KUSAM-MECO®

An ISO 9001:2008 Company

TRMS DATA LOGGER CLAMP METER WITH PC INTERFACE

14 FUNCTION 09 RANGES

Model - KM 135

SPECIAL FEATURES :

- Stylish & Versatile
- AC Clamp-on + Multimeter ranges
- AC True RMS Voltage & Current functions
- Total Harmonic distortion THD%-R
- Data Hold & Auto Hold
- 5400 points Hi-Lo logging
- On screen Hi-Lo logging data review capability
- K-type Temperature measurement
- Fast Audible Continuity
- PC interface kit (Optional)

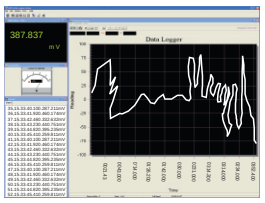
GENERAL SPECIFICATION :

✶ **Sensing :** True RMS sensing
✶ **Jaw opening size :** 45mm max
✶ **Display :** 3-5/6 Digits 6000Counts Backlight Display
Voltage functions : 6000 counts; **Ohms & Hz functions :** 9999 counts;
ACA clamp-on function : 4000 counts
✶ **Update Rate :** Voltage, ACA clamp-on, Ohms & Temperature function : 4 per second nominal
Hz function : 2 Per second nominal
✶ **Polarity :** Automatic
✶ **Operating Temperature :** 0°C to 40°C
✶ **Relative Humidity :** Max. R.H. 80% for temperature uptp 31°C decreasing linearly to 50% R.H. 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.
✶ **Power Supply :** standard 1.5V AAA battery x 2
✶ **Power Consumption (typical) :** Voltage & ACA functions : 3.5mA typical
Ohm & Temperature functions : 4mA typical
✶ **Low Battery :** Below approx. 2.4V
✶ **APO Consumption :** 10 A typical
✶ **APO Timing :** Idle for 16 minutes
✶ **Dimension :** L224mm x W78mm x H40mm
✶ **Weight :** 224gm approx

SAFETY :

- **Safety :** Meets IEC61010-2-032(1994), EN61010-2(1995), UL3111-2-032(1999).
Measurement Category : CAT III 600 Volts AC & DC
- **Transient protection :** 6.5kV (1.2/50µs surge)
- **Pollution degree :** 2
- **E.M.C. :** Meets EN61326(1997,1998/A1),EN61000-4-2(1995), and EN61000-4-3(1996)
In an RF field of 3V/m :
Total Accuracy = Specified Accuracy + 45 digits;
Performance above 3V/m is not specified
- **Overload Protection :**
ACA Clamp-on jaws : AC 1000A rms Contuinuous
+ & COM terminals (all functions) : 600VDC / VAC rms

Software CD

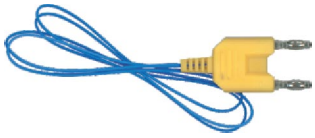


PC Software Screen

BA-1XX Cable | **BUA-2303 USB to Serial Adapter** | **BC-100R USB port Cable**

ACCESSORIES :

Test Leads pair, User's Manual, Batteries installed, BKP60 banana plug type K-thermocouple & Carrying case.



Thermocouple

OPTIONAL ACCESSORIES :

PC interface kit (including BA-1XX optical adaptor back, BC-100R cable, Software CD), BKB32 banana plug to type-K socket plug adaptor

All Specifications are subject to change without prior notice

ELECTRICAL SPECIFICATIONS : KM 135

Accuracy is ± (% of reading digits + number of digits) or otherwise specified, at 23°C ± 5°C and less than 75% R. H. 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 waveforms. Fundamentals are specified at 50Hz or 60Hz.

AC CURRENT (CLAMP-ON)

Range	Resolution	Accuracy[1) 2) 3)]
50Hz / 60Hz		
40.00 A	10 mA	±(1.0%rdg + 5dgts)
400.0 A	100 mA	
1000 A	1 A	
45Hz ~ 500Hz		
40.00 A	10 mA	±(2.0%rdg + 5dgts)
400.0 A	100 mA	
1000 A	1 A	±(2.5%rdg + 5dgts)
500Hz ~ 3.1kHz		
40.00 A	10 mA	±(2.0%rdg + 5dgts)
400.0 A	100 mA	
1000 A	1 A	±(2.5%rdg + 5dgts)

Crest Factor :
< 2.5 :1 at full scale & < 5.0 : 1 at half scale for 40.00A & 400.0A ranges
< 1.4 :1 at full scale & < 2.8 : 1 at half scale for 1000A range

1) Add 8d to specified accuracy while reading is below 10% of range
2) Induced error from adjacent current-carring conductor : < 0.06A/A
3) 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 making lines (toward jaws opening)

DC VOLTAGE

Range	Resolution	Accuracy
600.0V	100 mV	±(0.5%rdg + 5dgts)

NMRR : > 50dB @ 50/60Hz
CMRR : > 120dB @DC, 50/60Hz, RS = 1k
Input Impedance : 2M , 30pF nominal

FREQUENCY

Range	Accuracy
5.00Hz ~ 500.0Hz	±(0.5%rdg + 4dgts)

Sensitivity (Sine RMS)
40A range : > 4A
400A range : > 40A
1000A range : > 400A
600V range : > 30V

AUDIBLE CONTINUITY TESTER

Audible threshold	between 10 and 300
Response time	250µS typical

AC VOLTAGE

Range	Resolution	Accuracy
50Hz / 60Hz		
600.0 V	0.1 V	±(1.0%rdg + 5dgts)
40Hz ~ 500Hz		
600.0 V	0.1 V	±(1.5%rdg + 5dgts)
500Hz ~ 3.1kHz		
600.0 V	0.1 V	±(2.5%rdg + 5dgts)

CMRR : > 60dB @ DC to 60Hz, Rs = 1K
Input Impedance : 2M , 30pF nominal
Crest Factor : < 2.3 : 1 at full scale & < 4.6 : 1 at half scale

TEMPERATURE

Range	Accuracy [1) 2)]
-50°C ~ 300°C	±(2.0%rdg + 3°C)
-58°F ~ 572°F	±(2.0%rdg + 6°F)

1) Type-K thermocouple range & accuracy not included
2) Add 3°C (or 6°F) to specified accuracy @ -20°C~50°C (@ -4°F~58°F)

THD%-R[1)]

Range	Harmonic Order	Accuracy[2)]
0.0%~99.9%	Fundamental	1.5% of Reading + 6d
	2nd ~ 3rd	5.0% of Reading + 6d
	4th ~ 10th	2.5% of Reading + 6d
	11th ~ 51st	2.0% of Reading + 6d

1) THD% -R is defined as : (Total Harmonic RMS / Total RMS) x 100%
2) Specified accuracy @ ACA fundamental > 5A; ACV fundamental > 50V

RESISTANCE

Range	Resolution	Accuracy
999.9	0.1	±(1.0%rdg + 6dgts)

Open Circuit Voltage : 0.4VDC typical

All Specifications are subject to change without prior notice

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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 readig 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 as 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.

LIST OF PRODUCTS

* Digital Multimeter
* Digital AC & AC/DC Clampmeter
* AC Clamp Adaptor
* AC/DC Current Adaptor
* 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
* Thermo Hygrometer
* Thermo Anemometer
* Wood & Paper Moisture Meter
* Distance Meter
* Digital Hand Held Temperature Indicators
* Digital Lux Meter
* Network Cable Tester
* Power Factor Regulator
* Maximum Demand Controller/Digital Power Meter
* Earth Resistance Tester

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E-mail : kusam_meco@vsnl.net, **Website :** www.kusam-meco.co.in,
www.kusamelectrical.com

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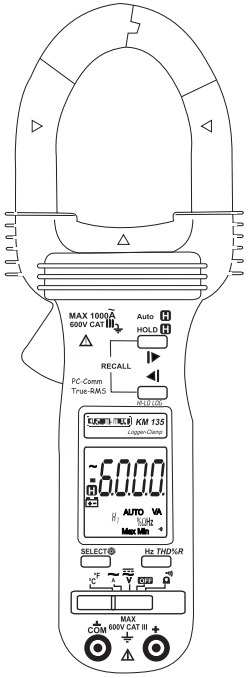
DIGITAL LOGGER CLAMP™ MODEL KM 135

OPERATION MANUAL

KUSAM-MECO

USER'S MANUAL

KM 135
LOGGER CLAMP™



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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

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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:

Display : Voltage functions : 6000 Counts LCD display
ohms & Hz functions : 999Counts LCD display
ACA clamp-on function : 4000 counts LCD display

Update Rate : Voltage, ACA clamp-on,Ohms & Temp. Functions : 4 per second nominal
Hz function : 2 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 up to 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 0.15x(specified accuracy)/°C@(0°C -18°C or 28°C-40°C), or other wise specified

Sensing : True RMS

Pollution degree : 2

Transient protection :6.5kV (1.2/50µs surge) for all models

Safety : Meets IEC61010-2-032(1994), EN61010-2-032(1995), UL3111-2-032(1999). Category III 600Volts ac & dc

Jaw opening & Conductor diameter :45mm max

Power Supply :standard 1.5V AAA Size battery x 2

Power Consumption :Voltage & ACA functions 3.5mA typical
Ohms & Temperature functions : 4mA typical

APO Timing :Idle for 16 minutes

APO Consumption :10µA typical

E.M.C. :Meets,EN61326(1997, 1998/A1)EN61000-4-2(1995), and EN61000-4-3(1996)
In an RF field of 3V/m; Total Accuracy = Specified Accuracy + 45 digits
performance above 3V/m is not specified

Overload Protection :ACA Clamp-on jaws : AC 1000A rms
Contuinuous + & COM terminals (all functions) : 600VDC/VAC rms

Weight : 224gm approx.

Accessories : Test leads, batteries installed, soft carrying case, PC interface kit banana plug type-K thermocouple etc.

Optional accessories : PC interface kit(including Optical adapter back, cable & Software CD etc.)

ELECTRICAL SPECIFICATIONS :

Accuracy is ±(% reading digits + number of digits) or otherwise specified, at 23°C ±5 ° C & less than 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, besides fundamentals, fall within the meter specified AC bandwidth for non-Sinusoidal wave forms Fundamental are specified at 50Hz and 60Hz.

AC Voltage

RANGE	Accuracy
50Hz / 60Hz	
600.0V	1.0% + 5d
45Hz ~ 500Hz	
600.0V	1.5% + 5d
500Hz ~ 3.1kHz	
600.0V	2.5% + 5d

CMRR : >60dB @ DC to 60Hz, Rs = 1KΩ
Input Impedance : 2MΩ, 30pF nominal
True RMS models Crest Factor :
< 2.3 : 1 at full scale & < 4.6 : 1 at half scale

DC Voltage

Range	Accuracy
600.0V	0.5% + 5d

NMRR : >50dB @ 50/60Hz

CMRR : >120dB @DC, 50/60Hz, RS = 1kΩ

Input Impedance : 2MΩ, 30pF nominal

ACA Current (Clamp-on)

Range	Accuracy[1)2)3)]
50Hz / 60Hz	
40.00A, 400.0A, 1000A	1.0% + 5d
45 Hz ~ 500Hz	
40.00A, 400.0A	2.0% + 5d
1000A	2.5% + 5d
500Hz ~ 3.1kHz	
40.00A, 400.0A	2.0% + 5d
1000A	2.5% + 5d

Crest Factor :< 2.5 :1 at full scale & < 5.0 : 1 at half scale for 40.00A & 400.0A ranges
< 1.4 :1 at full scale & < 2.8 : 1 at half scale for 1000A range

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

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

3)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 making lines (away from jaw opening) Add 4% to specified accuracy for measurements made BEYOND jaw making lines (toward jaws opening)

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THD%-R[1)]

Range	Harmonic order	Accuracy[2)]
0.0% ~ 99.9%	Fundamental	1.5% of Reading + 6d
	2nd ~ 3rd	5.0% of Reading + 6d
	4nd ~ 10th	2.5% of Reading + 6d
	11th ~ 51st	2.0% of Reading + 6d

1)THD-R is defined as : (Total Harmonic RMS / Total RMS)x 100%

2)Specified accuracy @ ACA fundamental > 5A; ACV fundamental > 50V

Resistance

Range	Accuracy
999.9Ω	1.0% + 6d

Open Circuit Voltage : 0.4VDC typical

Audible Continuity Tester

Audible threshold : between 10Ω and 300Ω.
Response time : 250μs

Frequency

Range	Accuracy
5.00Hz ~ 500.0Hz	0.5% + 4d

Sensitivity (Sine RMS)
40A range : > 4A
400A range : > 40A
1000A range : > 400A
600V range : > 30V

Temperature

Range	Accuracy[1)]
-50°C ~ 300°C	2.0% + 3°C
-58°F ~ 572°F	2.0% + 6°F

1)Add 3°C or 6°F) to specified accuracy @ -20°C ~- 50°C (or @ -4°F~-58°F) Type-K thermocouple range & accuracy not included.

INTERNATIONAL ELECTRICAL SYMBOLS

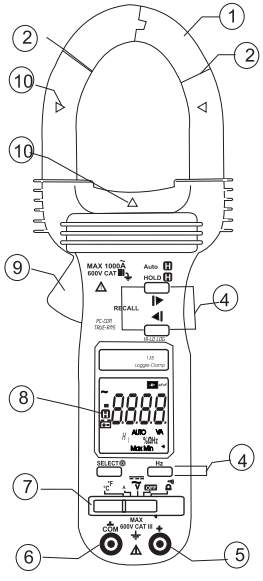
⚠	Caution ! Refer to the explanation in this Manual
⚠	Caution ! Risk of electric shock
⏚	Earth (Ground)
▣	Double Insulation or Reinforced insulation
▭	Fuse
~	AC--Alternating Current
⎓	DC--Direct Current

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)Transformer Clamp Jaws for AC current magnetic field pick up

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

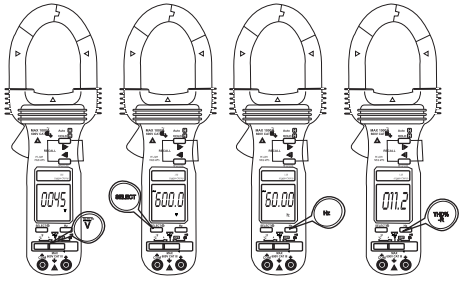
7) Slide-switch Selector to turn the power ON/OFF and Select a function

8) LCD display

9) Jaw trigger for opening the transformer clamp jaws

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

4) OPERATION



ACV & DCV functions

Set the slide-switch function-selector to the $\tilde{\overline{V}}$ position. Default at last selected function. Press SELECT button to toggle between ACV and DCV measurement functions. There is no LCD annunciator for DC. LCD annunciator " ~ " turns on to indicate AC is selected.

Line-Level Frequency function

When voltage or current function is selected, press **Hz** button momentarily toggles to Line-Level Frequency function. Frequency trigger levels vary automatically with function ranges.

THD%-R Total Harmonic Distoration- RMS function

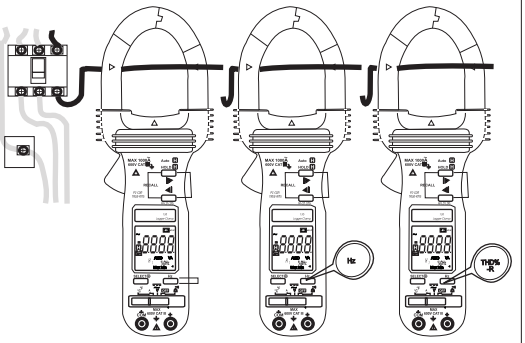
THD%-R = (Total Harmonics RMS / Total RMS) x 100%

Total Harmonic Distoration - RMS (THD%-R) is the percentage ratio of the Total Harmonics RMS value to The total (overall)RMS value of a voltage or current signal, & is given by the above expression. An ideal sinusoidal waveform has a value of 0%. A badly distorted sinusoidal waveform may have a much higher THD%-R value of approaching one hundred (100% is maximum theoretical reading).

When voltage or current function is selected, press and hold **THD%-R** button for one second or more toggles to Total Harmonic Distoration - RMS measurement function The LCD annuniciator "%" turns on.

Note :

Specified accuracy at ACA fundamental >5A; ACV fundamental >50V. The meter displays"---,-% when ACA fundamental <1A; ACV fundamental <8.5V



ACA Current clamp-on function

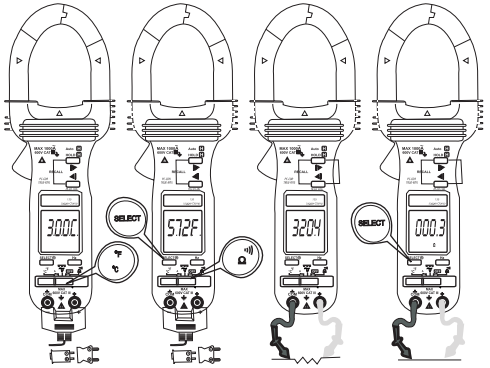
Set the slide-switch function-selector to the $\tilde{A}$ position. Input are made through the clamp jaws for non-invasive ACA current measurements.

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.

•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.



Temperature function

Set the slide-switch function-selector to the °C/°F position. Default at last selected function. Press **SELECT** button to toggle between °C and °F measurement functions. Be sure to insert the banana plug type-K temperature bead probe at correct **+ -** polarities.

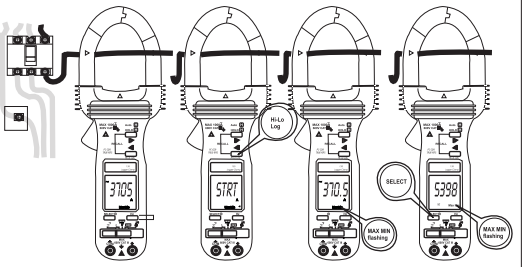
Ω / functions

Set the slide-switch function-selector to the **Ω** / function position. Default at last selected function. Press SELECT button to toggle between **Ω** and measurement functions.

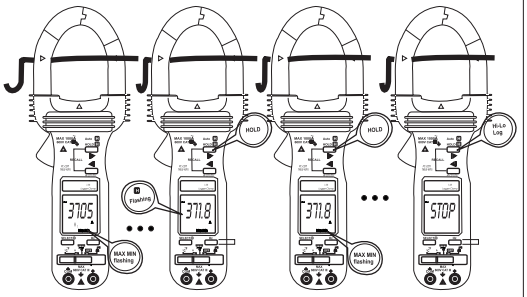
Hi-Lo Logging mode

Hi-Lo Logging is an innovation feature. It minimizes product cost for maximum monitoring speed and period making field monitoring simpler and more affordable. Hi-Lo Logging captures the most

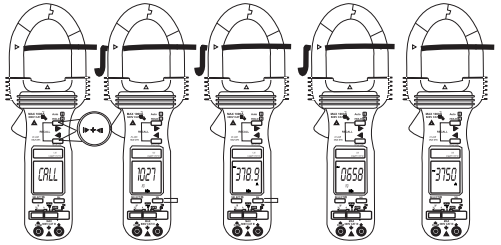
important surges (Hi) & sages (Lo) on intervals of every one-minute. That is, the meter uses its highest update rate to compare and capture the highest and lowest readings on every one-minute time interval. It can log up to 5400 pairs of Hi/Lo readings and thus 5400 minutes of total logging period.



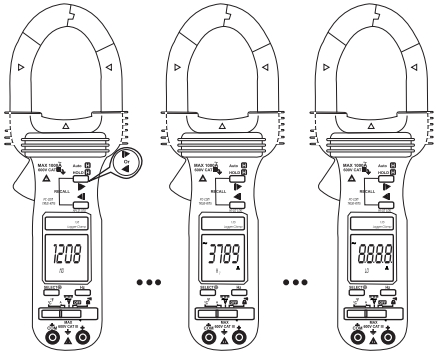
Press and hold the **"Hi-LO Log"** button for one second or more to start "Strt" a new Hi-Lo Logging session. All previously logged data is erased! Annunciators " Max Min" lashes and real-time measurement readings are being displayed. Press **SELECT** button momentarily toggles to display logged data item number (number of one-minute time intervals). " no" display in the secondary display.



Press the HOLD button momentarily to pause. The LCD annunciator " H " flashes. Press the **HOLD** button momentarily again to continue. Press and hold the **" Hi-Lo Log"** button for one second or more again to stop "STOP" and end the Hi-Lo Logging session. The meter can now be switched off.



To recall, switch on the meter, then press the forward " ▶▌" and backward "◀▌ "arrow buttons at the same time to recall "CALL" the logged data. The meter displays in turn the absolute maximum item number, absolute maximum reading , absolute minimum item number, and then absolute minimum reading (of the whole logging period).



Press the forward " ▶▌" (or backward "◀▌") arrow buttons momentarily to read the next logged data item. The meter displays in turn the one-minute item interval number "NO" (the count of one-minute time intervals), Hi-reading " Hi " (the highest reading), and then

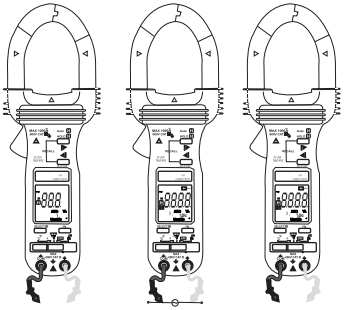
Lo-reading "Lo" (the lowest reading) of that one-minute item interval. Press-and-hold the button can quickly scroll the logged items. The meter gives short beeps when the last (or the first) item is reached.

Note :

1. When the meter memory is full or the meter battery is low, the meter will stop (end) the Hi-Lo logging session and go back to the normal measuring mode.

2. The data is stored to the non-volatile memory shortly after every one-minute item interval to minimize data safety. However, the end-of-data sign can be stored only after the Hi-Lo logging session is ended with a session stop :"STOP". Therefore, always stop "STOP" the Hi-Lo logging properly before sliding the slide-switch function-selector to the next function position.

3. After the Hi-Lo logging session is ended, you can switch off the meter for transportation, storage. Or even battery changing. The logged data can also be download to PC computers through the optional purchase PC interface kit. Also see RS232 PC computer interface capabilities section.



Auto H Feature
The **Auto H** (Automatic-Hold) feature automatically captures and displays significant stable readings. Press and hold the **Auto H** button for one second or more to toggle to the Auto H mode. The LCD annunciators "**Auto** "& H turn on.

WARNING
To avoid electric shock hazard, do not use the Auto H (Automatic-Hold) mode to determine if a circuit is live. Unstable readings will not be captured and displayed.

HOLD H feature
The Hold feature freezes the display for later viewing. Press the **HOLD H** button momentarily to toggle to the Hold mode. The annunciator " H " turns on.

Display Backlight
Press the **SELECT** button for 1 second or more to toggle the display backlight on and off.

Auto Power Off (APO)
The meter turns off after approximately 16 minutes of neither switch nor button activity. To wake up the meter from APO, slide the function-selector to other position and back on again. Always turn the function-selector to OFF when the meter is not in use.

Disabling Auto-Power-Off (APO)
Press-and-hold the **HOLD** button while sliding the function-selector to a (designated) function-selector position. This disables the Auto-Power-Off feature of the functions on that particular function-selector position. The LCD display "SLP " & "OFF " to confirm activation right after the HOLD button is released. Slide the function-selector to any other Positions afterwards resumes Auto-Power-off features

RS232 PC computer interface capabilities
The instrument equips with an optical isolated data output port at the bottom case near the battery compartment. Optional purchase PC interface Kit (including Optical Adapter Back, Cable & Software CD) is required to connect the meter to PC computer thru RS232 protocol. The RS232 Data Recording System software equips with a digital meter, an analog meter, a comparator meter, and a data Graphical recorder. Refer to the README file that comes with the interface kit for further details.

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 (cause by lighting or switching surge to the system) by accident or abnormal conditions of operation, the series a 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

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

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.

MUMBAI

TEST CERTIFICATE

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 135**

SERIAL NO. _____

DATE: _____

ISO 9001
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.

KUSAM-MECO

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

All transaction are subject to Mumbai Jurisdiction.

KUSAM-MECO

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