



MEGGER® BM400/2 Series

- Fully complies with the requirements of BS 7671, HD 384 and IEC 364
- 1mA 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

Analog/Digital Insulation and Continuity Testers

DESCRIPTION

The Megger BM400/2 Series of autoranging insulation and continuity testers, provides simplicity of use in a hand-held instrument designed to IEC1010-1 safety standards. The ease of use and comprehensive specifications are achieved using the latest electronic design and display technology.

The analog/digital LCD incorporates the benefits of electronic arc analog indication and a clear-cut digital reading. The analog 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 BM400/2 Series offers a range of single, dual and multi-voltage variants to fit specific applications. 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. 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 and 2 voltage ranges (except on the BM402/2 and BM404/2). The resistance range measures up to 100k Ω on the digital scale and up to 10M Ω on the analog 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.

The 2 voltage ranges measure up to 50.0 and 600 V ac or dc respectively, and indicate the presence of negative dc. A voltage warning is provided on all instruments to alert the user to the presence of external voltage greater than 25 V. Instruments with a voltage range will revert to the voltage display and indicate the level of voltage present. 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 analog arc and 'V' symbol will flash. The voltage range will indicate if capacitive charge remains

after a test, and will monitor the automatic discharge.

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 Switched Test Probe (SP1) can be used to enable remote operation of the test button from the negative test probe.

The BM400/2 Series is designed to withstand the most rigorous application requirements. Its rugged construction makes it well suited to tool bag treatment. The IP54 environmental protection rating ensures product reliability in wet and dusty conditions. A separate battery compartment is provided for the six cells, which provide exceptional battery life.

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

APPLICATIONS

The BM400/2 Series, designed for flexibility and versatility, is used in a wide variety of applications in the residential, commercial, industrial and contracting markets as well as on site maintenance applications.

Electrical Contractors

The BM400/2 Series is ideal for testing electrical installations in both the domestic and industrial contracting environment. Test voltages of 250 V, 500 V and 1000 V dc are available. A 250 V insulation test voltage is necessary to test low voltage circuits supplied by an isolating transformer. 500 V dc 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 dc 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 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 leads are available as an optional accessory.

Service Organizations

For Service Organizations the voltage measuring feature includes a range of 0-50.0V ac/dc with 0.1V resolution and is intended for measuring power supply and other low voltages found within domestic appliances. Additionally the MCC10 optional clampmeter will provide direct indication of ac current in the range 1.0 to 10.0A enabling the measurement of motor operating and other currents. These new features are unique, offering measurement ranges not normally found in an Insulation Tester.

Advanced Applications

Advanced users who wish to utilize the results of continuous monitoring of insulation resistance for calculating Dielectric Absorption Ratios including Polarization Index, can benefit from the addition of the DLB1 RS232 communications base to the BM400/2 instruments. The communications base enables the BM400/2 Series 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 a PC. 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.

FEATURES AND BENEFITS

- Display includes solid state analog arc
- Analog scale reads up to 10 G Ω for high insulation resistance readings
- Extra resistance range to 100 k Ω digital and 10 M Ω analog to assist fault finding on motors, generators, relays, etc.
- Separate voltmeter range operates from 0 to 600 V dc or 50/60 Hz and to 450 V at 400 Hz
- Automatic power down delay can be adjusted to 60 minutes for the voltage, continuity or k Ω ranges
- Choice of up to three test voltages
- Large three-digit liquid crystal display
- Enclosure is weather proof and dust proof to Institute of Petroleum classification IP54

SPECIFICATIONS**INSULATION RANGES**

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

Measuring Range

0.01 - 999 M Ω on all ranges
(0 - 10 G Ω on analog scale)

Terminal Voltage on Short Circuit Current

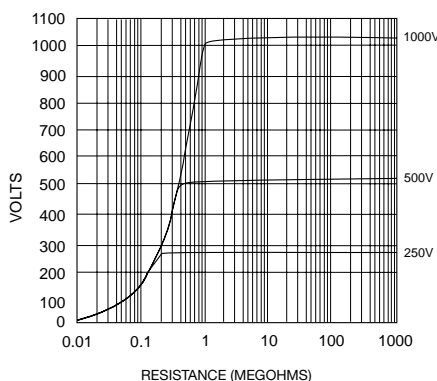
1 mA nominal

Test Current on Load

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

Accuracy at 68°F (20°C)

$\pm 2\%$, ± 2 digits

TERMINAL CHARACTERISTICS**CONTINUITY RANGES**

Measuring Range: 0.01 - 99.9 Ω
(0 - 50 Ω on analog scale)

Open Circuit Voltage: 5 V, ± 1 V

Short Circuit Current: 205 mA, ± 5 mA

Accuracy at 68°F (20°C)

1 - 9.99 Ω : ± 2 digits; 10 - 99.9 Ω : $\pm 5\%$

Zero Offset Adjust: 0 - 9.99 Ω

Continuity Buzzer

Operates at less than 5 Ω approx

RESISTANCE RANGE

(can be used for diode testing)

Measuring Range: 0.1 - 100 k Ω
(0 - 10 M Ω on analog scale)

Open Circuit Voltage: 5 V, ± 1 V

Short Circuit Current: 20 μ A, ± 1 V

Accuracy at 68°F (20°C):

$\pm 5\%$, ± 2 digits

VOLTAGE RANGE

(BM400/2, BM401/2, BM403/2 Only)

Measuring Range

- (i) 0 - 600 V dc
- (ii) 0 - 600 V ac (50/60 Hz)
- (iii) 0 - 450 V ac (400 Hz)
- (iv) 1.0 - 50.0 V ac/dc
(0-500 V on analog scale)

Accuracy at 68°F (20°C)

<450 V dc or ac (50/60 Hz): $\pm 1\%$, ± 2 digits
1.0 - 50.0 dc or ac 2% ± 3 digits

>450 V dc or ac (50/60 Hz): $\pm 2\%$, ± 2 digits

ac at 400 Hz: = 5% ± 2 digits

TEMPERATURE COEFFICIENT

<0.1% per °C on all ranges

DEFAULT VOLTMETER

The default voltmeter operates when an external voltage >25 V ac or dc is detected on any range except OFF and \rightarrow . 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 dc will cause 'dc' 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 \rightarrow 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. This can be adjusted to 60 minutes for the voltage, continuity and K ranges. Selecting an insulation range or off will revert the shut-off to 5 minutes.

GENERAL SPECIFICATION**Operating Range**

-4° to +140° F
-20° to +40° C

Operating Humidity

90% RH at 104° F max. (40°C)

Storage Range

-13° to +150° F
-25° to +65° C

Environmental Protection IP54**FUSE****Type**

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

Indication of a ruptured fuse is provided by the symbol \rightarrow .

SAFETY

The BM400/2 series is protected against connection to a 440 V Category III supply. The BM400/2 series will, in general, meet the requirements of IEC 1010-1 (1990), BS 4743 (1979) and VDC 0411 (1973). The BM402/2 and BM404/2, which do not incorporate a voltage range 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

1 lb 6 oz
625g

DIMENSIONS

8 H x 3 W x 2 D in
220 H x 92 W x 55 D mm

ACCESSORIES



SP1

The SP1 switched probe is an included 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

Operating Temperature:

-4° to +104° F (-20° to +40° C)

Operating Humidity:

90% RH @ +104° F max. (+40° C)

Storage Temperature:

-13° to +150° F (-25° to +65° C)

Protection: 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: 5 oz (155 g)



MCC10

The optional accessory, MCC10 Current Clamp will connect to the instrument test leads and enable direct indication of ac current to be displayed on the 50.0 V measuring range. Measurement in the range of 1.0 A to 10.0 A ac 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, enhances the product versatility and increases the applications for Electrical Contractors, Utilities and Service Organizations.

SPECIFICATION

Current Range: 1.0 A to 10 A ac RMS

Output Voltage: 1 V ac per 1 A ac

Accuracy: ±2%

Operating Temperature:

-14° to +122° F <75% RH
-10° to +50° C <75% RH

Storage Temperature:

-4° to +167° F (-20° to +75° C)

Type of Sensing: Induction coil for ac current

Max Output Impedance: 75 Ω

EMC: The unit meets EN50081-1 and EN50082-1 (1992)

Max Conductor Size: .6 in (15 mm) dia. cable or a .6 in (15 mm) x .7 in (17 mm) busbar.

Dimensions: 1.7 H x 3.8 W x .9 D in
43 H x 94 W x 23 D mm

Weight: 4 oz (105 g)



DLB1

The DLB1 optional accessory communication interface provides a 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

Baud Rate: 9600

Operating Range:

-4° to +104° F (-20° to +40° C)

Operating Humidity:

90% RH @ 104° F max (40° C)

Storage Temperature:

-4° to +150° F (-20° 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.

EMC: Meets EN60081-1 and EN50082-1 (1992)

Dimensions: 1.8 H x 3.8 W x 1.6 D in
46 H x 94 W x 42 D mm

Weight: 3 oz (80g)

ORDERING INFORMATION

Item (Qty)	Cat. No.	Item (Qty)	Cat. No.
Analog/Digital Insulation and Continuity Testers	BM400/2	Optional Accessories	
.....	BM401/2	Fixed prod	EV5210-350
.....	BM402/2	Fixed lead set FPK8	EV6110-920
.....	BM403/2	Test and carry case	EV6420-112
.....	BM404/2	MCC10	EV6111-290
Included Accessories		DLB1	EV6220-604
Test Lead Set	EV6220-437	(Complete with 6420-112)	
Zip Up Carrying Case	EV6420-090	Test record card (5 supplied)	EV6172-111
SP1	EV6220-606		



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