

DIGITAL INSULATION TESTER FOR PHOTOVOLTAIC SYSTEMS

Model **MIS-PV1**

INSTRUCTION MANUAL

Thank you for selecting our digital insulation tester.
MIS-PV1 for PV systems. Before using the instrument,
read this instruction manual thoroughly and operate
properly. Keep this manual carefully whenever you can
refer if necessary.

MAIN FEATURES

- (1) Measurable insulation resistance according to the generated voltage in PV systems.
- (2) Can read the displayed value in the dark by LED back light of LCD.
- (3) Auto power off function enables min. power consumption in case of forgetting switch power off.
- (4) The output display lamp (HV lamp) serves functions as warning of outer loading voltage and or as confirming electric discharge with superior safety and wide functionality.



MULTI 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
Website: <http://www.multimic.com/>
Email: multi@multimic.com

1. Before use

1.1 Safety Symbol

To use this instrument safely, the following symbols and contents are displayed on instrument body and instruction manual.



Showing careful operation. This symbol is displayed at the point where the references to instruction manual are required to protect operator & equipment.

Showing the high voltage output more than 1000V.
Touch to the terminal is dangerous.

WARNING: Indicating the matters to be attended to avoid electrical shock and accidents which may affect danger to operator's life and body.
CAUTION: Indicating the matters to be attended to avoid damage of equipment and for general points of operation.

1.2 Caution for Operation

- ! Do not drop and or throw the instrument at hard objects.
- ! Do not store the instrument at the places with high temperature more than 60°C low temperature less than -20°C and high humidity and also, avoid the direct rays of sun.
- ! Do not apply chemicals like as thinner, acetone, etc. for cleaning.
- ! Confirm the specifications/ratings in this manual and use the instrument within the rated values.

1.3 Confirm the Accessories

After opened the box, check the appearance of instrument and confirm the accessories are contained.

2. Specifications

2.1 Measuring Part

1) Rating

Range	Rated Measuring Voltage	Max. Effective Display Value	Center Display Value
PVL	500V	100MΩ	2MΩ
PVH	1000V	2000MΩ	50MΩ

2) Accuracy

Range	Rated Measuring Voltage/ Max. Effective Display Value	Measuring Range	Accuracy
PVL	500V/100MΩ	[First Effective Range] 0.1MΩ~50MΩ [Second Effective Range] ①0.05MΩ~0.1MΩ 50MΩ~100MΩ	less than ±5% less than ±10%
PVH	1000V/2000MΩ	[First Effective Range] 2MΩ~1000MΩ [Second Effective Range] ②1MΩ~2MΩ 1000MΩ~2000MΩ	less than ±5% less than ±10%

3) Rated Measuring Current

Range/Rated Voltage	Min. Measuring Resistance enables to keep rated voltage	Rated Measuring Current
PVL	500V/1000MΩ	1mA
PVH	1000V/2000MΩ	-0%~+20%

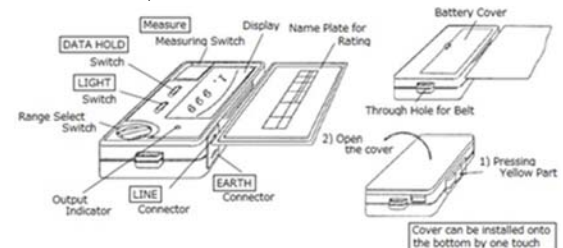
- 4) No-loading Voltage : less than 130% of rated voltage
- 5) Short-circuit Current : less than 2mA
- 6) Influence of Temperature : less than ±5%rdg at the center display by changing ambient temperature from 20°C to ±20°C.
- 7) Response Time : less than 10sec.(auto range)
- 8) Protection of Mis-input : nothing wrong when applying 120% of rated measuring voltage AC with nearby 50Hz or 60Hz sine wave for 10sec.
- 9) Display Range : 3.200/32.00/320.0/3200(auto range)
- 10) Min. Resolution : 0.001MΩ
- 11) A/D Conversion : dual integration mode
- 12) Display : max. 3200 count LCD with bar graph & annunciator
- 13) Over Range : "OL" mark on display
- 14) Low Battery Indication : "B" mark on display.
- 15) Data Hold : "DH" mark on display
- 16) Auto Power Off Function : automatically power off approx. 10 minutes after power on (to release this function, set the rotary switch to "OFF" and power on again.)
- 17) Load Discharge Function : Discharging DC electrical charge by auto discharge function. Can confirm discharge by HC lamp off.
- 18) Back Light Function : By pressing backlight switch (LIGHT) once, back light appears and by pressing switch again. It lights off. It will become automatically approx. 10 minutes after light on.

2.2 General Specification

- 1) Operating Temperature : 0~40°C, less than 80%RH (w/o condensation)*
- 2) Storage Temperature : -20°C~60°C, less than 80%RH (w/o condensation)
- 3) Withstanding Voltage : AC3700V/1 minute between electric circuit and outer case
- 4) Insulation Resistance : more than 50MΩ by DC1000V insulation resistance tester
- 5) Power Supply : AA alkaline battery (LR)x6
- 6) Outer Dimension : 170(W)x105(D)x52(H)mm
- 7) Weight : approx. 350g (without batteries)
- 8) Accessories : earth test lead - 1, line test lead - 1, test lead case - 1, belt - 1, battery (LR6) - 6, instruction manual - 1

3. Operation Procedure

3.1 Name of Part & Explanation



DATA HOLD : The displayed data on LCD is held by pressing this switch during measurement of insulation resistance and it will be released by pressing switch again.

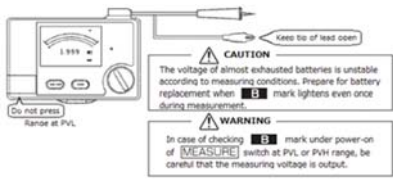
LIGHT Switch : By pressing this switch, back light LED lightens on LCD for approx. 10 minutes. (Automatic power saving function)

<REFERENCE>

For insulation resistance measurement, the instrument is getting power-on during pressing measuring switch. By standing up this switch, it will be locked as power-on continuously.

3.2 Check of Residual Battery Power

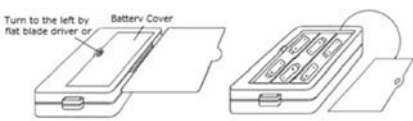
- 1) Confirm the range switch is at PVL.
- 2) If **B** mark is not lightening on LCD, the instrument can be operative.
- 3) If **B** mark is lightening during insulation resistant measurement. Judge the batteries are almost exhausted.
- 4) In this case, replace all LR6 alkaline batteries with new ones.



- 5) In case of checking the residual battery power in the condition of max. power consumption, set the range switch to PVH and check by keeping test leads shorten and pressing measuring switch.

3.3 Battery Replacement

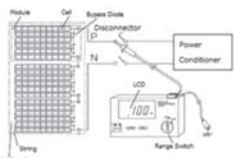
- 1) Loosen and remove the screw of battery cover by turning to the left with flat blade driver or coin.
- 2) Replace the batteries, confirming (+, -) polarity according to the directions graved in battery case.
- 3) In case of long time unuse, remove all batteries, as it may cause exhaustion and leakage of batteries.



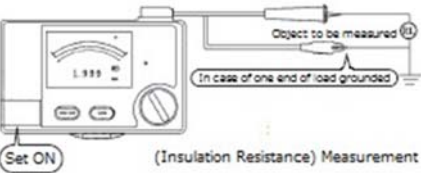
WARNING

- 1) Misapplication of battery polarity may cause leakage of battery and or damage of electric circuit
- 2) Do not disassemble batteries and do not throw them into the fire by no means as it is very dangerous.
- 3) Leaving batteries with wrong polarity setting may cause exhaustion and heating of batteries and they will be damaged. Such batteries cannot be used even after correct setting.
- 4) Dispose the used batteries to the indicated place according to the species.

3.4 Insulation Resistance Measurement (In PV System)



- 1) Confirm the measuring switch **MEASURE** is off.
- 2) Set the range switch according to the generated voltage. PVL is for 500V and PVH is for 1000V.
- 3) Disconnect solar panel (PV) from power conditioner (PCS) at the disconnecting switch.
- 4) Connect EARTH lead of MIS-PV1 with the earth terminal of PV system.
- 5) Contact LINE probe to P terminal of solar panel (at disconnector) and power on **MEASURE** switch. (Operate the instrument with **MEASURE** switch standing up, as it takes a long time for the measurement. By standing up the switch, it will be locked and will get power-on continuously).
- After switched on **MEASURE** switch, the bargraph on LCD is lightening step by step and the measured value will be displayed after all bargraph lightened and the first measurement finished. The first displayed value will be kept until finishing the second display. By pressing data hold switch once, the display will be hold and will be released by pressing switch again.
- 6) After finished the measurement, set **MEASURE** switch off and rotary range switch to off.
- 7) This instrument can be used not only for PV systems but also for ordinary electric apparatus & equipment.
- 8) In case that one end of the object to be measured is grounded, connect with clip at (EARTH) end. In case of not grounded, the connection at (EARTH) end is at discretion.
- 9) After confirmed HV lamp is not lightened by contacting (LINE) probe to the object to be measured, the bargraph on LCD is lightening step by step and the measured value will be displayed after all bargraph lightened.



WARNING

*For insulation resistance measurement in PV systems, be sufficiently careful for electrical shock, as solar panels are generating powers successively with voltage.

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.