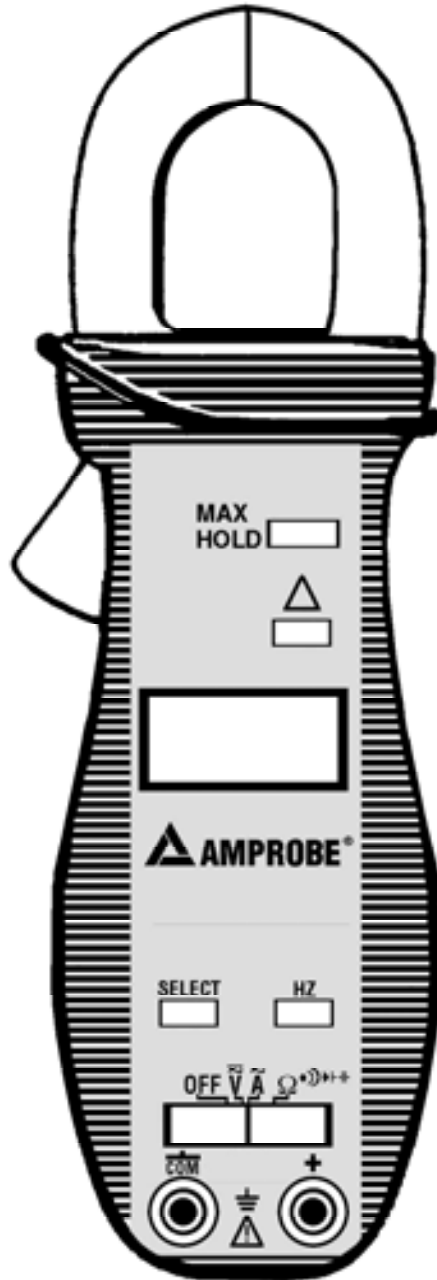


# INSTRUCTION MANUAL ACD-10 PRO & TRMS PRO



 **AMPROBE®**

Congratulations! You are now the owner of an AMPROBE Instrument. It has been quality crafted according to quality standards and contains quality components and workmanship. This instrument has been inspected for proper operation of all of its functions. It has been tested by qualified factory technicians according to the long-established standards of AMPROBE.

## **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 meets the requirements for double insulation to IEC61010-2-032 (1994), EN61010-2-032 (1995), UL3111-2-032 (1999).

### ***ACD-10 PRO/TRMS PRO***

Category II 600 Volts ac and dc.

Category III 300 Volts ac and dc.

### **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 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.








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 accidental short circuit of bare (uninsulated) hazardous live conductors or busbars, switch them off before insertion and removal of the current clamp jaws. Contact with the conductor could result in electric shock. Keep your hands/fingers behind the hand/finger barriers that indicate the limits of safe access of the meter and the test leads during measurement.

### **CAUTION**

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

## INTERNATIONAL ELECTRICAL SYMBOLS

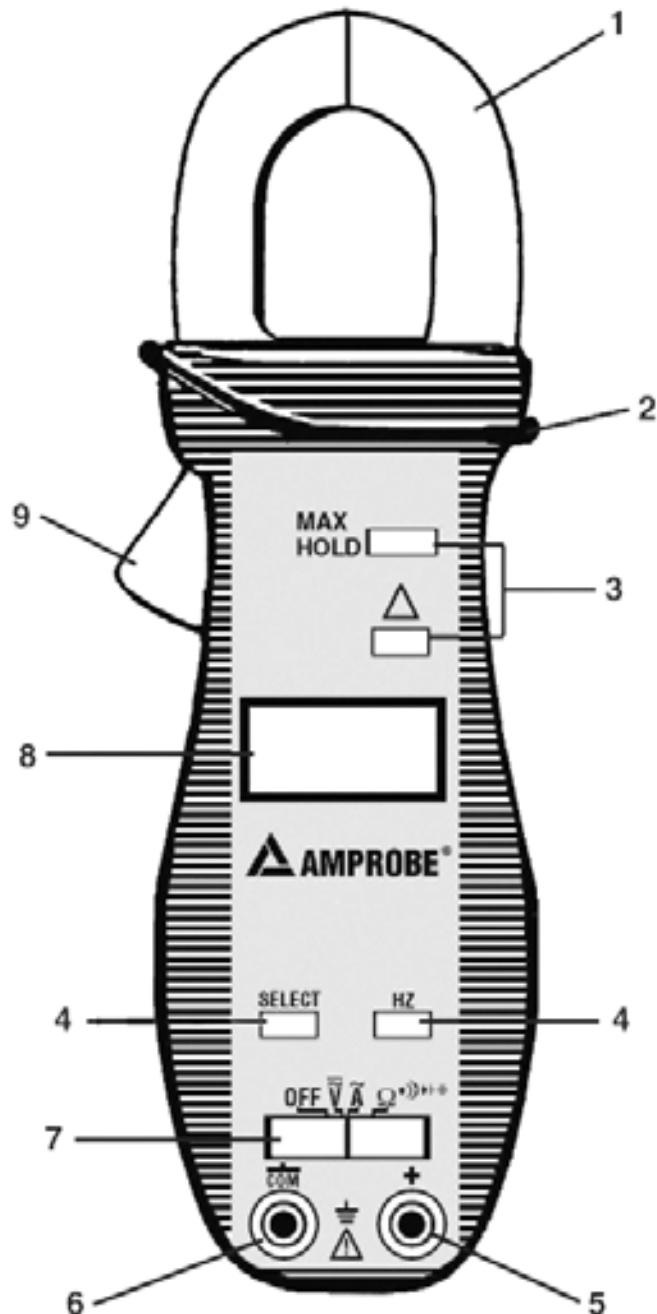
-  Caution ! Refer to the explanation in this Manual
-  Caution ! Risk of electric shock
-  Earth (Ground)
-  Double Insulation or Reinforced insulation
-  Fuse
-  AC--Alternating Current
-  DC--Direct Current

### 2) CENELEC Directives

The instruments conform to CENELEC Low-voltage directive 73/23/EEC and Electromagnetic compatibility directive 89/336/EEC.

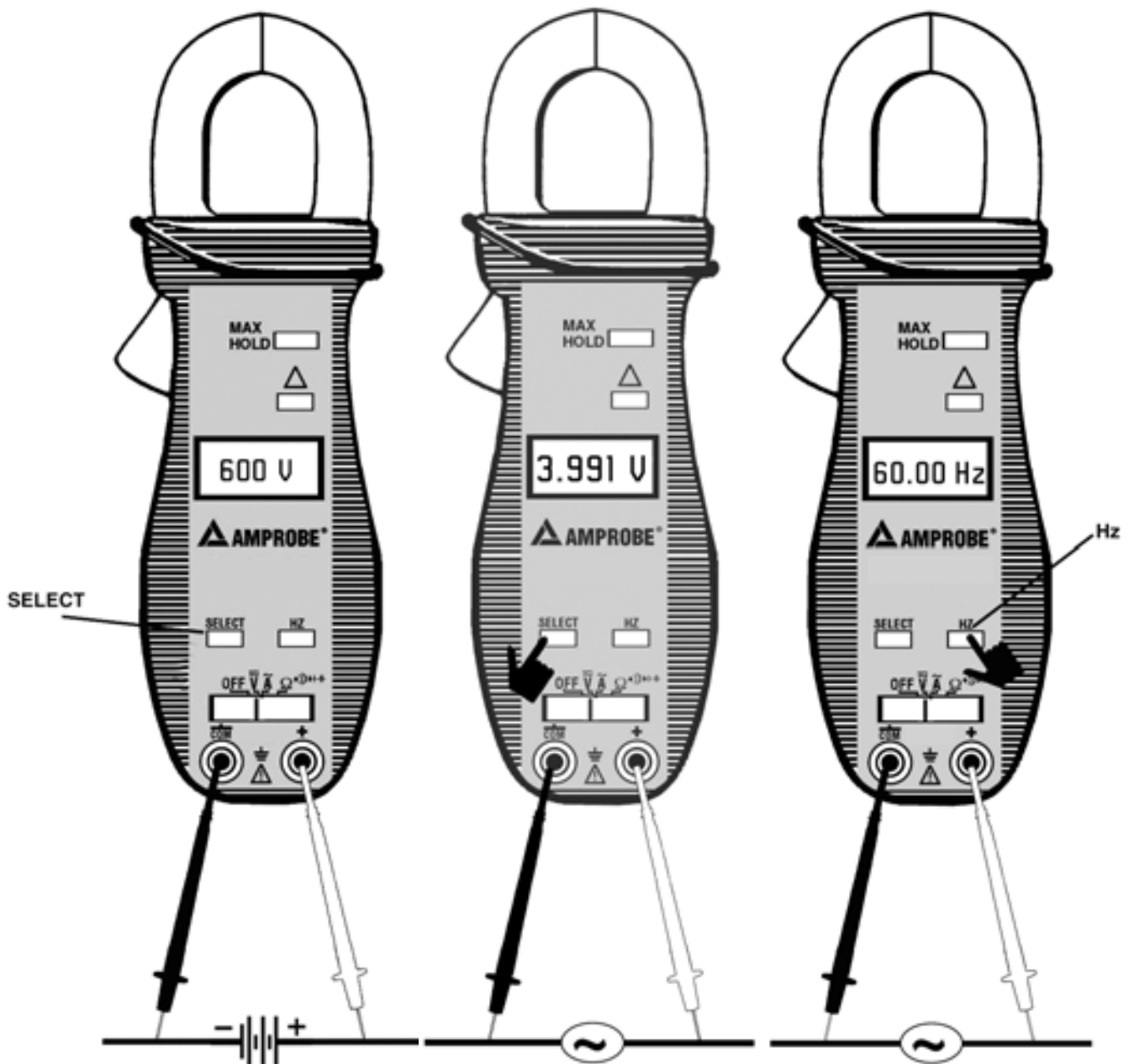
### 3) PRODUCT DESCRIPTION

This user's manual uses only representative model(s) for illustrations. Please refer specification details for function availability to each model.



- 1) Transformer Jaw Clamp for AC current magnetic field pick up
- 2) Hand/Finger Barrier to indicate the limits of safe access of the meter during measurement
- 3) Push-buttons for special functions & features
- 4) Push-buttons for special functions & features on Slide-switch Selector functions
- 5) Input Jack for all functions EXCEPT non-invasive ACA current function
- 6) Common (Ground reference) Input Jack for all functions EXCEPT non-invasive ACA current function
- 7) Slide-switch Selector to turn the display power ON/OFF and Select a function
- 8) 3-3/4 digits 4000 counts LCD display
- 9) Jaw trigger for opening the transformer clamp jaw

## 4) OPERATION



### DC Voltage, AC Voltage, Hz Frequency functions

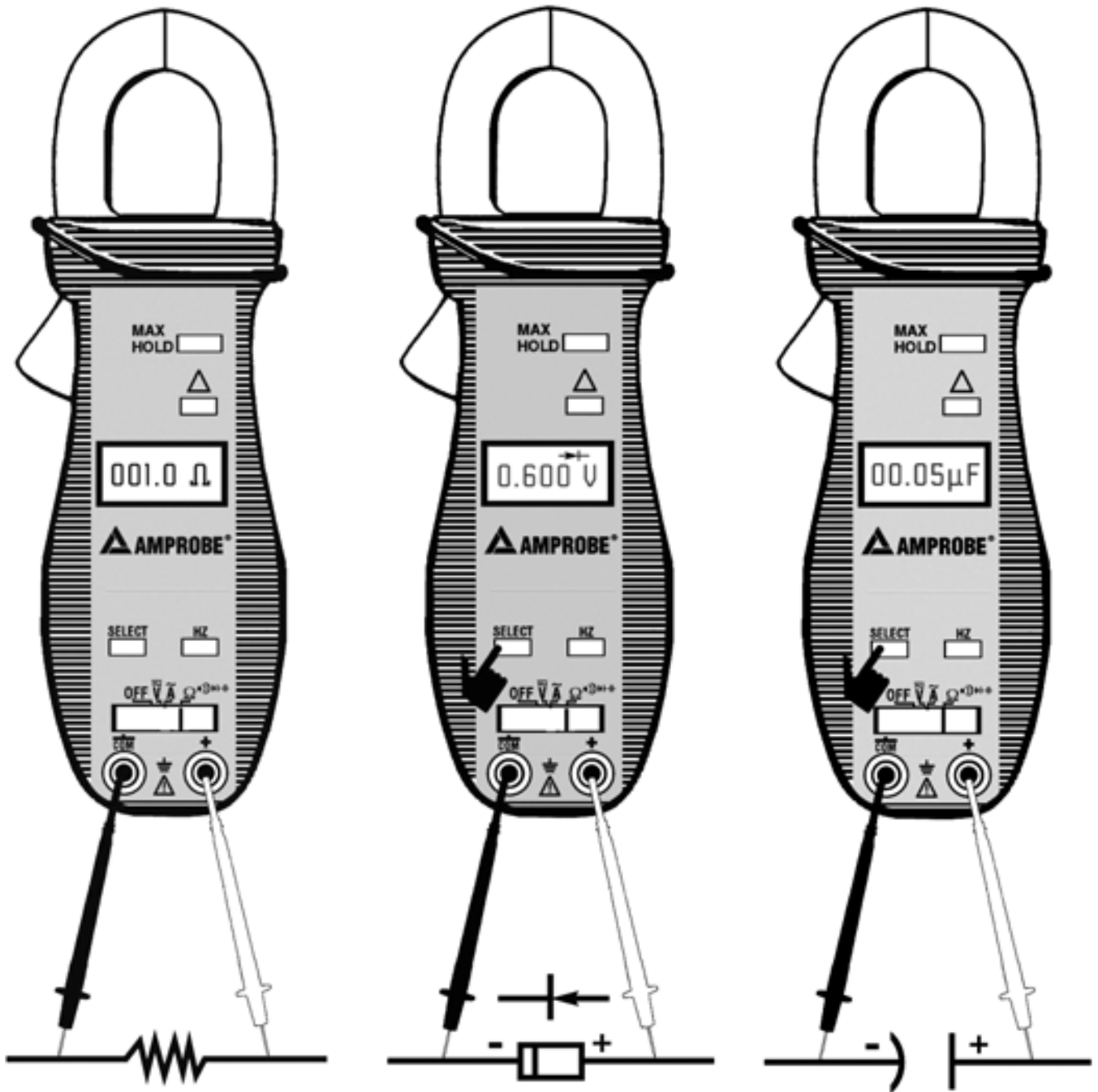
Inputs are made through the test leads terminals. Slide-switch on defaults at DC voltage. Press **SELECT** button momentarily to select AC voltage.

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

DCV & ACV via the test leads; ACA via the jaw clamp

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

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



**⚠ CAUTION**

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



## **$\Omega$ Resistance, and $\rightarrow$ ) Continuity functions**

Inputs are made through the test leads terminals. Slide-switch on defaults at  $\Omega$ . Press **SELECT** button momentarily to select  $\rightarrow$ ) Continuity function which is convenient for checking wiring connections and operation of switches. A continuous beep tone indicates a complete wire.

### **$\rightarrow$ Diode test function**

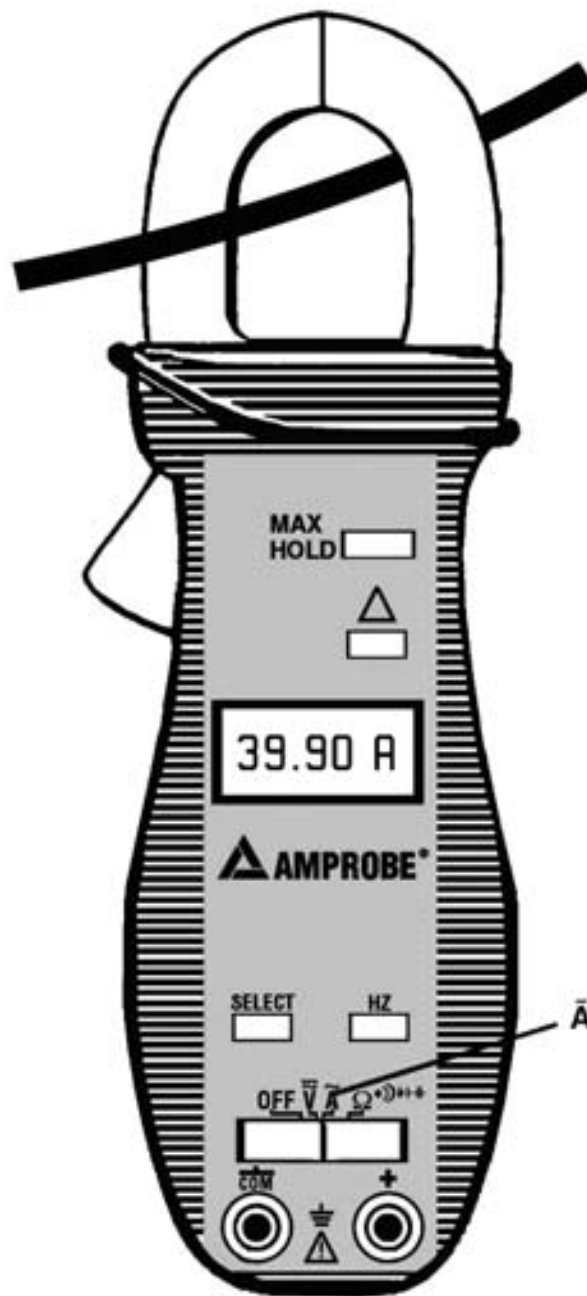
Inputs are made through the test leads terminals. Slide-switch on defaults at  $\Omega$ . Press **SELECT** button momentarily 2 times to select  $\rightarrow$  Diode test function. Normal forward voltage drop (forward biased) for a good silicon diode is between 0.400V to 0.900V. A reading higher than 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).

### **$\rightarrow$ Capacitance function**

Inputs are made through the test leads terminals. Slide-switch on defaults at  $\Omega$ . Press **SELECT** button momentarily 3 times to select  $\rightarrow$  Capacitance function. Relative zero  $\Delta$  mode can be used to zero out the parasitic capacitance of the leads and the internal protection circuitry of the meter when measuring low capacitance in the order of Pico Farad (pF).

### **$\Delta$ CAUTION**

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



### ACA Current clamp-on function

Inputs are made through the jaws clamps for non-invasive ACA current measurements.

### **⚠ CAUTION**

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.

Strong Electro-magnetic field environments such as high-current transformers, motors and conductors may affect measurement accuracy.



## **HOLD**

The *hold* feature freezes the display for later viewing. Press the **HOLD** button momentarily to activate or exit this feature.

## **MAX**

The *max* feature compares and displays the measured maximum value as fast as 30ms with auto-ranging capability. Press the **MAX** button for 1 second or more to activate or exit the *max* feature in the following functions: DCV, ACV & ACA

## **Relative zero mode**

Relative zero  mode allows the user to offset the meter consecutive measurements with the displaying reading as the reference value. The display will now show readings relative to the stored reference value. That is, display = reading - stored value. Press the  button momentarily to activate and to exit relative zero mode.

## **Auto-ranging**

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

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

When the meter is on, the Auto Power Off (APO) feature will switch the meter into a sleep mode automatically to extend battery life after approximately 30 minutes of the last front panel activity. To wake up the meter from APO, press the buttons momentarily or set the slide-switch to the OFF position and then slide back on again. Always set the slide-switch to the OFF position manually 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 been subjected to high voltage transient (caused by lightning or switching surge to the system) by accident or abnormal conditions of operation, the series 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 is not to be used for periods of longer than 60 days, remove the batteries and store them separately.

## Battery replacement

The meters use standard 3V alkaline button battery (ANSI/NEDA-5004LC, IEC-CR2032). In models ACD-10 PRO & ACD-10 TRMS PRO, one battery are used.

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

## 6) Specifications

### General Specifications

Display : 3-3/4 digits 4000 counts LCD display(s)

Update Rate : 3 per second nominal

Polarity : Automatic

Low Battery Indication: 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 0.15 x (specified accuracy)/°C @(0°C - 18°C or 28°C - 40°C), or otherwise specified

Sensing : Average sensing for ACD-10 PRO. True RMS for ACD-10TRMS PRO

Safety : Meets IEC61010-2-032 (1994), EN61010-2-032 (1995), UL3111-2-032 (1999)

For ACD-10 PRO/TRMS PRO: Category II 600 Volts AC & DC, and Category III 300 Volts AC & DC

Transient protection : 6.5kV (1.2/50 $\mu$ s surge) for all models

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:

Capacitance function is not specified

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

Performance above 3V/m is not specified

Overload Protections :

ACA Clamp-on jaws : AC 400A RMS continuous

“+” & “COM” terminals (all functions) : 600VDC/VAC RMS

Power Supply : 3V alkaline button battery (ANSI/NEDA-5004LC, IEC-CR2032). One battery for ACD-10 PRO & ACD-10 TRMS PRO.

Power Consumption : 2.5 mA typical

APO Timing : Idle for 30 minutes

APO Consumption : 0.8 $\mu$ A typical on all functions except on ACD-10 TRMS PRO  
Amps and Volts where it is 25 $\mu$ A

Dimension : L 7.8” X W 2.48” X H 1.25”

Weight : 0.412 Lb approx.

Jaw opening & Conductor diameter : 1.02” max

Accessories : Test leads (pair), battery installed, user's manual, & soft carrying pouch

### **Electrical Specifications**

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

- 1) Model ACD-10 PRO TRMS. True RMS accuracy of ACV is specified from 5% to 100% of range, and ACA is specified from 10% to 100% of range, or otherwise specified. Maximum Crest Factor < 1.75 : 1 at full scale & < 3.5 : 1 at half scale, with frequency components within the specified frequency bandwidth for non-sinusoidal waveforms.

**DC Voltage: ACD-10 PRO/TRMS PRO**

RANGE	Accuracy
400.0mV	0.3% + 4d
4.000V, 40.00V, 400.0V	0.5% + 3d
600V	1.0% + 4d

NMRR : >50dB @ 50/60Hz

CMRR : >120dB @ DC, 50/60Hz, Rs=1k $\Omega$

Input Impedance : 10M $\Omega$ , 30pF nominal  
(1000M $\Omega$  for 400.0mV range)

**AC Voltage: ACD-10 PRO/TRMS PRO**

RANGE	Accuracy <sup>1)</sup>
50Hz -- 500Hz	
4.000V, 40.00V, 400.0V	1.5% + 5d
600V	2.0% + 5d

CMRR : >60dB @ DC to 60Hz, Rs=1k $\Omega$

Input Impedance : 10M $\Omega$ , 30pF nominal

**Max Hold (where applicable)**

Specified accuracy  $\pm$  50 digits for changes > 25ms in duration

**Audible Continuity Tester**

Audible threshold : between 20 $\Omega$  and 120 $\Omega$ .

**Capacitance: ACD-10 PRO/TRMS PRO**

RANGE*	Accuracy**
500.0nF, 5.000 $\mu$ F, 50.00 $\mu$ F, 500.0 $\mu$ F, 3000 $\mu$ F	3.5%*** + 6d

\*Additional 50.00nF range accuracy is not specified

\*\*Accuracies with film capacitor or better

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

**AC CURRENT: ACD-10 PRO/TRMS PRO**

RANGE	Accuracy <sup>1)</sup>
50Hz / 60Hz	
40.00A	1.9% + 8d
400.0A	1.9% + 8d*
600A**	unspecified

\*Accuracy specified to 350A continuous, and 400A for 60 second max with 5 minutes cool down interval

\*\*Added range to indicate instantaneous over-range current values

**OHMS: ACD-10 PRO/TRMS PRO**

RANGE	Accuracy
400.0 $\Omega$	0.8% + 6d
4.000k $\Omega$ , 40.00k $\Omega$ , 400.0k $\Omega$	0.6% + 4d
4.000M $\Omega$	1.0% + 4d
40.00M $\Omega$	2.0% + 4d

Open Circuit Voltage : 0.4VDC typical

**Diode Tester: ACD-10 PRO/TRMS PRO**

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

**Hz Frequency: ACD-10 PRO/TRMS PRO**

Function	Sensitivity (Sine RMS)	Range
400.0mV	150mV	10Hz -- 2kHz
4.000V	3.2V	5Hz -- 40kHz
40.00V	25V	5Hz -- 100kHz
400.0V	100V	5Hz -- 100kHz
600V	400V	5Hz -- 5kHz
400.0A	55A	40Hz -- 400Hz

Display counts: 5000

Best resolution: 0.001Hz

Accuracy: 0.5%+4d



## LIMITED WARRANTY

Your AMPROBE instrument has a limited warranty against defective materials and/or workmanship for one year from the date of purchase provided that, in the opinion of the factory, the instrument has not been tampered with or taken apart.

**Should your instrument fail due to defective materials, and/or workmanship during this one-year period, please have your dated bill of sale, which must identify the instrument model number and serial number and call the number listed below:**

Repair Department  
ATP - AMPROBE  
MIRAMAR, FL  
Tel: 800-327-5060  
**[www.amprobe.com](http://www.amprobe.com)**



Advanced Test Products  
Miramar, FL  
Tel.: (954)499-5400  
Fax: (954)499-5454



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