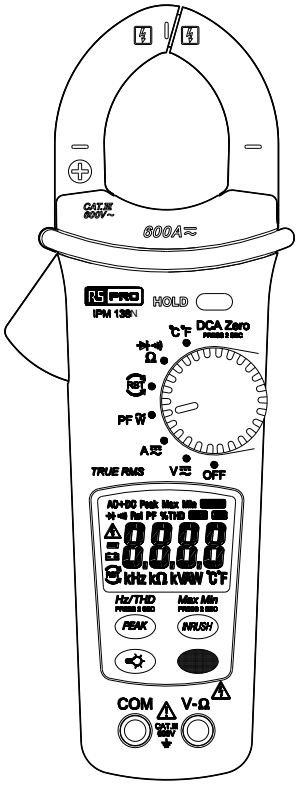
Instruction Manual
IPM 138N
Clamp Multimeter

EN



⚠ Safety Information

Read and understand this Instruction Manual completely before using this instrument. Failure to observe the warnings and cautions in this Instruction Manual may result in injury or death, or damage to the instrument and other equipment or property.

If this instrument is used in a manner not specified in these instructions, the protection provided by the instrument may be impaired.

⚠ WARNING

- Examine the instrument and probes and leads before use. Do not use the instrument if it is wet or damaged, or if you suspect it is not operating correctly.
- When using the instrument, test leads or probes, keep your fingers behind the finger guards.
- Remove the test lead from the instrument before opening the battery cover or instrument case.
- Always use the correct terminals, switch position and range for measurements.
- Verify the instrument is operating correctly by measuring a known voltage before use. If in doubt, have the instrument serviced.
- Do not apply more than the rated voltage as marked on the instrument between terminals, or between any terminal and earth ground.
- Use caution when measuring voltages above 30 Vac rms or 60 Vdc. These voltages pose a shock hazard.
- To avoid incorrect readings that can lead to electric shock, replace the battery as soon as low battery indicator ▷ appears in the display.
- Disconnect the circuit power and discharge all high-voltage capacitors before making resistance, continuity, or diode measurements.
- Do not use the instrument in a Hazardous Area or around explosive gasses or vapours.
- Wear suitable Personal Protective Equipment when working around or near hazardous Live conductors which could be accessible.
- Do not use the thermocouple to measure the temperature of Hazardous Live conductors or equipment.

⚠ Caution

- Disconnect the test leads from the test points before changing the position of the function rotary switch.
- Never connect the instrument to a source of voltage with the function rotary switch in Ω/ ⏚))) /⎓ ∼A position.

- If possible, do not work alone, so assistance can be given if required.
- Do not expose the instrument to extremes of temperature or high humidity.
- If this instrument is used in the vicinity of equipment which generates electro magnetic interference, the display may become unstable or the measurements may be subject to large errors.
- Do not take temperature measurements immediately after taking high voltage measurements as the accuracy of measurements may be impaired. Allow a minimum of 5 minutes for the instrument to stabilize before taking temperature measurements.

The following symbols may appear on the instrument and in this Instruction Manual:

	Risk of electric shock
	Refer to Instruction Manual
	Direct Current (dc)
	Alternating Current (ac)
	Battery
	Earth
	Equipment protected throughout by double or reinforced insulation
	Conforms to EU directives
	Dispose of this equipment in accordance with local regulations.
	Application around and removal from hazardous Live conductors is permitted.

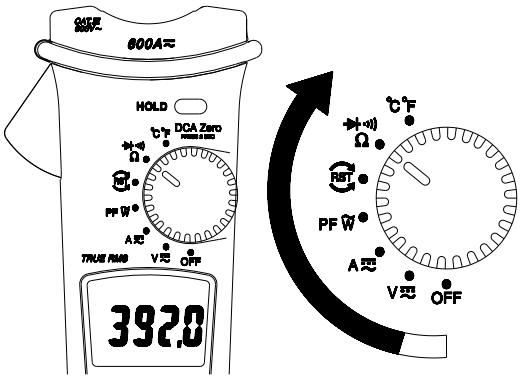
Maintenance

Do not attempt to repair this Instrument. It contains no user-serviceable parts. Repair or servicing should only be performed by qualified personnel. This instrument should be calibrated yearly, or more frequently if used in harsh conditions or if it is suspected of being inaccurate.
For calibration and repair contact RS Components - the address is given at the end of these instructions.

Cleaning

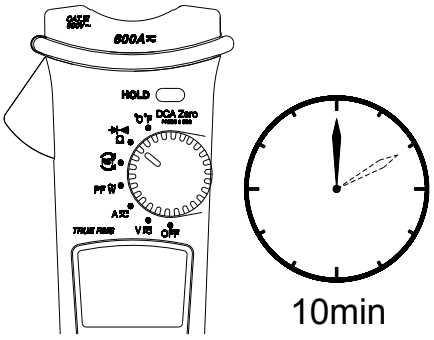
Periodically wipe the case with a damp cloth and detergent. Do not use abrasives or solvents.

Power On/ Off



Auto Power Off

The Auto Power-off function will turn the instrument off approximately 10 minutes after the last operation. To turn the instrument on again, turn the rotary switch to the off position and then back to the required function.



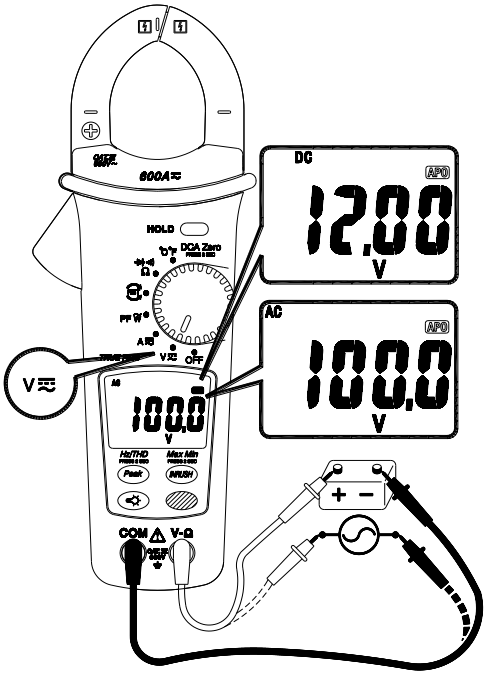
To disable the Auto Power-off function:

Turn the instrument off, press and hold the “PEAK” button and turn the rotary switch to the required function. The “APO” symbol will not appear in the display. The auto Power-off is disabled until the next time the instrument is turned off and on again.

1. VOLTAGE /CURRENT Measurement

1-1 Voltage testing procedures

1. Plug the Black test lead into the COM terminal and the Red test lead into the V-Ω terminal.
2. Set the rotary switch to the **V⎓⎓** position.
3. Connect the test leads to the device to be measured.
4. Read the value from digital display.

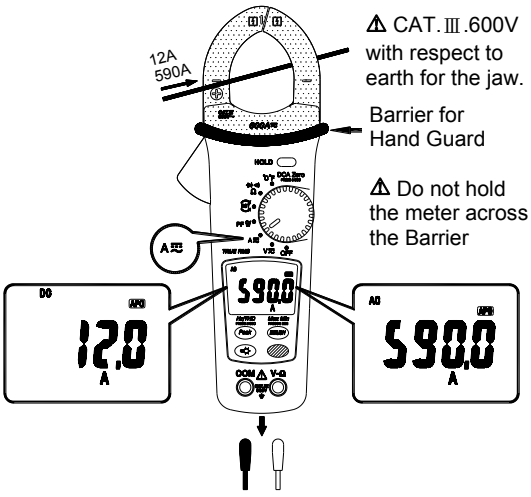


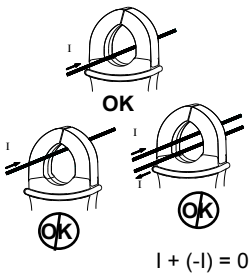
- If the measured voltage is greater than 42 V DC or AC RMS, the display will show "⚠" and the buzzer beeps three times.
- If the measured voltage exceeds 600 V DC or AC RMS, the display will show "**OL**".
- If the measured frequency exceeds 1000 Hz , the display will show " **out. F** ".

1-2 Current testing procedure

Note : Do not clamp the jaws around a conductor while the instrument power is on.

1. Press the trigger to open the transformer jaws and clamp around one conductor only. Ensure the jaw is firmly closed around the conductor.
2. Set the rotary switch to the **A≂** position.
3. Read the value from digital display.



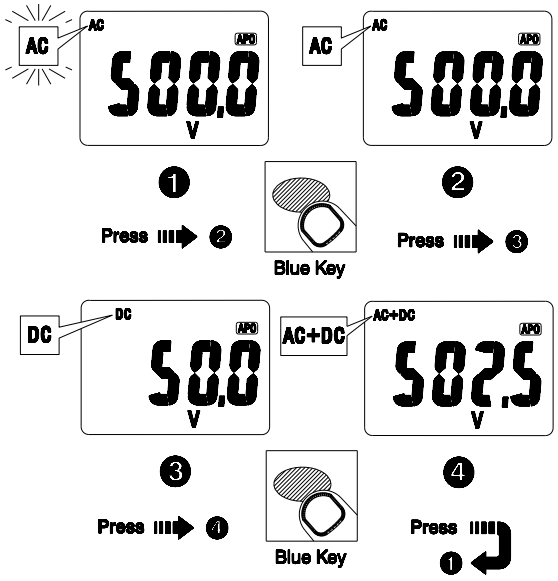


I + (-I) = 0

- If the measured current exceeds 620 A DC or AC RMS, the display will show "**OL**" .
- If the measured frequency exceeds 1000Hz , the display will show " **out. F** ".

1-3 Button Function

1-3-1 BLUE BUTTON: Press the Blue button to choose Auto AC or DC, AC, DC, or AC+DC measurement.



❶ **Auto AC/DC mode (AC or DC flashing):**
The displayed value will be the AC only RMS value or the DC value, whichever is greater.

❷ **AC mode :** AC only with RMS value.

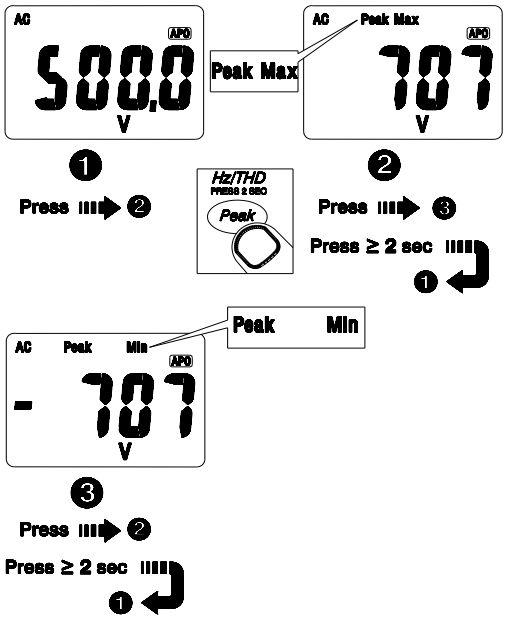
❸ **DC mode :** DC value.

❹ **AC+DC mode :** AC+DC RMS value.

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

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

a. PEAK HOLD



❶ **Normal:** Normal Operation.

❷ **Peak Max :** The instrument is activated to save the positive peak value and the negative peak value. The positive peak value is displayed.

❸ **Peak Min :** The instrument is activated to save the positive peak value and negative peak value. The negative peak value is displayed.

NOTE: Press the **HOLD** button in **PEAK HOLD** mode to stop the instrument updating the positive and negative peak values. When the **HOLD** mode is nested in **PEAK HOLD** mode, the **HOLD** mode must be released before the **PEAK HOLD** mode.

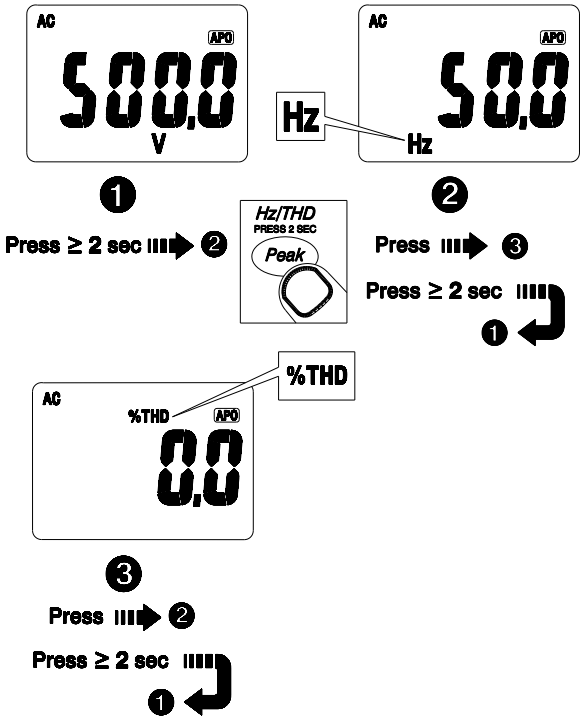
Overrange display :

OL: Peak Max value > 850V or > 850 A

-OL: Peak Min value < -850V 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:

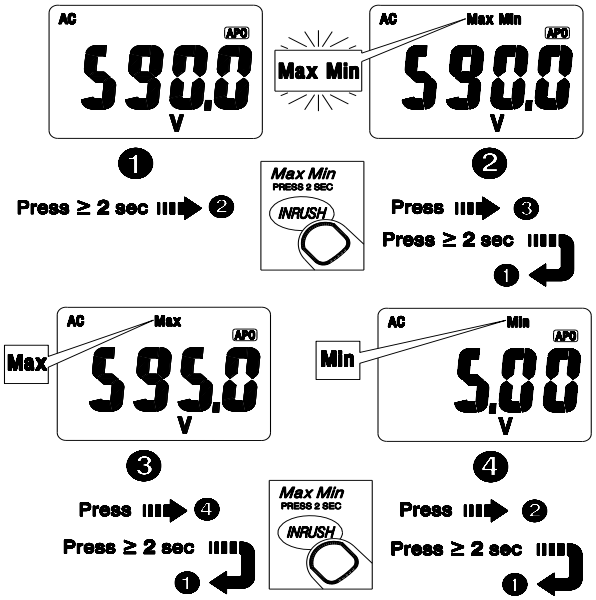
OL.U : Voltage overload (Vrms > 600V)

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

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

a. MAX MIN MODE:

- MAX MIN MODE is available for all functions.



❶ Normal : Normal Operation.

❷ MAX MIN (flashing) : The instrument is activated to save the maximum and minimum value. The present value is displayed.

❸ MAX : The instrument is activated to save the maximum and minimum value. The maximum value is displayed.

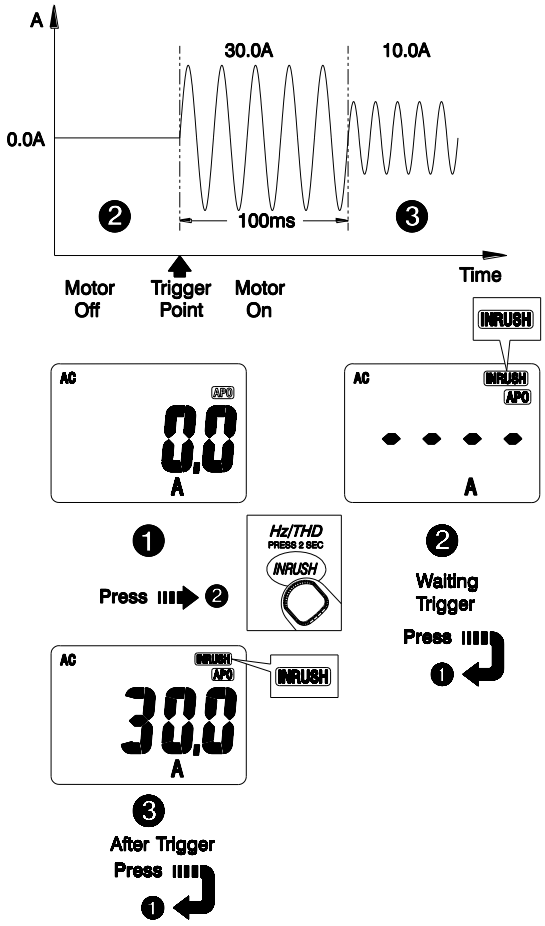
❹ MIN : The instrument is activated to save the maximum and minimum value. The minimum value is displayed.

NOTE :

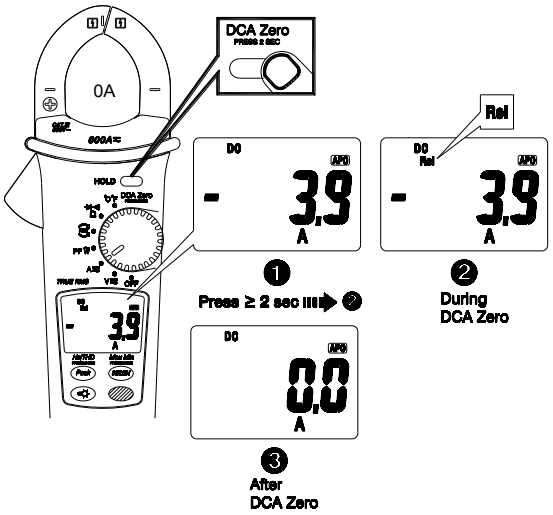
- Press the **HOLD** button in **MAX MIN** mode to stop the instrument updating the maximum and minimum values. When the **HOLD** mode is nested in **MAX MIN** mode, the **HOLD** mode must be released before the **MAX MIN** mode.

- Auto Power Off is disabled in **MAX MIN** mode.

b. INRUSH CURRENT : ACA ONLY



1-3-4 DCA ZERO： Remove the Jaws out of the conductor.
Press the **HOLD BUTTON** >2 sec to compensate the residual magnetism.

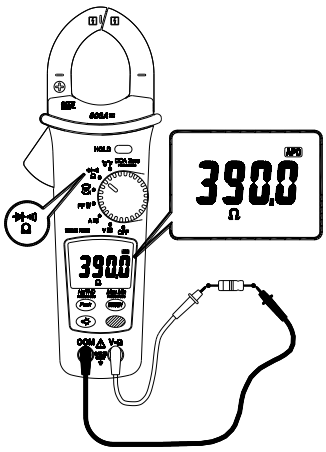


- Auto DC, DC, and AC+DC MODE are available for current measurement.

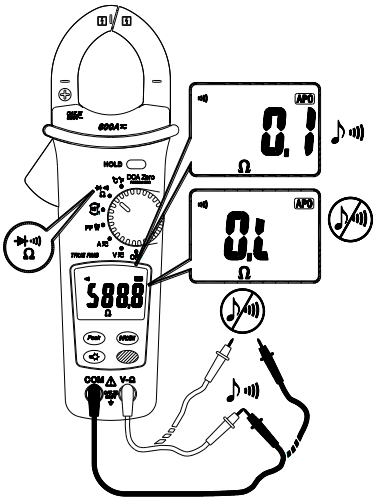
2. Resistance Measurement

Press the blue button to choose Resistance measurement, Continuity check or Diode test mode.

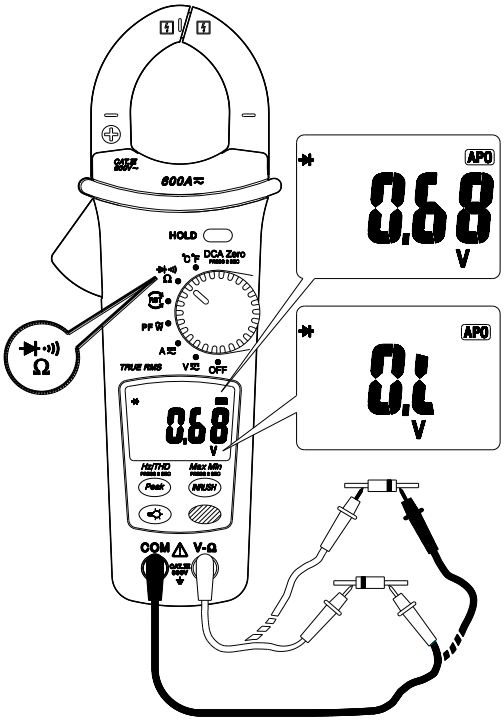
Resistance measurement



Continuity check



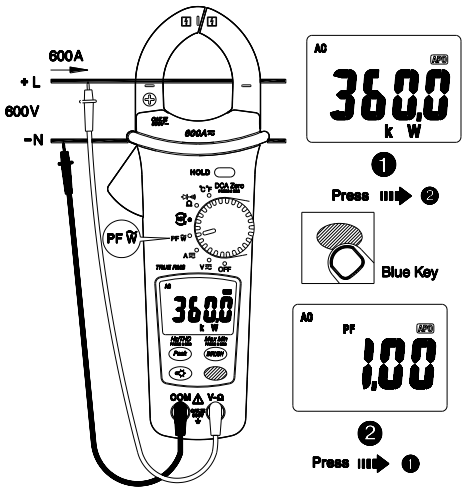
Diode testing



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

3-1 Single Phase Power Measurement

1. Plug the Black test lead into the COM terminal and the Red test lead into the V-Ω terminal.
2. Set the rotary switch to the PF Ŵ position.
3. Connect the Red test lead to the L, and the Black test lead to the N.
4. Press the trigger to open the transformer jaws and clamp around one conductor only. Ensure the jaw is firmly closed around the conductor.
5. PRESS the BLUE button to choose between Active Power (W) or POWER FACTOR (PF).



NOTE : For correct indication, the " **+** " symbol on the jaw must face the power source side.
Active power polarity indication: 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.

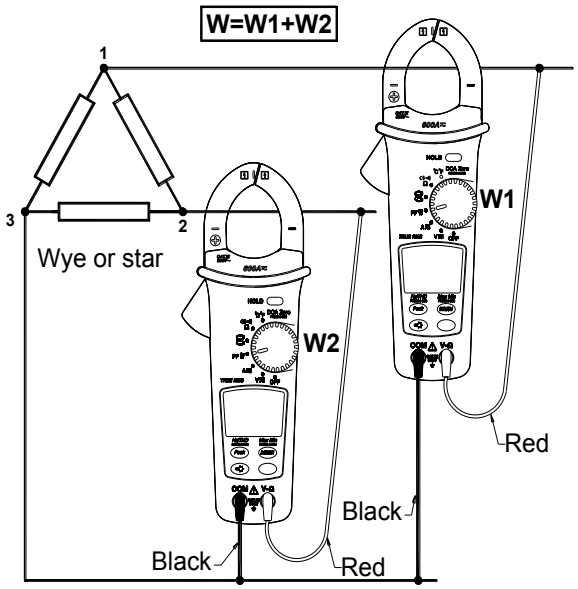
Power factor polarity indication:
No sign : The phase of the current signal is lagging behind the voltage signal (inductive load).
"_" sign : The phase of the current signal is leading the voltage signal (capacitive load).

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 > 600V)
OL.A : Current overload (Arms > 620A)
OL.UA : Both Voltage and current overload.
±OL kW : Active Power > 372 kW or < -372 kW.

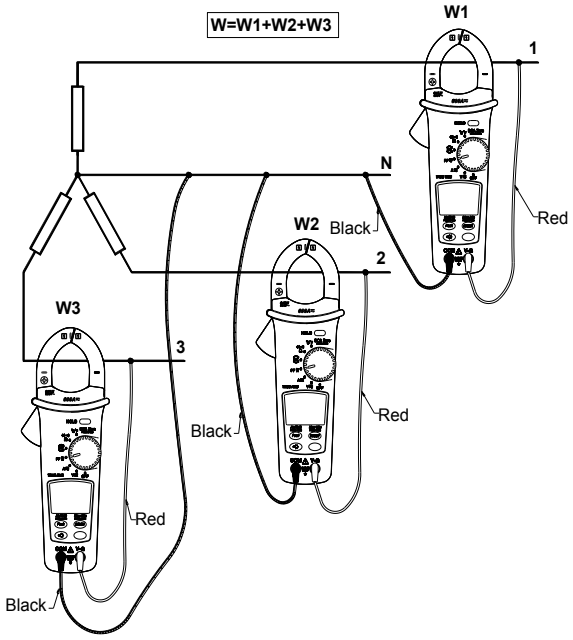
3-2 Three Phase Power Measurement

a. 3-phase 3 wire balanced / unbalanced
Set the rotary switch to the **PF W** position.

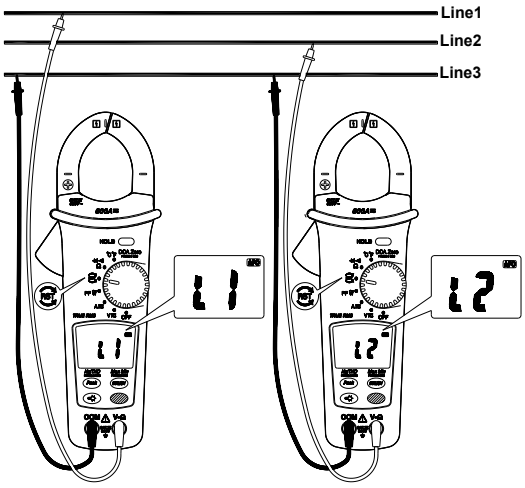


b. 3- phase 4 wire balanced / unbalanced

Set the rotary switch to the **PF W̃** position



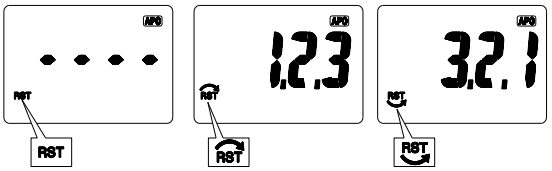
4. Phase Rotation



NOTE :

- Connect the three phases of the power source as shown above.
- The test is only possible while the system frequency is stable.

1. Plug the Black test lead into the COM terminal and the Red test lead into the V-Ω terminal.
2. Set the rotary switch to the " RST " position.
3. Connect the Red test lead to the supposed phase 1, and the Black test lead to the supposed phase 3.
   a. If the voltage < 30V, it display will show "**Lo V**" ; if voltage > 600V, then it will show "**OL V**".
   b. If the frequency is not 50 Hz or 60 Hz, then it will display "**out. F** ".
   c. If the voltage and frequency are normal, the display will show "**L1**" for about 3 sec.
4. If the display shows "**L2**", the BUZZER will sound twice. Connect the Red test lead to the supposed phase 2 before the "**L2**" has disappeared.
5. When "**L2**" has disappeared, the display will show the testing result.



a. If it displays " **1.2.3 ",** then the phase sequence is a **forward sequence**, which means the supposed phase 1 is ahead of the supposed phase 2.

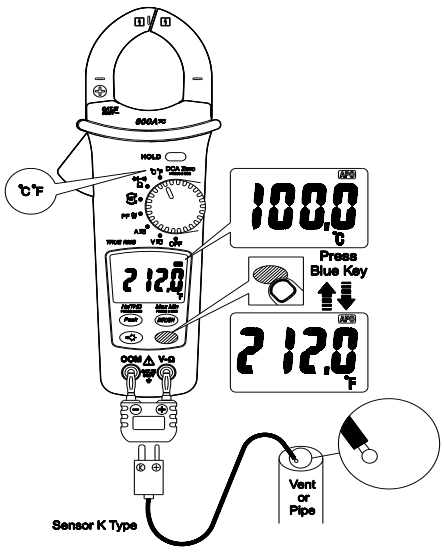
b. If it displays " **3.2.1** ", then the phase sequence is **reversed sequence**, which means the supposed phase 2 is ahead of the supposed phase 1.

c. If the display shows "— — — —" means it is unable to judge.

d. If the display shows "**Lo V**", it is possible the test leads were removed before the instrument could determine the correct sequence. Repeat the test.

6. Press Blue button to repeat the test.

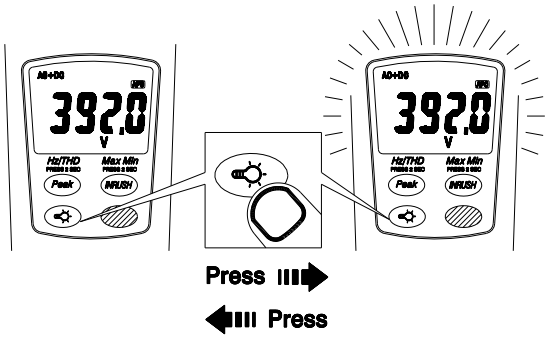
5. °C/°F Measurement



6. OTHER BUTTON FUNCTION

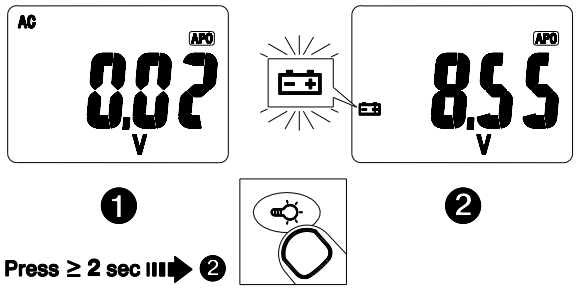
6-1 YELLOW BUTTON

6-1-1 DISPLAY BACKLIGHT



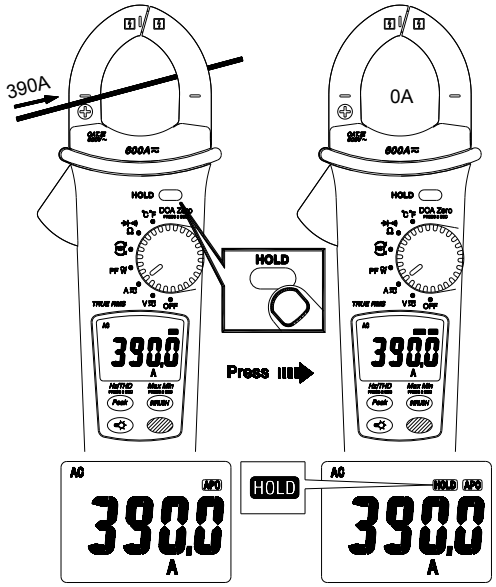
Press the yellow LIGHT BUTTON, to turn the backlight on. Press the button again to turn the backlight off otherwise the backlight will automatically turn off after approx. 30 sec.

6-1-2 BATTERY VOLTAGE CHECK



Press the yellow LIGHT BUTTON > 2 sec and the display will show the internal Battery Voltage. The minimum useable battery voltage is 7.00V. Replace the battery when the voltage is 7.00V or less.

6-2 HOLD BUTTON



Press the HOLD BUTTON to freeze the displayed value. Press it again to unfreeze the display and return to normal operation.

7. Buzzer

The Instrument beeps once for every valid button-press, and beeps twice for every invalid button-press.

8. Power-up options

Press the following buttons while turning the instrument on to enable the following functions:

PEAK BUTTON : disable auto power off.

INRUSH BUTTON : display of the software version.

HOLD BUTTON : display all LCD symbols approx 10sec.

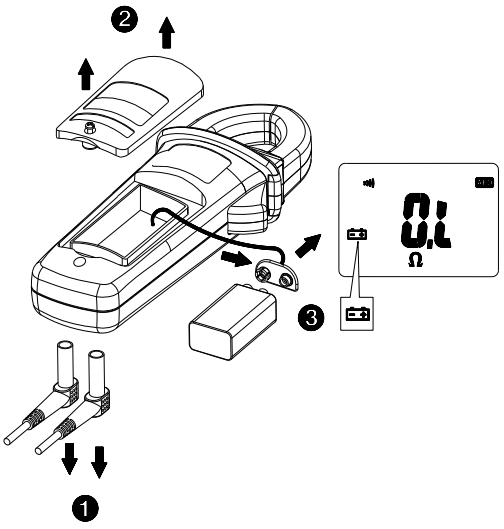
Battery Replacement

When the low battery indicator "＋" appears on the LCD, replace the battery with the type given in the specifications.

⚠ WARNING

Disconnect the test leads from the circuit and the instrument before removing the battery cover.

Refer to the following figure to replace the battery :



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 shown in the display. Replace the battery when the indicator ＋ appears.
Minimum battery voltage 7.00V
Power requirement :
9V battery Type 6LR61, IEC6LF22 or equivalent)
Battery life: Approximately 50 hours with an Alkaline battery.

1-2 Environmental Conditions

Indoor use only.
0°C to 30°C (32°F to 86°F) @ ≦80% RH
30°C to 40°C (86°F to 104°F) @ ≦75% RH)
40°C to 50°C (104°F to 122°F) @ ≦45%RH
Storage temperature :
-10 to +50°C (14°F to 122°F) @ 0 to 80% RH with batteries removed from the instrument.
Measurement Category (Installation Category) :
per IEC 61010-1: 2010 CAT.Ⅲ 600V Pollution Degree 2
Measurement Category I is for measurements performed on circuits not directly connected to mains. Examples include: Measurements on battery powered equipment and specially protected (internal) mains-derived circuits.
Measurement Category II is for measurements on circuits directly connected to the low voltage installation. Examples include: Household appliances, portable tools and similar equipment.
Measurement Category III is for measurements performed in the building installation. Examples include measurements on distribution boards, junction boxes, socket-outlets and wiring and cables in the fixed installation.
Measurement Category IV is for measurements performed at the source of the low-voltage installation. Examples include measurements on primary overcurrent protection devices and electricity meters.
Operating altitude: 2000m (6562 ft)
Conductor Size: Maximum 35mm diameter.
EMC: EN 61326-1

Shock and vibration: Sinusoidal vibration per MIL-T-28800E (5 ~ 55 Hz, 3g maximum).
Drop Protection: 4 feet drop onto hardwood or concrete floor.

1-3 Electrical Specifications

Accuracy is ±(% reading + number of digits) at 23°C ± 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	±(0.7%+ 5 dgt)
ACV	60.00V 600.0V	±(1.0% + 5 dgt) 45 Hz ~ 500 Hz

Overload protection : 600Vrms
Input impedance : 3MΩ // 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	±(1.5%+ 5 dgt)
ACA	600.0A	±(1.5% + 5 dgt) 45 Hz ~ 65 Hz ±(2.5% + 5 dgt) 66 Hz ~ 400 Hz

Overload protection : 600Arms
Position Error : ±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 button >2sec to compensate.

Peak Hold : Peak Max / Peak Min

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

Overload protection : 600Vrms/600Arms
Accuracy defined for :
Sine wave, ACV>5Vrms / ACA≧5Arms, Freq.50~400Hz.
- Only suitable for repetitive signals.

Frequency : Hz

Range	Accuracy
20.0 ~ 399.9 Hz 400 ~ 4000 Hz	±(0.1% + 5 dgt)

Overload protection : 600Vrms/600Arms
Sensitivity :
5Vrms for ACV, 5Arms for ACA (>400Hz Unspecified)
- The reading will be 0.0 for signals below 10.0 Hz.

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

Function	Range	Accuracy
ACV / ACA	100.0%	±(3% + 10 dgt)

Overload protection : 600Vrms/600Arms
- If ACV<10Vrms or ACA <10Arms, it will display "**rdy**".
- If the fundamental frequency is out of range 45 ~ 65Hz, the display will show "**out.F**".

Inrush Current :

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

Overload protection : 600Arms
Accuracy defined for :
Sine wave, ACA≧10Arms, Freq. 50/60Hz
- Integration time about 100m sec

Active Power : Watts

Function	Range	Accuracy
W~	4.000 kW 40.00 kW 360.0 kW	Add the errors of Voltage and current.

Overload protection : 600Vrms/600Arms
Accuracy defined for :
Sine wave, ACV≧10Vrms, ACA≧5Arms
Freq. 45~65Hz, PF=1.00

- The reading of Active Power may fluctuate due to small changes in current when measured using the 4.000 kW range.

Power Factor: PF = Watt ÷ (V×A)

Function	Range	Accuracy
PF	-1.00 ~ 0.00 ~1.00	±3°

Overload protection : 600Vrms/600Arms

Resistance, Continuity & Diode testing

Function	Range	Accuracy
Resistance	600.0 Ω 6.000 kΩ 20.00 kΩ	±(1%+ 5 dgt)
Continuity	600.0 Ω	±(1%+ 5 dgt)
Diode	2.00V	±(1.5% + 5dgt) for 0.4V ~ 0.8V

Overload protection : 600Vrms
Max. Open Circuit voltage for Diode : 3.0V
Max. Open Circuit voltage for Ω ,🔊 : 2.4V
Continuity check :
The internal buzzer activates if the resistance of the circuit under test is less than 30Ω 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 for an ambient temperature stability of within ±1°C. The instrument requires a 1 hour stabilization period for ambient temperature changes of more than ±1°C.

Limited Warranty

This instrument is warranted to the original purchaser against defects in material and workmanship for 3 years from the date of purchase. During this warranty period, RS Components will, at its option, replace or repair the defective unit, subject to verification of the defect or malfunction. This warranty does not cover disposable batteries, fuses 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. RS Components 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. For full terms and conditions, refer to the current RS Catalogue.

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