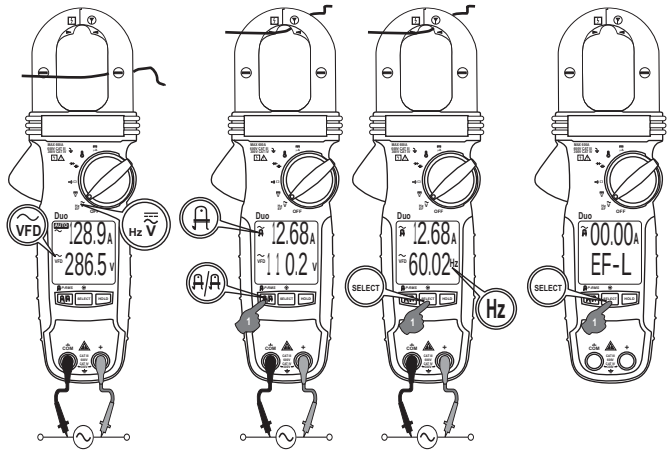
CAUTION: *(Application and Removal of the Clamp-on Jaws) Press the jaw trigger andclamp the jaws around conductor(s) of only one single pole of a circuit for load current measurements. Make sure the jaws are completely closed, or else it will introduce measurement errors. Enclosing conductor (s) of more than one pole of a circuit may result in differential current (like identifying leakage current) measurements. Align the conductors) 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).*

CAUTION: *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.*

ACV. Line-Level Hz & EF-Detection (NCV) functions

Inputs, other than that of **EF-Detection** as described later on, are made via the test lead terminals **COM/+.** Defaults at **ACV** Function. Press **SELECT** button momentarily to select **ACV, Hz, EF-H & EF-L** functions in sequence.

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



Note:

ACV *and* ***Hz*** *functions are equipped with digital low-pass filter, and are capable of dealing with* ***VFD*** *(Variable Frequency Drives) signals for fundamental readings. It also improves ACV and Hz reading stability being in most noisy electrical environments.*