

**TECHNI-PRO**

# **True RMS Industrial Digital Multimeter User Manual**



**Please read this manual before switching the unit on.  
Important safety information inside.**

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## 1. Introduction

This meter measures AC/DC Voltage, AC/DC Current, Resistance, Capacitance, Frequency (electrical & electronic), Duty Cycle, Diode Test, and Continuity plus Thermocouple Temperature. It can store and recall data. It features a waterproof, rugged design for heavy duty use. This meter can send out data wirelessly and be linked to PC. Proper use and care of this meter will provide many years of reliable service.

## 2. Safety



This symbol adjacent to another symbol, terminal or operating device indicates that the operator must refer to an explanation in the Operating Instructions to avoid personal injury or damage to the meter.



This **WARNING** symbol indicates a potentially hazardous situation, which if not avoided, could result in death or serious injury.



This **CAUTION** symbol indicates a potentially hazardous situation, which if not avoided, may result damage to the product.



This symbol advises the user that the terminal(s) so marked must not be connected to a circuit point at which the voltage with respect to earth ground exceeds (in this case) 1000 VAC or VDC.



This symbol adjacent to one or more terminals identifies them as being associated with ranges that may, in normal use, be subjected to particularly hazardous voltages. For maximum safety, the meter and its test leads should not be handled when these terminals are energized.



This symbol indicates that a device is protected throughout by double insulation or reinforced insulation.

### PER IEC1010 OVERVOLTAGE INSTALLATION CATEGORY OVERVOLTAGE CATEGORY I

Equipment of **OVERVOLTAGE CATEGORY I** is equipment for connection to circuits in which measures are taken to limit the transient over voltages to an appropriate low level.

**Note** – Examples include protected electronic circuits.

### 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

## 3. Safety Instructions

This meter has been designed for safe use, but must be operated with caution. The rules listed below must be carefully followed for safe operation.

- **NEVER** apply voltage or current to the meter that exceeds the specified maximum:

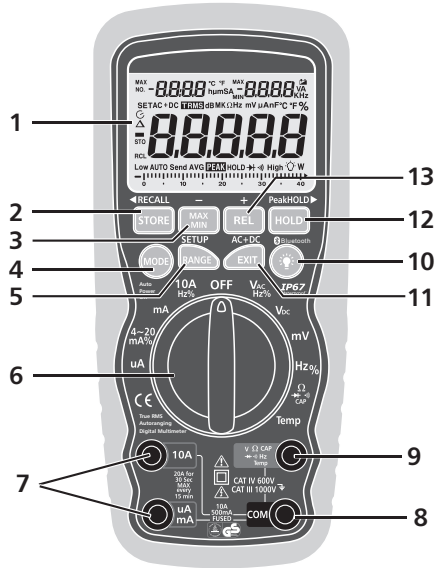
Input Protection Limits	
Function	Maximum Input
V DC or V AC	1000VDC/AC rms
mA AC/DC	500mA 1000V fast acting fuse
A AC/DC	10A 1000V fast acting fuse (20A for 30 seconds max every 15 minutes)
Frequency, Resistance, Capacitance, Duty Cycle, Diode Test, Continuity	1000VDC/AC rms
Temperature	1000VDC/AC rms
Surge Protection: 8kV peak per IEC 61010	

- **USE EXTREME CAUTION** when working with high voltages.
- **DO NOT** measure voltage if the voltage on the "COM" input jack exceeds 1000V above earth ground.
- **NEVER** connect the meter leads across a voltage source while the function switch is in the current, resistance, or diode mode. Doing so can damage the meter.
- **ALWAYS** discharge filter capacitors in power supplies and disconnect the power when making resistance or diode tests.
- **ALWAYS** turn off the power and disconnect the test leads before opening the covers to replace the fuse or batteries.
- **NEVER** operate the meter unless the back cover and the battery and fuse covers are in place and fastened securely.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

## 4.Controls and Jacks

- 1-50,000 count LCD display
- 2-STORE(<RECALL) button
- 3-MAX/MIN (-)button
- 4-MODE button
- 5-RANGE(SETUP) button
- 6-Function switch
- 7-mA,  $\mu$ A and 10A input jacks
- 8-COM input jack
- 9-Positive input jack
- 10-☀️: Backlight button
- 11-EXIT(AC+DC) button
- 12-HOLD(PEAKHOLD>) button
- 13-REL(+ ) button

**Note:** Tilt stand and battery compartment are on rear of unit.



## 5.Symbols and Annunciators

- ☐ Continuity
- ➔ Diode test
- 🔋 Battery status
- n nano ( $10^{-9}$ ) (capacitance)
- $\mu$  micro ( $10^{-6}$ ) (amps, cap)
- m milli ( $10^{-3}$ ) (volts, amps)
- A Amps
- K kilo ( $10^3$ ) (ohms)
- F Farads (capacitance)
- M mega ( $10^6$ ) (ohms)
- $\Omega$  Ohms
- PEAK** Peak Hold
- Hz Hertz (frequency)
- V Volts
- % Percent (duty ratio)
- REL Relative
- AC Alternating current
- AUTO Autoranging
- DC Direct current
- HOLD Display hold

- °F Degrees Fahrenheit
- °C Degrees Centigrade
- MAX Maximum
- MIN Minimum
- NO. Serial number
- S second
- SET Set up parameter
- left auxiliary display
- right auxiliary display
- AC+DC Alternating current+Direct current
- TRMS True RMS
- STO Store

- RCL Recall
- AUTO Auto Range
- ⌚ Timing symbol
- ☀️ Backlight
- ▬ Bargraph



## 6. Operating Instructions

**WARNING:** Risk of electrocution. High-voltage circuits, both AC and DC, are very dangerous and should be measured with great care.

- ALWAYS turn the function switch to the OFF position when the meter is not in use.
- If “OL” appears in the display during a measurement, the value exceeds the range you have selected. Change to a higher range.

### 6-1. DC Voltage Measurements

**CAUTION:** Do not measure DC voltages if a motor on the circuit is being switched ON or OFF. Large voltage surges may occur that can damage the meter.

- Set the function switch to the green  $V_{DC}$  position.
- Insert the black test lead banana plug into the negative **COM** jack. Insert the red test lead banana plug into the positive **V** jack.
- Touch the black test probe tip to the negative side of the circuit. Touch the red test probe tip to the positive side of the circuit.
- Read the voltage in the display.

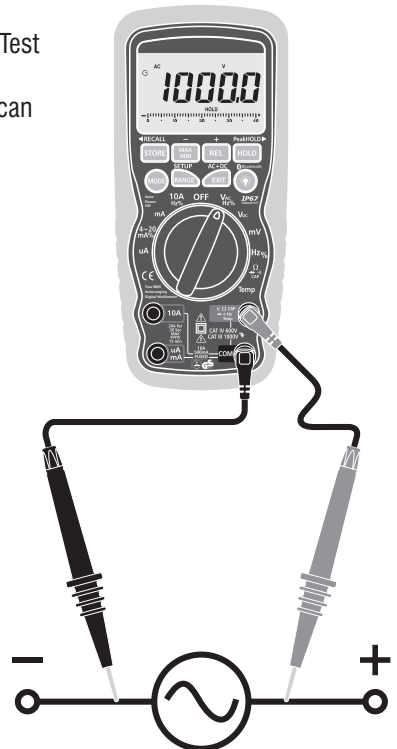


## 6-2.AC Voltage (Frequency, Duty Cycle) Measurements

**WARNING:** Risk of Electrocution. The probe tips may not be long enough to contact the live parts inside some 240V outlets for appliances because the contacts are recessed deep in the outlets. As a result, the reading may show 0 volts when the outlet actually has voltage on it. Make sure the probe tips are touching the metal contacts inside the outlet before assuming that no voltage is present.

**CAUTION:** Do not measure AC voltages if a motor on the circuit is being switched ON or OFF. Large voltage surges may occur that can damage the meter.

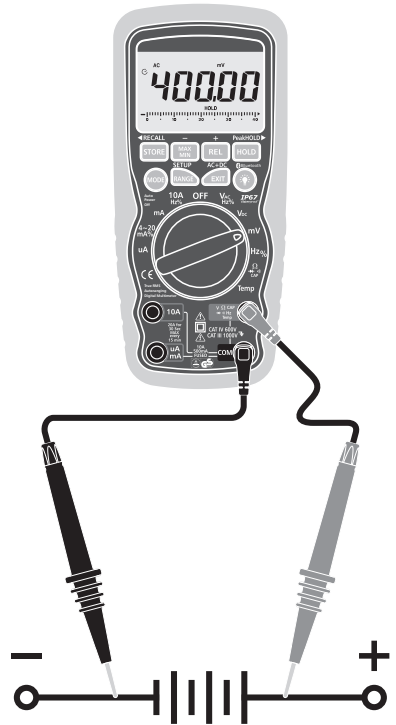
- Set the function switch to the green  $V_{AC}/Hz/\%$  position.
- Insert the black test lead banana plug into the negative **COM** jack. Insert red test lead banana plug into the positive **V** jack.
- Touch the black test probe tip to the neutral side of the circuit. Touch the red test probe tip to the “hot” side of the circuit.
- Read the voltage in the main display and the frequency in the right auxiliary display
- Press the **MODE** button to indicate “Hz”.
- Read the frequency in the main display.
- Press the **MODE** button again to indicate “%”.
- Read the % of duty cycle in the main display.
- Press EXIT for 2 seconds into the function of AC+DC. Test DC and AC TURE Rms.
- When the voltage of VAC > 0.2V, the frequency of VAC can be read synchronously in the right auxiliary display



### 6-3. mV Voltage Measurements

**CAUTION:** Do not measure mV voltages if a motor on the circuit is being switched ON or OFF. Large voltage surges may occur that can damage the meter.

- Set the function switch to the **mV** position.
- Press the MODE button to indicate “**DC**” or “**AC**”, or in AC range press **EXIT** for two seconds and chose ”AC+DC”
- Insert the black test lead banana plug into the negative **COM** jack. Insert the red test lead banana plug into the positive **V** jack.
- Touch the black test probe tip to the negative side of the circuit.
- Touch the red test probe tip to the positive side of the circuit.
- Read the mV voltage in the main display.
- When mVac > 2mV, the frequency of mVac can be read synchronously in the right auxiliary display

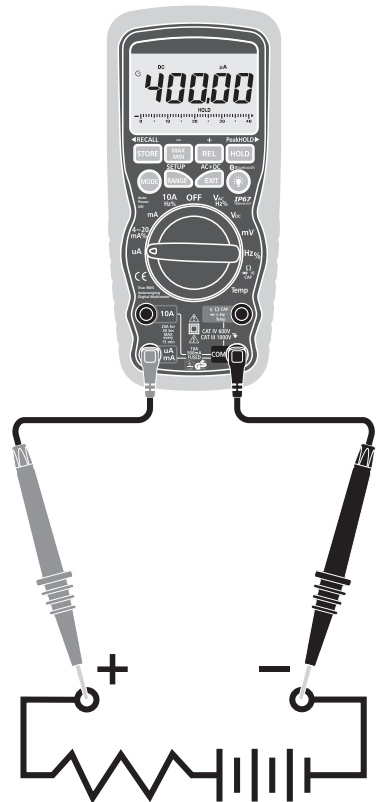




## 6-4. DC Current Measurements

**CAUTION:** Do not make 20A current measurements for longer than 30 seconds. Exceeding 30 seconds may cause damage to the meter and/or the test leads.

- Insert the black test lead banana plug into the negative **COM** jack.
- For current measurements up to  $5000\mu\text{A}$  DC, set the function switch to the  **$\mu\text{A}$**  position and insert the red test lead banana plug into the  **$\mu\text{A}/\text{mA}$**  jack.
- For current measurements up to 500mA DC, set the function switch to the **mA** position and insert the red test lead banana plug into the  **$\mu\text{A}/\text{mA}$**  jack.
- For current measurements up to 20A DC, set the function switch to the **10A/HZ/%** position and insert the red test lead banana plug into the **10A** jack.
- Press the **MODE** button to indicate “**DC**” on the display.
- Remove power from the circuit under test, then open up the circuit at the point where you wish to measure current.
- Touch the black test probe tip to the negative side of the circuit.  
Touch the red test probe tip to the positive side of the circuit.
- Apply power to the circuit.
- Read the current in the display.

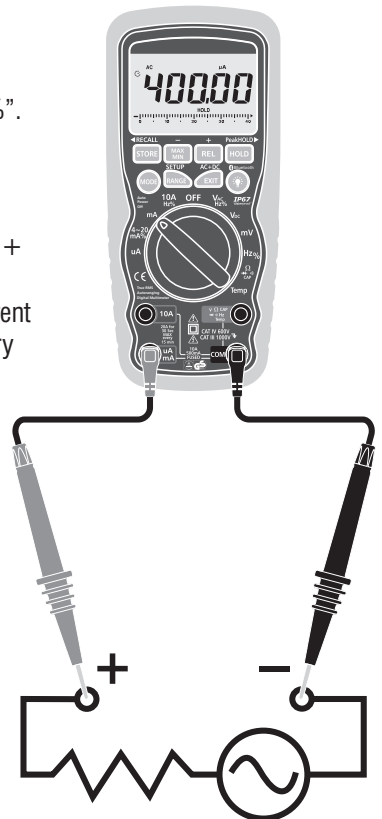


## 6-5.AC Current (Frequency, Duty Cycle) Measurements

**CAUTION:** Do not make 20A current measurements for longer than 30 seconds.

Exceeding 30 seconds may cause damage to the meter and/or the test leads.

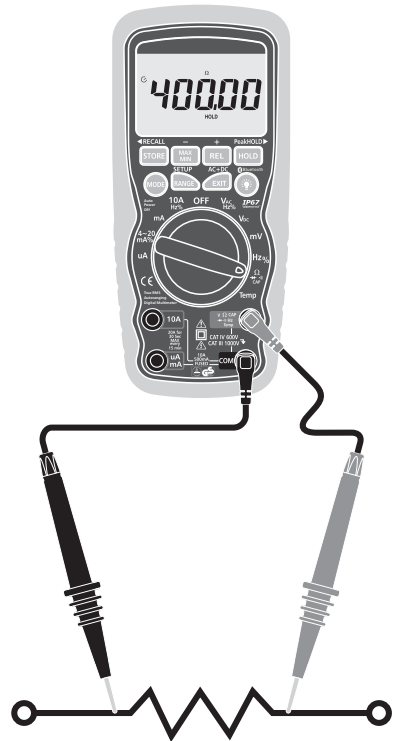
- Insert the black test lead banana plug into the negative **COM** jack.
- For current measurements up to  $5000\mu\text{A}$  AC, set the function switch to the  **$\mu\text{A}$**  position and insert the red test lead banana plug into the  **$\mu\text{A}/\text{mA}$**  jack.
- For current measurements up to  $500\text{mA}$  AC, set the function switch to the **mA** position and insert the red test lead banana plug into the  **$\mu\text{A}/\text{mA}$**  jack.
- For current measurements up to  $20\text{A}$  AC, set the function switch to the **10A/HZ/%** position and insert the red test lead banana plug into the **10A** jack.
- Press the **MODE** button to indicate “**AC**” on the display.
- Remove power from the circuit under test, then open up the circuit at the point where you wish to measure current.
- Touch the black test probe tip to the neutral side of the circuit.  
Touch the red test probe tip to the “hot” side of the circuit.
- Apply power to the circuit.
- Read the current in the display. In the  $10\text{AAC}$  range, right auxiliary display frequency.
- Press and hold the **MODE** button to indicate “**Hz**”.
- Read the frequency in the display.
- Momentarily press the **MODE** button again to indicate “**%**”.
- Read the % duty cycle in the display.
- Press and hold the **MODE** button to return to current measurement.
- Press **EXIT** for 2 seconds to enter into the function of AC+DC. Test DC and AC TURE Rms.
- When  $u\text{Aac} > 2\text{mA}$ ,  $\text{mAac} > 2\text{mA}$ ,  $10\text{Aac} > 0.2\text{A}$ , the current frequency can be read synchronously in the right auxiliary display.



## 6-6. Resistance Measurements

**WARNING:** To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any resistance measurements. Remove the batteries and unplug the line cords.

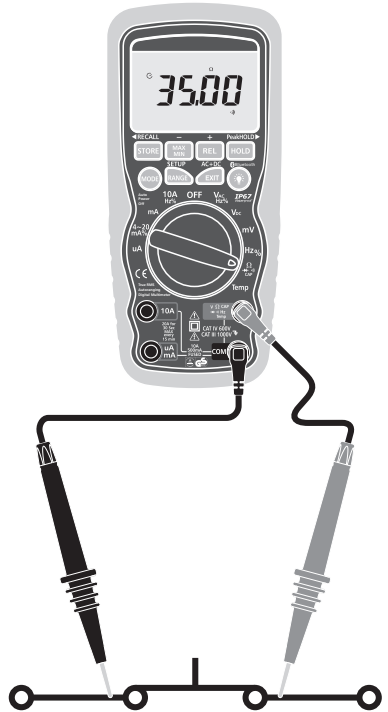
- Set the function switch to the  $\Omega$  CAP  $\rightarrow$   $\infty$  position.
- Insert the black test lead banana plug into the negative **COM** jack.
- Insert the red test lead banana plug into the positive  $\Omega$  jack.
- Press the **MODE** button to indicate  $\Omega$  on the display.
- Touch the test probe tips across the circuit or part under test, It is best to disconnect one side of the part under test so the rest of the circuit will not interfere with the resistance reading.
- Read the resistance in the display.



## 6-7. Continuity Check

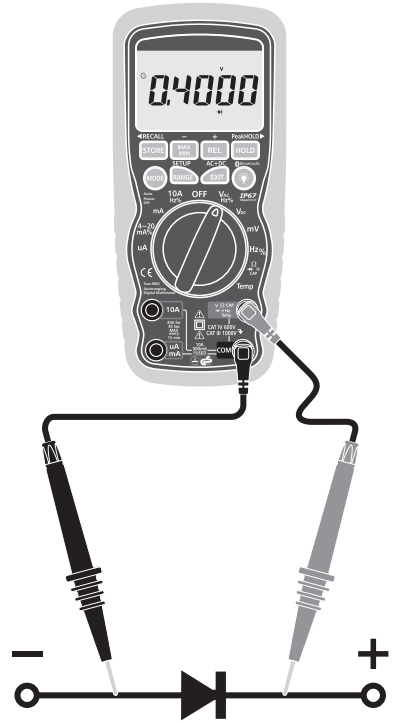
**WARNING:** To avoid electric shock, never measure continuity on circuits or wires that have voltage on them.

- Set the function switch to the  $\Omega$  CAP  $\rightarrow$   $\rightarrow$  position.
- Insert the black test lead banana plug into the negative **COM** jack. Insert the red test lead banana plug into the positive  $\Omega$  jack.
- Press the **MODE** button to indicate  $\rightarrow$  and  $\Omega$  on the display.
- Touch the test probe tips to the circuit or wire you wish to check.
- If the resistance is less than approximately 35  $\Omega$ , the audible signal will sound. If the circuit is open, the display will indicate “OL”.



## 6-8. Diode Test

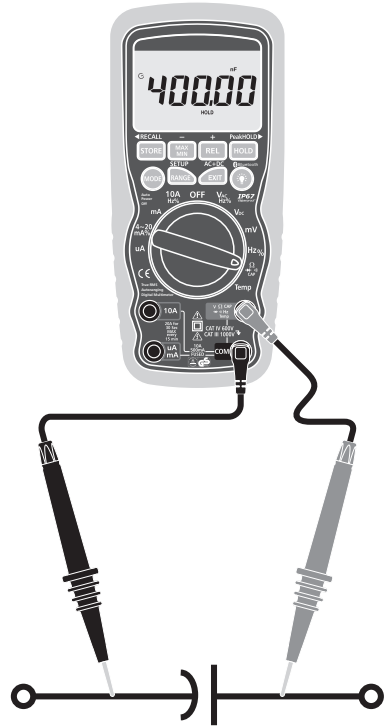
- Set the function switch to the  $\Omega$  CAP  $\rightarrow$   $\rightarrow$  position.
- Insert the black test lead banana plug into the negative **COM** jack and the red test banana plug into the positive **V** jack.
- Press the **MODE** button to indicate  $\rightarrow$  and **V** on the display.
- Touch the test probes to the diode under test. Forward voltage will typically indicate 0.400 to 0.700V. Reverse voltage will indicate “OL”. Shorted devices will indicate near 0V and open device will indicate in both polarities “OL”.



## 6-9. Capacitance Measurements

**WARNING:** To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any capacitance measurements. Remove the batteries and unplug the line cords.

- Set the rotary function switch to the  $\Omega$  CAP  $\rightarrow$   $\infty$  position.
- Insert the black test lead banana plug into the negative COM jack.
- Insert the red test lead banana plug into the positive V jack.
- Press the MODE button to indicate “F”
- Touch the test leads to the capacitor to be tested.
- Read the capacitance value in the display



## 6-10. Temperature Measurements

- Set the function switch to the **Temp** position.
- Insert the Temperature Probe into the input jacks, making sure to observe the correct polarity.
- Press the **MODE** button to indicate “°F” or “°C”
- Touch the Temperature Probe head to the part whose temperature you wish to measure. Keep the probe touching the part under test until the reading stabilizes (about 30 seconds).
- Read the temperature in the display.

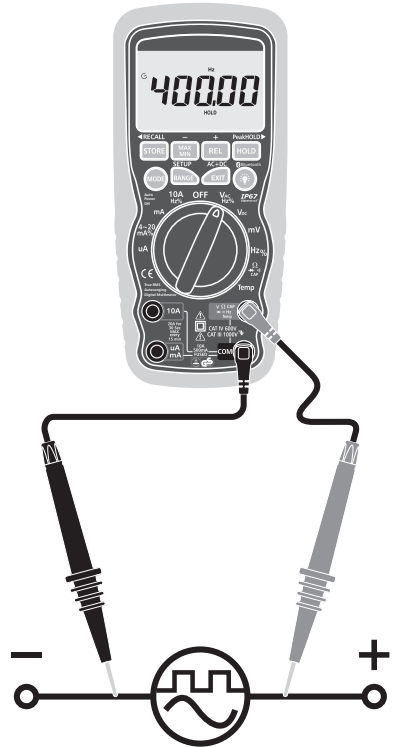
**Note:** The temperature probe is fitted with a type K mini connector.

A mini connector to banana connector adaptor is supplied for connection to the input banana jacks.



### 6-11. Frequency (Duty Cycle) Measurements (Electronic)

- Set the rotary function switch to the **Hz/%** position.
- Insert the black lead banana plug into the negative **COM** jack and the red test lead banana plug into the positive **Hz** jack.
- Touch the test probe tips to the circuit under test.
- Read the frequency on the display.
- Press the **MODE** button to indicate “%”.
- Read the % duty cycle in the display.



### 6-12. %4–20mA Measurements

- Set up and connect as described for DC mA measurements.
- Set the rotary function switch to the 4-20mA% position.
- The meter will display loop current as a % with 0mA = -25%, 4mA = 0%, 20mA = 100%, and 24mA = 125%.



### 6-13. Autoranging/Manual Range Selection

When the meter is first turned on, it automatically goes into AutoRanging. This automatically selects the best range for the measurements being made and is generally the best mode for most measurements. For measurement situations requiring that a range be manually selected, perform the following:

- Press the **RANGE** key. The “**AUTO**” display indicator will turn off.
- Press the **RANGE** key to step through the available ranges until you select the range you want.
- To exit the Manual Ranging mode and return to Auto ranging, press **EXIT**

**Note:** Manual ranging does not apply for the Temperature functions.

### 6-14. MAX/MIN

- Press the MAX/MIN key to activate the **MAX/MIN** recording mode. The display icon “**MAX**” will appear. The meter left auxiliary display will display and hold the maximum reading and will update only when a new “max” occurs. The display icon “MIN” will appear. The right auxiliary display meter will display and hold the minimum reading and will update only when a new “min” occurs.
- To exit **MAX/MIN** mode press **EXIT**


### 6-15. Relative Mode

The relative measurement feature allows you to make measurements relative to a stored reference value. A reference voltage, current, etc. can be stored and measurements made in comparison to that value. The displayed value is the difference between the reference value and the measured value.

**Note:** Relative mode does not operate in the 4-20mA function.

- Perform the measurement as described in the operating instructions.
- Press the **REL** button to store the reading in the display and the “**REL**” indicator will appear on the display.
- Left auxiliary display displays the margin of initial value and the current value.  
Right auxiliary display displays the initial reading. Main display the reading after REL TEST.
- Press the **EXIT** button to exit the relative mode.

### 6-16. Display Backlight

Press the  key to turn the backlight on. The backlight will automatically turn off after SET time. Press the **EXIT** button to exit the backlight on mode.

### 6-17. HOLD

The hold function freezes the reading in the display. Press the **HOLD** key momentarily to activate or to exit the **HOLD** function.

## 6-18. PEAK HOLD

The Peak Hold function captures the peak AC or DC voltage or current. The meter can capture negative or positive peaks as fast as 1 millisecond in duration. Momentarily press the **PEAK** button, "**PEAK**" and "**MAX**" will display in left auxiliary display. "**MIN**" will display in right auxiliary display. The meter will update the display each time a lower negative peak occurs. Press the **EXIT** button to exit the PEAK HOLD mode. Auto Power Off feature will be disabled automatically in this mode.

## 6-19. Data Record (Store/Recall)

### • STORE function

In the current testing mode, press "**STORE**" button one time, enter into STORE function.

On the left upper corner of LCD shows NO XXXX, which states current storage serial number. Then press "**PeakHOLD**" button to change into the initial serial number 0000. (Press again it will change back).

On the right upper corner of LCD shows XXXX, which states how many current storage is used.

Press "**STORE**" button again, enter into recording interval time set up function.

On the left upper shows 0000 S, which states recording interval time; using button "+" & "-" to select, the range is 0~255 seconds.

When the recording interval time is 0000 S, then press "**STORE**" button again to change into manual recording. Press the **STORE** button again to record once.

When the recording interval time is 1~255 S, then press "**STORE**" button again to start recording automatically from 0000.

Recording times shows on the left upper corner, data shows on the right upper corner (Due to digitally limitation, there is only display preceding four numbers)

To finish above STORE function, press "**EXIT**" button shortly.

If you expect to clear all memory data:

While power on, hold "**EXIT**" button, and switch from OFF to random and then release "**EXIT**" button, the LCD will flash thrice and buzzer thrice too, which means all memory data is cleared.

• **RECALL function**

Press “**STORE**” button two seconds to enter into RECALL function.

On the left upper corner shows XXXX , which states current storage serial number. On the right upper corner shows XXXX, which states how many current storage is used.

Press “**PeakHOLD**” button shortly once to scan data from 0000 to XXXX continuously.  
Press again then scan again.

Use button “+” & “-” to select serial number XXXX on the left upper corner and record data on the right upper corner.

To finish above RECALL function, press “**EXIT**” button.

## 6-20.Parameter Set Up(SET)

- Press the **"RANGE"** button Second seconds to enter into SET function. Then press shortly once, change on setting content.

Setting content includes(in sequence):

- A: Upper limit buzzer alarm
- B: Lower limit buzzer alarm
- C: Auto power off time
- D: Turn off the sound
- E: Backlit time

Use "**◀**", "**+**", "**-**", "**▶**" buttons to select the parameter.

- Press the **"SETUP"** button continuously to switch to the setting content until you exit the setting and enter the test mode, and the updated setting content will be saved. If the **"EX"** button is pressed during this time, not all settings can be saved.

## 6-21.AC+DC

In all the measuring mode VAC, mV(AC), 10A(AC), mA(AC), uA(AC), press **"EXIT"** button for 2seconds to enter into AC+DC testing. The precision is the same as AC measurement. LCD shows AC+DC signal. Press **"EXIT"** button to exit.

## 6-22.Low Battery Indication

When the " " icon appears alone in the display, the battery should be replaced.

## 6-23.Calibration Method

There are two methods to use MCU calibration: manual panel keyboard method or using wireless (Bluetooth) to connect PC. (Only for manufacturing, measurement and calibration, operation method is described in another document).

## 7. Maintenance

**WARNING:** To avoid electric shock, disconnect the test leads from any source of voltage before removing the back cover or the battery or fuse covers.

**WARNING:** To avoid electric shock, do not operate your meter until the battery and fuse covers are in place and fastened securely.

This MultiMeter is designed to provide years of dependable service, if the following care instructions are performed:

- **KEEP THE METER DRY.** If it gets wet, wipe it off.
- **USE AND STORE THE METER IN NORMAL TEMPERATURES.** Temperature extremes can shorten the life of the electronic parts and distort or melt plastic parts.
- **HANDLE THE METER GENTLY AND CAREFULLY.** Dropping it can damage the electronic parts or the case.
- **KEEP THE METER CLEAN.** Wipe the case occasionally with a damp cloth. DO NOT use chemicals, cleaning solvents, or detergents.
- **USE ONLY FRESH BATTERIES OF THE RECOMMENDED SIZE AND TYPE.** Remove old or weak batteries so they do not leak and damage the unit.
- **IF THE METER IS TO BE STORED FOR A LONG PERIOD OF TIME,** the batteries should be removed to prevent damage to the unit.

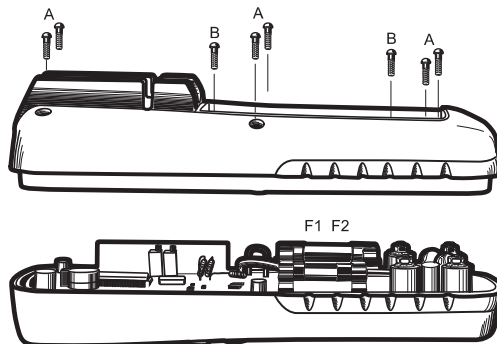
### 7-1. Battery Installation

**WARNING:** To avoid electric shock, disconnect the test leads from any source of voltage before removing the battery cover.

- Turn power off and disconnect the test leads from the meter.
- Open the rear battery cover by removing two screws (B) using a Phillips head screwdriver.
- Insert the battery into battery holder, observing the correct polarity.
- Put the battery cover back in place. Secure with the screws.

**WARNING:** To avoid electric shock, do not operate the meter until the battery cover is in place and fastened securely.

**NOTE:** If your meter does not work properly, check the fuses and batteries to make sure that they are still good and that they are properly inserted.



## 7-2.Replacing The Fuses

**WARNING:** To avoid electric shock, disconnect the test leads from any source of voltage before removing the meter cover.

- Disconnect the test leads from the meter.
- Remove the protective rubber holster.
- Remove the battery cover (two “B” screws) and the battery.
- Remove the six “A” screws securing the rear cover.
- Gently remove the old fuse and install the new fuse into the holder.
- Always use a fuse of the proper size and value (0.5A/1000V fast blow for the 500mA range [SIBA 70-172-40], 10A/1000V fast blow for the 20A range [SIBA 50-199-06]).
- Replace and secure the rear cover, battery and battery cover.

**WARNING:** To avoid electric shock, do not operate your meter until the fuse cover is in place and fastened securely.

## 8.Specifications

Function	Range	Resolution	Accuracy
DC Voltage	50mV	0.001mV	$\pm(0.05\% + 20d)$
	500mV	0.01mV	$\pm(0.025\% + 3d)$
	5V	0.0001V	$\pm(0.025\% + 3d)$
	50V	0.001V	$\pm(0.025\% + 3d)$
	500V	0.01V	$\pm(0.03\% + 3d)$
	1000V	0.1V	$\pm(0.03\% + 3d)$

Function	Range	Resolution	Accuracy			
AC			45 to1000 Hz	1to10kHz	10to100KHZ	100to150KHZ
Voltage (AC +DC)	50mV	0.001mV	$\pm(0.5\% + 30d)$	$\pm(1\% + 30d)$	$\pm(4\% + 40d)$	Not spec'd
	500mV	0.01mV	$\pm(1\% + 50d)$	$\pm(2\% + 50d)$	$\pm(5\% + 50d)$	
	5V	0.0001V	$\pm(0.5\% + 30d)$	$\pm(1\% + 30d)$	$\pm(4\% + 40d)$	Not spec'd
	50V	0.001V	$\pm(1\% + 50d)$	$\pm(2\% + 50d)$	$\pm(5\% + 50d)$	
	500V	0.01V	$\pm(0.8\% + 30d)$	$\pm(1.2\% + 30d)$	Not spec'd	Not spec'd
	1000V	0.1V	$\pm(1\% + 50d)$	$\pm(2\% + 80d)$		
All AC voltage ranges are specified from 5% of range to 100% of range						

Function	Range	Resolution	Accuracy
DC Current	500 $\mu$ A	0.01 $\mu$ A	$\pm(0.1\% + 20d)$
	5000 $\mu$ A	0.1 $\mu$ A	$\pm(0.1\% + 5d)$
	50mA	0.001mA	$\pm(0.1\% + 20d)$
	500mA	0.01mA	$\pm(0.2\% + 5d)$
	10A	0.001A	$\pm(0.3\% + 10d)$
(20A: 30 sec max with reduced accuracy)			

Function	Range	Resolution	Accuracy			
AC Current (AC + DC)			45 to 1000 Hz	1 to 10kHz	10 to 100KHZ	100 to 150KHZ
	500 $\mu$ A	0.01 $\mu$ A	$\pm(0.6\% + 30d)$ $\pm(1\% + 50d)$	$\pm(1\% + 30d)$ $\pm(2\% + 50d)$	$\pm(4\% + 40d)$ $\pm(5\% + 50)$	Not spec'd
	5000 $\mu$ A	0.1 $\mu$ A	$\pm(0.6\% + 30d)$ $\pm(1\% + 50d)$	$\pm(1\% + 30d)$ $\pm(2\% + 50d)$	$\pm(4\% + 40d)$ $\pm(5\% + 50)$	Not spec'd
	50mA	0.001mA	$\pm(0.6\% + 30d)$ $\pm(1\% + 50d)$	$\pm(1\% + 30d)$ $\pm(2\% + 50d)$	$\pm(4\% + 40d)$ $\pm(5\% + 50)$	Not spec'd
	500mA	0.01mA	$\pm(0.6\% + 30d)$ $\pm(1\% + 50d)$	$\pm(1.2\% + 30d)$ $\pm(2\% + 50d)$	$\pm(4\% + 40d)$ $\pm(5\% + 50)$	Not spec'd
	10A	0.001A	$\pm(1.0\% + 30d)$ $\pm(2\% + 50d)$	$\pm(1.5\% + 30d)$ $\pm(2\% + 50d)$	Not spec'd	Not spec'd
(20A: 30 sec max with reduced accuracy)						
All AC voltage ranges are specified from 5% of range to 100% of range full scale) if non sine wave in the wave crest less than 3.0.						


Function	Range	Resolution	Accuracy
Resistance	50Ω	0.001Ω	±(0.2% + 20 d)
	500Ω	0.01Ω	±(0.08% + 10 d)
	5kΩ	0.0001kΩ	±(0.08% + 3d)
	50kΩ	0.001kΩ	
	500kΩ	0.01kΩ	±(0.08% + 3d)
	5MΩ	0.001MΩ	±(0.2% + 10 d)
	50MΩ	0.001MΩ	±(2% + 20 d)
Capacitance	5nF	0.001nF	±(1.5% + 5d)
	50nF	0.01nF	
	500nF	0.1nF	
	5μF	0.001μF	±(1.5% + 5d)
	50μF	0.01μF	
	500μF	0.1μF	
	5mF	0.001mF	±(3% + 30d)
	50mF	0.01mF	
Frequency (electronic)	50Hz	0.001Hz	±(0.02% + 3 d)
	500Hz	0.01Hz	
	5kHz	0.0001kHz	
	50kHz	0.001kHz	
	500kHz	0.01kHz	
	5MHz	0.0001MHz	
	50MHz	0.001MHz	
	100MHz	0.01MHz	Not specified
	Sensitivity: 0.8V rms min. @ 20% to 80% duty cycle and <100kHz; 5Vrms min @ 20% to 80% duty cycle and > 100kHz.		
Frequency (electrical)	40.00HZ-10KHZ	0.01HZ-0.001KHZ	±(0.1% )
	Sensitivity:0.02Vrms, 20uArms		
Duty Cycle	0.1 to 99.90%	0.01%	±(1.2% reading + 2 digits)
	Pulse width: 100μs - 100ms, Frequency: 5Hz to 150kHz		
Temp (type-K)	-58 to 2462°F	0.1°F	±(0.5% reading + 4.5°F)
	-50 to 1350°C	0.1°C	±(0.5% reading + 2.5°C)
	(probe accuracy not included)		
4-20mA%	-25 to 125%	0.01%	±50 digits
	0mA=-25%, 4mA=0%, 20mA=100%, 24mA=125%		



**Note:** Accuracy specifications consist of two elements:

- (% reading) – This is the accuracy of the measurement circuit.
- (+ digits) – This is the accuracy of the analog to digital converter.

## 9. General Specifications

<b>Store Capacitance</b>	9999
<b>Enclosure</b>	Double molded, waterproof
<b>Shock (Drop Test)</b>	6.5 feet (2 meters)
<b>Diode Test</b>	Test current of 0.9mA maximum, open circuit voltage 2.8V DC typical
<b>Continuity Check</b>	Audible signal will sound if the resistance is less than 35Ω (approx.), Test current <0.35mA
<b>PEAK</b>	Captures peaks > 1ms
<b>Temperature Sensor</b>	Requires type K thermocouple
<b>Input Impedance</b>	>10MΩ VDC & >9MΩ VAC
<b>AC Response</b>	True RMS
<b>AC True RMS</b>	The term stands for “Root-Mean-Square,” which represents the method of calculation of the voltage or current value. Average responding multimeters are calibrated to read correctly only on sine waves and they will read inaccurately on non-sine wave or distorted signals. True RMS meters read accurately on either type of signal.
<b>ACV Bandwidth</b>	50Hz to 100kHz
<b>Crest Factor</b>	≤3 at full scale up to 500V, decreasing linearly to ≤1.5 at 1000V
<b>Display</b>	50,000 count backlit liquid crystal with bar-graph
<b>Overrange indication</b>	“OL” is displayed
<b>Auto Power Off</b>	15 minutes (approximately) with disable feature
<b>Polarity</b>	Automatic (no indication for positive); Minus (-) sign for negative
<b>Measurement Rate</b>	10 times per second, nominal
<b>Low Battery Indication</b>	“  ” is displayed if battery voltage drops below operating voltage
<b>Battery</b>	One 9 volt (NEDA 1604) battery
<b>Fuses</b>	mA, μA ranges; 0.5A/1000V ceramic fast blow A range; 10A/1000V ceramic fast blow
<b>Operating Temperature</b>	5°C to 40°C (41°F to 104°F)
<b>Storage Temperature</b>	-20°C to 60°C (-4°F to 140°F)
<b>Operating Humidity</b>	Max 80% up to 31°C (87°F) decreasing linearly to 50% at 40°C (104°F)
<b>Storage Humidity</b>	<80%
<b>Operating Altitude</b>	7000ft. (2000meters) maximum.

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<b>Weight</b>	0.753lb (342g) (includes holster).
<b>Size</b>	7.36" x 3.2" x 2.0" (187 x 81 x 50mm) (includes holster)
<b>Safety</b>	This meter is intended for origin of installation use and protected, against the users, by double insulation per EN61010-1 and IEC61010-1 2nd Edition (2001) to Category IV 600V and Category III 1000V; Pollution Degree 2. The meter also meets UL 61010-1, 2nd Edition (2004), CAN/CSA C22.2 No. 61010-1 2nd Edition (2004), and UL 61010B-2-031, 1st Edition (2003)

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