

# Individual Harmonics THD%, DF%, and Volts/Amps Readings! Dual-display Convenience!

Added DC Component Hdc Harmonics in AC+DC Mode!  
3-Phase Power both Balanced and Unbalanced Loads!

# BM099

AC+DC TRMS  
Harmonic PowerClamp™



www.brymen.com



Bright People's Choice



CE

UK  
CA

UL  
US



BM099

- 3-5/6 digits 6000 counts / 4 digits 9999 counts + 999 counts Dual Display
- LARGE 51mm AmpTip® jaws for both large and slim conductors
- 1000A AC/DC Power Quality Clamp-on with Multimeter functions
- CAT III 1kV and CAT IV 600V AC/DC for utility applications
- AC and AC+DC True RMS on Voltage, Current, Harmonics, and Power functions
- Power readings of W (real power), VA (apparent power), and VAR (reactive power)
- Dual Display Volt/Amp+THD%, Volt/Amp+DF%, ~VA/W/VAR+PF, and AC+DC\_VA+DCA
- Unbalanced-Load 3-Phase Power Readings; Selectable 3-wire and 4-wire calculations
- Direct Single-Phase Power, 3-Phase Balanced-Load Power, and AC+DC Apparent Power
- H02 to H25 Individual Harmonics Volt/Amp, THD%, and DF% Readings in V/A AC mode
- Added Hdc DC component to Harmonics Readings in V/A AC+DC mode
- THD% (Total Harmonic Distortion) of V/A functions from 2% to 600%
- DF% (Total Distortion Factor) of V/A functions from 2% to 100.0%
- ACV (with Low Pass Filter) and DCV; @ 60.00V and 999.9V ranges
- AC+DCV; @ 999.9V range; Bandwidth up to 3kHz
- Regular ACA, AC+DCA, and DCA; @ 999.9A range
- AmpTip® Low-Current ACA, AC+DCA, and DCA; @ 40.00A range
- Clamp-jaw ACA-Hz and Test-lead Line Level ACV-Hz from 40.00Hz to 70.00Hz
- Fast BeepLit™ Continuity; Beep sound with backlight effect for noisy environments
- Type-K temperature from -40.0 °C to 400.0 °C or -40.0 °F to 752.0 °F selectable
- Cx from 10.0µF to 999.9µF for start & run motor capacitors
- Diode test
- Non-Contact EF-Detection (NCV)
- Probe-Contact EF-Detection for more precise indication of live
- Ohms; @ 600.0Ω and 6.000kΩ ranges
- Auto-Power-Off (APO)
- Relative-Zero mode and DC-Zero mode
- HOLD feature freezes the display reading for later viewing.
- REC MAX/MIN to compare and record extreme display readings
- Backlighted LCD display plus Working Flashlight
- Soft carrying pouch
- UL, UKCA, and CE compliance
- Transient protection 8kV 1.2/50µs lightning surge
- 1kV AC/DC general input protection on all functions
- Rugged fire retarded housing with battery access door

# AmpTip® Jaws PowerClamp™ + 25<sup>th</sup> Harmonics! 1000A with AC+DC TRMS for CAT-III 1kV!

BeepLit™ Continuity, °C/°F, Cx, EF-Detection NCV, Clamp-on Hz,  
MinMax Record, Hold, and Relative Features!

## Direct Use on Lives

Apply to and Removal from Hazardous Live Uninsulated Conductors Permitted

## Large 51mm AmpTip® Jaws

Easy Measure on Both Large and Slim Conductors

## Type-K Temperature

Measures from -40.0 °C to 400.0 °C or -40.0 °F to 752.0 °F, Selectable

## Capacitance

Measures Start & Run Motor Capacitors from 10.0µF to 999.9µF

## Resistance

2 Ranges @ 600.0Ω and 6.000kΩ

## Fast BeepLit™ Continuity

Quick Open-short Tests with Backlight Effects on Switches, Fuses, and Wires

## High Accuracy 0.5% DCV

2 Ranges @ 60.00V and 999.9V

## Direct LPF ACV

For Noisy Electrical and VFD Signals; 2 Ranges @ 60.00V and 999.9V

## Diode Test

Quick Checks on Diodes and Rectifiers

## High Bandwidth AC+DCV

Range @ 999.9V; Bandwidth up to 3kHz

## AmpTip® Current

Measures at Jaw Tip for Small-sized Thin Conductors up to 40.00A

## Regular Current

Measures at Jaws Center for Regular Conductors up to 999.9A

## Clamp-on Hz

Measures Non-Invasive Current Frequency Via Clamp Jaws; 40Hz to 70Hz

## AC Line-Level Hz

Measures Noisy High Voltage Frequency via Test leads; 40Hz to 70Hz

## EF-Detection

Both Non-Contact (NCV) & Single-Probe Voltage Detection for Identifying Live Lines

## Convenient Dual Display

Volt/Amp+THD%, Volt/Amp+DF%, (AC)VA/W/VAR+PF, and (AC+DC)VA+DCA

## REC MAX/MIN

Compares and Records Extreme Display Readings

## THD% of Volt/Amp Functions

Harmonic Distortion of Total or Individual Harmonics up to the 25<sup>th</sup>

## DF% of Volt/Amp Functions

Distortion Factor of Total or Individual Harmonics up to the 25<sup>th</sup>

## LVD with UL Listed

Power analysis Applications for CAT III 1kV & CAT IV 600V Areas



## AC+DC Power VA

Measures Power VA in AC+DC mode with Dual Display DCA

## Single-phase & 3-phase Balanced-load Power

Measures AC Power W, VA, and VAR with Dual Display PF

## Relative Zero Mode

Convenient Readings Comparison & Offset

## DC-Zero Mode

Offsets DCA residuals from magnetic hysteresis of the jaws

## 3-phase Unbalanced-load Power

Measures and Calculates 3-wire/ 4-wire system Power W cost-effectively

## AC, AC+DC TRMS

Ideal for Non-sinusoidal Waveforms on Voltage, Current, Harmonics, and Power

## Rugged & Durable

Robust Fire-retarded Housing with Battery Access Door

## Ergonomic & Streamlined Body

Fits Nicely in A Hand with Single-Handed Rotary Switch Operation

## Data HOLD

Freezes the Displaying Reading for Later Viewing

## Fully Auto-ranging

Shortens the Time to Measure and Increases the Ease of Use

## Auto Power Off

Turns Off Automatically to Extend Battery Life

## Transient Protection

8kV 1.2/50µS Lightning or Switching Surge Protection for Serious Users

## 1kV Input Protection

Superb Protection for Misinput on All Functions and Ranges

## Back-lighted LCD plus Working Flashlight

Easy Viewing in the Dark

## EMC EN61326-1 Compliance

Superior Immunity to Interferences with Reliable Operations and Readings



# ELECTRICAL SPECIFICATIONS

Accuracy is  $\pm$  reading digits + number of digits) or otherwise specified, at 23°C  $\pm$  5°C & less than 75% relative humidity. Maximum crest factor < 1.56 : 1 at full scale & < 3.12 : 1 at half scale, and with frequency spectrum not exceeding the specified frequency bandwidth for non-sinusoidal waveforms.

## DCV

RANGE	Accuracy
60.00V, 999.9V	0.5%+5d

Input Impedance: 2M $\Omega$ , 50pF nominal

## ACV (with Low-Pass Filter)

RANGE	Accuracy
60.00V <sup>1)</sup> , 999.9V	@ 50Hz / 60Hz 0.5%+5d @ 10Hz ~ 200Hz 4.0%+5d @ 200Hz ~ 400Hz 14%+5d <sup>2)</sup>

Input Impedance: 2M $\Omega$ , 50pF nominal

<sup>1)</sup>Specified accuracy adds 40d @ <20Vac

<sup>2)</sup>Accuracy linearly decreases from 4%+5d @ 200Hz to 14%+5d @ 400Hz

## AC+DCV

RANGE	Accuracy
999.9V	@ DC, 50Hz / 60Hz 0.5%+5d @ 45Hz ~ 400Hz 2.5%+5d @ 500Hz ~ 3kHz 3.5%+5d

Input Impedance: 2M $\Omega$ , 50pF nominal

## Regular Clamp-on DCA

RANGE	Accuracy <sup>1)2)</sup>
999.9A	2.0%+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

## AmpTip® Clamp-on DCA

RANGE	Accuracy <sup>1)2)3)</sup>
40.00A	2.0%+5d

<sup>1)</sup>Induced error from the 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 15d to the specified accuracy @ <10A

## Hz Line Level Frequency

Function	Sensitivity (Sine RMS)	Range
999.9V	20V	40.00Hz ~ 70.00Hz
999.9A	2A	40.00Hz ~ 70.00Hz

Accuracy: 0.5%+5d

## Audible Continuity Tester

Audible Threshold: Between 10 $\Omega$  and 300 $\Omega$

Response time: 32ms approx.

# GENERAL SPECIFICATIONS

**Display:** 6000 counts / 9999 counts + 999 counts dual display nominal

**Update Rate:** 2 per second nominal

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

**Relative Humidity:** Maximum relative humidity 80% for temperature up to 31°C decreasing linearly to 50% relative humidity at 50°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 @ (-10°C ~ 18°C or 28°C ~ 50°C), or otherwise specified

**Sensing:** AC & AC+DC True RMS

**Safety:** Double insulation per IEC/UL/EN/BS EN 61010-1 Ed. 3.1, IEC/UL/EN/BS EN 61010-2-032 Ed. 4.0, IEC/UL/EN/BS EN 61010-031 Ed. 2.0 and the corresponding CAN/CSA-C22.2 regulations to Measurement Categories III 1000V AC & DC and Category IV 600V AC & DC

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

**Overload Protection:**

Current via Clamp-on Jaws: 1000A rms at <400Hz

Voltage via terminals: 1100V rms

Other functions via terminals: 1000V rms

**E.M.C.:** Meets EN61326-1

**Power Supply:** 1.5V AA Size (IEC LR6) battery X 2

**Power Consumption:** Typical 33mA for Current & Power functions, and 22mA for others

**Low Battery:** Below approx. 2.5V

**APC Timing:** Idle for 30 minutes

**APC Consumption:** 25uA typical

**Dimension:** L258mm X W94mm X H44mm

**Weight:** 394 gm

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

**Accessories:** Test lead set, User's manual, Soft carrying pouch, Bkp60 banana plug K-type thermocouple

**Optional purchase accessories:** BKB32 banana plug to type-K socket plug adaptor

## Total Harmonic Distortion-THD%<sup>1)</sup> of Regular Clamp-on ACA or AC+DCA

RANGE	Accuracy <sup>2)3)</sup>
2.0% ~ 600.0%	1.0%+5d

<sup>1)</sup>Total Harmonic Distortion-THD% is defined as (Total Harmonic RMS / Fundamental RMS) x 100%

<sup>2)</sup>Fundamental frequency range: 45Hz ~ 70Hz

<sup>3)</sup>Accuracy specified @ Total RMS  $\geq$  10A

## Total Distortion Factor-DF%<sup>1)</sup> of Regular Clamp-on ACA or AC+DCA

RANGE	Accuracy <sup>2)3)</sup>
2.0% ~ 100.0%	1.0%+5d

<sup>1)</sup>Total Distortion Factor-DF% is defined as (Total Harmonic RMS / Total RMS) x 100%

<sup>2)</sup>Fundamental frequency range: 45Hz ~ 70Hz

<sup>3)</sup>Accuracy specified @ Total RMS  $\geq$  10A

## Ohms

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

Open Circuit Voltage: 1.2VDC typical

## Capacitance

RANGE	Accuracy <sup>1)</sup>
10.0 $\mu$ F ~ 999.9 $\mu$ F	3.0%+6d

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

## Diode

RANGE	Accuracy
1.000V	1.0%+3d

Test Current: 0.3mA typically

Open Circuit Voltage: < 1.2VDC typically

## Total Harmonic Distortion-THD% of ACV<sup>1)</sup> or AC+DCV

Total Harmonic Distortion	RANGE	Accuracy
ACV, AC+DCV	60.00V <sup>1)</sup> , 999.9V	@ 50Hz / 60Hz 0.5%+5d @ 45Hz ~ 500Hz 2.5%+5d @ 500Hz ~ 3kHz 3.5%+5d
	THD% <sup>2)3)4)</sup>	2.0% ~ 600.0%
		1.0%+5d

Input Impedance: 2M $\Omega$ , 50pF nominal

<sup>1)</sup>Range available to ACV only. Specified accuracy adds 40d @ <20Vac

<sup>2)</sup>Total Harmonic Distortion-THD% is defined as (Total Harmonic RMS / Fundamental RMS) x 100%

<sup>3)</sup>Fundamental frequency range: 45Hz ~ 70Hz

<sup>4)</sup>Accuracy specified @ Total RMS  $\geq$  70V

<sup>5)</sup>When the Harmonics-related feature is activated, the Low Pass Filter of ACV turns off automatically for maximum measuring bandwidth

## Total Distortion Factor-DF% of ACV<sup>1)</sup> or AC+DCV

Total Distortion Factor	RANGE	Accuracy
ACV, AC+DCV	60.00V <sup>1)</sup> , 999.9V	@ 50Hz / 60Hz 0.5%+5d @ 45Hz ~ 500Hz 2.5%+5d @ 500Hz ~ 3kHz 3.5%+5d
	DF% <sup>2)3)4)</sup>	2.0% ~ 100.0%
		1.0%+5d

Input Impedance: 2M $\Omega$ , 50pF nominal

<sup>1)</sup>Range available to ACV only. Specified accuracy adds 40d @ <20Vac

<sup>2)</sup>Total Distortion Factor-DF% is defined as (Total Harmonic RMS / Fundamental RMS) x 100%

<sup>3)</sup>Fundamental frequency range: 45Hz ~ 70Hz

<sup>4)</sup>Accuracy specified @ Total RMS  $\geq$  70V

<sup>5)</sup>When the Harmonics-related feature is activated, the Low Pass Filter of ACV turns off automatically for maximum measuring bandwidth

## AmpTip® Clamp-on ACA

RANGE	Accuracy <sup>1)2)</sup>
40.00A	50Hz / 60Hz 1.5%+5d
40.00A	45Hz~400Hz 2.0%+5d

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

<sup>2)</sup>Add 30d to the specified accuracy @ <10A

## Regular Clamp-on ACA

RANGE	Accuracy <sup>1)</sup>
999.9A	50Hz / 60Hz 2.0%+5d
999.9A	45Hz ~ 400Hz 2.5%+5d

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

## Single-Phase & 3-Phase Balanced-Load Power

RANGE	Active Power (W)		
	@ PF	$\geq 0.5; \geq 1.0$	$\geq 0.31; < 0.5$
0010 W ~ 9999 W 10.00 kW ~ 99.99 kW 100.0 kW ~ 999.9 kW	@ACA $\geq 20A$	2%+2d	8%+5d
	@ACA $\geq 20A$ , $\geq 3A$	4%+5d	5%+5d
	@ACA $\geq 20A$ , $\geq 3A$ , $\geq 1A$	20%+8d	

RANGE	Apparent Power (VA)		
	@ACA $\geq 20A$	@ACA $\geq 20A$ , $\geq 3A$	@ACA $\geq 20A$ , $\geq 3A$ , $\geq 1A$
0010 VA ~ 9999 VA 10.00 kVA ~ 99.99 kVA 100.0 kVA ~ 999.9 kVA	2%+2d	4%+5d	20%+8d
	2%+2d	4%+5d	20%+8d
	2%+2d	4%+5d	20%+8d

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

## Reactive Power (Var)

RANGE	Accuracy <sup>1)</sup>		
	@ PF	$\leq 0.8; \geq 0.0$	$\leq 0.9; > 0.8$
0010 Var ~ 9999 Var 10.00 kVar ~ 99.99 kVar 100.0 kVar ~ 999.9 kVar	@ACA $\geq 10A$	2%+2d	8%+5d
	@ACA $\geq 10A$ , $\geq 6A$	7%+5d	10%+5d <sup>2)</sup>
	@ACA $\geq 10A$ , $\geq 6A$ , $\geq 3A$	20%+8d	N/A

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

## Power Factor (PF)

RANGE	Accuracy <sup>3)</sup>
0.51 ~ 1.00	3%+4d
0.21 ~ 0.50	5%+4d
0.00 ~ 0.20	10%+4d

<sup>1)</sup>Accuracy specified from Fundamental\_ACA  $\geq 1A$  and Fundamental\_ACV  $\geq 66V$ ; Fundamental frequency @ 50/60Hz

<sup>2)</sup>Specified from @PF  $\leq 0.95$ ;  $> 0.9$  @ACA  $\geq 6A$ ;  $\geq 3A$

<sup>3)</sup>Accuracy specified from Fundamental\_ACA  $\geq 3A$  and Fundamental\_ACV  $\geq 66V$ ; Fundamental @ 50/60Hz

## AmpTip® Clamp-on AC+DCA

RANGE	Accuracy <sup>1)2)3)</sup>
40.00A	DC 2.0%+5d
40.00A	50Hz / 60Hz 1.5%+5d
40.00A	45Hz ~ 400Hz 2.0%+5d

<sup>1)</sup>Induced error from the 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 30d to the specified accuracy @ <10A

## Regular Clamp-on AC+DCA

RANGE	Accuracy <sup>1)2)</sup>
999.9A	DC 2.0%+5d
999.9A	50Hz / 60Hz 2.0%+5d
999.9A	45Hz ~ 400Hz 2.5%+5d

<sup>1)</sup>Induced error from the 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

## Individual Harmonic order of ACV<sup>1)</sup> or AC+DCV

Parameter	RANGE	Accuracy <sup>1)2)3)</sup>
Individual Harmonic order: Hdc, H01 ~ H10	Vrms	999.9V 2.0%+5d <sup>4)</sup>
	THD% <sup>5)</sup>	0.0% ~ 600.0% 15d
	DF% <sup>6)</sup>	0.0% ~ 100.0% 15d

<sup>1)</sup>Fundamental frequency range: 45Hz ~ 70Hz

<sup>2)</sup>Accuracy specified @ Total RMS  $\geq 70V$

<sup>3)</sup>Unspecified @ Harmonic Order Voltage < 2V

<sup>4)</sup>Specified accuracy adds 3% @ DF% < 10%

<sup>5)</sup>Individual Harmonic-THD% is defined as (Harmonic order RMS / Fundamental RMS) x 100%

<sup>6)</sup>Individual Distortion Factor-DF% is defined as (Harmonic order RMS / Total RMS) x 100%

<sup>7)</sup>When the Harmonics-related feature is activated, the Low Pass Filter of ACV turns off automatically for maximum measuring bandwidth

## Individual Harmonic orders of Regular Clamp-on ACA or AC+DCA

Parameter	RANGE	Accuracy <sup>1)2)3)4)5)</sup>
Individual Harmonic order: Hdc, H01 ~ H10	Current RMS	999.9A 2.0%+5d <sup>6)</sup>
	THD% <sup>7)</sup>	0.0% ~ 600.0% +/- 15d
	DF% <sup>8)</sup>	0.0% ~ 100.0% +/- 15d

<sup>1)</sup>Fundamental frequency range: 45Hz ~ 70Hz

<sup>2)</sup>Accuracy specified @ Total RMS  $\geq 70V$

<sup>3)</sup>Unspecified @ Harmonic Order Current < 2A

<sup>4)</sup>Specified accuracy adds 3% @ DF% < 10%

<sup>5)</sup>Individual Harmonic-THD% is defined as (Harmonic order RMS / Fundamental RMS) x 100%

<sup>6)</sup>Individual Distortion Factor-DF% is defined as (Harmonic order RMS / Total RMS) x 100%

<sup>7)</sup>When the Harmonics-related feature is activated, the Low Pass Filter of ACV turns off automatically for maximum measuring bandwidth

## Individual Harmonic orders of Regular Clamp-on ACA or AC+DCA

Parameter	RANGE	Accuracy <sup>1)2)3)4)5)</sup>
Individual Harmonic order: Hdc, H01 ~ H10	Current RMS	999.9A 5.0%+5d <sup>6)</sup>
	THD% <sup>7)</sup>	0.0% ~ 600.0% +/- 20d
	DF% <sup>8)</sup>	0.0% ~ 100.0% +/- 20d

<sup>1)</sup>Induced error from the 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>Fundamental frequency range: 45Hz ~ 70Hz

<sup>4)</sup>Accuracy specified @ Total RMS  $\geq 10A$

<sup>5)</sup>Unspecified @ Harmonic Order Current < 2A

<sup>6)</sup>Specified accuracy adds 3% @ DF% < 10%

<sup>7)</sup>Individual Harmonic-THD% is defined as (Harmonic order RMS / Fundamental RMS) x 100%

<sup>8)</sup>Individual Distortion Factor-DF% is defined as (Harmonic order RMS / Total RMS) x 100%

## AC+DC Power (VA)

RANGE	Power (VA)	Accuracy <sup>1)2)3)4)</sup>
0010 VA ~ 9999 VA		2.0%+2d <sup>1-3)</sup>
10.00 kVA ~ 99.99 kVA		
100.0 kVA ~ 999.9 kVA		