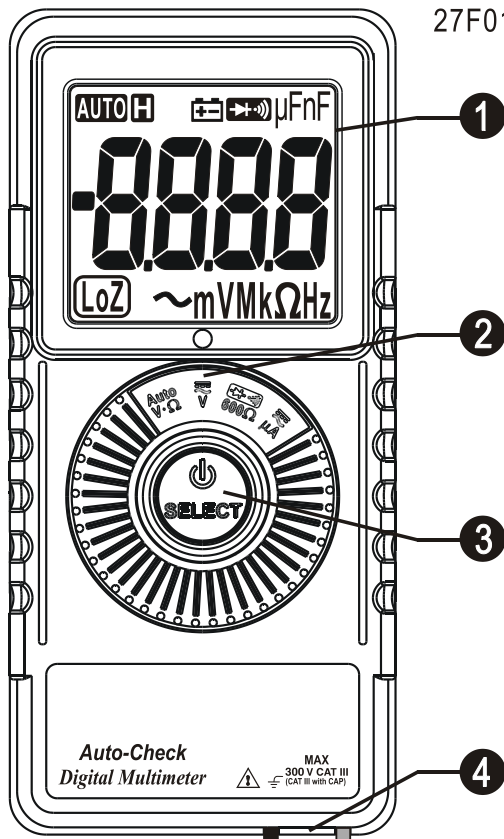


BM25a & BM27s USER'S MANUAL



1) PRODUCT DESCRIPTION

Note: Top of the line model is used as representative for illustration purposes. Please refer to your respective model for function availability.

1) LCD display

2) Rotary Selector to Select additional functions for Model 27s only. Model 25a does not have a physical Rotary Selector.

3) Push-button to Select additional functions, and to switch the Power On or Off

4) Input for all functions, or otherwise specified. Red test lead for positive (+) polarity and Black test lead for Ground reference (-)

2) SAFETY

This manual contains information and warnings that must be followed for operating the meter safely and maintaining the meter in a safe operating condition. If the meter is used in a manner not specified by the manufacturer, the protection provided by the meter may be impaired. Observe proper safety precautions when working with voltages above 30 Vrms, 42.4 Vpeak, or 60 VDC. These voltage levels pose a potential shock hazard to the user. Disconnect the test leads from test points before changing functions. Do not expose this product to rain or moisture. The meter is intended only for indoor use. Individual protective equipment must be used if hazardous live parts in the installation where measurement is to be carried out could be accessible. Keep your hands/fingers behind the hand/finger barriers (of the meter and the test probe assembly, where applicable) that indicate the limits of safe access of the hand-held parts during measurements. Inspect lead wires, connectors, and probes periodically for damaged insulation or exposed metal. If any defects are found, stop using meter immediately.

The meter meets IEC/EN/BSEN/CSA_C22.2_No./UL standards of 61010-1 Ed. 3.1 and 61010-2-033 Ed. 2.0 to Measurement CAT III 300V. The accompanied test probe assembly meets IEC/EN/BSEN/CSA_C22.2_No./UL standards of 61010-031 Ed. 2.0 to the same meter rating.

The 61010-031 requires exposed conductive test probe tip length to be $\leq 4\text{mm}$ for CAT III & CAT IV ($\leq 19\text{mm}$ for CAT II) ratings. The accompanied add-on caps (or permanent insulated tips option) must then be used for applications in CAT III & CAT IV areas. Refer to the category markings on your probe assemblies as well as on the add-on accessories (like detachable Caps or Alligator Clips), if any, for applicable rating changes.

INTERNATIONAL SYMBOLS



Marking of Electrical and Electronic Equipment (EEE). Do not dispose of this product as unsorted municipal waste. Contact a qualified recycler



Refer to the explanation in this Manual



Possibility of electric shock



Earth (Ground)



Meter protected throughout by Double Insulation or Reinforced Insulation



Fuse



Direct Current (DC)



Alternating Current (AC)



Three-phase Alternating Current



Application of current sensor to and removal from Hazardous Live Uninsulated Conductors is permitted

BRIEF INFORMATION ON MEASUREMENT CATEGORIES

Measurement Category III is applicable to test and measuring circuits connected to the distribution part of the building's low-voltage MAINS installation. Examples are measurements on distribution boards (including secondary electricity meters), photovoltaic panels, wiring and stationary motors in the fixed installation, and equipment for industrial use.

Measurement Category II is applicable to test and measuring circuits connected directly to utilization points (socket outlets and similar points) of the low-voltage MAINS installation. Examples are measurements on MAINS CIRCUITS of household appliances, portable TOOLS and similar equipment, and on the consumer side only of socket-outlets in the fixed installation.

2) EUROPEAN DIRECTIVES AND UK STATUTORY REQUIREMENTS

The instruments conform to EUROPEAN (CE) Low-Voltage Directive 2014/35/EU, Electromagnetic Compatibility Directive 2014/30/EU, and RoHS 2 Directive 2011/65/EU plus amendment Directive (EU) 2015/863. The instruments also conform to the UK (UKCA) Electrical Equipment (Safety) Regulations 2016, Electromagnetic Compatibility Regulations 2016, and The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012.

4) OPERATION

Note: All function operations described hereafter are via the Red test lead for positive (+) polarity and Black test lead for Ground reference (-), or otherwise specified

Warning: Before and after hazardous voltage measurements, test the voltage function on a known source such as line voltage to determine proper meter functioning.

4-1) FUNCTIONS IN “Auto V.Ω” POSITION

-Quick Start

AutoCheck™ mode is the default function in “Auto V.Ω” position. Press the SELECT button momentarily to select and step through the functions:

AutoCheck™ → Continuity → EF → ACV → DCV → Ω → Hz → Cx → AutoCheck™

-AutoCheck™ mode

This innovative AutoCheck™ feature automatically selects measurement function of DCV, ACV or Resistance (Ω) based on the input via the test leads.

- With no input, the meter displays “Auto” when it is ready.

- With no voltage signal but a resistance below $6\text{M}\Omega$ is present, the meter displays the resistance value. When below 25Ω is present, the meter (Model 27s only) further gives a continuity beep tone.
- When a signal above the threshold of DC 1.2V or AC 1.5V up to the rated 300V is present, the meter displays the appropriate voltage value in DC or AC, whichever larger in peak magnitude.
- **Overload-Alert Feature:** When above 600V (450V for Model 25a) is present, the meter displays “OL” with a warning beep tone. Disconnect the test leads from the signal immediately to avoid hazards.




Note:

***Range-Lock Feature:** When a measurement reading is being displayed in AutoCheck™ mode, press the **SELECT** button momentarily **1 time** can lock the function-range it was in. The LCD annunciator “**AUTO**” turns off. Range-lock can speed up repetitive measurements. Press the **SELECT** button momentarily again to return to AutoCheck™ mode.

***Hazardous-Alert:** When making resistance measurements in AutoCheck™ mode, an unexpected display of voltage readings alerts you that the part under test is still energized.

***AutoCheck™ nominal input impedances are slightly lower than that of common digital multimeters. They are, in fact, more similar to that of most traditional analog multimeters. “LoZ” will display on the LCD to remind the users in such cases. Although not likely, if such impedance might damage your circuits, use the common impedance (Hi-Z) voltage mode (Model 27s only) for making voltage measurements on them.**

-Continuity, Audible With Symbolic Display

From AutoCheck™ with “Auto” being displayed, press the **SELECT** button momentarily **1 time** to select Continuity function. The meter displays a symbolic open-switch display “ ” when it is ready. Continuity is convenient for checking wiring connections and operation of switches. A continuous beep tone with a symbolic closed-switch display “” indicates a complete circuit. In noisy environments, it is helpful to “see” continuity measurements.

-Electric Field EF-Detection

From AutoCheck™ with “Auto” being displayed, press the **SELECT** button momentarily **2 times** to select EF-Detection feature. The meter displays “EF” when it is ready. Signal strength is indicated as a series of bar-graph segments on the display and variable beep tones.

• **Non-Contact EF-Detection:** An antenna is located at the top left corner of the meter, which detects electric field surrounds current-carrying conductors. It is ideal for tracing live wiring connections, locating wiring breakage and to distinguish between live or earth connections.

• **Probe-Contact EF-Detection:** For more precise indication of live wires, such as distinguishing between live and ground sockets, use the Red (+) test probe for direct contact measurements.

-V and Ω of AutoCheck™ In Manual Selection

From AutoCheck™ with “Auto” being displayed, press the **SELECT** button momentarily **3 times** to select ACV, **4 times** to select DCV and **5 times** to select Resistance (Ω) functions of AutoCheck™. Such selected function remains auto-ranging.

-Frequency And Capacitance

From AutoCheck™ with “Auto” being displayed, press the **SELECT** button momentarily **6 times** to select Frequency (Hz), **7 times** to select Capacitance (F) functions and **8 times** to return to AutoCheck™ mode.

Note:

***Unlike the Line Level Hz Frequency function (for Model 27s only) as stated, this (Common) Hz Frequency function is set only at the highest input sensitivity mainly for measuring small electronic signals**

of below 20VAC rms.

4-2) OTHER FUNCTIONS


-DCV, ACV & Line-Level Hz functions (Model 27s only)

Rotate the rotary selector to the V position selects common impedance (Hi-Z) voltage measurements. DCV is the default function. Press **SELECT** button momentarily to select ACV. The AC annunciator “~” turns on. Press momentarily again to activate the Line-Level Hz function.

Note:

**Line-Level Hz input sensitivity varies automatically with ACV range selected when Line-Level Hz is selected. AC 6V range has the highest and AC 300V range has the lowest sensitivity. Measuring the signal in ACV function WHILE selecting Line-Level Hz function in that ACV range automatically sets the most appropriate sensitivity for higher voltage applications. This can avoid electrical noises as in 110/220V line voltage applications for example. If the reading shows zero due to insufficient signal levels, select Line-Level Hz function BEFORE making measurements (at AC 6V range) will set the highest sensitivity.*

-Diode & 600Ω functions (Model 27s only)

Rotate the rotary selector to the /600Ω position.

Diode test is the default function. The reading shows the approximate voltage drop across the test leads. Normal forward voltage drop (forward biased) for a good silicon diode is between 0.400V to 0.900V. A reading higher than that indicates a leaky diode (defective). A zero reading indicates a shorted diode (defective), and the meter will give a long beep as continuity warning. An OL indicates an open diode (defective). Reverse the test leads connections (reverse biased) across the diode. The digital display shows OL if the diode is good. Any other readings indicate the diode is resistive or shorted (defective).

Press **SELECT** button momentarily selects the lowest 600Ω range for lower resistance measurements. It is an extended range to complement the AutoCheck™ Resistance (Ω) function.

-DC-μA & AC-μA Micro-Amp functions (Model 27s only)

Rotate the rotary selector to the μA position. The display-reading unit is in μA although there is no unit annunciator on the display. DC-μA is the default function. There is no annunciator for DC. Press **SELECT** button momentarily to select AC-μA. The AC annunciator “~” turns on. These ranges, like other functions, are protected up to the maximum rated voltages of the meter.

4-3) OTHER FEATURES

-Power On & Off

Press and hold the SELECT button for 1 second and then release to turn the power ON or OFF. Press and hold the SELECT button for approximately 6 seconds to master reset the system to the default stage if in case the meter hangs up unexpectedly.

-Auto Power Off

Turn off intelligently after approximately 3 minutes of idle measurement readings and no button/switch activities.

-Auto-ranging

If the function selected has more than one range, the meter will auto-range to the best range and resolution. No manual ranging is required.

5) MAINTENANCE

WARNING

To avoid electrical shock, disconnect test leads from live circuits before opening the case. Do not operate with open case.

Cleaning and Storage

Periodically wipe the case with a damp cloth and mild detergent; do not use abrasives or solvents. If the meter is not to be used for periods of longer than 60 days, remove the battery and store it separately.

Trouble Shooting

If the instrument fails to operate, check battery, leads, etc., and replace as necessary. Double check operating procedure as described in this user's manual.

If the instrument voltage-resistance input has subjected to high voltage transient (mostly caused by lightning or switching surge to your system) by accident or abnormal conditions of operation, the series fusible resistors will be blown off (become high impedance) like fuses to protect the user and the instrument. Most measuring functions through this input will then be open circuit. The series fusible resistors and the spark gaps should then be replaced by qualified technician. Refer to the LIMITED WARRANTY section for obtaining warranty or repairing service.

Battery replacement

If the meter starts up with persistent resetting display or with low battery icon  turns on, replace the battery ASAP. The meter uses one 3V coin battery IEC-CR2032.

Before opening the case bottom, make sure the meter is switched off to avoid abrupt power reset to a running meter system. Disconnect test leads from live circuits. Loosen the screw from the case bottom. Lift the end of the case bottom nearest the input test leads until it unsnaps from the case top. Replace the battery. Observe battery polarities with positive (+) faces up (towards the case bottom). Replace the case bottom and ensure that the snap on the case top (near the LCD side) is engaged. Re-fasten the screw.

Note for Models 27s & 25a battery replacement:

**Models 27s & 25a use micro-controller (like a computer) to run the meter system. WHEN THE METER IS POWER-ON, intermittence battery power failure (fast intermittence battery contact interval in the order of millisecond) may cause the meter reset/re-startup abnormally. Simply press and hold the SELECT button for approximately 6 seconds to master reset the system if such a situation occurs.*

6) SPECIFICATION

GENERAL SPECIFICATIONS

Display & Update Rate:

3-5/6 digits 6000 counts; Updates 5 per second nominal

Operating Temperature: 0°C ~ 40°C

Relative Humidity: Maximum relative humidity 80% for temperature up to 31°C decreasing linearly to 50% relative humidity at 40°C

Altitude: Operating below 2000m

Storage Temperature: -20°C ~ 60°C, < 80% R.H. (with battery removed)

Temperature Coefficient: Nominal 0.15 x (specified accuracy)/ °C @ (0°C ~ 18°C or 28°C ~ 40°C), or otherwise specified

Sensing: Average sensing

Pollution Degree: 2

Safety: Certified per IEC/UL/EN/BSEN 61010-1 Ed. 3.1, IEC/UL/EN/BSEN 61010-2-033 Ed. 2.0, IEC/UL/EN/BSEN 61010-031 Ed. 2.0 and the corresponding CAN/CSA-C22.2 regulations to

Measurement Categories CAT III 300V AC & DC

Transient Protection: 4kV lightning surge (1.2/50 μ s)

E.M.C.: Meets EN61326-1

In an RF Field of 3V/m:

Capacitance function is not specified

Other function ranges:

Total accuracy = Specified accuracy + 45d

Performance above 3V/m is not specified

Overload Protection: $\geq 570V$ AC rms & $\geq 330V$ DC

Low Battery: Below approx. 2.4V

Power Supply: 3V standard button battery x 1 (IEC-CR2032; ANSI-NEDA-5004LC)

Power Consumption (typical):

Model 25a: 2mA

Model 27s: 6mA for Voltage functions on Auto-V Ω position, and 2mA for other functions

APO Consumption (typical): 2.2 μ A

APO Timing:

Idle for 3 minutes

Dimension / Weight: L113mm x W53mm x H10.2mm / Approx. 78 gm

Special Features:

AutoCheck™ (Automatic V & Ω Selection), and EF-Detection

Accessories: User's manual

Optional Accessories: BH-20R protective holster; BSC-20 soft carrying pouch

Electrical Specification

Accuracy is given as +/- (% of reading digits + number of digits) or otherwise specified @ 23°C +/- 5°C and less than 75% R.H.

DC Voltage (Models 25a & 27s)

RANGE	Accuracy
6.000V	0.5%+3d
60.00V	1.0%+5d
300.0V ¹⁾	1.2%+5d
300.0V ²⁾	2.0%+5d
300.0V ³⁾	1.5%+5d

Model 25a Input Impedance:

AutoCheck™ Lo-Z DCV: 160k Ω , 160pF nominal

Model 27s Input Impedance:

AutoCheck™ Lo-Z DCV: 833k Ω (4.2k Ω when displaying "Auto"), 90pF nominal

Hi-Z DCV: 5M Ω , 90pF nominal

NMRR: > 30dB @ 50Hz/60Hz

CMRR: > 100dB @ DC, 50Hz/60Hz; Rs=1k Ω

DCV AutoCheck™ Threshold:

> +1.2VDC or < -0.6VDC nominal

¹⁾Model 25a AutoCheck™ DCV only

²⁾Model 27s AutoCheck™ DCV only

³⁾Model 27s Hi-Z DCV only

AC Voltage (Models 25a & 27s)

RANGE	Accuracy
50Hz -- 60Hz	
6.000V, 60.00V, 300.0V	1.5%+5d

CMRR: > 60dB @ DC to 60Hz, Rs=1k Ω

Model 25a Input Impedance:

AutoCheck™ Lo-Z ACV: 160k Ω , 160pF nominal

Model 27s Input Impedance:

AutoCheck™ Lo-Z ACV: 833k Ω (4.2k Ω when displaying "Auto"), 90pF nominal

Hi-Z ACV: 5M Ω , 90pF nominal

ACV AutoCheck™ Threshold:

> 1.5VAC (50/60Hz) nominal

Capacitance (Models 25a & 27s)

RANGE ¹⁾	Accuracy ²⁾
100.0nF, 1000nF, 10.00 μ F, 100.0 μ F ³⁾ , 2000 μ F ⁴⁾	3.5%+6d ⁵⁾

- ¹⁾Accuracy below 50nF is not specified
²⁾Accuracies with film capacitor or better
³⁾Model 25a top range. Updates > 1 minute on large values
⁴⁾Model 27a only. Updates > 1 minute on large values
⁵⁾Specified with battery voltage above 2.8V (half full battery). Accuracy decreases gradually to 12% at low battery warning voltage of approx 2.4V

Ohms (Models 25a & 27s)

RANGE ¹⁾	Accuracy
600.0 Ω	2.0%+6d ²⁾
6.000k Ω	1.2%+6d ²⁾
60.00K Ω , 600.0K Ω	1.0%+4d
6.000M Ω	2.0%+4d

Open Circuit Voltage: 0.4VDC typical

- ¹⁾AutoCheck™ is for 6.000k Ω ~ 6.000M Ω ranges; 600.0 Ω is an independent range for Model 27s only
²⁾Add 40d to specified accuracy while reading is below 20% of range

Hz Frequency (Models 25a ¹⁾ & 27s ^{1) 2)})

RANGE	Accuracy	Specified at
10.00Hz -- 30.00kHz ^{1) 2)}	0.5%+4d	< 20V Sine-rms
10.00Hz -- 999.9Hz ²⁾		< 300V Sine-rms

Sensitivity (Sine-rms):

- ¹⁾Hz in Auto-V Ω position: > 3V
²⁾Line-level Hz in V position (Model 27s only):
 @ 6.000VAC range: > 3V
 @ 60.00VAC range: > 6V

@ 300.0VAC range: > 60V

Diode Tester (Model 27s only)

Test Current (Typical)	Open Circuit Voltage
0.48mA for Model 27	< 1.6VDC

DC μ A Current (Model 27s only)

RANGE	Accuracy	Burden Voltage
400.0 μ A	1.5%+3d	6mV/ μ A
2000 μ A	1.2%+3d	6mV/ μ A

AC μ A Current (Model 27s only)

RANGE	Accuracy	Burden Voltage
50Hz -- 60Hz		
400.0 μ A	2.0%+3d	6mV/ μ A
2000 μ A	1.5%+3d	6mV/ μ A

Audible Continuity Tester

Open Circuit Voltage: 0.4VDC typical

Audible Threshold:

Models 25a & 27s: between 50 Ω and 300 Ω

Non-Contact EF-Detection (Models 25a & 27s)

Threshold Voltage Between		Bar Graph
Model 25a	Model 27s	
15V ~ 55V	20V ~ 80V	-
30V ~ 85V	45V ~ 125V	..
45V ~ 145V	70V ~ 215V	...
75V ~ 190V	120V ~ 285V
>105V	>170V

Indication: Bar graph segments & audible beep tones proportional to the field strength

Detection Frequency: 50/60Hz

Detection Antenna: Top left corner of the meter

Probe-Contact EF-Detection: For more precise indication of live wires, use the Red (+) probe for direct contact measurements

LIMITED WARRANTY

BRYMEN warrants to the original product purchaser that each product it manufactures will be free from defects in material and workmanship under normal use and service within a period of one year from the date of purchase. BRYMEN's warranty does not apply to accessories, fuses, fusible resistors, spark gaps, batteries or any product which, in BRYMEN's opinion, has been misused, altered, neglected, or damaged by accident or abnormal conditions of operation or handling.

To obtain warranty service, contact your nearest BRYMEN authorized agent or send the product, with proof of purchase and description of the difficulty, postage and insurance prepaid, to BRYMEN TECHNOLOGY CORPORATION. BRYMEN assumes no risk for damage in transit. BRYMEN will, at its option, repair or replace the defective product free of charge. However, if BRYMEN determines that the failure was caused by misused, altered, neglected, or damaged by accident or abnormal conditions of operation or handling, you will be billed for the repair.

THIS WARRANTY IS EXCLUSIVE AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE. BRYMEN WILL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES.



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P/N: 7M1C-1281-B000

PRINTED IN TAIWAN