HERTIG

TES

AUTO - RANGING DIGITAL MULTIMETER

TES-2700

INSTRUCTION MANUAL

TES ELECTRICAL ELECTRONIC CORP.

1. SAFETY INFORMATION

- Read the following safety information carefully before attempting to operate or service the meter.
- To avoid damages to the instrument do not apply the signals which exceed the maximum limits shown in the technical specifications tables.
- Never measure current while the test leads are inserted into the input jacks.
- Do not use the meter or test leads if they look damaged. Use extreme caution when working around bare conductors or bus bars.
- Accidental contact with the conductor could result in electric shock.
- Use the meter only as specified in this manual ; otherwise, the protection provided by the meter may be impaired.
- Read the operating instructions before use and follow all safety information.
- Caution when working with voltages above 60V DC or 30 V AC RMS. Such voltages pose a shock hazard.
- Before taking resistance measurements or testing acoustic continuity, disconnect circuit from main power supply and all loads from circuit.

Safety symbols:


Caution refer to this manual before using the meter.


Dangerous voltages.


Meter is protected throughout by double insulation or reinforced insulation.
When servicing, use only specified replacement parts.


Comply with EN-61010-1

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2. FEATURES

- 3-1/2 (3200 COUNTS) Digital LCD with Bar-graph
- Auto- Ranging on Volt, Ohm , Current measurement
- Auto-power off
- Provides data HOLD mode
- Ohms, Diode / Audible Continuity and Capacitance input Overload protection to 500Vrms
- 20A / 380V high energy fuse protection on 20A AC/DC
- Flip - up stand

3. SPECIFICATIONS

3-1 General Information

Environment conditions : ① Installation Categories II
② Pollution Degree 2
③ Altitude up to 2000 meters
④ Indoor use only
⑤ Relatively humidity 80% max.
⑥ Operation Ambient 0～40℃

maintenance & Clearing: ① Repairs or servicing not covered in this manual should only be performed by qualified personal.
② Periodically wipe the case with a dry cloth and detergent.
Do not use abrasives or solvents on this instruments.

Operating Principle : Dual slope integration

Numerical Display : 3 1/2 digit liquid crystal display (LCD) maximum reading 3260 and Bargraph indication.

Display Symbol Definition :

▪	Decimal point
AC	Alternating current or voltage
DC	Direct current or voltage
V	Voltage
mV	Millivolt (1×10^{-3} volt)
A	Ampere (amps) Current
mA	Milliampere (1×10^{-3} amp)
Ω	Ohm. Resistance
KΩ	Kilohm (1×10^{3} ohm). Resistance
MΩ	Megohm (1×10^{6} ohm). Resistance
⊣▶	Diode
•))	Continuity Beeper
BT	Low Battery
−	Negative polarity
MANU	Manual Range
H	Date Hold

Range Selection : All ranges are selected by single Range Switch operation.

Over Range Indication : LCD will show a “OL”.

Low Battery Indication : The BT is displayed when the battery voltage drops below the proper operating voltage.

Sampling Rate : 12.5 times/sec of Bar-graph indication, 2 times /sec of digital display

Power Source : 2 pcs of “AAA” 1.5V Battery

Battery Life	: 500hrs approx.
Polarity	: Automatic polarity " ▬ " indicates negative input.
Auto Power Off Time	: Approx. 10 minutes
Operating Temperature and Humidity	: 0℃ to 40℃ (32℉ to 104℉) below 80% RH
Storage Temperature and Humidity	: -10℃ to 60℃ (14℉ to 140℉) below 70% RH
Dimensions	: 180 (L) × 82 (W) × 38(H) mm
Weight	: Approx. 365g
Accessories	: Test leads, Spare fuse (0.5A/250V), Battery and Instruction manual.

3-2 Electrical Specifications

Accuracies are ± (...% of reading + ...digits) at 23℃± 5℃,below 80% RH.

DC Voltage : (Autoranging & Manual range)

Range	Resolution	Accuracy	Input Impedance	Overload Protection
320mV	0.1mV	0.5%+2	> 100MΩ	AC/DC 750V
3.2V	1mV		11MΩ	
32V	10mV		10MΩ	
320V	100mV			
600V	1V	0.8%+2		

AC Voltage : 40Hz～400Hz (Autorange & Manual range)

Range	Resolution	Accuracy	Input Impedance	Overload Protection
3.2V	100uV	1.2%+4	11MΩ	AC/DC 750V
32V	1mV		10MΩ	
320V	10mV			
600V	1V			

DC Current : (uA mA Autoranging & Manual Range)

Range	Resolution	Accuracy	Burden Voltage	Overload Protection
320uA	0.1uA	1%+2	0.2V max	0.5A/250V fast blow fuse & Diode
3200uA	1uA		1.8V max	
32mA	10uA		1.2V max	
320mA	100uA		1.8V max	
20A	10mA	1.5%+2	0.6V max	20A/380V fast blow fuse 10A Continuity 20A for 30 sec. max.

AC Current : 40Hz～400Hz (uA mA Autorange & Manual range)

Range	Resolution	Accuracy	Burden Voltage	Overload Protection
320uA	0.1uA	1.5%+5	0.2V max	0.5A/250V fast blow fuse & Diode
3200uA	1uA		1.8V max	
32mA	10uA		1.2V max	
320mA	100uA		1.8V max	
20A	10mA	2.0%+5	0.6V max	20A/380V fast blow fuse 10A Continuity 20A for 30 sec. max.

Resistance: (Autoranging & Manual range)

Range	Resolution	Accuracy	Open Circuit Voltage	Overhead protection
320Ω	0.1Ω	0.8%+ 2	1.3V	660Vrms
3.2KΩ	1Ω			
32KΩ	10Ω			
320KΩ	100Ω			
3.2MΩ	1KΩ			
30MΩ	10KΩ	1.5%+ 3		

Diode Test: (⊣▶)

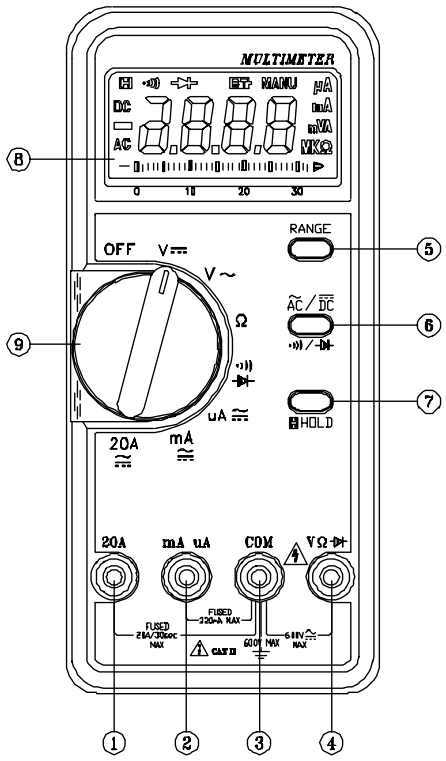
Range	Resolution	Short Circuit Current	Accuracy	Open Circuit Voltage	Overload Protection
⊣▶	1mV	0.8mA typical	1%+ 2	3V	660Vrms

Audible Continuity:

Range	Resolution	Max Open Circuit Voltage	Overload Protection
•))	≦20Ω	1.3V	660Vrms

4. PARTS & CONTROLS

4-1 Name of Parts and Positions:



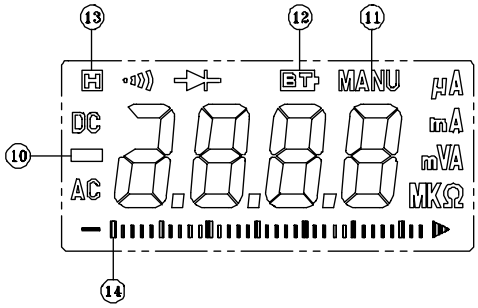
(Fig-1)

1. 20A Measuring Connector :
   To connect positive lead (red test lead) for current measurement below 20A.
2. mA & uA Measuring Connector :
   To connect positive lead (red test lead) for current measurement bellow 320mA.
3. COM Measuring Connector :
   To connect negative lead (black test lead) for current, resistance, Diode, continuity, capacitor, ADP measurement.
4. VΩ Measuring Connector :
   To connect positive lead (red test lead) for voltage, resistance, diode, continuity measurement.
5. Auto-Range & Manual-Range Button :
   Press RANGE to select the Manual Range mode (The meter remains in the range it was in when manual range is selected).

   In the Manual Range mode, each time you press RANGE button, the range (and the input range annunciator) increases, and a new value is displayed.

   If you are already in the highest range, the meter " wraps around " to the lowest range. To exit the Manual Range mode and return to Auto Range mode. Press and hold down RANGE for 2 seconds, the AUTO annunciator turns back on.
6. AC/DC Current Select and / select Button:
   a) To select function DC or AC current.
   b) To select continuity measurements or Diode tests.
7. Date Hold (H) Button :
   Press it once to hold the measured value in dark place when reading or recording is difficult, press it again to release the holding status.

8. LCD Display :
   Measured values, unit, symbols, and decimal points are displayed.
9. Range Selector Switch :
   For power on and power off and selection of desired range.



(Fig-2)

10. Negative Polarity :
    Automatically indicating negative inputs
11. Manual-range Mode indicator.
    Meter is in the autorange mode and will automatically select the range with the best resolution. Meter powers on in autorange mode.
12. Low Battery :
    As battery power is not sufficient. LCD will display BT.
13. Data Hold indicator.
14. Analog Display.

4-2 DC/AC Voltage Measurements

WARNING

Maximum Input Voltage at DC/AC Voltage Range is 600V AC/DC. Do not attempt to take any voltage measurement that may exceed to avoid electrical shock hazard and/or damage to this instrument.

(1) Connect red test lead to " VΩ" terminal and black test lead to " COM " terminal.

(2) Set Range Switch to $\overline{\overline{V}}$ or V range.

(3) Connect the test leads IN PARALLEL to the circuit being measured.

(4) Read the Voltage value on LCD.

4-3 DC/AC Current Measurement

WARNING

Continuous measurements can be applied in 10A Range. less that 30 seconds per measurements can be applied in 20A Range.

(1) Connect red test lead to the "mA/uA" Terminal for Current measurements up to 320mA. (For measuring Current between 320mA to 20A, Connect red test lead to "20A" terminal.)
Connect black test lead to "COM" terminal.

(2) Set Range Switch to desired A range. and press AC/DC switch to DC/AC function.

(3) Cut the power to the circuit to be tested and Connect the instrument IN SERIES with the circuit with the black test lead on the negative "−" side and the red lead on the positive "+" side being measured.

(4) Apply power and read the Current value on LCD.

4-4 Diode Tests

WARNING

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

(1) Connect red test lead to the " VΩ " terminal and black test lead to the " COM" terminal.

(2) Set range switch to the diode test " ▶|— " position and press •)) / ▶|— button to ▶|— function.

(3) Connect the red test lead to the anode side and black test lead to the cathode side of the diode being tested.

(4) Read forward voltage (Vf) Value on LCD.

(5) If the polarity of test leads are reversed with diode polarity (3), the digital reading should nearly equal to the reading in the open circuit condition. This can be used for distinguishing anode and cathode poles of a diode.

4-5 Resistance Measurement

WARNING

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

(1) Connect red test lead to " VΩ "terminal and black test lead to " COM" terminal.

(2) Set Range Switch to Ω range.

(3) Connect test lead to the circuit being measured and read the resistance Value on LCD.

4-6 Continuity Measurements

(1) Connect red test lead to " VΩ" terminal and black test lead to " COM" terminal.

(2) Set Range Switch to the position, and press button to function.

(3) Remove power from the circuit being tested and discharge all capacitors.

(4) Connect the Test Lead to the circuit being measured.

(5) When the impedance between the test terminal is lower than 20 Ω, it will activate a continuous beeper.

Note: *Continuity Test is available to check open/short of the circuit.*

5. BATTERY & FUSE REPLACEMENT

WARNING

To prevent electrical hazard or shock, turn off multi-meter and disconnect test leads before removing back cover.

5-1 Battery Check-Up & Replacement

(1) As battery power is not sufficient, LCD will display " BT ". Replacement of Two new batteries type AAA 1.5V is required.

(2) Set Range Switch to " OFF " position. Use a screw drive to remove the rear cover. Take out the battery and replace them with two new batteries of type AA 1.5V.

(3) Place back the rear cover and secure it with the original screw.

5-2 FUSE Replacement

(1) Set Range Switch to " OFF " position. Use a screw drive to remove rear cover. Take out the malfunction fuse and replace it with a new fuse rate 0.5A/250A (or 20A/600V) of fast blow type.

(2) Place back the rear cover and secure it with the original screw.

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TES ELECTRICAL ELECTRONIC CORP.

7F, No. 31, Lane 513, Rui Guang Road, Neihu Dist. Taipei.
Taiwan, R. O. C.
Tel : (02) 2799-3660 Fax : 886-2-2799-5099
E-Mail : tes@ms9.hinet.net Home page :
http://www.tes.com.tw

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