

# USER'S MANUAL

**BM195**  
**BM197**  
**BM198PV**

**Versatile Clamp-  
on Multimeter  
Series**



## 1) 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. Do not expose this product to rain or moisture. The meter is intended only for indoor use.

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 for damaged insulation or exposed metal periodically. If any defects are found, replace them immediately. Only use the test probe assembly provided with the meter or a UL Listed test probe assembly to the same meter ratings or better.

This Clamp-on meter is designed to apply around or remove from uninsulated hazardous live conductors. But still, individual protective equipment must be used if hazardous live parts in the installation where measurement is to be carried out could be accessible.

Optional offer premium test probe assembly using silicone lead wire insulation, at agent's discretion, is equipped with white inner insulation layers as wear indicators. Replace them immediately if any of the white layers has become visible.

Disconnect the test leads from the test points before changing functions.

All meter models meet IEC/EN/BSEN/CSA\_C22.2\_No./UL standards of 61010-1 Ed. 3.1 and 61010-2-032 Ed. 4.0 to Measurement Categories CAT IV 1000V ac & dc. The model 198PV additionally meets CAT III 1500V dc for Photovoltaic Power Generation applications.

The accompanying test probe assembly meets IEC/EN/BSEN/CSA\_C22.2\_No./UL standards of 61010-031 Ed. 2.0 to the same meter ratings or better. The 61010-031 requires exposed conductive test probe tips to be  $\leq 4\text{mm}$  for CAT III & CAT IV ratings. Refer to the category markings on your probe assemblies and 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 around and removal from hazardous live conductors is permitted

## BRIEF INFORMATION ON MEASUREMENT CATEGORIES

**Measurement Category IV** is applicable to test and measuring circuits connected at the source of the building's low-voltage MAINS installation. Examples are measurements on devices installed before the main fuse or circuit breaker in the building installation.

**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 meters), circuit-breakers, cables, bus-bars, junction boxes, switches, socket-outlets, stationary motors in the fixed installation, and equipment for industrial use.

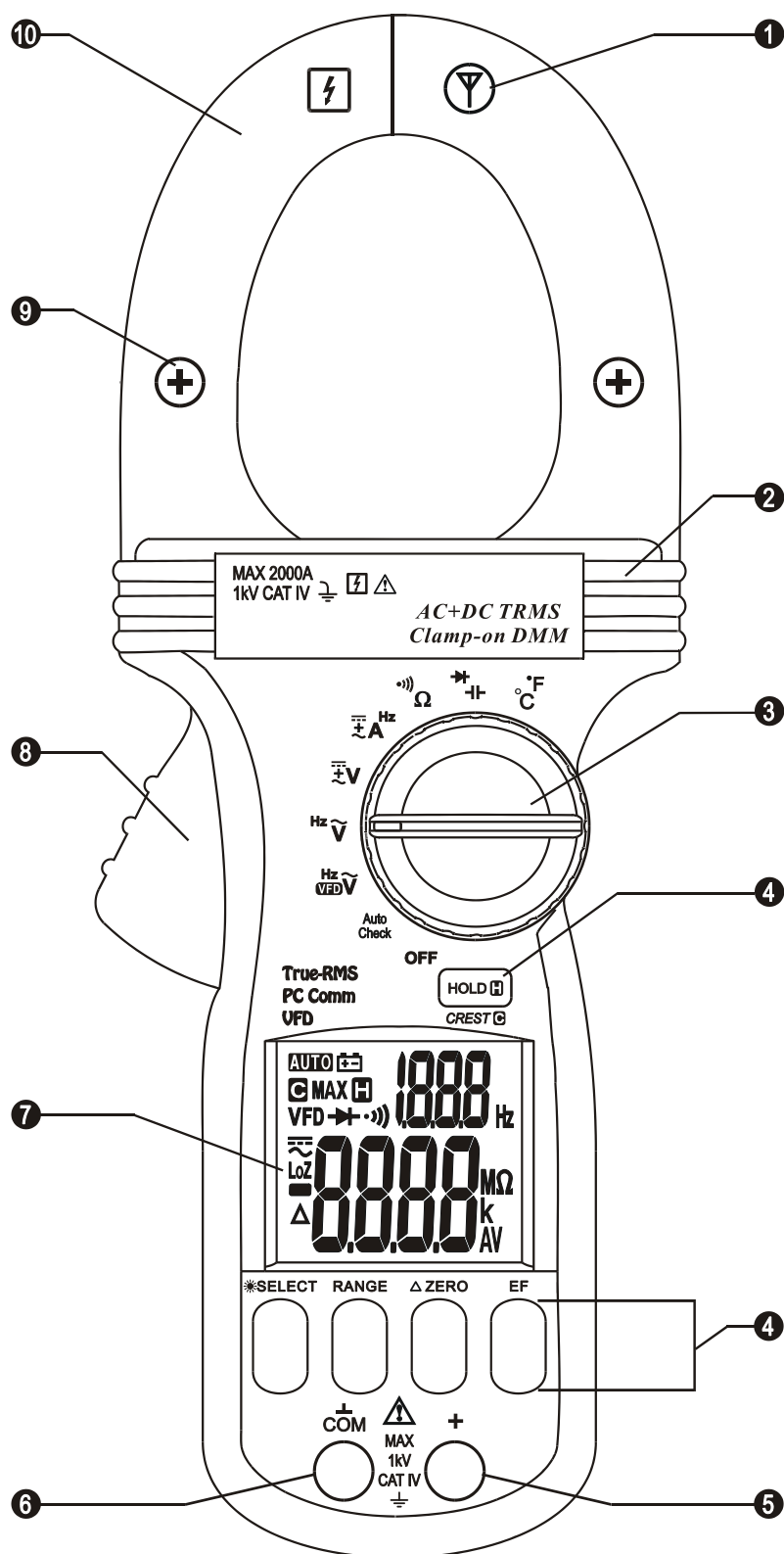
**Measurement Category II** is applicable to test and measuring circuits connected directly to utilization points (socket outlets and similar points) of the low-voltage MAINS installation. Examples are measurements on MAINS CIRCUITS of household appliances, portable tools and similar equipment.

## 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.

### 3) PRODUCT DESCRIPTION

This user's manual uses only a representative model (Model 197) for illustrations. Please refer to specification details for function availability to different models.



1) Antenna for Non-Contact EF-Detection

2) Hand/Finger Barrier to indicate the limits of safe access of the meter during a measurement

3) Rotary-switch Selector to turn the power ON/OFF and Select a function

4) Push-buttons for special functions & features.

5) Input Jack for all functions EXCEPT non-invasive DCA & ACA current functions

6) Common (Ground reference) Input Jack for all functions EXCEPT non-invasive DCA & ACA current functions

7) 3-5/6 digits 6000 counts & 3-1/2 digits 2000 counts dual numeric LCD display

8) Jaw trigger for opening the clamp jaw

9) Jaw center (& DCA polarity) Indicator, at where best DCA & ACA accuracy is specified

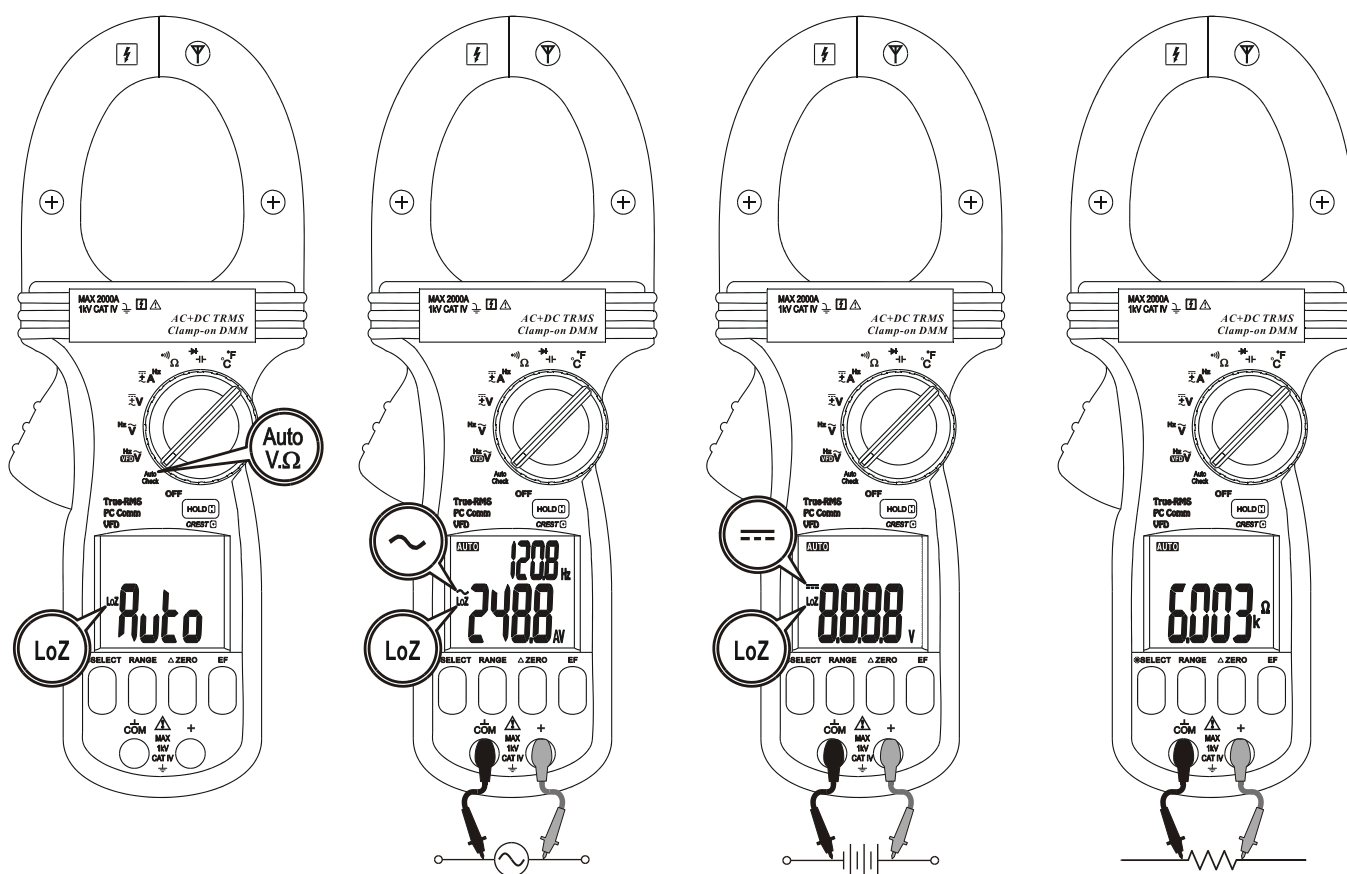
10) Hall-effect Clamp Jaw for AC & DC current magnetic field pick up

## 4) OPERATION

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

### AutoCheck™ mode (Models 197 & 195 only)

This innovative **AutoCheck™** feature automatically selects the measurement function of **ACV<sup>Hz</sup>**, **DCV**, or **Resistance ( $\Omega$ )** based on the input via test leads.



- With no input, the meter displays “**Auto**” when it is ready.
- With no voltage signal but a resistance below  $10\text{M}\Omega$  (nominal) is present, the meter displays the resistance value. When the resistance is below the “Audible Threshold”, the meter further gives a continuity beep tone.
- When a signal above the voltage threshold of  $1.5\text{V}$  DC or AC up to the rated  $1000\text{V}$  is present, the meter displays the voltage value in appropriate DCV or ACV, whichever is larger in peak magnitude.

### Note:

**\*Range-Lock and Function-Lock Feature:** When a measurement reading is being displayed in **AutoCheck™** mode, press the **RANGE** or **SELECT** button momentarily 1 time can lock the range or function it was in. Press the button momentarily repeatedly

to step through the ranges or functions.

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

**\*Ghost-voltage Buster:** Ghost-voltages are unwanted stray signals coupled from adjacent hard signals, which confuse common multimeter voltage measurements. Our AutoCheck™ mode provides low (ramp-up) input impedance (approx. 2.5kΩ at low voltage) to drain ghost voltages leaving mainly hard signal values on meter readings. It is an invaluable feature for precise indication of hard signals, such as distinguishing between hot and open wires (to ground) in electrical installation applications.

**Note:**

**AutoCheck™** mode input impedance increases abruptly from an initial 2.5kΩ to a few hundred kΩ's on high voltage hard signals. "**LoZ**" displays on the LCD to remind the users of being in such low impedance mode. Peak initial load current, while probing 1000VAC for example, can be up to 566mA ( $1000V \times 1.414 / 2.5k\Omega$ ), decreasing abruptly to approx. 3.37mA ( $1000V \times 1.414 / 420k\Omega$ ) within a fraction of a second. Do not use AutoCheck™ mode on circuits that could be damaged by such low input impedance. Instead, use rotary-switch selector  $\tilde{V}$  or  $\overline{V}$  high input impedance voltage modes to minimize loading for such circuits.

## **VFD-ACV<sup>Hz</sup> & ACV<sup>Hz</sup> functions**

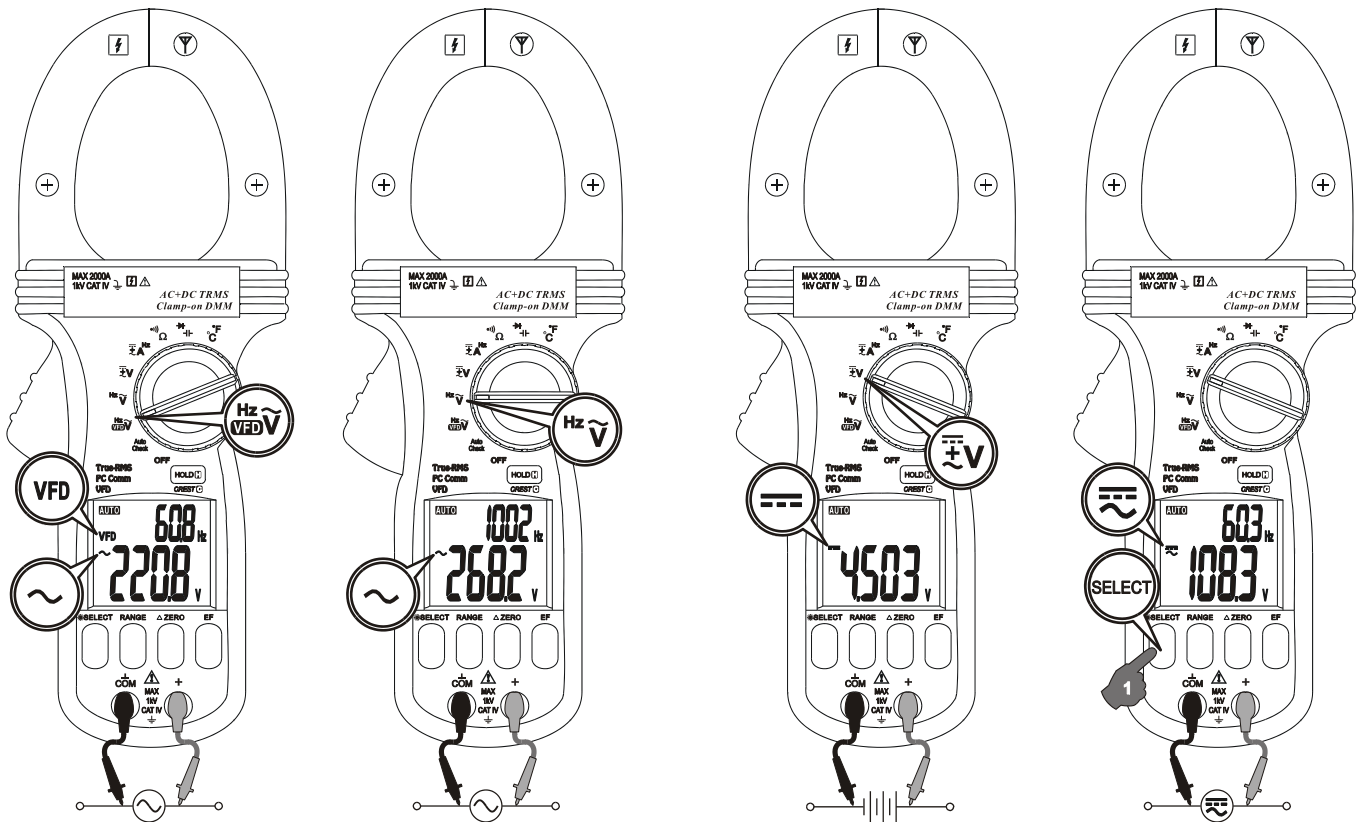
Inputs are made through the test lead terminals.

**VFD-ACV<sup>Hz</sup>** function is to deal with VFD (Variable Frequency Device) signals. It, however, further pre-selects the most appropriate voltage ranges and thus the Hz trigger levels to best cope with most VFD-Voltage and VFD-Frequency applications.

**Note:** The Hz trigger level is determined by the **AC/DC+AC Voltage or Current** function range being in use. Press **RANGE** button to select different function ranges and thus trigger levels manually.

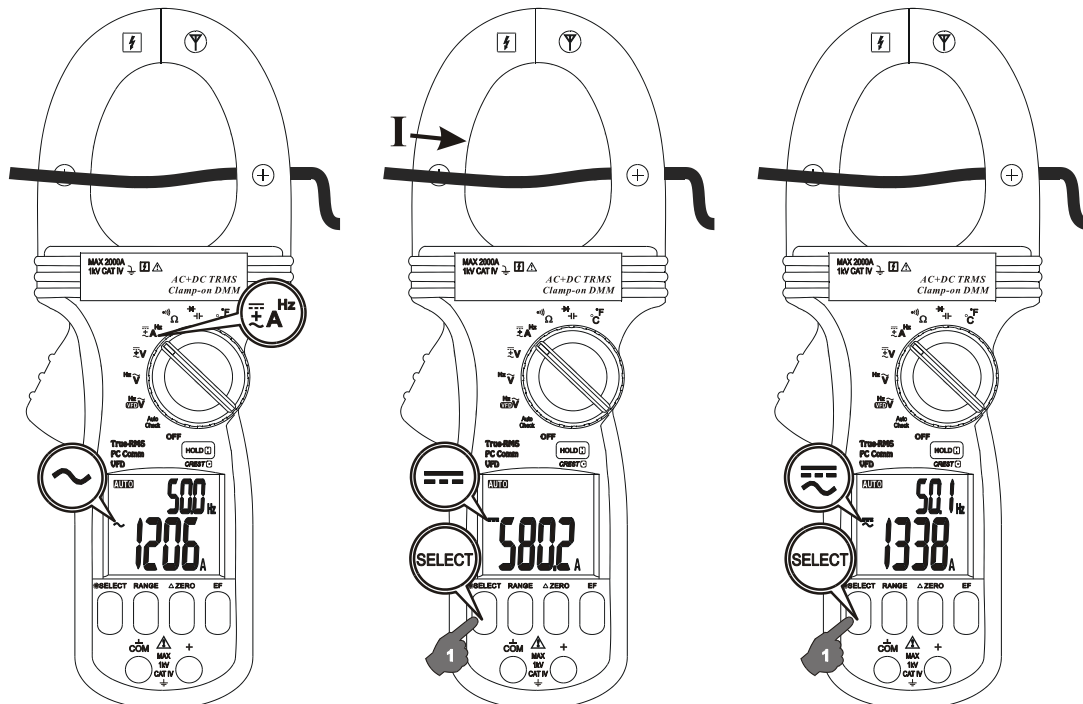
## **DCV & DC+ACV<sup>Hz</sup> (Models 198PV & 197 only) functions**

Inputs are made through the test lead terminals. Defaults at **DCV** Function. Press **SELECT** button momentarily and release to select **DC+ACV<sup>Hz</sup>**.



## ACA $\text{Hz}$ , DCA & DC+ACA $\text{Hz}$ (Models 198PV & 197 only) functions

Input is made through the clamp jaws for non-invasive current measurements. Defaults at **ACA  $\text{Hz}$**  Function. Press **SELECT** button momentarily and release to select the subject functions in sequence.



**Note:** *(Application and removal of the Clamp-on meter)*

For non-invasive current measurements, press the jaw trigger and clamp the jaws around conductor(s) of only one single pole of a circuit for load current measurement. Make sure the jaws are completely closed, or else it will introduce measurement errors. Enclosing conductor(s) of more than one pole of a circuit may result in differential current (like identifying leakage current) measurement. Locate the conductor(s) at the Jaws center as much as possible to get the best measuring accuracy. For removal, press the jaw trigger and remove the jaws from the conductor(s).

Adjacent current-carrying devices such as transformers, motors, and conductor wires will affect measurement accuracy. Keep the jaws away from them as much as possible to minimize influence.

**Note:**

*Do not use the meter to measure currents above the rated frequency (400Hz). Circulating currents may cause the magnetic circuits of the Jaws to reach a hazardous temperature.*

**Ω Resistance &  $\rightarrow$ ) Continuity functions**

Inputs are made through the test lead terminals. Defaults at **Ω Resistance**. Press **SELECT** button momentarily and release to select.  **$\rightarrow$ ) Continuity**

 **$\leftarrow$  Capacitance &  $\rightarrow$  Diode functions**

Inputs are made through the test lead terminals. Defaults at  **$\leftarrow$  Capacitance**. Press **SELECT** button momentarily and release to select  **$\rightarrow$  Diode**.

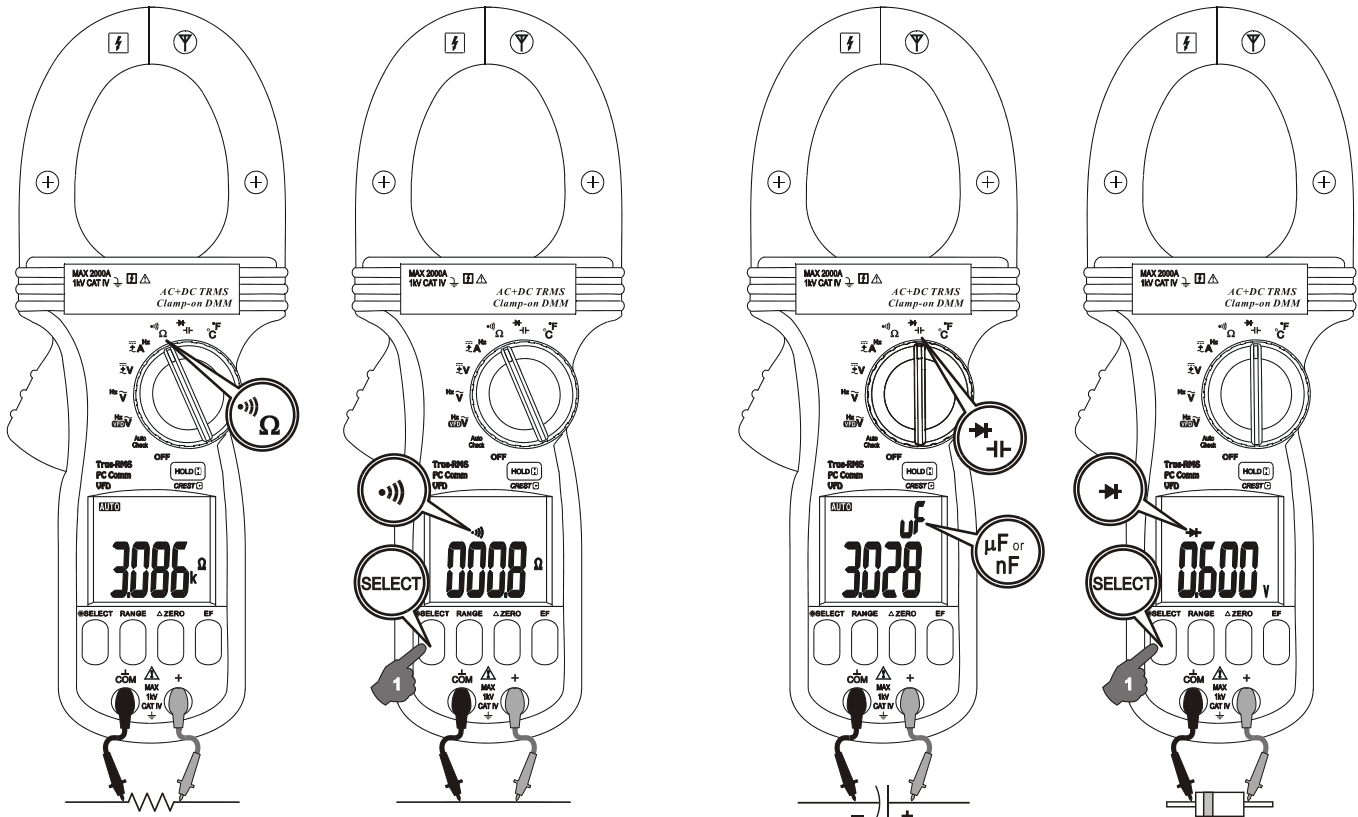
**Note:**

*When using Diode test function, 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). 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).*

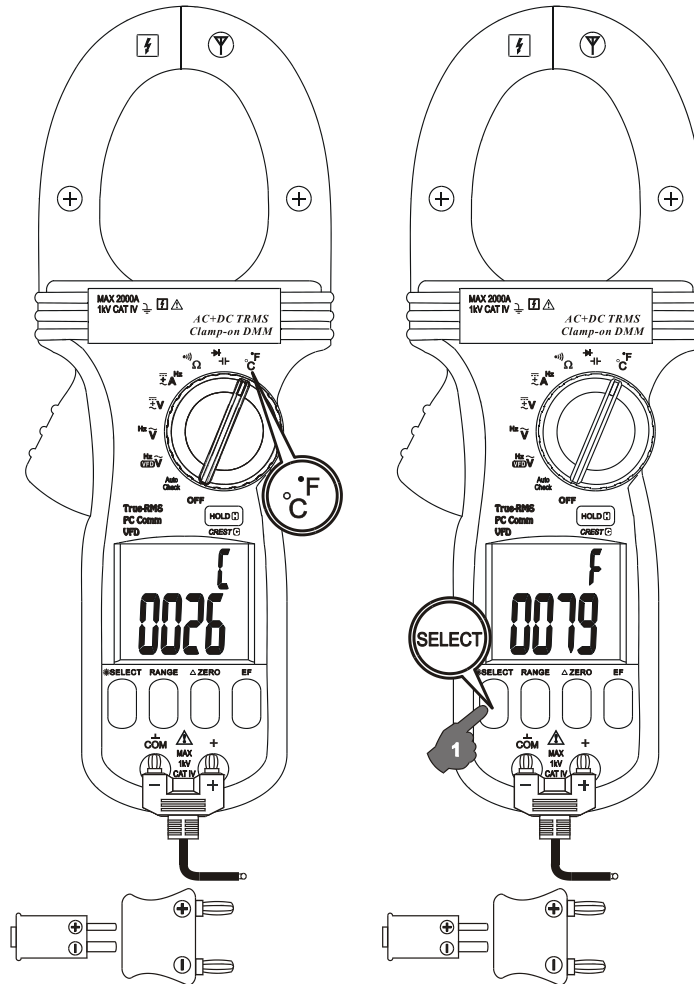
**Note:**

*1. Using Resistance, Continuity, Diode, or Capacitance function in a live circuit will produce false results and may damage the meter. In many cases, the suspected component(s) must be disconnected from the circuit to obtain an accurate measurement reading.*

2. When using Capacitance function, discharge capacitor(s) before making any measurements. Large value capacitors should be discharged through an appropriate resistance load



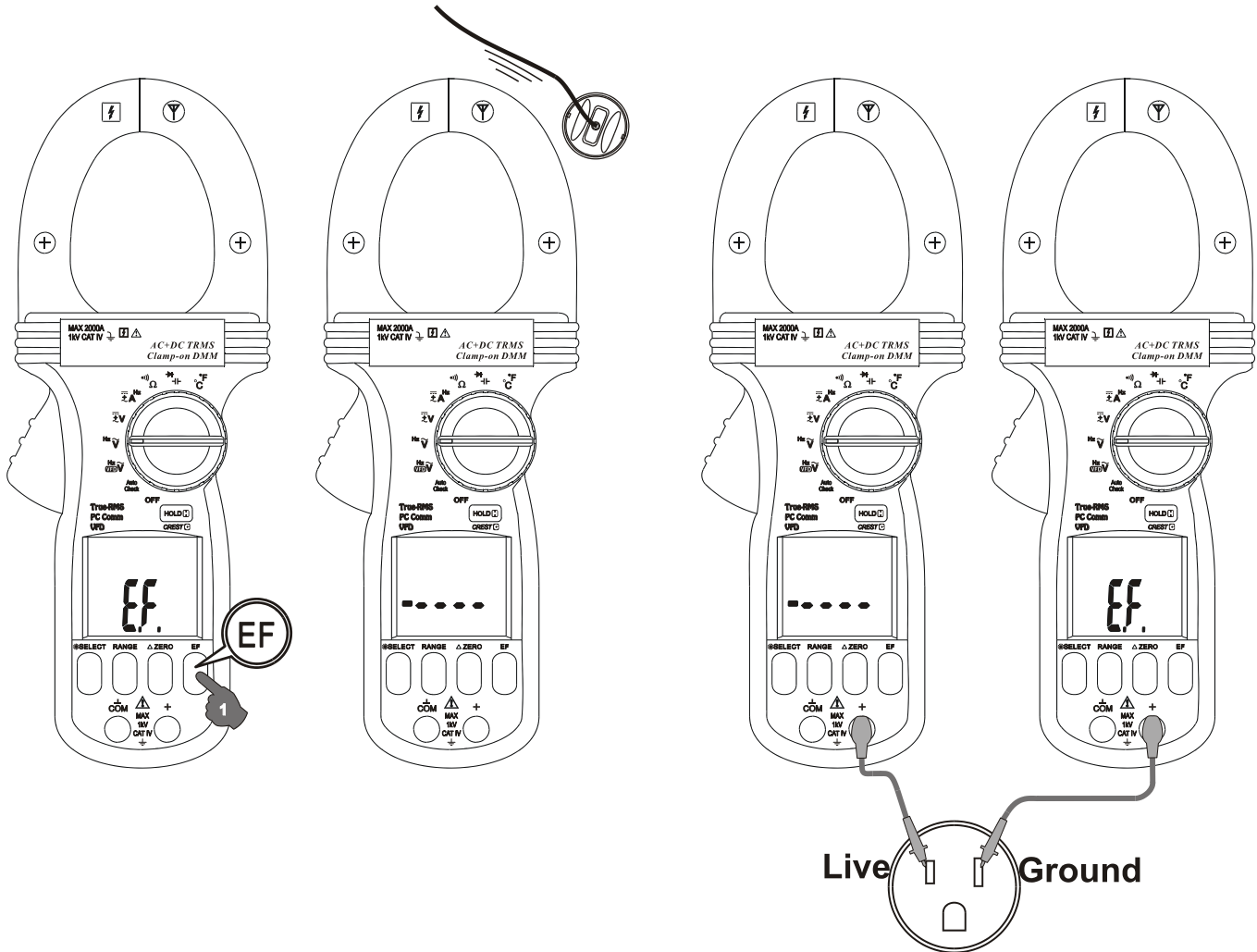
## Temperature function (Models 198PV & 197 only)



Defaults at **°C** (Celsius) readings. Press **SELECT** button momentarily and release to select **°F** (Fahrenheit) readings. Inputs are made through the test lead terminals. Be sure to insert the banana plug type-K temperature bead probe Bkp60 with correct **+** **-** polarities. You can also use a plug adapter Bkb32 (Optional purchase) with banana pins to a type-K socket to adapt other type-K standard mini-plug temperature probes.

## Electric Field EF-Detection

In Voltage or Current function, press the EF button momentarily and release to toggle to EF-Detection feature. The meter displays “E.F.” when it is ready. Signal strength is indicated as a series of bar-graph segments on the display together with variable beep tones.



- **Non-Contact EF-Detection:** An antenna is located along the top-right end of the clamp jaw, which detects the electric field surrounds energized conductors. It is ideal for tracing live wiring connections, locating wiring breakage, and distinguishing between live or earth connections.

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

## PC computer interface capabilities

The instrument equips with an optical isolated interface port at the meter back for data communication. Optional purchase PC interface kit BRUA-19X is required to connect

the meter to the PC computer RS232 or USB ports. *Press and hold the **HOLD** button while turning the meter on to enable meter PC-COMM output.*

## Hold

The hold feature freezes the display for later views. Press the **HOLD** button momentarily and release to toggle the hold feature.

## 5ms CREST-MAX capture mode

Press **CREST** (HOLD) button for one second or more and release to activate CREST-MAX capture (Instantaneous Peak-Hold) mode to capture signal peaks of voltage or current in duration as short as 5ms. The LCD “**C**” & “**MAX**” turn on. Press again the button momentarily and release can toggle the combination use of the HOLD feature. Press the button for 1 second or more and release to exit CREST-MAX capture mode. Auto-ranging and Auto-Power-Off are disabled automatically in this mode.

## Backlight LCD display (Models 198PV & 197 only)

Press the **SELECT** button for 1 second or more to toggle the LCD backlight. The backlight will also be turned off automatically after 32 seconds to extend battery life.

## Relative-Zero ( $\Delta$ ) mode

Relative-Zero allows the user to offset the meter consecutive measurements with the main display displaying reading as the reference value. Press the **REL** button momentarily and release to toggle Relative-Zero mode.

## Manual or Auto-ranging

Press the **RANGE** button momentarily and release to select manual-ranging, and the meter will remain in the range it was in, the LCD **AUTO** turns off. Press the button again to step through the ranges. Press and hold the button for 1 second or more and release to resume auto-ranging.

Note: Manual-ranging feature is not available in **Hz** and **II** function ranges.

## Set Beeper Off

Press the **RANGE** button while turning the meter on to temporarily disable the Beeper feature. Turn the rotary switch OFF and then back on to resume.

## Auto-Power-Off (APO)

The Auto-Power-Off (APO) mode turns the meter off automatically to extend battery life after approximately 34 minutes of no rotary switch or push-button operations. To wake up the meter from APO, press the **SELECT** button momentarily and release or turn the rotary switch OFF and then back on. Always turn the rotary switch to the OFF position when the meter is not in use.

### **Disabling Auto-Power-Off**

Press and hold the **SELECT** button while turning the meter on to temporarily disable the Auto-Power-Off (APO) feature. Turn the rotary switch OFF and then back on to resume.

## **5) MAINTENANCE**

### **Note:**

To avoid electrical shock, disconnect the meter from any circuit, remove the test leads from the input jacks and turn OFF the meter before opening the case. Do not operate with an open case.

### **Trouble Shooting**

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

If the instrument voltage-resistance input terminal has been subjected to high voltage transient (caused by lightning or switching surge to the system under test) by accident or abnormal conditions of operation, the protective impedance components in series might be blown off (become high impedance) like fuses to protect the user and the instrument. Most measuring functions through this terminal will then be open-circuited. Such components should then be replaced by qualified technicians. Refer to the LIMITED WARRANTY section for obtaining a warranty or repairing service.


### **Accuracy and Calibration**

Accuracy is specified for a period of one year after calibration. Periodic calibration at intervals of one year is recommended to maintain meter accuracy. Refer to the LIMITED WARRANTY section for obtaining calibration, repairing, or warranty service.

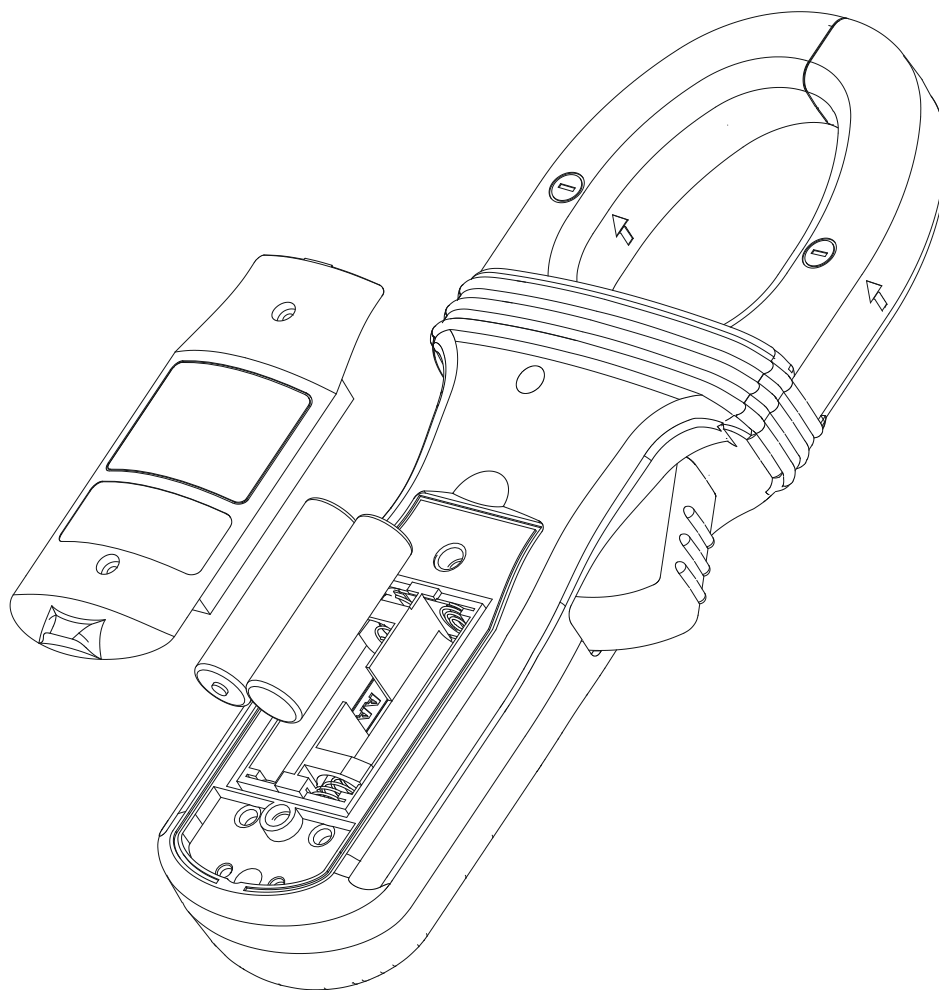
### **Cleaning and Storage**

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 batteries and store them separately.

### **Battery replacement**

When the low battery icon  turns on, the meter accuracy and performance cannot be guaranteed. The meter shuts off accordingly. Replace with new batteries to ensure

accuracy. The meter uses standard 1.5V AA Size (IEC LR6) battery X 2  
Loosen the 2 captive screws from the battery cover case. Lift the battery cover case.  
Replace the batteries. Replace the battery cover case. Re-fasten the screws.



## GENERAL SPECIFICATIONS

**Display:** 3-5/6 digits 6000 counts & 3-1/2 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  $0.15 \times (\text{specified accuracy})/^\circ\text{C}$  @ (0°C -- 18°C or 28°C -- 40°C), or otherwise specified

**Sensing:** Average sensing for model 195; True RMS for models 197 & 198PV

**Safety:** All meter models meet IEC/EN/BSEN/CSA\_C22.2\_No./UL standards of 61010-1 Ed. 3.1 & 61010-2-032 Ed. 4.0 to Measurement Categories CAT IV 1000V ac & dc. The model 198PV additionally meets CAT III 1500Vdc

**Transient Protection:** 12kV (1.2/50μs surge)

### Overload Protections:

Clamp-on jaws: 2000A DC/AC rms continuous

Models 197 & 195 only:

Voltage via terminals: 1100Vdc/Vac rms

Other functions via terminals: 1000Vdc/Vac rms

Model 198PV only:

Voltage via terminals: 1650Vdc / 1100Vac rms

Other functions via terminals: 1500Vdc / 1000Vac rms

**E.M.C.:** Meets EN61326-1:2013

In an RF field of 3V/m:


Capacitance function is not specified

Other function ranges: Total Accuracy = Specified Accuracy + 200 digits

Performance above 3V/m is not specified

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

**Power Consumption:** Typical 14mA for Current functions and 5.2mA for others

**Low Battery:**  Appears at approx. <2.4V where the meter accuracy cannot be guaranteed. The meter shuts off accordingly.

**APO Timing:** Idle for 34 minutes

**APO Consumption:** 10μA typical

**Dimension:** L264mm X W97mm X H43mm

**Weight:** 608 gm

**Jaw opening & Conductor diameter:** 55mm max

**Accessories:** Test leads (pair), user's manual, Bkp60 banana plug K-type thermocouple x 1

(Models 198PV & 197 only), Soft carrying pouch

**Optional purchase accessories:** USB interface kit BRUA-19X; BKB32 banana plug to type-K socket plug adaptor (Models 198PV & 197 only)

**Special Features:** AutoCheck™ V& $\Omega$  (Models 197 & 195 only); VFD-V & VFD-Hz; Backlighted LCD (Models 198PV & 197 only); 5ms CREST-MAX Capture mode (Peak Hold); Auto-ranging Relative-Zero mode; Display Hold; EF-Detection (NCV); Optional Interface capabilities with PC computers

### Electrical Specifications

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

True RMS models (198PV & 197) ACV, DC+ACV, ACA & DC+ACA accuracies are specified from 5 % to 100 % of range or otherwise specified. Maximum Crest Factor < 1.4 : 1 at full scale & < 2.8 : 1 at half scale, and with frequency components fall within the specified frequency bandwidth for non-sinusoidal waveforms.

### DC Voltage

RANGE	Accuracy
6.000V, 60.00V, 600.0V & 1000V	0.5%+5d
>1000V ~ 1500V <sup>1)</sup>	0.5%+5d

<sup>1)</sup>Model 198PV only

Input Impedance: 10M $\Omega$ , 50 pF nominal

### AutoCheck\_DCV (Models 197 & 195 only)

RANGE	Accuracy <sup>1)</sup>
6.000V, 60.00V, 600.0V & 1000V	1.3% + 5d

<sup>1)</sup>Not specified at  $\leq 1.5\text{VDC}$

Threshold:

> +1.5VDC or < -1.5VDC nominal

Approximate input impedance ( //600pF )  
for reference:

At direct input  $\leq 50\text{Vdc}$  (typical) from  
quiescence:

>8M $\Omega$  @ < 8Vdc (Protection clamping  
threshold)

25k $\Omega$  @ 9Vdc

13k $\Omega$  @ 10Vdc

2.8k $\Omega$  @ 50Vdc

At direct input  $\gg 50\text{V}$  (typical) from  
quiescence:

Initial impedance is approximately  
2.5k $\Omega$ . Impedance increases abruptly  
within a fraction of a second as  
display voltage (hard signal) is much  
higher than 50V (typical). End-up  
impedances vs display voltages  
typically are:

10k $\Omega$  @100V

60k $\Omega$  @300V

200k $\Omega$  @600V

420k $\Omega$  @1000V

### AC Voltage

RANGE	Accuracy
50Hz ~ 400Hz	
6.000V, 60.00V, 600.0V & 1000V	1.2% + 5d

Input Impedance: 10M $\Omega$ , 50 pF nominal

**AC+DC Voltage (Models 198PV & 197 only)**

RANGE	Accuracy
DC, 50Hz ~ 400Hz	
6.000V, 60.00V, 600.0V & 1000V	1.4% + 7d

Input Impedance: 10M $\Omega$ , 50 pF nominal

**AutoCheck\_ACV (Models 197 & 195 only)**

RANGE	Accuracy <sup>1)</sup>
50Hz ~ 60Hz	
6.000V, 60.00V, 600.0V & 1000V	1.5%+5d

<sup>1)</sup>Not specified at  $\leq 1.5\text{VAC}$

Threshold: > 1.5VAC nominal

Approximate input impedance ( //600pF )  
for reference:

At direct input  $\leq 50\text{Vac}$  (typical) from  
quiescence:

>8M $\Omega$  @ < 5.6Vac

22k $\Omega$  @ 7Vac

12k $\Omega$  @ 8Vac

2.8k $\Omega$  @ 50Vac

At direct input  $>> 50\text{V}$  (typical) from  
quiescence:

Initial impedance is approximately  
2.5k $\Omega$ . Impedance increases abruptly  
within a fraction of a second as  
display voltage (hard signal) is much  
higher than 50V (typical). End-up  
impedances vs display voltages  
typically are:

10k $\Omega$  @100V

60k $\Omega$  @300V

200k $\Omega$  @600V

420k $\Omega$  @1000V

**VFD\_ACV (with Low Pass Filter )**

RANGE	Accuracy <sup>1)</sup>
10Hz ~ 20Hz	
6.000V, 60.00V, 600.0V & 1000V	4%+80d
20Hz ~ 200Hz	
6.000V, 60.00V, 600.0V & 1000V	2%+60d
200Hz - 400Hz <sup>2)</sup>	
6.000V, 60.00V, 600.0V & 1000V	7%+80d

<sup>1)</sup>Not specified for fundamental frequency > 400Hz

<sup>2)</sup>Accuracy linearly decreases from 2% + 60d @ 200Hz to 7% + 80d @ 400Hz

**CREST-MAX Capture Mode**

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

**Ohm & AutoCheck™\_Ohm <sup>1)</sup>**

RANGE	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™ (Models 197 & 195 only)

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, 6.000μF	2.0%+5d
60.00μF, 600.0uF	3.5%+5d <sup>2)</sup>
2000μF	4.0%+5d <sup>2)</sup>

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

<sup>2)</sup>Temperature Coefficient: 0.25 x (specified accuracy)/ °C @ (0°C -- 18°C or 28°C -- 40°C)

**Diode Tester**

RANGE	Accuracy
1.000V	1.0% + 3d

Test Current: 0.56mA typically

Open Circuit Voltage: < 1.8VDC typically

**DCA Current (Clamp on)**

RANGE	Accuracy <sup>1) 2)</sup>
200.0A	2.0%+5d
0~500A	2.0%+5d
500~2000A	3.0%+5d

<sup>1)</sup>Induced error from adjacent current-carrying conductor: <0.1A/A

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

**Temperature (Models 198PV & 197 only)**

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

K-type thermocouple range & accuracy not included

**ACA Current (Clamp on)**

RANGE	Accuracy <sup>1)</sup>
50Hz ~ 60Hz	
200.0A	2.0%+5d
0~500A	2.5%+5d
500~2000A	3.0%+5d
40Hz ~ 50Hz & 60Hz ~ 400Hz	
200.0A	2.5%+5d
0~500A	3.0%+5d
500~1000A	3.5%+5d
1000~2000A	unspecified

True RMS Crest Factor (Models 198PV & 197 only):

< 1.4 : 1 at full scale & < 2.8: 1 at half scale

<sup>1)</sup>Induced error from adjacent current-carrying conductor: < 0.1A/A

**DC+ACA Current (Clamp on)  
(Models 198PV & 197 only)**

RANGE	Accuracy <sup>1) 2)</sup>
DC, 50Hz ~ 60Hz	
200.0A, 2000A	3.0%+8d
40Hz ~ 50Hz & 60Hz ~ 400Hz	
200.0A	3.5%+8d
0~1000A	3.5%+8d
1000~2000A	unspecified

True RMS Crest Factor:

< 1.4 : 1 at full scale & < 2.8 : 1 at half scale

<sup>1)</sup>Induced error from adjacent current-carrying conductor: < 0.1A/A

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

### Hz Line Level Frequency

Function	Sensitivity (Sine RMS)	Range
6V	2V <sup>2)</sup>	40Hz ~ 1999Hz
60V	20V <sup>2)</sup>	40Hz ~ 1999Hz
600V	100V <sup>2)</sup>	40Hz ~ 1999Hz
1000V	600V <sup>3)</sup>	40Hz ~ 1999Hz
200A	10A <sup>2)</sup>	20Hz ~ 400Hz
2000A	100A <sup>2)</sup>	20Hz ~ 400Hz
VFD 6V <sup>1)</sup>	0.6V~2.4V <sup>2)</sup>	10Hz ~ 400Hz
VFD 60V <sup>1)</sup>	6~24V <sup>2)</sup>	10Hz ~ 400Hz
VFD 600V <sup>1)</sup>	60V~240V <sup>2)</sup>	10Hz ~ 400Hz

Accuracy: 0.1%+4d

<sup>1)</sup>VFD sensitivity linearly decreases from  
10% F.S. @ 200Hz to 40% F.S. @ 400Hz

<sup>2)</sup>DC-bias, if any, not more than 50% of Sine  
RMS

<sup>3)</sup>DC-bias, if any, not more than 100V

### Non-Contact EF-Detection

Typical Voltage	Bar- Graph Indication
89V (tolerance: 12V ~ 165V)	-
177V (tolerance: 81V ~ 272V)	- - -
589V (tolerance: 178V ~ 1000V)	- - - - -

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 indications of live wires, such as  
distinguishing between live and ground  
connections, use the Red (+) test probe for  
direct contact measurement

## 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 an accident or abnormal condition 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 an accident or abnormal condition of operation or handling, you will be billed for the repair.

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