

TENMARS

Clamp-on meter

TM-12E

TM-13E

TM-13R



HB2TM12E0003

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1. FEATURES

Thank you for purchasing this instrument. Please read this instruction manual carefully and completely before using your digital clamp meter correct operation will insure the best performance and decrease the possibility of damages.

- * Jaws opening up to 30mm.
- * The maximum conductor size is $\phi 30\text{mm}$.
- * Safety sockets designed.
- * Data Hold.
- * Impedance in circuit is below 40Ω . The buzzer will sound.

2. SPECIFICATIONS

- a). Display: 3 3/4 digits LCD with maximum reading 3999, Plus decimal point, unit symbol indication.
- b). Polarity Indication: Automatic polarity, “-“ display for negative input.
- c). Overload Indication: LCD will show a “OL” in the left highest position.
- d). Low Battery Indication : Replace battery as LCD display “BAT”.
- e). Battery Life: 50 hours approx. (alkaline battery recommended)
- f). Sampling Rate: 2 times per second for digital display.
20 times per second for analog display.
- g). Power Supply: R03(AB)/SIZE AAA 1.5V/UM4 battery x2.
- h). Operation Altitude: up to 2000m.
- i). Operating Environment: Indoor use. This instrument has been designed for use in an environment of pollution degree 2.

- j).Auto Power Off: The power will be automatically turn off while the range set is unchanged for more than 30 minutes.
- k).Disabling Auto Off: Set the range selector OFF position to any range and also press down ZERO or RANGE button.
- l).Operating Temperature & Humidity: 5°C ~ 40°C ,below 80%RH.
- m).Storage Temperature & Humidity: -10°C ~ 60°C , below 70%RH.
- n).Safety: IEC61010 and EN61010 (IEC61010-1, IEC61010-2-031, IEC61010-2-032) CAT III 600V.
- o).EMC:This apparatus was designed in accordance with EMC standards in force and its compatibility has been tested in accordance EN61326 (1997) + A1 (1998) + A2 (2001).
- p).Dimension: 195mm(L)x64mm(W)x30mm(H).
- q).Weight: About 240g.(including batteries)
- r).Accessories: Test Leads 、 manual 、 Batteries.

Electrical Specifications:

Accuracy is indicated as [% of reading + digit number].
It is referred to the following reference conditions: 23°C
± 5°C with RH <75%

DCA (Auto/Manual)(13E/13R)

Range	Resolution	Accuracy	Overload Protection
40A	0.01A	$\pm(2.0\%+10)$	600A rms(60 Second)
400A	0.1A		

ACA (Auto/Manual)(12E/13E)

Range	Resolution	Accuracy 50Hz~60 Hz	Overload Protection
40A	0.01A	$\pm (2.0\%+10)$	600A rms (60 second)
400A	0.1A		

ACA (Auto/Manual) True RMS:From 10% to 100% of the range(13R)

Range	Resolution	Accuracy 50Hz~60 Hz	Accuracy 65Hz~500 Hz	Overload Protection
40A	0.01A	$\pm (2.0\%+5)$	\pm	600A rms (60 second)
400A	0.1A			

ACV (Auto/Manual)(12E)

Range	Resolution	Accuracy 50Hz~500 Hz	Input Impedance	Overload Protection
400V	0.1V	$\pm(1.5\%+5)$	10M Ω	660V rms
600V	1V			

ACV (Auto/Manual)(13E)

Range	Resolution	Accuracy 50Hz~500 Hz	Input Impedance	Overload Protection
400mV	0.1mV	$\pm(1.0\%+3)$ 40Hz~60 Hz	100M Ω	DC/AC 660V rms
4V	1mV		11M Ω	
40V	10mV	$\pm (1.0\%+3)$	10M Ω	
400V	100mV			
600V	1V	$\pm (1.2\%+3)$		

ACV True RMS: From 10% to 100% of the range (13R)

Range	Resolution	Accuracy	Input Impedance	Overload Protection
400mV	0.1mV	$\pm(1.2\%+40)$ 50Hz~60Hz	100M Ω	DC/AC 660V rms
4V	1mV	$\pm(1.2\%+20)$ 40Hz~499 Hz $\pm(2.0\%+20)$ 500Hz~1KHz	11M Ω	
40V	10mV	$\pm(1.2\%+5)$	10M Ω	
400V	100mV	40Hz~499 Hz		
600V	1V	$\pm(2.0\%+5)$ 500Hz~1KHz		

DCV (Auto/Manual)(12E)

Range	Resolution	Accuracy	Input Impedance	Overload Protection
400V	0.1V	$\pm(1.0\%+3)$	10M Ω	660V rms
600V	1V			

DCV (Auto/Manual)(13E/13R)

Range	Resolution	Accuracy	Input Impedance	Overload Protection
400mV	0.1mV	$\pm(0.8\%+2)$	100M Ω	DC/AC 660V rms
4V	1mV		11M Ω	
40V	10mV		10M Ω	
400V	100mV			
600V	1V		$\pm(1.0\%+2)$	

Frequency (Auto-Ranging)(12E)

Range	Resolution	Accuracy	Max. Sensitivity	Overload Protection
4KHz	1Hz	$\pm (0.8\%+3)$	3V rms	DC/AC 600V rms
40KHz	10Hz			
400KHz	100Hz			

Continuity

Range	Buzzer	Max. Open Voltage	Overload Protection
•)))	below 40 Ω	About-1.5VDC	600V rms

Resistance (12E)

Range	Resolution	Accuracy	Max. Open Voltage	Overload Protection
Ω •))) (400 Ω)	0.1 Ω	$\pm(1\%+5)$	About-1.5V _{DC}	600V rms

Resistance (Auto/Manual)(13E/13R)

Range	Resolution	Accuracy	Max. Sensitivity	Overload Protection
400 Ω	0.1 Ω	$\pm(1\%+5)$	about -1.5V _{DC}	DC/AC 600V rms (60 Second)
4K Ω	1 Ω			
40K Ω	10 Ω	$\pm(1\%+3)$	About-0.45V _{DC}	
400K Ω	100 Ω			
4M Ω	1K Ω			
40M Ω	10 Ω	$\pm(3\%+3)$		

3. INSTRUMENT DESCRIPTION

- a. Safety guard.
- b. Jaw Trigger.
- c. Rotary Range Selector.
- d. LCD
- e. COM Jack: it is used for the connection of negative signal input while measuring DCV, ACV, Ω / \llcorner .
- f. V/ Ω Jack: It is used for the connection of positive signal input while measuring DCV, ACV, Ω / \llcorner .
- g. RANGE Button: Manual ranging is allowed while the button is pressed, and the symbol MANU is shown on LCD, The auto ranging mode is activated again while pressing the button more than 2 seconds or setting the range.
- h. DATA HOLD button: The reading data shown on LCD can be locked while pressing the button.
- i. ZERO button: The reading data shown on LCD can be reset to 0 while the button is pressed once, and the symbol "ZERO" is also displayed on LCD, Press the button again, the data cleared can be shown on LCD, and the symbol "ZERO" begins to blink. To abort the zero mode, hold down the button for more than 1 second. (13E/13R)

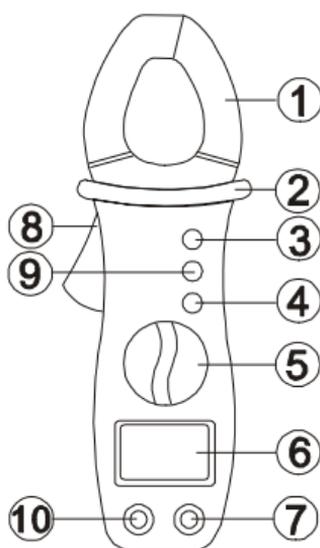


Fig.1

1. Inductive clamp Jaw
2. Safety guard
3. Data hold button(12E)
ZERO button(13E/13R)
4. Range button(13E/13R)
5. Rotary Range selector
6. LCD
7. V/Ω Jack
8. Jaw Trigger
9. Range button(12E)
Hold button(13E/13R)
10. COM Jack

4. MEASUREMENT



CAUTION

When this button is pressed, the range is unchanged.

4.1. NOTES

1. Check if the batteries are installed properly.
2. Check if the LCD and the range indicator show the same as the function desired.
3. When changing range, firstly remove the tested conductor or electrical circuit from the clamp jaw in order to avoid an accident.
4. Strong vibrations and impacts, may cause damage to the instrument.
5. Do not test on or connect to any circuit with voltage or current exceeding the specified overload protection.
6. When measuring resistor, Please do not add any voltage, though there is a protection circuit, excessive voltage will still cause malfunction.
7. When measuring current, firstly remove the test leads of common and voltage / resistance.
8. When measuring current, any strong current nears or closes to the clamp jaw will affect the accuracy.
9. This instrument is not available for the non-sine wave AC signal, otherwise there will be a great error.
10. When measuring current, always put the tested conductor in the center of the clamp jaw so as to obtain a more accurate reading.
11. During measuring, if the value of reading or indication of sign remain unchanged, check if the DATA HOLD function is active and the symbol  is displayed on the LCD.

- In order to avoid reading incorrect data, you have to replace the batteries immediately when the symbol BAT appears on the LCD.
- Do not touch the circuit board before you take any adequate action, and thus prevent from any damage of contamination and static electricity.

4.2. AC CURRENT (ACA) MEASUREMENT



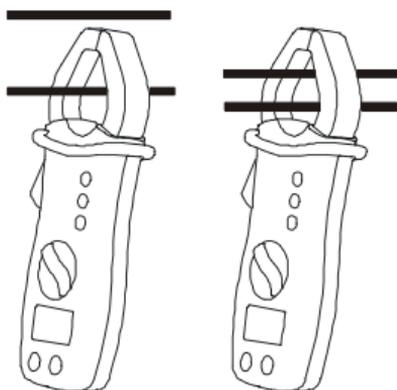
WARNING

Make sure that all the test leads are disconnected from the meter's terminal for current measurement.

- Select “~A” range.
- Open the clamp and put the tested conductor in the center of the clamp jaws (see Fig.2). (No gap is allowed between the connections of clamp jaws)
- The current value will be indicated on the LCD.
- If the reading is difficult, press the DATA HOLD button to hold the obtained value. To exit from this function press DATA HOLD button again.

Fig. 2

Correct Incorrect



4.3. AC VOLTAGE (ACV) MEASUREMENT



WARNING

Maximum input for DCV or ACV is 600V. Do not attempt to take any voltage measurement that exceeds the limits. Exceeding the limits could cause electrical shock and damage the clamp meter.

1. Select "V~" range.
2. Insert the test leads into the jacks. The red test lead plug into V/ Ω jack, and the black test lead plug into COM jack.
3. Connect the two long ends of test leads to the desired circuit, and then reading will be displayed.
4. If the reading is difficult, Press DATA HOLD button to hold the obtained value. To exit from this function, press DATA HOLD button again.

4.4. DC VOLTAGE (DCV) MEASUREMENT



WARNING

Maximum input for DCV or ACV is 600V. Do not attempt to take any voltage measurement that exceeds the limits. Exceeding the limits could cause electrical shock and damage the clamp meter.

1. Select "V" range.
2. Insert the test leads into the jacks. The red test lead plug into V/ Ω jack and the black test lead plug into COM jack.
3. Connect the two long ends of test leads to the desired circuit.
4. If the reading is difficult, press DATA HOLD button to hold the obtained value. To exit from this function, press DATA HOLD button again.

4.5. DC CURRENT (DCA) MEASUREMENT



WARNING

Make sure that all the test leads are disconnected from the meter's terminal for current measurement.

1. Select " $\text{---}A$ " range.
2. Check if the display shows zero in advance. If the display doesn't show zero, press "ZERO" button. (If the current measurement is over 40A, press "RANGE" button to select 400A range before zeroing.)
3. Open the clamp and put the tested conductor in the center of the clamp jaws (See Fig.2). (No gap is allowed between the connections of clamp jaws).
4. The current value will be indication on the LCD.
5. The excesses magnetic value should be deducted from the reading data if auto zero is not performed.

4.6. RESISTANCE MEASUREMENTS



WARNING

Before taking any in circuit resistance measurement, remove power from the circuit being tested and discharge all the capacitors. If a reading is over range, the message "OL" will be displayed.

1. Select " $\Omega / \cdot \cdot \cdot$ " range.
2. Insert the test leads into the jacks, the red test lead play into " V/Ω " jack, and the black test lead plug into COM jack.
3. Connect the two long ends of test leads to the desired circuit, then reading will be displayed.
4. Press DATA HOLD button to hold the value when takes the resistance measurement, if it's necessary.

4.7. CONTINUITY TEST

1. Select “V/Ω” range.
2. Insert the test leads into the jacks. The red test lead plug into V/Ω jack, and the black test lead plug into COM jack.
3. Connect the two long ends of test leads to the desired circuit, then reading will be displayed while the buzzer sounds the resistance value is lower than 40Ω approximately.

4.8. FREQUENCY MEASUREMENT

1. Select “Hz” range.
2. Insert the test leads into the jacks, the red test lead plug into V/Ω jack, and the black test lead plug into COM jack.
3. Connect the two long ends of test leads in parallel to the desired circuit, then reading will be displayed.

5. SYMBOLS DESCRIPTION



Ground



Meter Double insulated



Caution



Danger high voltage: risk of electric shock



DC Voltage or Current



AC Voltage or Current



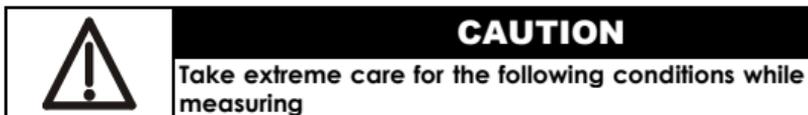
DC/AC Voltage or Current



Application around and removal from hazardous live conductors is permitted

- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
- Do not touch or be close to the inductive clamp when measuring current.
- Individual protective equipment (for example: Insulation gloves) must be used when measuring current.
- CAT IV - Is for measurements performed at the source of the low-voltage installation.
- CAT III - Is for measurements performed in the building installation.
- CAT II - Is for measurements performed on circuits directly connected to the low-voltage installation.
- CAT I - Is for measurements performed on circuits not directly connected to mains.

6. SAFETY PRECAUTION



1. Measuring voltage over 20V as it may cause human body electricity conduction.
2. Measure AC power.
3. Do not measure voltage, current under humid or wet environment.
4. If any unusual condition of test leads's end (metal part). And attachment of the meter, such as breakage, deformation, fracture, foreign substance, No display, etc., do not conduct any measuring.
5. Do not contact any exposed metal (conductive) parts, such as end of test lead, jack, fixing object, circuit etc,.

6. Keep you insulated from the object waiting for measuring.
7. Do not operate the meter under the environment with explosive gas (material), combustible gas(material) steam or filled with dust.
8. In order to avoid reading incorrect data, you have to replace the batteries immediately when the symbol BAT appears on the LCD.
9. In order to avoid the damage caused by contamination and static electricity, do not touch the circuit board before you take any adequate action.

7. MAINTENANCE NOTES

7.1. BATTERY REPLACEMENT

1. If the symbol "BAT" is shown on the display while measuring, you have to replace the batteries.
2. Remove all test leads and the conductor under test before performing of battery replacement.
3. Set the range to OFF position.
4. Remove the screws from the battery cover with screwdriver, and detach the battery cover from the bottom cover.
5. Remove the batteries from battery holder carefully, (replace them with new batteries UM-4 or SIZE 1.5V x 2).
6. Attach the battery cover back to its right place, and tight it with screws.

7.2. MAINTENANCE AND CARE

1. This meter is a precision digital instrument. Whether in use or in storage, please do not exceed the specification requirements to avoid any possible damage or danger during use.
2. Do not use strong or abrasive detergents, water, and wet cloth to clean the instrument. Do use a dry cloth to clean the instrument.
3. Do not place this meter in high temperature or humidity or expose to direct sunlight.
4. Once the measurement is completed, turn the rotary switch to off. Remove the batteries from battery holder if the instrument is not be used for a long period in order to avoid the liquid leakage from the battery.
5. That all necessary requirements of inspection and maintenance are not mentioned in this manual, a qualified technician should perform it.

8. END OF LIFE



Caution: this symbol indicates that equipment and its accessories shall be subject to a separate collection and correct disposal

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