

USER'S MANUAL

BM905s
BM906s
BM907s

Versatile Multimeters



1) SAFETY

Terms in this manual

WARNING identifies conditions and actions that could result in serious injury or even death to the user.

CAUTION identifies conditions and actions that could cause damage or malfunction in the instrument.

This manual contains information and warnings that must be followed for operating the instrument safely and maintaining the instrument in a safe operating condition. If the instrument is used in a manner not specified by the manufacturer, the protection provided by the instrument may be impaired. The meter is intended only for indoor use.

The meter protection rating, against the users, is double insulation per IEC/UL/EN61010-1 Ed. 3.0, IEC/EN61010-2-030 Ed. 1.0, IEC/EN61010-2-033 Ed. 1.0, IEC/UL/EN61010-031 Ed. 1.1 and CAN/CSA-C22.2 No. 61010-1-12 Ed. 3.0 to Category II 1000 Volts, CAT III 600Volts and CAT IV 300Volts AC & DC.

Terminals (to COM) measurement category:

V / A / mA μ A: Category II 1000V, Category III 600V and Category IV 300V AC & DC.

Per IEC61010-1 2nd Ed. (2001) Measurement Category

Measurement Category IV (CAT IV) is for measurements performed at the source of the low-voltage installation. Examples are electricity meters and measurements on primary overcurrent protection devices and ripple control units.

Measurement Category III (CAT III) is for measurements performed in the building installation. Examples are measurements on distribution boards, circuit-breakers, wiring, including cables, bus-bars, junction boxes, switches, socket-outlets in the fixed installation, and equipment for industrial use and some other equipment, for example, stationary motors with permanent connection to the fixed installation.

Measurement Category II (CAT II) is for measurements performed on circuits directly connected to the low voltage installation. Examples are measurements on household appliances, portable tools and similar equipment.

WARNING

To reduce the risk of fire or electric shock, do not expose this product to rain or moisture. To avoid electrical shock hazard, observe the proper safety precautions when working with voltages above 60 VDC or 30 VAC rms. These voltage levels pose a potential shock hazard to the user. Do not touch test lead tips or the circuit being tested while power is applied to the circuit being measured. Keep your fingers behind the finger guards of the test leads during measurement. Inspect test leads, connectors, and probes for damaged insulation or exposed metal before using the instrument. If any defects are found, replace them immediately. Do not measure any current that exceeds the current rating of the protection fuse(s). Do not attempt a current measurement to any circuit where the open circuit voltage is above the protection fuse(s) voltage rating(s). Suspected open circuit voltage should be checked with voltage functions. Never attempt a voltage measurement with the test lead inserted into the $\mu\text{A}/\text{mA}$ or A input jack. Only replace the blown fuse(s) with the proper rating as specified in this manual. Only use the test lead provided with the equipment or UL Listed Probe Assembly.

CAUTION

Disconnect the test leads from the test points before changing functions. Always set the instrument to the highest range and work downward for an unknown value when using manual ranging mode.

INTERNATIONAL ELECTRICAL SYMBOLS

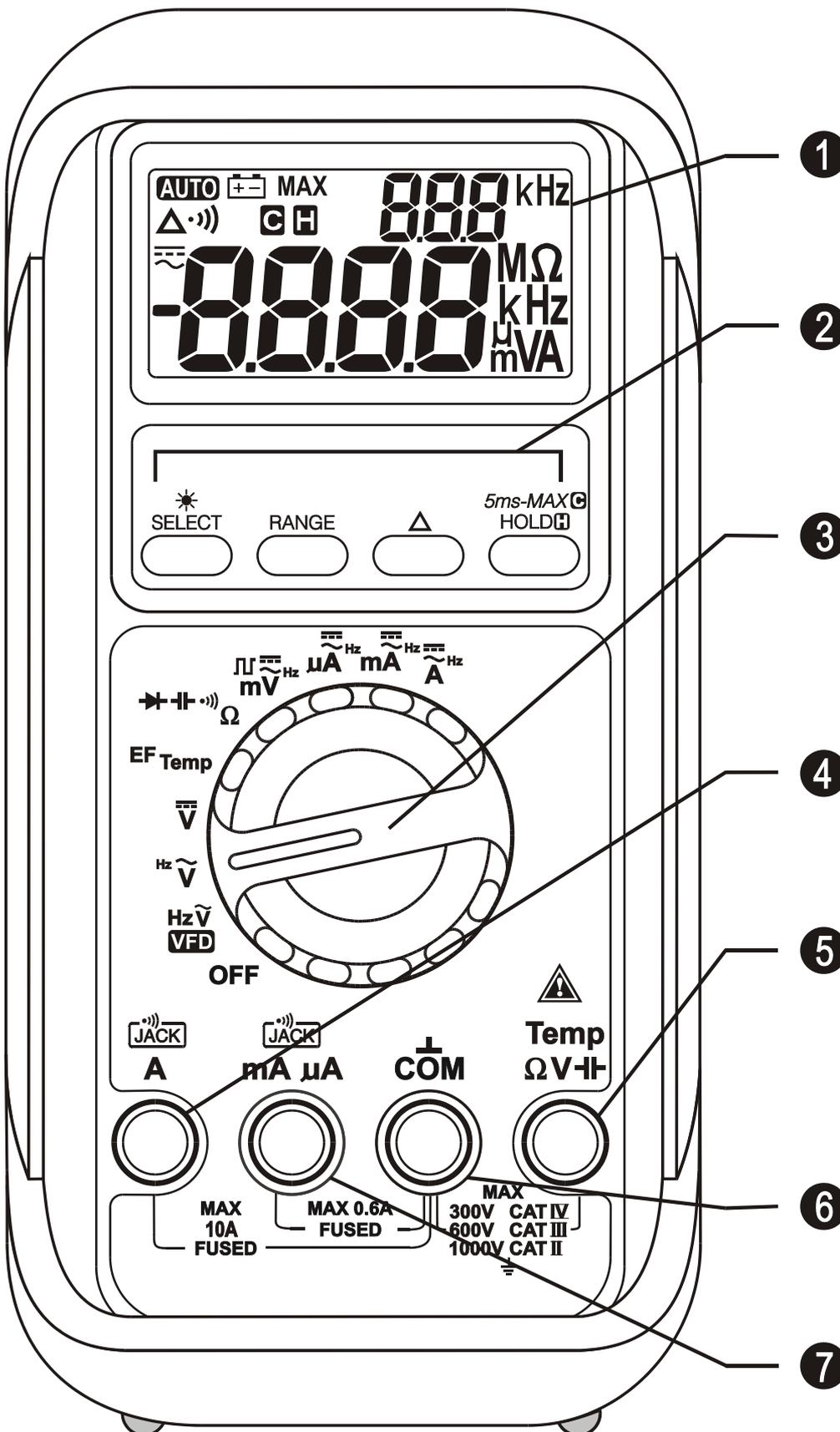
	Caution ! Refer to the explanation in this Manual
	Caution ! Risk of electric shock
	Earth (Ground)
	Double Insulation or Reinforced insulation
	Fuse
	AC--Alternating Current
	DC--Direct Current

2) CENELEC DIRECTIVES

The instruments conform to CENELEC Low-voltage directive 2006/95/EC and Electromagnetic compatibility directive 2004/108/EC

3) PRODUCT DESCRIPTION

This user's manual uses only representative model for illustrations. Please refer specification details for function availability to each model.



1) 3-5/6 digits 6000 counts + 999 counts dual display LCD

2) Push-buttons for special functions & features

3) Selector to turn the Power On or Off and select a function

4) Input Jack (+) for 10A (20A for 30sec) current function

5) Input Jack (+) for all functions *EXCEPT* current (μA , mA, A) functions

6) Common (Ground reference) Input Jack (-) for all functions

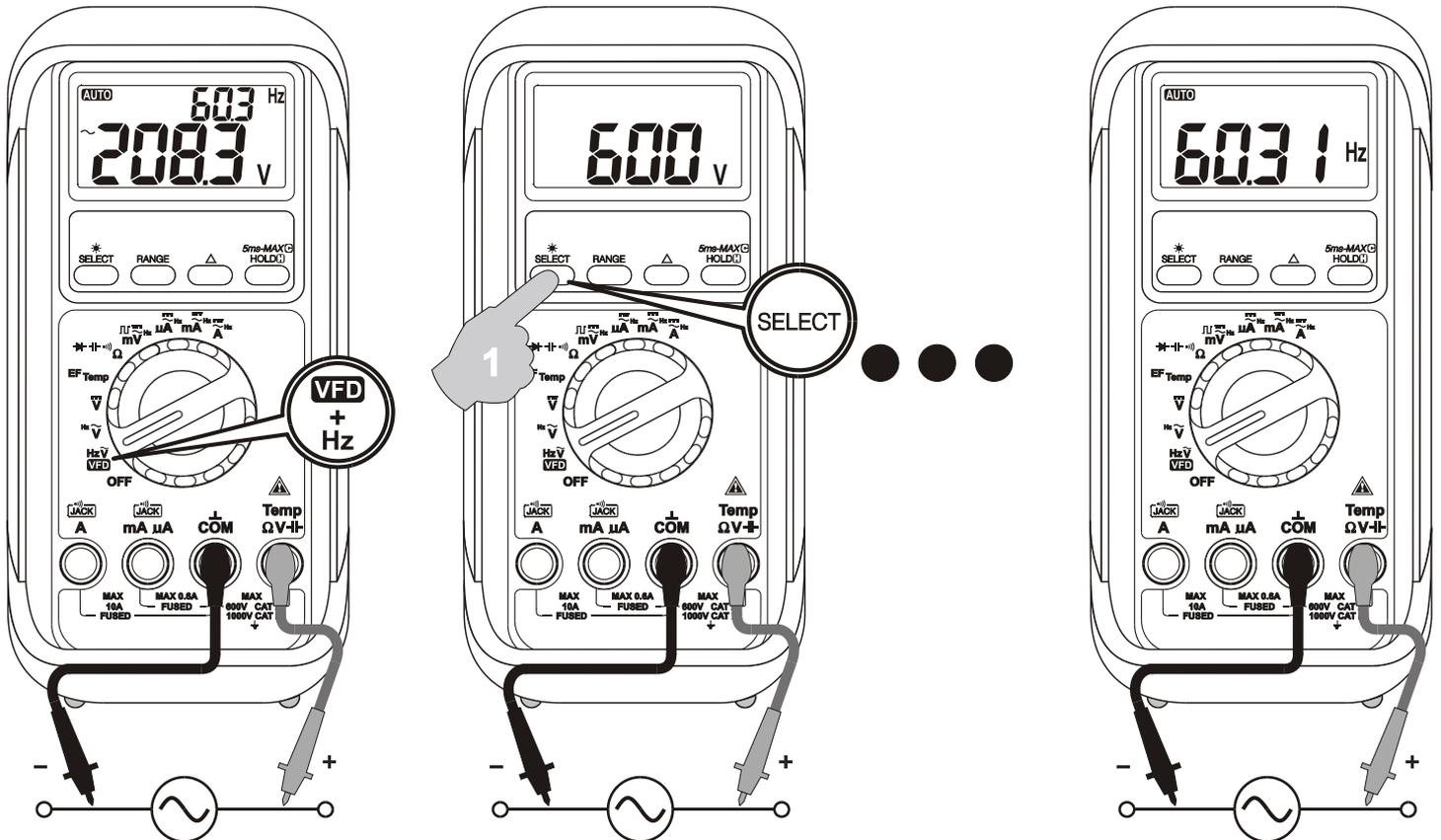
7) Input Jack (+) for milli-amp and micro-amp functions

4) OPERATION

CAUTION

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

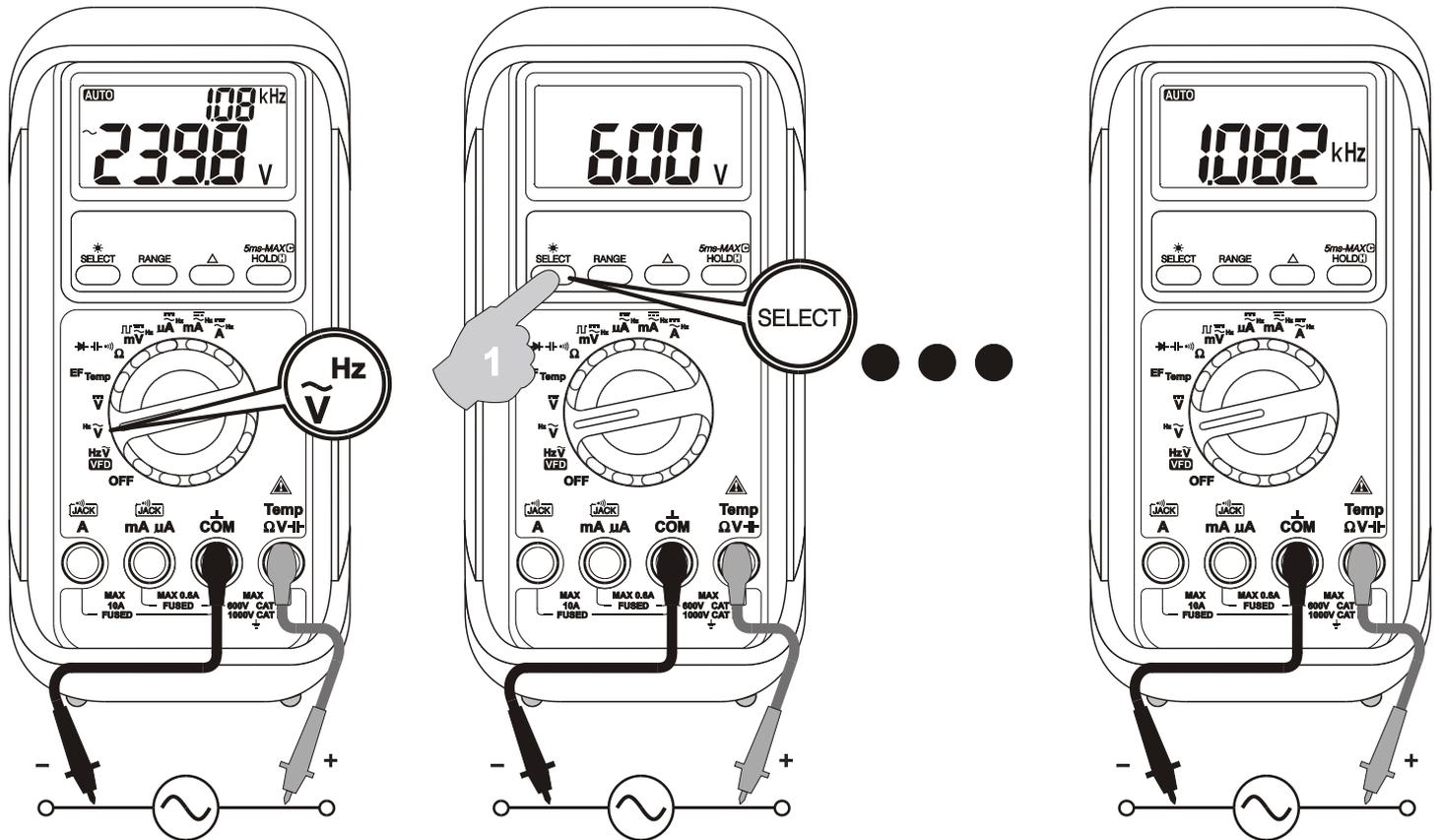
VFD-ACV ^{+Hz} & VFD-Hz (Line Level)



Function defaults at **VFD-ACV ^{+Hz}**. By default, voltage is set at 600V & 1000V two auto-ranges to best cope with most Variable Frequency Drives (VFD) measurements. High noise-rejection frequency measurement algorithm and Low-pass filter circuit are permanently bundled with all the voltage and frequency function-ranges within this rotary-switch position. Press the **RANGE** button momentarily to select other ranges only when needed.

Hz Input sensitivity varies automatically with voltage range selected. 6V range has the highest and 1000V range has the lowest. Press **SELECT** button momentarily toggles to higher resolution **VFD-Hz** in main display. The display shows the selected voltage range for about one second before displaying Hz readings. Pressing the **RANGE** button momentarily repeatedly to display and select any other voltage range. If the Hz reading becomes unstable, select higher voltage range to avoid electrical noise. If the reading shows zero, select lower voltage range for better sensitivity.

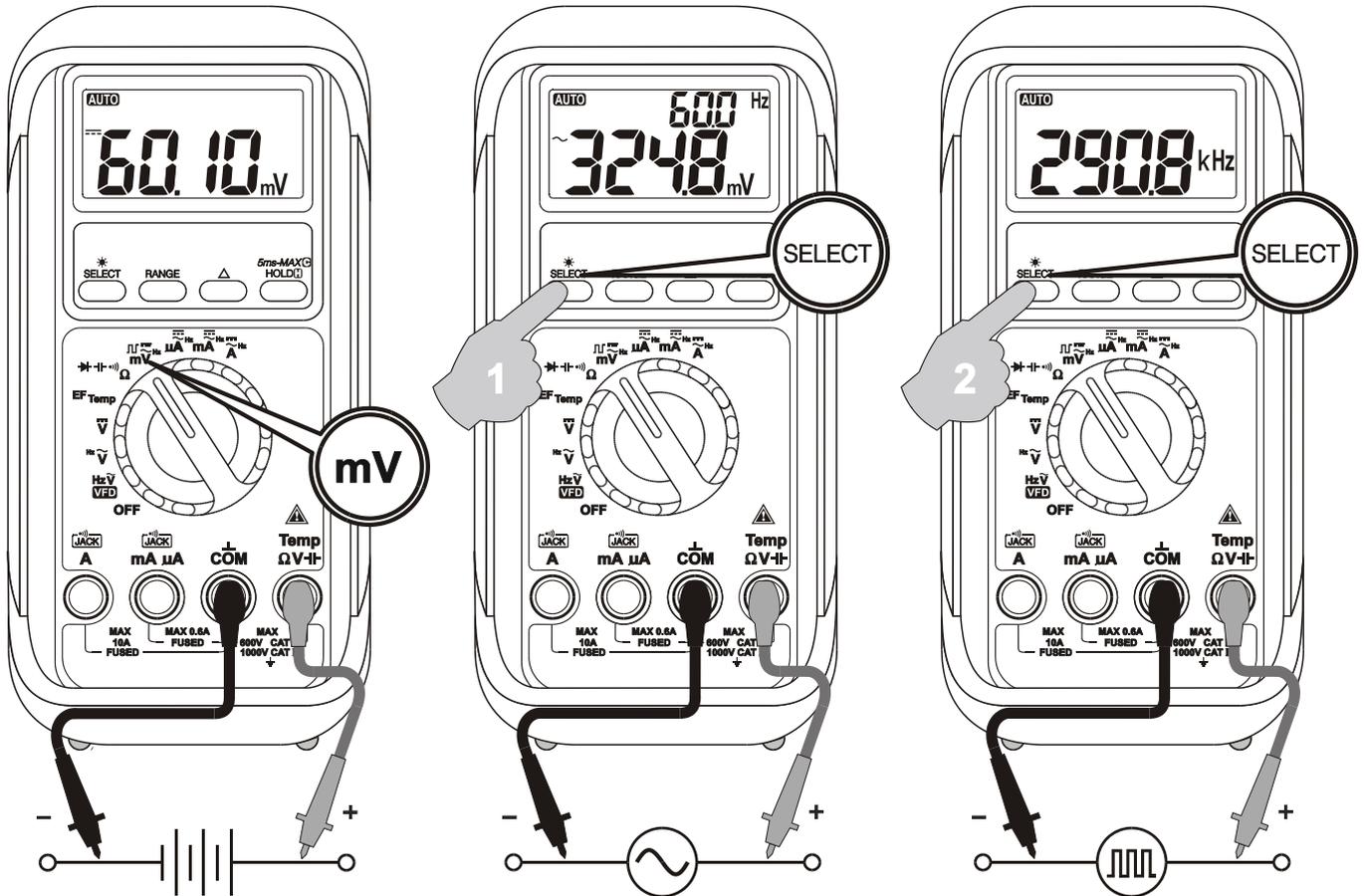
ACV ^{+Hz} & Hz (Line Level)



All the voltage and frequency function-ranges within this rotary-switch position are set at regular frequency response without employing LPF. Function defaults at **ACV ^{+Hz}**. Hz Input sensitivity varies automatically with voltage range selected. 6V range has the highest and 1000V range has the lowest. Press **SELECT** button momentarily toggles to higher resolution **Hz** in main display. The display shows the selected voltage range for about one second before displaying Hz readings. Pressing the **RANGE** button momentarily repeatedly to display and select any other voltage range. If the Hz reading becomes unstable, select higher voltage range to avoid electrical noise. If the reading shows zero, select lower voltage range for better sensitivity.

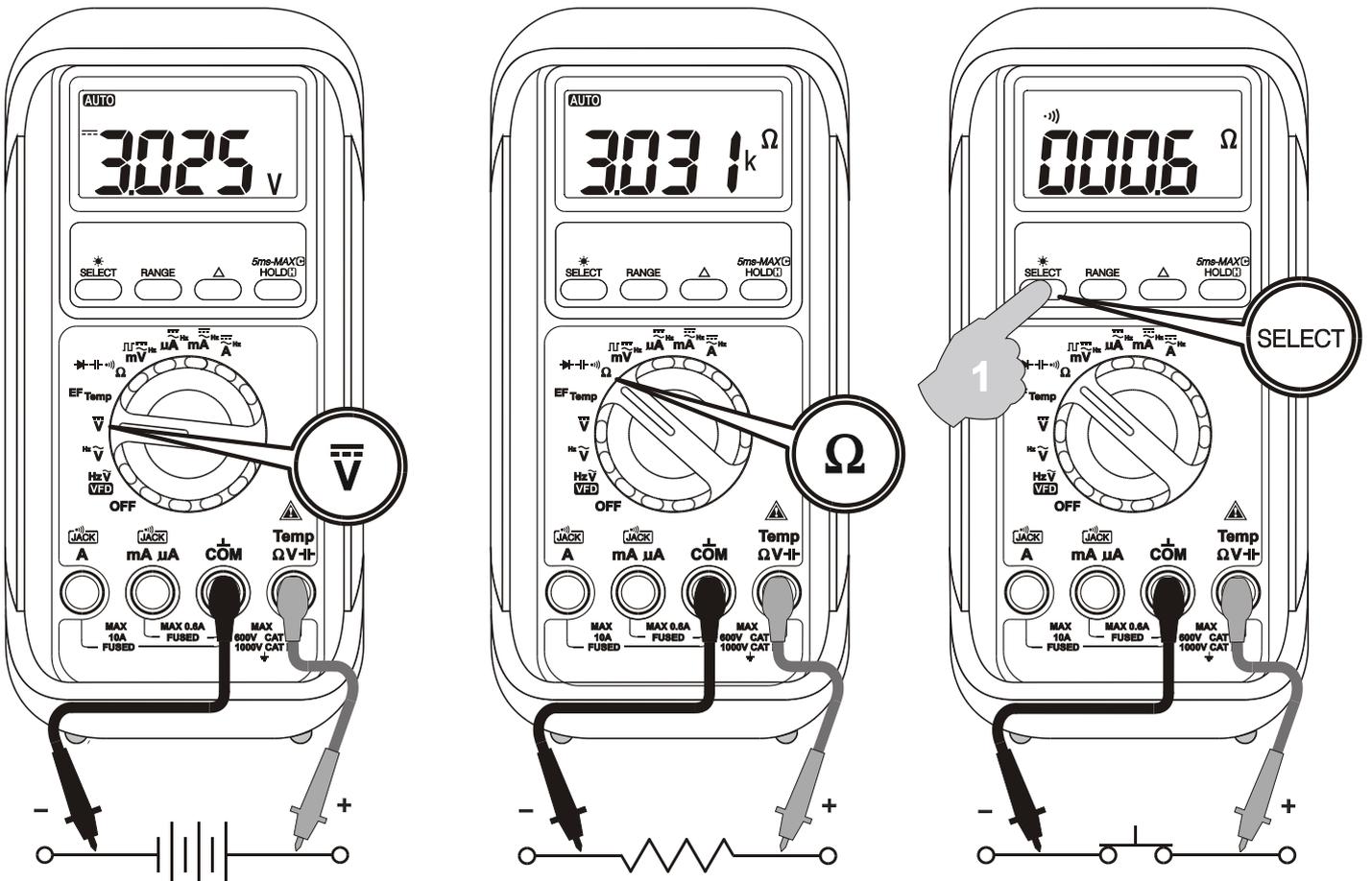
DCmV, ACmV ^{+Hz} & Hz (Logic Level)

Function defaults at **DCmV**. Press the **SELECT** button momentarily to select the subject functions in sequence. **Hz (Logic Level)** is set at the highest available sensitivity for logic level frequency measurements.



DCV

Turn rotary switch to DCV function position directly.



Ω Resistance, \rightarrow) Continuity

Defaults at Ω . Press **SELECT** button momentarily to select \rightarrow) Continuity function which is convenient for checking wiring connections and operation of switches. A continuous beep tone indicates a complete wire.

CAUTION

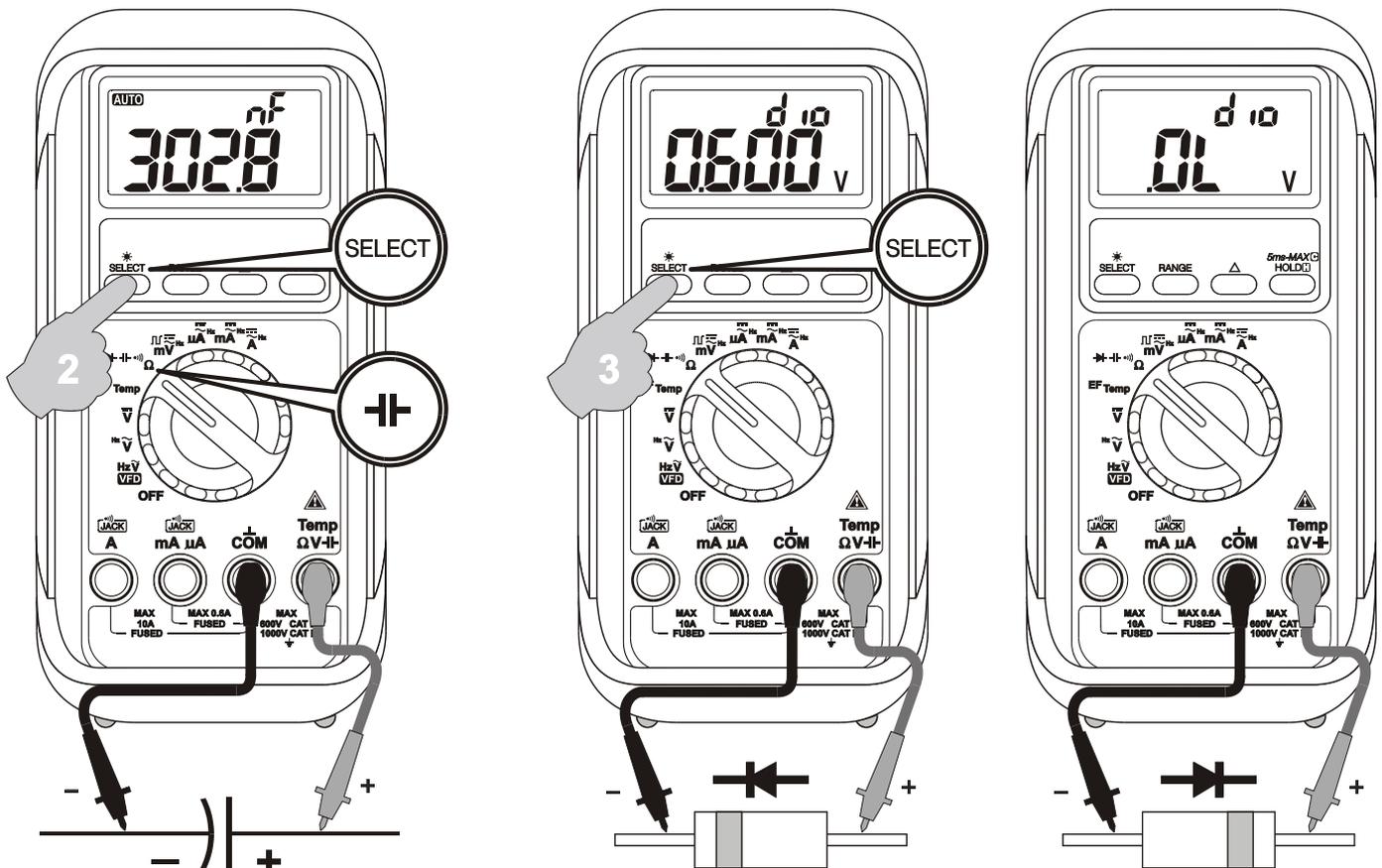
Using Resistance, Continuity, Diode or Capacitance function in a live circuit will produce false results and may damage the instrument. In many cases the suspected component must be disconnected from the circuit to obtain an accurate measurement reading.

$\text{--}\text{||}\text{--}$ Capacitance

Defaults at Ω . Press **SELECT** button momentarily 2 times to select $\text{--}\text{||}\text{--}$ Capacitance function. Relative zero Δ mode can be used to zero out the parasitic capacitance of the leads and the internal protection circuitry of the meter when measuring low capacitance in the order of Pico Farad (pF).

CAUTION

Discharge capacitors before making any measurement. Large value capacitors should be discharged through an appropriate resistance load

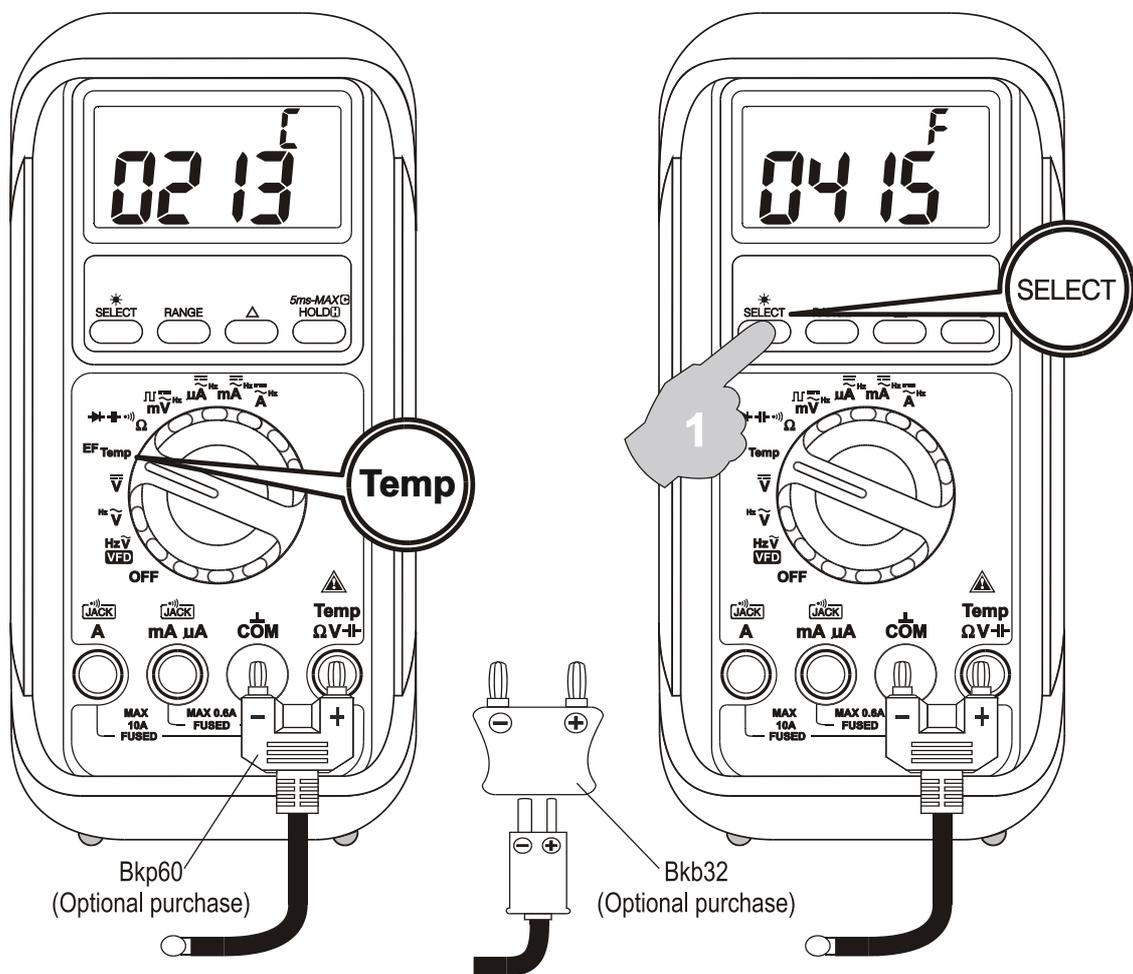


→ Diode test

Defaults at Ω . Press **SELECT** button momentarily 3 times to select → 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).

Temperature (Model 906s & 907s only)

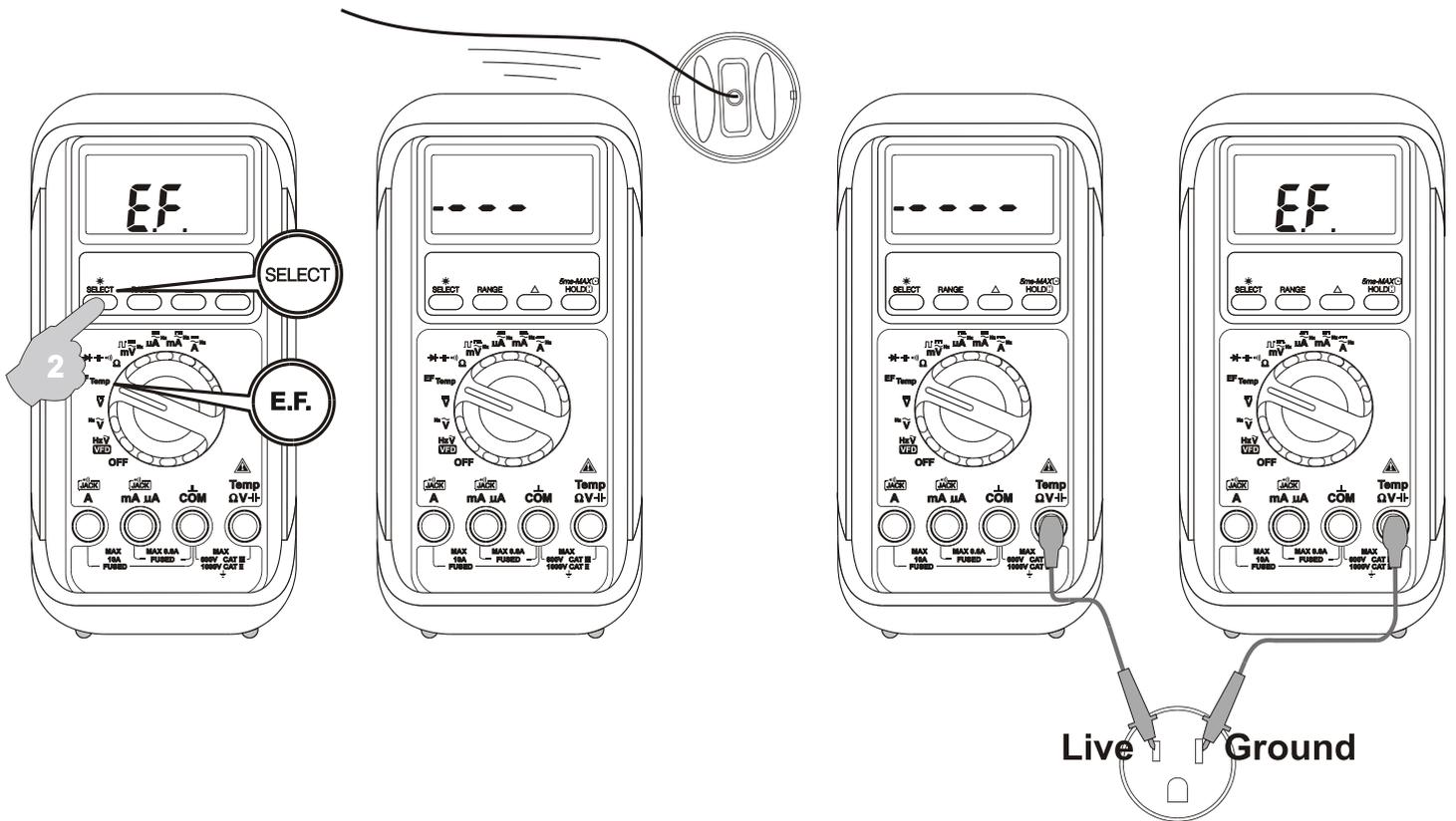
Defaults at $^{\circ}\text{C}$. Press **SELECT** button momentarily to select $^{\circ}\text{F}$ function.



Note: 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 type-K socket to adapt other standard type-K mini plug temperature probes.

Electric Field EF-Detection

Model 905 defaults at **E.F.** function. Models **906s & 907s** default at **°C**. Press **SELECT** button momentarily 2 times to select **E.F.** function. The meter displays “E.F.” when it is ready. Signal strength is indicated as a series of bar-graph segments on the display plus variable beep tones.



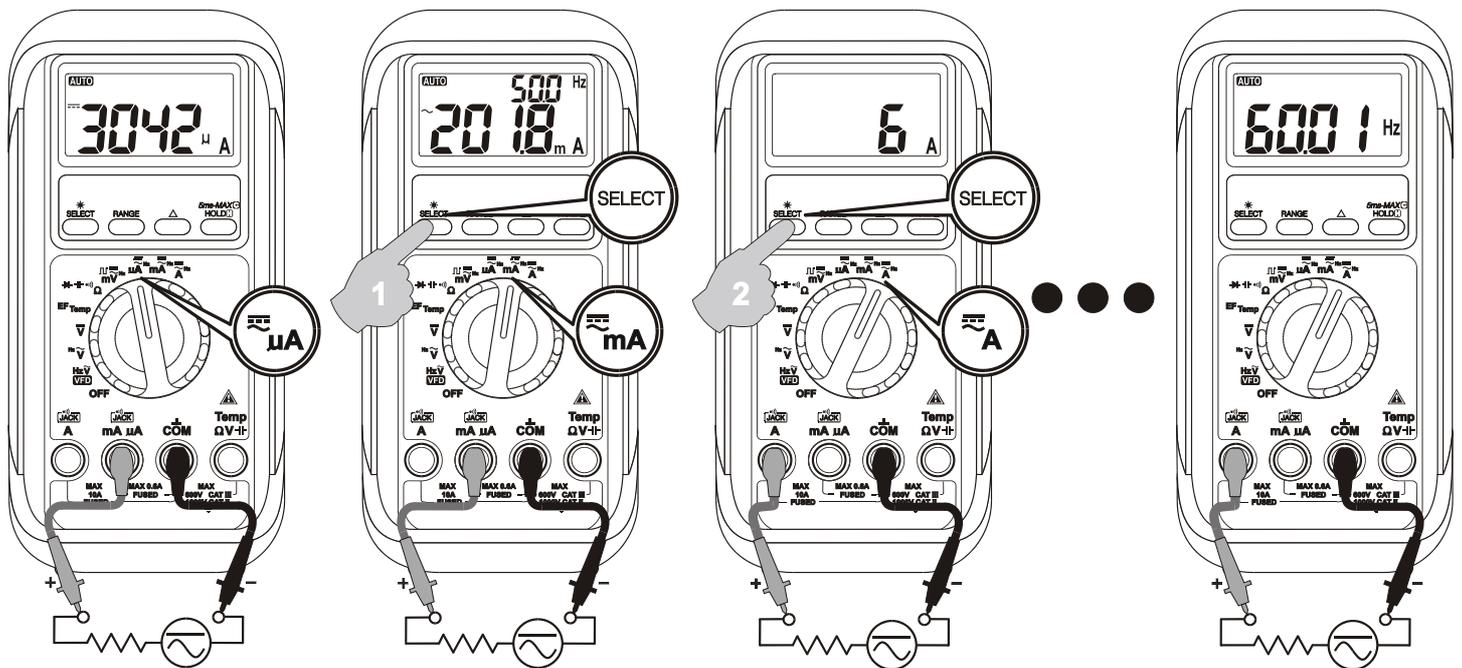
● **Non-Contact EF-Detection:** An antenna is located along the top end of the meter, which detects electric field surrounding current-carrying conductors. It is ideal for tracing live wiring connections, locating wiring breakage and to distinguish between live or earth connections.

● **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 measurements.

μA , mA, and A Current functions

Function defaults **DC**. Press **SELECT** button momentarily to select **AC^{Hz}**. Hz Input sensitivity varies automatically with current range selected. 600 μA range has the highest and 10A range has the lowest. Press **SELECT** button momentarily further select higher resolution **Hz** in main display. The display shows the selected current range for about one second before displaying Hz readings. Pressing the **RANGE** button momentarily repeatedly to display and select any other current range. If the Hz

reading becomes unstable, select higher current range to avoid electrical noise. If the reading shows zero, select lower current range for better sensitivity.



CAUTION

When measuring a 3-phase system, special attention should be taken to the phase-to-phase voltage which is significantly higher than the phase-to-earth voltage. To avoid exceeding the voltage rating of the protection fuse(s) accidentally, always consider the phase-to-phase voltage as the working voltage for the protection fuse(s).

5ms CREST-MAX capture mode

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

Backlighting LCD display (Model 907s 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.

Hold

The HOLD feature freezes the display for later view. Press the **HOLD** button momentarily to toggle the HOLD feature.

Relative Zero (Δ) mode

Relative zero allows the user to offset the meter consecutive measurements with the main display displaying reading as the reference value. Press the Δ button momentarily to toggle relative zero mode.

Manual or Auto-ranging

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

Note: Manual ranging feature is not available in Hz and Hz functions.

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.

Beep-Jack™ Input Warning

The meter beeps as well as displays “InEr” to warn the user against possible damage to the meter due to improper connections to the μA , mA, or A input jacks when any other function (like voltage function) is selected.

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 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 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

WARNING

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 open case.

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. If self-diagnostic message "C_Er" is being displayed while powering on, some meter ranges might be largely out of specifications. To avoid mis-leading measurements, stop using the meter and send it for re-calibration. 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

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 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 circuit. Such components should then be replaced by qualified technician. Refer to the LIMITED WARRANTY section for obtaining warranty or repairing service.

Battery and Fuse replacement

Battery use:

Standard 1.5V AAA Size (NEDA 24A or IEC LR03) battery X 2

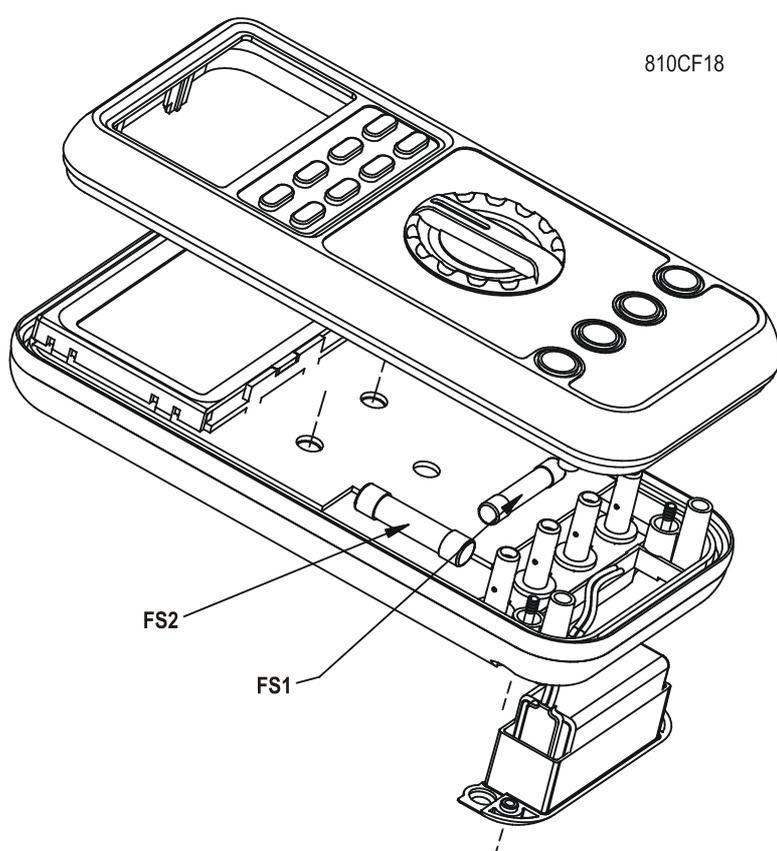
Fuses use:

Fuse (FS1) for μ mA current input:

0.4A/1000V ac & dc, IR 30kA, F fuse, or better; Dimension: 6 x 32 mm

Fuse (FS2) for A current input:

11A/1000V ac & dc, IR 20kA, F fuse, or better; Dimension: 10 x 38 mm



Battery replacement for models with battery access door:

Loosen the 2 screws from the battery access door of the case bottom. Lift the battery access door and thus the battery compartment up. Replace the battery. Re-fasten the screws.

Fuse replacement (and also Battery replacement for splash proof version without battery access door):

Loosen the 4 screws from the case bottom. Lift the end of the case bottom nearest the input jacks until it unsnaps from the case top. Replace the blown fuse(s) and/or the battery. Replace the case bottom, and ensure that all the gaskets are properly seated and the two snaps on the case top (near the LCD side) are engaged. Re-fasten the screws.

6) GENERAL SPECIFICATIONS

Display: 3-5/6 digits 6000 counts + 3 digits 999 counts dual display LCD

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 (T.C.): nominal $0.15 \times (\text{specified accuracy}) / ^\circ\text{C} @ (0^\circ\text{C} -- 18^\circ\text{C} \text{ or } 28^\circ\text{C} -- 40^\circ\text{C})$, or otherwise specified

Sensing: Average sensing for models 905s & 906s; True RMS for model 907s

Safety: Double insulation per IEC/UL/EN61010-1 Ed. 3.0, IEC/EN61010-2-030 Ed. 1.0, IEC/EN61010-2-033 Ed. 1.0, IEC/UL/EN61010-031 Ed. 1.1 and CAN/CSA-C22.2 No. 61010-1-12 Ed. 3.0 to Category II 1000V, CAT III 600V and CAT IV 300V AC & DC

Transient Protection: 6kV (1.2/50 μ s surge)

Terminals (to COM) Measurement Category:

V / A / mA μ A : Category II 1000V, CAT III 600V and CAT IV 300V AC & DC.

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

Overload Protection:

μ A & mA : 0.4A/1000V DC/AC rms, IR 30kA, F fuse

A : 11A/1000V DC/AC rms, IR 20kA, F fuse

V : 1100V DC/AC rms

mV, Ω & others : 1000V DC/AC rms

Power Supply: 1.5V AAA Size battery X 2

Power Consumption: 5.4mA typical

Low Battery: Below approx. 2.4V

APO Timing: Idle for 34 minutes

APO Consumption: 10 μ A typical

Dimension: L186mm X W87mm X H35.5mm; L198mm X W97mm X H55mm with

holster

Weight: 340 gm; 430 gm with holster

Accessories: Test leads (pair), holster, batteries installed, user's manual

Optional Accessories (Models 907s & 906s only): Bkp60 banana plug K-type thermocouple, BKB32 banana plug to type-K socket plug adaptor

Special Features: VFD-V & VFD-Hz in Dual Display; Backlighted LCD (Model 907s only); 5ms CREST-MAX Capture mode (Peak Hold); Auto-ranging Relative-Zero mode; Display Hold; EF-Detection (NCV); Beep-Jack™ input warning

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 907s AC voltage & AC current accuracies are specified from 5 % to 100 % of range or otherwise specified. Maximum Crest Factor <1.65:1 at full scale & < 3.30:1 at half scale, and with frequency components fall within the specified frequency bandwidth for non-sinusoidal waveforms.

DC Voltage

RANGE	Accuracy
60.00 mV	0.6%+3d
600.0mV,	0.3%+3d
6.000V,	1.2%+3d
60.00V	0.6%+3d
600.0V, 1000V	1.0%+3d

Input impedance: 10M Ω , 50 pF nominal

AC Voltage

RANGE	Accuracy
50Hz ~ 500Hz	
60.00 mV	1.3% + 5d
600.0mV,	1.0% + 5d
6.000V	2.0% + 5d
60.00V	1.3% + 5d
600.0V, 1000V	2.0% + 5d

Input impedance: 10M Ω , 50 pF nominal

VFD-Voltage (LPF-ACV)

RANGE	Accuracy ¹⁾
10.0Hz ~ 20.0Hz	
6.000V, 60.00V, 600.0V, 1000V	3.5% +8d
20.0Hz ~ 200Hz	
6.000V, 60.00V, 600.0V, 1000V	2.5% +8d
200Hz ~ 400Hz ²⁾	
6.000V, 60.00V, 600.0V, 1000V	7.0% + 8d

Input impedance: 10M Ω , 50 pF nominal

¹⁾Not specified for fundamental frequency > 400Hz

²⁾Accuracy linearly decreases from 2.5% + 8d @ 200Hz to 7.0% + 8d @ 400Hz

Crest-MAX Capture (V & A only)

Accuracy: Specified accuracy plus 250

digits for changes > 5ms in duration

Ohm

RANGE ¹⁾	Accuracy
600.0Ω,	0.8%+8d
6.000KΩ, 60.00KΩ, 600.0KΩ	0.6%+4d
6.000MΩ	1.5%+5d
60.00MΩ	2.5%+5d

Open Circuit Voltage: 0.45VDC typical

Audible Continuity Tester

Audible Threshold:

between 10Ω and 120Ω

Response time: <32ms

Capacitance

RANGE	Accuracy ¹⁾
60.00nF ²⁾ , 600.0nF, 6.000μF,	2.0%+5d
60.00μF, 600.0μF ³⁾	3.5%+5d
3000μF ³⁾	4.0%+5d

¹⁾Accuracies with film capacitor or better

²⁾Accuracy unspecified

³⁾T.C.: 0.25 x specified accuracy / °C @ 0 ~ 18 °C, 28 ~ 40 °C

Diode Tester

RANGE: 1.000V

Test Current: 0.2mA typical

Open Circuit Voltage: < 1.8VDC typical

DC Current

RANGE	Accuracy	Burden Voltage
600.0μA	1.2% + 5d	0.25mV/μA
6000μA	1.0% + 3d	0.25mV/μA
60.00mA	2.0% + 5d	4.0mV/mA
600.0mA	1.5% + 3d	4.0mV/mA
6.000A	1.5% + 5d	0.045V/A
9.00A ¹⁾	1.2% + 3d	0.045V/A

¹⁾10A continuous, >10A to 20A for 30 seconds max with 5 minutes cool down interval

AC Current

RANGE	Accuracy ¹⁾	Burden Voltage
50Hz -- 500Hz		
600.0μA	2.0% + 6d	0.25mV/μA
6000μA	1.5% + 5d	0.25mV/μA
60.00mA	2.5% + 6d	4.0mV/mA
600.0mA	2.1% + 5d	4.0mV/mA
6.000A	2.0% + 6d	0.045V/A
9.00A ¹⁾	1.8% + 5d	0.045V/A

¹⁾10A continuous, >10A to 20A for 30 seconds max with 5 minutes cool down interval

Temperature (Models 906s & 907s only)

RANGE	Accuracy
-50 °C ~ 1000 °C	1% + 3d
-58 °F ~ 1832 °F	1% + 6d

K type thermocouple range & accuracy not included

~ Hz Line Level Frequency (Dual Display)

AC Range	Sensitivity (Sine RMS)	Range
600mV	0.1V	10Hz~100kHz
6V	0.6V	10Hz~10kHz
60V	6V	10Hz~50kHz
600V	60V	10Hz~50kHz
1000V	600V	45Hz~10kHz
VFD 6V	0.6V~2.1V ¹⁾	10Hz~400Hz
VFD 60V	6V~21V ¹⁾	10Hz~400Hz
VFD 600V	60V~210V ¹⁾	10Hz~400Hz
600μA	60μA	10Hz~10kHz
6000μA	600μA	10Hz~10kHz
60mA	6mA	10Hz~10kHz
600mA	60mA	10Hz~10kHz
6A	0.6A	20Hz~3kHz
9A	6A	20Hz~3kHz

Accuracy: 0.2%+4d

¹⁾VFD sensitivity linearly decreases from 10% F.S. @ 200Hz to 35% F.S. @ 400Hz

⏏ Hz Logic Level Frequency

RANGE	Accuracy ¹⁾
5.000Hz ~ 300.0KHz	0.2%+4d

¹⁾Accuracy is specified at < 20VAC rms

Input Signal : Square wave with duty cycle > 40% & < 70%, or Sine wave

Sensitivity :

5Hz--20Hz : > 1Vrms Sine wave;

20Hz--300kHz : > 2.6Vp; or 1.9Vrms

Sine wave

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: Top end of the meter

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

- NOTE -

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 accident or abnormal conditions 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 accident or abnormal conditions of operation or handling, you will be billed for the repair.

THIS WARRANTY IS EXCLUSIVE AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE. BRYMEN WILL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES.



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