

# Innovative AmpTip™ Jaws for Slim-Conductors In CAT-III 1000V Areas

Deluxe All-In-One AC/DC 1000A,  
3-Terminal RST Phase-Rotation,  
HVAC, AC+DC TRMS



World-wide Patented:

- D148257
- 1996509
- D678091S
- 402011006274.7
- M438628
- 2755507
- 13486915
- 202012102140.4
- M429871
- 2359464
- 202011052429.9



## BM080 Series

### AmpTip™ Jaws Clamp-on DMMs



BRIGHT PEOPLE'S CHOICE



**BM089**



**BM088**



**BM086**



**BM083**

089	086	083	FUNCTIONS & FEATURES	
●	●	●	●	VFD-V & Hz for fundamental V/Hz of most Variable-Frequency-Drives
●	●	●	●	Fast measurement updates 3/sec
●	●	●	●	3-5/6 digits 6,000 counts display large LCD
●	●			51mm conductor size Hall-effect 1000A DC/AC jaws
		●	●	51mm conductor size Ultra-slim 1000A AC jaws
●	●	●	●	AmpTip™ Low-current-range calibrated at Jaw-tip for slim-conductors
●	●	AC	AC	AC+DC, AC True RMS voltage and current functions
●	●	●	●	1000VAC/DC input protection on general functions
●	●	●	●	Auto Power Off
●	●	●	●	Data HOLD
●	●	●	●	Record MAX/MIN/AVG mode (Auto-ranging)
●	●	●	●	Relative mode (Auto-ranging) with DC-Zero mode on DCA, DC+ACA ranges
●	●	●		Fast 80ms PEAK-RMS mode to capture in-rush currents
●	●	●		5ms CREST mode to capture instantaneous +Peak & -Peak
●	●	●	●	Back-lighted easy-to-read LCD display
●	●			Flashlight for easy operation in dim areas
●	●	●	●	Non-Contact EF-Detection (NCV)
●	●	●	●	Probe-Contact EF-Detection for more precise indication of live
●		●		Ⓡ 3Φ-Rotation-R for MAINS supply (Probe-contact)
●		●		Ⓜ 3Φ-Rotation-M (Hi-sensitivity mode) for Motors (Probe-contact)
●		●		Type-K temperature -40.0°C to 400°C or -40.0°F to 752°F selectable
●		●		DCμA ranges 200.0μA to 2000μA (via leads) for HVAC flame sensors
●	●			DC+ACA ranges 60.00A to 1000A + AmpTip™ DC+ACA 60.00A range
●	●			DCA ranges 60.00A to 1000A + AmpTip™ DCA 60.00A range
●	●	●	●	ACA ranges 60.00A to 1000A + AmpTip™ ACA 60.00A range
●	●			DC+ACV ranges 600.0V to 1000V
●	●	●	●	DCV ranges 600.0V to 1000V
●	●	●	●	ACV ranges 600.0V to 1000V
●	●	●	●	Ohm ranges 600.0Ω to 60.00kΩ
●	●	●	●	Cx ranges 200.0μF to 2500μF for start & run motor capacitors
●	●	●	●	Diode test & Fast audible Continuity
●	●	●	●	Line-level ACV Frequency 5.00Hz to 999.9Hz
●	●	●	●	Soft carrying pouch
●	●	●	●	Rugged fire retarded casing with battery access door
●	●	●	●	Transient protection 8kV 1.2/50μs lightning surge
●	●	●	●	LVD EN61010-1/61010-2-032/61010-2-033 to CAT III 1000V & Cat IV 600V
●	●	●	●	EMC EN61326-1 (EN55022, EN61000-3-2/-3 & EN61000-4-2/-3/-4/-5/-6/-8/-11)

# Patented AmpTip™ Jaws & Phase Rotation! DC+AC 1000A! CAT III 1kV!

Advanced Safety Compliance with IEC 61010-2-032 3rd Edition and IEC 61010-2-033 1st Edition  
Investigated, Tested and Listed by UL, a global independent safety science company



**TYPE-K TEMPERATURE (BM089 & 086 ONLY)**  
Selectable °C And °F Readings;  
Comes With Bkp60 Bead Probe

**FLASHLIGHT (BM089 & 088 ONLY)**  
Built-in Convenient Work Light  
For Easy Viewing In The Dark

**LARGE 51mm AmpTip™ CLAMP JAWS**  
For Large & Small Conductors With  
AC Or DC+AC TRMS 1000A Capability

**AC+DC TRUE RMS MEASUREMENTS (BM089 & 088 ONLY)**  
For Non-sinusoidal & Complex  
Waveforms Of Voltages & Currents

**LVD CAT III 1KV & CAT IV 600V**  
Certified EN61010-2-032, EN61010-2-033,  
EN61010-1 & Relevant UL Standards On  
CAT III 1000V & CAT IV 600V

**DIODE TEST**  
For Testing Diodes & Rectifiers

**FAST AUDIBLE CONTINUITY**  
For Quick Open-short Tests  
On Switches, Fuses, And Wires

**REGULAR CURRENT & Hz**  
Measures At Jaw Center For  
Regular Conductors Up To 1000 Amps

**AmpTip™ LOW-CURRENT & Hz**  
Ergonomically Measures At Jaw Tip For  
Small-sized Conductors Up To 60 Amps

**VFD V & Hz FEATURE**  
Measures Fundamental  
Voltage & Frequency Of Most  
Variable Frequency Drives

**FULLY AUTO-RANGING DMM**  
Shortens The Time To Measure  
And Increases The Ease Of Use

**AUTO-POWER-OFF**  
Extends Battery Life

**IN-RUSH PEAK-RMS (BM089, 088, 086 ONLY)**  
Captures In-rush Peak RMS Readings  
At Durations As Short As 80ms

**RECORD MAX / MIN / AVG**  
Records Max, Min, & Calculates Avg  
Readings Over Time. Auto-ranging

**BACKLIGHTED LCD DISPLAY**  
For Easy Viewing In The Dark

**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

**RUGGED & DURABLE**  
High-impact Fire-retarded  
Enclosure With Battery  
Compartment & Access Door

**EF-DETECTION**  
Both Non-Contact (NCV) &  
Single-Probe Voltage Detection  
For Identifying Live Lines

**DCµA (BM089 & 086 ONLY)**  
For HVAC Flame Sensors  
Testing Via Test Probes

**PHASE ROTATION (BM089 & 086 ONLY)**  
Dual Sensitivity Modes For  
Both Motors And Supply Systems

**CAPACITANCE**  
2 Auto-ranges Up To 2500µF  
To Measure Motor Capacitors

**RESISTANCE**  
3 Auto-ranges Up To 60kΩ  
Best Resolution 0.1Ω At 600Ω Range

**ERGONOMIC & STREAMLINE BODY**  
Also Comes With A Soft Pouch  
For Easy Carrying & Protection

**DATA HOLD**  
Freezes The Displaying  
Reading For Later View

**RELATIVE ZERO & DC\_ZERO**  
For Convenient Readings Comparison  
As Well As DC Jaws Hysteresis Offset

**0.8% DCV BASIC ACCURACY**  
DCV 2 Auto-ranges To 1000V;  
ACV 2 Auto-ranges To 1000V

**5ms CREST-MAX**  
Captures In-rush Peak Signals Of ACA  
Or ACV As Short As 5ms In Duration

**CONVENIENT Hz BUTTON**  
Toggles Between Amps & Hz Via Jaws,  
Or Volts & Hz Via Test Probes

## GENERAL SPECIFICATIONS

**Display:** 3-5/6 digits 6000 counts.

**Polarity:** Automatic

**Update Rate:** 5 per second nominal;

**Operating Temperature:** -10°C to 50°C

**Relative Humidity:** Non condensing ( $\leq 10^\circ\text{C}$ )

$\leq 90\% \text{ RH}$  (at  $10\text{--}30^\circ\text{C}$ )

$\leq 75\% \text{ RH}$  (at  $30\text{--}40^\circ\text{C}$ )

$\leq 45\% \text{ RH}$  (at  $40\text{--}50^\circ\text{C}$ )

**Pollution degree:** 2

**Storage Temperature:**  $-20^\circ\text{C}$  to  $60^\circ\text{C}$ , < 80% R.H. (with battery removed)

**Altitude:** Operating below 2000m; Storage below 12000m

**Temperature Coefficient:** nominal  $0.10 \times$  (specified accuracy) /  $^\circ\text{C}$  @  $(-10^\circ\text{C} \text{ -- } 18^\circ\text{C}$  or  $28^\circ\text{C} \text{ -- } 50^\circ\text{C})$ , or otherwise specified

**Sensing:** True RMS

**Safety:** Double insulation per UL/IEC/EN61010-1 Ed. 3.0, IEC/EN61010-2-033 Ed. 1.0, CAN/CSA C22.2 No. 61010-1 Ed. 3.0, IEC/EN61010-2-032 Ed. 3.0 & IEC/EN61010-031 Ed. 1.1 to CAT III 1000V and CAT IV 600V AC & DC

**Transient Protection:** 8.0kV (1.2/50 $\mu\text{s}$  surge)

**Overload Protections:**

Current & Hz functions via jaws: 1000ADC/AAC rms at <400Hz

Voltage & 3-Phase Rotation functions via terminals: 1100VDC/VAC rms

Other functions via terminals: 1000VDC/VAC 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):

ACA, DCA & DC+ACA Functions, in an RF field of 1V/m: Total Accuracy = Specified Accuracy + 60 digits at around 200MHz~350MHz

Ohm and DC $\mu\text{A}$  Functions, in an RF field of 1V/m:

Total Accuracy = Specified Accuracy + 80 digits

Other Functions, in an RF field of 3V/m:

Total Accuracy = Specified Accuracy + 20 digits

**Power Supply:** 1.5V AA Size battery X 2

**Power Consumption:** Typical 13mA for Current functions of BM089 & BM088; 4.3mA for others

**Low Battery:** Below approx. 2.85V for Capacitance & Hz;

Below approx. 2.5V for other functions

**APO Timing:** Idle for 32 minutes

**APO Consumption:** 5 $\mu\text{A}$  typical

**Dimension:** L258mm X W94mm X H44mm

**Weight:** 392gm for BM088 & BM089; 312gm for BM083 & BM086

**Jaw opening & Conductor diameter:** 51mm max

**Accessories:** Test lead set, User's manual, Soft carrying pouch, Bkp60 banana plug K-type thermocouple (BM089 & BM086 only), Alligator clip set (BM089 & BM086 only)

**Optional purchase accessories:** BKB32 banana plug to type-K socket plug adaptor (BM089 & BM086 only)

**Special Features:** AmpTip™ low-current range;

MAX/MIN/AVG Recording mode; Display Hold;

EF-Detection (NCV); Backlight LCD; Flashlight

(BM089 & BM088 only); 80ms Peak-RMS mode for inrush current (BM089, BM088 & BM086 only); 5ms

Crest (Instantaneous Peak-Hold) mode (BM089, BM088 & BM086 only); Relative-Zero, 3-Phase Rotation

detection (BM089 & BM086 only)

## Electrical Specifications

Accuracy is  $\pm$ (% reading digits + number of digits) or otherwise specified, at  $23^\circ\text{C} \pm 5^\circ\text{C}$ .

Maximum Crest Factor < 2.5 : 1 at full scale & < 5 : 1 at half scale or otherwise specified, and with frequency spectrum not exceeding the specified frequency bandwidth for non-sinusoidal waveforms.

### DC Voltage

RANGE	Accuracy
600.0V, 1000V	0.8% + 5d

Input Impedance: 10M $\Omega$ , 100 pF nominal

### AC Voltage (with Digital Low-Pass Filter)

RANGE	Accuracy
50Hz ~ 60Hz	
600.0V, 1000V	0.8% + 5d
20Hz ~ 200Hz	
600.0V, 1000V	1.5% + 5d
200Hz ~ 400Hz	
600.0V, 1000V	10% + 5d

Input Impedance: 10M $\Omega$ , 100 pF nominal

### DC+AC Voltage (with Digital Low-Pass Filter) (BM089 & BM088 Only)

RANGE	Accuracy
50Hz ~ 60Hz	
600.0V, 1000V	1.0% + 7d
DC, 40Hz ~ 200Hz	
600.0V, 1000V	1.8% + 7d
200Hz ~ 400Hz	
600.0V, 1000V	12% + 7d

Input Impedance: 10M $\Omega$ , 100 pF nominal

### PEAK-rms (ACV & ACA of Models 089, 088 & 086 only)

Response: 80ms to > 90%

### CREST (Peak-Hold)

Accuracy: Add 250 digits to specified accuracy for changes > 5ms

### Audible Continuity Tester

Audible Threshold: At between 10 $\Omega$  and 250 $\Omega$

Response time: 32ms approx.

### Ohm

RANGE	Accuracy
600.0 $\Omega$ , 6.000K $\Omega$ , 60.00K $\Omega$	1.0% + 5d

Open Circuit Voltage: 1.0VDC typical

### Capacitance

RANGE	Accuracy <sup>1)</sup>
200.0 $\mu\text{F}$ , 2500 $\mu\text{F}$	2.0% + 4d

<sup>1)</sup>Accuracies with film capacitor or better

### Diode Tester

RANGE	Accuracy
2.000V	1.5% + 5d

Test Current: 0.3mA typically

Open Circuit Voltage: < 3.5VDC typically

### DC $\mu\text{A}$ (BM089 & BM086 only)

RANGE	Accuracy	Burden Voltage
200.0 $\mu\text{A}$ , 2000 $\mu\text{A}$	1.0% + 5d	3.5mV/ $\mu\text{A}$

### Temperature (BM089 & BM086 only)

RANGE	Accuracy
-40.0 $^\circ\text{C}$ ~ 99.9 $^\circ\text{C}$	1.0% + 0.8 $^\circ\text{C}$
100 $^\circ\text{C}$ ~ 400 $^\circ\text{C}$	1.0% + 1 $^\circ\text{C}$
-40.0 $^\circ\text{F}$ ~ 211.8 $^\circ\text{F}$	1.0% + 1.5 $^\circ\text{F}$
212 $^\circ\text{F}$ ~ 752 $^\circ\text{F}$	1.0% + 2 $^\circ\text{F}$

K-type thermocouple range & accuracy not included

### AmpTip™ clamp-on ACA

RANGE	Accuracy <sup>1) 2) 3)</sup>
40Hz ~ 100Hz	
60.00A	1.5% + 5d
100Hz ~ 400Hz	
60.00A	2.0% + 5d

<sup>1)</sup>Induced error from adjacent current-carrying conductor: <0.02A/A

<sup>2)</sup>Specified with Relative Zero  $\Delta$  mode applied to offset the non-zero residual readings, if any

<sup>3)</sup>Add 10d to the specified accuracy @ < 4A

### AmpTip™ clamp-on DCA (BM089 & BM088 only)

RANGE	Accuracy <sup>1) 2) 3)</sup>
60.00A	1.5% + 5d

<sup>1)</sup>Induced error from adjacent current-carrying conductor: <0.02A/A

<sup>2)</sup>Specified with DC-Zero mode applied to offset the non-zero residual readings, if any

<sup>3)</sup>Add 10d to the specified accuracy @ < 4A

### AmpTip™ clamp-on DC+ACA (BM089 & BM088 only)

RANGE	Accuracy <sup>1) 2) 3)</sup>
DC, 40Hz ~ 100Hz	
60.00A	2.0% + 7d
100Hz ~ 400Hz	
60.00A	2.2% + 7d

<sup>1)</sup>Induced error from adjacent current-carrying conductor: <0.08A/A

<sup>2)</sup>Specified with DC-Zero mode applied to offset the non-zero residual readings, if any

<sup>3)</sup>Add 10d to the specified accuracy @ < 4A

### Regular Clamp-on ACA

RANGE	Accuracy <sup>1) 2)</sup>
40Hz ~ 100Hz	
60.00A <sup>3) 4)</sup> , 600.0A, 1000A <sup>5)</sup>	1.8% + 5d
100Hz ~ 400Hz	
60.00A <sup>3) 4)</sup> , 600.0A, 1000A <sup>5)</sup>	2.2% + 5d

<sup>1)</sup>Induced error from adjacent current-carrying conductor: < 0.02A/A for Models 089 & 088

< 0.05A/A for Models 086 & 083

<sup>2)</sup>For Models 086 & 083, specified accuracy is for measurements made at the jaw center. When the conductor is not positioned at the jaw center, add 2% to specified accuracy for position errors

<sup>3)</sup>For Models 086 & 083, add 10d to specified accuracy @ < 6A

<sup>4)</sup>For Models 089 & 088, add 10d to the specified accuracy @ < 9A

<sup>5)</sup>Maximum Crest Factor < 1.4 : 1 at full scale & < 2.8 : 1 at half scale

### Regular Clamp-on DCA (BM089 & BM088 only)

RANGE	Accuracy <sup>1) 2)</sup>
60.00A <sup>3)</sup> , 600.0A, 1000A	1.8% + 5d

<sup>1)</sup>Induced error from adjacent current-carrying conductor: <0.02A/A

<sup>2)</sup>Specified with DC-Zero mode applied to offset the non-zero residual readings, if any

<sup>3)</sup>Add 10d to the specified accuracy @ < 9A

### Regular Clamp-on DC+ACA (BM089 & BM088 only)

RANGE	Accuracy <sup>1) 2)</sup>
DC, 40Hz ~ 100Hz	
60.00A <sup>3)</sup> , 600.0A, 1000A <sup>4)</sup>	2.2% + 7d
100Hz ~ 400Hz	
60.00A <sup>3)</sup> , 600.0A, 1000A <sup>4)</sup>	2.5% + 7d

<sup>1)</sup>Induced error from adjacent current-carrying conductor: < 0.08A/A

<sup>2)</sup>Specified with DC-Zero mode applied to offset the non-zero residual readings, if any

<sup>3)</sup>Add 10d to the specified accuracy @ < 9A

<sup>4)</sup>Maximum Crest Factor < 1.4 : 1 at full scale & < 2.8 : 1 at half scale

### Hz Line Level Frequency

Function	Sensitivity <sup>1)</sup> (Sine RMS)	Range
600V, 1000V	50V	5.00Hz ~ 999.9Hz
60A (AmpTip™)	40A	40.00Hz ~ 400.0Hz
60A, 600A, 1000A	40A	40.00Hz ~ 400.0Hz

Accuracy: 1%+5d

<sup>1)</sup>DC-bias, if any, not more than 50% of Sine RMS

### Non-Contact EF-Detection

Typical Voltage	Bar-Graph Indication
20V (tolerance: 10V ~ 36V)	-
55V (tolerance: 23V ~ 83V)	--
110V (tolerance: 59V ~ 165V)	---
220V (tolerance: 124V ~ 330V)	----
440V (tolerance: 250V ~ 1000V)	-----

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

Detection Frequency: 50/60Hz

Detection Antenna: Inside the 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 one single probe to test via terminal COM for direct contact EF-Detection with best sensitivity.

