COMPLY WITH HI-VOLTAGE PHASE CURRENT MEASUREMENT

CLAMP LEAKER

# M-140HC

## INSTRUCTION MANUAL

Thank you very much for selecting our M-140HC Clamp Leaker complying with hi-voltage line current measurement. This instrument is high reliable leakage current clamp meter developed by our superior technique.

Before use, read this instruction manual completely and apply this instrument correctly.

Keep this instruction manual carefully to take out whenever you need.

**MULTI MEASURING INSTRUMENTS CO.,LTD.**
Akihabara Murai Bldg. 7F, 1-26 Kanda Sakuma-cho,
Chiyoda-ku, Tokyo, 101-0025 Japan
TEL: 81-3-3251-7013 FAX: 81-3-3253-4278
URL: http://www.multimic.com/
E-mail: multi@multimic.com

SAFETY SUMMARY

- To use this instrument safely, read this “SAFETY SUMMARY” carefully and apply the instrument correctly.
- The CAUTIONs and WARNINGs which appear on the following pages are stated to prevent the operator & other people from the dangers and their properties from the damages beforehand.
  - △ WARNING : This symbol indicates the contents “Possibilities of the death or the serious wound can be supposed” caused from mis-operations.
  - △ CAUTION : This symbol indicates the contents “Possibilities of the injury or only the material damage can be supposed” caused from mis-operations.

## △ WARNING

**POSSIBLE ELECTRICAL SHOCK**

- This instrument is for the use of low voltage circuit.
  Do not make measurements of power lines carrying more than AC 600V.
  Before use, check and confirm the voltage of circuit to be measured.
- Apply only the coated cables and do not clamp bare cables.
- For high voltage current measurement, apply the instrument at low voltage corresponding field.

**POSSIBLE ELECTRICAL SHOCK OR ACCIDENT**

- Do not handle the instrument in the rain, at humid place, with a drop of water and or with wet hands.
- Do not use the instrument if the CT or CT case are damaged and if something is wrong with the CT cables. Also, do not use leaving the battery cover off.
- Do not give the shock to tip of CT.
- Do not disassemble the instrument.

## 1. GENERAL

This instrument is a leakage current clamp meter with high precision and wide range combined by newest CT technologies which enabled to make up CT utilities extremely. Also, it can measure phase current of CVT and or CV cable in high voltage circuit very simply by our originally developed measuring method. Until now, it has been very dangerous to open the circuit by mold disconnector or pillar disconnector due to flow of big arc current. This instrument can measure phase current and can prevent danger when opening circuits.

## 2. SPECIFICATIONS

### 2-1 Current Detection Part

| | |
|---|---|
| CT Inside Diameter | : φ40mm |
| Method | : Split-core type ZCT |
| Withstanding Volt.age | : AC2200V/1 minute |

### 2-2 Measuring Part

| | |
|---|---|
| Measuring Function | : AC Leakage Current, loading current;<br>Phase current of hi-voltage circuit (measuring at low voltage corresponding field). |
| Measuring Method | : CT clamp method (max. applicable conductor φ40mm) |
| Measuring Range | : AC current 0~300.0mA/300A (50/60Hz)<br>Line current CVT cable and CV cable |
| Range Swtich | : mA, A, Phase Current CVT, Phase Current CV |
| AC Current Detection | : Average sensing |
| A/D Conversion | : Successive approximation method |
| Display | : Max. 3199 count, LCD with annunciator |
| Over Range Indication | : “OL” mark on LCD |
| Sampling Rate | : 2 times/sec. |
| Data Hold Indication | : “DH” mark on LCD |
| Low Battery Indication | : “B” mark on LCD |
| Auto Power Off | : approx. 10 minutes after the final rotary switch operation.<br>To power on again, set rotary switch to OFF. |
| m(meter) Display Switch | : The length of high voltage circuit will be displayed in line current measuring range (estimated value), calculated by storey capacitance. |

## 2-3 General Specifications

| | |
|---|---|
| Applicable Circuit Voltage | : less than AC600V (insulated conductor) |
| Withstanding Voltage | : AC2200V/1 minute between outer case and CT core |
| Operating Temperature | : 0~40°C, less than 80%RH (Non-condensing) |
| Storage Temperature | : -10~60°C, less than 70%RH (Non-condensing) |
| Power Supply | : AAA alkaline battery (LR03)x3 |
| Current Consumption | : approx. 3.5mA (approx.. 150h for continuous use) |
| Dimension & Weight | : 45(W)x195(H)x24(D)mm, approx.. 180g |
| Accessories | : AAA battery (LR03) x 3 installed in the instrument, instruction manual x 1, soft carrying case x 1 |

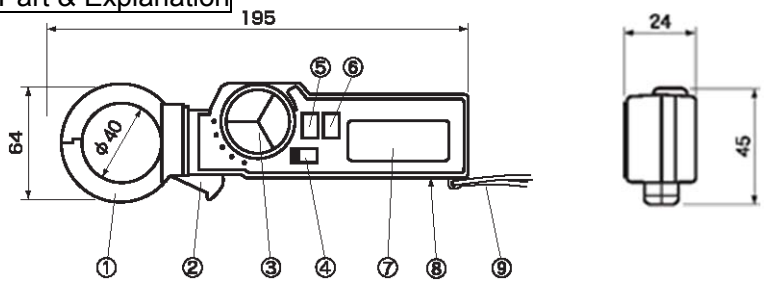
## 2-4 Accuracy

At 23°C ±5°C, less than 80%RH and the conductor to be measured is located in the center position of CT.

| Range | Min. Resolution | Accuracy |
|---|---|---|
| 30/300mA | 0.01mA | ±1.2%rdg ±5dgt |
| 30/300A | 0.01A | 0~200A:±1.2%rdg ±5dgt<br>200~250A: $^{+1.0\%}_{-2.0\%}$ rdg±5dgt<br>250~300A: $^{+1.0\%}_{-3.0\%}$ rdg±5dgt |
| Phase Current CVT | 0mA | estimated value |
| Phase Current CV | 0mA | |

## 3. OPERATION PROCEDURE

### 3-1 Name of Part & Explanation




| | |
|---|---|
| ① Clamp CT | : Current detection sensor, clamp-on method |
| ②Open/Close Lever | : By pushing to inside, CT will be opened |
| ③ Range Switch | : For power On/Off, ACmA, ACA, Line Current CVT and Line Current CV. By auto power off function, power will be off automatically approx. 10 minutes after the final switch operation. To power on again, set rotary switch once to OFF and power on again. |
| ④ Frequency Change Switch | : Set according to power supply frequency (50 or 60Hz) |
| ⑤ Data Hold Switch | : By push one time, “DH” sign will be on LCD and the data will be hold. By push once more, this function will be released. |
| ⑥ “m” Conversion Switch | : In case of hi-voltage phase current measurement, the storey capacitance is 38mA/100m both for CVT and CV cable. This instrument will show the length of hi-voltage, incoming line in “m” (meter) by conversion when no loading at hi-voltage end. By push one time at hi-voltage line current range, “m” mode will appear and “mA” mode will become again by push once more. |
| ⑦ Display | : Digital display of measured value, unit symbol and battery sign. |
| ⑧Battery Compartment | : Batteries are installed (back side) |
| ⑨Hand Strap | : Preventing drop of the instrument by applying to the wrist during measurement. |

## 3-2 Battery Installment

△ WARNING

POSSIBLE ELECTRICAL SHOCK OR ACCIDENT

- Do not replace the batteries under the conditions of measuring current or voltage
- Do not operate the instrument with battery cover off.

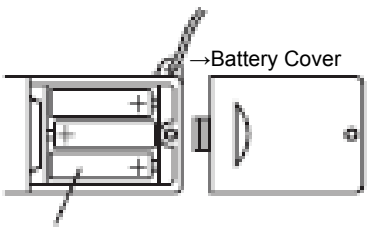
△ CAUTION

When not using the instrument for a long period, remove the batteries and keep separately. The batteries may leak and may cause damage to the instrument.

- "B" sign will appear on the display when batteries are exhausted and get less than operation voltage. Replace to new batteries immediately.
- Do not use the batteries mixed new one and once used and or different kind ones.

[How to replace the batteries]

1. Remove the screw fixing battery cover at the bottom of rear case by plus driver and slide & remove the battery cover to the direction of arrow mark.
2. Pick up the exhausted batteries.
3. Confirm the polarities and put the new batteries.
4. Replace the battery cover to the original position and fix screw by driver.



AAA Alkaline Battery (LR-03) x 3

## 3-3 Measurement

To use the instrument safely, follow the contents described in WARNING and CAUTION without fail.

△ WARNING

POSSIBLE ELECTRICAL SHOCK

- For safety, use the instrument in circuit less than 600V.
  Before operation, confirm the circuit voltage to be used.

POSSIBLE ELECTRICAL SHOCK OR ACCIDENT

- Do not handle the instrument in the rain, at humid place, with a drop of water and or with wet hands.
- Do not use the instrument if the instrument body or CT case are damaged.
- Do not use the instrument, leaving the battery cover off.

POSSIBLE FIRE HAZARD AND BURN ACCIDENT

- Part of CT will get heat when applying excessive current.
  Do not apply more than maximum capable current (300A rms) to CT part.

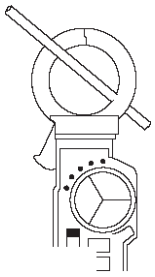
### 1) Line Current Measurement

(1) Set range switch③ from OFF to [30/300mA] position (display will appear).

(2) Set frequency change switch④ to applying frequency (50 or 60Hz).

(3) Open clamp CT① and clamp it to the conductor to be measured (one line). Close CT completely.

(4) Select most suitable range by rotary switch and read the displayed value. (In case of over range, “OL” mark will appear on LCD).



*use data hold⑤ where displayed value cannot be seen clearly.

2) Leakage Current Measurement

(1) Leakage current measurement at grounding line. The operation is the same manner as line current measurement.

(2) Leakage current measurement except for grounding line clamp CT to two wires at single phase and three wires at three phase in a lump.

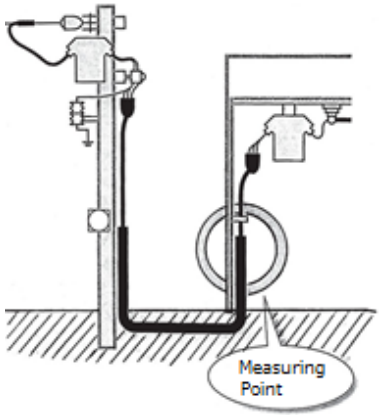
3) Phase Current Measurement of Hi-Voltage Circuit (with shielded grounding line)

CAUTION FOR MEASUREMENT

- The measurement by this mode is for estimated value detection and use it to judge circuit condition with no loading or loading

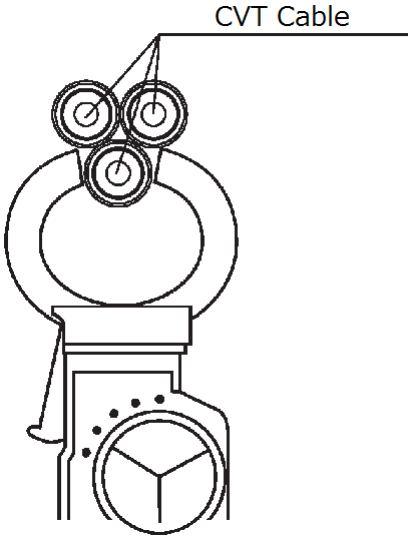
△ WARNING

- This instrument is for low voltage circuit and never use for hi-voltage cable without shielding.




(1) Measurement of CVT Cable

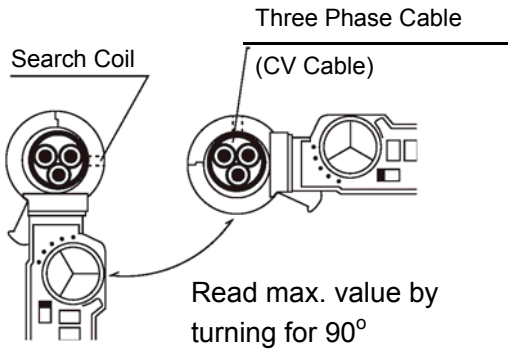
In case of CVT cable as the right drawing, this instrument can measure phase current by clamping 1/2 CT to one phase.



① Set range switch③ from OFF to “CVT” position (display will appear).
② Set frequency change switch④ to applying frequency (50 or 60Hz).
③ Clamp 1/2 CT to the cable as drawing shown on P7 and read displayed value.
④ The circuit can be opened by disconnector , etc. after confirmed no loading condition.
⑤ At no loading condition, the length of hi-voltage incoming line can be displayed at the estimated value. Clamping 1/2 CT, press “m” conversion switch⑥ one time and “m” will be displayed. By press once more, display will return to “mA”.

(2) Measurement of CV Cable

Move CV cable to the search coil of CT like as at the right drawing and read the max. value by keeping close and turning the instrument for 90°.




① Set range switch③ from OFF to 「CV」 position (display will appear).
② Set frequency change switch④ to applying frequency (50 or 60Hz).
③ Clamp CT to CV cable and move it to search coil of CT.
④ The circuit can be opened by disconnector, etc. after confirmed no loading conditions.
⑤ At no loading condition, the length of hi-voltage incoming line can be displayed at the estimated value. Reading max. value, press “m” conversion switch⑥ one time and “m” will be displayed. By press once more, display will return to “mA”.

## 4. REPAIR SERVICE

When requesting for repair service, please bring the instrument directly to the dealer where you bought.

When mailing the instrument, always pack it in its original or equivalent packing materials to avoid any damage during the transportation and also put together with documents showing your name, address, phone number and defect point.

## 5. WARRANTY

This instrument is sent out from our factory after the sufficient internal inspections but if you find any defect due to the fault in our workmanship or the original parts, please contact the dealer where you bought the instrument.

The warranty period is 12 months from the date of purchase and the instrument shall be repaired at free of charge, provided that we judge the cause of defect is obviously resulted from our responsibility.

GURANTEE REGULATIONS

1. This instrument is warranted for the operation under normal use for 12 months from the date of purchase.
2. This warranty does not cover the following defects:
   a. Defect caused from the improper use and operation.
   b. Defect caused from the use, operation and storage beyond the original specifications, designs and conditions.
   c. Defect caused from the renovations or repairs done by someone else than us or our representatives.
   d. Defect not caused from our responsibilities.