

# BM400/2 Series

## Analogue/Digital Insulation Continuity Testers



- Fully complies with the requirements of BS 7671, HD 384 and IEC 364
- 1 mA insulation output current
- 200 mA short circuit current output
- Remote control switched probe
- Optional RS232 port
- Optional current clamp accessory
- Waterproof and dustproof to IP54

### DESCRIPTION

The Megger® BM400/2 Series of autoranging insulation and continuity testers, provides simplicity of use in a hand-held instrument, which fully complies with British and International Wiring Regulations. The ease of use and comprehensive specifications are achieved using the latest electronic design and display technology.

The analogue/digital LCD incorporates the benefits of electronic arc analogue indication with unambiguous digital readings. The analogue scale helps to make rapid identification of insulation condition, and to monitor variable readings, and is complemented by the precision and simplicity of a digital display.

The series offers a range of single, dual and multi-voltage variants to suit the user's application. Each range conforms to BS 7671 (formerly the 16th Edition IEE Wiring Regulations) and International standards IEC 364 and HD 384. The insulation ranges output the nominal test voltage when loaded with 1 mA as specified within these standards. The continuity ranges have a short circuit test current of at least 200 mA in order to comply with the requirements of European harmonisation and international documentation. Also, the hands free continuity ranges have the facility to null the resistance of the test leads enabling direct readings of low resistance to be taken. A continuity buzzer is included on the second continuity range.

In addition to the insulation and continuity ranges, the BM400/2 series has a resistance range which measures up to 100 kΩ on the digital scale and up to 10 MΩ on the

analogue scale. Due to the low test voltage and current of this range, it can be used to test circuits with sensitive equipment connected, without causing damage.

Two voltage ranges measure up to 50,0 V and 600 V a.c. or d.c. respectively, and indicate the presence of negative d.c. A voltage warning is provided in these models, alerting the user to the presence of external voltage greater than 25 V, by displaying the voltage level, even when measuring on insulation and continuity ranges. The voltage range will indicate if capacitive charge remains after a test, and will monitor the automatic discharge. Two non voltage-measuring models (BM402/2 and BM404/2) are available which generally precludes the use of fused test leads. To alert the user of the presence of external voltage, the non-voltage measuring instruments (the BM402/2 and BM404/2), will emit a beep and the analogue arc and 'V' symbol will flash. On all models testing is inhibited if 55 V is detected. Hands free operation is offered as standard on all ranges except the insulation ranges. Locking and non-locking test buttons are provided with each instrument for user selection. Use of the non-locking button is recommended to prevent accidental mis-use and injury, and in cases where continuous operation of an insulation test is required the locking button can be fitted. Alternatively the optional accessory Switched Test Probe SP1 can be used enabling remote operation of the test button from the negative test probe.

The BM400/2 series is rugged, and therefore suited to tool bag treatment, as well as having an IP54 environmental

protection rating which ensures product reliability in wet and dusty conditions. Exceptional battery life is provided by six cells housed in separate battery compartment.

The instruments are designed to IEC 1010-1, VDE0411 and BS4743 safety standards.

## **ELECTRICAL CONTRACTORS**

The BM400/2 series, designed for flexibility and versatility, has a wide variety of applications and is ideal for testing electrical installations to the British and International Wiring Regulations. Each instrument in the series conforms to the requirements of Table 71 A in BS 7671, and to VDE 0413 parts 1 and 4, HD384 and IEC364.

The BM400/2 series can be used in both the domestic and industrial contracting environments. Test voltages of 250 V, 500 V and 1000 V d.c. are available. A 250 V insulation test voltage is necessary to test low voltage circuits supplied by an isolating transformer. 500 V d.c. is the most commonly required voltage, since it is used to test all circuits except low voltage circuits with a nominal voltage up to and including 500 V. The 1000 V d.c. test voltage is used on circuits with a nominal voltage greater than 500 V and less than 1000 V.

The continuity ranges can be used to test the continuity of protective and ring final circuit conductors, and the polarity of the conductors.

The BM400/2 series instruments can also be used for insulation and continuity tests on transformers, motors, generators, domestic appliances, power tools, such as electric drills, and many other pieces of electrical equipment.

On high energy systems it is essential to use test leads with fused prods when measuring voltage. These are available as an optional accessory.

## **SERVICE ORGANISATIONS**

The BM400/2 series is ideal for use by Service Organisations due to the wide range of parameters which can be measured with the instrument and its associated optional accessories.

The insulation test ranges are available for establishing the integrity of the insulation of internal parts such as motors and transformers, as well as other equipment, and the continuity ranges can be used for circuit tracing and operational checking of switches, etc.

With the resistance range measuring up to 100 k $\Omega$  on the digital display, and 10 M $\Omega$  on the analogue scale, basic components such as resistors, capacitors and diodes can be tested for functionality.

Two voltage ranges of 1-50,0 V and 0-600 V a.c./d.c. enable internal mains voltages and power supply rail levels to be measured, and with the addition of the MCC10 optional Current Clamp, appliance current consumptions can be measured and compared to the rating plate.

These unique features offer measurement ranges and facilities not normally found in an Insulation Tester and could therefore reduce the number of test instruments required by the Service Engineer.

## **ADVANCED APPLICATIONS**

The addition of the DLB1 RS232 communication base will enable the BM400/2 family to produce a continuous output of information corresponding to the value which is shown on the instrument display. The DLB1 is supplied complete with AVODATA software which will enable the test information to be transferred to an IBM compatible computer.

This opens up applications for continuous monitoring of insulation resistance for the advanced user who may wish to use the results for calculating Dielectric Absorption Ratios including Polarisation Index. The Polarisation Index Ratio is defined as the ratio between insulation resistance values measured after 1 minute and 10 minutes; it is useful for determining insulation quality without the need for temperature compensation or necessary referral to historical test information.

The DLB1 when used in conjunction with the SP1 can also facilitate limited remote operation of the BM400/2 series for applications where the product may need to be permanently installed in or near a piece of equipment.

## SPECIFICATIONS

### Insulation Ranges

	BM400/2 BM402/2	BM401/2 BM404/2	BM403/2
Nominal Voltage	500 V	500V	250 V
Test Voltage (d.c.)	1000 V		500 V 1000 V

### Measuring Range

0,01 - 999 M $\Omega$  on all ranges (0 - 10 G $\Omega$  on analogue scale)

### Terminal Voltage on Short Circuit Current

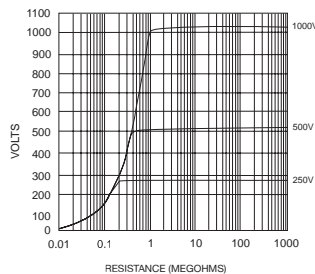
1 mA nominal

### Test Current on Load

1 mA at min. pass values of insulation specified in BS 7671, HD 384 and IEC 364.

### Accuracy (at 20° C)

$\pm 2\%$ ,  $\pm 2$  digits



### Terminal Characteristics

#### CONTINUITY RANGES

Measuring Range:	0,01 - 99,9 $\Omega$ (0-50 $\Omega$ on analogue scale)
Open Circuit Voltage:	5 V, $\pm 1$ V
Short Circuit Current:	205 mA, $\pm 5$ mA
Accuracy (at 20° C)	0,01 - 9,99 $\Omega$ : $\pm 2\%$ , $\pm 2$ digits; 10 - 99,9 $\Omega$ : $\pm 5\%$
Zero Offset Adjust:	0 - 9,99 $\Omega$
Continuity Buzzer	Operates at less than 5 $\Omega$ approx.

#### RESISTANCE RANGE

##### (can be used for diode testing)

Measuring Range:	0,1 - 100 k $\Omega$ (0 - 10 M $\Omega$ on analogue scale)
Open Circuit Voltage:	5 V, $\pm 1$ V
Short Circuit Current:	20 $\mu$ A, $\pm 2$ digits
Accuracy (at 20° C):	$\pm 5\%$ , $\pm 2$ digits

#### VOLTAGE RANGE

##### (not BM402/2 and BM404/2)

Measuring Range	(i) 0 - 600 V d.c. (ii) 0 - 600 V a.c. (50/60 Hz) (iii) 0 - 450 V a.c. (400 Hz) (iv) 1,0 - 50,0 V a.c./d.c. (0-500 V on analogue scale)
Accuracy (at 20° C)	<450 V d.c. or a.c. (50/60 Hz): $\pm 1\%$ , $\pm 2$ digits 1,0 - 50,0 d.c. or a.c. $\pm 3$ digits >450 V d.c. or a.c. (50/60 Hz):

$\pm 2\%$ ,  $\pm 2$  digits

a.c. at 400 Hz:  $\pm 5\%$   $\pm 2$  digits

### TEMPERATURE COEFFICIENT

<0,1% per °C on all ranges.

### DEFAULT VOLTMETER

The default voltmeter operates when an external voltage >25 V a.c. or d.c. is detected on any range except OFF and . If this voltage exceeds 55 V then insulation testing will be inhibited. When this occurs, all instruments, except the BM402/2 and BM404/2, will revert to the voltage range display. Reverse polarity d.c. will cause 'd.c.' to appear on the voltage measuring instruments. The BM402/2 and BM404/2 will beep and flash 'V' on the display as a warning. If external volts are present, testing will be inhibited.

### BATTERY CONDITION TEST

If the batteries are low during a test, the symbol will appear automatically. The batteries can also be checked by selecting the battery condition test position. This will indicate the result as volts and as a bar.

### AUTO SHUT-OFF

The instrument auto shut-off operates 5 minutes after the start of a test, on all ranges, except the insulation ranges where it operates after 12 minutes. This can be adjusted to 60 minutes for the voltage, continuity and K $\Omega$  ranges. Selecting an insulation range or off will revert the shut-off to 5 minutes.

## GENERAL SPECIFICATION

Operating Range	-20 - +40°C
Operating Humidity	90% R.H. at 40°C max.
Storage Range	-25 - +65°C

Environmental Protection IP54

### Fuse

500 mA (F) 440 V, 32 x 6 mm  
Ceramic HBC 10 kA minimum.

Indication of a ruptured fuse is provided by the symbol .

### Safety

The BM400/2 series is protected against connection to a 440 V phase-to-phase Category III supply. The BM400/2 series will, in general, meet the requirements of IEC 1010-1 (1990), BS 4743 (1979) and VDE0411 (1973). The BM402/2 and BM404/2, which do not incorporate a voltage range, though fully protected, should not be connected to live circuits intentionally.

### INSTALLATION CATEGORIES

Category III: Fixed wiring and installations within a building.

### AUTOMATIC DISCHARGE

When the test button is released after an insulation test the item under test will be discharged automatically. Any voltage present will be indicated on the display so that the discharge can be monitored (except on the BM402/2 and BM404/2, which will display 'V').

### POWER SUPPLY

Battery Type	6 x 1,5 V cells IEC LR6 type only.
Battery Life	3000 5 second operations, at 1 kV worst case
Weight	625g
Dimensions	220 x 92 x 55 mm

**E.M.C**

In accordance with IEC61326 including Amendment No.1


**SP1**

The SP1 switched probe is available as an optional accessory. By simply plugging the standard red positive lead into the instrument, and with the switched test probe inserted into a unique socket on the top of the insulation tester, tests can be made by pressing the remote switch on the probe.

This remote operation significantly increases the ease of use of the product and reduces the time taken to perform a test.

**SPECIFICATION**

<b>Operating Temperature Range:</b>	-20°C to +40°C
<b>Operating Humidity:</b>	90% RH @ 40°C max.
<b>Storage Temperature Range:</b>	-25°C to +65°C
<b>Protection:</b>	IP54

**Safety:**

Meets the safety requirements for double insulation to IEC1010-2-31 (1995) EN61010-2-31 (1995) IEC1010-1 (1995) EN61010-1 (1995) Category III, 300 V phase to earth and 500 V phase to phase.

**Weight:** 155 g

**MCC1**

The MCC10 Current Clamp will connect to the instrument test leads and enable direct indication of a.c. current to be displayed on the 50,0 V measuring range. Measurement in the range of 1,0 A to 10,0 A a.c. can be made, with overload up to 16 A at marginally reduced accuracy, and the clamp will span a conductor of 15 mm. This current measuring feature, not normally associated with insulation testers, greatly enhances the product versatility and further increases the applications for Electrical Contractors, Utilities and Service Organisations.

**SPECIFICATION**

<b>Current Range:</b>	1,0 A to 10 A a.c. R.M.S
<b>Output Voltage:</b>	1 V a.c. per 1 A a.c.
<b>Accuracy:</b>	±2%
<b>Operating Temperature:</b>	-10°C to +50°C <75% RH
<b>Storage Temperature:</b>	-20°C to +75°C
<b>Type of Sensing:</b>	Induction coil for a.c. current

**Max. Output Impedance:** 75Ω

**E.M.C.**

In accordance with IEC61326 including Amendment No.1

**Max. Conductor Size:** 15 mm dia. cable, or a 15 mm x 17 mm busbar.

**Size (without leads):-** 43 mm x 23 mm x 94 mm

**Weight:** 105 g

**DLB1**

The DLB1 optional accessory communication interface provides an RS232 serial data output simultaneous to the displayed readings.

When used in conjunction with the AVODATA software provided and an IBM-compatible PC, long-term insulation monitoring and data storage are possible.

AVODATA also enables test data to be presented in tabular form and facilitates the printing of certificates.

**SPECIFICATION**

<b>Baud Rate:</b>	9600
<b>Operating Range:</b>	-20°C to +40°C
<b>Operating Humidity:</b>	90% RH @ 40°C max.
<b>Storage Temperature Range:</b>	-25°C to +65°C

**Safety:**

Meets the safety requirements for double insulation to IEC1010-1(1995) EN61010-1(1995) to Cat. III, 300 V phase to earth (ground) and 500 V phase to phase.

**E.M.C.**

In accordance with IEC61326 including Amendment No.1

**Dimensions:** 94 mm x 46 mm x 42 mm

**Weight:** 80 g

**ORDERING INFORMATION**

Item (Qty)	Order Code
500 V/1000 V with voltage range	BM400/2
500 V with voltage range	BM401/2
500 V/1000 V with voltage warning	BM402/2
250 V/500 V/1000 V with voltage range	BM403/2
500 V with voltage warning	BM404/2
<b>Included Accessories</b>	
Test lead set	6220-437
Zip-up carrying case	6420-132
<b>Optional Accessories</b>	
Fixed prod	5210-350
Fused lead set FPK8	6111-218
Test & carry case	6420-112
SP1	6220-606
MCC10	6111-290
DLB1	6220-604
	(Complete with 6420-112)
Test record card (pack of 20)	6111-216

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**BM400\_2\_DS\_en\_V10**

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