



®

## Instruction Manual

KYORITSU ELECTRICAL INSTRUMENTS  
WORKS, LTD.

# **K2002PA**

## **2000A AC**

## **Clamp Meter**



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## Contents

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1. Safety Warnings .....	1
2. Features .....	4
3. Specifications .....	5
4. Instrument Layout .....	7
5. Preparation for Measurement	
5 – 1 Battery Voltage Check .....	8
5 – 2 Checking Switch Setting and Operation .....	8
6. Measurement	
6 – 1 Current Measurement .....	9
6 – 2 Voltage Measurement .....	11
6 – 3 Resistance Measurement .....	12
7. Notes on Functions	
7 – 1 Data Hold .....	14
7 – 2 Sleep Function .....	14
7 – 3 Output for Recorder .....	15
7 – 4 Mode Switching Function .....	16
8. Battery Replacement .....	17
9. Optional Accessories .....	18
10. Disposing the Product .....	18

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# 1 . Safety Warnings

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- This instrument has been designed and tested according to IEC Publication 61010 ; Safety Requirements for Electronic Measuring Apparatus. This instruction manual contains warnings and safety rules which must be observed by the user to ensure safe operation of the instrument and to retain it in safe condition. Therefore, read through these operating instructions before starting using the instrument.



## WARNING

- Read through and understand instructions contained in this manual before starting to use the instrument.
- Save and keep the manual handy to enable quick reference whenever necessary.
- Be sure to use the instrument only in its intended applications and to follow measurement procedures described in the manual.
- Be sure to understand and follow all safety instructions contained in the manual.

Be sure to observe the above instructions.


Failure to follow the above instructions may cause injury, instrument damage and/or damage to equipment under test.

Major Tech is by no means liable for any damage resulting from the instrument in contradiction to this cautionary note.

- The symbol  indicated on the instrument means that the user must refer to related parts in the manual for safe operation of the instrument. Be sure to carefully read the instructions following each  symbol in this manual.

 **DANGER** is reserved for conditions and actions that are likely to cause serious or fatal injury.

 **WARNING** is reserved for conditions and actions that can cause serious or fatal injury.

 **CAUTION** is reserved for conditions and actions that can cause minor injury or instrument damage.

- Following symbols are used on the instrument and in the instruction manual. Attention should be paid to each symbol to ensure your safety.



Refer to the instructions in the manual.



Indicates an instrument with double or reinforced insulation.



Indicates that this instrument can clamp on bare conductors when measuring a voltage corresponding to the applicable Measurement category, which is marked next to this symbol.



Indicates AC (Alternating Current).



Indicates DC (Direct Current).



Indicates AC and DC.



Indicates Earth.



Crossed-out wheel bin symbol (according to WEEE Directive: 2002/ 96/ EC) indicating that this electrical product may not be treated as household waste, but that it must be collected and treated separately.

### DANGER

- Never make measurement on the circuit above 750VAC or 1000VDC.
- Do not attempt to make measurement in the presence of flammable gasses, fumes, vapor or dust. Otherwise, the use of the instrument may cause sparking, which can lead to an explosion.
- Transformer jaw tips are designed not to short the circuit under test. If equipment under test has exposed conductive parts, however, extra precaution should be taken to minimize the possibility of shorting.
- Never attempt to use the instrument if its surface or your hand is wet.
- Do not exceed the maximum allowable input of any measurement range.
- Never open the battery compartment cover and the instrument case when making measurement.
- Verify proper operation on a known source before use or taking action as a result of the indication of the instrument.
- Never try to make measurement if any abnormal conditions, such as broken Transformer jaws or case is noted.
- The instrument is to be used only in its intended applications or conditions. Otherwise, safety functions equipped with the instrument doesn't work, and instrument damage or serious personal injury may be caused.
- Keep your fingers and hands behind the protective fingerguard during measurement.

### WARNING

- Never attempt to make any measurement if any abnormal conditions are noted, such as broken case, cracked test leads and exposed metal parts.
- Do not turn the function selector switch with test leads connected to the instrument.
- Do not install substitute parts or make any modification to the instrument. Return the instrument to your distributor for repair or re-calibration.
- Do not try to replace the batteries if the surface of the instrument is wet.
- Always switch off the instrument and make sure to disconnect test leads before opening the battery compartment cover for battery replacement.
- Stop using the test lead if the outer jacket is damaged and the inner metal or color jacket is exposed.

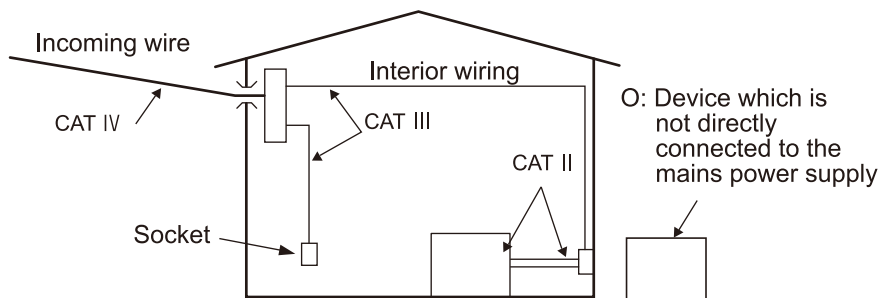
## ⚠ CAUTION

- Always make sure to check the function selector switch is set to an appropriate position before starting measurement.
- Always make sure to insert the plug of each lead fully into the appropriate terminal on the instrument.
- Be sure to set the function selector switch to the "OFF" position after use. When the instrument will not be in use for a long period, place it in storage after removing the batteries.
- Do not expose the instrument to the direct sun, high temperature or dew fall.
- Use a cloth dipped in water or neutral detergent for cleaning the instrument. Do not use abrasives or solvents.

### Measurement categories (Over-voltage categories)

To ensure safe operation of measuring instruments, IEC 61010 establishes safety standards for various electrical environments, categorized as O to CAT IV, and called measurement categories. Higher-numbered categories correspond to electrical environments with greater momentary energy, so a measuring instrument designed for CAT III environments can endure greater momentary energy than one designed for CAT II.


- O : Circuits which are not directly connected to the mains power supply.
- CAT II : Electrical circuits of equipment connected to an AC electrical outlet by a power cord.
- CAT III : Primary electrical circuits of the equipment connected directly to the distribution panel, and feeders from the distribution panel to outlets.
- CAT IV : The circuit from the service drop to the service entrance, and to the power meter and primary overcurrent protection device (distribution panel).



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## 2. Features

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- Tear-drop-shaped jaws for ease of use in crowded cable areas and other tight places.
- Provides a wide measuring range from 0 up to 2000A.
- Terminal cover to avoid the use of an incorrect terminal.
- Measures current variation as short as 10 msec with peak-hold feature.
- Provides output to a chart recorder for current variation recording.
- Designed to international safety standards.  
IEC61010-1 (CAT III 600V /CAT II 1000V Pollution degree 2)  
IEC61010-031, IEC61010-2-032, IEC 61010-2-033
- Data hold function to allow easy readings in dimly lit or hard-to-read locations.
- Sleep feature to conserve battery power.
- Permits easy continuity check with a beeper.
- Provides a dynamic range of 4,000 counts full scale.
- Provides wide measuring range of voltage and resistance in auto-ranging.
- Wide frequency range from 40Hz to 1kHz (Current measuring range: 0-1500A).
- Transformer jaws fitted with guard to further improve safety.
- Protected throughout by double or reinforced insulation “” .

### 3. Specifications

#### ● Measuring Ranges and Accuracy(at $23\pm5^{\circ}\text{C}$ , relative humidity 45-75%)

##### AC Current $\sim 400\text{ A}$ , $\sim 2000\text{ A}$

Range	Measuring Range	Resolution	Accuracy (Frequency Range)	Maximum Measurement Time
400 A	0 ~ 400.0 A	0.1 A	$\pm 1.0\%\text{rdg} \pm 3\text{dgt}(50/60\text{Hz})$ $\pm 2.0\%\text{rdg} \pm 3\text{dgt}(40 \sim 1\text{ kHz})$	Continuous
2000 A	0 ~ 1000 A	1 A	$\pm 1.0\%\text{rdg} \pm 3\text{dgt}(50/60\text{Hz})$	
	1000 ~ 1500 A		$\pm 3.0\%\text{rdg} \pm 3\text{dgt}(40 \sim 1\text{ kHz})$	15min
	1500 ~ 2000 A		$\pm 3.0\%\text{rdg}$ (50/60Hz)	5 min

##### AC Voltage ( $\sim \text{V}$ ) Auto-ranging

Range	Measuring Range	Resolution	Accuracy (Frequency Range)
40 V	0 ~ 40.00 V	0.01 V	$\pm 1.0\%\text{rdg} \pm 2\text{dgt}(50/60\text{Hz})$ $\pm 1.5\%\text{rdg} \pm 3\text{dgt}(40 \sim 1\text{ kHz})$
400 V	15.0 ~ 400.0 V	0.1 V	
750 V	150 ~ 750 V	1 V	

Initially set to the 40V range. Input impedance is about  $1\text{ M}\Omega$ .

##### DC Voltage ( $\text{— V}$ ) Auto-ranging

Range	Measuring Range	Resolution	Accuracy
40 V	0 ~ $\pm 40.00\text{ V}$	0.01 V	$\pm 1.0\%\text{rdg} \pm 2\text{dgt}$
400 V	$\pm 15.0 \sim \pm 400.0\text{ V}$	0.1 V	
1000 V	$\pm 150 \sim \pm 1000\text{ V}$	1 V	

Initially set to the 40V range. Input impedance is about  $1\text{ M}\Omega$ .

##### Resistance(Auto-ranging)

Range	Measuring Range	Resolution	Accuracy
400 $\Omega$	0 ~ 400.0 $\Omega$	0.1 $\Omega$	$\pm 1.5\%\text{rdg} \pm 2\text{dgt}$
4k $\Omega$	0.150 ~ 4.000k $\Omega$	1 $\Omega$	
40k $\Omega$	1.50 ~ 40.00k $\Omega$	10 $\Omega$	
400k $\Omega$	15.0 ~ 400.0k $\Omega$	100 $\Omega$	

Initially set to the 400 $\Omega$  range. In the continuity check mode, fixed to the 400 $\Omega$  range and when the reading is not more than  $50\pm 35\Omega$ , the buzzer beeps.

##### OUTPUT (AC Current Ranges)

DC Output: 100.0mV per 1000 counts (Output impedance: about 10k $\Omega$ )

Range	Output Voltage / Measuring Range	Accuracy (Frequency Range)
400 A	0 ~ 400.0mV / 0 ~ 400 A	$\pm 1.5\%\text{rdg} \pm 0.5\text{ mV}(50/60\text{Hz})$ $\pm 2.5\%\text{rdg} \pm 0.5\text{ mV}(40 \sim 1\text{ kHz})$
2000 A	0 ~ 150.0mV / 0 ~ 1500 A	$\pm 1.5\%\text{rdg} \pm 0.5\text{ mV}(50/60\text{Hz})$ $\pm 3.5\%\text{rdg} \pm 0.5\text{ mV}(40 \sim 1\text{ kHz})$
	150.0 ~ 200.0mV / 1500 ~ 2000 A	$\pm 3.5\%\text{rdg}$ (50/60Hz)

#### ● Electromagnetic compatibility (EMC)

EN61000-4-3 Radiated RF electromagnetic field immunity

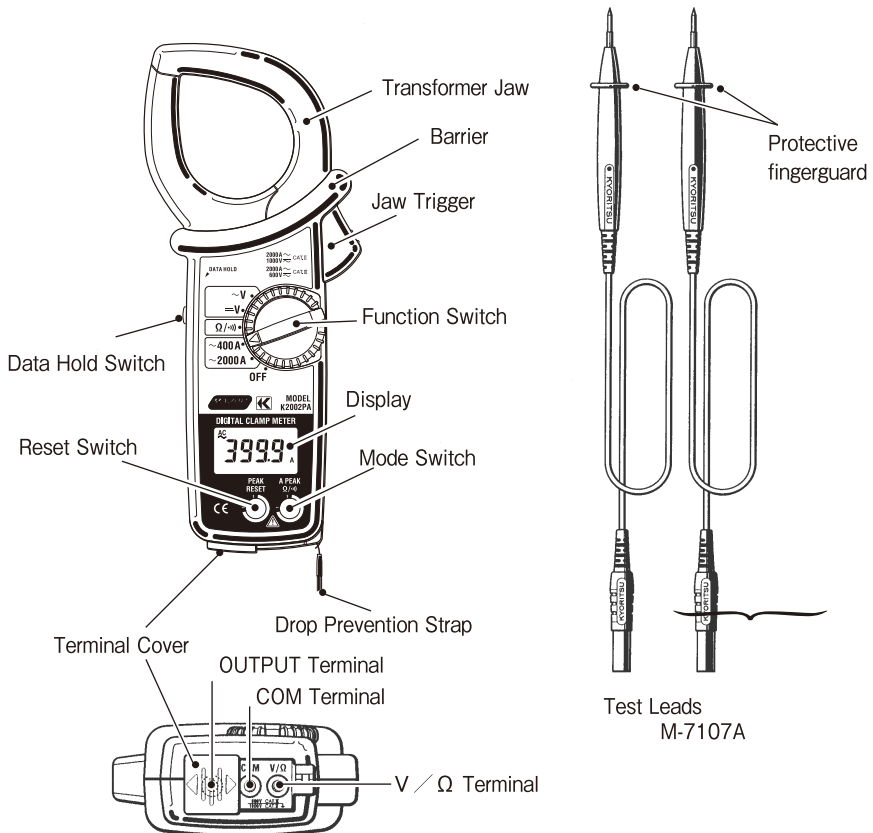
RF field strength =  $\leq 1\text{ V/m}$ , total accuracy : specified accuracy

RF field strength =  $3\text{ V/m}$ , total accuracy : specified accuracy + 2 % of range

● Operating System	Dual Integration
● Display	Liquid crystal display with a maximum count of 4000
● Low Battery Warning	"BATT" symbol is displayed on the digital display.
● Overrange Indication	"OL" is displayed where input exceeds the upper limit of a range
● Response Time	Approx. 2 seconds
● Sleep function	Automatically powered down in about 10 minutes after the last switch operation
● Data Hold	Available in all ranges provided the peak measurement mode is deactivated.
● Operating Environmental conditions	indoor use
● Storage Temperature and Humidity	altitude up to 2000m
● Operating Temperature and Humidity	— 20 ~ 60°C , relative humidity up to 85% without condensation
● Conductor Size	0 ~ 40°C , relative humidity up to 85% without condensation
● Overload Protection	Approx. 54.5 diameter max.
	2400A AC for 10sec
	1200V AC/DC for 10sec
	600V AC for 10sec
● Withstand Voltage	5160V AC for 5 seconds between electrical circuit and housing cases or metal parts of jaws
● Insulation Resistance	10M $\Omega$ or greater at 1000V between electrical circuit and housing cases or metal parts of jaws
● Safety Standard	IEC 61010-1, 61010-2-032, 61010-2-033, 61010-031: Measurement CAT III 600V/ CAT II 1000V, pollution degree 2.
● EMC	EN 61326-1
● RoHS	EN 50581
● Dimensions	247 (L) $\times$ 105 (W) $\times$ 49 (D) mm
● Weight	Approx. 470g(battery included)
● Power Source	Two R6P(DC1.5V) batteries or equivalent
● Current Consumption	Approx. 5mA max. (Approx. 20 $\mu$ A in the sleep mode)
● Accessories	Test leads M-7107A
	Two R6P batteries
	Instruction manual
	Carrying case M-9094
● Optional Accessories	Multi-Tran M-8008
	Output Probe M-7256, etc.

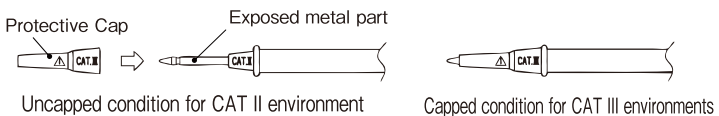


## 4. Instrument Layout



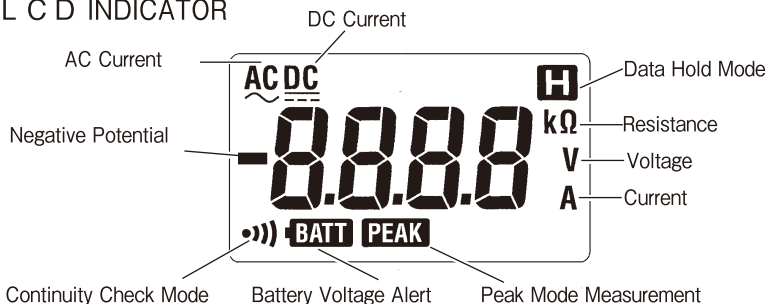
**Barrier and Protective fingerguard:** It is a part providing protection against electrical shock and ensuring the minimum required air and creepage distances.

**Test Lead Cap :** Test leads can be used under the CAT II and III environments by attaching a Protective cap as illustrated below. Use of our Protective cap offers different lengths suitable for the test environments.



When the instrument and the test lead are combined and used together, whichever lower category either of them belongs to will be applied.

## ● L C D INDICATOR



## 5. Preparation for Measurement

### 5 — 1 Checking Battery Voltage

- ① Set the function selector switch to any position other than "OFF".
- ② When the display is clear without "BATT" showing, proceed to measurement.
- ③ When the display blanks or "BATT" is indicated, replace the batteries according to section 8: battery replacement.

### NOTE

- It is possible that display is kept in blank while the function selector switch is set to a position other than "OFF". This is due to sleep function which automatically powers the instrument down in a certain period of time after the last switch operation. To operate the instrument in this case, set the switch back to the "OFF" position, then to the desired position, or press any button.

### 5 — 2 Checking Switch Setting and Operation

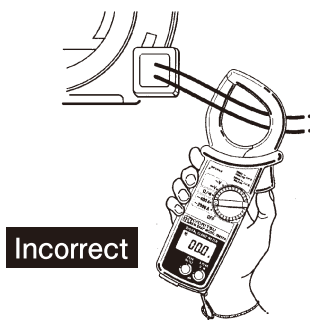
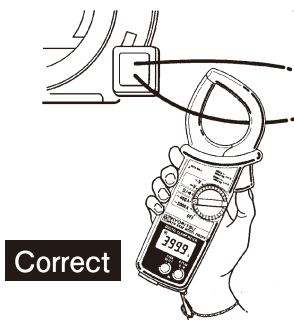
Make sure that the function selector switch is set to the correct position, the instrument is set to the correct mode and the data hold function is deactivated. Otherwise, desired measurement cannot be made. (See section 6 for measurement instructions and section 7 for notes on functions.)

## 6. Measurement

### 6 — 1 Current Measurement

#### ⚠ WARNING

- Do not make measurement on a circuit above 750V AC. This may cause shock hazard or damage to the instrument or equipment under test.
- Transformer jaw tips are designed not to short the circuit under test. If equipment under test has exposed conductive parts, however, extra precaution should be taken to minimize the possibility of shorting.
- Do not make measurement with the battery compartment cover removed from the instrument.
- Do not make current measurement with the test leads connected to the V/  $\Omega$  and COM terminals.
- When measuring current is not less than 1000A, make sure to stop measurement within the maximum measuring time shown below.  
1000 ~ 1500 A : 15min. 1500 ~ 2000 A : 5 min.
- Keep your fingers and hands behind the barrier during measurement.



#### 6 — 1 — 1 AC Current Measurement (Normal Mode)

- ① Set the function selector switch to the " $\sim$  400A" or " $\sim$  2000A" position and make sure that the current under test does not exceed the upper limit of the measuring range you are selecting.
- ② Press the trigger to open the transformer jaws and clamp them onto the conductor under test.

- ③ Take the reading on the display.

## NOTE

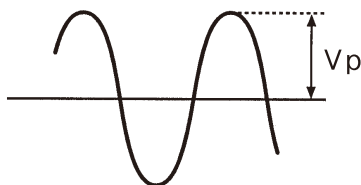
- During current measurement, keep the transformer jaws fully closed. Otherwise, accurate measurement cannot be made. The maximum measurable conductor size is 54.5mm in diameter.
- When measuring a larger current, the transformer jaws may buzz. This is not a fault and does not affect the accuracy at all.

## 6 — 1 — 2 Peak Current Measurement

- ① Set the function selector switch to the " ~ 400A " or " ~ 2000A " position.
- ② Press the mode switch to select the peak mode. "PEAK" will be shown on the display.
- ③ Press the trigger to open the transformer jaws and clamp them onto the conductor under test. Then, press the reset switch.
- ④ The display shows the current's crest value divided by the square root of two. Therefore, when the current is sinusoidal, the reading equals RMS value.
- ⑤ To reset the display, press the reset switch.

(Note: When this is done, the reading goes off for about one second.)

INPUT Current



Peak Hold



- ⑥ After the measurement is over, press the mode switch to return to the normal mode.

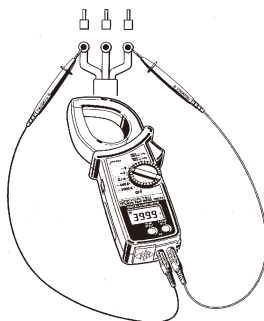
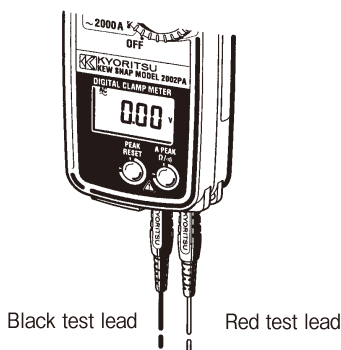
## NOTE

- In the peak measurement mode, the data hold feature is disabled.

## 6 — 2 Voltage Measurement

### WARNING

- Do not make measurement on a circuit above 750V AC or 1000V DC. This may cause shock hazard or damage to the instrument or equipment under test.
- Do not make measurement with the battery compartment cover removed.
- Keep your fingers and hands behind the Protective fingerguard during measurement.



### 6 — 2 — 1 DC Voltage Measurement

- ① Set the function selector switch to the " — V " position.
- ② Slide the terminal cover to the left. Plug the red test lead into the V/Ω terminal and the black test lead into the COM terminal.
- ③ Connect the other end of the test leads to the circuit under test. Take the reading on the display. When the red lead is the negative potential, the " — " sign is shown on the display.

### 6 — 2 — 2 AC Voltage Measurement

- ① Set the function selector switch to the " ~ V " position.
- ② Slide the terminal cover to the left. Plug the red test lead into the V/Ω terminal and the black test lead into the COM terminal.
- ③ Connect the other end of the test leads to the circuit under test. Take the reading on the display.

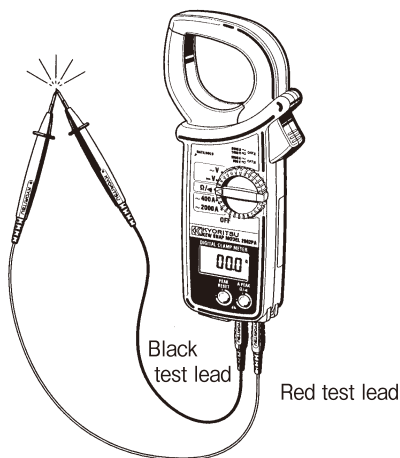
### NOTE

- For high sensitivity, there are parts which do not indicate " 0 ".

## 6 — 3 Resistance Measurement

### **⚠ WARNING**

- Before attempting to make measurement, make sure that the circuit under test is not live. The instrument is protected against a voltage up to 600V.
- Do not make measurement with the battery compartment cover removed.
- Keep your fingers and hands behind the Protective fingerguard during measurement.



### 6 — 3 — 1 Resistance Measurement (Normal Mode)

- ① Set the function selector switch to the " $\Omega / \cdot \Omega$ " position.
- ② Slide the terminal cover to the left. Plug the red test lead into the V/ $\Omega$  terminal and the black test lead into the COM terminal.
- ③ Short the tip of the test leads and check whether the display reads "0".
- ④ Connect the tip of the test leads to the circuit under test. Take the reading on the display.

### NOTE

- When shorting the tip of the test leads, the display may read a very small resistance instead of "0." This is the resistance of the test leads, not a fault.
- If one of the test leads is open, the display reads "OL".

## 6 — 3 — 2 Continuity Check

- ① Set the function selector switch to the " $\Omega / \cdot \gg$ " position.
- ② Slide the terminal cover to the left. Plug the red test lead into the V/ $\Omega$  terminal and the black test lead into the COM terminal.
- ③ Press the mode switch to set the instrument to the continuity check mode. The measuring range is fixed to 400  $\Omega$  and the " $\cdot \gg$ " symbol is shown on the display.
- ④ Short the tip of the test leads and make sure that the display reads "0" and the buzzer beeps.
- ⑤ Connect the tip of the test leads to the circuit under test. The display reads the resistance and the buzzer beeps when the reading is not more than about 50  $\Omega$ .

### NOTE

- When shorting the tip of the test leads, the display may read a very small resistance instead of "0". This is the resistance of the test leads, not a fault.
- If one of the test leads is open, the display reads "OL".

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## 7. Notes on Functions

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### 7 — 1 Data Hold

This is a function used to freeze the measured value on the display.

- ① Press the data hold switch. The reading becomes frozen and the "H" symbol is shown on the display, indicating the instrument in the data hold mode.
- ② To exit the data hold mode, press the data hold switch again to release it.

#### NOTE

- When the function selector switch is turned while the instrument is in the data hold mode, the data hold function remains activated. To make measurement in this case, release the data hold switch by pressing it and exit the data hold mode.
- The data hold function is disabled in the peak measurement mode on the AC current range.
- When the sleep function is activated, the data hold mode turns to the normal mode.

### 7 — 2 Sleep Function

This is a function to prevent the instrument from being left powered on in order to conserve battery life.

- ① The instrument automatically enters the sleep (powered-down) mode about 10 minutes after the last switch operation.
- ② To exit the sleep mode, press the data hold, reset or mode switch or turn the function selector switch back to "OFF", then to any other position.

#### [How to Exit the Sleep Mode]

- ① Turn the function selector switch from "OFF" to another position with the data hold switch pressed. Then, "P.OFF" is shown on the display. This disables the sleep function and enables continuous use of the instrument.



- ② To enable the sleep function, turn the function selector switch back to "OFF", then to any other position.

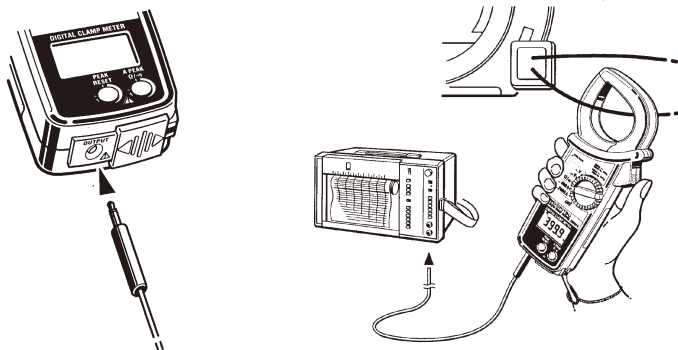
## NOTE

- The instrument consumes small amount of current in the sleep mode. When the instrument is not in use, make sure to set the function selector switch to "OFF".

## 7 — 3 Recorder Output

Only on the " $\sim 400\text{A}$ " or " $\sim 2000\text{A}$ " range, DC voltage proportional to the input current is output from the OUTPUT terminal.

- ① Set the function selector switch to the " $\sim 400\text{A}$ " or " $\sim 2000\text{A}$ " position.
- ② Slide the terminal cover to the right and insert the recorder output plug into the OUTPUT terminal for connection with a recorder or other recording device.



## NOTE

- Output voltage is  $1\text{mV/A}$  on the " $\sim 400\text{A}$ " range and  $0.1\text{mV/A}$  on the " $\sim 2000\text{A}$ " range. Set an appropriate input sensitivity on the recorder.
- The peak hold function does not apply to the recorder output even if the instrument is in the peak hold mode.
- For long term measurement, disable the sleep function. (See section 7-2 for sleep function.)

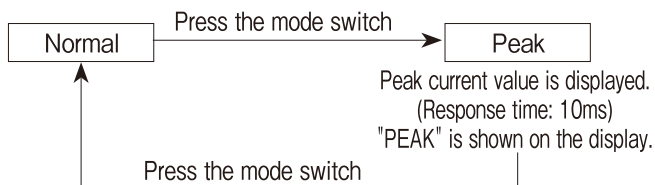
## DANGER

Never apply voltage to the output terminal.

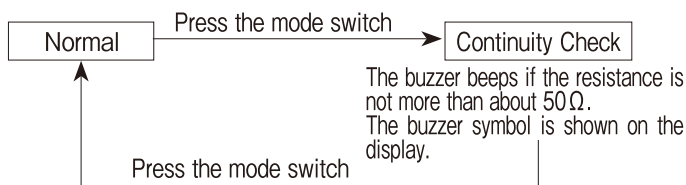
### 7 - 4 Mode Switching Function

On a AC current (" ~ 400A" or " ~ 2000A") or the resistance( $\Omega$  /  $\cdot$ ) range, press the mode switch to cycle through the measurement modes. The instrument is initially set to the normal mode and can be switched to the peak or continuity check mode by means of the mode switch. (See section 6-1-2 for peak current measurement and section 6-3-2 for continuity check.)

#### « AC Current Range(400A or 2000A) »



#### « Resistance Range »



## 8. Battery Replacement

### WARNING

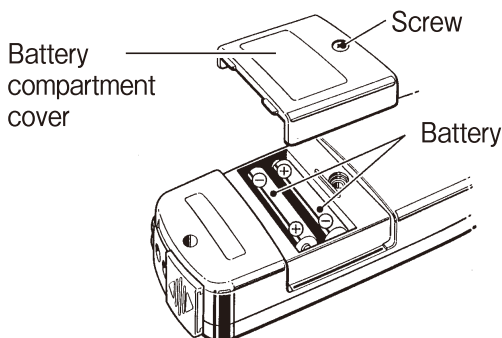
- To avoid electric shock hazard, make sure to set the function selector switch to "OFF" and remove the test leads from the instrument before trying to replace batteries.

### CAUTION

- Do not mix new and old batteries.
- Make sure to install batteries in correct polarity as indicated in the battery compartment.

### NOTE

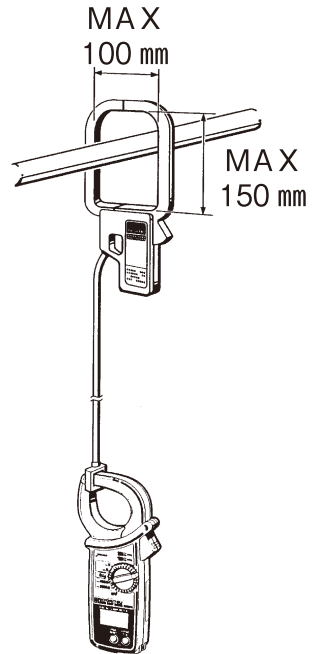
- If the instrument is powered on, but the display blanks or "BATT" is shown on the display, replace the batteries.
- ① Set the function selector switch to the "OFF" position.
  - ② Unscrew and remove the battery compartment cover on the bottom of the instrument.
  - ③ Replace the batteries observing correct polarity. Use two new R6P batteries.
  - ④ Replace and screw the battery compartment cover.



## 9. Optional Accessories

- Multi-Tran MODEL 8008 extends the capability of MODEL K2002PA's, allowing measurement up to 3000A or on a large bus-bar or conductor.

- ① Set the function selector switch to " $\sim$  400A"
- ② As shown in the figure below, clamp MODEL K2002PA onto the pickup coil of MODEL 8008.
- ③ Clamp MODEL 8008 onto the bus-bar or conductor under test.
- ④ Take the reading on MODEL K2002PA and multiply it by 10.



## 10. Disposing the Product

**Waste Electrical and Electronic Equipment (WEEE), Directive 2002/96/EC**  
This Product complies with the WEEE Directive (2002/96/EC) marking requirement.

The affixed product label (see below) indicates that you must not discard this electrical/electronic product in domestic household waste.

### Product Category

With reference to the equipment types in the WEEE directive Annex 1, this product is classified as a "Monitoring and Control instrumentation" product.





Major Tech reserves the rights to change specifications or designs described in this manual without notice and without obligations.

## **MAJOR TECH (PTY) LTD**

T9 Industrial Village, 7 Sam Green Road,  
Tunney Ext. 9, Elandsfontein,  
South Africa  
P.O. Box 888, Isando 1600,  
South Africa

Telephone: +27 11 872 5500  
National Contact Number: 08 61 62 5678  
E-mail: [sales@major-tech.com](mailto:sales@major-tech.com)

[www.major-tech.com](http://www.major-tech.com)

