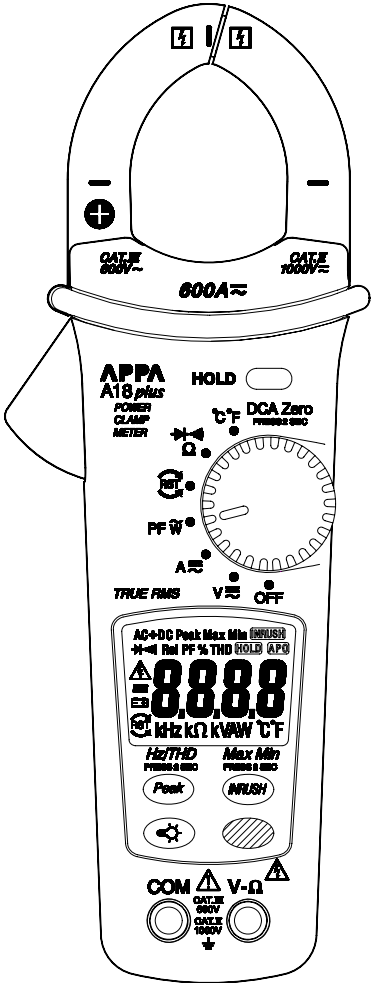
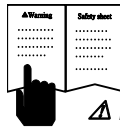


User Manual



APPA
A18plus





⚠ Read First

⚠ Safety Information

To ensure safe operation and service of the Meter, follow these instructions. Failure to observe warnings can result in severe **injury or death**.

- Avoid working alone so assistance can be rendered.
- Do not use test leads or the Meter if they look damaged.
- Do not use the Meter if the Meter is not operating properly or if it is wet.
- Use the Meter only as specified in the Instruction card or the protection by the Meter might be impaired.
- Use extreme caution when working around bare conductors or bus bar. Contact with the conductor could result in electric shock.
- Use caution with voltages above 30 Vac rms, or 60 Vdc. These voltages pose a shock hazard.

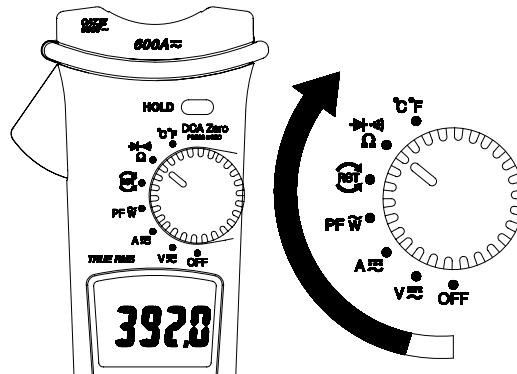
Symbols as marked on the Meter and Instruction manual

	Risk of electric shock
	See instruction card
	DC measurement
	Equipment protected by double or reinforced insulation
	Battery
	Earth
	AC measurement
	Conforms to EU directives
	Application around and removal from hazardous live conductors is permitted
	Do not discard this product or throw away.

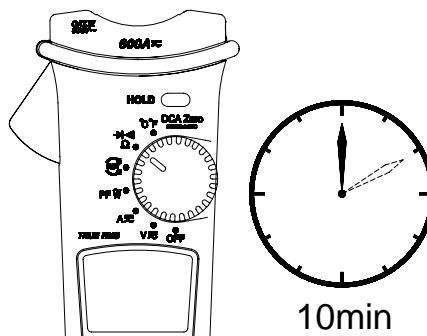
⚠ Caution

If the meter is used in the vicinity of equipment which generates electromagnetic interference, the display may become unstable or the measurements show may be subject to large errors.

Power On/ Off



Auto Power Off



The meter can work again by turning it on from the OFF position.

Auto Power Off disable :

Press PEAK KEY while tuning meter on from OFF position.

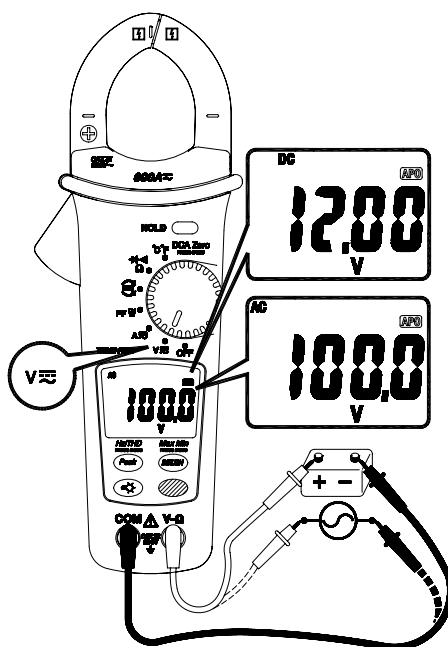
⚠ Warning

To avoid electrical shock, hazard or damage to meter, do not attempt to measurement that might exceed 1000 V DC or AC RMS. Do not apply more then 1000 V DC or AC RMS between the comment input terminal and earth ground.

1. VOLTAGE /CURRENT Measurement

1-1 Voltage testing procedures

- Step 1. Plug the Black test lead into the COM terminal and the Red test lead into the V- Ω terminal.
- Step 2. Set the rotary switch to the $V_{\overline{\sim}}$ position.
- Step 3. Connect the test leads to the device to be measured.
- Step 4. Read the value from digital display.



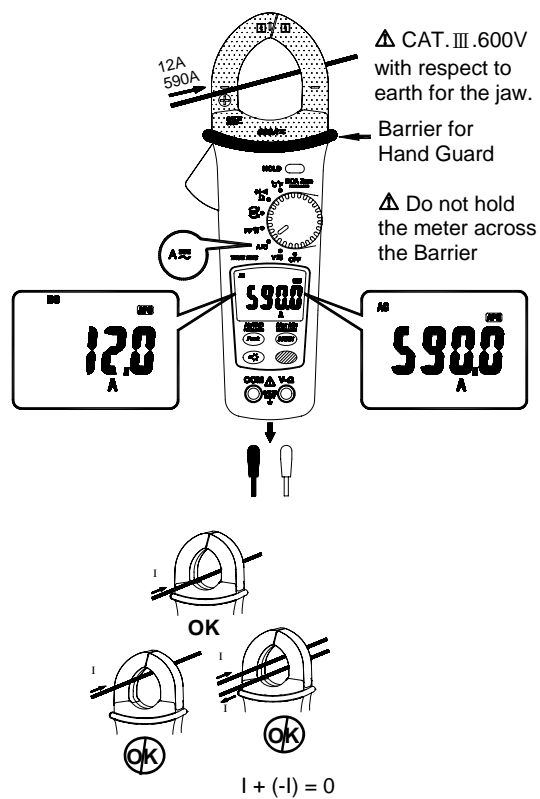
- If the measured voltage is greater than 42 V DC or AC RMS, the display will show the " Δ " symbol, and the buzzer beeps thrice.
- If the measured voltage exceeds 1000 V DC or AC RMS, the display will show the "**OL**" symbol.
- If the measured frequency exceeds 1000 Hz, the display will show the "**out. F**" symbol.

1-2 Current testing procedure

Step 1. Set the rotary switch to the $A_{\overline{\sim}}$ position.

Step 2. Press the trigger to open the transformer jaws and clamp one conductor only, make sure that the jaw is firmly closed around the conductor.

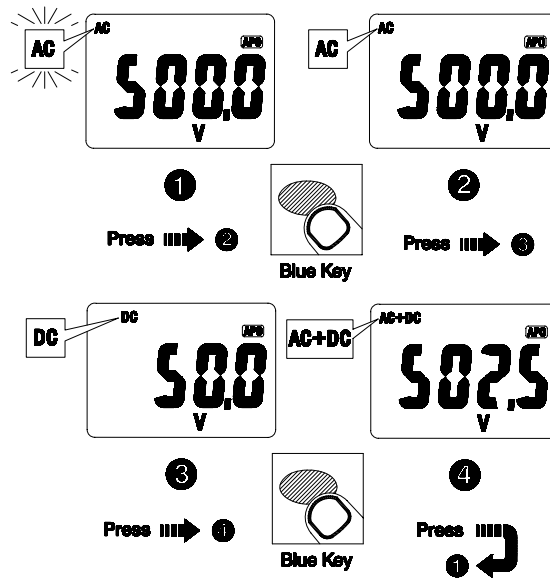
Step 3. Read the value from digital display.



- If the measured current exceeds 620 A DC or AC RMS, the display will show the "OL" symbol.
- If the measured frequency exceeds 1000Hz, the display will show the "out. F" symbol.
- Don't clamp on any conductor while the meter power on.

1-3 Key Function

1-3-1 **BLUE KEY** : Push the Blue key to choose among Auto AC/DC, AC, DC, and AC+DC measurement.

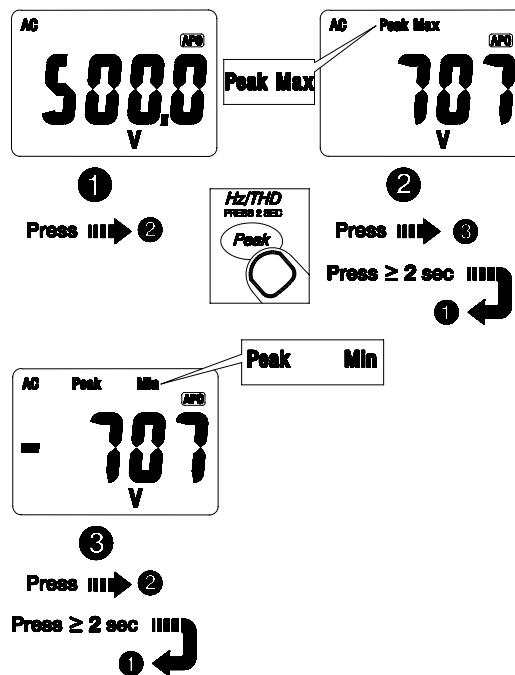


- ❶ Auto AC/DC mode (AC or DC flashing):
Display Measurement result at AC only with RMS value or DC value, it depends on whichever is greater.
- ❷ AC mode : AC only with RMS value.
- ❸ DC mode : DC value.
- ❹ AC+DC mode : AC+DC RMS value.

1-3-2 PEAK KEY (HZ/THD press 2 sec):

- Only Auto AC, AC and AC+DC MODE are available for voltage and current measurement.

a. PEAK HOLD



- ❶ Normal: Normal Operation.
- ❷ Peak Max : Meter is activated to save the positive peak value and negative peak value. Positive Peak value is displayed.
- ❸ Peak Min : Meter is activated to save the positive peak value and negative peak value. Negative Peak value is displayed.

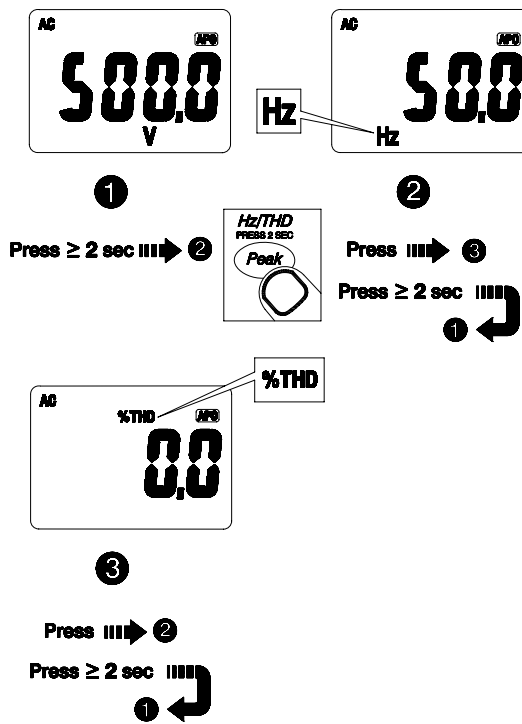
NOTE: Press **HOLD** key in **PEAK HOLD** mode to make the meter stop updating the positive and negative peak value .
When the **HOLD** mode is nested in **PEAK HOLD** mode, the **HOLD** mode must be released before the **PEAK HOLD** mode.

Overrange display:

- OL :** Peak Max value > 1400V or > 850 A
- OL :** Peak Min value < -1400V or < -850 A

b. HZ/THD (=THD-R) Measurement :

- THD-R= RMS of Harmonics ÷ Total RMS of fundamental and Harmonics ×100% (Harmonics up to 25th.)



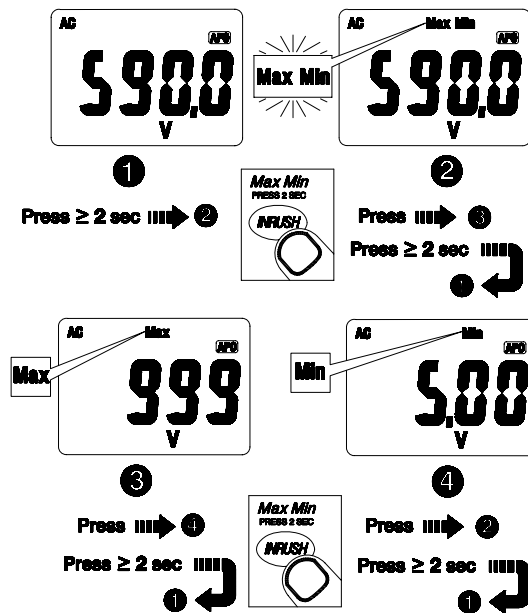
Overrange display:

- OL.U :** Voltage overload (Vrms > 1000V)
- OL.A :** Current overload (Arms > 620A)

1-3-3 INRUSH KEY (Max Min press 2 sec):

a. MAX MIN MODE:

- MAX MIN MODE is available for all functions.

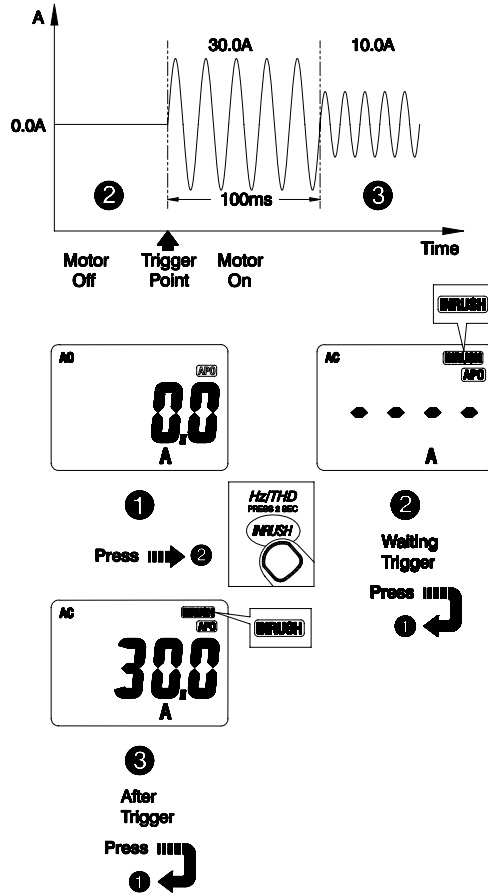


- ❶ Normal: Normal Operation.
- ❷ MAX MIN (flashing): Meter is activated to save the maximum and minimum value. Present value is displayed.
- ❸ MAX: Meter is activated to save the maximum and minimum value. Maximum value is displayed.
- ❹ MIN: Meter is activated to save the maximum and minimum value. Minimum value is displayed.

NOTE:

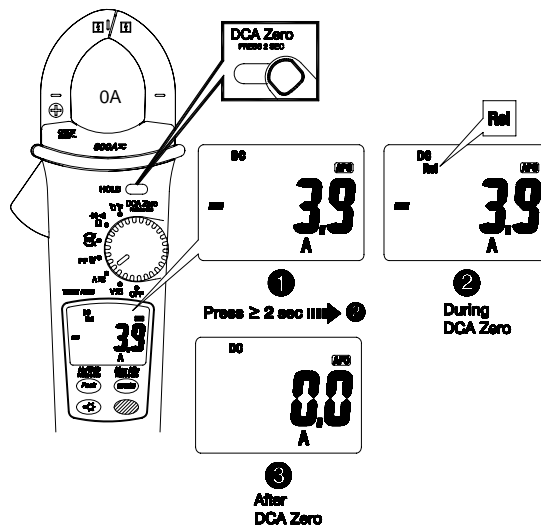
- Press **HOLD** key in **MAX MIN** mode to make the meter stop updating the maximum and minimum value. When the **HOLD** mode is nested in **MAX MIN** mode, the **HOLD** mode must be released before the **MAX MIN** mode.
- **Auto Power Off** is disable in **MAX MIN** mode.

b. INRUSH CURRENT : ACA ONLY



1-3-4 DCA ZERO : Remove the Jaw out of the conductor.

Press **HOLD KEY** >2 sec to compensate the residual magnetism.

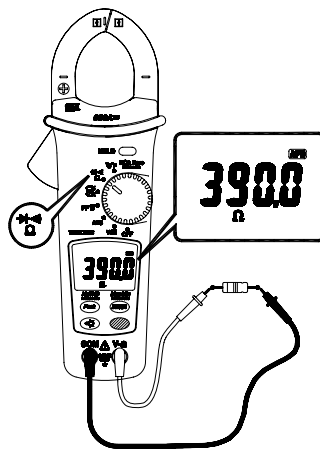


- Only Auto DC, DC, and AC+DC MODE are available for current measurement.

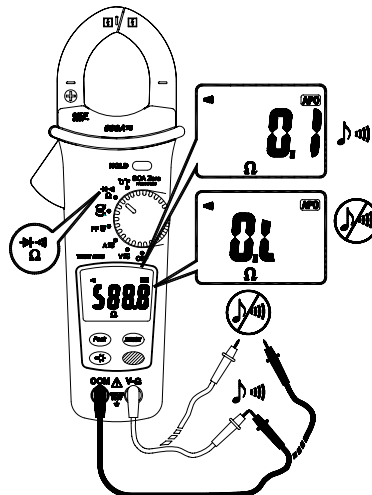
2. OHM Measurement

Press Blue Key to choose among Resistance measurement, Continuity check, and Diode testing. Don't take any high voltage measurement prior to accurate resistance measurements

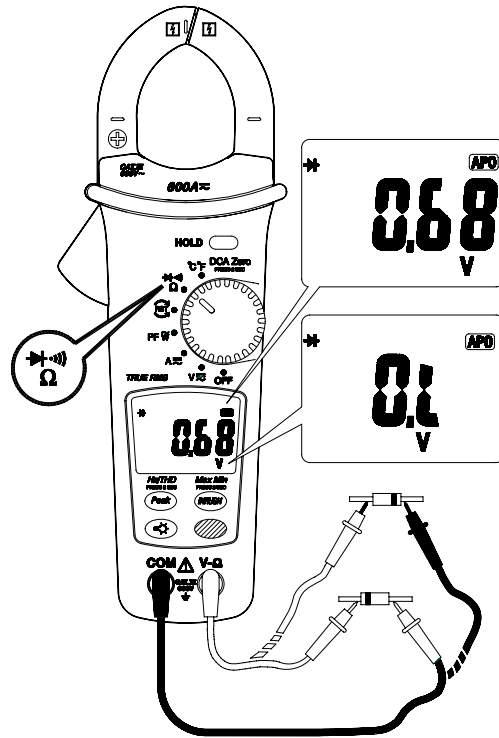
Resistance measurement



Continuity check



Diode testing



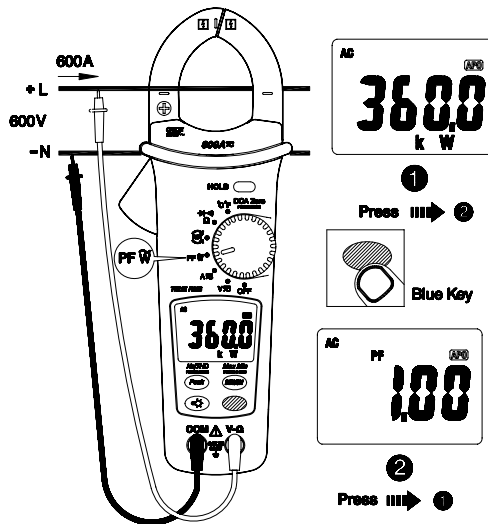
⚠ Caution

To avoid possible damage to the Meter or to the equipment under test, disconnect circuit power and discharge all high-voltage capacitors before measuring resistance and diode.

3. Active power (W)/Power factor (PF) Measurement

3-1 Single Phase Power Measurement

- Step1. Plug the Black test lead into the COM terminal and the Red test lead into the V- Ω terminal.
- Step2. Set the rotary switch to the PF W~ position.
- Step3. Connect the Red test lead to the L, and the Black test lead to the N.
- Step4. Press the trigger to open the transformer jaws and clamp one conductor only, make sure that the jaw is firmly closed around the conductor.
- Step5. PRESS BLUE key to choose between Active Power(W) and POWER FACTOR (PF).



NOTE : The “ + ” symbol on the jaw must face on the power source side.

Active power sign : refer to above figure.

No sign : Indicates the power flows from the power source to the load.

"_" sign : Indicates the power flows from the load to the power source.

Power factor sign :

No sign : The phase of the current signal is lagging behind the voltage signal (inductive load).

"_" sign : The phase of the current signal is leading the voltage signal (capacitive load).

Underrange display :

0.000 kW : Vrms <0.5V or Arms <0.5A

PF - - - - : Vrms <0.5V or Arms <0.5A

Overrange display:

OL.U : Voltage overload (Vrms > 1000V)

OL.A : Current overload (Arms > 620A)

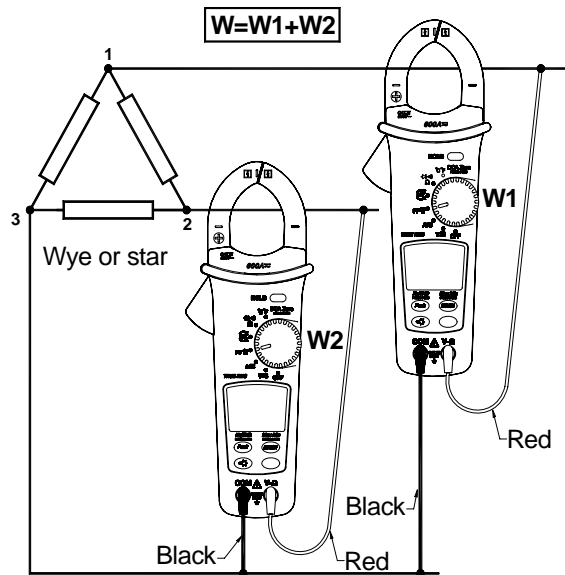
OL.UA : Both Voltage and current overload.

±OL kW : Active Power > 600 kW or < -600 kW.

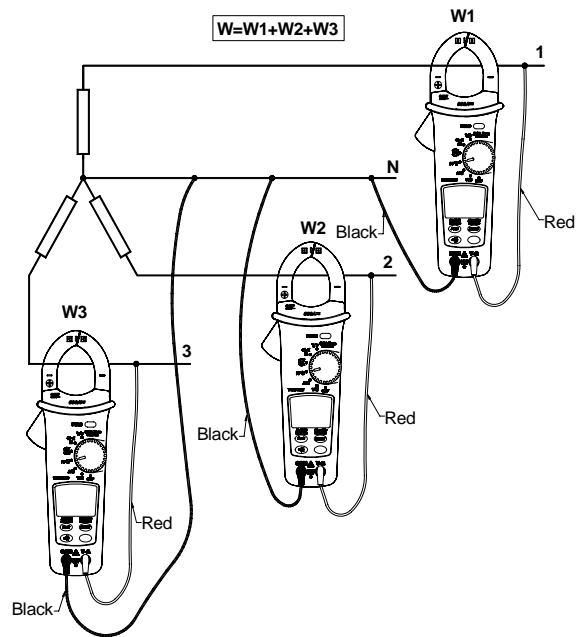
3-2 Three Phase Power Measurement

a. 3 phase 3 wire balanced / unbalanced

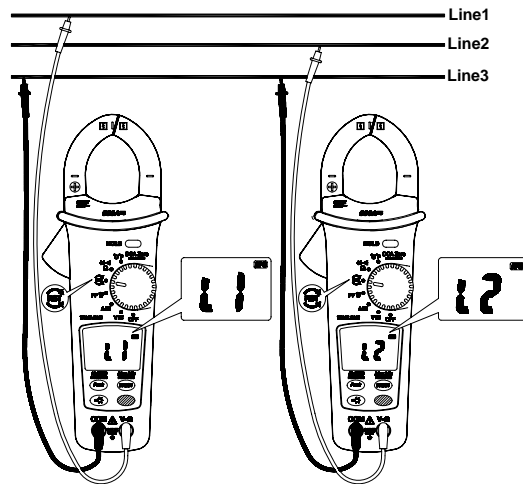
Set the rotary switch to the PF W~ position.



b. 3 phase 4 wire balanced / unbalanced
Set the rotary switch to the PF W~ position

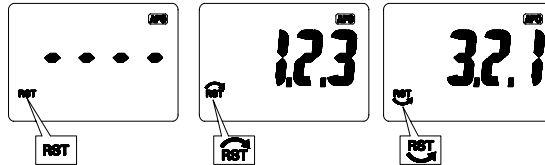


4. Phase Rotation



NOTE :

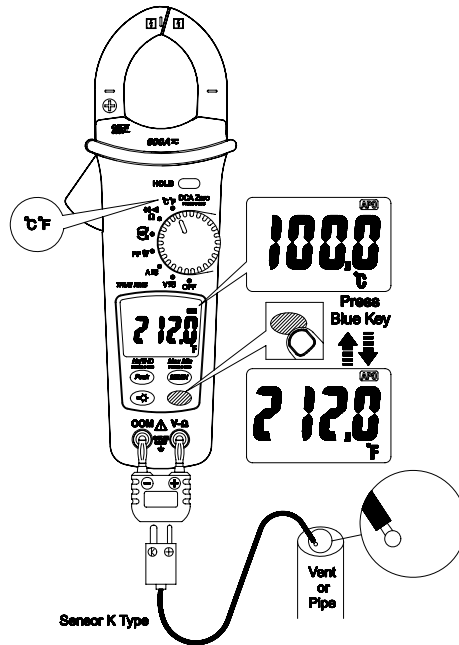
- Connect the supposed three phase of power source as shown above.
 - The test is only available while the system frequency is stable.
- Step 1. Plug the Black test lead into the COM terminal and the Red test lead into the V- Ω terminal.
- Step 2. Set the rotary switch to the "RST" position.
- Step 3. Connect the Red test lead to the supposed phase Line 1, and the Black test lead to the supposed phase Line 3.
- a. If volt < 30V, it will display "**Lo V**"; if volt > 1000V, then it will display "**OL V**".
 - b. If the frequency is not 50 Hz or 60 Hz, then it will display "**out. F**".
 - c. If it is normal, then it will display "**L1**" for about 3 sec.
- Step 4. If it displays "**L2**", then BUZZER will be sound for twice. Please switch the Red test lead to connect to the supposed phase Line 2 immediately before the "**L2**" is disappeared.
- Step 5. When "**L2**" is disappeared, it will display the testing result.



- a. If it displays “ **1.2.3**”, then the phase sequence is **forward sequence**, which means the supposed phase Line 1 is ahead of the supposed phase Line 2.
- b. If it displays “ **3.2.1**”, then the phase sequence is **reversed sequence**, which means the supposed phase Line 2 is ahead of the supposed phase Line 1.
- c. Display “----” means it is unable to judge.
- d. If displays “**Lo V**”, it is possible that you remove the test leads before completing the whole testing procedures.

Step 6. Press Blue key to repeat the test.

5. °C/°F Measurement

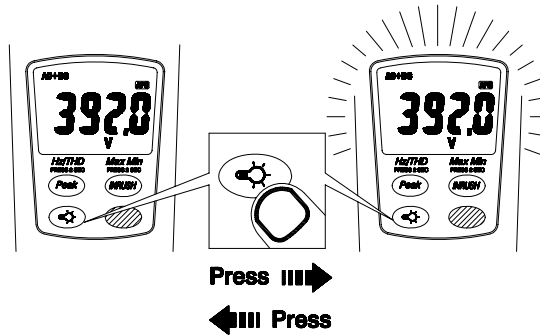


Don't take any high voltage measurement prior to accurate °C/°F measurements.

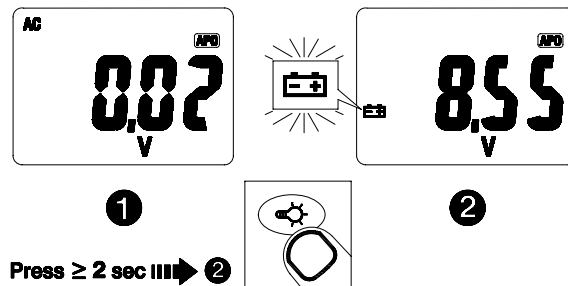
6. OTHER KEY FUNCTION

a . LIGHT

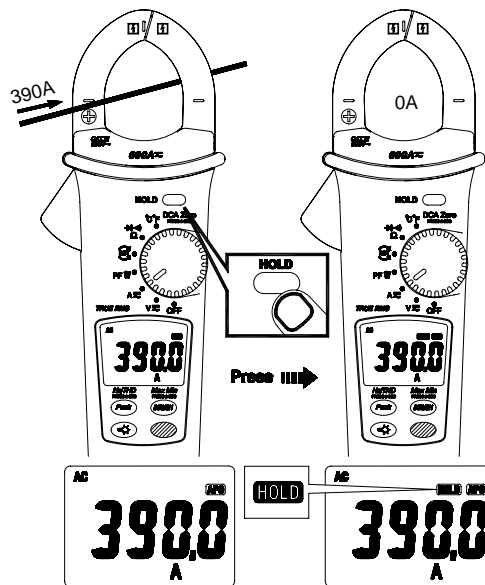
PRESS LIGHT KEY, it will turn on the backlit and auto backlit off after approx. 30 sec.



PRESS LIGHT KEY > 2 sec, it will display Battery Voltage.
The low battery voltage is 7.00V.



b. HOLD
PRESS HOLD KEY, Freeze current display value.



7. Buzzer

The Meter beeps once for every valid key-press, and beeps twice for every invalid key-press.

8. Power-up options

Press key while tuning meter on from OFF position.

PEAK KEY : disable auto power off.

INRUSH KEY : display of the software version.

HOLD KEY : display all LCD symbols approx 10sec.

9. Maintenance

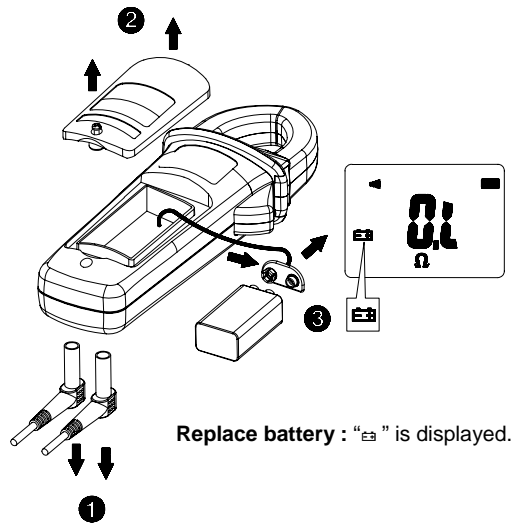
Do not attempt to repair this Meter.

It contains no user-serviceable parts. Repair or serving should only be performed by qualified personal.

10. Cleaning

Periodically wipe the case with a dry cloth and detergent do not use abrasives or solvents.

Battery Replacement



Specifications

1-1 General Specifications

LCD display digits : 3 5/6 digit large scale LCD readout.


Display count : 6000 counts.


Measuring rate : 3 times / sec.

Overrange display : "OL" or "-OL" .

Automatic power off time :

Approximately 10 minutes after power on.

Low battery indicator :  is displayed. Replace the battery

when the indicator  appears in the display.

Low battery voltage 7.00V

Power requirement : 9V battery.

Battery life : ALKALINE 9V 50 hours.

1-2 Environmental Conditions

Indoor Use.

Calibration : One year calibration cycle.

Operating temperature : 0°C ~ 30°C ($\leq 80\%$ RH)

30°C ~ 40°C ($\leq 75\%$ RH)

40°C ~ 50°C ($\leq 45\%$ RH)

Storage temperature : -10 to 50°C for current, -20 to 60°C for other function, 0 to 80% RH (batteries not fitted).

Overvoltage category : IEC 61010-1 600V CAT. III.

1000V CAT. II.

CAT **Application field**

I	The circuits not connected to mains.
II	The circuits directly connected to Low-voltage installation.
III	The building installation.
IV	The source of the Low-voltage installation.

Operating altitude : 2000m (6562 ft)

Conductor Size : 35mm diameter.

Pollution degree : 2

EMC : EN 61326-1

Shock vibration : Sinusoidal vibration per MIL-T- 28800E (5 ~ 55 Hz, 3g maximum).

Drop Protection : 4 feet drop to hardwood on concrete floor.

1-3 Electrical Specifications

Accuracy is \pm (% reading + number of digits) at 23°C \pm 5°C < 80%RH.

Temperature coefficient :

0.2 x (Specified accuracy) / °C, < 18°C, > 28°C .

Voltage

Function	Range	Accuracy
DCV	60.00V 600.0V 1000V	\pm (0.7%+ 5 dgt)
ACV	60.00V 600.0V 1000V	\pm (1.0% + 5 dgt) 45 Hz ~ 500 Hz

Overload protection : 1000Vrms

Input impedance : 3M Ω // less100pF

AC Conversion Type :

AC/DC Coupled True RMS responding

AC+DC Vrms accuracy :

same as ACV spec. +1% rdg. + 5dgt.

Current

Function	Range	Accuracy
DCA	600.0A	\pm (1.5%+ 5 dgt)
ACA	600.0A	\pm (1.5% + 5 dgt) 45 Hz ~ 65 Hz \pm (2.5% + 5 dgt) 66 Hz ~ 400 Hz

Overload protection : 600Arms

Position Error : \pm 1% of reading.

AC Conversion Type:

AC / DC Coupled True RMS responding

AC+DC Arms accuracy :

same as ACA spec. +1.5% rdg. +5dgt.

- DCA affected by the temperature and the residual magnetism. Press HOLD key >2sec to compensate it.

Peak Hold : Peak Max / Peak Min

Function	Range	Accuracy
ACV	85.0V 1400V	\pm (3% + 15 dgt)
ACA	85.0A 850A	\pm (3% + 15 dgt) (corrected DCA Zero)

Overload protection : 1000Vrms/600Arms

Accuracy defined for :

Sine wave, ACV>5Vrms / ACA \geq 5Arms, Freq.50~400Hz.

- Only suitable for the repetitive events.

Frequency : Hz

Range	Accuracy
20.0 ~ 399.9 Hz 400 ~ 4000 Hz	$\pm(0.1\% + 5 \text{ dgt})$

Overload protection: 1000Vrms/600Arms

Sensitivity :

5Vrms for ACV, 5Arms for ACA (>400Hz Unspecified)

- Reading will be 0.0 for signals below 10.0 Hz.

Total Harmonic distortion: %THD(=THD-R)

Function	Range	Accuracy
ACV / ACA	100.0%	$\pm(3\% + 10 \text{ dgt})$

Overload protection : 1000Vrms/600Arms

- If ACV<10Vrms or ACA <10Arms, it will display "rdy".

- If the fundamental frequency out of range 45 ~ 65Hz, it will display "out.F".

Inrush Current :

Function	Range	Accuracy
ACA	10.0 ~59.9A 60.0 ~ 600.0A	2.5% \pm 2A 2.5% \pm 5d

Overload protection : 600Arms

Accuracy defined for :

Sine wave, ACA \geq 10Arms, Freq. 50/60Hz

- Integration time about 100m sec

Active Power : Watt

Function	Range	Accuracy
W~	4.000 kW 40.00 kW 400.0 kW 600 kW	Add the errors of Voltage and current.

Overload protection : 1000Vrms/600Arms

Accuracy defined for :

Sine wave ,ACV \geq 10Vrms, ACA \geq 5Arms

Freq. 45~65Hz, PF=1.00

- The reading of Active Power will be fluctuated apparently due to the current fluctuation in 4.000 kW range.

Power Factor: PF = Watt \div (V \times A)

Function	Range	Accuracy
PF	-1.00 ~ 0.00 ~1.00	$\pm 3^\circ$

Overload protection : 1000Vrms/600Arms

Resistance, Continuity & Diode testing

Function	Range	Accuracy
Resistance	600.0 Ω 6.000 k Ω 20.00 k Ω	$\pm(1\% + 5 \text{ dgt})$
Continuity	600.0 Ω	$\pm(1\% + 5 \text{ dgt})$
Diode	2.00V	$\pm(1.5\% + 5\text{dgt})$ for 0.4V ~ 0.8V

Overload protection : 600Vrms

Max. Open Circuit voltage for Diode : 3.0V

Max. Open Circuit voltage for Ω , \rightarrow : 2.4V

Continuity check :

Internal sounds activates if the resistance of the circuit under test is less than 30 Ω approximately.

Max. display count : 5400 counts.

Temperature

Function	Range	Accuracy
°C	-50.0 °C ~ 399.9°C	± (1% + 3°C)
	400 °C ~ 1000 °C	
°F	-58.0 °F ~ 751.9 °F	±(1% + 6°F)
	752 °F ~ 1832 °F	

Overload protection: 600Vrms

- The above specification is assumed at the ambient temperature stability within $\pm 1^{\circ}\text{C}$.

The meter needs 1 hour for stability for ambient temperature change more than $\pm 1^{\circ}\text{C}$.

Limited Warranty

This Meter is warranted to the original purchaser against defects in material and workmanship for 1 year from the date of purchase. During this warranty period, manufacturer will, at its option, replace or repair the defective unit, subject to verification of the defect or malfunction.

This warranty does not cover fuses, disposable batteries, or damage from abuse, neglect, accident, unauthorized repair, alteration, contamination, or abnormal conditions of operation or handling.

Any implied warranties arising out of the sale of this product, including but not limited to implied warranties of merchantability and fitness for a particular purpose, are limited to the above. The manufacturer shall not be liable for loss of use of the instrument or other incidental or consequential damages, expenses, or economic loss, or for any claim or claims for such damage, expense or economic loss. Some states or countries laws vary, so the above limitations or exclusions may not apply to you.



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