

# 500,000 Counts High Performance! Innovative Features! User-Oriented!

5-4/5d DCV At 1 $\mu$ V Best Resolution, DC & AC in Dual Display, 100kHz DC+AC TRMS, Cat IV 1kV Safety...  
USB PC-Comm, Paper-White Backlit, Bar-graph, BeepJack™, Crest (Peak), Rec (Min Max Avg), Relative...  
Measures VFD V & Hz, X-Speed Large Cx, nS Conductance, 4-20mA, T1-T2, Line Level Hz, Duty %, dBm...  
Ergonomic, Large LCD, Battery Access Cover, Magnetic Hanger, Holster, Probe Holders, Tilt stand Hanger...



CE

**BM860 Series  
Professional Multimeter**

**BRYMEN**®

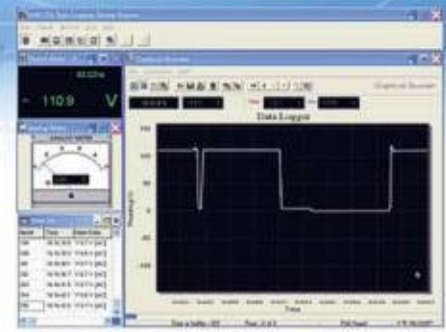
BRIGHT PEOPLE'S CHOICE  
<http://www.brymen.com>



● **BM869**



● **BM867**



**BU-86X interface kit  
(optional purchase)**



869	867	FUNCTIONS & FEATURES
●	●	5-4/5 Digits 500,000 Counts Large Easy To Read LCD Display
●	●	Fast Measurements, 5/Sec; Fully Auto-Ranging
●	●	Dual Digital Display
●	●	41 Segment Analog Bar-graph Updates 60/Sec
●	●	Optional Purchase USB Cable & Software For Win98/2k/xp/Vista
●	●	Intelligent Auto Power Off (I-APO) Resets On Significant Operation & Readings
●	●	Data Hold
●	●	Relative Zero Mode
●	●	Audible & Visible BeepJack™ Input Warning Against Improper Plug In
●	●	AC, AC+DC True RMS Conversion;
●	●	100kHz AC, AC+DC Voltage Bandwidth
●	0.03%	0.02% High Basic DCV Accuracy
●	●	VFD-V & VFD-Hz Measures Fundamental V & Hz Of Most Variable Frequency Drives
●	●	T1-T2 Dual Type-K Temperature -50°C To 1000°C; Selectable °F Readings
●	●	Record Max/Min Readings; Calculates Average Reading over time; Auto-Ranging
●	●	Crest (Instantaneous Peak Hold) Max/Min Readings, Auto-Ranging
●	●	Paper-White Back-Lighted Large Easy To Read LCD Display
●	●	dBm Readings, 20 Selectable Impedance Values
●	●	DCV 0.001mV To 1000V
●	●	ACV 0.01mV To 1000V
●	●	AC+DCV 0.01mV To 1000V
●	15A	DCA 0.01μA To 10A; 20A For 30 Seconds Per 5 Minutes Cooling
●	15A	ACA 0.01μA To 10A; 20A For 30 Seconds Per 5 Minutes Cooling
●	15A	AC+DCA 0.01μA To 10A; 20A For 30 Seconds Per 5 Minutes Cooling
●	●	Ohms 0.01Ω To 50MΩ
●	●	Conductance 0.01nS To 99.99nS
●	●	X-Speed Capacitance 50.00nF To 25mF
●	●	Line Level Frequency 10Hz To 200kHz
●	●	Logic Level Frequency 5Hz To 1MHz
●	●	Logic Level Duty Cycle Readings 0.1% To 99.99%
●	●	Diode Tester
●	●	Rugged Fire Retarded Casing With Battery Access Door
●	●	Replaceable Protective Holster With Probe-Holders & Tilt-Stand
●	●	Optional Purchase Magnetic Hanger
●	600V	1000V General (Ohm, Capacitance ... etc.) Input Protection
●	600V	1000V High Breaking Capacity Fuses Protected On Current Inputs
●	●	Transient Protection Up To 12kV 1.2/50μs Lightning Surge
●	●	LVD Meets EN61010-1 CAT IV 1kV
●	●	EMC EN61326-1:2006 (EN55022, EN61000-3-2/-3 & EN61000-4-2/-3/-4/-5/-6/-8/-11)

# The Ultimate Choice Of Resolution, Performance, Safety & Features!

Unbeatable 5-4/5d DCV Resolution, 100kHz DC+AC Performance, Cat IV 1kV Safety & New VFD Features!

**HIGH ACCURACY**  
0.02% BASIC DCV ACCURACY;  
1 $\mu$ VDC BEST RESOLUTION

**AUTO & MANUAL-RANGING**  
AUTO-RANGING WITH  
MANUAL-RANGING OVERRIDE

**PAPER-WHITE DISPLAY BACKLIGHT**  
FOR EASY VIEWING IN THE DARK

**FUNCTION SELECTION**  
TOGGLE CONVENIENTLY BETWEEN  
PRIMARY & SECONDARY FUNCTIONS

**CREST (PEAK HOLD)**  
CAPTURES INSTANTANEOUS  
+PEAK & -PEAK, AUTO-RANGING

**LOGIC LEVEL DUTY%**  
MEASURES DIGITAL LOGIC LEVEL  
DUTY CYCLE % READINGS

**LOGIC LEVEL Hz**  
MEASURES DIGITAL LOGIC LEVEL  
FREQUENCIES UP TO 1MHz

**HIGH IMPEDANCE VOLTAGE**  
1000VAC/DC MEASURING CAPABILITIES;  
HIGH INPUT IMPEDANCE FOR  
LOAD SENSITIVE CIRCUITS

**Hz OF LINE LEVEL VOLTAGE**  
MEASURES NOISY HIGH VOLTAGE  
ACV FREQUENCIES UP TO 200kHz  
IN DUAL DISPLAY

**dBm FUNCTION**  
WITH 20 SELECTABLE  
REFERENCE IMPEDANCE VALUES

**VFD V & Hz FEATURE**  
MEASURES FUNDAMENTAL  
VOLTAGE & FREQUENCY OF MOST  
VARIABLE FREQUENCY DRIVES

**PC INTERFACE CAPABILITY**  
OPTIONAL PURCHASE USB CABLE  
WITH DATA RECORDING PC SOFTWARE  
FOR WIN98/NT4/2K/XP/VISTA

**BEEP-JACK™ AUDIBLE & VISIBLE WARNING**  
GUARDS AGAINST IMPROPER A-TERMINAL  
PLUG IN. DECREASES RISKS OF DAMAGE

**INTELLIGENT AUTO-POWER-OFF**  
TO EXTEND BATTERY LIFE. HAPO RESETS ON  
SIGNIFICANT OPERATION & MEASUREMENTS

**AC, AC+DC 100kHz TRUE RMS**  
FOR NON-SINUSOIDAL WAVEFORMS  
OF COMPLEX VOLTAGE OR CURRENT SIGNALS

**PROTECTIVE HOLSTER**  
WITH HOLDERS FOR PROBE STORAGE  
AND "THIRD HAND" FEATURE,  
REPLACEABLE & WASHABLE

**LVD SAFETY**  
MEETS EN61010-1  
2ND EDITION CAT IV 1kV

**ANALOG BAR-GRAPH**  
FAST UPDATE RATE 60/SEC

**LARGE 500,000 COUNTS LCD DISPLAY**  
5/SEC FAST NOMINAL UPDATE RATE

**ASIC TECHNOLOGY**  
MORE FUNCTIONS & FEATURES  
AT AFFORDABLE PRICES

**DUAL DIGITAL DISPLAY**  
SIMULTANEOUSLY VIEW RELEVANT  
PARAMETERS IN COMPLEMENTARY DISPLAY

**T1-T2 TYPE-K TEMPERATURE**  
2 CHANNEL MEASUREMENTS,  
SELECTABLE °C & °F READINGS

**DIODE TEST**  
FOR CHECKING DIODES  
AND RECTIFIERS

**DATA HOLD**  
FREEZES THE DISPLAYING  
READING FOR LATER VIEW

**MAX MIN AVG RECORD**  
RECORD MAX, MIN & AVG  
READINGS; AUTO-RANGING

**nS CONDUCTANCE**  
nS=1/G $\Omega$  VIRTUALLY EXTENDS  
RESISTANCE MEASUREMENT TO  
THE ORDER OF G $\Omega$ . IT IS USEFUL  
FOR LEAKAGE MEASUREMENTS

**FAST AUDIBLE CONTINUITY**  
FOR QUICK OPEN-SHORT TESTS  
ON SWITCHES, FUSES, AND WIRES

**%4-20mA LOOP CURRENT**  
FOR PROCESS CONTROL

**X-SPEED CAPACITANCE**  
X-SPEED MEASURES UP TO 25mF  
ONLY IN A FEW SECONDS; 1kV PROTECTION

**CURRENT & Hz**  
MEASURES CURRENT & FREQUENCIES,  
AC & DC IN DUAL DISPLAY

**ERGONOMIC STREAMLINE DESIGN**  
FITS COMFORTABLY IN ONE'S HAND

**TRANSIENT PROTECTION**  
UP TO 12kV 1.2/50 $\mu$ s LIGHTNING SURGE;  
SUPERB PROTECTION FOR SERIOUS USERS

**EMC**  
MEETS EN61326-1:2006 (EN55022,  
EN61000-3-2/-3 & EN61000-4-2/-3/-4/-5/-6/-8/-11)

## BM869 & BM867 GENERAL SPECIFICATION

**Display:** 4-4/5 digits 50,000 counts fast mode. Selectable stable mode  
5-4/5 digits 500,000 counts for DC Voltage, & 5 digits 99,999 counts for Hz  
**Polarity:** Automatic  
**Update Rate:**  
4-4/5 digits fast mode: 5 per second nominal;  
5-4/5 digits stable mode: 1.25 per second nominal;  
41 Segments Bar graph: 60 per second max  
**Operating Temperature:** 0°C to 45°C  
**Relative Humidity:** Maximum relative humidity 80% for temperature up to 31°C decreasing linearly to 50% relative humidity at 45°C  
**Pollution degree:** 2  
**Storage Temperature:** -20°C to 60°C, < 80% R.H. (with battery removed)  
**Altitude:** Operating below 2000m  
**Temperature Coefficient:** nominal 0.15 x (specified accuracy) / °C @|0°C - 18°C or 28°C - 45°C, or otherwise specified  
**Sensing:** AC, AC+DC True RMS  
**Safety:** Double insulation per IEC61010-1 2nd Ed., EN61010-1 2nd Ed., UL61010-1 2nd Ed. & CAN/CSA C22.2 No. 61010.1-0.92 to Category IV 1000V AC & DC  
BM867 Terminals (to COM) Measurement Category:  
V : Category IV 1000 Vac & Vdc

A / mA $\mu$ A : Category IV 600 Vac and 300 Vdc  
BM869 Terminals (to COM) Measurement Category:  
V / A / mA $\mu$ A : Category IV 1000 Vac & Vdc  
**Overload Protections:**  
BM867:  
 $\mu$ A & mA: 1A/600V, IR 10kA or better, F fuse  
A: 10A/600V, IR 100kA or better, F fuse  
V: 1050Vrms, 1450Vpeak  
mV,  $\Omega$  & Others: 600 Vdc & Vac rms  
BM869:  
 $\mu$ A & mA: 0.44A/1000V, IR 10kA or better, F fuse  
A: 11A/1000V, IR 20kA or better, F fuse  
V, mV,  $\Omega$  & Others: 1050Vrms, 1450Vpeak  
**Transient protection:** 12kV (1.2/50 $\mu$ s surge)  
**E.M.C.:** Meets EN61326-1:2006 (EN55022, EN61000-3-2, EN61000-3-3, EN61000-4-2, EN61000-4-3, EN61000-4-4, EN61000-4-5, EN61000-4-6, EN61000-4-8, EN61000-4-11)  
In an RF field of 3V/m:  
Capacitance function is not specified  
Other function ranges:  
Total Accuracy = Specified Accuracy + 100 digits

Performance above 3V/m is not specified  
**Power Supply:** Single Alkaline 9V battery; NEDA1604A, JIS6AM6 or IEC6LF22  
**Power Consumption:** 6.5mA typical; 8mA for VFD ranges (BM869 only)  
**Low Battery:** Below approx. 7V  
**APO Timing:** Idle for 17 minutes  
**APO Consumption:** 70 $\mu$ A typical  
**Dimension:** L208mm X W103mm X H64.5mm with holster  
**Weight:** 635 gm with holster  
**Accessories:** Test leads (pair), holster, battery installed, user's manual, Bkp60 banana plug K-type thermocouple x 1 (BM869 only)  
**Optional Accessories:** BU-86X PC interface kit, Bkb32 banana pins to K-type socket plug adapter (BM869 only)  
**Special Features:** Record MAX, MIN & AVG readings; Crest (Instantaneous Peak hold) MAX & MIN readings; Relative zero mode; 500,000 counts stable DCV mode; Paper-White Backlit display; dBm readings; %4-20mA loop current readings; Data Hold; BeepJack™ Audible & visible input warning; T1-T2 differential temperature readings (BM869 only); VFD V & Hz readings (BM869 only)

## ELECTRICAL SPECIFICATIONS

Accuracy is  $\pm$ (% reading digits + number of digits) or otherwise specified, at 23°C  $\pm$  5°C & less than 75% relative humidity.  
True RMS voltage & current accuracies are specified from 5% to 100% of range or otherwise specified. Maximum Crest Factor < 3:1 at full scale & < 6:1 at half scale, and with frequency components within the specified frequency bandwidth for non-sinusoidal waveforms.

### DC Voltage

RANGE	BM869	BM867
Accuracy		
500.00 mV, 5.0000V	0.02% + 2d	0.03% + 2d
50.000V	0.03% + 2d	0.04% + 2d
500.00V	0.04% + 2d	0.05% + 2d
1000.0V	0.15% + 2d	0.15% + 2d

NMR: >60dB @ 50/60Hz  
CMRR: >120dB @ DC, 50/60Hz, Rs=1k $\Omega$   
Input Impedance: 10M $\Omega$ , 60pF nominal (80pF nominal for 500mV range)

### AC, DC AC & AC+DC AC Voltage

RANGE	BM869	BM867
Accuracy *		
20Hz ~ 45Hz		
500.00mV, 5.0000V, 50.000V	1.5% + 40d	Unspec'd
500.00V, 1000.0V	Unspec'd	Unspec'd
DC, 45Hz ~ 300Hz		
500.00mV	0.35% + 20d	0.8%+60d
5.0000V, 50.000V	0.8% + 30d	
500.00V, 1000.0V	0.5% + 40d	
300Hz ~ 5kHz		300Hz ~ 1kHz
500.00mV	0.35% + 20d	0.8%+40d
5.0000V, 50.000V, 500.00V	0.5% + 40d	2.0%+60d
1000.0V	0.8% + 40d (300Hz ~ 1kHz)	1.0%+40d
5kHz ~ 20kHz		1kHz ~ 20kHz
500.00mV	0.5%+30d	1dB**
5.0000V, 50.000V	0.8%+40d	2dB**
500.00V	0.5%+40d	3dB**
1000.0V	Unspec'd	Unspec'd
20kHz ~ 100kHz		
500.00mV	2.5%+40d	Unspec'd
5.0000V, 50.000V	4.0%+40d**	
500.00V	Unspec'd	
1000.0V	Unspec'd	Unspec'd

\*From 5% to 10% of range: Specified accuracy + 80d  
\*\*From 5% to 10% of range: Specified accuracy + 180d  
From 10% to 15% of range: Specified accuracy + 100d  
CMRR: >75dB @ DC to 60Hz, Rs=1k $\Omega$   
Input Impedance: 10M $\Omega$ , 60pF nominal (80pF nominal for 500mV range)  
Residual reading less than 50 digits with test leads shorted.

### VFD AC Voltage (BM869 only)

RANGE	Accuracy*
5Hz ~ 20Hz	
5.0000V, 50.000V, 500.00V, 1000.0V	3% + 80d
20Hz ~ 200Hz	
5.0000V, 50.000V, 500.00V, 1000.0V	2% + 50d
200Hz ~ 440Hz	
5.0000V, 50.000V, 500.00V, 1000.0V	6% + 80d**

\*Not specified for fundamental frequency > 440Hz  
\*\*Accuracy linearly decreases from 2% + 50d @ 200Hz to 6% + 80d @ 440Hz

### dBm

Range and accuracy are subjected to ACmV, ACV, and reference impedance selected. Typical 600 $\Omega$  reference impedance ranges:  
At ACmV: -29.83dBm to 03.80dBm  
At ACV: -01.09dBm to 62.22dBm  
Input Impedance: 10M $\Omega$ , 60pF nominal  
Selectable reference impedance of 4, 8, 16, 32, 50, 75, 93, 110, 125, 135, 150, 200, 250, 300, 500, 600, 800, 900, 1000 & 1200 $\Omega$

### Ohms

RANGE	BM869	BM867
Accuracy		
500.00 $\Omega$	0.07%+10d	0.1%+10d
5.0000k $\Omega$	0.07%+2d	0.1%+6d
50.000k $\Omega$	0.1%+2d	0.1%+6d
500.00k $\Omega$	0.1%+2d	0.1%+6d
5.0000M $\Omega$	0.3%+6d	0.4%+6d
50.000M $\Omega$	2.0%+6d	2.0%+6d
99.99nS*	2.0%+10d	2.0%+10d

Open Circuit Voltage: < 1.3VDC (< 3VDC for 500 $\Omega$  range)  
\*From 0% to 10% of range: Specified accuracy + 30d

### Audible Continuity Tester

Audible threshold: between 20 $\Omega$  and 200 $\Omega$   
Response time < 100 $\mu$ s

### Diode Tester

Range	Accuracy	Test Current (Typical)	Open Circuit Voltage
2.0000V	1%+1d	0.4mA	< 3.5 VDC

### Capacitance

RANGE	Accuracy*
50.00nF	0.8% + 3d
500.0nF	0.8% + 3d
5.000 $\mu$ F	1.5% + 3d
50.00 $\mu$ F	2.5% + 3d
500.0 $\mu$ F**	3.5% + 5d
5.000mF**	5.0% + 5d
25.00mF**	6.5% + 5d

\*Accuracies with film capacitor or better  
\*\*In manual-ranging mode, measurements not specified below 45.0 $\mu$ F/0.450mF/4.50mF (450 counts) for 500.0 $\mu$ F/5.000mF/25.00mF ranges respectively

### DC Loop Current %4-20mA

4mA = 0% (zero); 20mA = 100% (span)  
Resolution: 0.01% Accuracy:  $\pm$  25d

### Crest mode (Instantaneous Peak Hold)

Accuracy: Specified accuracy  $\pm$  100 digits for changes > 0.8ms in duration

### DC Current

RANGE	Accuracy	Burden Voltage
500.00 $\mu$ A	0.15%+20d	0.15mV/ $\mu$ A
5000.0 $\mu$ A	0.1%+20d	0.15mV/ $\mu$ A
50.000mA	0.15%+20d	3.3mV/mA
500.00mA	0.15%+30d	3.3mV/mA
5.0000A	0.5%+20d	45mV/A
10.000A*	0.5%+20d	45mV/A

\*10A continuous, >10A to 20A (to 15A for BM867) for 30 second max with 5 minutes cool down interval

### T1-T2 Dual Type-K Temperature (BM869 only)

RANGE	Accuracy
-50.0°C to 1000.0°C	0.3%+1.5°C
-58.0°F to 1832.0°F	0.3%+3.0°F

Type-K thermocouple range & accuracy not included

### AC, DC AC & AC+DC AC Current

RANGE	BM869	BM867	Burden Voltage
Accuracy			
DC, 50Hz ~ 60Hz			
500.00 $\mu$ A	0.5%+50d	1.0%+40d	0.15mV/ $\mu$ A
5000.0 $\mu$ A			0.15mV/ $\mu$ A
50.000mA			3.3mV/mA
500.00mA			3.3mV/mA
5.0000A			45mV/A
10.000A*			45mV/A
40Hz ~ 1kHz			
500.00 $\mu$ A	0.7%+50d	1.0%+40d	0.15mV/ $\mu$ A
5000.0 $\mu$ A			0.15mV/ $\mu$ A
50.000mA			3.3mV/mA
500.00mA			3.3mV/mA
5.0000A			45mV/A
10.000A*			45mV/A
1kHz ~ 10kHz			
500.00 $\mu$ A	2.0%+50d	Unspec'd	0.15mV/ $\mu$ A
5000.0 $\mu$ A			0.15mV/ $\mu$ A
50.000mA			3.3mV/mA
500.00mA			3.3mV/mA
5.0000A			45mV/A
10.000A*	Unspec'd	Unspec'd	45mV/A

\*10A continuous, >10A to 20A (to 15A for BM867) for 30 second max with 5 minutes cool down interval

### Hz Line Level Frequency

AC Function RANGE	Sensitivity (Sine RMS)	Range
500mV	100mV	10Hz ~ 200kHz
5V	0.5V	10Hz ~ 200kHz
50V	5V	10Hz ~ 100kHz
500V	50V	10Hz ~ 100kHz
1000V	500V	10Hz ~ 10kHz
VFD 5V	0.5V ~ 2V*	10Hz ~ 440Hz
VFD 50V	5V ~ 20V*	10Hz ~ 440Hz
VFD 500V	50V ~ 200V*	10Hz ~ 440Hz
500 $\mu$ A	50 $\mu$ A	10Hz ~ 10kHz
5000 $\mu$ A	500 $\mu$ A	10Hz ~ 10kHz
50mA	5mA	10Hz ~ 10kHz
500mA	50mA	10Hz ~ 10kHz
5A	1A	10Hz ~ 3kHz
10A	10A	10Hz ~ 3kHz

Accuracy: 0.02%+4d

\*VFD sensitivity linearly decreases from 200Hz to 440Hz

### Hz Logic Level Frequency

RANGE	Accuracy
5.000Hz ~ 1.0000MHz	0.002%+4d

Sensitivity: 2.5Vp square wave

### %Duty Cycle

RANGE	Accuracy
0.1% ~ 99.99%	3d/kHz+2d

Input Frequency: 5Hz ~ 500 kHz, 5V Logic Family

### BRYMEN TECHNOLOGY CORPORATION

http://www.brymen.com  
TEL: +886 2 2226 3396 (rep)  
FAX: +886 2 2225 0025



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