

[1] SAFETY PRECAUTIONS Before use, read the following safety precautions. This instruction manual explains how to safely use your new DG34a/DG35a MΩ tester. Before use, please read this manual thoroughly. After reading it, keep it together with the product so you can refer to it when necessary. If this product is not used as specified in this manual, the protection function of this product may be compromised. Instructions given under the "⚠WARNING" and "⚠CAUTION" headings must be followed to prevent accidental burns or electrical shock.

1-1 Explanation of Warning Symbols
The meanings of the symbols used in this manual and on the product are as follows.
⚠ Very important instruction for safe use.
The warning messages are intended to prevent accidents to operating personnel such as burn and electrical shock. The caution messages are intended to prevent damage to the instrument.

■ High-voltage warning. (High voltage is generated from test pins.)
⚡ Direct current (DC) ⚠ Ground
~ Alternating current (AC) ⚠ Double insulation (Protection Class II) LINE/ ~ ⚠ LINE : Line/Plus input (Red)
EARTH/ ~ ⚠ EARTH : Earth/Minus input (Black)

1-2 Warning Instruction for Safe Use

- ⚠ WARNING**
- To ensure that you use the instrument safely, be sure to observe the instructions.
 - Never use the instrument on electric circuits that exceed 3.6 kVA.
 - Pay special attention when measuring voltages of AC 33 Vrms (46.7 V peak) or DC 70 V or more to avoid injury.
 - The clamp sensor provided with this instrument is exclusively for low-voltage use. Perform clamp current measurement with 600 V or less lines.
 - When testing MΩ, disconnect the power supply of the device being measured.
 - Since high voltage (500 V / 250 V / 125 V) is generated during the testing of MΩ, be careful about electric shock.
 - To avoid electric shock, always be sure to discharge the high voltage charged in the measured device after testing MΩ.
 - Never apply an input signal exceeding the maximum rating input value.

- Never use the instrument to measure a line connected to equipment (i.e. motors) that generates induced or surge voltage since it may exceed the maximum allowable voltage.
- Never use the instrument if the main unit or test leads are damaged or broken.
- Always use the instrument when it is not in its case.
- Never keep your fingers behind the finger guards on the probe and the clamp sensor barrier when taking measurements.
- Be sure to disconnect the test pins from the circuit when changing the function.
- Before starting measurement, make sure that the function and range are properly set in accordance with the measurement.
- Never touch the instrument with wet hands or use it in a damp environment.
- When MΩ is tested, measurement voltage is generated from the black test probe connected to the ground side, so do not touch the test pin.
- When testing MΩ, first connect the black test probe to the ground side of the device being measured and then connect the red test probe to the line side. When disconnecting them, first remove the red test probe on the line side and then remove the black test probe on the ground side.
- Never open the instrument case except when replacing batteries. Do not try to alter the original specifications.
- To ensure safety and maintain accuracy, calibrate and check the instrument at least once a year.
- The instrument is for indoor use only.

⚠ CAUTION

- When MΩ is being tested, the measurement terminal of this instrument generates high voltage. It is recommended that devices and parts (such as semiconductors) with low or unknown withstanding voltage be disconnected from the electric wiring (circuit) before it is measured. This is particularly important with computer-related devices.
- When testing MΩ, set the value of the rated voltage as close to the working voltage of the circuit being measured as possible.
Example: With a 100 V circuit, use a rated voltage of 125 V.

- 2-2 Features**
- Compact, lightweight, portable design that easily fits into a breast pocket.
 - MΩ testing settings can be switched between 3 rated voltage ranges (500 V/250 V/125 V) with the full-scale value of 400.0 MΩ (DG34a) or 40.00 MΩ (DG35a).
 - Provided with a current clamp sensor that can measure up to 100 A DC/AC.
 - The clamp sensor has a thin U-shaped sensor design that is 7 mm thick. Also because the inclination angle of the sensor is variable between 0° and 180°, the display section of the main unit can be adjusted to an easy-to-view angle.
 - Provided with an AC/DC voltage measurement function that can be used for checking line line conditions on site.
 - The LCD panel incorporates an electroluminescent backlight for easier operation in dark or low-light conditions.
 - The storable sections of the test leads and test probes use an elastic material that is easy to wind and store.
 - Provided with a clip adapter useful for measurement.

1-3 Overload Protections

Function	Input terminals	Maximum rating input value	Maximum overload protection input
DCV · ACV		DC/AC 600 V	DC/AC 600 V
400 MΩ (DG34a) 40 MΩ (DG35a) 125 V/250 V/500 V	LINE (Red) EARTH (Black)	Voltage and current input prohibited	250 V AC (50/60 Hz) 30 sec.
DCA · ACA	Clamp sensor section	DC/AC 100 A	100 A DC/AC

Note: AC voltage and AC current are regulated by rms, values of sinusoidal wave.

[2] APPLICATION AND FEATURES
2-1 Applications
Integrating the measurement functions demanded at electrical work sites, including MΩ testing, DC/AC clamp current measurement and DC/AC voltage measurement into a single unit, this instrument is a compact MΩ tester with clamp sensor ideal for electrical work.

- [3] NAME OF COMPONENT UNITS**
3-1 Multimeter
-

⚠ WARNING

- This section is very important for safety. Read and understand the following instructions fully and maintain your instrument properly.
- The instrument must be calibrated and inspected at least once a year to maintain its safety and accuracy.

6-1 Maintenance and Inspection

- Appearance
 - Has the appearance been damaged by falling?
- Test leads
 - Is the test lead cord damaged?
 - Is the core wire exposed at any place on the test leads?
 If the built-in fuse is blown, current measurement is impossible. Make sure that the test leads are not cut, referring to the section 5-1.

6-2 Calibration
The manufacturer may conduct calibration and inspection. For more information, please contact your dealer.

6-3 Battery Replacement

⚠ WARNING

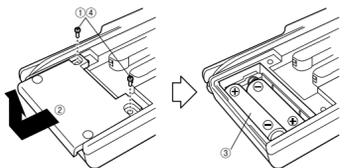
- To avoid electric shock, do not remove the battery compartment cover when input is applied to the measurement terminal and clamp sensor or when measurement is being performed.
- Be sure to confirm that the function switch is set to "OFF" before replacing the batteries.

⚠ CAUTION

Set the batteries with their polarities facing in the correct directions.

- Remove the two fixing screws from the battery compartment cover.
- Slide the battery compartment cover downward to remove it.
- Replace both of the two batteries in the battery compartment with new ones.

- Ⓧ Place the battery compartment cover and tighten the fixing screws.**
- About the batteries when shipped from the factory
The batteries incorporated when shipped from the factory are monitor batteries, so their service life may be shorter than that of brand-new batteries. A monitor battery is a type of battery used to check the functions of and performance of the product.



6-4 Storage

⚠ CAUTION

- The panel and the case are not resistant to volatile solvent and must not be cleaned with thinner or alcohol.
- 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.
Storage temperature/humidity range: -10 ~ 50 °C, <80 % RH (without condensation)
- When the instrument is not going to be used for extended time, be sure to remove the batteries.

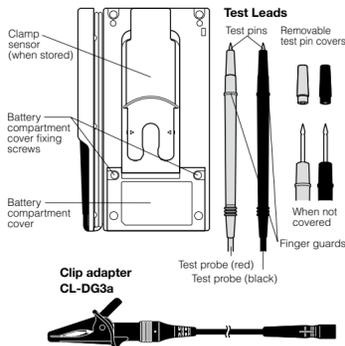
[7] AFTER-SALE SERVICE
7-1 Warranty and Provision
Sanwa offers comprehensive warranty services to its end-users and to its product resellers. Under Sanwa's general warranty policy, each instrument is warranted to be free from defects in workmanship or material under normal use for the period of one (1) year from the date of purchase. This warranty policy is valid within the country of purchase only, and applied only to the product purchased from Sanwa authorized agent or distributor. Sanwa reserves the right to inspect all warranty claims to determine the extent to which the warranty policy shall apply. This warranty shall not apply to disposable batteries, or any product or parts, which have been subject to one of the following causes:
1. A failure due to improper handling or use that deviates from the instruction manual.
2. A failure due to inadequate repair or modification by people other than Sanwa service personnel.
3. A failure due to causes not attributable to this product such as fire, flood and other natural disaster.
4. Non-operation due to a discharged battery.
5. A failure or damage due to transportation, relocation or dropping after the purchase.

7-2 Repair
Customers are asked to provide the following information when requesting services:
1. Customer name, address, and contact information
2. Description of problem
3. Description of product configuration
4. Model Number
5. Product Serial Number
6. Proof of Date-of-Purchase
7. Where you purchased the product
Please contact Sanwa authorized agent / distributor / service provider, listed in our website, in your country with above information. An instrument sent to Sanwa / agent / distributor without above information will be returned to the customer.

Note:
1) Prior to requesting repair, please check the following:
Capacity of the built-in battery, polarity of installation and discontinuity of the test leads.

2) Repair during the warranty period:
The failed meter will be repaired in accordance with the conditions stipulated in 7-1 Warranty and Provision.
3) Repair after the warranty period has expired:
• If it is expected that servicing can restore the original functioning of the instrument, we will service it for a price upon request of the user.
• The service charge or transport freight could sometimes become higher than the product price. Please consult us before asking for servicing.
• The minimum retention period of the servicing performance parts of this instrument is six (6) years after the discontinuation of production. This period is equal to the servicing available period. However, the retention period of a part may be reduced if it becomes unavailable due to discontinuation of production of the part manufacturer, etc.
4) Precautions when sending the product to be repaired:
To ensure the safety of the product during transportation, place the product in a box that is larger than the product 5 times or more in volume and fill cushion materials fully and then clearly mark "Repair Product Enclosed" on the box surface. The cost of sending and returning the product shall be borne by the customer.

7-3 SANWA web site
http://www.sanwa-meter.co.jp
E-mail: exp_sales@sanwa-meter.co.jp



[4] DESCRIPTION OF FUNCTIONS

⚠ WARNING
When canceling an operation, do not turn the function switch during measurement.

4-1 Power Switch/Function Switch/Range Switch (All Functions)
Turn this switch to turn the power ON and OFF and to select the measurement function, as well as the rated voltage range of the MΩ test function.

4-2 MΩ START/STOP Button (MΩ Test Function)
Each time the START/STOP button is pressed in the MΩ test function, the mode switches in the order of the MΩ testing voltage generation & MΩ testing mode → the MΩ testing voltage stop & measurement value data hold mode → the MΩ testing voltage generation & MΩ testing mode → In the MΩ testing voltage generation & MΩ testing mode, the MΩ is illuminated on the display and the selected measurement voltage is generated. In the MΩ testing voltage stop & measurement value data hold mode, the measurement voltage is stopped and the measurement value is maintained. "MΩ" is illuminated on the display.

Notes:
• The MΩ testing voltage generation mode automatically stops after about 30 seconds. Should this be the case, the measurement value will not be held.
• When the measurement function is switched, the measurement value data hold is canceled.

4-3 AC/DC Button (V · CLAMP A Positions)
Each time this button is pressed in the V or CLAMP A position, the measurement function switches in the order of AC → DC → AC →

4-4 REL Button (DCV · ACV · DCA · ACA Functions)
When the DCV, ACV, DCA or ACA function is activated, press this button. "REL" and "MΩ" will be illuminated on the display, and the measurement value will be set using the input value at the time the button was pressed as a reference. To cancel this mode, press the button again and keep it depressed for more than 2 seconds.
Ex.) Display after the REL button is pressed during DC 100 V input

Actual input value	Display in REL measurement
DC 0120 V	Δ DC 0020 V
DC 0100 V	Δ DC 0000 V
DC 0090 V	Δ DC -0010 V

Notes:
• This operation cannot be used with the MΩ test function.
• When the function is switched, the REL measurement will be canceled.

4-5 BACKLIGHT Button (All Functions)
Press this button to turn on the backlight. The backlight will automatically turn off after about 10 seconds.

4-6 DATA HOLD Button (DCV · ACV · DCA · ACA Functions)
When this button is pressed, "MΩ" will be illuminated on the display and the measurement value displayed at that time will be maintained. Pressing this button again will cancel the DATA HOLD mode and restore the measurement mode.
Note: This operation cannot be used with the MΩ test function.

4-7 Low Battery Indication (All Functions)
When the built-in batteries are exhausted and the battery voltage drops below about 2.6 V, "batt" will appear in the display. If this icon is lit, replace the batteries with new ones (two at the same time).

[5] MEASUREMENT PROCEDURE

5-1 Start-Up Inspection

⚠ WARNING

- Make sure that the low battery indication does not appear in the display.
- Never use the instrument if the instrument or test leads are damaged or broken.
- Check continuity of test leads.

Note: If there is no display, the batteries may be exhausted.

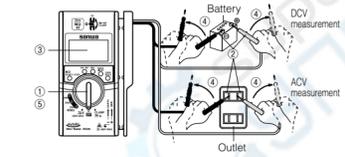
5-2 Voltage Measurement

⚠ WARNING

- Never apply an input signal exceeding the maximum rating input value.
- Be sure to disconnect the test pins from the circuit when changing the function.
- Always keep your fingers behind the finger guards on the probe when making measurements.

Function	Max. rating input value	Measurement range
DCV	DC 600 V	600 V
ACV	AC 600 V	600 V

- Applications
DCV/Voltage of the DC circuit is measured.
ACV/Sine wave AC voltage, such as lighting voltage, is measured.
- Measurement procedure
① Set the function switch to the "V" position and select either DCV or ACV with the AC/DC button.
② Apply the red and black test pins to the circuit to measure.
• For measurement of DCV, apply the black test pin to the negative potential side of the circuit to measure and the red test pin to the positive potential side.
• For measurement of ACV, apply the red and black test pins to the circuit to measure.
③ The reading of voltage is shown on the display.
④ After measurement, release the red and black test pins from the object measured.
⑤ Be sure to set the function switch to the OFF position after the measurement is complete.



◆ Accuracy is guaranteed in the case of sine wave.
◆ The frequencies where accuracy is guaranteed in the ACV measurement are 40 ~ 400 Hz.
◆ Measurement of an inverter power supply circuit may cause a malfunction.

[8] SPECIFICATIONS

8-1 General Specifications

Measurement	Double integral method
Display	Max. 3999 count
Over ranging indication	Most significant digit blinks
Polarity selection	Automatic selection (- display only)
Low battery indication	Displayed when built-in batteries are exhausted (to 2.6 V or less) with "batt" lit or blinking in display
Sampling rate	Approx. 2 times/sec
Response time of MΩ testing	Approx. 3 sec. or less
Current measurement system	CT clamp
Max. clamp conductor diameter	10 mm
AC sensing	Average sensing
Environmental condition	Operating altitude <2000 m, indoor use, pollution degree II
Accuracy-guaranteed temperature/humidity range	23 ± 5 °C, <80 %RH (without condensation)
Operating temperature/humidity range	5 ~ 40 °C, <80 %RH (without condensation)
Storage temperature/humidity range	-10 ~ 50 °C, <80 %RH (without condensation)
Power supply	Two LR03 alkaline batteries
Power consumption	DG34a: Maximum power consumption — Approx. 40 mW (MΩ testing 500 V range, 100 MΩ load measurement) DG35a: Maximum power consumption — Approx. 100 mW (MΩ testing 500 V range, 10 MΩ load measurement)
Number of MΩ testings that can be performed with brand-new batteries*	Approx. 2000 or more, successively, in 500 V range (DG34a/DG35a) 130 (H) x 75 (W) x 19.9 (D) mm (excluding protrusions), approx. 160 g (including batteries)
Dimensions & Mass	

Test lead length	Approx. 60 cm for both red and black
Accessories	Black alligator clip (CL-DG3a), instruction manual

* Per measurement time: 5 sec. (measurement interval ~ 25 sec.). The number varies depending on the batteries used.

8-2 Measurement Range and Accuracy

Accuracy assurance range: 23 ± 5 °C & less than 80 %R.H. No Condensation

Function	Range	Accuracy	Input impedance	Remarks
DCV	600 V	±(1.1 %rdg+3dgt)	Approx. 10 MΩ	
DC Voltage				
ACV	600 V	±(1.6 %rdg+7dgt)	Approx. 10 MΩ	• Accuracy-guaranteed range: 40 ~ 400 Hz • Accuracy in the case of sin wave
MΩ	125 V			See "Common Specifications for MΩ Testing" and "DG34a Specifications for MΩ Testing".
400.0 MΩ (DG34a)	250 V	±(3.0 %rdg+3dgt)		
	500 V			
MΩ	125 V			See "Common Specifications for MΩ Testing" and "DG35a Specifications for MΩ Testing".
40.00 MΩ (DG35a)	250 V	±(3.0 %rdg+3dgt)		
	500 V			
DCA	100.0 A	±(2.0 %rdg+5dgt)		• Accuracy was measured after canceling display value by the REL function.
Direct Current				
ACA	100.0 A	±(2.0 %rdg+5dgt)		• Accuracy-guaranteed range: 40 ~ 400 Hz • Accuracy in the case of sin wave
Alternating Current				

• Common Specifications for MΩ Testing
<No-load measurement voltage>

Rated voltage	No-load voltage
125 V/250 V/500 V (DG34a/DG35a)	1 ~ 1.2 times that of rated voltage

• DG34a Specifications for MΩ Testing
<Measurement range>

Measurement range	Measurement extent	Measurement resolution
400 MΩ	000.0 MΩ ~ 399.9 MΩ	0.01 MΩ

<Rated voltage/short-circuit current>

Rated voltage	Rated current	Short-circuit current	Resistance value at which rated voltage can be maintained
125 V	Approx. 12.5 μA	Approx. 12.5 μA	Approx. 10 MΩ or more
250 V	Approx. 2.5 μA	Approx. 2.5 μA	
500 V	Approx. 0.5 μA	Approx. 0.5 μA	

• DG35a Specifications for MΩ Testing
<Measurement range>

Measurement range	Measurement extent	Measurement resolution
40 MΩ	00.00 MΩ ~ 39.99 MΩ	0.01 MΩ

<Rated voltage/short-circuit current>

Rated voltage	Rated current	Short-circuit current	Resistance value at which rated voltage can be maintained
125 V	Approx. 12.5 μA	Approx. 12.5 μA	Approx. 10 MΩ or more
250 V	Approx. 2.5 μA	Approx. 2.5 μA	
500 V	Approx. 0.5 μA	Approx. 0.5 μA	

rdg: reading dgt: digits
Note: Correct measurement may not be possible in areas exposed to strong magnetic fields generated by electrical equipment such as a transformer or large current path, electromagnetic waves generated by wireless equipment, or areas where electrostatic charges are generated.

Accuracy calculation
Ex.) Measurement of AC voltage (ACV)
Display value: 0100 V
Range accuracy: ± (1.6 %rdg+7dgt)
Error: ± (0100 V x 1.6 % + 7dgt) = ± 8 V
True value: 0100 V ± 8 V (in a range of 0092 ~ 0108 V)
Note: 7 dgt corresponds to 7 V.

Specifications and external appearance of the product described above may be revised for modified without prior notice.

5-3 MΩ Testing

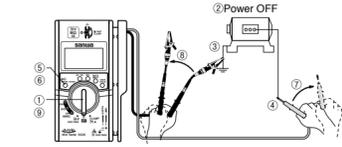
⚠ WARNING

- Never apply an external voltage on the input terminal.
- Do not turn the function switch during measurement.
- Do not hold the test probe by a section closer to the test pin side behind the finger guard.
- When the measured object has capacitance, it may remain charged by the applied voltage from this instrument for some time after measurement is completed. Be careful.

Function	Rated voltage range	Max. rating input value	Measurement range
MΩ (DG34a)	125 V 250 V 500 V	400.0 MΩ	400.0 MΩ
MΩ (DG35a)	125 V 250 V 500 V	40.00 MΩ	40.00 MΩ

- Applications: MΩ testing of electrical equipment and circuits.
- Measurement procedure
① Set the function switch to the desired measurement voltage range of MΩ.
② Short-circuit the test pins on the red and black test probes, then press the MΩ START/STOP button to confirm that the test leads are connected (displayed value: 3 counts or less).
③ Turn off the power of the device you are going to measure.
④ Connect the black test probe (provided, with the black clip connected) to the ground line of the device you are going to measure.
⑤ Connect the red test probe to the other end of the line of the device being measured.
⑥ Press the MΩ START/STOP button. The testing voltage will be applied between the test leads, and MΩ testing will start. Measurement time is about 30 seconds. Once that time has elapsed, the application of the measurement voltage will stop automatically. Measurement can be stopped at any time by pressing the MΩ START/STOP button again. The measurement value will be fixed at the value when the button was pressed.

- To perform the MΩ testing again, press the MΩ START STOP button again.
- After the measurement is complete, release the pin of the red test probe from the device that was measured.
- Release the black test probe from the ground line of the device that was measured.
- Be sure to set the function switch to the OFF position after completing measurement.



◆ A numerical value appears in the display before the MΩ START/STOP button is pressed (before the measurement voltage is applied). This is not a malfunction, and the displayed value is irrelevant to the measurement.
◆ During MΩ testing, the least significant digit of the displayed measurement value may sometimes flicker.
◆ During MΩ testing, use the rated voltage that's as close as possible to the voltage used by the circuit being measured.
Example: Use the rated voltage of 125 V for an electrical circuit of 100 V.

5-4 Clamp Current Measurement (CLAMP A)

⚠ WARNING

- The clamp sensor of this instrument is exclusively for low voltage. Perform the clamp current measurement on a line with 600 V or less.
- Do not turn the function switch during measurement.
- During measurement, do not hold the clamp sensor at any point beyond the barrier.
- To prevent electric shock, be sure to store the test probe and test lead in their designated storage compartments.

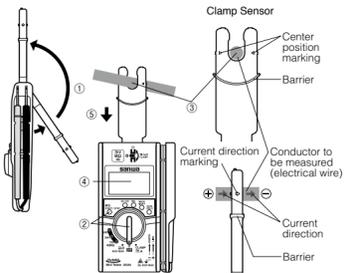
⚠ CAUTION

- The measurable diameter of a conductor is 10 mm. Do not force a cable with an outer diameter of more than 10 mm into the clamp sensor section. Also do not apply external force to the clamp sensor section.
- Make sure that the conductor to be measured is aligned with the center of the arrows on the clamp sensor. Otherwise, a measurement error will result.
- Do not let this instrument come near a conductor in which large current flows or place it on a strong magnetic field. Such an environment may cause a current value to be displayed even though no measurement is made (an error may occur). Since the clamp sensor of this instrument is a U-shaped open-type sensor, it is more susceptible to such an environment compared than a closed-type sensor.

Function	Max. input rating value	Measurement range
DCA	DC 100.0 A	DC 100.0 A
ACA	AC 100.0 A	AC 100.0 A

- Applications
DCA: Measures the current consumption of devices such as an automotive battery.
ACA: Measures the sine wave alternating current with 40 ~ 400 Hz frequency of power supply facilities.
- Measurement procedure
① Raise the clamp sensor from the rear of the main unit.
② Set the function switch to the CLAMP A position, and press the SELECT button to select DCA or ACA.
• DCA: Use the REL function to set the display value to "000.0 A" before measurement.
• ACA: No adjustment is necessary.

- Align one line of the conductor to be measured with the center of the arrows on the clamp sensor.
- DCA: Point the object to be measured in the same direction as the current direction marking. If it is pointed in the opposite direction, "-" will be displayed.
• ACA: The current direction of the object to be measured is irrelevant.
- Read the measurement value in the display.
- After measurement, remove the conductor from the clamp sensor.
- Be sure to set the function switch to the OFF position after completing measurement.



◆ When the position of this instrument is changed during DCA measurement, the display may fluctuate due to geomagnetism.
◆ Because the AC sensing system of this instrument is an average value system, an error in the measured value will occur with waveforms other than sine waves.
◆ Accuracy is guaranteed in ACA measurement between 40 ~ 400 Hz.
◆ Measurement of an inverter power supply circuit may cause a malfunction.