TENMA®

Palm Size Digital Multimeter

Model: 72-7765A / 72-10420A / 72-7770A

IMPORTANT SAFETY INFORMATION

Please read these instructions carefully before use and retain for future reference.

- Check the test leads, probes and case insulation before using. If you find any breakage or abnormality, or you consider the device is broken, stop using the device immediately.
- When using the test probes, keep your fingers behind the finger protection ring.
- Do not use the meter with the back cover open.
- Select the appropriate test range for measurements.
- Ensure all inputs are less than the range selected otherwise it may cause electrical shock or meter damage.
- Do not change the range selector position during measurements.
- Do not apply a voltage over 250V between COM terminal and ground.
- Take caution when working voltages are above 60V DC or 30V AC rms.
- Do not connect the meter to voltage signals when the range selector is on current, resistance, diode or continuity range.
- When measuring current, each single measurement should be shorter than 10 seconds. For current values over 5A, the wait period between each measurement must be longer than 15 minutes.
- When a measurement has been completed, disconnect the testing probes from the circuit under test.
- Replace the batteries as soon as the low battery indicator appears on the display.
- Remove dead batteries from the meter or if it is not going to be used for a long time.
- Never mix old and new batteries together, or different types of batteries.
- Never dispose of batteries in a fire, or attempt to recharge ordinary batteries.
- Before replacing the battery, turn off the meter and disconnect all the test probes.
- To prolong battery life turn off the meter after use.

WHAT'S INCLUDED

- Digital palm size Multimeter.
- Instruction manual.
- Test leads.

ELECTRICAL SYMBOLS

⎓	AC or DC		Low battery
~	AC		Diode
⎓	DC		Fuse
⏚	Ground		Continuity sounder
⧈	Double insulation		

FUNCTIONS

1. LCD display
2. Range button (72-7765A) (Press the yellow button to switch between AC and DC current, or between continuity and diode measurements, indicated by buzzer. In standby mode, press it to activate the meter and cancel auto power off function.)
3. HOLD button (72-10420A/72-7770A) (Press the yellow button, then the current displayed data will be held with letter H shown on LCD. Press it again to exit data hold operation.)
4. Backlight display button (Press the blue button to turn on backlight.)
5. Range selector.
6. COM input terminal.
7. 10A input terminal.
8. Other input terminal.

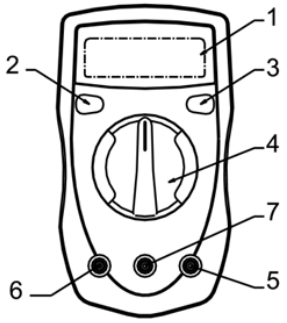

Figure 1

OPERATING PARAMETERS

- Operating temperature: 23ºC ± 5ºC.
- Relative humidity: <75%.

DC VOLTAGE

Model	Range	Resolution	Accuracy	Overload Protection
72-7765A	400mV	0.1mV	± (0.8%+3)	250V AC
	4V	1mV	± (0.8%+1)	
	40V	10mV		
	250V	100mV		
72-10420A 72-7770A	200mV	100µV	± (0.5%+2)	250V DC and AC
	2000mV	1mV		
	20V	10mV		
	200V	100mV		
	250V	1V	± (0.8%+2)	

Note:

- Input impedance is 10MΩ.

AC VOLTAGE

Model	Range	Resolution	Accuracy	Overload Protection
72-7765A	4V	1mV	± (1.2%+3)	250VAC
	40V	10mV		
	250V	100mV		
72-10420A 72-7770A	200V	100mV	± (1.2%+10)	250V DC and AC
	250V	1V		

Notes:
- Input impedance: ~ 5MΩ.
- Displaying effective value of sine wave (mean value response).
- Frequency response: 40 ~ 400Hz.

DC CURRENT

Model	Range	Resolution	Accuracy	Overload Protection
72-7765A	400μA	0.1μA	± (1%+2)	400mA/250V fast type fuse Φ5x20mm
	4000μA	1μA		
	40mA	10μA	± (1.2%+2)	
	400mA	100μA		
	4A	1mA	± (1.5%+5)	10A/600V fast type fuse Φ6x25mm
	10A	10mA		
72-10420A 72-7770A	2000μA	0.1μA	± (0.5%+2)	200mA, 250V fast type fuse Φ5x20mm
	20mA	1μA		
	200mA	100μA	± (1.2%+2)	10A, 600V fast type fuse Φ6x25mm
	10A	10mA	± (2%+5)	

Note:
- At 10A range: every measurement should be <10s, the interval between measurements must be > 15 minutes.

AC CURRENT

Range	Resolution	Accuracy	Overload protection
400μA	0.1μA	± (1.5%+5)	400mA/250V fast type fuse Φ5x20mm
4000μA	1μA		
40mA	10μA	± (2%+5)	400mA/250V fast type fuse Φ5x20mm
400mA	100μA		
4A	1mA	± (2.5%+5)	10A/600V fast type fuse Φ6x25mm
10A	10mA		

DIODE AND CONTINUITY MEASUREMENT

Range	Resolution	Accuracy	Overload protection
	1mV	Displaying approximate forward voltage drop	250V DC and AC
	0.1Ω (72-7765A)	Beeping if impedance <100Ω	
	1Ω	Beeping if resistance <70Ω	

RESISTANCE

Model	Range	Resolution	Accuracy	Overload protection
72-7765A	400Ω	0.1Ω	± (1.2%+2)	250V DC and AC
	4kΩ	1Ω	± (1%+2)	
	40kΩ	10Ω	± (1%+2)	
	400kΩ	100Ω	± (1%+2)	
	4MΩ	1kΩ	± (1.2%+2)	
	40MΩ	10kΩ	± (1.5%+5)	
72-10420A 72-7770A	200Ω	0.1Ω	± (0.8%+5)	
	2000Ω	1Ω	± (0.8%+2)	
	20kΩ	10Ω	± (0.8%+2)	
	200kΩ	100Ω	± (0.8%+2)	
	20MΩ	10kΩ	± (1%+5)	
	200MΩ	100kΩ	± (5%[reading-10]+10) (72-7770A)	

TEMPERATURE (Model 72-10420A only

Range	Resolution	Accuracy	Overload protection
-40 ~ 150°C	1℃	± (1%+3)	250V DC and AC
150 ~ 1000°C		± (1.5%+15)	

SQUARE WAVE OUTPUT (Model 72-7770A only

Range	Function
OUT	~ 50Hz square wave

OPERATION

Voltage measurement (See Figure 1&2)

DC voltage measurement
For Model 72-7765A, the testing ranges are: 400mV, 4V, 40V and 250V.
For Model 72-10420A and 72-7770A, the testing ranges are: 200mV, 2000mV, 20V, 200V and 250V.

To measure DC voltage, perform the following steps:
- Insert the red test probe into the VΩmA terminal and the black test probe into the COM terminal.
- Turn the range selector to V range(s).
- Connect the test probes with the circuit being measured. The measured value will be shown on LCD.

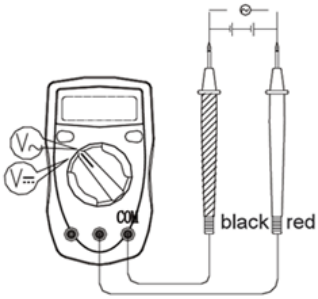

Figure 1 Model 72-7765A

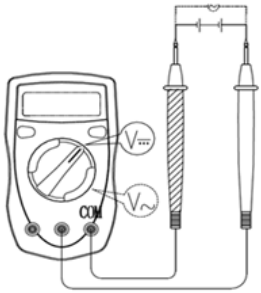

Figure 2 Model 72-10420A/72-7770A

AC voltage measurement
For Model 72-7765A, the ranges are: 4V, 40V and 250V
For Model 72-10420A and 72-7770A, the ranges are: 200V and 250V.

To measure AC Voltage, perform the following steps:

- Insert the red test probe into the VΩmA terminal and the black test probe into the COM terminal.
- Turn the range selector to V ~
- Connect the test probes to the circuit being measured. The measured value will be shown on LCD, which is the effective value of sine wave (mean value response).

Notes:

- DCV and ACV measurement with 72-7765A is auto range.
- If the voltage to be measured is unknown, use the maximum measuring range (250V) and reduce the range step by step until a satisfactory reading is obtained. (Do not adjust when connected to the circuit).
- If LCD shows “OL”, this indicates the measured value is higher than the selected range. Select a higher range in order to obtain a measured value.
- In each range, the meter has an input impedance of about 10MΩ. This loading effect can cause measurement errors in high impedance circuits.
- If the circuit impedance is less than or equal to 10kΩ, the error is negligible (0.1% or less).

Current measurement (See Figure 3 & 4)

WARNING

- Never attempt a current measurement where the voltage between either terminal and ground is greater than 60V.

DC current measurement

- Model 72-7765A testing range: 400μA, 4000μA, 40mA, 400mA, 4A and 10A
- Model 72-7770A/72-10420A testing range: 2000μA, 20mA, 200mA and 10A

To measure DC current, perform the following steps:

- Turn off the power and discharge all high-voltage capacitors of the circuit to be measured.
- Insert the red test probe into the VΩmA or 10A terminal and the black test probe into the COM terminal.
- Turn the range selector to ⎓
- Connect the red test probe to the positive electrode and the black test probe to the negative electrode of the circuit in series.
- Turn on the circuit power. The measured value shows on the display.

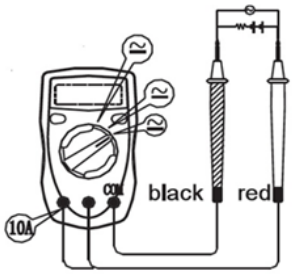

Figure 3 Model 72-7765A

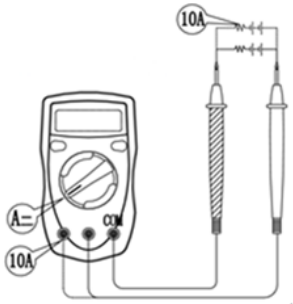

Figure 4 Model 72-10420A/72-7770A

AC current measurement (Model 72-7765A only)

- The testing ranges are: 400µA, 4000µA, 40mA, 400mA, 4A and 10A
- To measure AC current, perform the following steps:
- Turn off the power and discharge all high-voltage capacitors of the circuit to be measured.
- Insert the red test probe into the VΩmA or 10A terminal and the black test probe into the COM terminal.
- Turn the range selector to µA/mA/A ≂ range.
- Press the SELECT button for switching DC measurement to AC measurement.
- Connect the red test probe to the positive electrode and the black test probe to the negative electrode of the circuit in series.
- Turn on the circuit power. The measured value shows on the display.

Notes:

- If the current to be measured is unknown, use the maximum measurement range (10A) and reduce the range step by step until a satisfactory reading is obtained. (Do not adjust when connected to the circuit).
- When current measurement has been completed, disconnect the testing probes from the circuit under test.

Resistance measurement (See Figure 5)

WARNING: To avoid damages to the meter or to the devices under test, disconnect circuit power and discharge all the high-voltage capacitors before measuring resistance.
Model 72-7765A testing ranges: 400Ω, 4kΩ, 40kΩ, 400kΩ, 4MΩ and 40MΩ
Model 72-10420A testing ranges: 200Ω, 2000Ω, 20kΩ, 200kΩ and 20MΩ
Model 72-7770A testing ranges: 200Ω, 2000Ω, 20kΩ, 200kΩ, 20MΩand 200MΩ

To measure resistance, perform the following steps:

- Insert the red test probe into the VΩmA terminal and the black test probe into the COM terminal.
- Turn the range selector to Ω range(s).
- Connect the test probes to the circuit in parallel.
- Read the testing result on the display.

Figure 5

Notes:

- The test probes can add 0.1Ω to 0.3Ω of error to resistance measurement. To obtain precise reading in low-resistance measurement, short-circuit the test probes beforehand and record the reading obtained. Subtract this value from the measured value to obtain the resistance of the circuit under test.
- For high resistance measurement (>1MΩ), it normally takes several seconds to obtain a stable reading.

Diode and continuity measurement (See Figure 6&7)

Diode measurement

Perform diode test to check diodes, transistors, and other semiconductor devices.
The meter can measure the voltage drop of PN joint of diode and other semiconductors in this range. For a silicon semiconductor with normal structure, the reading of the forward voltage drop should be within 0.5~0.8V.
To test diode, perform the following steps:

- Insert the red test probe into the VΩmA terminal and the black test probe into the COM terminal.
- Turn the range selector to  range.
- For forward voltage drop readings on any semiconductor components, connect the red test probe to the anode and the black test probe to the cathode of the components.
- The measured value will be shown on the display. This is the voltage drop across the diode. If the display shows “OL”, it indicates the open circuit or reversed connection.

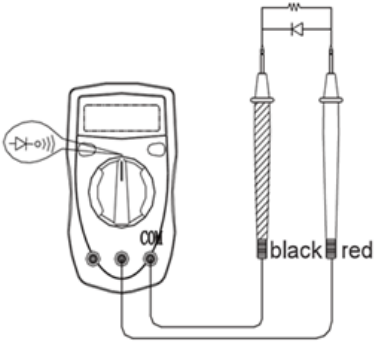

Figure 6 72-7765A

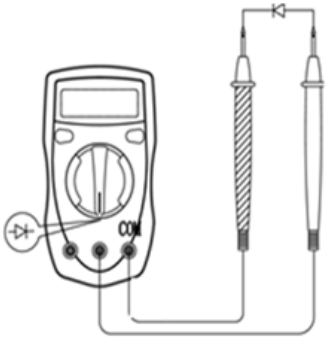

Figure 7 72-10420A/ 72-7770A

Continuity measurement

To test continuity, perform the following steps:

- Insert the red test probe into the VΩmA terminal and the black test probe into the COM terminal.
- Turn the range selector to ⊣◆ •)) range.
- Connect the test probes to the circuit to be measured. The buzzer beeps if the circuit resistance is less than 100Ω. If the display shows “OL”, this indicates the open circuit.

Temperature measurement (Model 72-10420A only, see figure 8)

The temperature measurement range is -40°C - 1000°C.

To measure temperature, perform the following steps:

- Insert the output ports (anode and cathode) of the temperature probe respectively into VΩmA°C /°F and COM terminals.
- Turn the range selector to °C / °F range.
- Place the temperature measuring end of the temperature probe on the surface of or in the object to be measured. The measured value will be shown on the display.

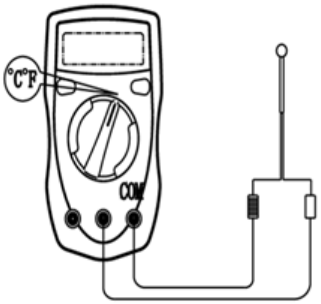

Figure 8

Notes:

- The inside meter temperature will be automatically displayed when there is no temperature probe connected.
- The point contact temperature probe attached to the meter can only measure temperature lower than 250°C. When higher temperature measurement is needed, please use other suitable temperature probe.

Square wave output (Model 72-7770A only)

To avoid meter damage, do not connect the output terminal (red test probe) to the circuit with voltage higher than 10V.

To measure square wave output, perform the following steps:

- Turn the range selector to ⊓⊔ OUT range.
- The meter outputs square wave signal between VΩmA and COM Terminals.

Notes:

- The frequency is about 50Hz.
- The output amplitude is >2.3Vpp when the meter is connected to the circuit with 1MΩ resistance.
- When measurement is completed, disconnect the test probes from the circuit under test.

GENERAL SPECIFICATIONS

Item	Model	
	72-7765A	72-10420A/72-7770A
Max voltage (including transient overvoltage) between terminals and ground	250V rms	
VΩmA terminal fuse protection	400mA, 250V fast type, Φ5x20mm	200mA, 250V fast type, Φ5x20mm
10A terminal fuse protection	10A, 600V fast type, Φ6x25mm	
Range selection	auto	manual
Max display	3999	1999
Battery	1.5V(AAA)x2	9V Battery NEDA1604 or 6F22 or 006Px1
Operating temperature	0 ~ 40°C	
Storage temperature	-10 to 50°C	
Relative humidity	0 to 30°C: 75%, 31 to 40°C: <50%	
Dimension (H x W x L)	130 x 73.5 x 35mm	
Weight (including battery)	156g	

BATTERY AND FUSE REPLACEMENT

Replacing the battery:

- Remove the test probes from the meter input terminals and turn the range selector to OFF position.
- Unscrew and lift off the back cover.
- Remove the old battery.
- Replace with the new battery of same type.
- Refit the back cover.

Replacing the fuse:

- Remove the test probes from the meter input terminals and turn the range selector to OFF position.
- Unscrew and lift off the back cover and remove the fuse from its holder.
- Replace ONLY with the fuses that match the following specifications:
  400mA, 250V fast type, Φ5x20mm (72-7765A).
  200mA, 250V fast type, Φ5x20mm (72-10420A/72-7770A).
  10A, 600V fast type, Φ6x25mm.
- Refit the back cover.

INFORMATION ON WASTE DISPOSAL FOR CONSUMERS OF ELECTRICAL & ELECTRONIC EQUIPMENT

These symbols indicate that separate collection of Waste Electrical and Electronic Equipment (WEEE) or waste batteries is required. Do not dispose of these items with general household waste. Separate for the treatment, recovery and recycling of the materials used. Waste batteries can be returned to any waste battery recycling point which are provided by most battery retailers. Contact your local authority for details of the battery and WEEE recycling schemes available in your area.

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