TENMARS

TM-2012/3012 AC CLAMP METER

TM-2013/3014 AC/DC CLAMP METER

User's manual

CE

HB2TM2012001

TENMARS ELECTRONICS CO., LTD

CONTENTS:

1. SAFETY PRECAUTIONS AND PROCEDURES

This apparatus conforms to safety standard EN 61010, relating to electronic measuring instruments. For your own safety and that of the apparatus, you must follow the procedures described in this instruction manual and especially read all the notes proceeded by the symbol ⚠ carefully.

WARNING

⚠ If instrument is used in way don't conform to prescriptions of this user's manual, all considered safety protection maybe damaged.

Take extreme care for the following conditions when measuring:

- Do not measure voltage, current under humid or wet environment.
- Do not operate the meter under the environment with explosive gas (material), combustible gas (material), steam or filled with dust.
- Keep you insulated from the object waiting for measuring.
- Do not contact any exposed metal (conductive) parts such as end of test lead, socket, fixing object, circuit, etc.
- If any unusual condition of testing end (metal part) and attachment of the meter such as breakage, deformation, fracture, foreign substance, no display, etc., do not conduct any measuring.
- Measuring voltage over 20V as it might cause human body electricity conduction.

Take care not to allow your hand to pass over the Safety Guard (see Fig.1, pos.2) on current measurements and voltage measurements using the holster

2. THE FOLLOWINGS SYMBOLS ARE USED:

 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.

2.1. PRELIMINARY

- This apparatus has been designed for use in an environment of pollution degree 2.
- It can be used for **CURRENT** and **VOLTAGE** measurements on installations of surge voltage category CAT IV 600 V, CAT III up to 1000 voltage between Phase and Earth (fixed installations) and for current measures up to CATIII 1000V/660A and CAT IV 600V/660A for (TM-2012/2013) and CAT III 1000V/1200A CATIV 600V/1200A for (TM-3012/TM-3014)。
- This meter is not available for non-sine wave AC signal.
- You must comply with the usual safety regulations aimed at:
  - ♦ Protecting you against the dangerous electric current.
  - ♦ Protecting the instrument against an incorrect operation.
- Only the leads supplied with the instrument guarantee compliance with the safety standard. They must be in a good condition and they must be replaced, if necessary with an identical model.
- Do not test or connect to any circuit with voltage or current exceeding the specified overload protection.

- Do not perform any test with environmental condition exceeding the limits indicated in paragraphs 13.1.1
- Check if the batteries are installed correctly.
- Prior to connecting the test probes to the installation, check that the function selector is positioned on the required measurement.
- Check if the LCD and the range indicator show the same as the function desired.

2.2. DURING USE

Read the recommendation which follow and the instruction in this manual:

WARNING

Non-compliance with the warnings and/or the instructions for use may damage the apparatus and/or its components or injure the operator.

- When changing range, first remove the tested conductor or electrical circuit from the clamp jaw in order to avoid any accident.
- When the apparatus is connected to the measuring circuits, never touch an unused terminal.
- When measuring resistor, please do not add any voltage. Though there is a protection circuit, excessive voltage will still cause malfunction.
- When measuring current, first remove the test leads of common and voltage-resistance.
- When measuring current, any strong current nears or closes to the clamp jaw will affect the accuracy.
- When measuring current, always put the tested conductor in the center of the clamp jaw so as to obtain a more accurate reading as referred into paragraph 5.1.2.
- During measuring, if the value of reading or indications of sign remain unchanged, check if the HOLD function is active.

2.3. AFTER USE

- Once the measurements are completed, turn the rotary switch to OFF.
- If the instruments is not be used for a long period, remove the battery.

2.4. DEFINITION OF MEASURING (OVERVOLTAGE) CATEGORY

The norm EN 61010: Safety requirements for electrical equipment for measurement,
Control and laboratory use, Part 1: General requirements, defines what a measuring
Category, usually called over voltage category, is.

Circuits are divided into the following measurement categories:

- **Measurement category IV** is for measurements performed at the source of the low-voltage installation.
  Examples are electric meters and measurements on primary over current protection devices and ripple control units.
- **Measurement category III** is for measurements performed in a building installation.
  Examples are measurements on distribution boards, circuit breakers, wiring, including cables, bus-bars, junction boxes, switches, switches, socket-outlets in the fixed installation, and equipment for industrial use and some other equipment, for example, stationary motors with permanent connection to fixed installation.
- **Measurement category II** is for measurements performed on circuits directly connected to the low voltage installation.
  Examples are measurements on household appliances, portable tools and similar equipment.
- **Measurement category I** is for measurements performed on circuits not directly connected to MAINS.
  Examples are measurements on circuits not derived from MAINS, and specially protected (internal) MAINS-derived circuits. In the latter case, transient stresses are variable; for

that reason, the norm requires that the transient withstand capability of the equipment is made known to the user.

3. GENERAL DESCRIPTION

Dear customer, we thank you for your patronage. The clamp you have just purchased will grant you accurate and reliable measurements provided that it is used according to the present manual's instructions.
Thanks to a new development concept assuring double insulation as well as compliance with category III up to 600V you can rely on utmost safety conditions.

The apparatus can perform the following measurements:

- AC current (I_{AC}).
- AC voltage (V_{AC}).
- DC voltage (V_{DC}).
- Resistance.
- Continuity Test.
- Diode test.

Each of these parameters can be selected by means of a 7-position rotary switch, including an OFF position. There are also the following keys: "**D-H**" and "**R-H**". For their use please see paragraph 5.2.

The selected quantity appears on a high-contrast display with indication of measurement units and functions.

4. PREPARATION FOR USE

4.1. INITIAL

All the equipment has been checked mechanically and electrically prior to shipment.
Every care has been taken to ensure that the instrument reaches you undamaged.

However, it is wise to carry out a rapid check in order to detect any possible damage, which might have been caused during transport. Should this be the case, immediately enter the usual claims with courier.

Check the packaging contained according to packaging list reported in paragraph 15 In case of discrepancies contact the dealer.

In the event of re-shipment of the equipment please follow the instructions reported in paragraph.

4.2. SUPPLY VOLTAGE

The instrument is battery supplied; it use two batteries model 9V NEDA 1604 IEC 6F22 JIS 006P battery included in packaging. The batteries autonomy is about 200 hours.

The symbol "  " appears when the batteries are nearly discharged. In case replace them following the instructions in paragraph 13.

4.3. CALIBRATION

The instrument fulfils the technical characteristics listed in this manual. The performance of the specifications is guaranteed for one year.

4.4. STORAGE

In order to guarantee the accuracy of the measurements, after a period of storage in extreme environment condition, wait for the time necessary so that the apparatus returns to normal measuring conditions (see environments specifications paragraph 18.1.1.

5. OPERATING INSTRUCTIONS

5.1. INSTRUMENT DESCRIPTION

5.1.1.Commands description

1. Inductive clamp jaw.
2. Work light.
3. HOLD key.
4. Jaw Trigger.
5. Rotary switch Selector.
6. Backlight and Work light key.
7. Inrush/select key.
8. Relative /ZERO key.
9. MAX/MIN key.
10. COM Jack: it is used for the connection of negative signal input while measuring DCV、ACV、HZ、Ω、 (((• 、 ⊣▶⊢、CX、ADP.
11. V/Ω Jack: It is used for the connection of positive signal input while measuring DCV、ACV、HZ、Ω、 (((• 、 ⊣▶⊢、CX、ADP.

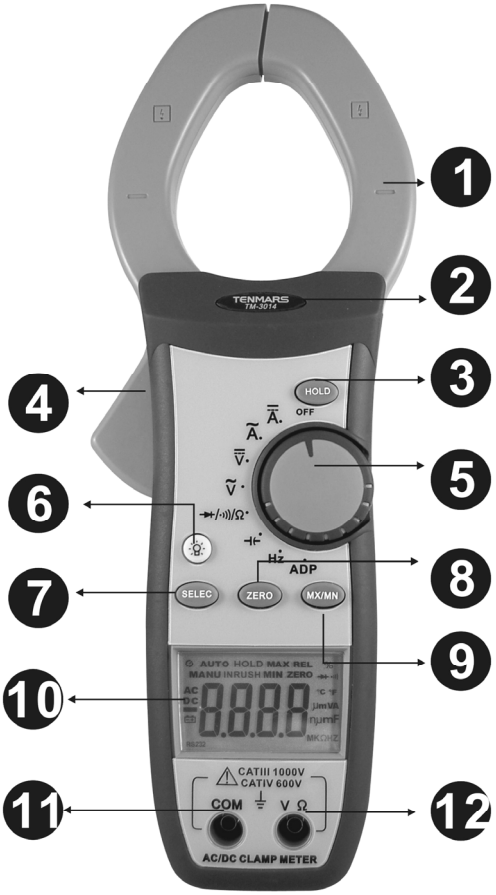
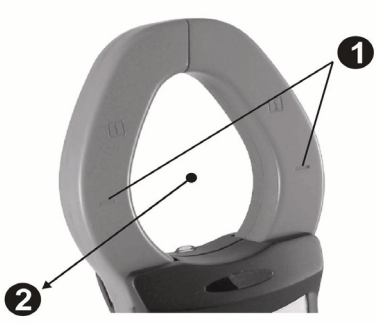


Fig. 1: Instrument description

5.1.2.Alignment marks

Put the conductor within the jaws on intersection of the indicated marks as much as possible (see Fig. 2) In order to meet the meter accuracy specifications.



LEGEND:
1. Alignment marks.
2. Conductor.

Fig. 2: Alignment marks

5.1.3.AUTO POWER OFF function

1. In order to save the battery the clamp will be switched off 30 minutes later last selecting
   a function or changing range operation.
2. If this function is enabled the symbol is displayed.
3. To disable this function select OFF position then rotate the selector in any position while the REL key is pressed. Turning OFF and ON the clamp the AUTO POWER OFF will be re-enabled.

5.2. FUNCTION KEY DESCRIPTION

5.2.1.RANGE key: range selection

Pressing the RANGE key you can switch between the Automatic or Manual Range selection.
In particular the "MANU" symbol point out the Manual range selection while the "AUTO" symbol point out the Automatic Range selection.
The Manual Range selection will be disable if:

- The RANGE key is pressed more than 2 second.
- The position of the rotary switch is changed.

5.2.2.ZERO relative function

- The ZERO relative function subtracts an OFFSET (stored when the key has been pressed) from the present measurements and displays the result.
- To enable this function press the ZERO key for less than 1 second. Consequently on the display will appear the message "ZERO" and the relative value.
- Pressing the ZERO key again for less than 1 second the display will show the offset; and the message "ZERO" start blinking.
- The ZERO relative function will be disable if:
- The ZERO key is pressed more than 2 second.
- The position of the rotary switch is changed.

- This function can't be enabled if the functions HOLD are already selected.
- Pressing the ZERO key the instrument will automatically set the MANUAL Range selection.

5.2.3.HOLD key: HOLD function

- The HOLD function allows operator to hold the displayed digital values. When this function is enabled the display shows the "H" symbol.
- The HOLD function will be disabled if:
- The HOLD key is pressed again.
- The position of the rotary switch is changed.
- The analogy barograph isn't affected of enabling of this function so it continues showing present readings.
- The HOLD function will be disabled if:
- The HOLD key is pressed again.
- The position of the rotary switch is changed.

5.2.4.Backlight display and work light for easy reading in the dark.

- Press button for more than 1 second to toggle backlight and work light ON/OFF. Back light and work light turns off automatically after 15 seconds.

5.2.5.MAX/MIN function

- By pressing MX/MN key, maximum and minimum values are measured. Both values are stored and can be recalled by pressing the same key. The symbol corresponding to the desired function is displayed: "MAX" for maximum value, "MIN" for minimum value. MX/MN key is disabled when HOLD function is active. To exit this function keep MX/MN key pressed for at least 1 second or rotate the selector to another position.

6. TRUE RMS MEASUREMENT

The meter measures the true RMS value of AC voltages and currents. In physical terms, the RMS (root-mean-square) value of a waveform is the equivalent DC value that causes the same amount of heat to be dissipated in a resistor. True RMS measurement greatly simplifies the analysis of complex AC signals. Since the RMS value is the DC equivalent of the original waveform, it provides a reliable basis for comparing dissimilar waveforms.
By contrast, many meters use average-responding AC converters rather than true RMS converters. The scale factor in these meters is adjusted so that they display the RMS value for a harmonic-free sine wave. However, if a signal is not sinusoidal, average-responding meters does not display correct RMS readings.

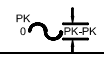
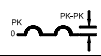
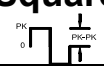
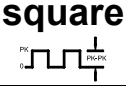
7. INRUSH CURRENT

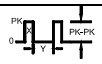
Inrush current refers to the maximum, instantaneous input current drawn by an electrical device when first turned on. For example, incandescent light bulbs have high inrush currents until their filaments warm up and their resistance increases. Alternating current electric motors and transformers may draw several times their normal full-load current when first energized, for a few cycles of the input waveform. Power converters also feature high inrush currents relative to their steady state currents. This is typically the charging current of the input capacitance. The selection of overcorrect protection devices such as fuses and circuit breakers is made more complicated when high inrush currents must be tolerated. The overcorrect protection must react quickly to overload or short circuit but must not interrupt the circuit when the inrush current flows

8. WAVEFORM COMPARISON

Table 1.illustrates the relationship between AC and DC components for common waveforms, and compares readings for true RMS meters and average-responding meters. For example, consider the first waveform, a 1.414V (zero-to-peak) sine wave. Both the RMS-calibrated average-responding meters display the correct RMS reading of 1.000V(the DC component equals 0). However, consider the 2V (peak-to-peak) square wave. Both types of meter correctly measure the DC component (0V), but your also correctly measures the AC component (1.000V) The average-responding meter measures 1.111V, which amounts to an 11% error.

Table 1. WAVEFROM COMPARISON CHART

AC coupled Input Waveform	Peak Value		Metered Voltages			Total RMS
			AC Components only		DC components only	
	Peak - Peak	0-Peak	RMS CAL (*)	27E		TRUE RMS $\sqrt{AC^2 + DC^2}$
Sine 	2.828	1.414	1.000	1.000	0.000	1.000
Rectified sine (Full Wave) 	1.414	1.414	0.421	0.436	0.900	1.000
Rectified sine (Half Wave) 	2.000	2.000	0.779	0.771	0.636	1.000
Square 	2.000	1.000	1.111	1.000	0.000	1.000
Rectified square 	1.414	1.414	0.875	0.707	0.707	1.000
Rectangular pulse	2.000	2.000	4.442K	2K	2D	2√D

						
Triangle Sawtooth 	**3.464**	**1.732**	**0.962**	**1.000**	**0.000**	**1.000**
(*) RMS CAL is the displayed value for average responding meter that are calibrated to display RMS for sine waves.						

Crest Factor = Peak value/True value

9. DESCRIPTION OF ROTARY SWITCH FUNCTIONDC

9.1. DC CURRENT (DCA) MEASUREMENT OF (TM-3014/TM-2013)

WARNING

- Make sure that all the test leads are disconnected from the meter's terminals for current measurement.
- When measuring current, any strong current nears or closes to the clamp jaws will affect the accuracy.
- The instrument is not available for non-sine wave DC signal.

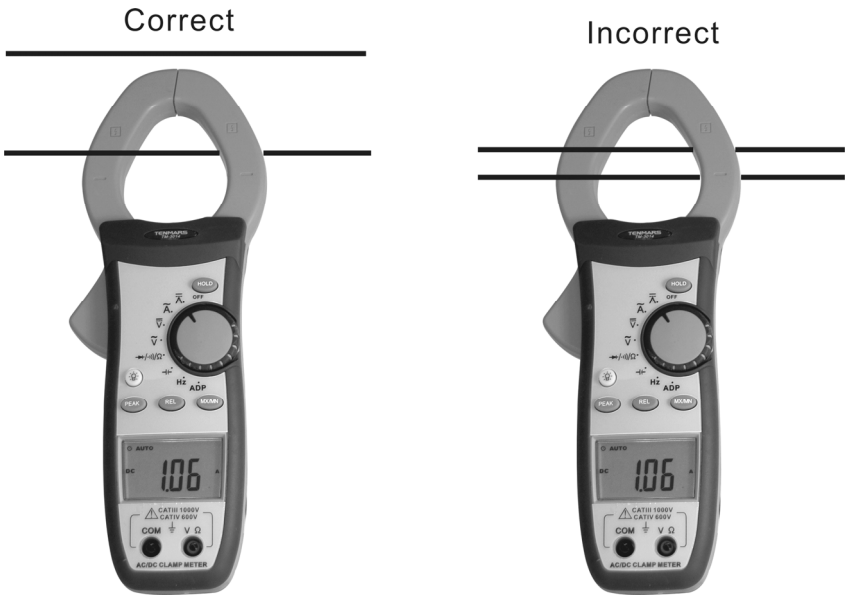


Fig. 3: Use of clamp during DC current measurement

1. Set the rotary switch to **A ⎓**.
2. Check if the display shows zero in advance. If the display doesn't show zero, press ZERO key.
3. Open the clamp and put the tested conductor in the center of the clamp jaw taking care to comply with the current flow shown in the label placed inside the Inductive clamp jaw and indicates.FIG.3.
4. The current value will be indicating on the display with automatic detection of the appropriate range.
5. If the reading is preceded by the "-" sign check .if the current flow comply with consideration indicated.
6. The "O.L" symbol means that the measured quantity is higher than the selected range. If the reading is difficult, press the HOLD key to hold the obtained value. To exit from this function press HOLD key again. The analogy barograph isn't affected of enabling of this function.

9.2. AC CURRENT (ACA) MEASUREMENT

WARNING

⚠

- Make sure that all the test leads are disconnected with the meter's terminal for current measurement.
- When measuring current, any strong current nears or closes to the clamp jaws will affect the accuracy.
- The instrument is not available for non-sine wave AC signal.

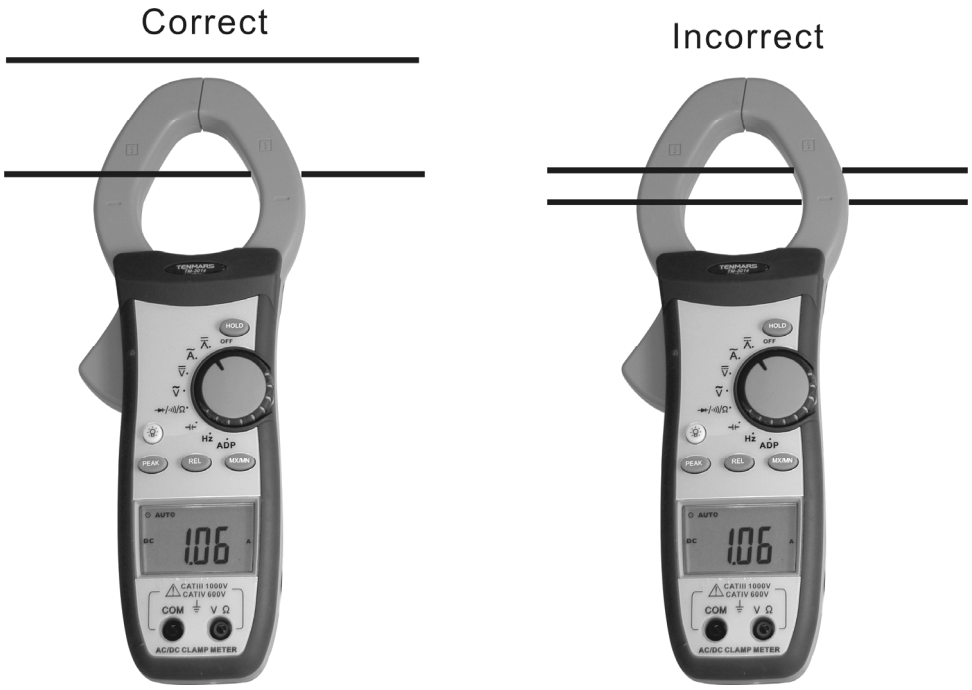


Fig. 4: Use of clamp during AC current measurement

1. Set the rotary switch to **A ∼.**
2. Open the clamp and put the tested conductor in the center of the clamp jaw.
3. The current value will be indicating on the display with automatic detection of the appropriate range.
4. The "O.L" symbol means that the measured quantity is higher than the selected range. If the reading is difficult, press the HOLD key to hold the obtained value. To exit from this function press HOLD key again. The analogy barograph isn't affected of enabling of this function

9.3. AC VOLTAGE (ACV) MEASUREMENT

WARNING

Maximum input for AC Voltage measurements is DC 1000V AC750Vrms.
Do not attempt to take any voltage measurement that exceeds the limits.
Exceeding the limits could cause electrical shock and damage the clamp meter.

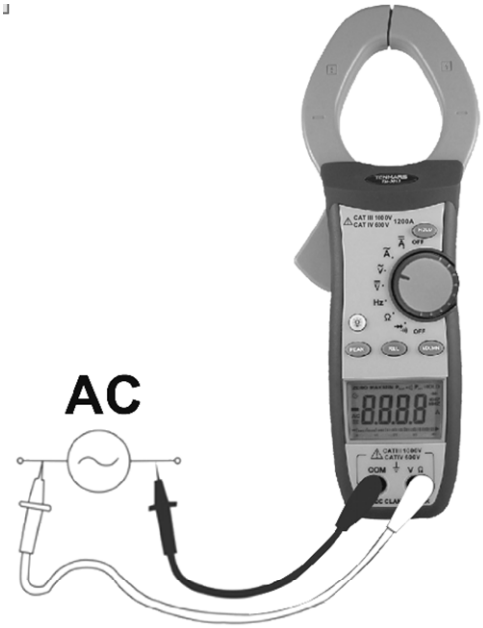


Fig. 5: Use of clamp for AC voltage measures

1. Set the rotary switch to V∼.
2. Plug the test leads into the jacks. The red test lead plugs into V/Ω jack and the black test lead plugs into COM jack.
3. Connect the two long ends of test leads with the desired circuit, and then the reading will be displayed with automatic detection of the appropriate range.
4. If the reading is difficult, press the HOLD key to hold the obtained value. To exit from this function press HOLD key again. The analogy barograph isn't affected of enabling of this function.

9.4. DC VOLTAGE (DCV) MEASUREMENT

WARNING

⚠ Max. Input for DCV or ACV is DC 1000V AC750Vrms. Do not attempt to take any voltage measurement which exceeds the limits. Exceeding the limits could cause electrical shock and damage the clamp meter.

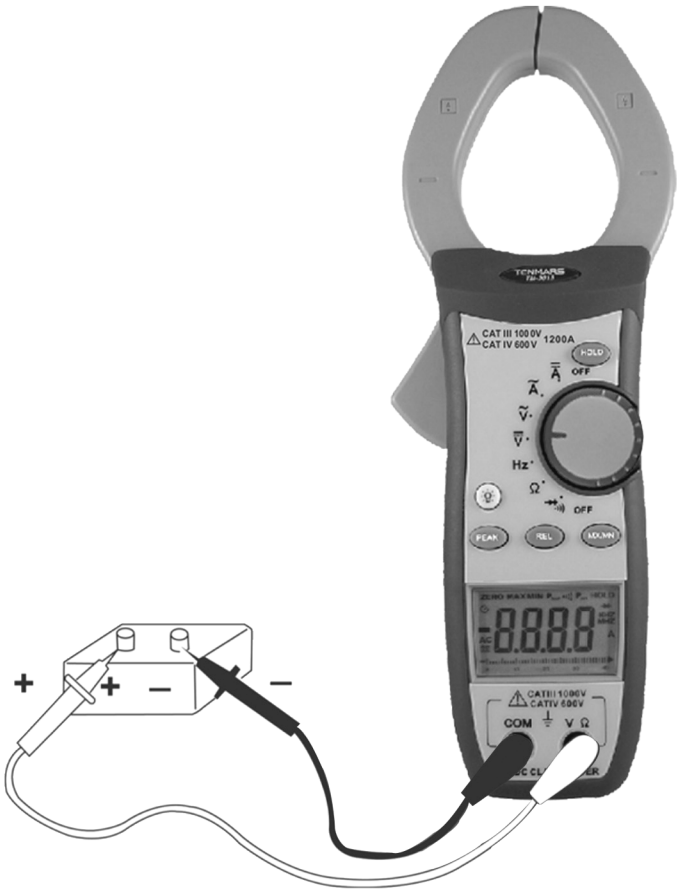


Fig. 6: Use of clamps for DC voltage measures

1. Set the rotary switch to **V** ⎓.
2. Plug the test leads into the jacks. The red test lead plugs into V/Ω jack, and the black test lead plugs into COM jack.
3. Connect the two long ends of test leads with the desired circuit, and then the reading will be displayed with automatic detection of the appropriate range.
4. If the reading is preceded by the "**-**" sign check if the Voltage polarity comply with consideration indicated.

5. If the reading is difficult, press the HOLD key to hold the obtained value. To exit from this function press HOLD key again. The analogy barograph isn't affected of enabling of this function.

9.5. RESISTANCE MEASUREMENT

WARNING

Before taking any in circuit resistance measurement, remove power from the circuit being tested and discharge all the capacitors.

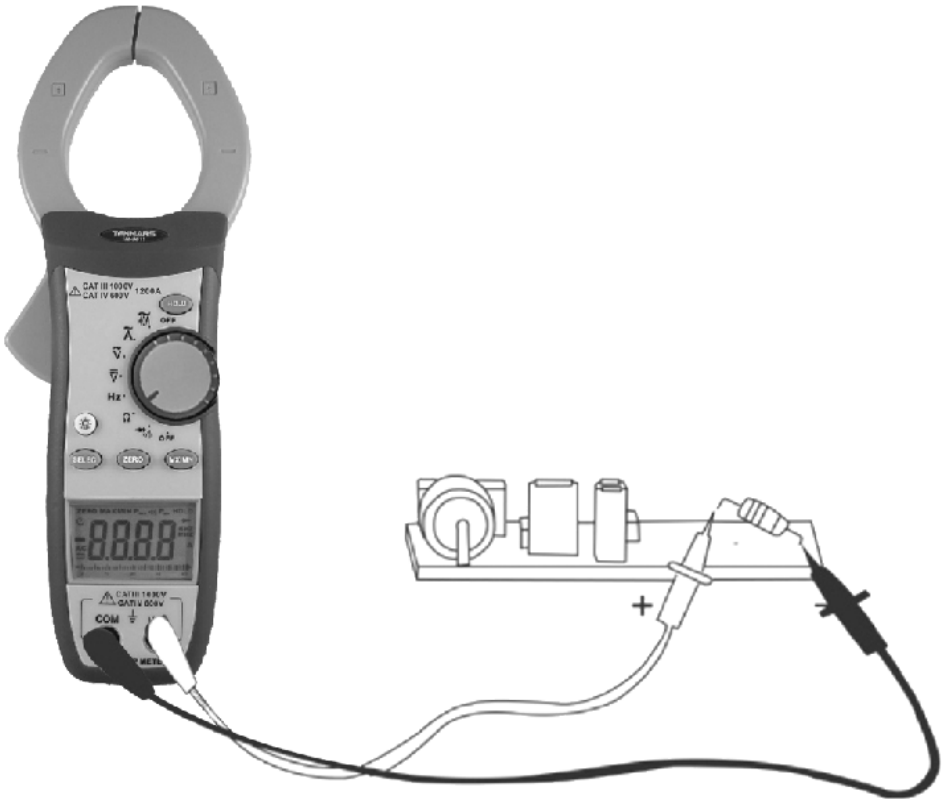


Fig. 7: Use of clamps for resistance measures

1. Set the rotary switch to →|/ (((• /Ω.
2. Press the Inrush/select key to Ω.
3. Plug the test leads into the jacks. The red test lead plugs into V/Ω jack, and the black test lead plugs into COM jack.

4. Connect the two long ends of test leads with the desired circuit, and then the reading will be displayed with automatic detection of the appropriate range.
5. If the reading is difficult, press the HOLD key to hold the obtained value. To exit from this function press HOLD key again. The analogy barograph isn't affected of enabling of this function.

9.6. DIODE MEASUREMENT

WARNING

Before taking any in circuit resistance measurement, remove power from the circuit being tested and discharge all the capacitors.

Fig. 7: Use of clamps for resistance measures

1. Set the rotary switch to ⊣▶⊢/ (((• /Ω.
2. Press the Inrush/select key to ⊣▶⊢.
3. Plug the test leads into the jacks. The red test lead plugs into V/Ω jack, and the black test lead plugs into COM jack.
4. Connect the two long ends of test leads with the desired circuit, and then the reading will be displayed with automatic detection of the appropriate range.
5. If the reading is difficult, press the HOLD key to hold the obtained value. To exit from this function press HOLD key again. The analogy barograph isn't affected of enabling of this function.

9.7. CONTINUITY MEASUREMENT

WARNING

Before taking any in circuit resistance measurement, remove power from the circuit being tested and discharge all the capacitors.

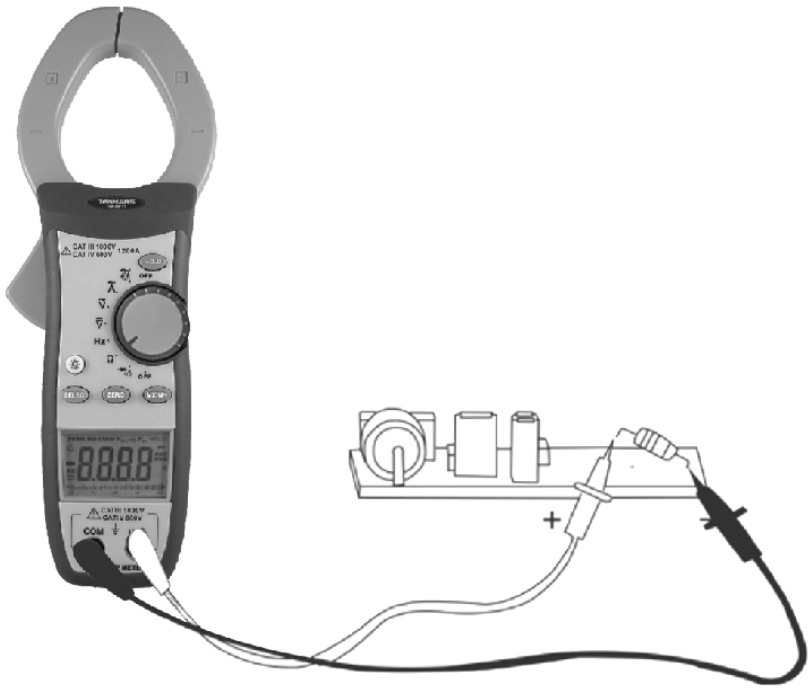


Fig. 7: Use of clamps for resistance measures

1. Set the rotary switch to →|/ (((• /Ω.
2. Press the Inrush/select key to (((• .
3. Plug the test leads into the jacks. The red test lead plugs into V/Ω jack, and the black test lead plugs into COM jack.
4. Connect the two long ends of test leads with the desired circuit, and then the reading will be displayed with automatic detection of the appropriate range.
5. If the reading is difficult, press the HOLD key to hold the obtained value. To exit from this function press HOLD key again. The analogy barograph isn't affected of enabling of this function.

9.8. FREQUENCY MEASUREMENTS

WARNING

Max. Input for DCV or ACV is DC 1000V AC750Vrms. Do not attempt to take any voltage measurement which exceeds the limits. Exceeding the limits could cause electrical shock and damage the clamp meter.

Fig. 11: Use of clamp for" Frequency" measures

1. Set the rotary switch to Hz.
2. Plug the test leads into the jacks. The red test lead plugs into V/Ω jack and the black test lead plugs into COM jack.
3. Connect the two long ends of test leads with the desired circuit, and then the reading will be displayed with automatic detection of the appropriate range.
4. If the reading is difficult, press the HOLD key to hold the obtained value. To exit from this function press HOLD key again. The analogy barograph isn't affected of enabling of this function.

10. ADP MEASUREMENTS

WARNING

Max. Input for DC 660.0mV. Do not attempt to take any voltage measurement which exceeds the limits. Exceeding the limits could cause electrical shock and damage the clamp meter.

Fig. 12: Use of clamp for" Frequency" measures

1. Set the rotary switch to ADP.
2. Plug the test leads into the jacks. The red test lead plugs into V/Ω jack and the black test lead plugs into COM jack.
3. Connect the two long ends of test leads with the desired circuit, and then the reading will be displayed with automatic detection of the appropriate range.
4. If the reading is difficult, press the HOLD key to hold the obtained value. To exit from this function press HOLD key again. The analogy barograph isn't affected of enabling of this function.

11. CAPACITANCE MEASUREMENTS

WARNING

Before taking any in circuit or capacitance measurement, remove power from the circuit being tested and discharge all capacitors. Use the short test lead pair for measurement in order to reduce the stray capacitance. Before connecting the test capacitor, note the display, which may show a reading other than zero whenever the range is changed. Subtract this offset reading from the test result of a capacitor to obtain the true value. Connect the test capacitor to the input clamps noting the polarity connections when required.

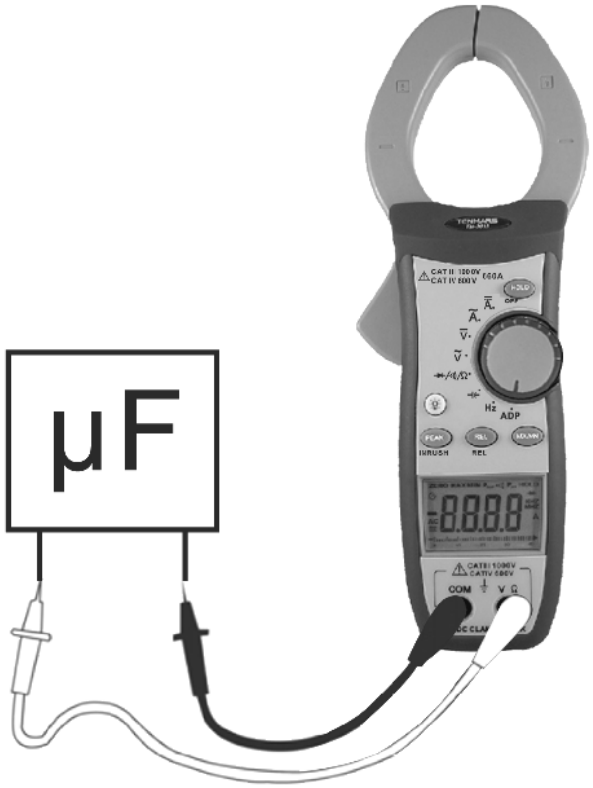


Fig. 11: Use of clamp for" Frequency" measures

1. Set the rotary switch to $\dashv\vdash$.
2. Plug the test leads into the jacks. The red test lead plugs into V/Ω jack and the black test lead plugs into COM jack.
3. Connect the test leads to the capacitor terminals taking care of the shown polarity. The capacitance value will be displayed with automatic detection of the range.
4. The message "**OL**" means that the voltage exceeds the measuring limits. In this case disconnect the test leads from the circuit under test to avoid damaging the instrument or endanger your own safety.
5. In order to obtain an accurate reading. A capacitor must be discharge the capacitor the chip has a built-in discharge mode to automatically discharge the capacitor. In discharge mode, the LCD displays dIS.C.

12. PREVENTIVE MAINTENANCE

12.1. GENERAL INFORMATION

1. This digital clamp meter is a precision 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 place this meter in high temperature or humidity or expose to direct sunlight.
3. Be sure to turn the meter off after use. For long time storage, remove the battery to avoid leakage of battery liquid that would damage the interior parts.

13. BATTERY REPLACEMENT

When LCD displays the symbol "  " replace battery.

WARNING

Only expert and trained technicians must perform this operation.
Remove the test leads or the conductor under test before performing of battery replacement.

1. Set range switch to OFF position.
2. Remove the test leads or the objects to be tested.
3. Remove the screw from the battery cover, and detach the battery covers from the bottom cover.
4. Remove the low batteries.
5. Replace batteries with new of the same type (9V NEDA 1604 IEC 6F22JIS 006P battery x 1pc.). Make attention to the correct polarity.
6. Replace the battery cover and screw.
7. Don’t disperse used battery in the environment. Use apposite container only.

14. CLEANING

For cleaning the instrument use a soft dry cloth. Never use a wet cloth, solvents or water, etc.

15. CHARACTERISTICS SPECIFICATIONS

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

DC Current of (TM-2013)

Range	Resolution	Accuracy	Overload Protection
66A	0.01A	± (1.5%+10)	**660A rms (60 second)**
660A	0.1A	± (2.0%+5)	

DC Current of **(TM-3014)**

Range	Resolution	Accuracy	Overload Protection
660A	0.1A	± (1.5%+5)	**1200A rms (60 second)**
1200A	1A	± (2.0%+5)	

AC Current of (TM-2012/TM-2013)

Range	Resolution	Accuracy (50~60 Hz)	Overload Protection
66A	0.01A	± (2.0%+10)	**660A rms (60 second)**
660A	0.1A	± (2.0%+5)	

AC Current of **(TM-3012/TM-3014)**

Range	Resolution	Accuracy (50~60 Hz)	Overload Protection
660A	0.1A	± (1.5%+10)	**1200A rms (60 second)**
1200A	1A	± (1.5%+5)	

DC Voltage

Range	Resolution	Accuracy	Input impedance	Overload Protection
6.6V	1mV	±(0.5%rdg + 3 dgt)	11MΩ	DC 1000V AC750Vrms
66V	10mV		10MΩ	
660V	100mV			
1000V	1V	±(0.8%rdg + 3 dgt)		

AC voltage

Range	Resolution	Accuracy (50 ~ 500Hz)	Input Impedance	Overload Protection
6.6V	1mV	±(1.2%rdg + 3 dgt)	11MΩ	DC 1000V AC750Vrms
66V	10mV		10MΩ	
660V	100mV			
750V	1V	±(1.5%rdg +4dgt)		

AC voltage (TRUE RMS: from 10% to 100% of the range)

Range	Resolution	Accuracy	Input Impedance	Overload Protection
6.6V	1mV	±(1.2%+10)50 Hz~500 Hz ± (1.5%+10)500 Hz~1KHz	11MΩ	DC 1000V AC750Vrms
66V	10mV		10MΩ	
660V	100mV			
750V	1V	±(1.5%+5)50Hz~500 Hz ±(2.0%+5)500 Hz~1KHz		

■ Input Impedance: 10MΩ// less than 100Pf.
Crest factor : >3:1.

Resistance

Range	Resolution	Accuracy	Max. Open Loop voltage	Overload protection
660Ω	0.1Ω	±(1.0% rdg + 5 dgt)	About 3.0VDC	DC 1000V AC750Vrms
6.6KΩ	1Ω	±(1.0% rdg + 3 dgt)	About 0.45VDC	
66 KΩ	10Ω			
660 KΩ	100Ω			
6.6MΩ	1 KΩ			
66MΩ	10KΩ	±(3.0% rdg + 3 dgt)		

Continuity test

Range	Resolution	Buzzer	Max. Open Voltage	Overload Protection
	0.1Ω	<35Ω	About 1.2V	DC 1000V AC750Vrms

Diode test

Range	Resolution	Max. Open Loop voltage	Overload Protection
	10mV	About 3.0VDC	DC 1000V AC750Vrms

Frequency" tests

Range	Resolution	Accuracy	Sensitivity	Overload Protection
660HZ	0.1HZ	±(0.5% rdg + 3dgt)	>1.5VACrms <5VACrms	**DC 1000V AC750Vrms**
6.6KHZ	1HZ			
66KHZ	10HZ			
100KHZ	100HZ			

Minimum pulse duration: 25ns

30% ≤ Duty Cycle ≤70%

Capacitance Test

Range	Resolution	Accuracy	Overload Protection
6.6uF	0.001uF	±(2.0% rdg + 8dgt)	**DC 1000V AC750Vrms**
66uF	0.01uF		
660uF	0.1uF		
6.6mF	1uF	±(5.0% rdg + 20dgt)	
66mF	10uF		

16. SAFETY

Insulation: Class 2, double reinforced insulation

Pollution: Level 2

For inside use, maxes height: 2000m

Over voltage: IEC61010-1 for CAT III 1000V CAT IV 600V
IEC61010-2-032 for CATIII 1000V/660A and CAT IV600V/660A (TM-2012/2013)
IEC61010-2-032 for CAT III 1000V/1200A and CATIV 600V/1200A (TM-3012/TM-3014)

17. GENERAL DATA

Mechanical characteristics

Jaws opening:	40mm(TM-2012/2013) 50mm (TM-3012/3014)
Max conductor size:	42mm(TM-2012/2013) 52mm (TM-3012/3014)

Supply

Batteries type:	V NEDA 1604 IEC 6F22JIS 006P battery x 1pc.
Low battery indication:	Symbol "[-+]" is displayed when battery level is too low.
Battery life:	About 200 hours.
Dimension:	
Size:	M-2012/2013➔ 252mm(L) x 91mm(W) x 47mm(H). TM-3012/3014➔ 266mm(L)x93mm(W)x47mm(H).
Weight:	TM-2012/2013About 540g. (Including battery) TM-3012/3014 about 580g. (Including battery)

Display

Characteristics:	5/6 LCD with maximum reading 6600 units plus decimal point signs.
Sample rate:	2 times/sec.
Conversion mode:	mean value

18. ENVIRONMENTAL CONDITIONS

18.1.1. Climatic conditions

Reference temperature:	23° ± 5°C
Operating temperature:	5 to 40 °C
Operating humidity:	<80% relative humidity for temperatures up to 31 °C decreasing linearly to 50% relative humidity at 40 °C.
Storage temperature:	-10 to 60 °C
Storage humidity:	0 to 80% RH

19. EMC

This tester was designed in accordance with EMC Standards in force and its compatibility has been tested in accordance with EN61326-1 (2006).

20. STANDARD ACCESSORIES

The accessories contained inside the packaging are the following Standard Accessories: User's manual, 9V battery, and Test Leads， Carrying case.

21. END OF LIFE

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

TENMARS YFE

Professional Electrical and Environment Test & Measurement Instruments:

LED light meter, Temperature &Humidity meter
Infrared Thermometer, Sound level meter
Light meter, EMF meter, UV Light meter, RF meter
Hot wire Anemometer, Co meter
Anemometer, Lan cable tester, Co2 meter
Solar power meter, Radiation meter,
Clamp meter, Multimeter
Phase Rotation tester, Digital Insulation tester

Our products of high quality are selling well all over the world

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