

TENMA®



Digital Bench Multimeter










Model: 72-8720

IMPORTANT SAFETY INFORMATION

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

- This meter is designed to meet IEC61010-1, 61010-2-032, and 61010-2-033 in Pollution Degree 2, Measurement Category (CAT I 1000V, CAT II 600V, CAT III 300V) and double Insulation.
- When using electrical appliances basic safety precautions should always be followed.
- Please operate according to this manual, otherwise the protection provided by the device will be impaired or fail.
- There are no user-serviceable parts in this product. Refer servicing to qualified personnel.
- Use only the test leads supplied or the protection may be impaired.
- Check the test leads, probe and case insulation condition before using. If you find any breakage, damage 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 rings.
- Ensure all inputs are less than the range selected otherwise it may cause electrical shock or meter damage.
- Take caution when voltages are above 60V DC and 30V AC rms.
- Do not use the meter with the battery or fuse covers removed.
- Do not adjust the range selector during measurement.
- 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.









ELECTRICAL SYMBOLS GUIDE

 AC or DC	 Ground	 Double insulated
 Warning	 Low battery	 Continuity test
 Diode test	 Capacitance test	 Fuse

WHAT'S INCLUDED

- Bench type digital multimeter.
 - Installation guide and computer interface software (CD-ROM).
 - Operating manual.
 - Power cord.
 - Alligator clip.
 - Multi purpose socket.
 - Temperature probe.
 - Test leads (1 pair).
 - RS232 interface cable.
 - USB interface cable.
- } Stored in compartment in the back of the unit.

FUNCTIONS

Range Selector Positions	Rotary Switch Function	Blue SELECT Function
	DC voltage measurement	None
	AC voltage measurement	None
Hz Duty mV 	DC millivolt measurement	Frequency measurements Duty Cycle measurement
	Resistance measurement	Diode test Continuity test
	Capacitance test	None
°C °F	Centigrade temp measurement	Fahrenheit temp measurement
μA 	AC or DC current measurement (40ma, 400ma)	Switch between AC or DC
mA 	AC or DC current measurement (40ma, 400ma)	Switch between AC or DC 4-20mA loop as % reading
A 	AC or DC current measurement (10A)	Switch between AC or DC

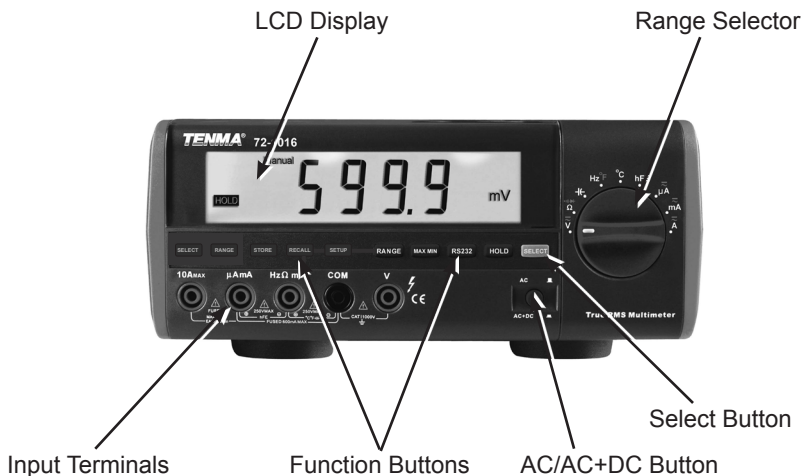
Function buttons	Operation performed
SELECT	SELECT: used to select any rotary switch alternate function
LIGHT	LIGHT: under battery power turns backlight on
RANGE	Exit AUTO and enter MANUAL ranging. In MANUAL select next input range. Press EXIT to return to AUTO (default)
STORE	Stores the current measurement value. Press EXIT to return
RECALL	Recall the stored value. Press EXIT to return
SETUP	Access setup selections. Display 'SET' is flashing. Each press moves to the next selection.
SEND	Press to output data, AUTO mode off. Press EXIT to quit In SETUP press to select OFF at selection of HIGH and LOW
MAXMIN	Displays max/min and current reading. Press exit to quit In SETUP each press select next digit In RECALL press to enable SEND feature In STORE press to switch between clearing or start storing reading from current index number
REL	Enter RELATIVE mode. Upper right secondary display shows present value. Lower right secondary display shows stored value. Primary display shows present measurement minus stored value. Press EXIT to quit mode.

Function buttons	Operation performed
REL	In SETUP each press decrements an option In RECALL each press goes back to previous reading In STORE each press decreases a second on the storing interval. Press EXIT to exit.
HOLD	HOLD freezes the displayed value. Press EXIT to release.
PEAK	Press to access Peak Hold feature. Primary display shows peak hold reading. Press EXIT to quit.
EXIT	Press to exit certain button functions.
AC/DC	In AC measurement mode press to display AC+DC True RMS value and AC+DC.

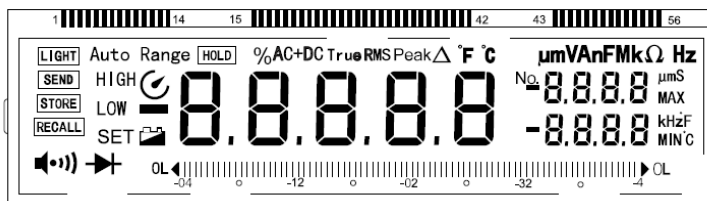
OPERATING PARAMETERS

- Ambient temperature : 0°C ~ 40°C.
- Relative humidity : ≤75% @ 0°C ~ 30°C, ≤50% @ 31°C ~ 40°C
- Maximum operating altitude 2000m
- Maximum Display : Digital: 5999
- Measurement Speed : Updates 2-3 times/second
- Polarity display : Automatic

FRONT PANEL LAYOUT








- Turn the Range Selector to power the meter on and select a function. The display initially shows a standard setup for that function.
- Use the blue SELECT button to choose an alternate function for the chosen setting.
- Changing the main setting does not carry over the alternative function setting.



Function	Primary Display	Lower right Secondary Display	Upper right Secondary Display
DCV	Tested DC Voltage value	No Display	Full range: 4,40,400,1000
ACV	Tested AC Voltage value	Tested frequency value: 40kHz ~ 250kHz	Full range: 4,40,400,750
DCmV	Tested DCmV value	No display	Full range: 400
Ω	Tested resistance value	No display	Full range: 400, 4, 40, 400, 4, 40
∞	Tested resistance value	No display	Full range value: 400
\rightarrow	Tested resistance value	No display	Full range: 4
Hz	Tested frequency value	No display	Full range: 40, 400, 4, 40, 400, 4, 40, 400
$\text{---} \text{---}$	Tested capacitance value	No display	Full range: 40, 400, 4, 40, 400, 4, 40
°C	Tested °C value	No display	1000
°F	Tested °F value	No display	1832
DCμA	Tested DCμA value	N/A	Full range: 400, 4000
ACμA	Tested ACμA value	Tested frequency value 40kHz ~ 100kHz	Full range: 400, 4000
DCmA	Tested DCmA value	No display	Full range: 40, 400
ACmA	Tested ACmA value	Tested frequency value 40kHz ~ 100kHz	Full range: 400, 4000
DCA	Tested DC current value	No display	Full range: 10
ACA	Tested AC current value	Tested frequency value 40kHz ~ 100kHz	Full range: 10
STORE	Current measurement reading	Value of the corresponding index number	Index number increase one. Index number: no.0001~9999
RECALL	The recalled value	The total number of stored value	Index number: no.0001~9999
Max/min	Current measurement reading	Minimum reading value	Maximum reading value
REL	Present measurement value minus stored value	The stored value	Present measurement value

- Auto ranging (AUTO in the display) always comes on initially when you select a new function. In auto range, the Meter selects the lowest input range possible, ensuring that the reading appears with the highest available resolution.
- Press RANGE to enter MANUAL ranging in the present setting. You can then select the next manual range higher by repeatedly pressing RANGE. Return to auto ranging by pressing EXIT.
- Press RANGE when turning on the Meter, the Meter enters the analogue resistance signal measurement mode.

Symbol	Meaning
MAX	Maximum reading displayed
MIN	Minimum reading displayed
No	The sequence of reading
°C, °F	Degrees celcius (default) or fahrenheit
HµmS	H: hour µ: micro m: minutes S: seconds
-	Negative reading
	Low battery - replace as soon as possible to avoid inaccurate readings.
SET	Setup feature is enabled
AC+DC	For DCV and DCA functions, reading represents trueRMS total of AC and DC measurements
True RMS	Indicator for true RMS value
Ω, kΩ, mΩ	Ohm unit of resistance Kiloohm 2×10^3 or 1000ohms Megaohm 1×10^6 or 1,000,000ohms
Hz, kHz MHz	Hertz unit of frequency measurement Kilohertz 1×10^3 or 1000hertz Megahertz 1×10^6 or 1,000,000hertz
V, mV	Volts unit of measurement Millivolt 1×10^{-3} or 0.001volts
µA, mA, A	Amperes unit of current Milliamp 1×10^{-3} or 0.001amperes Microamp 1×10^{-6} or 0.000001amperes
F, mF µF, nF	Farad unit of measurement Nanofarad. 1×10^{-9} or 0.000000001 farads Microfarad. 1×10^{-6} or 0.000001 farads Millifarad. 1×10^{-3} or 0.001 farads
	Automatic power off feature is turned on
	Continuity test sounder
STO	Data store is on
RCL	Data recall is on
Δ	Relative mode displays present value minus stored value.

Symbol	Meaning
LOW	Indicates lowest setup limit
AUTO	The meter is set to auto range with range for best resolution selected
SEND	Data output in progress
	Backlight feature is on
HOLD	Data hold mode is active
PEAK HOLD	Peak hold mode is active
	Diode test
%	Frequency signal duty cycle. 4~20mA loop current as % reading
>OL	Input value overload for the selected range
Analogue Bar	Provides an analogue bar graph of the present input, quick response

Analogue Bar Graph


The bar graph provides an analogue indication of the measured input. For most measurement functions, the bar graph updates 10 times per second.

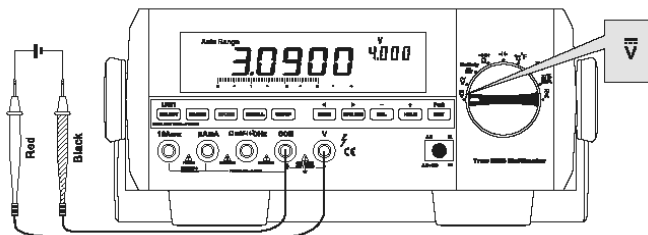
OPERATION

DC Voltage Measurement

Warning: To avoid personal injury, or damage to the meter from electric shock, please do not attempt to measure voltages higher than 1000V although readings may be obtained.

To measure DC voltage, connect the meter as follows:

- Insert the red test lead into the V terminal and the black test lead into the COM terminal.
- Set the rotary switch to .
- Connect the test leads across with the object being measured. The measured DC voltage's true RMS value shows on the display.
- When measurement has been completed, disconnect the connection between the test leads and the circuit under test.



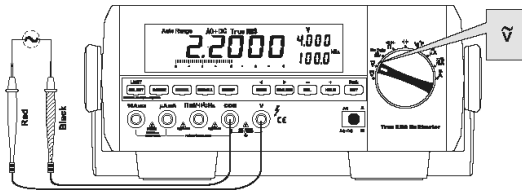
Note: In each range, the meter has an input impedance of 10M Ω except 600mV range has 3000M Ω . This loading effect can cause measurement errors in high impedance circuits. If the circuit impedance is less than or equal to 10k Ω , the error is negligible (0.1% or less).

AC Voltage Measurement

Warning: To avoid personal injury, or damage to the meter from electric shock, please do not attempt to measure voltages higher than 1000V although readings may be obtained.

To measure AC voltage, connect the meter as follows:

- Insert the red test lead into the V terminal and the black test lead into the COM terminal.
- Set the rotary switch to \tilde{V} .
- Connect the test leads across with the object being measured. The measured AC voltage's true RMS value shows on the display.
- When a ACV function is selected, you can press the AC+DC button to view the AC + DC True RMS value in the primary display.
- When measurement has been completed, disconnect the connection between the test leads and the circuit under test.



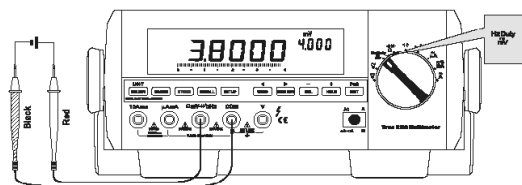
Note: In each range, the meter has an input impedance of 10M Ω except 600mV range has 3000M Ω . This loading effect can cause measurement errors in high impedance circuits. If the circuit impedance is less than or equal to 10k Ω , the error is negligible (0.1% or less).

DC Millivoltage Measurement

Warning: To avoid damage to the meter, please do not attempt to measure voltages higher than 400mV although readings may be obtained.

To measure DC Millivoltage, connect the meter as follows:

- Insert the red test lead into the V terminal and the black test lead into the COM terminal.
- Set the rotary switch to mV $\overline{\text{---}}$. Press the SELECT button to cycle through frequency and duty cycle.
- Connect the test leads across with the object being measured. The measured RMS value shows on the display.
- When measurement has been completed, disconnect the connection between the test leads and the circuit under test.



Note: When measuring DC Millivoltage, the Meter acts around a 2.5G Ω input impedance in parallel with the circuit.

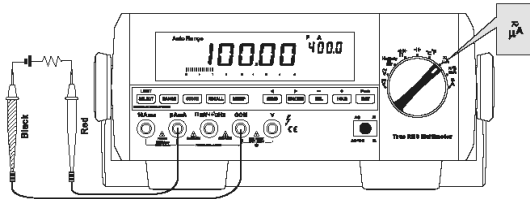
DC or AC Current Measurement

Warning: Before connecting the meter in series with the circuit under test, be sure power the circuit is off. If the fuse burns out during measurement, the meter may be damaged and there is risk of personal injury to the operator.

Use correct terminals, function, and range for the measurement. When the test leads are connected to the current terminals, do not connect in parallel across any circuit.

To measure current, do the following:

- Insert the red test lead into the μA mA terminal and the black test lead into the COM terminal.
- Set the rotary switch to an appropriate measurement position in μA , mA or A, press SELECT button to select AC measurement mode. Default is DC.
- Connect the test leads in series with the object being measured. The measured value shows on the display.
- The measurement displays True RMS value.
- Press AC/AC+DC button to measure AC+DC current's true RMS.



Note: If the value of current to be measured is unknown, use the maximum measurement position, and reduce the range step by step until a satisfactory reading is obtained.

- Each measurement time of high current ($>5\text{A}$) should be less than 10 seconds and the interval time between 2 measurements should be greater than 15 minutes.
- When current measurement is complete, disconnect the test leads from the circuit under test.

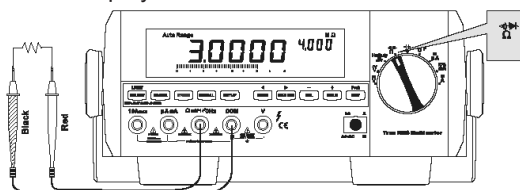
Measuring Resistance

Warning: To avoid damage to the meter or to the devices under test, disconnect circuit power and discharge all the high-voltage capacitors before measuring resistance.

To avoid possible injury, please do not attempt to input voltages higher than 60V DC or 30V AC.

To measure resistance, connect the meter as follows:

- Insert the red test lead into the Ω terminal and black lead into the COM terminal.
- Set the rotary switch to Ω and press SELECT button to select Ω measurement mode.
- Connect the test leads across with the object being measured. The measured value shows on the display.



Note: When measuring low resistances, the test leads and internal wiring will add approximately $0.1 \sim 0.2\Omega$ of error. To obtain accurate readings in low-resistance, short-circuit the test lead beforehand and record the reading obtained, call this reading as X. Then use the equation: measured resistance value (Y) – (X) = accurate readings of resistance.

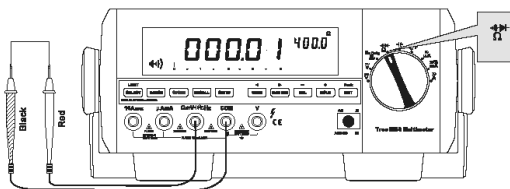
- If reading with shorted test leads is not $< 0.5\Omega$, check for loose test leads or possible incorrect function selection.
- When measuring high resistance ($>1M\Omega$), it is normal to take several seconds to obtain a stable reading.
- The LCD displays OL indicating open-circuit or the resistor value is higher than the maximum range of the meter.
- When testing the resistance signal from the calibrator, it is necessary to press and hold the RANGE while turning on the Meter to change the maximum display to 4000 counts but the accuracy remains unchanged.
- When resistance measurement has been completed, disconnect the connection between the test leads and the circuit under test.

Continuity Test

Warning: To avoid damage to the meter or to the devices under test, disconnect circuit power and discharge all the high-voltage capacitors before testing for continuity. To avoid personal injury, please do not attempt to input voltages higher than 60V DC or 30V AC.

To test for continuity, connect the meter as below:

- Insert the red test lead into the Ω terminal and the black test lead into the COM terminal.
- Set the rotary switch to $\Omega \rightarrow \rightarrow \rightarrow$ and press SELECT button to select $\rightarrow \rightarrow \rightarrow$ measurement mode.
- Connect the test lead across with the object being measured. The buzzer sounds if the resistance of a circuit under test is $<50\Omega$, the circuit is in good condition. The buzzer does not sound if the resistance of a circuit under test is $>50\Omega$, the circuit is broken.
- The measured value shows on the display and the unit is Ω .



Note: In continuity mode, the resistance range is 400Ω , and the open circuit voltage is approximately 1.2V.

- When continuity testing has been completed, disconnect the connection between the test leads and the circuit under test.

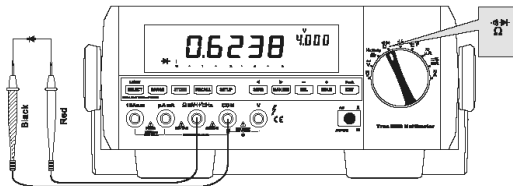
Diode Test

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 personal injury, please do not attempt to input voltages higher than 60V DC or 30V AC.

- Perform the diode test to check diodes, transistors, and other semiconductor devices. The diode test sends a current through the semiconductor junction, and then measures the voltage drop across the junction. A good silicon junction drops between 0.5V and 0.8V.

To test a diode out of a circuit, connect the meter as follows:

- Insert the red test lead into terminal and the black test lead into the COM terminal.
- Set the rotary switch to $\Omega \rightarrow \rightarrow \rightarrow \rightarrow$ and press SELECT button to select $\rightarrow \rightarrow$ measurement mode.
- 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 Connect the test leads to the proper terminals as said above to avoid error display. 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.
- Open circuit voltage is around 2.7V.
- When diode testing is completed, disconnect the test leads from the device under test.

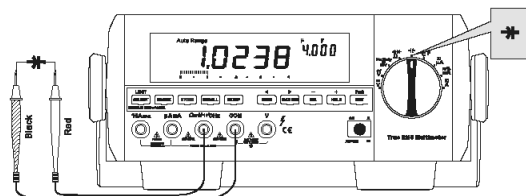


Capacitance Measurement

Warning: To avoid damage to the meter or to the equipment 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 follows:

- Insert the red test lead into the Hz Ω mV terminal and the black test lead into the COM terminal.
- Set the rotary switch to $\rightarrow \leftarrow$. The Meter may display a fixed reading which is an internal distributed capacitor value. For testing less than 10nF capacitor, the tested value must subtract the 3. It is recommended to use test clip to carry out measurement to reduce the effect of internal capacitance.



Note: The Meter displays a fixed value which is the value of the meters own internal circuitry. To ensure accuracy, it is necessary to subtract this value from the displayed value when measuring small capacitors.

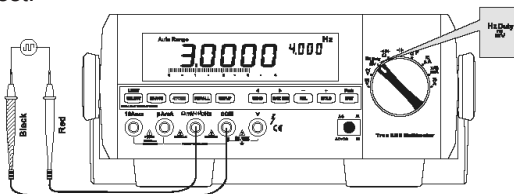
- Connect the test leads across with the object being measured. The measured value shows on the display.
- The multi-purpose socket can be used instead of test leads. Insert the capacitor being tested into the corresponding input terminal of the multi-purpose socket. This will provide a more accurate reading when measuring small capacitor values.
- When measuring capacitance values larger than 600uF, it is normal for the meter to require some time to stabilize.
- The LCD displays OL indicating the tested capacitor is shorted or it exceeds the maximum range.
- When capacitance measurement has been completed, disconnect the test leads from the device under test.

Frequency Measurement

Warning: To avoid the risk of personal injury, do not attempt to measure frequency with voltage higher than 30V RMS.

To measure frequency, connect the meter as follows:

- Insert the red test lead into the Hz terminal and the black test lead into the COM terminal.
- Set the rotary switch to Hz% mV and press SELECT button to select Hz measurement mode.
- Connect the test leads across with the object being measured. The measured value shows on the display.
- When frequency measurement is complete, disconnect the test leads from the circuit under test.



Note: When making frequency measurements, the measured signal “a”, must fall within the following voltage level:

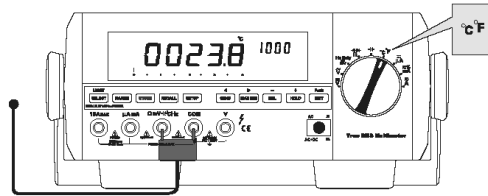
10Hz ~ 1MHz	$150mV \leq a \leq 30V \text{ rms}$
> 1MHz ~ 10MHz	$300mV \leq a \leq 30V \text{ rms}$
> 10MHz ~ 50MHz	$600mV \leq a \leq 30V \text{ rms}$
> 50MHz	Unspecified

Temperature Measurement

To measure temperature, connect the meter as follows:

- Set the rotary switch to °C/°F to measure temperature. °C is default, press SELECT to change to °F. The display shows OL initially.
- Short the test leads to show room temperature.
- Insert the point contact temperature probe into the corresponding Hz and COM terminal.

- Place the temperature probe to the object being measured. The measured value shows on the display after few seconds.



Note

The testing environment must be between 18°C to 28°C to ensure accuracy especially when measuring low temperature. Different reading may be obtained when testing room environment under short or open circuit situation, then short-circuited reading shall be considered as the correct reading.

- The included point contact temperature probe can only be used under 230°C.
- For any measurement higher than that, the rod type temperature probe must be used instead.
- When temperature measurement has been completed, disconnect the connection between the temperature probe, multi-purpose socket and the circuit under test and remove the multi-purpose socket from the input terminal.

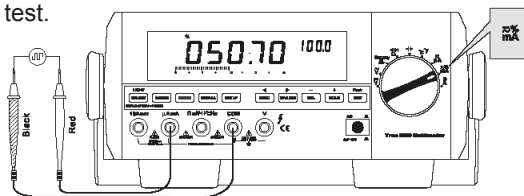
4~20mA loop current as % readout

Warning: To avoid personal injury, or damage to the meter from electric shock, please do not attempt to measure voltages higher than 250V from socket, although readings may be obtained.

- Disconnect circuit power and discharge all capacitors before measuring.
- To use 4~20mA Loop feature, connect the Meter as follows:
- Set the rotary switch to mA \approx % and press SELECT button to switch to (4~20mA) % option.
- Connect the test leads in series with the object being measured.
- The measured value shows on the display.
- When the reading obtained is:
 - < 4mA, the primary display shows LO
 - 4mA, the primary display shows 0%. \bar{O} .
 - 20mA, the primary display shows 100%
 - > 20mA, the primary display shows HI

Note: When the measured current is <5A, continuous measurement is allowed.

- When the measured current is between 5A-10A, continuous measurement should be less than 10 seconds and interval between tests more than 15 minutes.
- Do not attempt to measure higher than 10A.
- When measurement has been completed, disconnect the test leads from the circuit under test.



Storing and recalling readings

- To store a reading:
- Press STORE once, STORE and No.xxxx appears to confirm the operation and the upper right secondary display shows the current measurement reading.
- Press ► to toggle between clearing the stored readings and start from the first or the last stored reading. The lower right secondary display shows the original number of records.
- Press STORE the second time, STORE and S appears. The upper right secondary display shows the storing time interval in second, it is preset to zero which means it will not auto update reading. To change the interval in second by pressing + or - from 0 up to 255 seconds.
- Press and hold + or - to access quick access setting.
- Press STORE a third time, STORE and No.9999 appears.
- The upper right secondary display shows the index number increased by one.
- The lower right secondary display shows the value of the corresponding index number, the primary display shows the current measurement reading.
- If there is no set time to store the reading, each press of STORE will store one reading. An index number increase one.
- The maximum number of stored reading is 9999. When the stored readings memory is full, the meter will stop storing data.
- To exit and stored the reading, press EXIT. To exit without storing the reading, turn the meter off manually.
- Automatic power off feature will be disabled after entering this mode.




- Use the following procedure to recall the stored reading:
- Press RECALL to recall the stored value and RECALL appears to confirm the operation. The upper right secondary display shows the index number No.xxxx.
- The primary display shows the corresponding recalled data and the lower right secondary display shows the total number of the stored data.
- Press ► button to enable the SEND feature to export the data to the computer via USB or RS232.
- The software shows the data storing time and also the data value. After the data transferring is completed, the SEND feature will be disabled automatically .
- Press + or - button to view additional stored reading.
- Press and hold + or - to access quick recalling.
- Press EXIT to exit recalling.

Setup Options

- To enter the Setup mode, turn the meter on and press the SETUP button. It is recommended to change the default setting only when the Meter is at DCV measurement mode.
- In the setup mode, each press of SETUP button steps to the next selection. Each press of - or + button decrements or increments an option.
- Each setup selection and option appears in the primary display in the sequence shown in the following table.

Saving Setup Options

- At each setup option store your choice and exit setup by pressing EXIT. To advance to the next option press +.
- To exit without saving press SETUP.

Selection	Option	Factory default	Description
HIGH	Max 4000 Press ► to turn OFF Press ► to select the digit to edit	OFF	Over the upper limits - intermittent beep
LOW	Max 4000 Press ► to turn OFF Press ► to select the digit to edit	OFF	Over the lower limits - intermittent beep
	10 20 30 OFF	10 Mins	10 mins power off 20 mins power off 30 mins power off Power off disabled
	1 OFF	S1	Beeps continuously and icon lights No beep - icon flashes
	10 20 30 OFF	10	Backlight off in 10 secs Backlight off in 20 secs Backlight off in 30 secs Disable backlight feature
Analogue bar graph	Zero is on left hand side Zero is in the centre (DCV/DCI only)	Zero on left side	0 40 -40 0 40

Turning on the Display Backlight

Warning: In order to avoid the hazard arising from mistaken readings in low light situations, please use display backlight function.

- Press LIGHT button to turn the display backlight on.
- Press LIGHT button again to turn the display backlight off.

The RANGE Button

- Press RANGE to enter the manual ranging mode.
- Press and hold RANGE for over 1 second to return to autoranging.


The MAX MIN Button

MAX MIN recording mode captures and stores the maximum and minimum input value detected.

To use the MAX MIN mode as follows:

- Press MAX MIN to display the highest reading (MAX is shown on display).
- Press MAX MIN again to display the lowest reading (MIN is shown on display).
- Press and hold MAX MIN for over 1 second to exit the MAX MIN mode.



Sleep Mode

- The meter will automatically enter the sleep mode after approximately 10 minutes of inactivity to preserve battery life. The last value will be stored.
- The meter can be activated by pressing the POWER button off and then on or pressing the HOLD button, it will display the last measurement value before it entered sleep mode and under the HOLD mode.
- Turning the rotary switch can also activate the meter however, it will start from the switch selected function and it will not display the last measurement value before it entered sleep mode.
- To disable the sleep mode function, press MAX MIN, RANGE, or RS232 button while turning on the meter the  symbol disappears.

SPECIFICATION

DC Voltage			
Range	Resolution	Accuracy	Overload Protection
400mV	0.01mV	$\pm(0.025\%+5)$ REL mode	1000V Input impedance At 400mV range : ~ 2.5G Ω At all other ranges: ~ 10M Ω
4V	0.0001V	$\pm(0.5\%+5)$	
40V	0.001V		
400V	0.01V		
1000V	0.1V	$\pm(0.1\%+8)$	
AC Voltage			Accuracy
4V	0.0001V	45Hz-1kHz	$\pm(0.4\%+30)$
		>1kHz-10kHz	$\pm(3\%+30)$
		>10kHz-100kHz	$\pm(6\%+30)$
40V	0.001V	45Hz-1kHz	$\pm(0.4\%+30)$
		>1kHz-10kHz	$\pm(3\%+30)$
		>10kHz-20kHz	$\pm(6\%+30)$
400V	0.01V	45Hz-1kHz	$\pm(0.4\%+30)$
		>1kHz-10kHz	$\pm(5\%+30)$
		>10kHz-100kHz	Not Specified
1000V	0.1V	45Hz-1kHz	$\pm(1\%+30)$
		>1kHz-5kHz	$\pm(5\%+30)$
		>5kHz-10kHz	$\pm(10\%+30)$
DC Current			
400 μ A	0.01 μ A	$\pm(0.1\%+15)$	Fuse 0.5A, 250V fast type, 5x20mm
4000 μ A	0.1 μ A		
40mA	0.001mA		
400mA	0.01mA		
10A	0.001A	$\pm(0.5\%+30)$	Fuse 10A, 250V fast type, 5x20mm.
AC Current			
400 μ A	0.01 μ A	45Hz~1kHz: $\pm(0.7\%+15)$	Fuse 0.5A, 250V, fast type, 5x20mm.
4000 μ A	0.1 μ A	>1kHz~5kHz: $\pm(1\%+30)$	
40mA	0.001mA	>5kHz~10kHz: $\pm(2\%+40)$	
400mA	0.01mA		
10A	0.001mA	45Hz~1kHz: $\pm(1.5\%+40)$ >1kHz~5kHz: $\pm(2.5\%+40)$ >5kHz~10kHz: $\pm(5\%+40)$	Fuse 10A, 250V, fast type, 5x20mm.

Resistance				
Range	Resolution	Accuracy		Overload Protection
400Ω	0.01Ω	± (0.3%+40) + test lead open circuit resistance value		1000V rms
4kΩ	0.0001kΩ	±(0.3+40)		
40kΩ	0.001kΩ			
400kΩ	0.01kΩ	± (0.5%+40)		
4mΩ	0.0001MΩ	± (1%+40)		
40MΩ	0.001MΩ	± (1.5%+40)		
Capacitance				
40nF	0.001nF	± (1%+20) + capacitance value of open circuit test leads		1000V rms
400nF	0.01nF	± (1%+20)		
4μF	0.0001μF			
40μF	0.001μF			
400μF	0.01μF	± (1.2%+20)		
4mF	0.0001mF	± (5%+20)		
40mF	0.001mF	Not Specified		
Frequency				
40kHz	0.001kHz	± (0.01%+8)		1000V rms
400kHz	0.01Hz			
4kHz	0.0001kHz			
40kHz	0.001kHz			
400kHz	0.01kHz			
4MHz	0.0001MHz			
40MHz	0.001MHz	Not Specified		
400MHz	0.01MHz			
Temperature				
°C	0.1°C	-40°C~40°C	± (3%+30)	1000V rms
		40°C~400°C	± (1%+30)	
		400°C~1000°C	± 2.5%	
°F	0.1°F	-40°F~32°F	± (4%+50)	
		32°F~752°F	± (1.5%+50)	
		752°F~1832°F	±3%	

Continuity Test			
Range	Resolution	Overload Protection	Remarks
	0.01Ω	1000V rms	Open circuit voltage approximate -1.2V. When circuit disconnected with resistance value >50Ω, buzzer does not sound. When circuit is in good connection with resistance value <10Ω buzzer sounds continuously
Diode Test			
	0.0001mV	1000V rms	Open circuit voltage approximate 2.8V. Working current approximate 1mA.
Duty Cycle			
100%	0.01%	± (1%+40)	1000V
4~20mA Loop Current			
(4~20mA)%	0.01%	± (1%+50)	Fuse 0.5A, 250V, fast type, 5x20mm.

MAINTENANCE


Cleaning

- Periodically wipe the case with damp cloth and mild detergent. Do not use abrasives or solvents for cleaning.
- Clean the measurement probe tips occasionally, as dirt on the probes can affect reading accuracy.

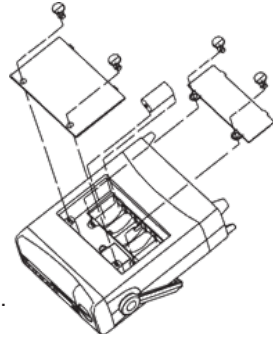
Replacing the fuses

- Press the POWER button to turn the meter off, disconnect the power cord and remove all connections from the terminals.
- Fuse 3: Remove the screws from the power socket at the rear of the meter. Remove the fuse by gently prying one end loose, then take out the fuse from its holder. Refit a replacement fuse.
- Fuse 1 and 2: Open the accessories compartment at the top of the front cover, then open the fuse compartment to replace fuse 2 and 3. Remove the fuse by gently prying it loose from its holder. Install the replacement fuse.
- Use ONLY replacement fuses with the identical type and specification as follows and make sure the fuse is inserted firmly in the holder.
- Fuse 1: 0.5A, 250V, fast type, 5x20mm
- Fuse 2: 10A, 250V, fast type, 5x20 mm
- Fuse 3: 0.2A, 250V, fast type, 5x20 mm

Replacing the Battery

Warning: To avoid false readings, replace the battery as soon as the battery indicator “” appears when using battery to power on the meter.

- Press the POWER to turn the meter off and remove all connections from the terminals.
- Open the accessories compartment at the top of the front case.
- Open the battery compartment inside the accessories compartment.
- Remove all the batteries from the battery compartment.
- Replace the battery with new 6pcs of 1.5V battery (R14).
- Refit the battery compartment cover and also the accessories compartment cover.



RS232C and USB Serial Port

To use 72-1016 Interface Program, you need the following hardware and software:
An IBM PC or equivalent computer with 80486 or higher processor and monitor with screen resolution of 600 x 800 pixels or better.

Microsoft Windows 95 or newer.

At least 8MB of RAM.

At least 8MB free hard drive space.

Access to a local or network CD-ROM.

A free serial port.

A mouse or other pointing device supported by Windows.

Default of RS232C serial port for communication is set as:

Baud Rate: 19200

Start bit: 1

Stop bit: 1

Data bits: 7

Parity: Odd

Setting of USB Serial Ports

Using the CD provided with the meter, install the USB serial port driver & computer interface software before connecting the meter and computer.

Check for the USB Serial port shown in the Control Panel => System => Device Manager. Make sure to connect the meter to the computer with the same port.



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.

