

# Featuring Dual-Display Convenience + Added DCA Models!

Features VFD V/Hz,

Motor Cx,

In-rush Crest,

EF-Detection,

°C/°F and

Auto-Check™

on V/Ω!



BRUA-13X PC Interface Kit  
(Optional Purchase)



**BM189 & BM186**  
Versatile Clamp-on Multimeters

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



BM189

BM186

BM188

BM185

BM183

BM181

| 189 | 186 | 188 | 185 | 183 | 181 | FUNCTIONS & FEATURES                                                          |
|-----|-----|-----|-----|-----|-----|-------------------------------------------------------------------------------|
| ●   | ●   | ●   | ●   | ●   | ●   | VFD-V & Hz for fundamental V/Hz of most Variable-Frequency-Drives             |
| ●   | ●   | ●   | ●   | ●   | ●   | Fully auto-ranging for ease of use; Fast measurement updates 5/sec            |
| ●   | ●   | ●   | ●   | ●   | ●   | 3-5/6 digits, 6,000 counts + 1,999 counts dual-display large LCD              |
| ●   | ●   |     |     |     |     | 600A DC/AC Clamp-on; 30mm conductor size Hall-effect jaws                     |
| ●   |     | ●   | ●   | ●   | ●   | 600A AC Clamp-on; 26mm conductor size Ultra-slim jaws                         |
| ●   |     | AC  |     | AC  |     | AC, AC+DC True RMS voltage and current functions                              |
| ●   | ●   | ●   | ●   | ●   | ●   | 600VAC/DC input protection on all functions                                   |
| ●   | ●   | ●   | ●   | ●   | ●   | Dual Display ACA+Hz and ACV+Hz                                                |
| ●   | ●   | ●   | ●   | ●   | ●   | High 0.5% DCV accuracy                                                        |
| ●   | ●   | ●   | ●   | ●   | ●   | Auto Power Off                                                                |
| ●   | ●   | ●   | ●   | ●   | ●   | Data HOLD                                                                     |
| ●   | ●   | ●   | ●   | ●   | ●   | Soft carrying pouch                                                           |
| ●   | ●   | ●   | ●   | ●   | ●   | Non-Contact EF-Detection (NCV)                                                |
| ●   | ●   | ●   | ●   | ●   | ●   | Relative Zero mode (Auto-ranging)                                             |
| ●   | ●   | ●   | ●   | ●   | ●   | Fast 5ms Crest-MAX mode to capture in-rush currents                           |
| ●   | ●   | ●   | ●   | ●   | ●   | Probe-Contact EF-Detection for more precise indication of live                |
| ●   | ●   | ●   | ●   | ●   | ●   | AutoCheck™ feature (Automatic DCV, ACV & Ohms selection)                      |
| ●   | ●   | ●   | ●   | ●   | ●   | Lo-Z volts to drain ghost voltages (AutoCheck™ feature)                       |
| ●   | ●   | ●   | ●   | ●   | ●   | Back-lighted easy-to-read LCD display                                         |
| ●   | ●   | ●   | ●   | ●   | ●   | Type-K temperature -50°C to 1000 °C or -58°F to 1832°F selectable             |
| ●   | ●   | ●   | ●   | ●   | ●   | DCµA 2 ranges 600.0µA to 2000µA (via leads) for HVAC flame sensors            |
| ●   | ●   |     |     |     |     | DCA 2 ranges 60.00A to 600.0A                                                 |
| ●   | ●   | ●   | ●   | ●   | ●   | ACA 2 ranges 60.00A to 600.0A                                                 |
| ●   | ●   | ●   | ●   | ●   | ●   | DCV 4 ranges 6.000V to 600V                                                   |
| ●   | ●   | ●   | ●   | ●   | ●   | ACV 4 ranges 6.000V to 600V                                                   |
| ●   | ●   | 60M | 60M | 60M | 60M | Ohm 6 ranges 600.0Ω to 40.00MΩ                                                |
| ●   | ●   | ●   | ●   | ●   | ●   | Cx 6 ranges 60.00nF to 2000µF for start & run motor capacitors                |
| ●   | ●   | ●   | ●   | ●   | ●   | Diode test & Fast audible Continuity                                          |
| ●   | ●   | ●   | ●   | ●   | ●   | Line-level ACV Frequency 10Hz to 1999Hz                                       |
| ●   | ●   | ●   | ●   | ●   | ●   | Non-invasive ACA Frequency via clamp jaws 20Hz to 400Hz                       |
| ●   | ●   | ●   | ●   | ●   | ●   | Optional purchase USB cable set & software for Win98/2k/xp/Vista/Win7         |
| ●   | ●   | ●   | ●   | ●   | ●   | Rugged fire retarded casing with battery access door                          |
| ●   | ●   | ●   | ●   | ●   | ●   | Transient protection 6kV 1.2/50µs lightning surge                             |
| ●   | ●   | ●   | ●   | ●   | ●   | LVD EN61010-2-032 & EN61010-1 CAT III 600V                                    |
| ●   | ●   | ●   | ●   | ●   | ●   | EMC EN61326-1:2006 (EN55022, EN61000-3-2/-3 & EN61000-4-2/-3/-4/-5/-6/-8/-11) |

# DCA + Dual-Display VFD Clamp-ons For Electrical Professionals!

Ghost-Voltage-Buster, True-rms and PC-Comm interface for Advanced Users!

**AUTO-POWER-OFF**  
EXTENDS BATTERY LIFE

**RUGGED & DURABLE**  
HIGH-IMPACT FIRE-RETARDED ENCLOSURE  
WITH BATTERY COMPARTMENT & ACCESS DOOR

**SMALL HALL-EFFECT CLAMP JAWS**  
(BM189 & 186 ONLY)  
FOR EASY ACCESS TO TIGHT PLACES  
WITH DC & AC 600A CAPABILITY

**5ms CREST-MAX**  
CAPTURES IN-RUSH PEAK SIGNALS OF ACA  
OR ACV AS SHORT AS 5ms IN DURATION

**LVD CAT III 600V SAFETY**  
MEETS EN61010-2-032, EN61010-1  
& UL STANDARDS ON CAT III 600V

**PC-COMM INTERFACE CAPABILITY**  
OPTIONAL PURCHASE RS232C+USB CABLES  
WITH DATA RECORDING PC SOFTWARE  
FOR WIN98/NT/2K/XP/VISTA/WIN7

**LIGHT WEIGHT & SMALL BODY**  
ALSO COMES WITH A SOFT POUCH  
FOR EASY CARRYING & PROTECTION

**FULLY AUTO-RANGING DMM**  
SHORTENS THE TIME TO MEASURE  
AND INCREASES THE EASE OF USE

**6000 + 1999 COUNTS DUAL DISPLAY**  
SIMULTANEOUS MEASUREMENTS OF  
ACA+Hz OR ACV+Hz

**BACKLIGHTED LCD DISPLAY**  
(BM189, 188 & 185 ONLY)  
FOR EASY VIEWING IN THE DARK

**AC+DC TRUE RMS MEASUREMENTS**  
(BM189 ONLY)  
FOR NON-SINUSOIDAL & COMPLEX  
WAVEFORMS OF VOLTAGES & CURRENTS

**0.5% DCV BASIC ACCURACY**  
DCV 4 AUTO-RANGES TO 600V;  
ACV 4 AUTO-RANGES TO 600V

**TYPE-K TEMPERATURE**  
(BM189, 188 & 185 ONLY)  
SELECTABLE °C AND °F READINGS;  
COMES WITH BKP60 BEAD PROBE

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

**TRANSIENT PROTECTION**  
UP TO 8kV 1.2/50µs LIGHTNING SURGE;  
MORE CONFIDENCE FOR SERIOUS USERS

**GHOST-VOLTAGE-BUSTER**  
LoZ DRAINS GHOST/STRAY VOLTAGES  
LEAVING ONLY HARD SIGNALS  
ON METER READINGS

**AUTOCHECK® FEATURE**  
AUTOMATIC SELECTION OF  
LoZ DCV, LoZ ACV & OHMS

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

**EF-DETECTION**  
BOTH NON-CONTACT (NCV) &  
SINGLE-PROBE VOLTAGE DETECTION  
FOR IDENTIFYING LIVE LINES

**RELATIVE ZERO MODE**  
FOR CONVENIENT READINGS  
COMPARISON & OFFSET

**HIGH CURRENT (ACA) Hz**  
MEASURES NON-INVASIVE  
ACA FREQUENCY VIA CLAMP JAWS

**HIGH VOLTAGE (ACV) Hz**  
MEASURES NOISY HIGH VOLTAGE  
ACV FREQUENCY VIA TEST LEADS

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

**CAPACITANCE**  
6 AUTO-RANGES UP TO 3000µF  
TO MEASURE MOTOR CAPACITORS

**DIODE TEST**  
FOR TESTING DIODES & RECTIFIERS

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

**RESISTANCE**  
6 AUTO-RANGES UP TO 60MΩ



## BM186 & BM189 GENERAL SPECIFICATIONS

**Display:** 3-5½ digits 8000 counts & 3-1½ digits 1,999 counts for Hz  
**Polarity:** Automatic  
**Update Rate:** 5 per second nominal  
**Operating Temperature:** 0°C to 40°C  
**Relative Humidity:** Maximum relative humidity 80% for temperature up to 31°C decreasing linearly to 50% relative humidity at 40°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 % (specified accuracy) / °C @ (0°C - 18°C or 28°C - 40°C), or otherwise specified  
**Sensing:** Average sensing for BM186, True RMS for BM189  
**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 CAT III 600V and CAT IV

## 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 model 189 voltage accuracies are specified from 5% to 100% of range or otherwise specified. Maximum Crest Factor < 1.65 : 1 at full scale & < 3.3 : 1 at half scale, and with frequency components within the specified frequency bandwidth for non-sinusoidal waveforms.

## DC Voltage

| RANGE                                       | Accuracy |
|---------------------------------------------|----------|
| 6.000V, 60.00V, 600.0V & 600V <sup>1)</sup> | 0.5%+5d  |

<sup>1)</sup>Added range to indicate instantaneous over-range voltage values  
 Input Impedance: 10M $\Omega$ , 50 pF nominal

## AutoCheck™ DCV

| RANGE                                       | Accuracy  |
|---------------------------------------------|-----------|
| 6.000V, 60.00V, 600.0V & 600V <sup>1)</sup> | 1.3% + 5d |

<sup>1)</sup>Added range to indicate instantaneous over-range voltage values  
 AutoCheck™ Lo-Z DCV Threshold:  
 > +1.5VDC & < -1.5VDC nominal

## AutoCheck™ Lo-Z DCV Input Impedance:

Initially approx. 2.5k $\Omega$ , 650pF nominal; Impedance increases abruptly within a fraction of a second as display voltage is above 50V (typical). Ended up impedances vs display voltages typically are:  
 15k $\Omega$  @100V  
 100k $\Omega$  @300V  
 250k $\Omega$  @600V

## AC Voltage

| RANGE                                       | Accuracy  |
|---------------------------------------------|-----------|
| 50Hz ~ 400Hz                                |           |
| 6.000V, 60.00V, 600.0V & 600V <sup>1)</sup> | 1.2% + 5d |

<sup>1)</sup>Added range to indicate instantaneous over-range voltage values  
 Input Impedance: 10M $\Omega$ , 50 pF nominal

## AC+DC Voltage (BM189 Only)

| RANGE                                       | Accuracy  |
|---------------------------------------------|-----------|
| DC, 50Hz ~ 400Hz                            |           |
| 6.000V, 60.00V, 600.0V & 600V <sup>1)</sup> | 1.4% + 7d |

<sup>1)</sup>Added range to indicate instantaneous over-range voltage values  
 Input Impedance: 10M $\Omega$ , 50 pF nominal

## AutoCheck™ ACV (with Low Pass Filter)

| RANGE                                       | Accuracy <sup>1)</sup> |
|---------------------------------------------|------------------------|
| 5Hz ~ 20Hz                                  |                        |
| 6.000V, 60.00V, 600.0V & 600V <sup>2)</sup> | 3.5%+80d               |
| 20Hz ~ 200Hz                                |                        |
| 6.000V, 60.00V, 600.0V & 600V <sup>2)</sup> | 2.0%+60d               |
| 200Hz ~ 400Hz <sup>3)</sup>                 |                        |
| 6.000V, 60.00V, 600.0V & 600V <sup>2)</sup> | 7%+80d                 |

<sup>1)</sup>Not specified for fundamental frequency > 400Hz  
<sup>2)</sup> Added range to indicate instantaneous over-range voltage values  
<sup>3)</sup>Accuracy linearly decreases from 2% + 50d @ 200Hz to 7% + 80d @ 400Hz

## AutoCheck™ Lo-Z ACV Input Impedance:

Initially approx. 2.5k $\Omega$ , 650pF nominal; Impedance increases abruptly within a fraction of a second as display voltage is above 50V (typical). Ended up impedances vs display voltages typically are:  
 15k $\Omega$  @100V

## 300V AC & DC

**Transient Protection:** 6.0kV (1/2 $\mu$ s surge)  
**Overload Protections:**  
 ACA Clamp-on jaws: AC 600A rms continuous  
 \* + 8 COM Terminals (all other functions):  
 60V/DCV/ACV rms  
**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:  
 An Capacitance function is not specified  
 Other function ranges:  
 Total Accuracy = Specified Accuracy + 150 digits  
 Performance above 3V/m is not specified  
**Power Supply:** 1.5V AAA Size (NEDA 24A or IEC LR03) battery X 2  
**Power Consumption:** Typical 13mA for Current functions, and 5.2mA for others  
**Low Battery:** Below approx. 2.4V

**APC Timing:** Idle for 34 minutes  
**APC Consumption:** 10 $\mu$ A typical  
**Dimension:** L190mm X W63mm X H32mm

**Weight:** 227 gm  
**Jaw opening & Conductor diameter :** 30mm max  
**Accessories:** Test leads (pair), user's manual, Bx160 banana plug K-type thermocouple x 1 (BM189 Only)

**Optional purchase accessories:** USB Interface kit BRU-13A; BKB32 banana plug to type-K socket plug adaptor (BM189 only)  
**Special Features:** AutoCheck™ V&C; VFD-V & VFD-Hz; Backlight LCD (BM189 only); 5ms CREST-MAX Capture mode (Peak Hold); Auto-ranging Relative-Zero mode; Display Hold; EF-Detection (NCV); Interface capabilities with PC computers

## CREST-MAX Capture Mode

Accuracy: Specified accuracy plus 250 digits for changes > 5ms in duration

## AutoCheck™ Ohm

| RANGE <sup>1)</sup>                                | Accuracy |
|----------------------------------------------------|----------|
| 600.0 $\Omega$ , 6.000k $\Omega$ , 60.00k $\Omega$ | 0.5%+5d  |
| 600.0k $\Omega$                                    | 0.8%+5d  |
| 6.000M $\Omega$                                    | 1.2%+5d  |
| 40.00M $\Omega$                                    | 2.3%+5d  |

Open Circuit Voltage: 0.45VDC typical

<sup>1)</sup>AutoCheck™ Ohm Threshold:  
 < 10.00M $\Omega$  nominal

## Audible Continuity Tester

Audible Threshold: Between 10 $\Omega$  and 200 $\Omega$   
 Response time: 32ms approx.

## Capacitance

| RANGE                           | Accuracy <sup>1)</sup> |
|---------------------------------|------------------------|
| 60.00nF, 600.0nF, 6.000 $\mu$ F | 2.0%+5d                |
| 60.00 $\mu$ F, 600.0 $\mu$ F    | 3.5%+5d <sup>2)</sup>  |
| 2000 $\mu$ F                    | 4.0%+5d <sup>2)</sup>  |

<sup>1)</sup>Accuracies with film capacitor or better  
<sup>2)</sup>Temperature Coefficient: 0.25 % (specified accuracy) / °C @ (0°C - 18°C or 28°C - 40°C)

## Diode Tester

| RANGE  | Accuracy  |
|--------|-----------|
| 1.000V | 1.0% + 3d |

DC Test Current: 0.56mA typically  
 Open Circuit Voltage: < 1.8VDC typically

## DCA Current (Clamp on)

| RANGE                | Accuracy <sup>1)</sup> |
|----------------------|------------------------|
| 60.00A <sup>2)</sup> | 1.5%+8d                |
| 600.0A               | 1.5%+5d                |

<sup>1)</sup>Induced error from adjacent current-carrying conductor < 0.01AIA  
<sup>2)</sup>Specified with Relative Zero  $\Delta$  mode applied to offset the non-zero residual readings, if any  
<sup>3)</sup>Below 16% of range, add 10d to the specified accuracy

## ACA Current (Clamp on)

| RANGE                         | Accuracy <sup>1)</sup> |
|-------------------------------|------------------------|
| 50Hz ~ 60Hz                   |                        |
| 60.00A <sup>2)</sup> , 600.0A | 1.5%+6d                |
| 40Hz ~ 400Hz                  |                        |
| 60.00A <sup>2)</sup> , 600.0A | 2%+6d                  |

True RMS Crest Factor (Model 189 only):  
 < 1.7 : 1 at full scale & < 3.4 : 1 at half scale  
<sup>1)</sup>Induced error from adjacent current-carrying conductor < 0.01AIA  
<sup>2)</sup>Below 16% of range, add 10d to the specified accuracy

## DC+ACA Current (Clamp on) (BM189 Only)

| RANGE                         | Accuracy <sup>1)</sup> |
|-------------------------------|------------------------|
| DC, 40Hz ~ 400Hz              |                        |
| 60.00A <sup>2)</sup> , 600.0A | 2.2%+10d               |

True RMS Crest Factor:  
 < 1.7 : 1 at full scale & < 3.4 : 1 at half scale  
<sup>1)</sup>Induced error from adjacent current-carrying conductor < 0.01AIA  
<sup>2)</sup>Specified with Relative Zero  $\Delta$  mode applied to offset the non-zero residual readings, if any  
<sup>3)</sup>Below 16% of range, add 10d to the specified accuracy

## Temperature (BM189 only)

| RANGE            | Accuracy  |
|------------------|-----------|
| -50 °C ~ 1000 °C | 0.3% +4d  |
| -58 °F ~ 1832 °F | 0.3% + 6d |

K-type thermocouple range & accuracy not included

## HZ Line Level Frequency

| Function               | Sensitivity (Sine RMS) | Range         |
|------------------------|------------------------|---------------|
| 6V                     | 1V                     | 10Hz ~ 1999Hz |
| 60V                    | 10V                    | 10Hz ~ 1999Hz |
| 600V                   | 60V                    | 10Hz ~ 1999Hz |
| 60A                    | 6A                     | 20Hz ~ 400Hz  |
| 600A                   | 60A                    | 20Hz ~ 400Hz  |
| VFD 6V <sup>1)</sup>   | 1V-2V                  | 10Hz ~ 400Hz  |
| VFD 60V <sup>1)</sup>  | 6V-20V                 | 10Hz ~ 400Hz  |
| VFD 600V <sup>1)</sup> | 6V-200V                | 10Hz ~ 400Hz  |

Accuracy: 0.1%+4d  
<sup>1)</sup>4dF sensitivity linearity decreases from 10% F.S. @ 200Hz to 40% F.S. @ 400Hz

## Non-Contact EF-Detection

| Typical Voltage              | Bar-Graph Indication |
|------------------------------|----------------------|
| 20V (tolerance: 10V ~ 36V)   | -                    |
| 55V (tolerance: 23V ~ 85V)   | ---                  |
| 110V (tolerance: 59V ~ 600V) | -----                |

Indication: Bar-graph segments & audible beep tones proportional to the field strength  
 Detection Frequency: 50/60Hz  
 Detection Antenna: Top side of the stationary jaw  
 Probe-Contact EF-Detection: For more precise indication of live wires, such as distinguishing between live and ground connections, use the Red (+) test probe for direct contact measurement

## BRMVEN TECHNOLOGY CORPORATION

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