

3 1/2 Digits Unbeatable Best Buy Multimeters with All-Ranges Protection OPERATION MANUAL

1. SAFETY RULES

- This meter is designed and tested in accordance with EN publication 61010-1, pollution degree II and installation category (overvoltage category) II 600V.
- This meter has been tested according to the following EC Directives
 - 89/336/EEC Electromagnetic Compatibility, EN61326
 - 73/23/EEC Product safety law of Low Voltage Directive, EN61010-1
- This meter is designed to be indoor use at temperature 5°C to 40°C and altitude up to 2,000m.
- To ensure that the meter is used safely, follow all safety and operating instructions in this operation manual. If the meter is not used as described in this operation manual, the safety features of this meter might be impaired.

2. INTERNATIONAL SYMBOLS

- | | | | |
|--|----------------------------------|--|-------------------|
| | Important information see manual | | Diode |
| | AC | | Continuity |
| | DC | | Ground |
| | | | Double insulation |

3. SPECIFICATIONS

3.1 General Specifications

- Display : 3 1/2 digit LCD with max. reading of 1999.
 Polarity : Automatic, (-) negative polarity indication.
 Zero adjustment : Automatic.
 Over range indication : Only the MSD "1" is displayed.
 Power : 1.5V AAA battery x 3
 Dimension : 85 (W) x 155 (H) x 40 (D) mm.
 Net Weight : Approx. 250g. (Including battery).

3.2 Electrical Specifications

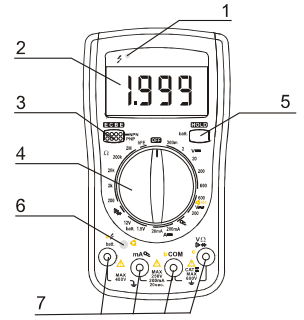
Accuracies are ± (% of reading + number of least significant digits) at 23°C ± 5°C, <75% RH.

DC Voltage	Range	Resolution	Accuracy	Input Impedance	Overload Protection			
	200mV	0.1mV				±(1.0%+3)	10MΩ	600V DC/ACrms
2V	1mV							
20V	0.01V							
200V	0.1V							
600V	1V							
AC Voltage	Range	Resolution	Accuracy	Frequency (Hz)	Overload Protection			
	200V	0.1V				±(1.2%+3d)	40~400	600V DC/ACrms
600V	1V							
DC Current	Range	Resolution	Accuracy	Open circuit voltage	Overload Protection			
	20mA	0.01mA				±(1.2%+3d)	250V DC/ACrms	
	200mA	0.1mA						
10A*	0.1A	±(5.0%+3d)						
Resistance	Range	Resolution	Accuracy	Open circuit voltage	Overload Protection			
	200Ω	0.1Ω				±(1.2%+3d)	<1.0V	250V DC/AC rms <30 sec.
	2kΩ	0.001kΩ						
	20kΩ	0.01kΩ						
	200kΩ	0.1kΩ						
2MΩ	0.001MΩ							
Capacitance (BS1902/03)	Range	Resolution	Accuracy	Test Volt/Freq	Overload Protection			
	20μF	0.01μF				±(2.5% + 3d)	<3V/2.5Hz	250V DC/AC rms <30 sec
200μF	0.1μF							
Temperature (BS1903)	Range	Resolution	Accuracy	Overload Protection				
	-20°C to +400°C	1°C		±(2.5% + 4°C)	250V DC/AC rms <30 sec.			
Diode Test	Test Voltage	Test Current	Overload Protection					
			<3V	Approx. 1.6mA	250V DC/AC rms <30 sec.			
Continuity Test	Test range	Open circuit Voltage	Overload Protection					
			Buzzer sounds when resistance value <30Ω	<3V	250V DC/AC rms <30 sec.			
Transistor Test (NPN-PNP) (BS1901/02/03)	range	hFE Value		Overload protection				
	hFE	0 – 1000		250V DC/AC rms <30 sec.				
Phase Sequence Indication	Range		Phase Sequence Indication					
	380ACV ±10%		Correct Phase Sequence – Phase Sequence Light "ON"					
Live Wire Verification Voltage	Tested Voltage Range							
	100~250V							
Battery Test (BS 1901)	Range		Load Resistance		Overload Protection			
	1.5V load	12V load	150Ω / 900Ω			250V DC/AC rms <30 sec.		
Square Waveform Output (BS 1901W)	Output Voltage	Frequency	Wave Form		Overload Protection			
	Approx. 3V	50Hz	Square Wave			250V DC/AC rms <30 sec.		

* for BS1903 only, use 10A fused current adaptor at 200mV range

4. PANEL DESCRIPTIONS

- Live wire verification indication light (BS1901/01W)
- LCD display
- Transistor testing socket (BS1901/02/03); Battery test key (BS1901W)
- Multifunction selector
- HOLD key / Battery test key
- Phase verification indication light
- Input terminal



5. OPERATION

⚠ WARNING

- When measuring voltage ensure that the instrument is not connected or switched to a current or resistance, or battery test, or diode/ continuity check range. Always ensure that the correct terminals are used for the type of measurement to be made.
- Use extreme care when measuring voltage above 50V, especially from sources where high energy exists.
- Avoid making connections to "live" circuits whenever possible.
- When performing current measurements ensure that the circuit is not "live" before opening it in order to connect the test leads.
- Before performing resistance/capacitance measurements or diode test, ensure that the circuit under test is de-energised.
- Always ensure that the correct function and range is selected. If in doubt about the correct range, start with the highest and work downwards.
- Extreme care should be taken when using the instrument to conjunction with a current transformer connected to the terminals. High voltage may be produced at the terminals if an open circuit occurs.
- Ensure that the test leads and prods are in good condition with no damage to the insulation.
- Take care not to exceed the overload limits as given in the specifications.

5.1 DC and AC voltage measurement

- Connect the black test lead to the "COM" terminal and red test lead to the "V" terminal.
- Set the multifunction selector to desired DC V or AC V position and connect the test leads across the source or load under measurement.

5.2 DC current measurement

- Connect the black test lead to the "COM" terminal and red test lead to the "mA" terminal for measurement up to 200mA.
- Set the multifunction selector to desired current range position.
- Connect the test leads in series with the current source to be measured.
- When the tested current is above 100mA, the input voltage drop might above 1V; hence, the test duration cannot exceed 15 seconds!

⚠ CAUTION: Max. input overload: 250V rms < 20sec.

5.3 Resistance measurement

- Connect the black test lead to the "COM" terminal and red test lead to the "Ω" terminal.
- Set the multifunction selector to desired resistance (Ω) range position.
- Connect the test leads across the circuit to be tested.

⚠ CAUTION: Ensure that the circuit to be tested is "dead".
Max. input overload : 250V rms < 20sec.

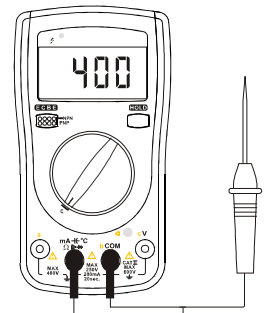
5.4 Capacitance Measurement (BS1902/03)

- Connect the black test lead to the "COM" terminal and red test lead to the "—" terminal.
- Set the multifunction selector to desired Capacitance (C) range position.
- Connect the test leads across the capacitance to be tested.

⚠ CAUTION: Ensure that the capacitance to be tested is discharged.
Max. input overload : 250V rms < 20sec.

5.5 Temperature Measurement (with K-Type Thermocouple) (BS1903)

- Connect the K-Type Thermocouple cathode (-) to the "COM" terminal and the anode (+) to "°C" terminal.
- Set the multifunction selector to "°C" range position.
- Use the K-Type Thermocouple' probe contact the object to be tested (Liquid)
- If the temperature of the environment is sudden changed or the resettable fuse is in active mode, the temperature measurement should continue after 30 minutes; otherwise, the measurement is not accurate.



5.6 Diode test

- Connect the black test lead to the "COM" terminal and red test lead to the "▶" terminal.
- Set the multifunction selector to ▶ (same as ⚡) position.
- Connect the black and red test leads to the cathode (-) and anode (+) ends of the diode to be tested respectively.
- Read the forward voltage drop (junction) value from the display. When the forward biased is open, the display will shows overload '1'.

⚠ CAUTION: Max. input overload: 250V rms < 20sec.

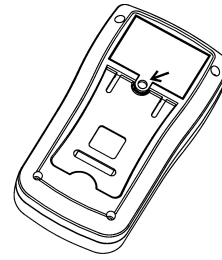
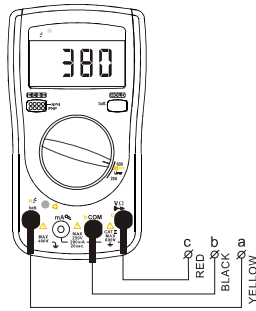
5.7 Transistor (NPN/PNP) Test (BS1901/02/03)

- Set the multifunction selector to hFE position, the meter will display 000
- Connect the transistor's pin to the testing socket according to the type of the transistor, the meter will display transistor's hFE value, if display abnormal value, it mean wrong connection is made or the transistor is damage.

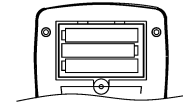
⚠ CAUTION: Max. input overload: 250V rms < 20sec.

5.8 Phase Sequence Verification

1. Connect the red test lead to the "c" terminal, black test lead to "b" terminal and yellow test lead to "a" terminal
2. Set the multifunction selector to "600V~/abc" range.
3. Connect yellow/black/red test lead to three-phase contact point. If the phase sequence indicator lights on, indicating the connection is in correct phase sequence.
4. If the phase sequence indicator lights off, please swap black (b) and red (c) test leads, if the indicator remains off which means that there is a missing phase or wrong connection, please use Live Wire Verification function to verify each phase again.



A. Remove the screw of the battery compartment



B. Open the compartment and replace the spent battery with the same type and rating.

5.9 Live Wire Verification (BS1901/1W)

1. Connect the red test lead to the "L" terminal, black test lead to "COM" terminal and hold the black test lead (please note: **do not touch the test pin and keep your hands away from the finger guard of the test lead!**)
2. Set the multifunction selector to "600V~/abc" range.
3. Use the red test lead to contact the live wire to be tested. When there is a live wire, the Live Wire Verification lights will turn on.

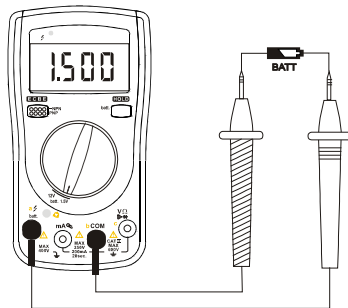
5.10 Continuity test

1. Connect the black test lead to the "COM" terminal and red test lead to the "diode" terminal.
2. Set the multifunction selector to "diode" (same as "h") position.
3. Connect the test leads across the circuit to be tested, if the resistance less than 30Ω, buzzer will be activated.

CAUTION: Max. input overload: 250V rms < 20sec.

5.11 Battery test (BS1901/01W)

1. Connect the black test lead to the "COM" terminal and red test lead to the "batt." terminal.
2. Set the multifunction selector to battery "1.5V or 12V" range
3. To measure the battery voltage without loading (V_1), connect the test leads to the battery, red test lead to the battery cathode (+), black test lead to the battery anode (-). If the display shows '-' which means the red test lead is connected to the anode (-).
4. To measure the battery voltage with loading (V_2), press the "HOLD/batt." key. The meter presets the internal loading $R_0 = 900\Omega$ for 12V and $R_0 = 150\Omega$ for 1.5V.
5. To find the internal impedance (R_i) of the battery, the following formula can be used.



$$R_i = \frac{\text{Voltage without loading} - \text{Voltage with loading}}{\text{Internal loading}}$$

$$= \frac{(V_1 - V_2) \times R_0}{V_2}$$

For example: $V_1 = 1.550V$; $V_2 = 1.450V$; $R_0 = 150\Omega$ for 1.5V battery measurement

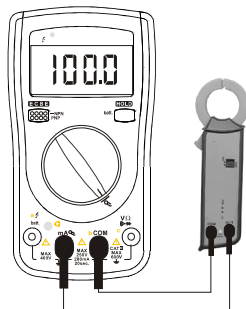
$$R_i = \frac{(1.550 - 1.450) \times 150}{1.450} \approx 10.34\Omega$$

5.12 Square waveform output (BS1901W)

- 1) Connect the black test lead to the "COM" socket and red test lead to the "mA-ur" socket.
- 2) Set the function selector to "square" position.
- 3) connect test leads across device under test.

5.13 Measuring AC current with an add-on clamp (optional)

1. Connect an add-on clamp anode (-) to "COM" terminal and cathode (+) to "AC" terminal
2. Clamp the tested wire with the clamp head and the AC current value will be shown on the display.



6. MAINTENANCE

CAUTION

BEFORE ATTEMPTING BATTERY REMOVAL OR REPLACEMENT, DISCONNECT TEST LEADS OR PROBES FROM ANY ENERGISED CIRCUITS TO AVOID SHOCK HAZARD.

6.1 Fitting and replacing the battery

1. Ensure that the instrument is not connected to any external circuit, set the Multifunction selector to OFF position and remove the test leads from the terminals.
2. Remove the screw of the battery compartment on the bottom of the back case.
3. Replace the spent battery with the same type and rating.
4. Reinstall the battery compartment, tighten and securing screw.

6.2 Cleaning

Periodically wipe the case with a soft damp cloth and mild household cleanser. Do not use abrasives or solvents. Ensure that no water gets inside the equipment to prevent possible shorts and damage.

7. ACCESSORIES

The accessories contained inside the packaging are the following:

<ul style="list-style-type: none"> • Pair of test leads • English instruction manual • 3 Phases 3rd test lead with clip • K-Type Thermocouple (for BS1903 only) 	<ul style="list-style-type: none"> • 10A Current Adaptor (for BS1903 only) • 1.5V AAA battery x 3 • Certificate of test
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Optional: 10A DC current Adaptor 3700- 10A
AC current add-on clamp BS- 06

8. SERVICE

8.1 Warranty Conditions

This meter is guaranteed against any material fault or manufacturer's defect, in accordance with the general conditions of sale. During the warranty period (one year), faulty parts may be replaced, with the manufacturer reserving the right to decide either to repair or replace the product.

In the event of returning the meter to the after-sales service or to a regional branch, the outward transport is payable by the customer. The delivery must be agreed in advance with consignee.

For delivery indicate, by means of an enclosed note, as clear as possible, the reasons for returning it. Use only the original packing.

Any damage caused by shipment using NOT the original packaging will be charged in any case to the consignor.

The manufacturer will not be responsible for any damage to persons or things.

The warranty does not apply to the following cases:

- Accessories and battery are not included in warranty.
- Repairs following unsuitable use of the meter or by combining the latter with incompatible meter or accessories.
- Repairs resulting from incorrect shipping.
- Repairs resulting from servicing carried out by a person not approved by the company.
- Modifications to the meter without explicit authorisation from our technical department.
- Adaptation to a particular application not provided for by the definition of the meter or by the instruction manual.

The contents of this manual may not be reproduced in any form whatsoever without the manufacturer's authorization.

Our products are patented. The logotypes are registered. We reserve the right to modify specifications and prices as part of technological developments which might be necessary.

8.2 Service

If the meter should not work properly, before contacting the DEALER OR THE SERVICE CENTRE, check the battery condition, the test leads, etc., Change them if necessary. If the meter still does not work, check if your operating procedure agrees with the description in this manual.

In the event of returning the meter, it must be re-sent to the after-sales service (at address or to a regional branch), the outward transport is payable by the customer. The delivery must be agreed in advance with consignee.

For delivery indicate the reasons for returning it. (By means of an enclosed note, as clear as possible). Use only the original packing.

Any damage caused by delivery with NO original packaging will be charged in any case to the consignor.

FOR TECHNICAL ASSISTANCE, PLEASE CONTACT:

Remarks: Due to our policy of continual product development, we reserve the right to amend the specifications of the mentioned products without notice.