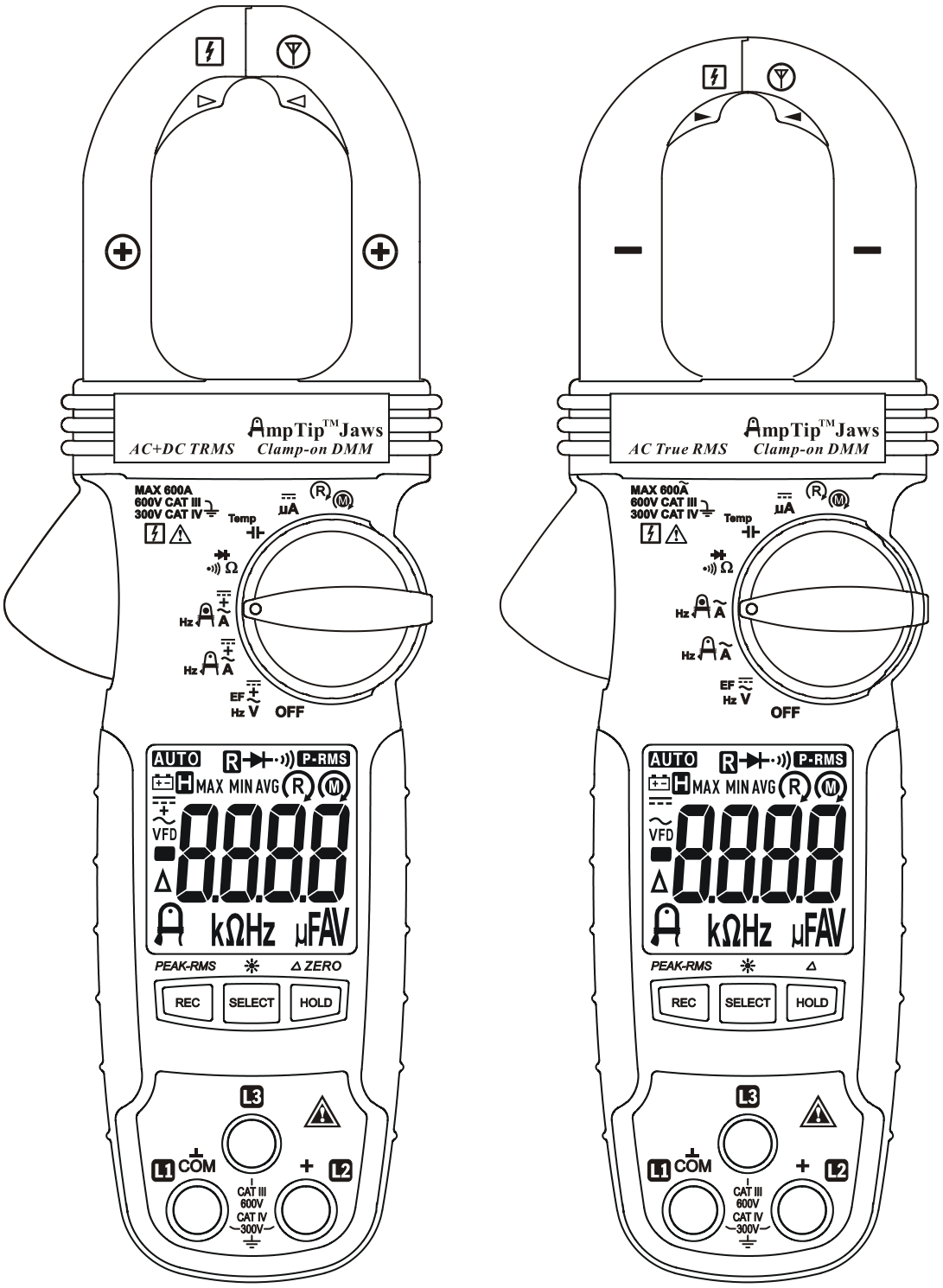


USER'S MANUAL

TIS E237 & E247

Clamp-on Multimeter Series

1) 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 protection rating, against the users, is double insulation per UL/IEC/EN61010-1 Ed. 3.0, IEC/EN61010-2-033 Ed. 1.0, CAN/CSA C22.2 No. 61010-1 Ed. 3.0, UL/IEC/EN61010-2-032 Ed. 3.0 & UL/IEC/EN61010-031 Ed. 1.1:

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

Per IEC61010-1 (2010) OVERVOLTAGE CATEGORY

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

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

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

TERMS IN THIS MANUAL

WARNING identifies conditions and actions that could result in serious injury or even death to the user.

CAUTION identifies conditions and actions that could cause damage or malfunction in the instrument.

WARNING

To reduce the risk of fire or electric shock, do not expose this product to rain or moisture. The meter is intended only for indoor use.

To avoid electrical shock hazard, observe the proper safety precautions when working

with voltages above 60 VDC or 30 VAC rms. These voltage levels pose a potential shock hazard to the user. Before and after hazardous voltage measurements, test the voltage function on a known source such as line voltage to determine proper meter functioning.

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

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

CAUTION

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

INTERNATIONAL ELECTRICAL SYMBOLS

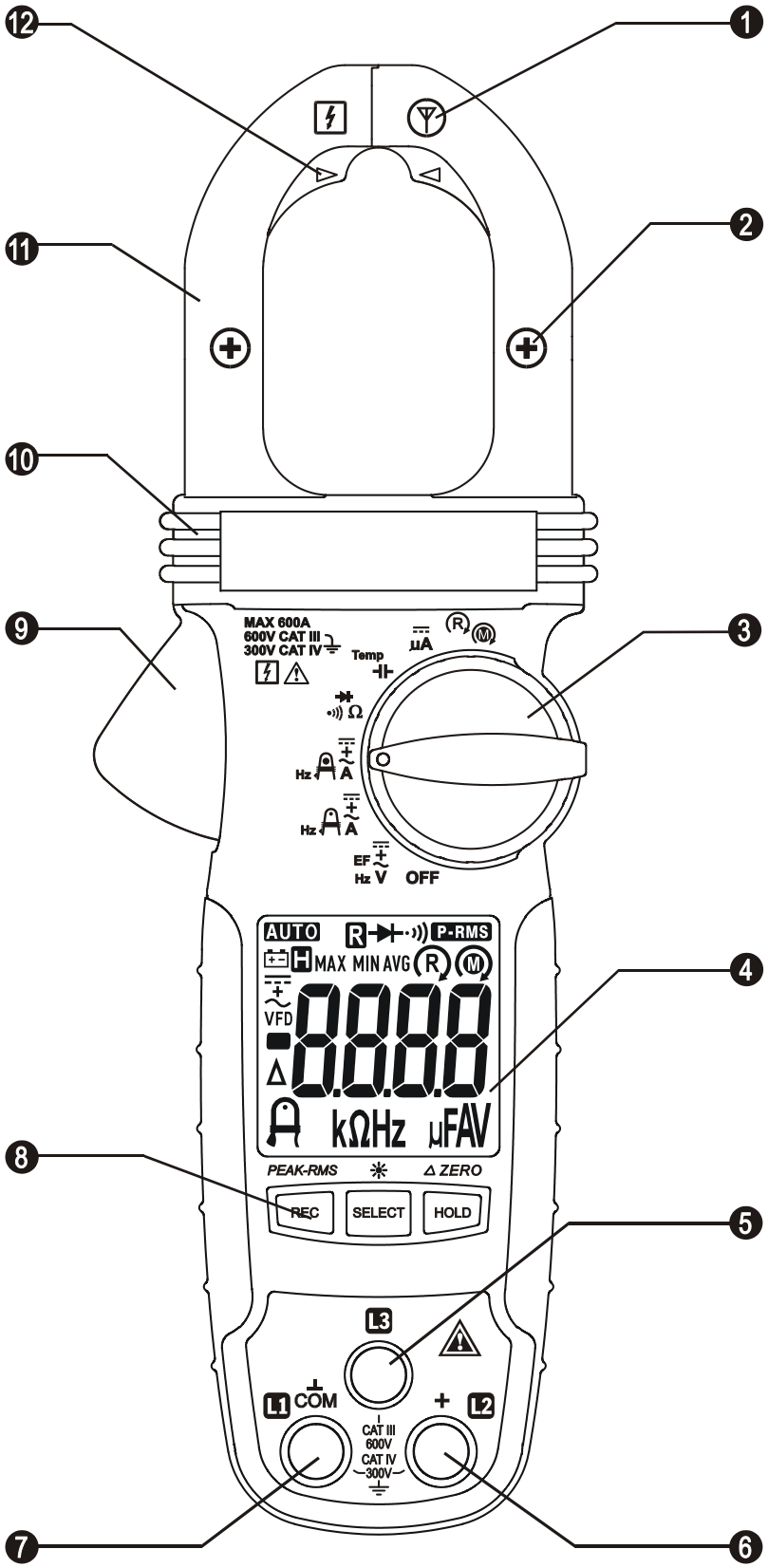
⚠	Caution ! Refer to the explanation in this Manual
⚠	Caution ! Risk of electric shock
⏚	Earth (Ground)
⧈	Double Insulation or Reinforced insulation
⎓	Fuse
~	AC--Alternating Current
⎓	DC--Direct Current
⚡	Application around and removal from hazardous live conductors is permitted

2) CENELEC Directives

The instruments conform to CENELEC Low-voltage directive 2014/35/EC, Electromagnetic compatibility directive 2014/30/EU and RoHS directive 2011/65/EU.

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) Antenna area for Non-Contact EF-Detection

2) Jaw center indicator (with DCA polarity for TIS E247 only), 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) Additional input Jack for Phase Rotation function only

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

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

8) Push-buttons for special functions & features.

9) Jaw trigger for opening the clamp jaw

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

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

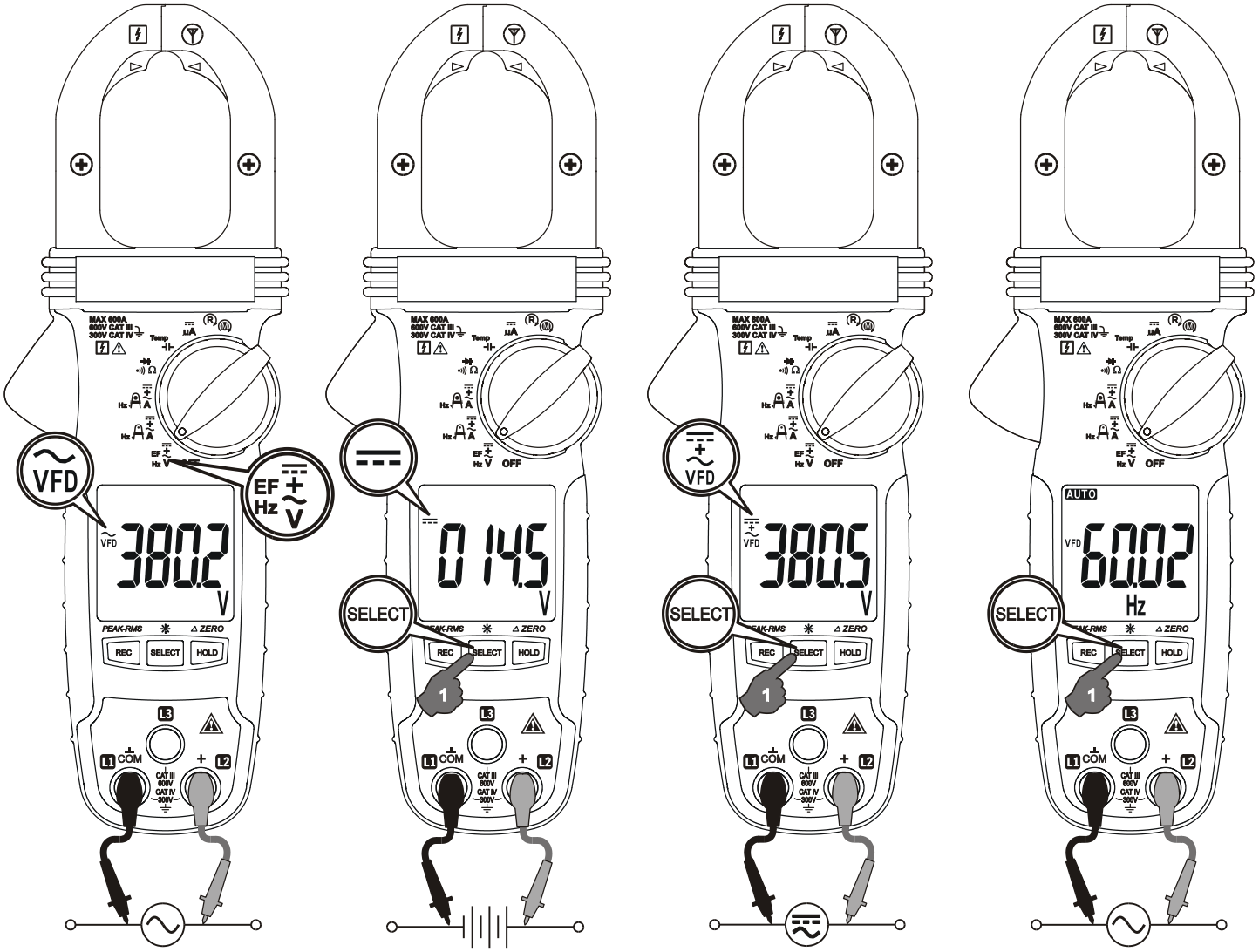
12) Additional center indicator for AmpTip™ Low-current function, at where best AmpTip™ current accuracy is specified

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 (Model TIS E247 only), Line-level Hz, & EF (NCV) functions

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

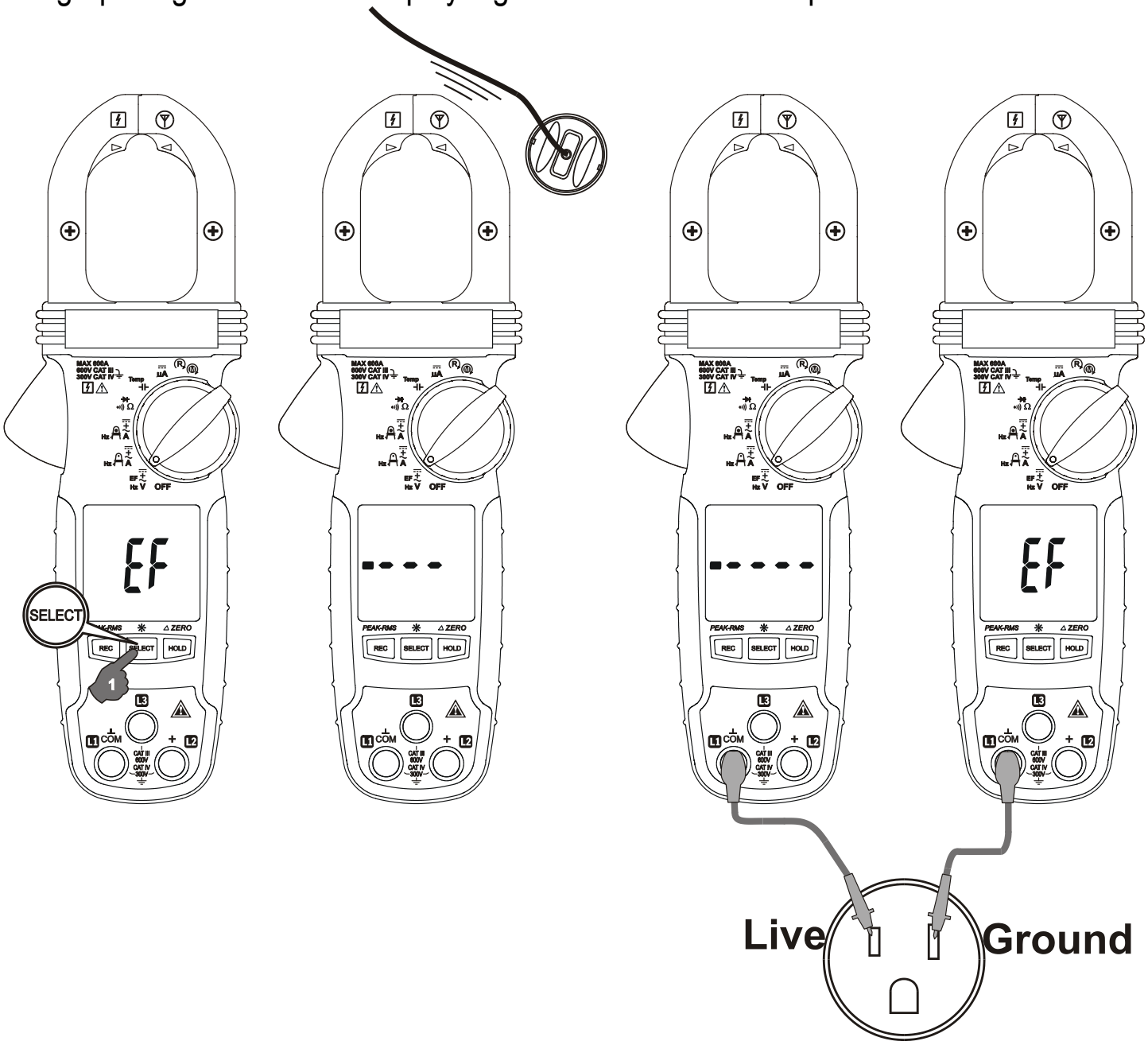


Note:

***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.

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

CAUTION

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

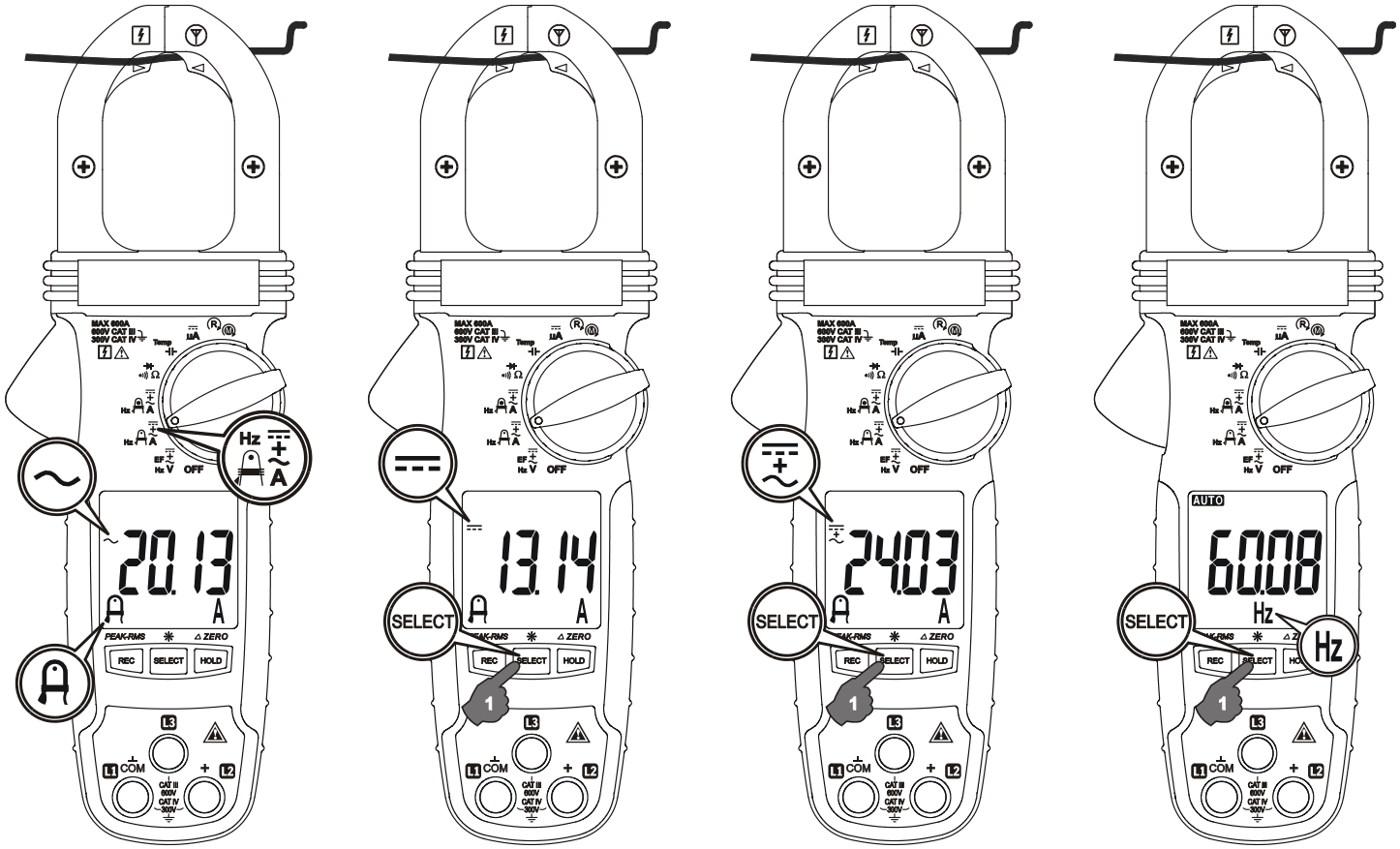
Adjacent current-carrying devices such as transformers, motors and conductor wires may affect measurement accuracy. Keep the jaws away from them as much as possible to minimize influence.

WARNING

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

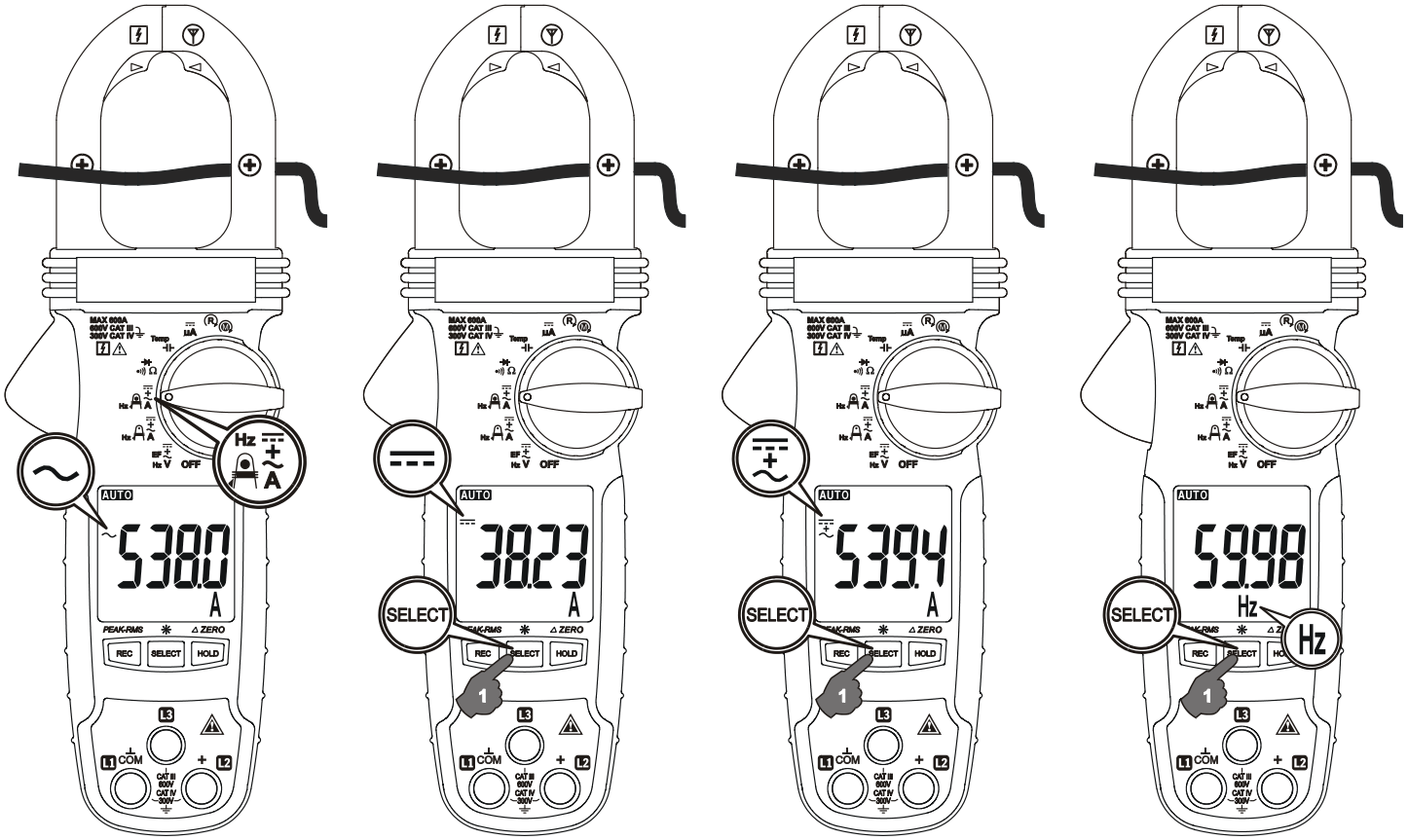
Non-Invasive AmpTip™ Low-Current Functions:
ACA, DCA (Model TIS E247 only), DC+ACA (Model TIS E247 only), & Hz

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.



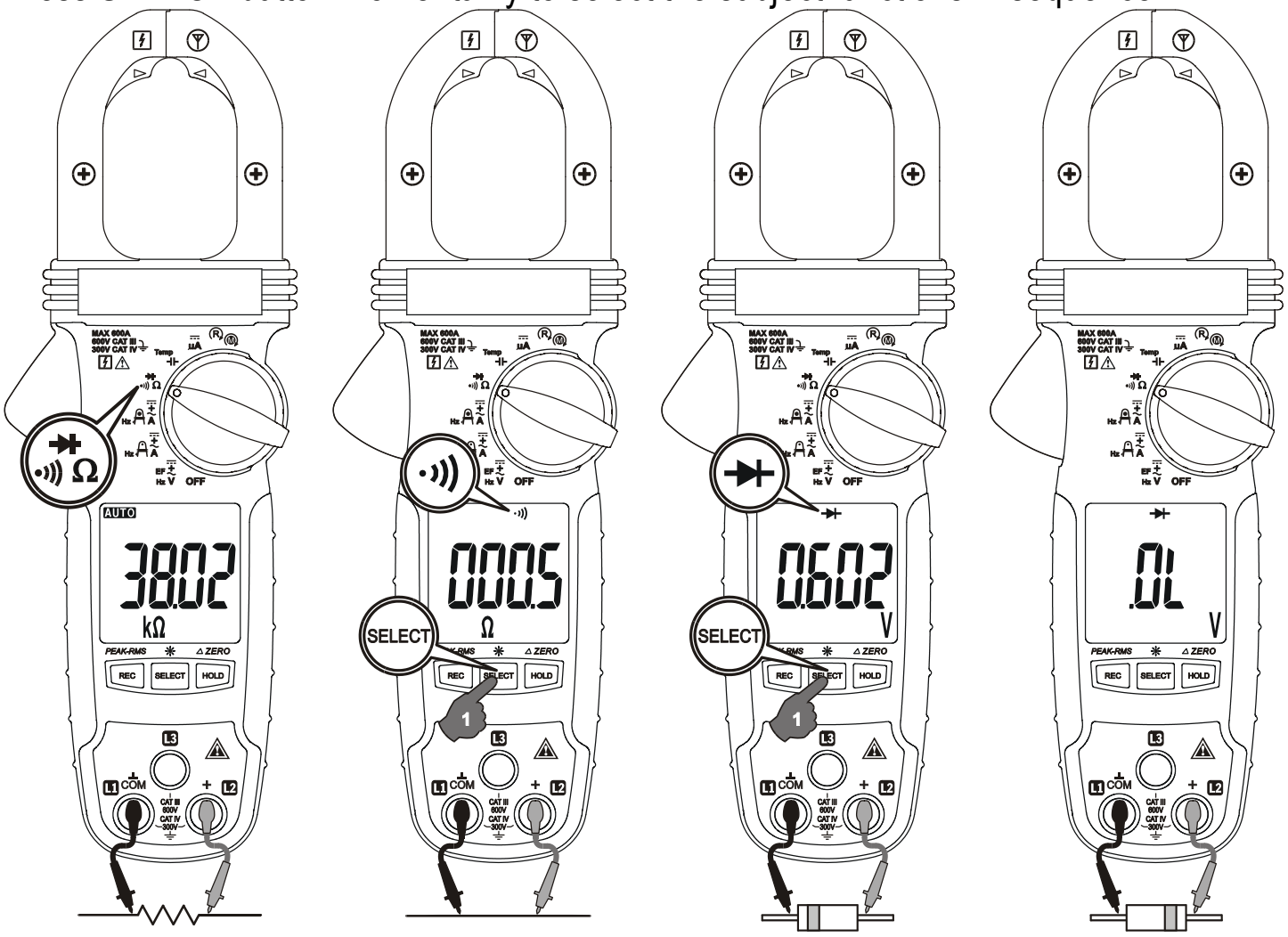
Non-Invasive Regular Current Functions:
ACA, DCA (Model TIS E247 only), DC+ACA (Model TIS E247 only), & Hz

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



Ω Resistance, •)) Continuity, & ⊣ Diode functions

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



Note

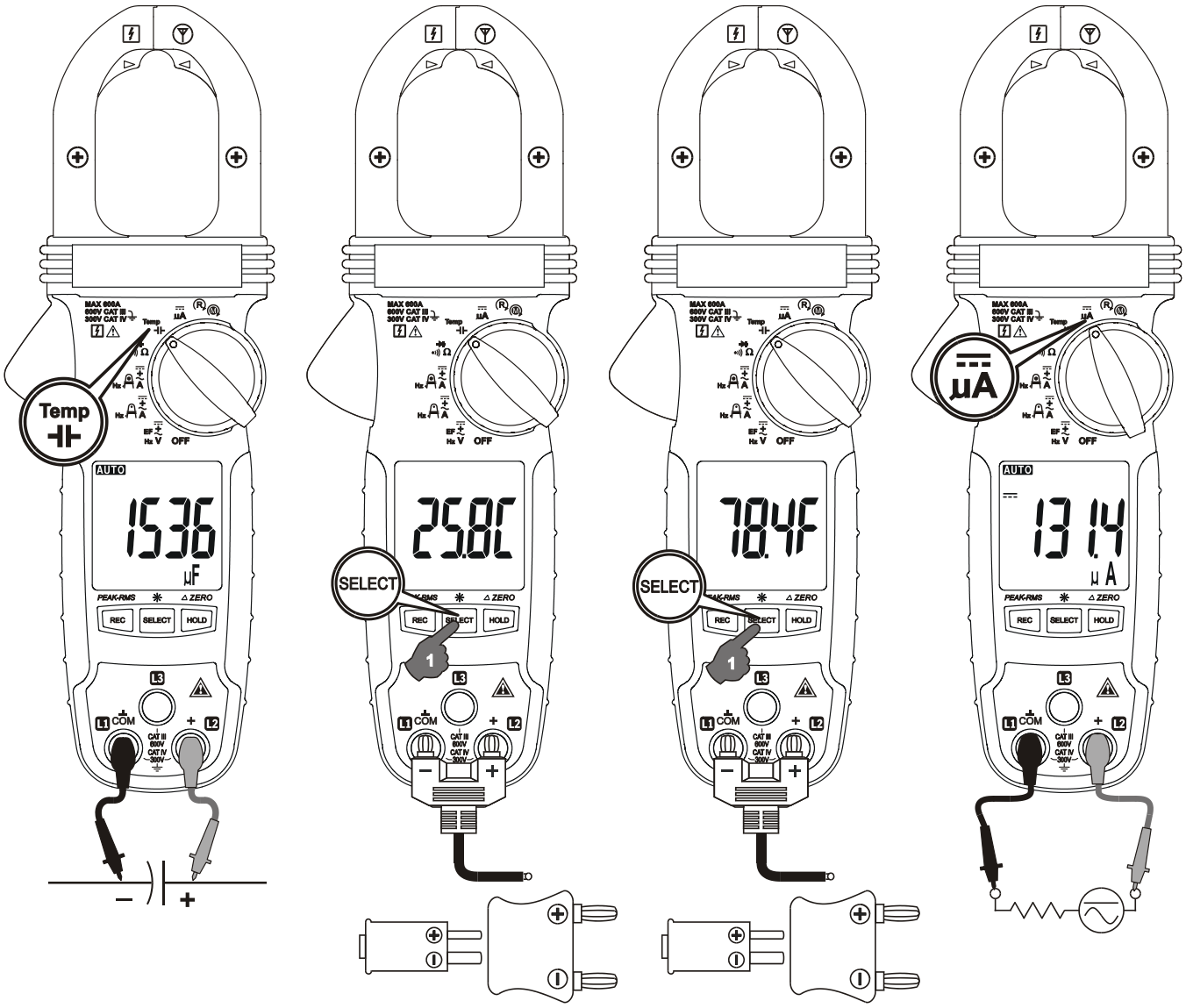
When using Diode test function, normal forward voltage drop (forward biased) for a good silicon diode is between 0.400V to 0.900V. A reading higher than that indicates a leaky diode (defective). A zero reading indicates a shorted diode (defective). An OL indicates an open diode (defective). Reverse the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

CAUTION

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

⊣⊢ Capacitance, & Temperature functions

Inputs are made through the test lead terminals **COM**/**+**. Defaults at **⊣⊢ Capacitance**. Press **SELECT** button momentarily to select **°C** (Celsius) or **°F** (Fahrenheit) in sequence.



Note

Be sure to insert the banana plug type-K temperature bead probe with correct **+ −** *polarities. You can also use a plug adapter (Optional purchase) with banana pins to type-K socket to adapt other type-K standard mini plug temperature probes.*

CAUTION

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

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

DCμA Current function

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

Application notes:

The **DCμA** function is designed especially for HVAC/R flame sensor applications. The 0.1μA 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 ^{o}F (74 ^{o}C) at photocell

For gas flames (Flame Rod):

- Ignition interference (A flame signal current difference with the ignition both on and 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 ^{o}F (316 ^{o}C) at the flame electrode insulator causing short to ground.

Ⓜ & Ⓡ 3-Phase Rotation function

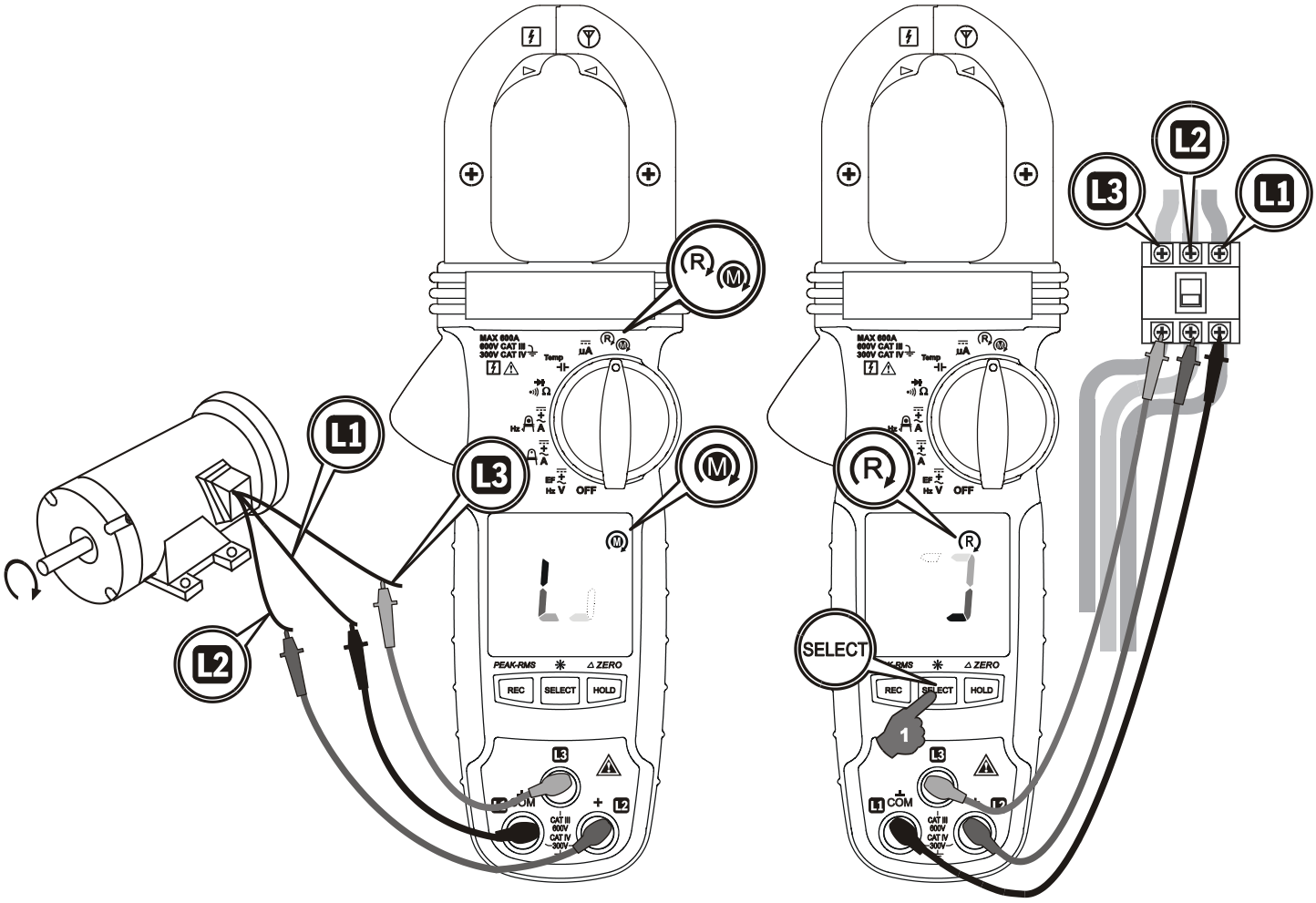
Inputs are made through the test lead terminals **L1**/**L2**/**L3**. Phase Rotation directions are indicated as symbolic movements by the LCD segments. Defaults at Ⓜ. Press **SELECT** button momentarily toggles between Ⓜ and Ⓡ modes.

Ⓜ : Hi-sensitivity mode, which detects relatively low signal outputs generated from motor spinning, for checking phase connections of Motors.

Ⓡ : Normal-sensitivity mode for identifying phase sequence of MAINS (electricity supply).

CAUTION

Proper Rotation detection relies on solid signal connection to all three test lead terminals simultaneously. Any single disconnection will lead to detection failure and may produce false indication. To verify signal connection and hence proper meter indication, swap any two connects (between the meter and the test points) to check for indication of reverse movement



Using the Hi-sensitivity mode Ⓜ for Motors:
Connect to the Motor as illustrated. Be sure the electricity supply is removed. From the perspective of looking down the shaft of the motor, speed-spin it clockwise to generate sufficient signal strength for proper meter detection. If the meter indicates a clockwise movement, the motor leads connected to L1, L2 and L3 of the meter are L1, L2 and L3 (also known as R, S and T), respectively. If the meter indicates a counter-clockwise movement, swap any two connects between the meter and motor. Then retest.

Using the Normal mode Ⓡ for MAINS (electricity supply):
Connect to the MAINS as illustrated. If the meter indicates a clockwise movement, the phases connected to L1, L2 and L3 of the meter are L1, L2 and L3 (also known as R, S and T), respectively. If the meter indicates a counter-clockwise movement, swap any two connects between the meter and phases. Then retest. Connect the above mentioned L1, L2 and L3 of a Motor and that of the MAINS respectively should get a clockwise motor movement.

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

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

Record mode
Press **REC** button momentarily to activate MAX/MIN/AVG recording mode. LCD "R" & "**MAX MIN AVG**" turn on. The meter beeps when new MAX (maximum) or MIN (minimum) reading is updated. AVG (Average) reading is calculated over time. Press the button momentarily to read the MAX, MIN and AVG 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 (Δ ZERO) mode
Relative-Zero allows the user to offset the meter consecutive measurements with the main display displaying reading as the reference value. LCD "Δ" turns on. Press the

Δ 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 **Δ ZERO** (**HOLD**) button for one second or more to activate/ re-activate this mode. Apply this mode before making any single DCA or DC+ACA measurement for best measuring accuracy. The meter shows "**dc_0**" shortly to confirm activation before continuing measurements. The beeper will sound 3 short beeps, however, to warn for null activation if the residual is beyond a reasonable hysteresis reading of -5 to 5 DCA.

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

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

Intelligent Auto-Power-Off (APO)
The Auto-Power-off (APO) mode 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

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 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

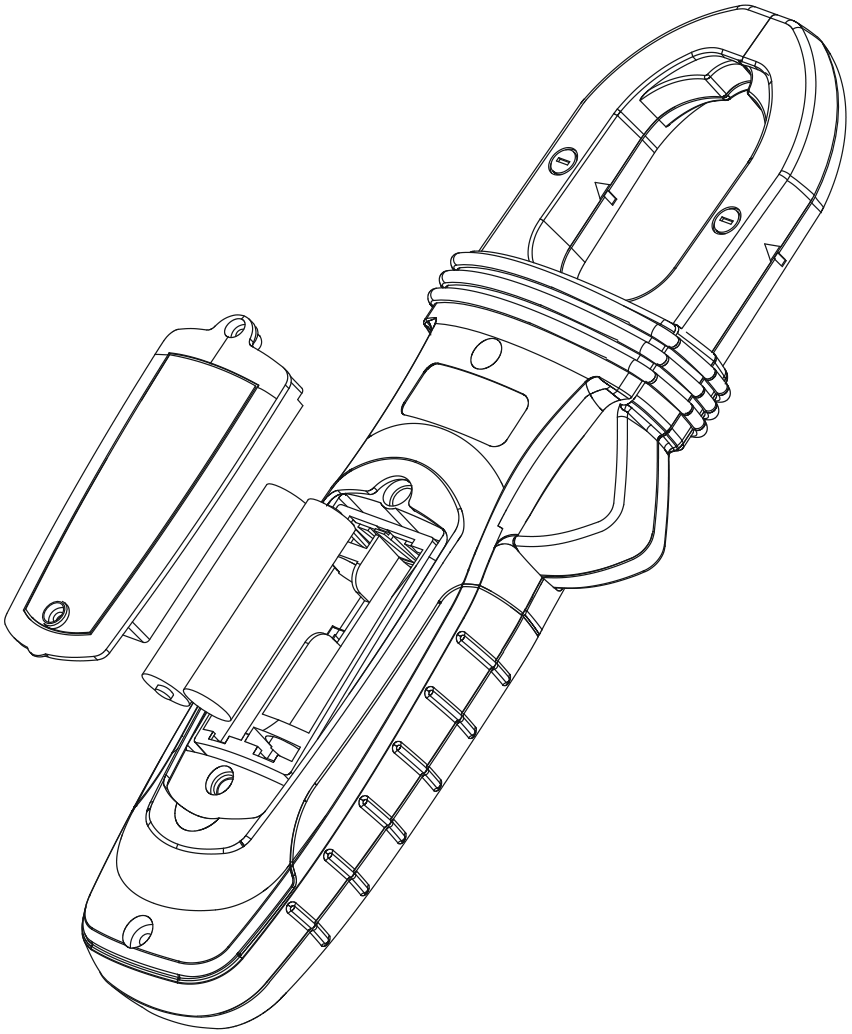
Accuracy is specified for a period of one year after calibration. Periodic calibration at intervals of one year is recommended to maintain meter accuracy. Refer to the LIMITED WARRANTY section for obtaining calibration, repairing or warranty service.

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: Double insulation per UL/IEC/EN61010-1 Ed. 3.0, IEC/EN61010-2-033 Ed. 1.0, CAN/CSA C22.2 No. 61010-1 Ed. 3.0, IEC/EN61010-2-032 Ed. 3.0 & IEC/EN61010-031 Ed. 1.1 to CAT III 600V and CAT IV 300V AC & DC

Transient Protection: 6.0kV (1.2/50μs 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 EN61326-1:2006 (EN55022, EN61000-3-2, EN61000-3-3, EN61000-4-2, EN61000-4-3, EN61000-4-4, , EN61000-4-5, EN61000-4-6, EN61000-4-8, EN61000-4-11):
DCA and DC+ACA Functions, in an RF field of 1V/m:
Total Accuracy = Specified Accuracy + 20 digits at around 405MHz
DCμA 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 4.3mA
Low Battery:
Below approx. 2.85V for Capacitance & Hz
Below approx. 2.5V for other functions
APO Timing: Idle for 32 minutes
APO Consumption: 5μA typical
Dimension (LxWxH): 217 x 76 x 37mm
Weight: 186gm
Jaw opening & Conductor diameter : 30mm max
Accessories: Test lead set, User's manual, Soft carrying pouch, banana plug K-type thermocouple, Alligator Clip set
Optional purchase accessories: Banana plug to type-K socket plug adaptor
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, 3-Phase Rotation detection

Electrical Specifications

Accuracy is ±(% 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 spectrum not exceeding the specified frequency bandwidth for non-sinusoidal waveforms.

DC Voltage

RANGE	Accuracy
600.0V	1.0% + 5d

Input Impedance: 10MΩ, 100 pF nominal

AC Voltage (with Digital Low-Pass Filter)

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

Input Impedance: 10MΩ, 100 pF nominal

DC+AC Voltage (with Digital Low-Pass Filter) (TIS E247 Only)

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

Input Impedance: 10MΩ, 100 pF nominal

PEAK-rms (ACV & ACA)

Response: 80ms to > 90%

Audible Continuity Tester

Audible Threshold: At between 10Ω and 250Ω
Response time: 32ms approx.

Ohm

RANGE	Accuracy
600.0Ω, 6.000KΩ, 60.00KΩ	1.0% + 5d

Open Circuit Voltage: 1.0VDC typical

Capacitance

RANGE	Accuracy [1]
200.0μF, 2500μF	2.0% + 4d

[1]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

DCμA

RANGE	Accuracy	Burden Voltage
200.0μA, 2000μA	1.0% + 5d	3.5mV/μA

Temperature

RANGE	Accuracy
-40.0 °C ~ 99.9 °C	1.0% + 0.8°C
100 °C ~ 400 °C	1.0% + 1°C
-40.0 °F ~ 211.8 °F	1.0% + 1.5°F
212 °F ~752 °F	1.0% + 2°F

K-type thermocouple range & accuracy not included

AmpTip™ clamp-on ACA

RANGE	Accuracy[1) 2) 3) 4)]
50Hz ~ 60Hz	
60.00A	1.5% + 5d

[1]Induced error from adjacent current-carrying conductor:
<0.06A/A
[2]Specified with Relative Zero Δ mode applied to offset the non-zero residual readings, if any
[3]Add 10d to the specified accuracy @ < 4A
[4]Unspecified @ <0.2A

AmpTip™ clamp-on DCA (TIS E247 only)

RANGE	Accuracy[1) 2) 3)]
60.00A	2.0% + 5d

1)Induced error from adjacent current-carrying conductor: <0.01A/A
2)Specified with DC-Zero mode applied to offset the non-zero residual readings, if any
3)Add 10d to the specified accuracy @ < 4A

AmpTip™ clamp-on DC+ACA (TIS E247 only)

RANGE	Accuracy[1) 2) 3)]
DC, 50Hz ~ 60Hz	
60.00A	2.0% + 7d

1)Induced error from adjacent current-carrying conductor: <0.01A/A
2)Specified with DC-Zero mode applied to offset the non-zero residual readings, if any
3)Add 10d to the specified accuracy @ < 4A

Regular Clamp-on ACA

RANGE	Accuracy [1) 2) 3)]
50Hz ~ 100Hz	
60.00A [4) 5)], 600.0A	1.8% + 5d
100Hz ~ 400Hz	
60.00A [4) 5)], 600.0A	2.0% + 5d

1)Induced error from adjacent current-carrying conductor:
<0.06A/A
2)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
3)Add 10d to specified accuracy @ < 6A, and unspecified @ < 0.2A

Regular Clamp-on DCA (TIS E247 only)

RANGE	Accuracy [1) 2)]
60.00A [3)] , 600.0A	2.0% + 5d

[1)]Induced error from adjacent current-carrying conductor: <0.01A/A
[2)]Specified with DC-Zero mode applied to offset the non-zero residual readings, if any
[3)]Add 10d to the specified accuracy @ < 9A

Regular Clamp-on DC+ACA (TIS E247 only)

RANGE	Accuracy [1) 2)]
DC, 50Hz ~ 100Hz	
60.00A [3)], 600.0A	2.2% + 7d
100Hz ~ 400Hz	
60.00A [3)], 600.0A	2.7% + 7d

[1)]Induced error from adjacent current-carrying conductor: < 0.01A/A
[2)]Specified with DC-Zero mode applied to offset the non-zero residual readings, if any
[3)]Add 10d to the specified accuracy @ < 9A

Hz Line Level Frequency

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

Ⓜ 3-Phase Rotation

Voltage Range：0.4V ~ 600V (sine wave only)
Frequency Range：3Hz ~ 400Hz

Ⓡ 3-Phase Rotation

Voltage Range：65V ~ 600V (sine wave only)
Frequency Range：35Hz ~ 400Hz

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.

LIMITED WARRANTY

TIS 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. TIS's warranty does not apply to accessories, fuses, fusible resistors, spark gaps, varistors, batteries or any product which, in TIS'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 TIS authorized agent or send the product, with proof of purchase and description of the difficulty, postage and insurance prepaid, to TEST INSTRUMENT SOLUTIONS. TIS assumes no risk for damage in transit. TIS will, at its option, repair or replace the defective product free of charge. However, if TIS 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.

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