

# AUTO-RANGING MULTIMETER

PART NO: TTIDM1000VAR (..151475)



TO PREVENT SERIOUS INJURY, READ AND UNDERSTAND ALL WARNINGS AND INSTRUCTIONS BEFORE USE.

**OPERATING INSTRUCTIONS**

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# INTRODUCTION

TTIDM1000VAR is a professional auto ranging multimeter. The multimeter comes with the following features:

- AC/DC current measurement up to 10A
- AC voltage measurement up to 750V
- DC voltage measurement up to 1000V
- hFE & EF function
- Diode test
- Data hold
- Audible continuity

## INTENDED USE









The multimeter is to be used only for electrical inspection within the specifications the machine is rated for. Failure to use the machine within the specifications may result in serious injury or death.

## PRODUCT CONTENTS

Unpack ensure the following attachments are complete or intact.

1. Operating instruction manual
2. One pair of test leads
3. TTIDM1000VAR multimeter.
4. 9V Battery
5. Capacitor testing adaptor

## ELECTRICAL SYMBOLS

	AC (alternating current)		Double insulation
	DC (direct current)		Grounding
	AC or DC (alternating current or direct current)		Low battery indicator
	Warning. Refer to the operating manual		This symbol signifies product complies with Australian requirements

# GENERAL SAFETY

Prior to using the meter, read the product manual and ensure you have a solid understanding of the machines functions and features.



## WARNING

The warnings, cautions, and instructions discussed in this instruction manual cannot cover all possible conditions or situations that could occur. It must be understood by the operator that common sense and caution are factors that cannot be built into this product, this must be supplied by the operator.

# SAFETY INSTRUCTIONS

## SAFETY STANDARDS

This meter complies with the standard IEC61010: pollution degree 2, over-voltage category (CAT III 1000V, CAT IV 600V) and double insulation.

- CAT III: Distribution level, fixed installation, with smaller transient over-voltage's than CATIV.
- CAT IV: Primary supply level, overhead lines, cable systems etc.

In this manual, a **WARNING** identifies conditions and actions that pose hazards to the user or may damage the meter or the equipment under test.

A **NOTE** identifies the information that user should pay attention too. International electrical symbols used on the meter and in this operating manual are covered on page 5.


## GUIDE FOR SAFE OPERATION




## WARNING

To avoid possible electric shock or personal injury, and to avoid possible damage to the meter or the equipment under test, adhere to the following recommendations:

- Before using the meter inspect the case. Do not use the meter if it is damaged or the case (or part of the case) is removed. If you can identify cracks or missing parts stop using the meter immediately.
- Inspect the test leads for damaged insulation or exposed wires. Check test leads continuity. Replace damaged test leads with leads that are suitable to the meter that meet or exceed the safety requirements.
- Comply with local and national safety codes. Use personal protective equipment (approved rubber gloves, face protection, and flame-resistant clothes) to prevent shock and arc blast injury where hazardous live conductors are exposed.
- Do not apply more than the rated voltage, as marked on the meter, between the terminals or between any terminal and grounding.
- Limit operation to the specified measurement category, voltage, or amperage ratings.

- Use Product-approved measurement category (CAT), voltage, and amperage rated accessories (probes, test leads, and adapters) for all measurements.
- Use the correct terminals, function, and range for measurements.
- Before each use, verify meter operation by measuring a known voltage first.
- Do not touch voltages >30 V ac rms, 42 V ac peak, or 60 V dc.
- Do not use the meter around explosive gas, vapor, or in damp or wet environments
- The function selector should be placed in the right position before using the unit, do not change the range/function during measurement to avoid damage to the meter or equipment under test.
- When the meter is working at an effective voltage over 60V in DC or 30V rms in AC, special care should be taken as there is danger of electric shock.
- Do not touch the probes to a voltage source when the test leads are connected to the current terminals.
- Connect the common test lead before the live test lead and remove the live test lead before the common test lead.
- Do not use a current measurement as an indication that a circuit is safe to touch. A voltage measurement is necessary to know if a circuit is hazardous.
- Do not use the HOLD function to measure unknown potentials. When HOLD is turned on, the display does not change when a different potential is measured.
- When using the test leads, ensure leads are fully seated and keep your fingers behind the finger guards.
- To avoid electric shock, injury, or damage to the Meter, disconnect circuit power and discharge all high-voltage capacitors before testing resistance, continuity, diodes, or capacitance.
- Before measuring current, check the meters fuses' and turn off the current to be tested before connecting the meter to the circuit. After connecting the circuit reliably, turn the current to be tested on.
- Replace the battery as soon as the battery indicator " " appears. With a low battery, the meter may produce false readings that can lead to electric shock and personal injury.
- Do not alter the meter and use only as specified, or the protection supplied by the meter can be compromised.
- Use a soft cloth and mild detergent should to clean the surface of the meter when performing general maintenance. No abrasives or solvents should be used in cleaning; this is to prevent the surface of the meter from corrosion, damage and accident.
- Turn the meter off when it is not in use. Remove the batteries if the meter is not used for an extended period of time. If the batteries are not removed, battery leakage may result.
- Repair the meter before use if the battery leaks. Battery leakage may create a shock hazard or damage the meter.

# GENERAL SPECIFICATIONS

Maximum Voltage between any terminals and grounding: please refer to the technical index for more details.
⚠ Fused Protection for $\mu$ AMA Input Terminal: 1A H 240V $\Phi$ 6x25mm.
⚠ Fused Protection for 10A Input Terminal: 10A H 240V $\Phi$ 6x25mm.
Display: Maximum reading 4000 (frequency 9999), analogue bar graph 41 segments
Measurement Speed: Updates 2~3 times/second.
Range: Auto or Manual
Polarity Display: Auto
Overload indication: Display OL
Battery Deficiency: Display "  "
Temperature: <ul style="list-style-type: none"> <li>○ Operating: 0°C to +40°C (32°F to +104 °F).</li> <li>○ Storage: -10°C to +50°C (14 °F to +122°F).</li> </ul>
Relative Humidity: <ul style="list-style-type: none"> <li>○ <math>\leq</math>75% @ 0°C ~ 30°C below</li> <li>○ <math>\leq</math>50% @ 30 - 40°C.</li> </ul>
Battery Type: 9V
Under the influence of radiated Radio-Frequency electromagnetic Field phenomenon, the captioned model has a measurement error, it will be back to normal when the interference is removed.
Safety/Compliances: IEC61010 CAT III 1000V, CAT IV 600V over-voltage and double insulation standard.

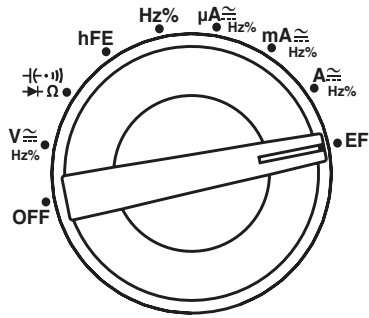
# EXTERNAL OVERVIEW

1. LCD Display
2. RANGE Button
3. HOLD/LIGHT button
4. Function selector
5. Input Terminals
6. MIN/MAX Button
7. REL  $\Delta$  Button
8. Hz% Button
9. BLUE Button







## FUNCTIONAL DIAL OVERVIEW

POSITION	DESCRIPTION
$V \approx$ $mV \approx$	AC and DC voltage measurement
$\Omega$	Resistance measurement
$\rightarrow $	Diode test
$\bullet )$	Continuity test
$ $	Capacitance test
Hz%	Frequency and duty cycle test
hFE	Transistor measurement
$\mu A \approx$	DCA and ACA measurement
$mA \approx$	DCmA and ACmA measurement
$10A \approx$	10A DC and AC measurement
EF	Sensor test
OFF	Shut-down








## LCD SCREEN OVERVIEW

SYMBOL	DESCRIPTION
$\square$	Data hold
$\curvearrowright$	Sleep mode indicator
$-$	Indicates negative reading
AC	Indicator for AC measurement
DC	Indicator for DC measurement
AUTO	Automatically selects the range with the best resolution
MANU	Indicator for manual ranging mode
OL	Input value is too large for the selected range
hFE	Transistor testing indicator
$\rightarrow $	Diode measurement
$\bullet )$	Continuity measurement (buzzer is on)
MAX/MIN	Maximum and Minimum reading

	Data output is in progress
	<b>Warning:</b> To avoid false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the battery indicator appears.
	Sensor test is in progress
	The REL is on to display the stored value minus the present value
<b><math>\Omega</math>, k<math>\Omega</math>, M<math>\Omega</math></b>	<ul style="list-style-type: none"> <li>• <math>\Omega</math>: Ohm The unit of resistance.</li> <li>• k<math>\Omega</math>: kilohm. <math>1 \times 10^3</math> or 1000 ohms</li> <li>• M<math>\Omega</math>: Megaohm. <math>1 \times 10^6</math> or 1,000,000 ohms</li> </ul>
<b>mV, V</b>	<ul style="list-style-type: none"> <li>• V: Volts. The unit of voltage</li> <li>• mV: Millivolt. <math>1 \times 10^{-3}</math> or 0.001 volts</li> </ul>
<b><math>\mu</math>A, mA, A</b>	<ul style="list-style-type: none"> <li>• <math>\mu</math>A : Microamp. <math>1 \times 10^{-6}</math> or 0.000001 amperes</li> <li>• mA: Milliamp. <math>1 \times 10^{-3}</math> or 0.001 amperes</li> <li>• A: Amperes (amps). The unit of current</li> </ul>
<b>nF, <math>\mu</math>F, mF</b>	<ul style="list-style-type: none"> <li>• nF : Nanofarad. <math>1 \times 10^{-9}</math> or 0.000000001 farads</li> <li>• <math>\mu</math>F : Microfarad. <math>1 \times 10^{-6}</math> or 0.000001 farads</li> <li>• F: Farad. The unit of capacitance</li> </ul>
<b>C/F</b>	Temperature unit, Celsius/Fahrenheit
<b>Hz, kHz, MHz</b>	<ul style="list-style-type: none"> <li>• Hz: Hertz. The unit of frequency in cycles/second</li> <li>• kHz: Kilohertz. <math>1 \times 10^3</math> or 1,000 hertz</li> <li>• FMHz: Megahertz. <math>1 \times 10^6</math> or 1,000,000 hertz</li> </ul>
<b><math>\beta</math></b>	The unit of transistor

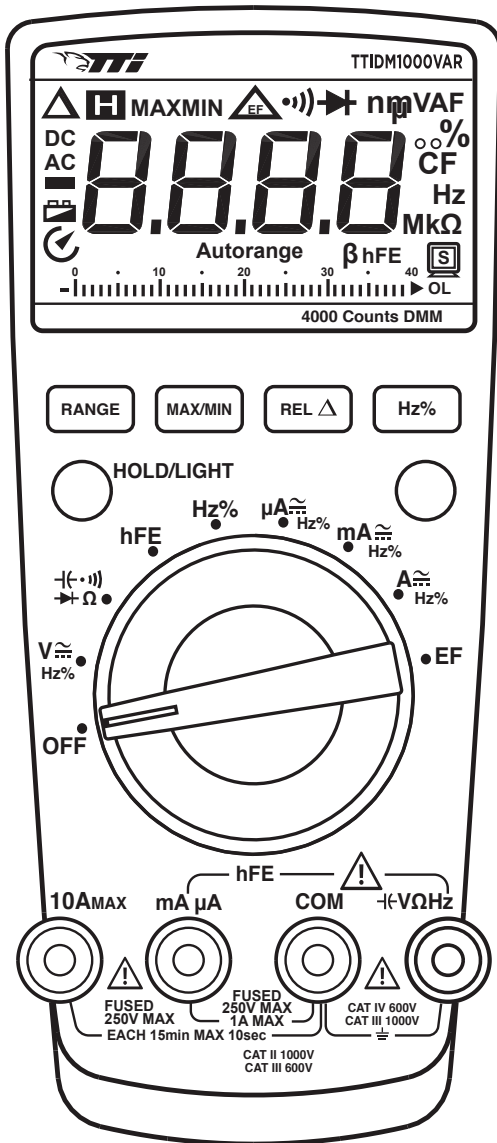
## BUTTONS OVERVIEW

BUTTON	DESCRIPTION
 <b>HOLD</b>	Press to enter or exit data hold mode.
 <b>LIGHT</b>	Press and hold for 2 seconds to turn the display backlight on or off.
<b>(BLUE)</b> 	Press to select the alternate feature
 <b>RANGE</b>	<ul style="list-style-type: none"> <li>• Press RANGE to enter the manual ranging mode; the meter beeps.</li> <li>• Press RANGE to step through the ranges available for the selected function; the meter beeps</li> <li>• Press and hold RANGE for 2 seconds to return to auto ranging; the meter beeps</li> </ul>
 <b>MAX/MIN</b>	Press to select the maximum and minimum value.



REL  $\Delta$

- Press to enter REL mode.
- Press again to exit REL mode



# OPERATING INSTRUCTIONS

## AC/DC VOLTAGE MEASUREMENT



### WARNING

To avoid electric shock or damage to the meter, do not attempt to measure voltages higher than the rated voltage (AC 750V, DC 1000V).

When measuring high voltages, take extra care to avoid electric shock.

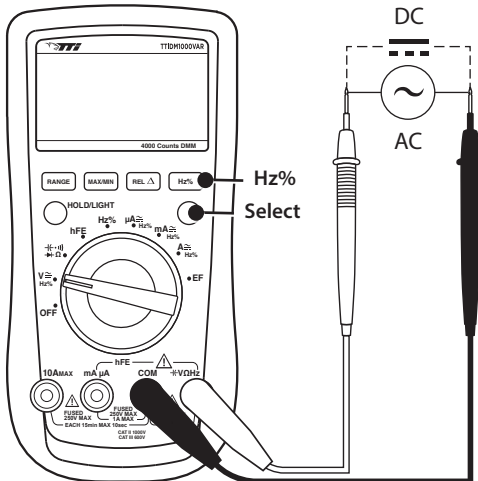
When connecting the test leads to the circuit or device, connect the common (COM) test lead before connecting the live lead; when removing the test leads, remove the live lead before removing the common test lead.

1. Connect the common test lead to **COM** terminal then insert the red test lead into the  $\overline{\text{V}}\Omega\text{Hz}$ .
2. Switch the function selector to **V**; DC measurement is default or press **BLUE** button to switch between DC and AC measurement mode.
3. Connect the test leads across with the object being measured. The measured value shows on the display.



### NOTE:

- In each range, the meter has an input impedance of 10M $\Omega$  except mV range which input impedance is 3000M $\Omega$ . This loading effect can cause measurement errors in high impedance circuits. If the circuit impedance is less than or equal to 10k $\Omega$ , the error is negligible (0.1% or less).
- When measuring mV, you must press RANGE manually to enter mV range.
- When voltage measurement has been completed, disconnect the connection between the testing leads and the circuit under test, then remove the testing leads from the input terminals of the meter.



# AC/DC CURRENT MEASUREMENT



## WARNING

- Never attempt to make an in-circuit current measurement when the open-circuit potential to earth is >600 V.
- To prevent possible electric shock, fire or personal injury, switch off the power supply of the circuit before measuring the current, and then connect the meter with the circuit in series.
- Check the Meter's fuse before testing.
- Use the proper terminals, switch position, and range for your measurement.
- Never place the probes in parallel with a circuit or component when the leads are plugged into the A (Amps) terminals.

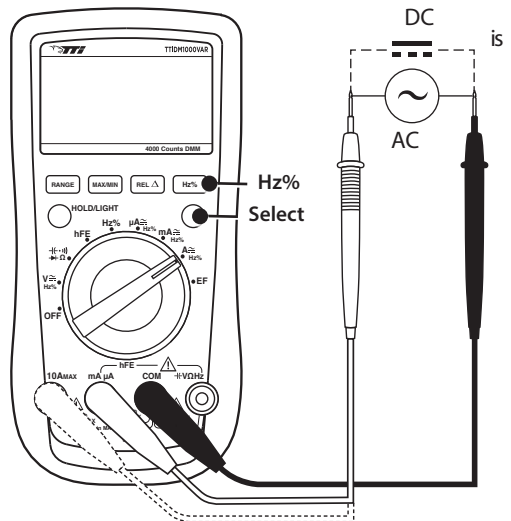
To measure current:

1. Connect the common test lead to **COM** terminal then insert the red test lead into the **µmA** or **10A MAX** input terminal.
2. Set the function selector to **mA** or **A**.
3. The meter defaults to DC current measurement mode. To toggle between DC and AC current measurement function, press **BLUE** button.
4. Connect the test lead in series to the return circuit to be tested. The measured value shows on the display.
5. Display effective value of sine wave (mean value response).
6. Press **Hz%** to obtain the frequency and duty cycle value.



## NOTE:

- If the value of current to be measured unknown, use the maximum measurement position, and reduce the range step by step until a satisfactory reading is obtained.
- For safety purposes, each measurement time for >5A current should be less than 10 seconds and the interval time between 2 measurements should be greater than 15 minutes.
- When current measurement has been completed, disconnect the connection between the testing leads and the circuit under test, then remove the testing leads from the input terminals of the meter.



# RESISTANCE MEASUREMENT



## WARNING

- To avoid damaging the meter or to the device under test, disconnect circuit power and discharge all the high-voltage capacitors before measuring resistance.
- To avoid electric shock, do not input higher than DC 60V or AC 30V voltages.

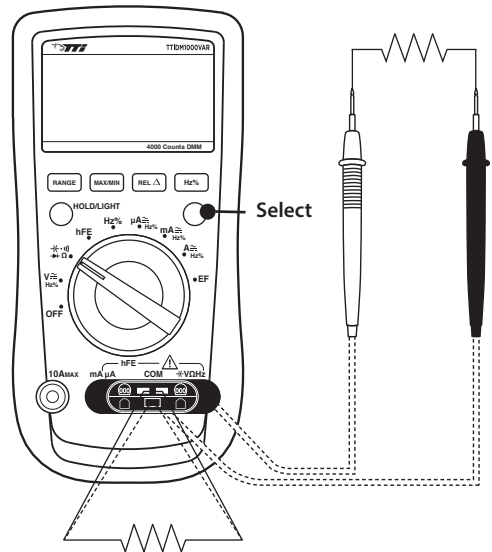
To measure resistance, remove power from circuit and connect the meter as followed:

1. Connect the common test lead to **COM** terminal then insert the red test lead into the  $\Omega$  terminal.
2. Set the function selector to  $\Omega$ , resistance measurement ( $\Omega$ ) is default or press the **BLUE** button to select  $\Omega$  measurement mode.
3. Connect the test leads across with the object being measured. If there is a lead on the resistor or SMT resistor, use the included testing adaptor to carry out testing. The measured value shows on the display.



## NOTE:

- The test leads can add  $0.2\Omega$  to  $0.5\Omega$  of error to resistance measurement. To obtain precision readings in low-resistance measurement, short-circuit the input terminals beforehand, using the relative measurement function button **REL**  $\Delta$  to automatically subtract the value measured when the testing leads are short circuited from the reading.
- If  $\Omega$  reading with shorted test leads is not  $\leq 0.5\Omega$ , check for loose test leads or other reasons.
- For high-resistance measurement ( $>1M\Omega$ ), it is normal to take several seconds to obtain a stable reading. To obtain a stable reading, use the test lead as short as possible or use the included testing adaptor to carry out measurement.
- The LCD displays **OL** indicating an open circuit for the tested resistor or the resistor value is higher than the maximum range of the meter.
- When resistance measurement has been completed, disconnect the connection between the testing leads and the circuit under test, then remove the testing leads away from the input terminals of the meter.




# CONTINUITY MEASUREMENT

## WARNING

- To avoid damaging the meter or to the device when testing, disconnect circuit power and discharge all the high-voltage capacitors before testing for continuity.
- To avoid electric shock, do not input higher than DC 60V or AC 30V

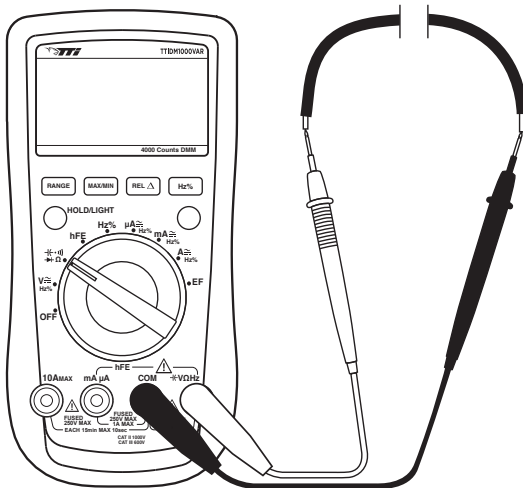
Use the continuity function as a fast, convenient method to check for opens and shorts. For maximum accuracy in making resistance measurements, use the meter's resistance function.

To test for continuity, remove power from circuit and connect the meter as followed:

1. Connect the common test lead to **COM** terminal then insert the red test lead into the  $\text{V}\Omega\text{Hz}$ . Set the function selector to  and press **BLUE** button to select measurement mode
2. Test the continuity by connecting conductor or circuit with test leads. If resistance is measured  $<10\Omega$ , and audible signal will sound. If circuit is open ( $>35\Omega$ ), display will show OL.

## NOTE:

- Open circuit voltage is around 0.45V
- When continuity testing has been completed, disconnect the connection between the testing leads and the circuit under test, and remove the testing leads away from the input terminals of the meter.



# DIODE MEASUREMENT

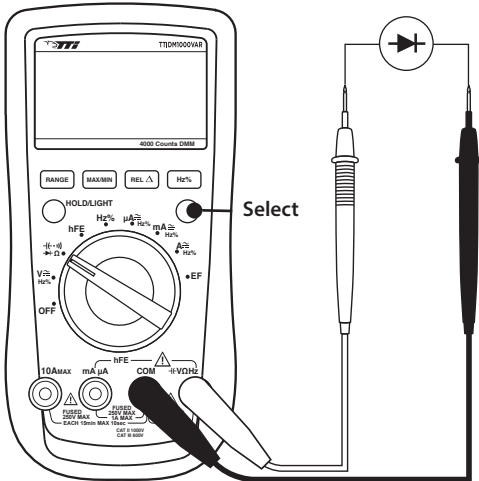
## WARNING

- To avoid possible damage to the meter and to the device under test, disconnect circuit power and discharge all high-voltage capacitors before testing diodes.
- To avoid electric shock, do not input higher than DC 60V or AC 30V

1. Connect the common test lead to **COM** terminal then insert the red test lead into the  $\nabla$   $\Omega$ Hz.
2. Set the function selector to  $\rightarrow$  and press **BLUE** button to select  $\rightarrow$  measurement mode.
3. For forward voltage drop readings on any semiconductor component, place the red test lead on the component's anode and place the black test lead on the component's cathode. The measured value shows on the display.

## NOTE:

- In a circuit, a good diode should still produce a forward voltage drop reading of 0.5V to 0.8V; however, the reverse voltage drop reading can vary depending on the resistance of other pathways between the probe tips.
- The LCD will display OL indicating diode being tested is open or polarity is reversed. The unit of diode is Volt (V), displaying the forward voltage drop readings.
- When diode testing has been completed, disconnect the connection between the testing leads and the circuit under test, then remove the testing leads away from the input terminals of the meter.



# CAPACITANCE MEASUREMENT



## WARNING

To avoid possible damage to the meter and to the device under test, disconnect circuit power and discharge all high-voltage capacitors before measuring capacitance. Use the DC Voltage function to confirm that the capacitor is discharged.

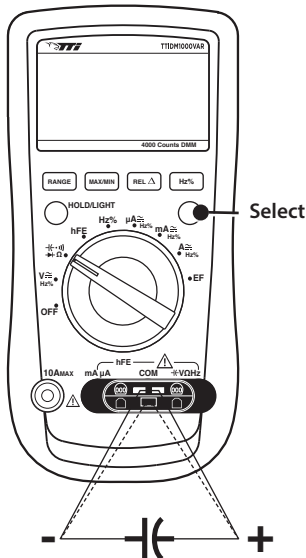
To measure capacitance, connect the meter as per below:

1. Connect the common test lead to **COM** terminal then insert the red test lead into the  $\nabla$  V $\Omega$ Hz.
2. Set the function selector to  $\nabla$  and press **BLUE** button to select nF measurement mode.
  - At that time, the meter will display a fixed value which is the meter's internal fixed distributed capacitance value. To ensure accuracy when measuring a small value of capacitance, the tested value must subtract this value, REL mode can help on that.
3. Connect the test leads across with the object being measured.  
The measured value shows on the display.
  - For more convenience, use the included testing adaptor for measuring capacitors. Insert the capacitor to be tested into the corresponding "+" and "-" of the testing adaptor. This method is more stable and correct when testing for small values of capacitance.



## NOTE:

- It takes longer when the tested capacitor is more than 100 $\mu$ F
- The LCD displays OL indicating the tested capacitor is shorted or it exceeds the maximum range.
- When capacitance measurement has been completed, disconnect all the connections between the testing adaptor, capacitor and the meter.



# FREQUENCY MEASUREMENT

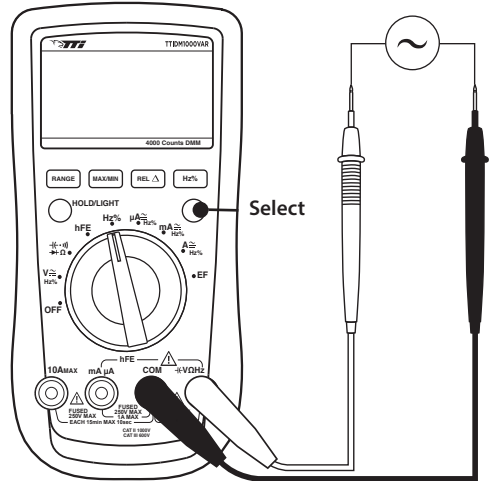


## WARNING

To avoid personal harm, do not attempt to input higher than 30V rms tested frequency voltage

To measure frequency, connect the meter as per below:

1. Connect the common test lead to **COM** terminal then insert the red test lead into the  $\nabla$ V $\Omega$ Hz.
2. Set the function selector to **Hz%**; frequency measurement (Hz) is default or press **Hz%** button to select Hz measurement mode
3. Connect the test leads across to the object being measured. The measured value will be displayed on the screen.
4. Measure duty cycle by pressing **Hz%** button to select % measurement mode.



## NOTE:

- Input Amplitude (DC electric level is zero): When 10Hz ~ 10MHz:  $200\text{mV} \leq a \leq 30\text{Vrms}$

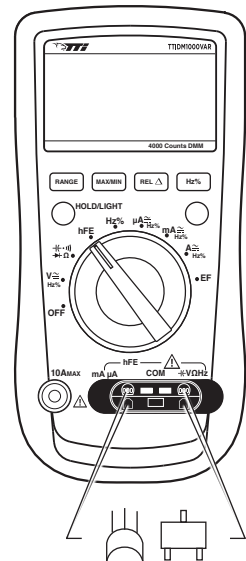
# TRANSISTOR HFE MEASUREMENT

1. Set the function selector to **hFE**.
2. Insert the testing adaptor into the input terminal as shown
3. Insert the transistor to be tested into the corresponding testing adaptor jacks.
4. The LCD display **hFE** nearest value



## NOTE:

When transistor measurement has been completed, disconnect all the connection between testing adaptor, transistor and the meter.





## EF FUNCTION

To use EF function, connect the meter as followed:

Set the function selector to **EF** and place the front of the multimeter towards the object being measured. \*Test leads not required.

When the meter detects an Electric Field the LCD displays digits representing the strength of the field. When the electric field is over the meter's measuring limit, the display will show OL with beeping buzzer and blinking red LED.



## DATA HOLD



### WARNING

To avoid electric shock, when Display HOLD is activated, be aware that the display will not change when you apply a different voltage.

The HOLD mode is applicable to all measurement functions. In this mode, the meter freezes the display

- Press **HOLD** to activate **data hold** mode.
- Press **HOLD** again to exit **data hold** mode.
- In Hold mode **H** is displayed.

## RANGE BUTTON

- Press **RANGE** to enter the manual ranging mode.
- Press **RANGE** to step through the ranges available for the selected function.
- Press and hold **RANGE** for over 2 seconds to return to auto-ranging.

## MAX/MIN BUTTON

- Press **MAX MIN** to start recording of maximum and minimum values. Steps the display through high (**MAX**) and low (**MIN**) readings. The meter enters manual ranging mode after pressing **MAX MIN** button.
- Press and hold **MAX MIN** for over 2 seconds to exit **MAX MIN** mode and return to the present measurement range.

## RELATIVE VALUE MODE

The REL mode applies to all measurement functions except frequency/duty cycle measurement. It subtracts a stored value from the present measurement value and displays the result.

If the stored value is 20V and the present measurement value is 22V, the reading would be 2V. If a new measurement value is equal to the stored value then the display will be zero V.

To enter or exit **REL** mode:

- Press **RELA** to enter **REL** mode, and the present measurement range is locked and displays "0" as the stored value.
- Press **RELA** again to reset the stored value and exit **REL** mode.

## TURNING ON THE BACKLIGHT DISPLAY



### WARNING

In order to avoid the hazard arising from mistaken readings in insufficient light or poor vision, please use Display Backlight function.

- Press and hold **HOLD/LIGHT** for over 2 seconds to turn the Display Backlight on.
- The display backlight will automatically turn off after 10 seconds.

## THE BLUE BUTTON

Is used for selecting the required measurement function when there is more than one function at one position of the function selector.

## SLEEP MODE

To preserve battery life, the meter will automatically turn off if you do not turn the function selector or press any button for around 15 minutes. The meter can be activated by turning the function selector or pressing any button. To disable the Sleep Mode function, press the **BLUE** button while turning on the meter.

# TECHNICAL INDEX

## ACCURACY SPECIFICATIONS

- Accuracy  $\pm a\%$  reading + b digits (guaranteed for 1 year).
- Operating temperature 18°C~28°C.
- Relative humidity <75%.

## DC VOLTAGE MEASUREMENT

RANGE	RESOLUTION	ACCURACY	INPUT IMPEDANCE	FIXED VALUE INPUT
40mV	0.01mV	$\pm (0.8\%+3)$	Around >3000M $\Omega$	1000V DC /750 AC
400mV	0.1mV	$\pm (0.8\%+3)$		
4V	0.001V	$\pm (0.5\%+1)$	Around >10M $\Omega$	
40V	0.01V			
400V	0.1V			
100V	1V	$\pm (1.0\%+3)$		

## AC VOLTAGE MEASUREMENT

RANGE	RESOLUTION	ACCURACY 45~400Hz	INPUT IMPEDANCE	FIXED VALUE INPUT
40mV	0.01 V	$\pm(1.2\%+5)$	Around >3000M $\Omega$	1000V DC /750 AC
400mV	0.1mV	$\pm(1.0\%+3)$		
4V	0.001V		Around >10M $\Omega$	
40V	0.01V			
400V	0.1V			
750V	1V	$\pm(1.2\%+5)$		

Displays effective value of sine wave. mV range is applicable from 5% of range to 100% of range.

## DC CURRENT MEASUREMENT

RANGE	RESOLUTION	ACCURACY	OVERLOAD PROTECTION
400μA	0.1μA	(1.0%+2)	Fuse 1: F1A H 240V (CE), <D6 x25mm
4000μA	1μA		
40mA	0.01mA	(1.2%+3)	
400mA	0.1mA		
4A	0.001A	(1.5%+3)	Fuse 2: F10A H 240V (CE),<D6 x 25mm
10A	0.01A		

## AC CURRENT MEASUREMENT

RANGE	RESOLUTION	ACCURACY	OVERLOAD PROTECTION
400μA	0.1μA	(1.2%+5)	Fuse 1: F1A H 240V (CE), <D6 x 25mm
4000μA	1μA		
40mA	0.01mA	(1.5%+5)	
400mA	0.1mA		
4A	0.001A	(2.0%+5)	Fuse 2: F10A H 240V (CE),<D6 x 25mm
10A	0.01A		

### REMARK:

- When  $\leq 5A$ : Continuous measurement is allowed
- When  $> 5A$ : Continuous measurement less than 10 seconds at an interval more than 15 minutes.
- Displays effective value of sine wave

## RESISTANCE MEASUREMENT

RANGE	RESOLUTION	ACCURACY	OVERLOAD PROTECTION	REMARK
400Ω	0.1Ω	$\pm(1.2\%+2)$	1000V DC /750 AC	When measuring below 2kΩ, apply <b>RELA</b> to ensure measurement accuracy.
4kΩ	0.001kΩ	$\pm(1.0\%+2)$		
40kΩ	0.01kΩ			
400kΩ	0.1kΩ			
40MΩ	0.001MΩ	$\pm(1.2\%+2)$		
40MΩ	0.01MΩ	$\pm(1.5\%+2)$		

## CAPACITANCE MEASUREMENT

RANGE	RESOLUTION	ACCURACY	OVERLOAD PROTECTION	REMARKS
40nF	0.01nF	±(3.0%+5)	1000V DC /750 AC	There is around 10nF residual reading when the circuit is open
400nF	0.1nF			
4μF	0.001μF			
40μF	0.01μF			
400μF	0.1μF	±(4.0%+5)		
4000μF	1μF	Unspecified		

## FREQUENCY MEASUREMENT

RANGE	ACCURACY	MAX RESOLUTION
10Hz-10MHz	(0.1%+4)	0.01Hz

Input amplitude: (DC electric level is zero)

- When 10Hz~10MHz:  $200\text{mV} \leq a \leq 30\text{Vrms}$
- When measuring frequency or duty cycle under AC voltage and current measurement mode, the input amplitude and frequency response must satisfy the following requirement:
  - Input amplitude  $\geq$  range  $\times$  30%
  - Frequency response  $\leq$  400Hz



Overload protection: 1000VDC/750VAC

## DIODE TEST

RESOLUTION	REMARK	OVERLOAD PROTECTION
0.001V	Open circuit voltage around 2.8V	1000V DC /750 AC

## CONTINUITY TEST

RESOLUTION	OVERLOAD PROTECTION
0.1Ω	1000V DC /750 AC

- Open circuit voltage is around 0.45V.
- Broken circuit resistance value is around  $>35\Omega$ , the buzzer does not beep.
- Good circuit resistance value is  $\leq 10\Omega$ , the buzzer beeps continuously.

## TRANSISTOR HFE

RESOLUTION	REMARK	OVERLOAD PROTECTION
0.001V	Open circuit voltage around 2.8V	1000V DC /750 AC

# MAINTENANCE



## WARNING

Do not attempt to repair or service the meter unless you are qualified to do so and have the appropriate calibration, performance test and service tools. If not, consult you Total Tools store for repair/service.

To avoid electrical shock or damage to the meter, do not get expose the meter to water or have it submerged in water.


## GENERAL MAINTENANCE

- Periodically wipe the case with a damp cloth and mild detergent. Do not use abrasives or solvents.
- Turn off the power of the meter when it is not in use.
- Remove the battery when the unit won't be in use for extended periods.
- Do not use or store the meter in an environment of high temperature, humidity, explosive, inflammable and strong magnetic field. The performance of the meter may deteriorate after dampened.

## BATTERY REPLACEMENT



## WARNING

To avoid false readings, which could lead to possible serious injury. Replace the batter as soon as the low battery “” indicator appears.

Make sure the test leads are disconnected from the circuit being tested before opening the case bottom.

To replace the battery:

1. Turn the meter power off and remove all connections from the terminals.
2. Remove the screw from the tilt stand and the battery compartment and separate the battery compartment and the tilt stand from the case bottom.
3. Remove the battery from the battery compartment.
4. Replace the battery with a new 9V battery (NEDA1604, 6F22 or 006P)
5. Assemble the tilt stand, battery compartment and case bottom, and reinstall the screw.

## FUSE REPLACEMENT



### WARNING

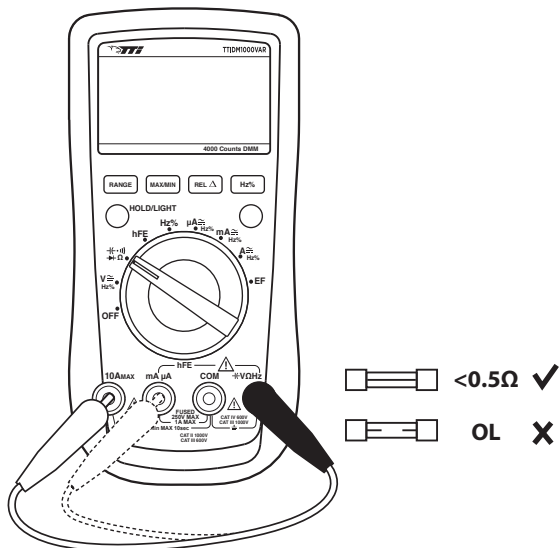
To avoid electrical shock or arc blast, or personal injury or damage to the Meter, use specified fuses ONLY in accordance with the following procedure.

To test the fuse:

If the meter does not respond when measuring current and transistor hFE, inspect the meter's built-in fuses to see if they are blown. Note: blown fuses are not covered under warranty.

To replace the meter's fuse:

1. Turn the meter power off and remove all the connections from the terminals.
2. Remove the screw from the tilt stand and the battery compartment and separate the battery compartment and the tilt stand from the case bottom.
3. Remove the two screws from the case bottom and separate the case top from the case bottom.
4. Remove the fuse by gently prying one end loose, then take out the fuse from its bracket.
5. Install ONLY replacement fuses with the identical type and specification as follows and make sure the fuse is fixed firmly in the bracket.
  - a. A mA range: F1, 1A H 240V,Φ6x25mm(CE).
  - b. 10A range: F2, 10A H 240V,Φ6x25 mm(CE).
6. Reinstall the case bottom and case top and reinstall the screw.
7. Reinstall the tilt stand, battery compartment and case bottom, then reinstall the screw.



1 year  
guarantee 

## WARRANTY INFORMATION

This warranty is provided by Total Tools (Importing) Pty Ltd of 20 Thackray Road, Port Melbourne VIC 3207. Phone: 03 9261 1900 (we, us, our).

### Express Warranty

Subject to the exclusions set out below, we warrant that this product will be free from defects in materials or workmanship for 12 months from the date of purchase.

The benefits conferred by this warranty are in addition to all rights and remedies which you may be entitled to under the Australian Consumer Law, and any other statutory rights you may have under other applicable laws. This warranty does not exclude, restrict or modify any such rights or remedies.

### Warranty exclusions

This express warranty does not apply where a defect or other issue with the product is caused by normal wear and tear, misuse or abuse of the product.

### Consumer guarantees

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage.

You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

### Warranty claims

To make a claim under this warranty, you must bring the product along with the proof of purchase and any other documentary evidence which you think is relevant to the Total Tools' place of purchase where the claim will be handled on our behalf. Any cost incurred by you in bringing the product to the place of purchase will be borne by you.

To make a claim under this warranty, the product and proof of purchase must be returned to the Total Tools place of purchase during the warranty period specified above.

If your warranty claim is accepted, we (or the Total Tools store that handles the claim on our behalf) will, at our discretion, repair or replace the product, or refund money to you and take back the product.