

sanwa

DM1528S DM5218S
INSULATION RESISTANCE TESTER
INSTRUCTION MANUAL

**SANWA ELECTRIC
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[1] Read First: Safety Information

We thank you for your purchasing our product, the battery-driven insulation resistance tester.

This is a DC resistance tester developed under the principle to provide new and unique design and function for the measurement of insulation resistance of each kind of electric equipments. Since this tester generates high voltage, we recommend that you read this instruction manual thoroughly, and treat the tester correctly and safely.

The symbols used on this tester and in this instruction manual denote the following meanings:

-  Be careful as the high voltage is impressed.
-  Be careful because there is a possibility of bodily injury or the destruction of equipment.

WARNING

To ensure that the meter is used safely, follow all safety and operating instructions.

1. Never use tester for high power or high voltage circuit.
2. Pay special attention when measuring the voltage of AC 30Vrms (42.4V Peak) or DC 60V or more to avoid injury.
3. Disconnect power source of the measured circuit before measuring insulation resistance.
4. High voltage is generated while measuring insulation resistance. Be cautions of electric shock.
5. After measuring insulation to avoid electric shock. Be sure to discharge the high voltage charged.
6. Never apply an input signal exceeding the maximum rating input value.
7. Never use tester for measuring the line connected with equipment (i.e. motors) that generates induced or surge voltage since it may exceed the maximum allowable voltage.
8. Never use tester if the tester or test leads are damaged or broken.
9. Never use uncased tester.
10. Always keep your fingers behind the finger guards on the probe when making measurements.

11. Be sure to disconnect the test pin from the circuit when changing the function.
12. Never use tester with wet hands or in a damp environment.
13. Never use test leads other than the exclusive test leads.
14. Never open tester case except when replacing batteries.
Do not attempt any alterations of original specifications.
15. To ensure safety and maintain accuracy, calibrate and check the tester at least once a year.
16. Indoor use.

Maximum Overload Protection Input

Function (Range)	Maximum rating input value	Maximum overload protection input
ACV (600)	AC600V	AC720V
DCV(60)	DC60V	AC600V

[2] Applications and Features

2.1 Applications

- DC insulation resistance tester to measure the insulation resistance of electric lines and electric equipment.

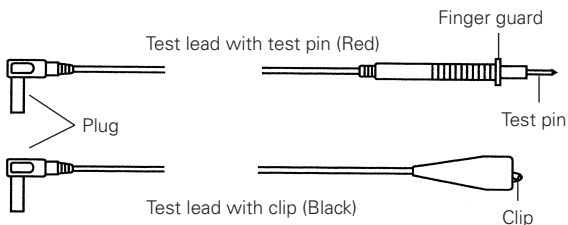
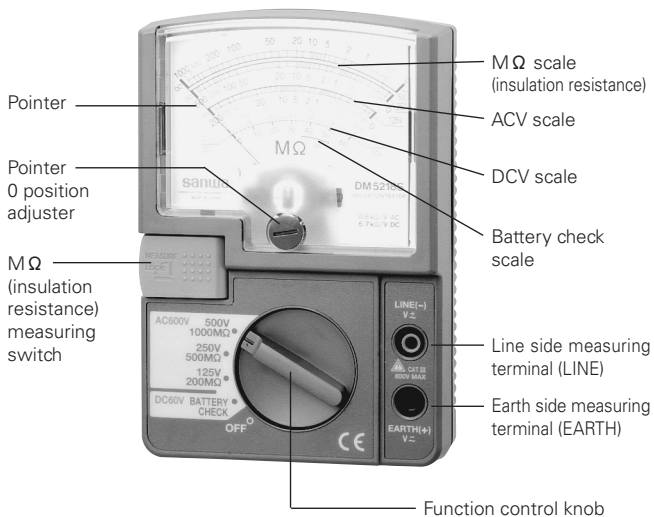
2.2 Features

- This tester is based on the revised standard JIS C1302-1994 Insulation resistance testers.
- It is equipped with the discharge function.
- It is equipped with the $M\Omega$ (insulation resistance) measuring switch that enables both one-shot and continuous measurement.
- It can measure DC voltage and AC voltage.

⚠ CAUTION

Remove components such as semi-conductors and apparatuses from the circuit of measuring object to avoid damages when withstand of the object is unknown or lower than rated measuring voltage of a resistance insulation tester, especially in case of the objects you measure connected with PCs or computers.

[3] Front View and Name of Each Part



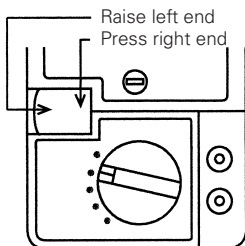
[4] Description of Functions

- Function control knob and MΩ (insulation resistance) measuring switch by operating these two switches, the functions and ranges can be set as shown below.

Position of Function Control Knob	MΩ Measuring Switch (*)	Set Range (Function)
AC600V 1000V/2000MΩ 500V/1000MΩ 250V/500MΩ 125V/200MΩ	DM1528S DM5218S OFF	600 VAC range
AC600V 1000V/2000MΩ 500V/1000MΩ 250V/500MΩ 125V/200MΩ	DM1528S DM5218S ON	1000V/2000MΩ range 500V/1000MΩ range 250V/500MΩ range 125V/200MΩ range
DC60V • BATTERY CHECK	OFF	DC60V range
DC60V • BATTERY CHECK	ON	BATTERY CHECK range

* The MΩ measuring switch is turned on by the following operation.


- ON only when the right end of the lever is pressed with a finger. (OFF when the finger is released)
- Continuously ON when the left end of the lever is raised. (OFF when it is laid down)

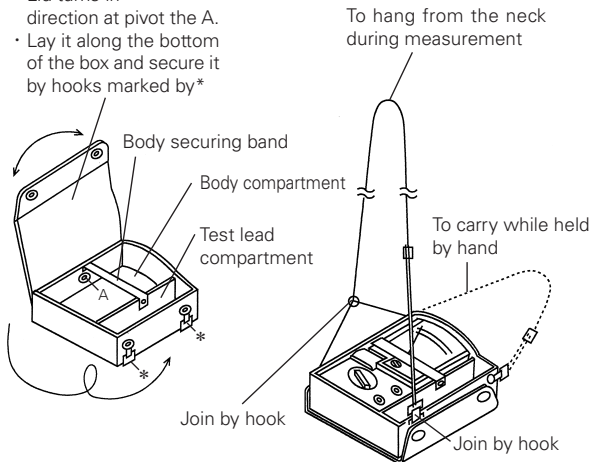


- Meter zero position adjustment
If the meter pointer is not on the ∞ graduation line of the MΩ scale when the function control knob is at OFF, adjust the zero position with a screwdriver.

How To Use Carrying Case

During measurement, set the case as illustrated and hang it from the neck.

- Lid turns in  direction at pivot the A.
- Lay it along the bottom of the box and secure it by hooks marked by*



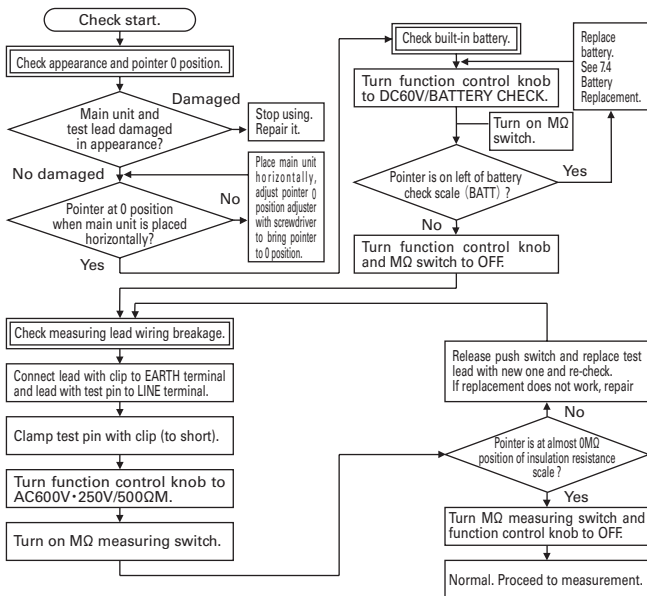
[5] Measuring Method

5.1 Start-up Check

WARNING

1. Do not use a damaged tester or test lead.
2. Make sure test lead wiring is not broken.
3. When testing the continuity of a test lead, the measuring terminals are under a high voltage. Be careful of electric shock.
4. To prevent electric shock and battery consumption, be sure to turn the $M\Omega$ measuring switch and function control knob to OFF after measurement.

Before starting measurement, check the “appearance”, “pointer 0 position”(*), “built-in battery” and “measuring lead” in this order. (*The pointer 0 position is the 0 position of the DC60V scale or ∞ position of the M Ω scales.)



5.2 How to Check Bult-in Battery (BATTERY CHECK)

Prior to M Ω (insulation resistance) measurement, be sure to check the built-in battery (Max. 5 second). A consumed battery will cause not only measurement errors but danger due to erroneous measurement. For checking methods, refer to 5.1 Start-up Check.

5.3 Measurement of MΩ (Insulation Resistance)

WARNING

1. Never apply a voltage to the measuring terminal when the tester is in the MΩ measuring range.
2. Prior to measurement, disconnect the measuring object (circuit) from the power supply.
3. Prior to measurement, make sure no voltage is applied to the circuit to measure by the AC600V range.
4. During measurement, a high voltage is generated. Do not touch the test pin, clip and measuring object.
5. The tester and measured circuit have been charged by high voltage immediately after the measurement. Be careful not to get electric shock.
6. There is a possibility of an accident of electric shock. After the measurement, be sure to discharge the high voltage charged in the measuring object. (See 5.4 Discharge Function)

CAUTION

1. When the measuring object is grounded (earth), a normal practice is to connect the lead with clip (EARTH) to ground (earth) and the lead with test pin (LINE) to the circuit. (When this connection is used, a measurement value becomes smaller than a value obtained by the reverse connection.)
2. To prevent a measuring error, keep the test lead connected to the LINE side out of contact with the measuring object and ground (earth).
3. The insulation resistance varies largely depending on temperature and humidity. It is also influenced by a voltage to apply (measuring voltage).
Normally as temperature, humidity and voltage increase, the insulation resistance decreases.

⚠ REFERENCE

1. The rated measuring current of this tester is 1 mA. (1 mA to 1.2 mA when the resistance of a value below the rated measuring voltage/1 mA and within 1st effective measurement scale is measured.)
2. The no-load voltage is within 1.3 times the rated measuring voltage.
3. While measuring there may be an oscillator noise from the meter, but this is not a malfunction.

1) Measuring object

Measurement of insulation resistance ($M\Omega$) of electric equipment and circuits.

2) Rated measuring voltage

Model	Rated measuring voltage
DM1528S	250V/500V/1000V
DM5218S	125V/250V/500V

3) Selection of a measuring range

When measuring insulation resistance, select a range of the voltage that is close to the voltage used by the circuit to measure, unless otherwise specified.

For example, when measuring insulation resistance of 100 V home appliances and indoor wiring, select the 125 V rated measuring voltage range and when measuring 200V power circuits, select the 250 V rated measuring voltage range.

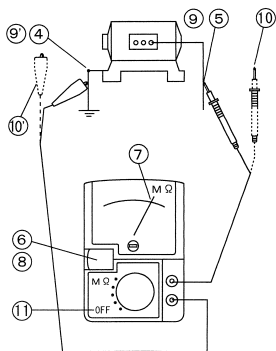
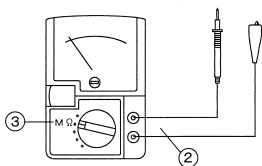
4) Measuring method

- ① Power off the measuring object.
- ② Connect the lead with clip (black) to the earth side measuring terminal (EARTH) and the lead with test pin (red) to the line side measuring terminal (LINE).
- ③ Turn the function control knob to a desired rated measuring voltage range.
- ④ Connect the clip of the lead with clip to the measuring object. Normally, the earth side measuring terminal should be on the earth line side.

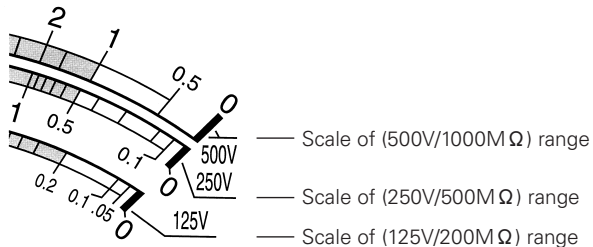
- ⑤ Bring the test pin of the lead with test pin in contact with the other side of the measuring object.

⚠ CAUTION : If the meter deflects in this state, the measuring object is charged. Be sure to remove the voltage prior to measurement.

- ⑥ Turn on the $M\Omega$ measuring switch.
(See [4] Description of Functions)
- ⑦ Read the indicated value. Use the appropriate scale according to the position of the function control knob (set range). (See page 10)
- ⑧ Turn off the $M\Omega$ measuring switch.
- ⑨ Discharge the high voltage charged in the measuring object. See 5.4 Discharge Function.



- ⑩ First, disconnect the test pin of the lead with test pin from the measuring object. Then remove the clip of the lead with clip.
- ⑪ Be sure to turn the function control knob to the position of OFF.



[Example. DM5218S]

5.4 Discharge Function

1) Reason of a need to discharge

For safety, high voltage remaining in capacitive measuring objects such as capacitors and electric wire must be discharged to prevent accidents.

2) Discharging method

This procedure follows the step ⑧ of 5.3-4)

- ① When the M Ω measurement has been completed, turn off only the M Ω measuring switch with the test pin and the clip connected to the measuring object.
- ② Then the pointer deflects to the right and its deflection becomes smaller as time passes (indicating the charged charge is being discharged).
- ③ When the pointer stops at zero (∞ of the M Ω scale) and discharge has been completed, conduct the steps ⑩ and ⑪ of 5.3-4)

5.5 Measurement of ACV (AC voltage) (Measuring range is the AC600V range only)

WARNING

1. Do not apply a voltage exceeding the maximum rated voltage of 600 VAC.
2. During measurement, do not operate the function control knob.
3. Do not measure a voltage with the M Ω measuring switch being pressed or raised.
4. When the circuit to measure has a breaker, measure the voltage on the secondary side (load side).
5. To prevent electric shock, do not touch the metal part of the pin plug and clip.

WARNING

Remove components such as semi-conductors and apparatuses from the circuit of measuring object to avoid damages when withstand of the object is unknown or lower than rated measuring voltage of a resistance insulation tester, especially in case of the objects you measure connected with PCs or computers.

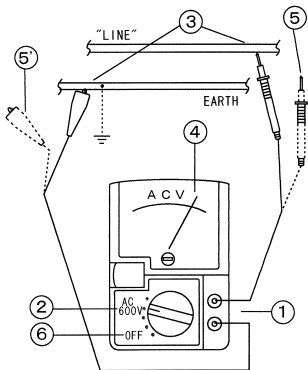
⚠ CAUTION

AC voltages of waveforms other than sinusoidal waveforms and frequencies other than 50 to 60 Hz will cause an indication error.

- 1) Measuring object
Sinusoidal AC voltages (ACV) such as lighting line voltages can be measured.

- 2) Measuring method

- ① Connect the lead with clip (black) to the earth side measuring terminal and the lead with test pin (red) to the line side measuring terminal.
- ② Turn the function control knob to AC600V.
- ③ Connect the lead with clip to the earth side of the circuit to measure and the lead with test pin to the charging side (line side).
- ④ Read the indicated value on the ACV scale.
- ⑤ Disconnect the lead with test pin and the lead with clip in this order from the measuring object.
- ⑥ Turn the function control knob to the position of OFF.



5.6 Measurement of DCV (DC voltage) (Measuring range is the DV60V range only)

⚠ WARNING

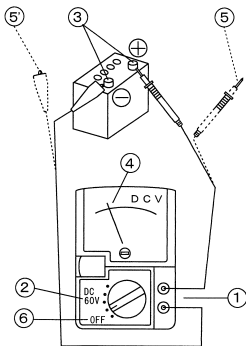
1. Do not apply a voltage exceeding the maximum rated voltage of 60 VDC.
2. Keep in mind the warnings of 5.5 described earlier.

- 1) Measuring object

DC voltages of batteries, etc. can be measured. Also, the tester can be used to check the presence of DC voltage prior to MΩ measurement.

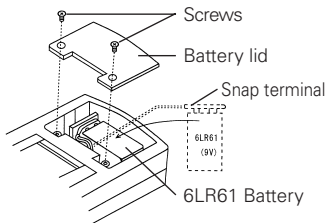
2) Measuring method

- ① Connect the lead with clip (black) to the earth side measuring terminal and the lead with test pin (red) to the line side measuring terminal.
- ② Turn the function control knob to DC60V/BATTERY CHECK.
- ③ Connect the lead with clip (black) to the negative (-) side of the measuring object (circuit) and the lead with test pin (red) to the positive (+) side.
- ④ Read the indicated value on the DCV scale.
- ⑤ Disconnect the lead with test pin and the lead with clip in this order from the measuring object.
- ⑥ Turn the function control knob to the position of OFF.



[6] Battery Replacement

- ① Remove two battery lid securing screws.
- ② Replace the consumed battery that is connected to the snap terminal with a new one.
- ③ Set the battery in the original place and secure the battery lid with screws.



⚠ Be sure to turn the function control knob to the position of OFF prior to replacing the battery.

⚠ Be sure to use the alkaline battery 6LR61 (9V)

[7] Specifications

7.1 Measurement Range and Accuracy

Accuracy assurance : 23°C ± 2°C 45~75%RH max.

No condensation

Attitude : Horizontal (±5°)

Model	DM1528S		DM5218S	
MΩ (Insulation) Resistance range	Rated measuring Voltage Maximum value	Large numeral : 1st effective measurement scale Small numeral : 2nd effective measurement scale	Rated measuring Voltage Maximum value	Large numeral : 1st effective measurement scale Small numeral : 2nd effective measurement scale
	$\frac{1000V}{2000M\Omega}$	1-2-1000 -2000MΩ	$\frac{500V}{1000M\Omega}$	0.5-1-500 -1000MΩ
	$\frac{500V}{1000M\Omega}$	0.5-1-500 -1000MΩ	$\frac{250V}{500M\Omega}$	0.1-0.5-200 -500MΩ
	$\frac{250V}{500M\Omega}$	0.05-0.5-200 -500MΩ	$\frac{125V}{200M\Omega}$	0.05-0.2-100 -200MΩ
ACV range	0~600V			
DCV range	0~60V			
Accuracy	<ul style="list-style-type: none"> MΩ range 1st effective measurement range : ±5% of reading 2nd effective measurement range : ±10% of reading 0, ∞ scale : ±0.7% of scale length No load voltage : \pm_{0}^{30} % of rated measuring voltage Rated measuring current : 1~1.2mA Short circuit current : max 2mA 			
	<ul style="list-style-type: none"> ACV range (50/60Hz sine wave) : ±5% of full scale 			
	<ul style="list-style-type: none"> DCV range : ±5% of full scale 			

7.2 General Specifications

AC rectifying method	: Half-wave rectification (Mean value indication rms value converted)
Meter specification	: Inner-pole type taut-band system, 24 μ A
Battery consumption	: Checked by BATTERY CHECK range.
Allowable temperature/humidity range	: 18~28 °C, 45~75% RH.
Service temperature/humidity	: 0~40°C, 80% RH max., no condensation.
Storage temperature/humidity	: -10~50°C, 70% RH max., no condensation.
Service ambient condition	: Altitude 2000 m max., environmental pollution II .
Built-in battery	: Layer built type alkaline battery 6LR61 x 1 (9V)
Max. power consumption	: Approx 2.6W (at 1000V/2000M Ω range)
Continuous service hours	: Approx 4.0 hours at 1000V/2000M Ω range. (When indicating the center scale value) Approx 4.5 hours at 500V/1000M Ω range. Approx 5.0 hours at 250V/500M Ω range. Approx 5.5 hours at 125V/200M Ω range.
Applicable standard	: JIS C 1302-1994 Insulation resistance testers.
Safety standard	: IEC-1010-1 Overvoltage category III , 600V. protection class II . (EN61010-1)
Withstand voltage	: 3.7 kV AC (one minute), between measuring terminal and rear case.
Size and weight	: 144(H) x 99 (W) x 43 (D) mm, approx. 310g
Accessories	: Test lead TL-508S, 1 set Carrying case C-08S, 1 piece Instruction manual, 1 copy

[8] Storage

CAUTION

- The panel and the case are not resistant to heat. Do not place the instrument near heat-generating devices (such as a soldering iron).
- Do not store the instrument in a place where it may be subjected to vibration or from where it may fall.
- For storing the instrument, avoid hot, cold or humid places or places under direct sunlight or where condensation is anticipated.

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