



DIGITAL MULTIMETER AUTO RANGING



TSDMM

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Thank You

For the purchase of this ToolShed product. We try our hardest to supply customers like you with the best quality products available, at the best price possible. We cant wait to continue working together in the future.

Please contact us for any servicing, replacement parts, or questions you might have about your ToolShed product by visiting our website, or calling: 0800 948 665.

PRODUCT DETAILS

<i>Product Model</i>	<i>ToolShed Digital Multimeter</i> <i>Auto Ranging</i>
<i>Product Code</i>	<i>TSDMM</i>

DISTRIBUTED BY:



Note:

This manual is for your reference only. Due to the continuous improvement of the ToolShed products, changes may be made at any time without obligation or notice.

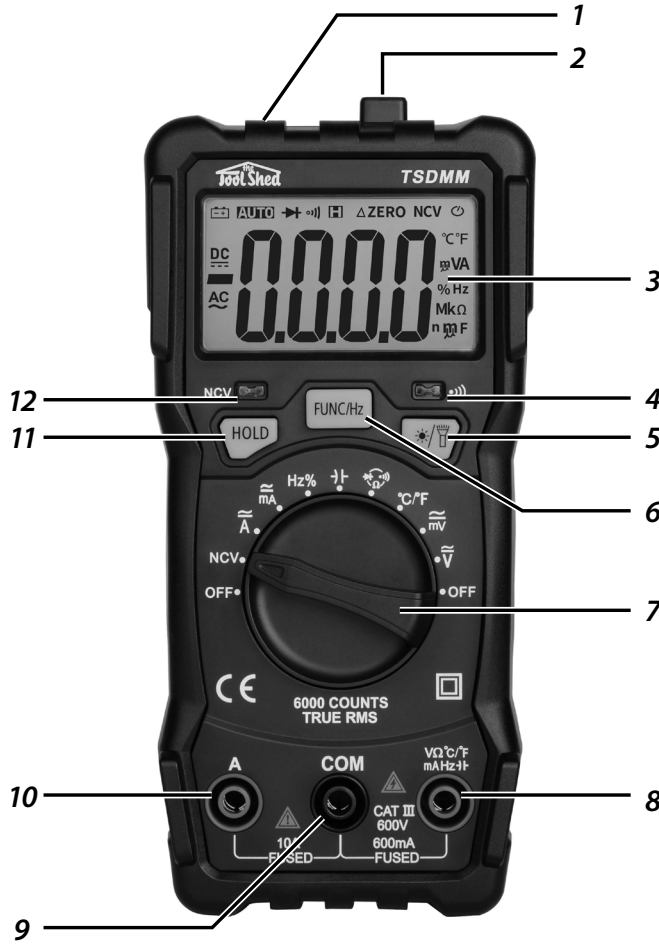
Warranty:

This product may be covered under The ToolShed warranty. For more information, see our Terms & Conditions at www.thetoolshed.co.nz

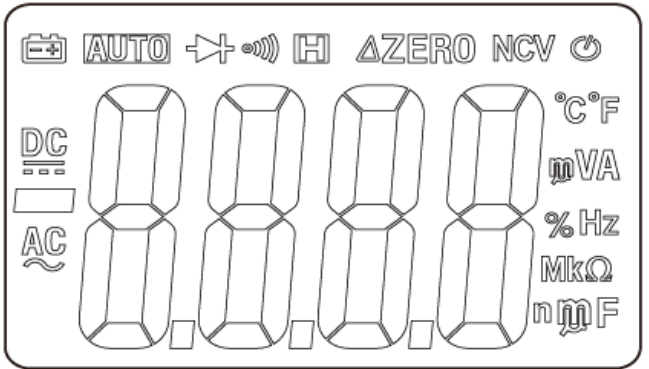
SPECIFICATIONS

Battery	3x 1.5 Volt AAA
Working Height	Under 2000 Metres
Working Temperature	0–40°C
Max. Voltage Between Terminal & Ground	600 Volts
Compliance	CAT II 600V
Conversion Rate	Approx. 3 s/second
Display	6000 Counts LED
Overload	“OL” Displayed
Size (LxWxH)	147 x 71 x 45 mm
Net Weight	220 Grams (Excl. Batteries)

PANEL IDENTIFICATION



- 1 Backlight
- 2 NCV Sensing Area
- 3 LED Display
- 4 Buzzer
- 5 Backlight Button
- 6 “FUNC/HZ” Function Selection Button
- 7 Rotary Switch
- 8 $\rightarrow \vdash$ HzVΩmA°C Input Socket
- 9 COM Input Socket
- 10 10A Input Socket
- 11 Hold Button
- 12 NCV Indicator



	Low Battery
	Automatic Power Off
	Negative Input Polarity
	Alternative Current Input
	Direct Current Input
	Buzzer
	Diode
	Transistor
	Non-Contact AC Voltage Detection
	Data Hold
	Temperature Measurement
	Voltage Unit
	Current Unit
	Resistance Unit
	Frequency Unit
	Frequency Unit

SAFETY GUIDELINES

Service

- **Have your tools and machinery serviced at The ToolShed with ToolShed replacement parts.** This will ensure that the safety of the power tool or machine is maintained.




WARNING

The warnings and precautions discussed in this manual cannot cover all possible conditions and situations that may occur. It must be under stood by the operator that common sense and caution are factors which cannot be built into this product, but must be supplied by the operator.

Multimeter Specific Safety

- When using this meter, you must comply with all the standard safety regulations in the following two aspects:
 - **Protection against electric shocks.**
 - **Preventing the misuse of the instrument's safety procedures.**
- To ensure your personal safety, please use the provided test pen with the meter, check all components before use, and make sure they are fully intact.
- The use of these meter instruments near devices with large electromagnetic disturbances will be unstable and may even cause large errors.
- Do not use this meter when the meter or the test pen appear broken in any way.
- If the meter is not used correctly as directed, the inbuilt safety functions of the meter may fail.
- Care must be taken when working around bare conductors or buses, in order to prevent electric shock or arc discharge, which may cause injury.
- Do not use this instrument near explosive gas vapour, or dust.
- The correct input function must be used to measure specific ranges.
- The input value must not exceed the limit of the input value specified for each range, in order to prevent damage to the instrument.
- Do not touch the unused input while the instrument is connected to the circuit during testing.
- When the measured voltage exceeds 60 vDC or 30 vAC, exercise caution to prevent electric shock.
- When measuring with a test pen, ensure you place your finger behind the guard ring of the pen.
- Before converting the range, you must make sure that the test pens have left the circuit you are testing.
- Before carrying out a resistance, diode, capacitance measurement, or continuity test, the circuit under test must be powered off and all high-voltage capacitors in the circuit under test should be discharged.
- Do not measure the resistance on a live circuit, or perform a buzzer test.

SAFETY GUIDELINES

- Before conducting a current measurement, the fuse of the meter should be checked.
- Before connecting the meter to the circuit under test, the power of the circuit under test should be turned off.
- When performing TV repairs or measuring power conversion circuits, care must be taken in the high-amplitude voltage pulses in the circuit under test, in order to avoid damage to the meter.
- The instrument uses 3x AAA 1.5V batteries as the power supply. The batteries must be properly installed in the battery compartment of the meter.
- When the battery with low voltage symbol appears , replace the battery immediately. Insufficient battery power can make the meter read incorrectly, which may result in electric shock or personal injury.
- When measuring voltages, do not exceed 600 Volts.
- Do not use the instrument when the instrument's housing or part of the housing is removed or damaged.

Input Protection Measures

- The voltage limit is 600 Volts when measuring voltage.
- The voltage limit is 250 ACV, or the equivalent RMS voltage when the frequency, resistor, buzzer, or the diode is measuring.
- The fuse (F200mA/250V) will work to protect when the uA and mA is measuring.

ACCURACY INDEX

Direct Current of Voltage

Range	Resolution
600mV	0.1mV
6V	1mV
60V	10mV
600V	100mV

Accuracy: $\pm 0.5\%$ of Reading + 5 Digits.

Input Resistance: 10M Ω .

Maximum Input Voltage: 600 Volts.

Alternative Current of Voltage True RMS

Range	Resolution
600mV	0.1mV
6V	1mV
60V	10mV
600V	100mV

Accuracy: $\pm 1.0\%$ of Reading + 4 Digits.

Input Resistance: 10M Ω .

Maximum Input Voltage: 600 Volts.

Frequency Response: 40Hz—1KHz TRMS.

Resistance

Range	Resolution
600 Ω	0.1 Ω
6k Ω	1 Ω
60k Ω	10 Ω
600k Ω	100 Ω
6M Ω	1k Ω
60M Ω	10k Ω

Overload Protection: 250V DC/AC.

Open Circuit Voltage: 2.4 Volts.

Diode & Buzzer



- The display shows the forward voltage drop.



- It buzzes when the resistor is less than 30 Ω and the indicator light will sound.

Overload Protection: 250V DC/AC.

Direct Current: DCA

Range	Resolution
60mA	0.01mA
600mA	0.1mA
10A	10mA

Accuracy: ± 1.2 –3.0% of Reading + 5 Digits.

Overload Protection: mA range with F 200mA /250V and 20 Amp range with F10A/250V.

- When the current is more than 5 Amps, the test time should be less than 10 minutes. One minute extra should be given to stop testing after this type of measurement.

ACCURACY INDEX

Alternative Current: ACA

Range	Resolution
60mA	0.01mA
600mA	0.1mA
10A	10mA

Accuracy: ± 1.5 –3.0% of Reading + 5 Digits.

Overload Protection: mA range with F600mA /250V and 20 Amp range with F10A/250V.

Max Input Current: mA: 600mA RMS

10A: 10A RMS.

Frequency Response: 40Hz—1KHz true RMS

- When the current is more than 5 Amps, the test time should be less than 10 minutes. One minute extra should be given to stop testing after this type of measurement.

Frequency

Range	Resolution
9.999Hz	0.001Hz
99.99Hz	0.01Hz
999.9Hz	0.1Hz
9.999KHz	0.001KHz
99.99KHz	0.01KHz
999.9KHz	0.1KHz
9.999MHz	0.001MHz

Accuracy: $\pm 1.5\%$ of Reading + 5 Digits.

Input Voltage Range: 200mV-10V AC RMS.

Overload Protection: 250V DC/AC.

Capacitance

Range	Resolution
60nF	0.01nF
600nF	0.1nF
6 μ F	1nF
60 μ F	10nF
600 μ F	100nF
6mF	0.1 μ F
100mF	0.001mF

Accuracy: $\pm 4.0\%$ of Reading + 5 Digits.

Overload Protection: 250V.

Temperature

Reading	Resolution	Range
$^{\circ}\text{C}$	1 $^{\circ}\text{C}$	-20 $^{\circ}\text{C}$ –1000 $^{\circ}\text{C}$
$^{\circ}\text{F}$	1 $^{\circ}\text{F}$	-4 $^{\circ}\text{F}$ –1832 $^{\circ}\text{F}$



Accuracy: $\pm 1.0\%$ of Reading + 3 Digits.

OPERATION

Regular Operation

- Press the **"FUNC/HZ"** button to enter into the function selection mode.
- The reading hold mode can keep the current reading on the display, change the measurement function position. Press and hold the key again to exit the data hold mode.

Backlight & the Torch Function

- The meter has a backlight and illumination function for users' convenience of reading measuring results in dark situations.
- To enter and exit this mode, please operate as below:
- Short press the  key to turn on the backlight, and short press again to exit. The backlight will turn off automatically after no operation for 15 Seconds.
- Long press  to turn on the illumination function and the backlight at the same time.
- Short press the key again to turn off the illumination function. The backlight will turn off automatically after no operation for 30 seconds.

Auto Power Off

- Approximately 15 minutes after the unit is powered on, if the Multimeter remains unused, the meter will sound loud voice prompts. If no button is pressed or the meter remains unused, it will automatically cut off power, and enter hibernation mode.
- Once in the automatic shutdown mode, pressing any key can restart the device.

ACV & DCV Measurement



NOTE

Do not measure any voltage greater than 600 Volts to prevent electric shock or damage to the instrument or self.
Do not apply if there is more than 600V voltage between the terminal and earth to prevent electric shock or damage to the instrument or self.

- Turn the switch to $\approx mV$ or $\approx V$, then press **"FUNC/HZ"** to choose AC or DC.
- Connect the black test pen to the **"COM"** jack and the red pen to the **"V"** jack.
- Measure the voltage value of the circuit during the test, using the other two ends of the test pens.
- The reading will be shown on the LED display as well as the polarity of the pen connected with the red lead.
- **NOTES:** The meter will show readings in the DCV range of 600mV and 6V, even if there is no input voltage or test pen connection. You can short circuit **V-Ω** and **COM** to make the meter show zero.
- Please change to a higher range if the **"OL"** Overload is shown.
- Using the ACV range, short pressing the **"FUNC-HZ"** key can test the frequency of the alternative current power. Please refer to the frequency measurement.

OPERATION

- The AC voltage values measured with this instrument are all true RMS values (square root). For sine waves and other waveforms (without DC offset), such as square waves, triangular waves and staircase waves, these measurements are accurate.

Resistance Measurement



NOTE

To avoid damage to the meter under test, all power to the circuit under test should be cut off before measuring resistance, and all high-voltage capacitors should be fully discharged.

- Rotate the rotary switch to $\rightarrow \nabla \cdot \Omega / \Omega$ and press **"FUNC-HZ"** to choose Ω .
- Connect the black test pen and the red test pen to the **"COM"** input socket and **"V-Ω"** input sockets respectively.
- Use the test pen to test the resistance value of the circuit.
- The resistance value will show on the display window.
- **NOTES:** The resistance value measured on the circuit usually differs from the rated resistance.
- To measure the low resistance accurately, please short-circuit the two test pens to read out the short-circuit resistance of the test leads, then subtract it by the readings to get an accurate resistance value.
- At 60 MΩ range, the reading will stabilise after a few seconds, which is normal for high resistance measurements.

- When the meter is not in circuit, the display will show **"OL"**, indicating that the measurement value is out of the measurement range.

Diode Measurement



NOTE

To avoid damage to the meter under test, all power to the circuit under test should be cut off before measuring diode, and all high-voltage capacitors should be fully discharged.

- Rotate the rotary switch to $\rightarrow \nabla \cdot \Omega / \Omega$ and press **"FUNC-HZ"** to choose $\rightarrow \nabla$.
- Connect the black test pen and the red test pen to the **"COM"** input socket and **"V-Ω"** input socket respectively.
- Connect the black test pen and red test pen to the negative and positive electrodes of the diode to be tested.
- The meter will display the forward bias value of the diode under test. If the polarity is reversed, then it shows **"OL"** (Overload).
- The normal diode in the circuit still produces a forward voltage drop of 0.5V—0.8V, but the reverse bias reading will depend on the variety of the resistance value of the other channels between the two test pens.

OPERATION

Capacitance Measurement



NOTE

To avoid damage to the meter or device under test, all power to the circuit under test should be cut off before measuring capacitance. All high-voltage capacitors should be fully discharged.

- Turn the rotary switch to \rightarrow position.
- Connect the black test pen and the red test pen to the “COM” input socket and \rightarrow input socket respectively.
- Measure the capacitance value of the circuit under test with the other two ends of the test pens. The reading will be shown on the LED display window.
- **NOTE:** More time would be needed to measure larger capacitors. Allow sufficient time depending on the size of your test.
- Take note of the polarities of the capacitor to ensure you connect to each end correctly to avoid any damage to the meter.

NCV Test

- Rotate the rotary switch to the **NCV** position and place the top of the meter close to the test conductor. If the meter detects the AC voltage meter, the corresponding signal strength indicator will light up according to the detected signal strength (low–yellow, high–red), and the buzzer will send out different frequency alarms.

- **NOTE:** Even if there is no indication that the voltage is still there, you should not rely on non-contact voltage detectors to determine if there is a voltage detection operation on the conductor. This may be affected by factors such as socket depth, insulation thickness, and type, to name a few.
- When the input voltage is put to the instrument, due to sensing in the presence of voltage, the voltage-sensing indicator light may illuminate.
- Interference sources in the external environment, such as flashlights, motors, etc., may accidentally trigger non-contact voltage detection.

Temperature Measurement

- Turn the Rotary Switch to the “°C (°F)” function, and the meter will show the surrounding temperature.
- Take off the test pens and connect the “COM” and “VΩmA” injects with the right polarity ends of the thermocouples.
- The meter will show the approximate temperature as read from the thermocouple.


MAINTENANCE

- When opening the instrument case or removing the battery cover, ensure no test pens are still connected to the ports.
- Please use authorised replacement parts from the ToolShed to service the meter.
- Before opening the meter, all relevant power must be disconnected. Also, you must ensure that you do not carry any static electricity so as not to damage to the meter.
- Instrument components, instrument calibration and maintenance operation instructions should be performed by professionals.
- When opening the instrument housing, some capacitance in the instrument may be noticed. Even after the instrument is turned off, dangerous voltages are kept.
- If the instrument displays any abnormality, the table should be immediately stopped and the meter sent in for repair. This is to ensure that the meter will not be used before proper inspection is completed.
- When the meter is not in use for a long time, please remove the batteries, and avoid storing in high temperature or humidity.

General Maintenance/Cleaning

- In order to avoid electric shock or damage to the instrument, there should be no charge on the inside of the instrument. Before opening the housing or the battery cover, any connection to the test meter and the input signal must be removed.
- Use a damp cloth, and a small amount of detergent if needed, to clean the meter housing. Do not use abrasives or chemical solvents. If the input sockets become soiled or wet, this may affect your readings.

Battery & Fuse Replacement

- Replace batteries and fuses to avoid electric shock or personal injury caused by erroneous readings. When the symbol  appears on the instrument display, replace the battery immediately. Please follow the steps below to replace the battery:
- Ensure you have turned off the meter.
- Pull all the test pens out of the input socket.
- Use a screwdriver to loosen the screws fixing the battery cover.
- Remove the battery cover
- Remove the old battery or the damaged fuse
- Replace the batteries or fuses with new ones, contact your nearest ToolShed if you require parts or advise.
- Reinstall the battery cover and close the screws until tight.