

Insulation & Continuity Testers

MEGGER® BM200 Series

Operating Instructions

MEGGER®

SAFETY WARNING

- * **The circuit MUST be de-energized and isolated BEFORE connections are made for any test.**
- * **Do not touch the circuit during an insulation test.**
- * **After insulation tests, capacitive circuits MUST be allowed to discharge BEFORE disconnecting the test leads.**
- * **Test leads, including prods and crocodile clips, must be in good order; clean and having no broken or cracked insulation.**
- * **When detecting or measuring voltage, test leads with fused prods must be used; as recommended in the Health & Safety Executive Guidance Note GS38.**
- * **Before use switch to '⚡', short test leads and obtain "buzz".**
- * **When making a voltage test or when the presence of a voltage is indicated DO NOT press the 'Test' button. Instruments must not be used for voltage tests above 600 V a.c.**
- * **In the interests of safety, it is not recommended that crocodile clips be connected to "live" conductors.**
- * **Disconnect the test leads and set switch to 'Off' BEFORE opening the rear cover.**
- * **REPLACEMENT FUSES MUST BE CERAMIC HBC AND OF THE CORRECT TYPE AND RATING. GLASS FUSES MUST NOT BE USED. (See the specification.)**
- * **When replacing the battery cells, ensure no dust, moisture or foreign matter enter the casing.**

The warnings must be read and understood before the instrument is used. They must be observed during use.

NOTE

This instrument is only to be used by a suitably trained and competent person.

SPECIFICATION

Insulation Range		BM200	BM201	BM202	BM203	BM204	BM205	BM206
Nominal Test Voltage (d.c.)		500 V	500 V	250 V	100 V	500 V & 1000 V	500 V & 1000 V	250 V, 500 V & 1000 V
Insulation Resistance Range		0,01 MΩ to 1000 MΩ (all instruments and all test voltages)						
Terminal Voltage on Open Circuit (d.c.)		1000 V range: 1400 V max. 500 V range: 750 V max. 250 V range: 250 V ±5% 100 V range: 100 V ±5%			BM200 to BM205		BM206 1100 V max. 575 V max. 300 V max. —	
Terminal Voltage on Load (d.c.)		1000 V range: 1000 V min. at 1 MΩ 500 V range: 500 V min. at 0,5 MΩ 250 V range: 250 V +0-20% at 1 MΩ 100 V range: 100 V +0-20% at 1 MΩ			BM200 to BM205		BM206 1000 V min. at 1 MΩ 500 V min. at 0,5 MΩ 250 V min. at 250 kΩ	
Short Circuit Current		2 mA max.						
Accuracy (at 20 °C)		analogue	±1,5% of scale length					
		digital	±3% of reading ± 2 digits					
			Note:- BM203 accuracy is ±10% of reading above 100 MΩ					
Response Time		1,5 s for full scale (i.e. 1000 MΩ)						
Resistance Range		BM200 to BM205						
Resistance		0,01 kΩ to 1000 kΩ						
Terminal Voltage on Open Circuit		2 V max.						
Accuracy (at 20 °C)		analogue	±2% of scale length					
		digital	±5% of reading ± 2 digits					
Response Time		1,5 s for full scale (i.e. 1000 kΩ)						
Continuity Ranges		Resistance						
		(i)	0,01 Ω to 5 Ω					
		(ii)	0,1 Ω to 50 Ω					
		(iii)	continuity buzzer up to 1 kΩ, with 'Test' button not pressed					
Terminal Voltage on Open Circuit		6 V max. 3 V min.						
Short Circuit Current		40 mA nominal						
Accuracy (at 20 °C)		analogue	For 5 Ω range, ±3% of reading ±0,05 Ω					
			For 50 Ω range, ±5% of reading ±0,5 Ω					
		digital	For 5 Ω range, ±3% of reading ±2 digits					
			For 50 Ω range, ±5% of reading ±2 digits					
Zero Offset		0 to +0,10 Ω at prod tips, on 5 Ω range						
Response Time		2 s to full scale						
Voltage Range		BM200, BM201, BM202, BM203, BM206						
Range		analogue	20 V to 500 V a.c.; 20 V to 350 V d.c.					
		digital	20 V to 600 V a.c.; 20 V to 350 V d.c. (above 350 V d.c. the display reads '>350') (No voltage range on BM204 or BM205)					
Input Impedance		500 kΩ approx.						
Accuracy (at 20 °C)		analogue	±3% of reading ±10 V					
		digital	±3% of reading ±3 V					
Voltage Indication		All instruments, including the BM204 and BM205 indicate the presence of voltage in excess of 20 V by both audible and visible warnings.						

General Display

Combined analogue and digital I.c.d. giving logarithmic and linear scales with dynamic pointer plus 3 digit display.

Overload Rating

**BM200, BM204
BM206
BM201, BM202,
BM203, BM205**

1200 V a.c. or d.c. for 10 s or 600 V a.c. or d.c. indefinitely.
600 V a.c. or d.c. indefinitely.

Temperature Coeff.

<0,1% per °C on all ranges

Temperature Range

operating -5 °C to +50 °C
storage -25 °C to +65 °C

Humidity Range

operating 90% RH at 40 °C max.

Fuses

100 mA 250 V 20 mm x 5 mm ceramic HBC (IEC 127/1)
500 mA 440 V 32 mm x 6 mm ceramic HBC
1,5 kA minimum

Safety

The BM200 to BM205 will, in general, meet the requirements of BS 4743 (1979), IEC 348 (1978) and VDE0411 (1973).
The BM206 will, in general, meet the requirements of IEC 1010 (1991), BS 4743 (1979) and VDE 0411 (1973).
Safety Class II.

Power Supply

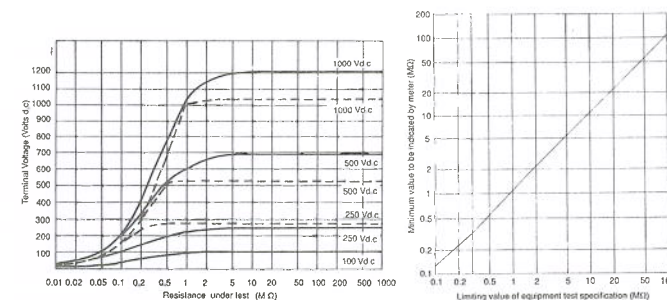
4 x 1,5 V cells IEC LR6 type (e.g. Duracell MN1500).
Minimum battery life (5 s tests as per VDE0413), 3000 tests at 500 V on 0,5 MΩ load; 500 tests at 1000 V on 1 MΩ load. (Nominal capacity of alkaline-manganese cells is 2250 mAh).

Dimensions

195 mm x 98 mm x 40 mm
(7 5/8 in x 3 7/8 in x 1 1/2 in approx.)

Weight

380 g (7/8 lb) approx.



Key: — BM200 to BM205
--- BM206

Typical Terminal Voltage Characteristic

Limiting Value Curve

ACCESSORIES

Supplied: Test lead set
Zip-up carrying case
Optional: Spare test lead set
Direct entry, fixed red prod
Fused test lead set (FPK1)
Silicon covered leads (advantageous for measurements > 100 MΩ)
red
black
Test-and-carry case — simulated leather

part no. 6220-408
part no. 6420-067
part no. 6220-437
part no. 5210-350
part no. 6110-872
part no. 6220-474
part no. 6220-475
part no. 6420-057

OPERATION

FITTING NEW BATTERY CELLS

Warning:- Set selector switch to 'Off'.
Disconnect test leads from terminals.

Precautions:- The instrument circuit contains static sensitive devices, take appropriate care when handling opened instrument. Used normally, the instrument is protected against impact, electrostatic discharge and the ingress of dirt and moisture. This protection is reduced when the back casing is removed. Therefore, only remove the back in a clean and dry environment.

1. Remove the screw at the bottom of the rear cover.
2. Lift up rear cover (from the bottom) and remove it.
3. Fit four new battery cells in the holder; observe the correct polarity.
4. Replace the rear cover and secure it with the screw BEFORE using the instrument. THIS IS IMPORTANT.

Note:- (i) '⎓' symbol appearing on the display indicates that the battery power is low. In this condition the 1000 V range no longer conforms to VDE 0413 part 1. The other ranges will continue to work to the full specification. When the battery is exhausted the buzzer will sound and a reading will not be possible. At low temperatures the display will fade as the battery voltage falls.
(ii) After fitting new battery cells, random effects may occur on the display or buzzer. These can be eliminated by operating the selector switch or 'Test' button.

Battery Life:-

Battery life will depend on the function selected and, for insulation tests, the resistance (or load) being measured.

Always use alkaline, especially for heavy loads i.e. where the majority of tests at 500 V or 1000 V have readings < 10 M Ω . Alkaline cells will survive better at low temperatures, generally give a longer life and will not leak when exhausted.

FUSES

A 100 mA fuse provides instrument circuit protection if the 'Test' button is pressed while the leads are connected to a voltage up to 250 V. Extra protection for higher voltages is provided by a 500 mA 440 V fuse. A ruptured 100 mA fuse affects only the '5 Ω ', '50 Ω ' and 'k Ω ' ranges. The '⎓', 'M Ω ' and voltage functions still operate normally. The voltage functions operate even if the fuses have ruptured.

Fuse Check

1. Select the '50 Ω ' position.
2. Connect the test leads together.
3. A constant reading > 50,0 Ω indicates a ruptured 100 mA fuse.
4. If the buzzer sounds constantly with the switch in the '50 Ω ' position and the leads disconnected, both fuses have ruptured.

Note:- With a ruptured fuse, the '5 Ω ' range can read > 5,00 Ω or 0,00 Ω irrespective of test lead connections.

Fuse Replacement

1. Open the instrument by following the same procedure as for fitting battery cells.
2. The fuses are located in the bottom left hand corner of the p.c.b.
Replace with fuses of the correct type and rating — see the specification.
3. Replace and secure the cover BEFORE using the instrument. THIS IS IMPORTANT.

GENERAL INFORMATION

Note:- The BM200, BM201, BM204, BM205 and BM206 are designed to meet the insulation testing requirements of the 16th Edition IEE Wiring Regulations and VDE 0413 part 1.

Display Segment Check:- Switch to 'Off' and press the 'Test' button. All segments illuminate with reduced contrast since little battery power is available in the 'Off' position.

Automatic Shut-Off

If the instrument is left switched on but unused, it will automatically turn itself off after 3 minutes (or 45 minutes for continuity buzzer). To conserve battery power switch off after use; do not rely on the auto shut-off.

Voltage Warning

To warn that connection has been made to a 'live' supply of > 20 V a.c. or d.c., the instrument's buzzer will sound, and on the display 'V' will flash (this occurs with any switch position selected including 'Off'). DO NOT PRESS THE 'TEST' BUTTON if this happens. Switch the supply off before proceeding with an insulation or continuity test.

If the 'M Ω ' or 'k Ω ' ranges are selected the instrument will measure and display the voltage present. (This does not apply to the BM204 and BM205 which indicate the presence of a voltage without measuring it.)

Note:- The voltage indication will always operate whatever function has been selected; even if a fuse has ruptured. For operator and instrument protection always:-

- (i) switch the supply off first
- (ii) then make the connections and check for voltage
- (iii) then press the 'Test' button.

TESTING

Insulation Testing

1. Set selector switch to 'M Ω ' as required.
2. Connect test leads, first to the instrument then to the isolated test item. Check that no voltage is indicated.
Note:- To avoid leakage, keep the test leads separated from each other and preferably not touching anything.
3. Press the 'Test' button. The analogue pointer appears and moves up scale to the value to be indicated; the digital reading is then shown.
Note:- For an analogue ∞ reading the digital reading will be '> 999'.
4. Release the 'Test' button. Any capacitive circuits charged during a test will then automatically discharge. If significant voltage remains the voltage scale reappears and the discharge is monitored.
5. Remove the test leads only when no voltage is indicated.

Resistance Testing

BM200 to BM205

1. Set the selector switch to 'k Ω '.
2. Perform steps (2) to (5) as for insulation testing.
Note:- The test voltage applied is only 1 V approx.

Continuity Testing

1. Set the selector switch to '50 Ω ' or '5 Ω ' as required.
2. Press the 'Test' button as for insulation testing.
Note:- The first press of the 'Test' button instigates an automatic zero adjustment prior to the measurement. This compensates for temperature drifts of internal components and reduces zero offset to typically 0,05 Ω . Deducting the reading with the leads short circuited from the original measurement gives a more accurate result on the 5 Ω range.

Continuity Buzzer

1. Set the selector switch to '⎓' (same position as '50 Ω ' range); the symbol '⎓' then appears on the display.
2. The continuity buzzer is engaged automatically without the need to press the 'Test' button. The buzzer sounds every time the test leads make contact with a low resistance.
Note:- Pressing the 'Test' button disengages the buzzer facility and selects the '50 Ω ' measuring range. To re-engage the buzzer facility simply move the selector switch to an adjacent position and then back to '⎓'.

Voltage Indications

- A) Automatic indication of voltage. Refer to 'Voltage Warnings' above.
- B) Voltage range (except BM204 and BM205)
On the 'M Ω ' insulation test range(s) and on the 'k Ω ' range, the instrument defaults to a voltmeter when the 'Test' button is not pressed and > 20 V is present on the circuit.
Note:- Negative d.c. gives warning by buzzer and flashing 'V' only — no measurement is shown.
- C) Discharge monitor (except BM204 and BM205)
After an insulation test on a capacitive circuit, when the 'Test' button is released, the instrument defaults to a voltmeter after the pointer has returned to zero if > 20 V still exists on the tested circuit. The voltmeter will monitor the discharging voltage and show when it is safe to remove the test leads.



AVO MEGGER INSTRUMENTS LIMITED

Archcliffe Road, Dover, Kent CT17 9EN
Tel: 0304 202620 Fax: 0304 207342

This instrument is manufactured in the United Kingdom.
The company reserves the right to change the specification or design without prior notice.
MEGGER is the registered Trade Mark of AVO MEGGER INSTRUMENTS LIMITED.
This data uses the comma as the decimal marker to align with general European usage.
Parts of this instrument are the subject of patent applications.
Copyright ©, AVO MEGGER INSTRUMENTS LIMITED 1991.
Part No 6171-598 Edition 1 Printed in England SL2,6k/1X

An AVO INTERNATIONAL company

