

# USER MANUAL

## MW3366

600A  
TRMS AC+DC  
CLAMP METER

**Sefram**



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## 1) SAFETY

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

Observe proper safety precautions when working with voltages above 30 Vrms, 42.4 Vpeak or 60 VDC. These voltage levels pose a potential shock hazard to the user. 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 probe assembly, where applicable) that indicate the limits of safe access of the hand-held parts during measurements. Inspect lead wires, connectors, and probes for damaged insulation or exposed metal periodically. If any defects are found, replace them immediately. Only use the test probe assembly provided with the meter or a UL Listed test probe assembly to the same meter ratings or better.











Optional offer premium test probe assembly using silicone lead wire insulation, at agent's discretion, is equipped with white inner insulation layers as wear indicators. Replace them immediately if any of the white layers has become visible.

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

The meter meets IEC/EN/BSEN/CSA\_C22.2\_No./UL standards of 61010-1 Ed. 3.1 and 61010-2-032 Ed. 4.0 to Measurement Categories CAT III 600V and CAT IV 300V AC & DC

The accompanied test probe assembly meets IEC/EN/BSEN/CSA\_C22.2\_No./UL standards of 61010-031 Ed. 2.0 to the same meter ratings or better. The 61010-031 requires exposed conductive test probe tips to be  $\leq 4\text{mm}$  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.

## INTERNATIONAL SYMBOLS

	Marking of Electrical and Electronic Equipment (EEE). Do not dispose of this product as unsorted municipal waste. Contact a qualified recycler.
	Refer to the explanation in this Manual.
	Possibility of electric shock
	Earth (Ground)
	Meter protected throughout by Double Insulation or Reinforced insulation
	Fuse
	Direct Current (DC)
	Alternating Current (AC)
	Three-phase Alternating Current
	Application around and removal from hazardous live conductors is permitted

### 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.

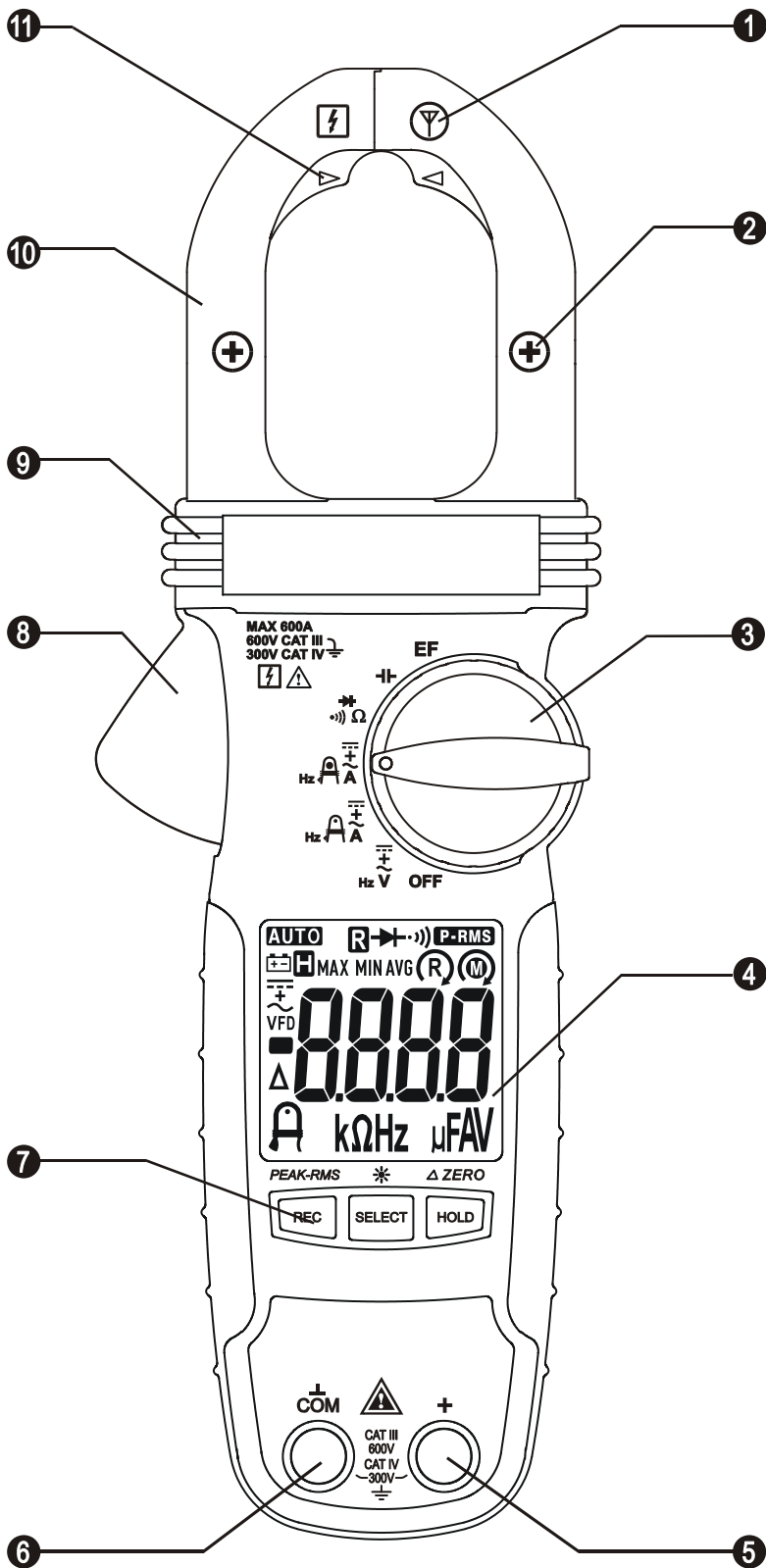
**Measurement Category III** is applicable to test and measuring circuits connected to the distribution part of the building's low-voltage MAINS installation. Examples are measurements on distribution boards (including secondary meters), circuit-breakers, wiring, including cables, bus-bars, junction 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.

## 2) EUROPEAN DIRECTIVES AND UK STATUTORY REQUIREMENTS

The instruments conform to EUROPEAN (CE) Low-Voltage Directive 2014/35/EU, Electromagnetic Compatibility Directive 2014/30/EU, and RoHS 2 Directive 2011/65/EU plus amendment Directive (EU) 2015/863. The instruments also conform to the UK (UKCA) Electrical Equipment (Safety) Regulations 2016, Electromagnetic Compatibility Regulations 2016, and The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012.

### 3) PRODUCT DESCRIPTION



1) Antenna area for Non-Contact EF-Detection

2) Jaw center indicator (with DCA polarity), at where best current accuracy is specified

3) Rotary Selector to turn the power ON/OFF and Select a function

4) 3-5/6 digits 6000 counts numeric LCD display

5) Input Jack for all functions EXCEPT non-invasive DCA, DC+ACA, or ACA current functions

6) Common (Ground reference) Input Jack for all functions EXCEPT non-invasive DCA, DC+ACA, or ACA current functions

7) Push-buttons for special functions & features.

8) Jaw trigger for opening the clamp jaw

9) Hand/Finger Barrier to indicate the limits of safe access of the meter

10) Clamp Jaw for DC or AC current magnetic field pick up

11) Additional center indicator for AmpTip™ Low-current function,

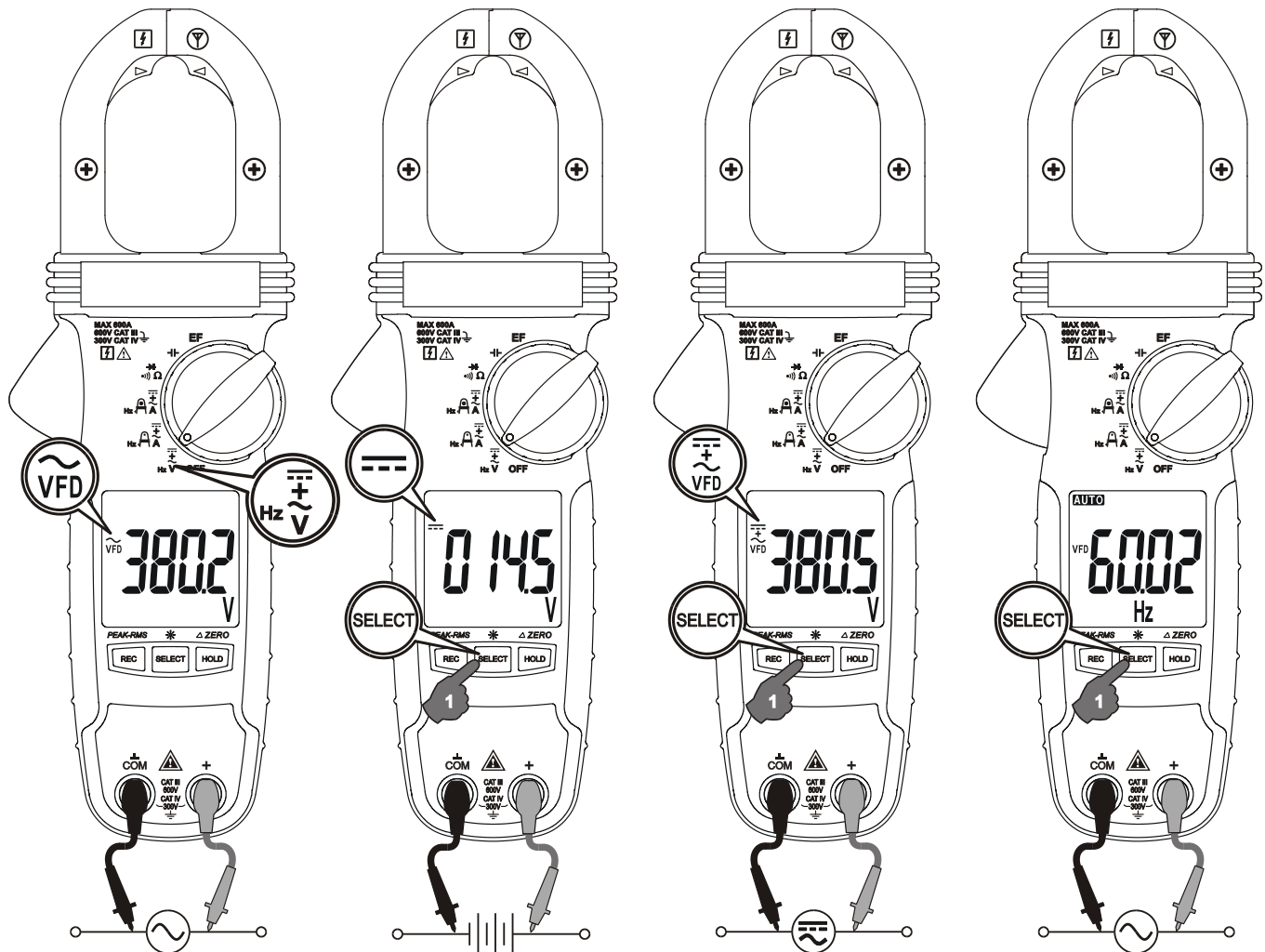
at where best AmpTip™ current accuracy is specified

## 4) OPERATION

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

### ACV, DCV, DC+ACV, & Line-level Hz functions

Inputs are made through the test lead terminals **COM/+**. Defaults at **ACV\*** Function. Press **SELECT** button momentarily to select **DCV**, **DC+ACV** or **Line-level Hz** function in sequence.

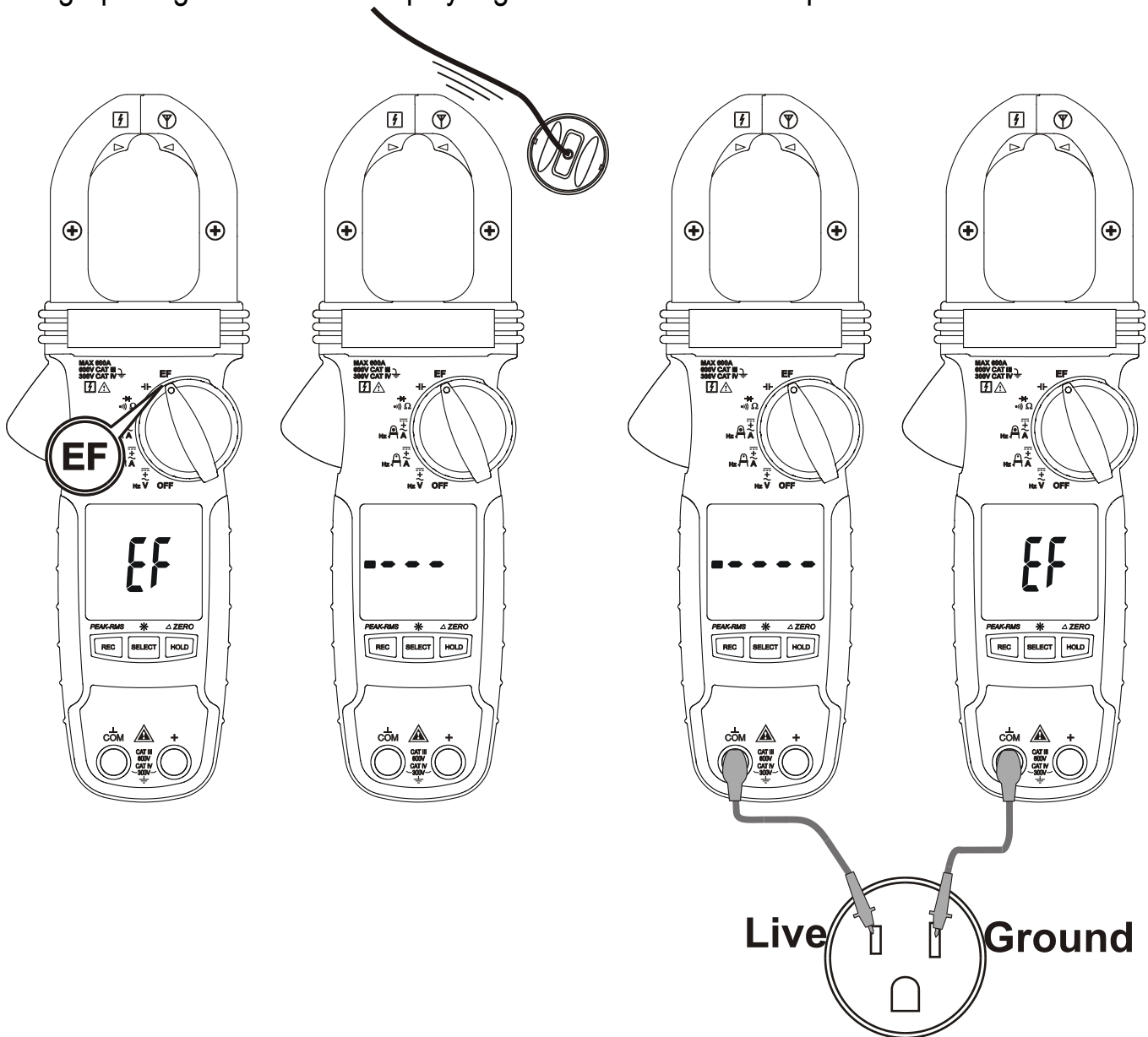


Note:

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

## Electric Field EF-Detection

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



- **Non-Contact EF-Detection:** An antenna is located along the top-right end of the stationary clamp jaw, which detects electric field surrounds energized conductors. It is ideal for tracing live wiring connections, locating wiring breakage and to distinguish between live or earth connections.

- **Probe-Contact EF-Detection:** For more precise indication of live wires, such as distinguishing between Live and Ground connections, use one single probe to test via terminal **COM** for direct contact EF-Detection with best sensitivity.

**NOTES for Non-Invasive (Clamp-on) Current Measurements:****NOTE**

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

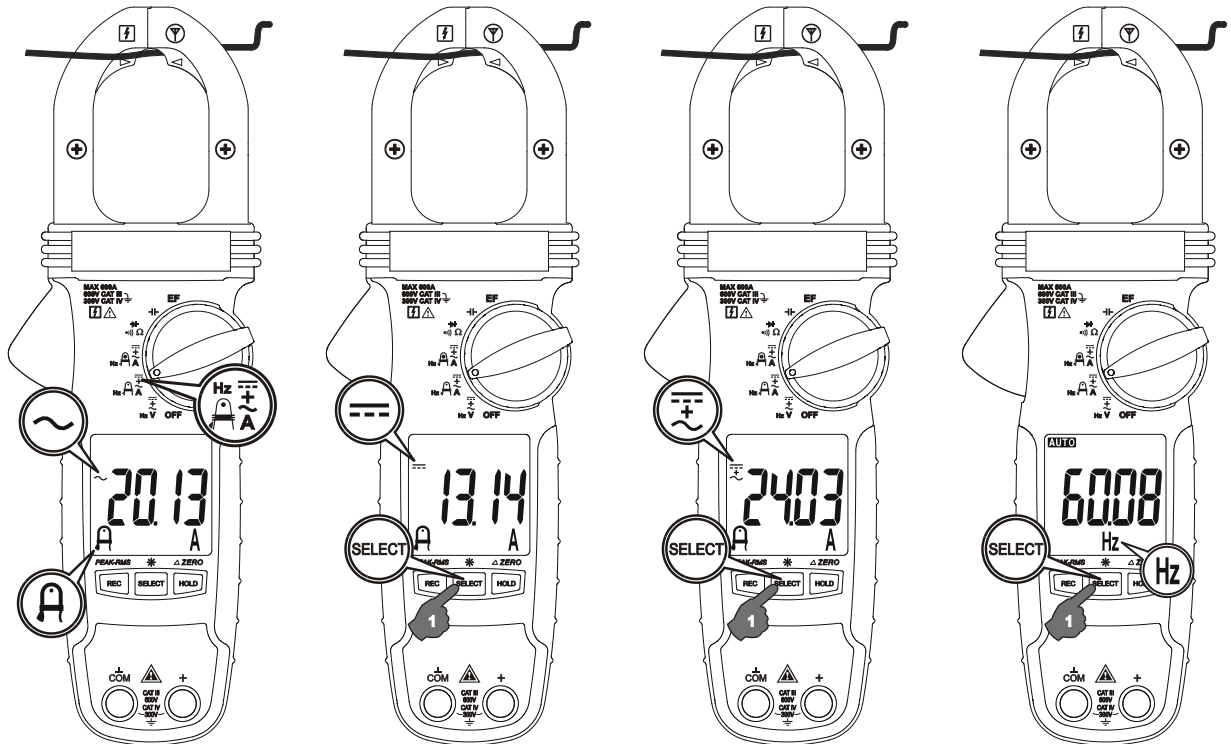
*Adjacent current-carrying devices such as transformers, motors and conductor wires may affect measurement accuracy. Keep the jaws away from them as much as possible to minimize influence.*

**NOTE**

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

## Non-Invasive AmpTip™ Low-Current Functions: ACA, DCA, DC+ACA & Hz

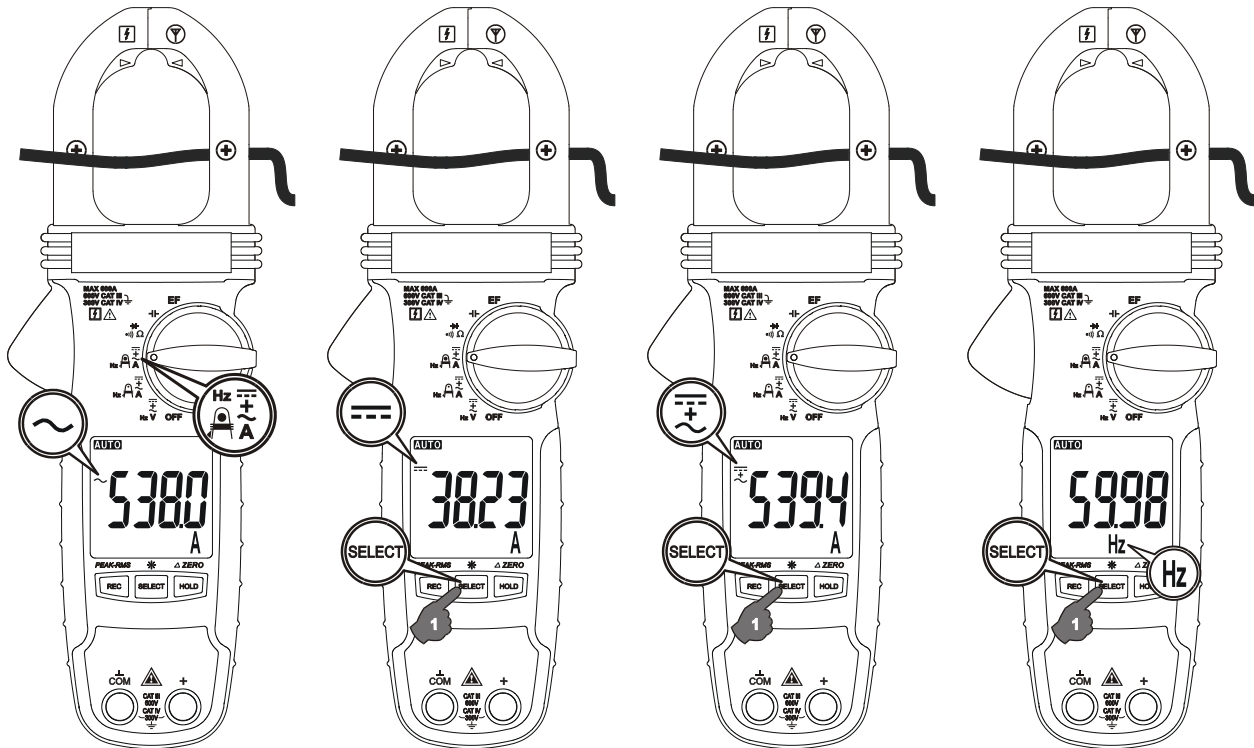
Input is made via the clamp jaws with best accuracy specified near the jaw tip area for small conductors low-current measurements. Defaults at **ACA** function. Press **SELECT** button momentarily to select the subject functions in sequence.



## Non-Invasive Regular Current Functions: ACA, DCA, DC+ACA, & Hz

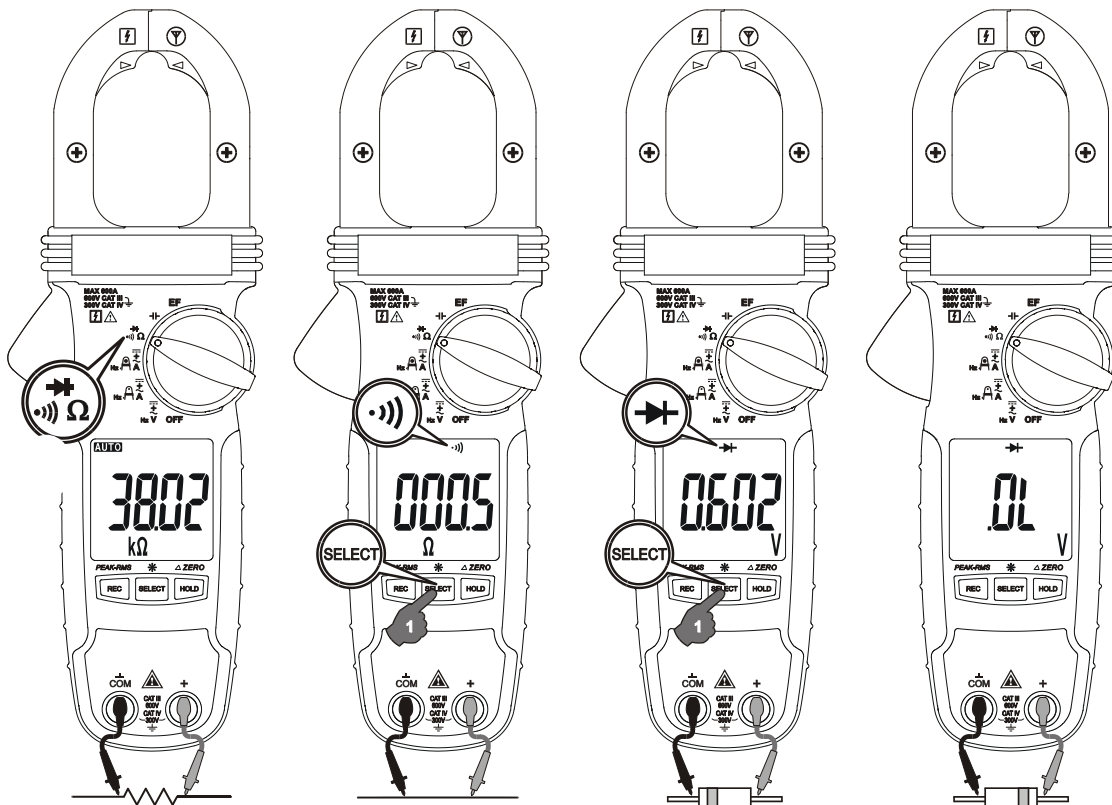
Input is made via the clamp jaws with best accuracy specified at the jaw center for regular current measurements. Press **SELECT** button momentarily to select the subject functions in sequence.





## Ω Resistance, ∩)) Continuity, & → Diode functions

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



**NOTE**

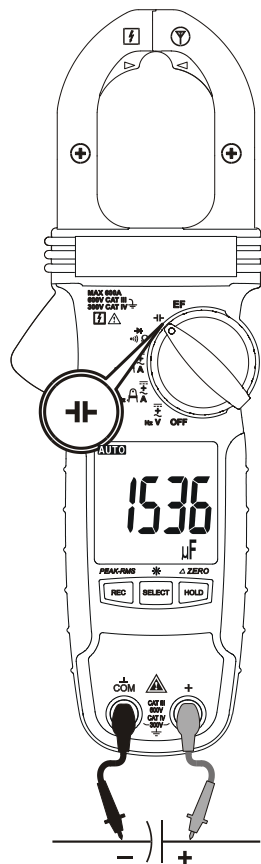
When using Diode test function, normal forward voltage drop (forward biased) for a good silicon diode is between 0.400V to 0.900V. A reading higher than that indicates a leaky diode (defective). A zero reading indicates a shorted diode (defective). An OL indicates an open diode (defective). Reverse the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

**NOTE**

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

**⚡ Capacitance functions**

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

**NOTE**

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

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

### Hold

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

### Record mode

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

### Relative-Zero ( $\Delta$ ZERO) mode

Relative-Zero allows the user to offset the meter consecutive measurements with the main display displaying reading as the reference value. LCD “ $\Delta$ ” turns on. Press the

$\Delta$  ZERO (**HOLD**) button for one second or more to toggle Relative-Zero mode.

**DC-Zero mode** is set instead of Relative-Zero mode, however, to only offset the non-zero DCA residuals caused by magnetic hysteresis of the jaws as in **DCA & DC+ACA** functions. Press the  $\Delta$  ZERO (**HOLD**) button for one second or more to activate/ re-activate this mode. Apply this mode before making any single DCA or DC+ACA measurement for best measuring accuracy. The meter shows “**dc\_0**” shortly to confirm activation before continuing measurements. The beeper will sound 3 short beeps, however, to warn for null activation if the residual is beyond a reasonable hysteresis reading of -5 to 5 DCA.

### 80ms PEAK-RMS mode

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

### Backlight LCD display

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

## **Intelligent Auto-Power-Off (APO)**

The Auto-Power-off (APO) mode 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

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.

## **5) MAINTENANCE**

### **NOTE**

*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 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 LIMITED WARRANTY section for obtaining warranty or repairing service.

### **Accuracy and Calibration**

Accuracy is specified for a period of one year after calibration. Periodic calibration at intervals of one year is recommended to maintain meter accuracy. Refer to the LIMITED WARRANTY section for obtaining calibration, repairing or warranty service.

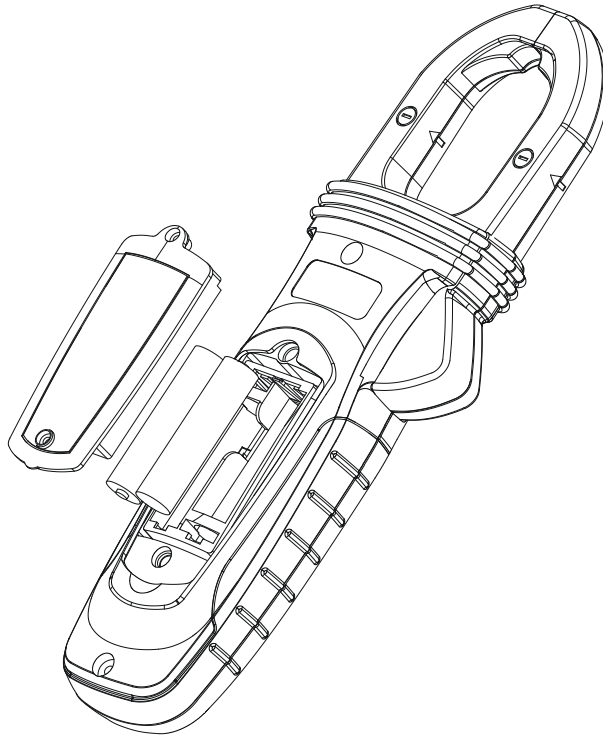
## Cleaning and Storage

Periodically wipe the case with a damp cloth and mild detergent; do not use abrasives or solvents. If the meter is not to be used for periods of longer than 60 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.



## GENERAL SPECIFICATIONS

**Display:** 3-5/6 digits 6000 counts.

**Polarity:** Automatic

**Update Rate:** 5 per second nominal.

**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

**Pollution degree:** 2

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

**Altitude:** Operating below 2000m

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

**Sensing:** True RMS

**Safety:** Certified per IEC/EN/CSA\_C22.2\_No./UL standards: 61010-1 Ed. 3.1, 61010-2-032 Ed. 4.0, & 61010-031 Ed. 2.0 to Measurement Categories CAT III 600V and CAT IV 300V ac & dc

**Transient Protection:** 6.0kV (1.2/50 $\mu$ s surge)

**Overload Protections:**

Current & Hz functions via jaws: 600ADC/AAC rms at <400Hz

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

Other functions via terminals: 600VDC/VAC rms

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

DCA and DC+ACA Functions, in an RF field of 1V/m:

Total Accuracy = Specified Accuracy + 20 digits at around 405MHz

DC $\mu$ A and Ohm Functions, in an RF field of 1V/m:

Total Accuracy = Specified Accuracy + 25 digits

Other Functions, in an RF field of 3V/m:

Total Accuracy = Specified Accuracy + 20 digits

**Power Supply:** 1.5V AAA Size battery X 2

**Power Consumption:** Typical 13mA for Current functions

**Low Battery:**

Below approx. 2.85V for Capacitance & Hz

Below approx. 2.5V for other functions

**APO Timing:** Idle for 32 minutes

**APO Consumption:** 5 $\mu$ A typical

**Dimension (LxWxH):** 223 x 76 x 37mm

**Weight:** 234g

**Jaw opening & Conductor diameter:** 35mm max

**Accessories:** Test lead set, User's manual, Soft carrying pouch,

**Special Features:** AmpTip™ low-current range; MAX/MIN/AVG Recording mode; Display Hold; EF-Detection (NCV); Backlighted LCD; 80ms Peak-RMS mode for inrush current; Relative-Zero

## Electrical Specifications

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

Maximum Crest Factor < 2.5: 1 at full scale & < 5: 1 at half scale or otherwise specified, and with frequency spectrum not exceeding the specified frequency bandwidth for non-sinusoidal waveforms.

**DC Voltage**

RANGE	Accuracy
600.0V	1.0% + 5d

Input Impedance: 10M $\Omega$ , 100 pF nominal

**AC Voltage (with Digital Low-Pass Filter)**

RANGE	Accuracy
50Hz ~ 60Hz	
600.0V	1.0% + 5d

Input Impedance: 10M $\Omega$ , 100 pF nominal

**DC+AC Voltage (with Digital Low-Pass Filter)**

RANGE	Accuracy
DC, 50Hz ~ 60Hz	
600.0V	1.2% + 7d

Input Impedance: 10M $\Omega$ , 100 pF nominal

**PEAK-rms (ACV & ACA)**

Response: 80ms to > 90%

**Audible Continuity Tester**

Audible Threshold: At between 10 $\Omega$  and 250 $\Omega$

Response time: 32ms approx.

**Ohm**

RANGE	Accuracy
600.0 $\Omega$ , 6.000K $\Omega$ , 60.00K $\Omega$	1.0% + 5d

Open Circuit Voltage: 1.0VDC typical

**Capacitance**

RANGE	Accuracy <sup>1)</sup>
200.0 $\mu$ F, 2500 $\mu$ F	2.0% + 4d

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

**Diode Tester**

RANGE	Accuracy
2.000V	1.5% + 5d

Test Current: 0.3mA typically

Open Circuit Voltage: < 3.5VDC typically

**AmpTip™ clamp-on ACA**

RANGE	Accuracy <sup>1) 2) 3) 4)</sup>
50Hz ~ 60Hz	
60.00A	1.5% + 5d

<sup>1)</sup>Induced error from adjacent current-carrying conductor:

<0.01A/A for Models

<sup>2)</sup>Specified with Relative Zero  $\Delta$  mode applied to offset the non-zero residual readings, if any

<sup>3)</sup>Add 10d to the specified accuracy @ < 4A

**AmpTip™ clamp-on DCA**

RANGE	Accuracy <sup>1) 2) 3)</sup>
60.00A	2.0% + 5d

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

<sup>2)</sup>Specified with DC-Zero mode applied to offset the non-zero residual readings, if any

<sup>3)</sup>Add 10d to the specified accuracy @ < 4A

**AmpTip™ clamp-on DC+ACA**

RANGE	Accuracy <sup>1) 2) 3)</sup>
DC, 50Hz ~ 60Hz	
60.00A	2.0% + 7d

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

<sup>2)</sup>Specified with DC-Zero mode applied to offset the non-zero residual readings, if any

<sup>3)</sup>Add 10d to the specified accuracy @ < 4A



**Regular Clamp-on ACA**

RANGE	Accuracy <sup>1) 2) 3)</sup>
50Hz ~ 100Hz	
60.00A <sup>4) 5)</sup> , 600.0A	1.8% + 5d
100Hz ~ 400Hz	
60.00A <sup>4) 5)</sup> , 600.0A	2.0% + 5d

<sup>1)</sup>Induced error from adjacent current-carrying conductor:

<0.01A/A for Models

<sup>2)</sup>, Maximum Crest Factor < 2: 1 at full scale & < 4 : 1 at half scale

<sup>4)</sup> add 10d to the specified accuracy @ < 9A

**Regular Clamp-on DCA**

RANGE	Accuracy <sup>1) 2)</sup>
60.00A <sup>3)</sup> , 600.0A	2.0% + 5d

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

<sup>2)</sup>Specified with DC-Zero mode applied to offset the non-zero residual readings, if any

<sup>3)</sup>Add 10d to the specified accuracy @ < 9A

**Regular Clamp-on DC+ACA**

RANGE	Accuracy <sup>1) 2)</sup>
DC, 50Hz ~ 100Hz	
60.00A <sup>3)</sup> , 600.0A	2.2% + 7d
100Hz ~ 400Hz	
60.00A <sup>3)</sup> , 600.0A	2.7% + 7d

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

<sup>2)</sup>Specified with DC-Zero mode applied to offset the non-zero residual readings, if any

<sup>3)</sup>Add 10d to the specified accuracy @ < 9A

**Hz Line Level Frequency**

Function	Sensitivity <sup>1)</sup> (Sine RMS)	Range
600V	50V	5.00Hz ~ 999.9Hz
60A (AmpTip™)	40A	50.00Hz ~ 400.0Hz
60A, 600A	40A	50.00Hz ~ 400.0Hz

Accuracy: 1%+5d

<sup>1)</sup>DC-bias, if any, not more than 50% of Sine RMS

## Non-Contact EF-Detection

Typical Voltage	Bar-Graph Indication
20V (tolerance: 10V ~ 36V)	-
55V (tolerance: 23V ~ 83V)	--
110V (tolerance: 59V ~ 165V)	---
220V (tolerance: 124V ~ 330V)	----
440V (tolerance: 250V ~ 600V)	-----

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

Detection Frequency: 50/60Hz

Detection Antenna: Inside the top side of the stationary jaw

Probe-Contact EF-Detection: For more precise indication of live wires, such as distinguishing between live and ground connections, use one single probe to test via terminal COM for direct contact EF-Detection with best sensitivity.

- NOTE -

## LIMITED WARRANTY

SEFRAM warrants to the original product purchaser that each product it manufactures will be free from defects in material and workmanship under normal use and service within a period of one year from the date of purchase. SEFRAM's warranty does not apply to accessories, fuses, fusible resistors, spark gaps, varistors, batteries or any product which, in SEFRAM's opinion, has been misused, altered, neglected, or damaged by accident or abnormal conditions of operation or handling.

To obtain warranty service, contact your nearest SEFRAM authorized agent or send the product, with proof of purchase and description of the difficulty, postage and insurance prepaid, to SEFRAM INSTRUMENTS. SEFRAM assumes no risk for damage in transit. SEFRAM will, at its option, repair or replace the defective product free of charge. However, if SEFRAM determines that the failure was caused by misused, altered, neglected, or damaged by accident or abnormal conditions of operation or handling, you will be billed for the repair.

THIS WARRANTY IS EXCLUSIVE AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE. SEFRAM WILL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES.

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SEFRAM  
32 Rue Edouard Martel, BP55, 42009  
Saint-Etienne - France  
04 77 59 01 01  
<http://www.sefram.com>



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