

sanwa

DCL1000 **DIGITAL CLAMP METER**

INSTRUCTION MANUAL 

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[1] SAFETY PRECAUTIONS

***Before use, read the following safety precautions.**

This instruction manual explains how to use your new digital clamp meter DCL1000. Before use, please read this manual thoroughly to ensure correct and safe use. After reading it, keep it together with the product for reference to it when necessary.

The instructions given under the heading of "⚠️WARNING" must be followed to prevent accidental burn and electric shock.

1-1 Explanation of Warning Symbols

The meaning of the symbols used in this manual and attached to the product is as follows:

⚠️: **Very important instructions for safe use.**

- The warning messages are intended to prevent accidents to operating personnel such as burn and electric shock.
- The caution messages are intended to prevent incorrect handling and measurement which may damage the product.

⚡: Risk of Electric shock

— : Direct current (DC)

⏚: Ground

Ω : Resistance

~ : Alternating current (AC)

➤ : Diode

••): Buzzer

□: Double insulation or reinforced insulation

1-2 Warning Messages for Safe Use

⚠️ WARNING


The following instructions are intended to prevent personal injury such as burn and electric shock. Be sure to follow them when using the meter:

1. This is a clamp meter for low-voltage circuits. Be sure to use it for circuits of voltage-to-ground of 600 Vrms or below.
2. Voltages above 70 VDC or 33 Vrms AC (46.7 V peak) are hazardous to human body. Never touch them.
3. Never input signals exceeding the maximum rated input value (see 1-3).
4. Never use the meter for measuring voltages of lines connected to equipment (e.g. motors) that generates induced or surge voltage since it may exceed the maximum allowable overload input.

5. Never use the meter near equipment which generates strong electromagnetic waves or is charged.
6. Never use the meter if the meter or test leads are damaged or broken.
7. Never use the meter with the case or battery lid removed.
8. During measurement, do not hold a place beyond the barrier of the meter or the test pin side of the flange of the test leads.
9. To measure a voltage, first connect the black test lead to the negative (-) or ground side. When disconnecting, the positive (+) or non-ground side must be disconnected last.
10. During measurement, do not change the meter to another function.
11. Before starting measurement, make sure that the function and range are properly set.
12. Never use the meter when it is wet or with wet hands.
13. Be sure to use the specified type of test leads.
14. Never attempt repair or modification, except for battery replacement.
15. Inspect the meter at least once a year.
16. This meter is for indoor use only.

1-3 Overload Protection

The maximum rated input value and overload protection have been established for the signal input part of each function.

Function	Signal Input Part	Maximum Rated Input Value	Maximum Overload Protection
A	Clamp type current sensor (CT)	AC 1000Arms	AC 1000Arms
\tilde{V} \overline{V}	Between + and - terminal	DC · AC 600V	DC · AC 600V
Ω \rightarrow \rightarrow		 Voltage and current input prohibited.	

[2] APPLICATIONS AND FEATURES

2-1 Applications

This is an AC clamp meter designed for the IEC measurement category CAT. III 600 V and is suitable for measurement of AC current of electrical equipment and power supply facilities.

2-2 Features

- Lighter than conventional clamp meters (30% reduction from Sanwa equivalent meters) for easy transportation.
- Large “ **HOLD** ” button to ensure holding of the indicated value.
- Safety design in compliance with the IEC.
- DMM function provided.
- Relative value (RELATIVE) measuring function provided.

PER IEC61010 OVERVOLTAGE INSTALLATION CATEGORY

OVERVOLTAGE CATEGORY II

Equipment of OVERVOLTAGE CATEGORY II is energy-consuming equipment to be supplied from the fixed installation.

Note:

Examples include household, office, and laboratory appliances.

OVERVOLTAGE CATEGORY III

Equipment of OVERVOLTAGE CATEGORY III is equipment in fixed installations.

Note:

Examples include switches in the fixed installation and some equipment for industrial use with permanent connection to the fixed installation.

OVERVOLTAGE CATEGORY IV

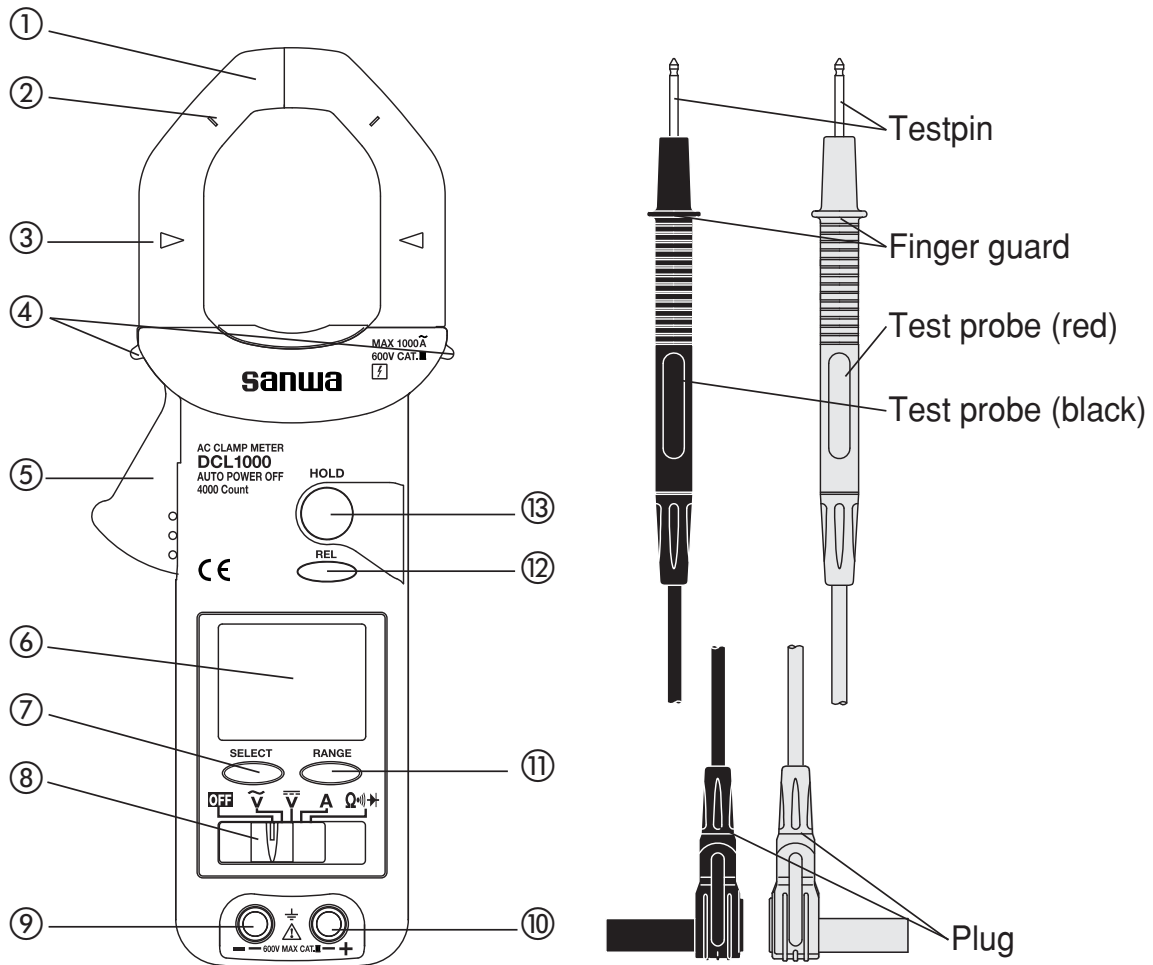
Equipment of OVERVOLTAGE CATEGORY IV is for use at the origin of the installation.

Note:





Examples include electricity meters and primary over-current protection equipment.

[3] NAMES AND FUNCTIONS OF COMPONENT UNITS

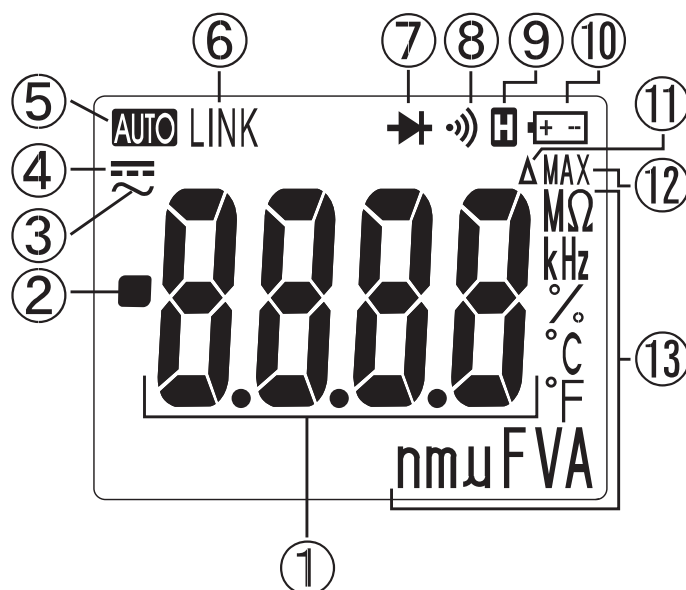
3-1 Names and Functions of the Meter and Test Leads



①	Clamp type current sensor (CT)	A sensor to clamp a conductor to measure. ("Clamp sensor")
②	Accuracy guarantee range mark	A range to clamp a conductor to measure which is guaranteed for accuracy. (See 5-2)
③	Center position mark	
④	Barrier	A convex part to prevent fingers from touching an object to measure during measurement of current.
⑤	Open/close lever	A lever to open and close the clamp sensor.
⑥	Display	An LCD to show measured values, etc.

⑦	SELECT button	When the SELECT button is pressed, the functions change as follows: Ω →  →  Position: Ω →  →  → Ω								
⑧	Power switch & function switch	Slide this switch to turn on and off the power and to select a function.								
⑨	– measuring terminal	Insert the black test lead.								
⑩	+ measuring terminal	Insert the red test lead.								
⑪	RANGE button (Range hold)	When this button is pressed, the meter will be set in the manual mode and the range is fixed. (“ AUTO ” will disappear from the display.) In the manual mode, each time this button is pressed, the range changes. While checking the unit and decimal point on the display, select the best range. To return to the auto range, hold this button pressed for 1 second or longer. (“ AUTO ” will appear on the display.)								
⑫	REL button (Relative value measurement)	When this button is pressed, “ Δ ” will appear on the display and the input value when this is pressed will be set to 0. To reset, press this button again. (“ Δ ” will disappear from the display.) Example: Indication after pressing this button when 30.00 VDC is input: <table border="1"> <thead> <tr> <th>Actual input value</th> <th>Reading</th> </tr> </thead> <tbody> <tr> <td>DC 30.00V</td> <td>DC 0.00V</td> </tr> <tr> <td>DC 35.00V</td> <td>DC 5.00V</td> </tr> <tr> <td>DC 25.00V</td> <td>DC - 5.00V</td> </tr> </tbody> </table>	Actual input value	Reading	DC 30.00V	DC 0.00V	DC 35.00V	DC 5.00V	DC 25.00V	DC - 5.00V
Actual input value	Reading									
DC 30.00V	DC 0.00V									
DC 35.00V	DC 5.00V									
DC 25.00V	DC - 5.00V									
⑬	HOLD button (Data hold)	When this button is pressed, the value indicated will be held. (“ H ” will appear on the display.) The indicated value will not change if the measurement input fluctuates. When this button is pressed again, the hold status will be canceled and the meter will return to the normal measurement mode. (“ H ” will disappear from the display.)								

3-2 Display



①	8888	Numerical value indication.
②	·	Negative sign of numerical data.
③	~	Indication of AC measurement.
④	≡	Indication of DC measurement.
⑤	AUTO	Lights in the auto range mode.
⑥	LINK	Not used.
⑦	→	Lights when the diode test function is used.
⑧)))	Lights when the continuity check function is used.
⑨	H	Lights in the data hold mode.
⑩	+ -	Warning of low battery power: This mark will appear on the display when the built-in battery has been discharged and its voltage has dropped to below about 2.4 V. When this mark flickers or lights, replace the battery with a new one.
⑪	Δ	Lights in the relative mode (REL).
⑫	MAX	Not used.
⑬	nm μ F V A MΩ kHz % °C °F	Unit of measurement. n, μ, F, %, °C and °F are not used.

[4] DESCRIPTION OF FUNCTIONS AND TERMS

4-1 Auto Power Off

If no switch or button is operated for about 30 minutes after power on, the power will automatically be turned off and the display will become blank.

To reset the meter, press any button or remove the test leads or the clamp sensor (CT) from an object to measure and set the function switch to OFF.

*In the auto power off mode, a very small amount of current keeps flowing. Therefore, when measurement has been finished, be sure to return the function switch to the OFF position.

*The auto power off function cannot be canceled.

4-2 AC Detection Method

This meter employs the average value method and therefore indicates an average value of voltage or current in the positive half cycle. No error will occur in measurement when the input waveform is sinusoidal wave with no distortion. However, if the input waveform is distorted sinusoidal wave or non-sinusoidal wave, an error of magnitude proportional to waveforms will occur.


[5] MEASURING PROCEDURE

WARNING

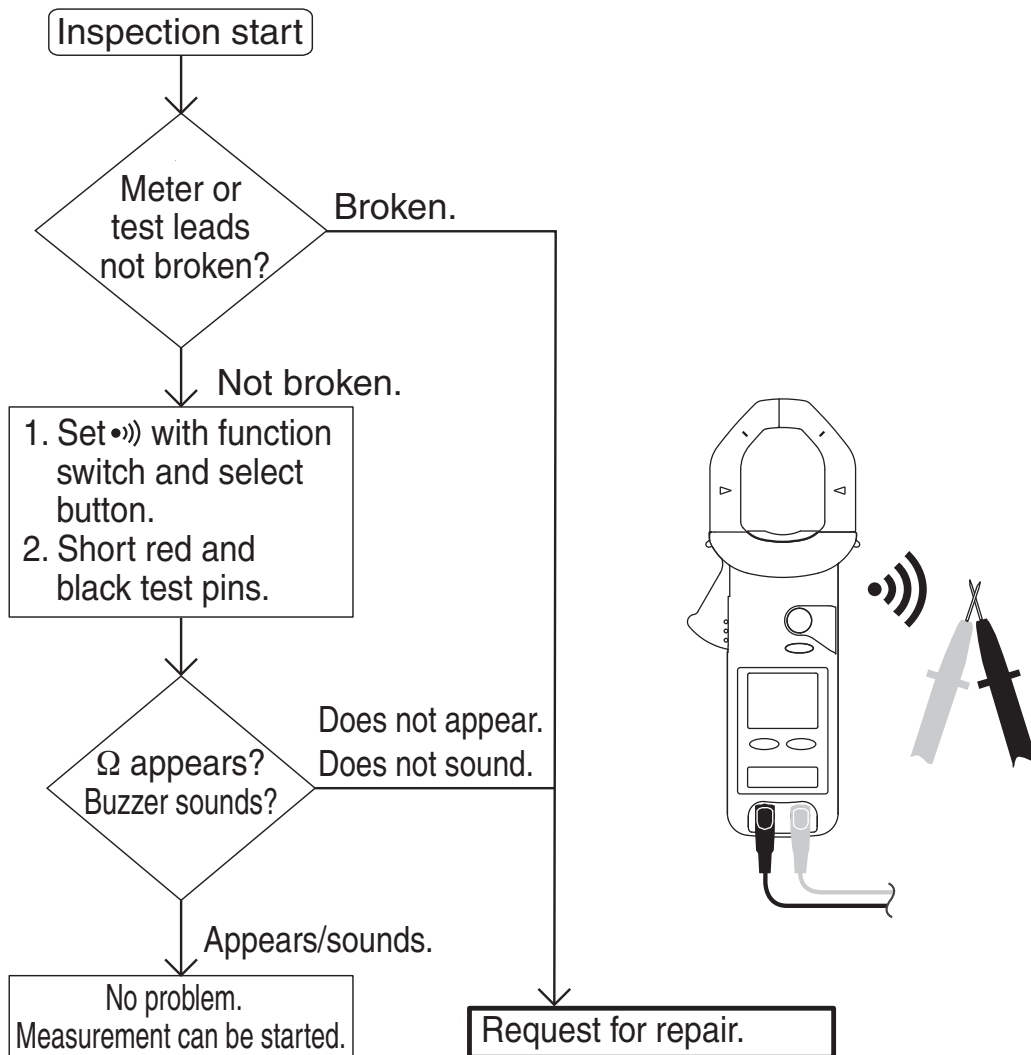
1. Do not apply an input signal exceeding the maximum rated input of each function.
2. During measurement, do not change the function switch.
3. During measurement, do not hold a place beyond the barrier of the meter or the test pin side of the flange of the test leads.
4. When measurement has been finished, remove the clamp sensor (CT) and test leads from the object measured and return the function switch to the OFF position.

5-1 Start-up Inspection

CAUTION

1. Be sure that when the power switch is turned on, the battery low warning mark () is not flickering or lit. If it is flickering or lit, replace the battery with a new one. (See 6-4.)
2. Do not use the meter if the meter or test lead is damaged or broken.
3. Make sure the test leads are not cut.

Always conduct the start-up inspection to ensure safety.

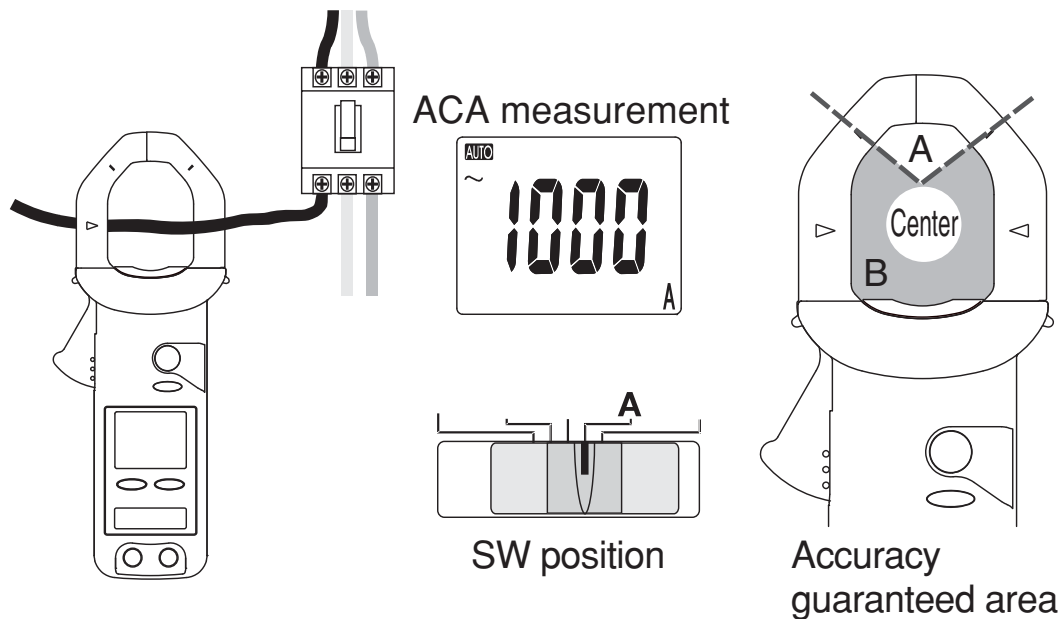


5-2 Current (ACA) Measurement

⚠ WARNING

Remove the test leads from the measuring terminals to avoid electric shock.

Function	Max rated input value	Range
ACA	AC 1000A	400.0A, 1000A



Remarks:

- This meter is of average value response.
Frequency range: 50/60 Hz (Sinusoidal wave AC)
- If vibration noise occurs in the clamp sensor (CT) part when measuring a large current above 100 A, it is not a failure.
- For accuracy when the indicated value is 15% of the range or less, 8 dgt is added to the accuracy shown in 8-2.
- An induction error below 0.06 A/A may occur due to influence of current flowing in adjacent conductors.
- It may malfunction when measuring voltage/current in the inverter circuit.

A guide for a range of conductor positions for accuracy guarantee

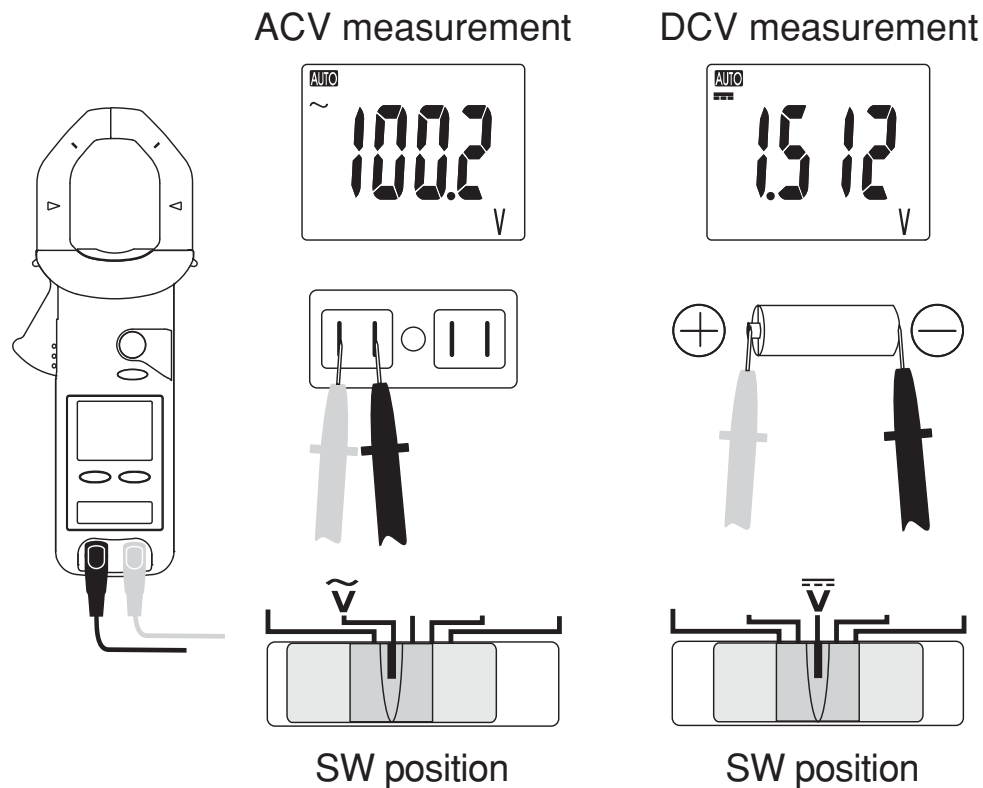
When an object is measured at the center of the clamp sensor (CT), the specified accuracy (see 8-2) can be obtained. In other places of conductors to be measured, the accuracy is as follows:

A area: 4% is added to the specified accuracy.

B area: 1% is added to the specified accuracy.

5-3 Voltage (V) measurement

Function	Max rated input value	Range
DCV	DC 600V	400.0mV, 4.000V, 40.00V, 400.0V, 600V
ACV	AC 600V	400.0mV, 4.000V, 40.00V, 400.0V, 600V



Remarks:

- Average value response and the frequency range is 50/60 Hz.
- The AC 400.0mV range is set with the **RANGE** button.
- In the 400.0mV range, the input resistance is approx. 1000 M Ω and in other ranges, it is approx. 10 M Ω .
- In the 400.0mV range, the indication may fluctuate when the test leads are released. It is not a failure.
- When the measuring terminals are shorted, the indication may not become zero.
- When measuring DCV, if a voltage is applied to the measuring terminals with + and – polarity reversed, a voltage value with “–” sign is indicated.
- It may malfunction when measuring voltage/current in the inverter circuit.

5-4 Resistance, Continuity Buzzer and Diode (Ω \rightarrow \rightarrow)



WARNING

Never apply a voltage to the input terminals.

5-4-1 Resistance (Ω) measurement

Function	Max rated input value	Range
Ω	40.00M Ω	400.0 Ω , 4.000k Ω , 40.00k Ω , 400.0k Ω , 4.000M Ω , 40.00M Ω

Open circuit voltage: Approx. 0.4 VDC

5-4-2 Continuity check (\rightarrow)

Measuring range: 0 ~ 400.0 Ω

Buzzer sound range: 0 Ω ~ 65 Ω ($\pm 55\Omega$)

Open circuit voltage: Approx. 0.4V DV

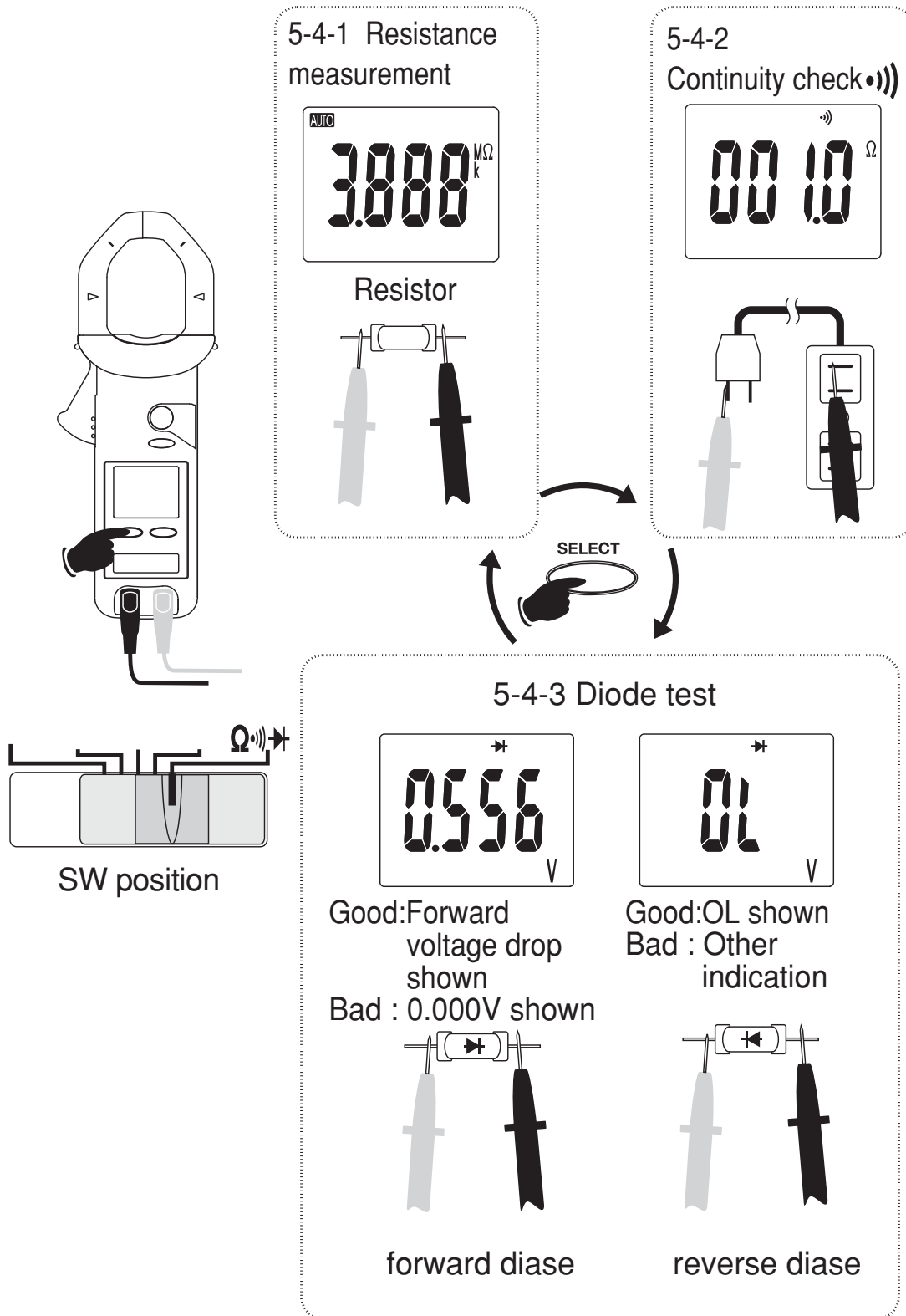
5-4-3 Diode test (\rightarrow)

Open circuit voltage: Approx. 1.6 VDC

Measuring current: 0.4 mA (typical)

Remarks:

- If resistance measurement is affected by noises, shield the object to measure with – potential.
- If measurement is conducted with a finger touching the test pins, an error will occur due to influence of resistance of the body.
- The area under voltage cannot be measured.



Each time the SELECT button is pressed, the functions change as indicated by → in the figure.

[6] MAINTENANCE

WARNING

1. The following instructions are very important for safety. Read this manual thoroughly to ensure correct maintenance.
2. Calibrate and inspect the meter at least once a year to ensure safety and maintain its accuracy.

6-1 Maintenance and Inspection

- 1) Appearance: Is the meter not damaged due to falling or other cause?
- 2) Test leads: Are the test leads not damaged, or is the core wire not exposed from any part or broken?
If any of the above problems exists, stop using the meter and request for repair.

6-2 Calibration and Inspection

For more information, please contact your dealer or Sanwa agent.

6-3 Storage

CAUTION

1. The panel and case are not resistant to volatile solvent and must not be cleaned with thinner or alcohol.
2. The panel and case are not resistant to heat. Do not place the meter near heat-generating devices.
3. Do not store the meter in a place where it may be subjected to vibration or from where it may fall.
4. Do not store the meter in places under direct sunlight, or hot, cold or humid places or places where condensation is anticipated.
5. If the meter will not be used for a long time, remove the battery.

6-4 Battery Replacement

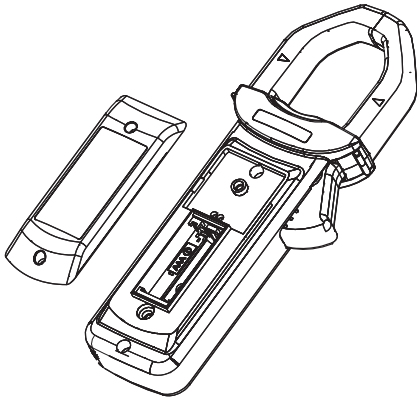
Battery when the meter is shipped:

A battery for monitoring has been installed prior to shipment from the factory. It may be discharged before the expiration of the described battery life.

*The battery for monitoring is a battery used to check the functions and performance of the product.

⚠ WARNING

If the rear case is removed with an input being applied to the measuring terminals, you may suffer electric shock. Before starting replacement, always make sure no input is being applied and the function switch is **OFF** .



- ① Remove the battery lid screws (2 pieces) with a screwdriver.
- ② Take out the battery and replace it with a new one.
Battery: R03 1.5 V x 2 pieces.
- ③ Attach the battery lid and secure it with screws.

[7] After-Sales 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 disposables 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:
In some cases, repair and transportation cost may become higher than the price of the product. Please contact Sanwa authorized agent / service provider in advance.
The minimum retention period of service functional parts is 6

years after the discontinuation of manufacture. This retention period is the repair warranty period. Please note, however, if such functional parts become unavailable for reasons of discontinuation of manufacture, etc., the retention period may become shorter accordingly.

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

[8] SPECIFICATIONS

8-1 General Specifications

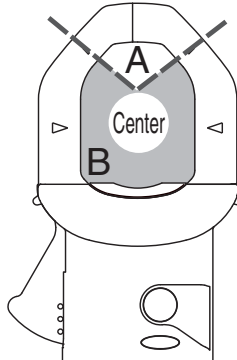
Operation method	Δ - Σ method
AC Sensing	Average value
LCD	4000 counts
Sampling rate	3 times/sec nominal
Range selection	Auto and Manual
Over-range indication	“OL” shown in numerical part.
Polarity indication	“-” indicated only when negative input.
Low battery indication	“  ” lights or flickers at about 2.4V or below.
Environmental condition	Altitude 2000 m or below, pollution degree II.
Operating temperature / humidity	5°C to 40°C and maximum relative humidity 80% for temperature up to 31°C decreasing linearly to 50% relative humidity at 40°C (No condensation)
Storage temperature / humidity	-20°C ~ 60°C, 70%R.H or below (with battery removed).
Power supply	R03 1.5V x 2 pieces
Power consumption	2.2mA at DCV (typical)
Battery life	Approx. 120 hours at DCV
Safety standards	IEC61010-2-032 (2002), CAT-III 600V IEC61010-031
EMC	IEC61326 In an RF field of 3V/m: Total Accuracy = Specified Accuracy + 45 digits Performance above 3V/m is not specified
Clamp sensor (CT) clamp size	Max. 42 mm
Dimensions	238(L) X 95(W) X 45(H) mm
Weight	Approx. 290g (battery included)
Auto power off	About 30 min. after power on.
Accessories	Battery (built-in), test leads (TL-23), carrying case (C-DCL1000), instruction manual

8-2 Measuring Range and Accuracy

Temperature: 23±5°C, humidity: 75% RH max., built-in battery voltage 2.4 V or above.

rdg (reading): Read value, dgt (digit): Number of counts of last digit

ACA

Range	Accurac	Remarks
400.0A	$\pm(1.7\%rdg+5dgt)$	<ul style="list-style-type: none"> · This meter is of average value response. Frequency range: 50/60 Hz (Sinusoidal wave AC) · Accuracy is specified when an object is measured at the center of the clamp sensor (CT), · A guide for a range of conductor positions for accuracy guarantee In other places of conductors to be measured, the accuracy is as follows: A area: 4% is added to the specified accuracy. B area: 1% is added to the specified accuracy.  <ul style="list-style-type: none"> · For accuracy when the indicated value is 15% of the range or less, 8 dgt is added to the accuracy. · An induction error below 0.06 A/A may occur due to influence of current flowing in adjacent conductors. · It may malfunction when measuring voltage/current in the inverter circuit.
1000A	$\pm(1.7\%rdg+5dgt)$	

DCV

Range	Accuracy	Input Impedance	Remarks
400.0mV	$\pm(1.2\%rdg+3dgt)$	Approx. 1000MΩ	
4.000V	$\pm(1.9\%rdg+3dgt)$	Approx. 10MΩ	
40.00V			
400.0V			
600V	$\pm(2.2\%rdg+4dgt)$		

ACV

Range	Frequency range	Accuracy	Input Impedance	Remarks
400.0mV	50Hz~500Hz	$\pm(4.2\%rdg+5dgt)$	Approx. 10M Ω	The AC 400.0mV range is set with the RANGE button.
4.000V	50Hz/60Hz	$\pm(2.2\%rdg+5dgt)$		
	60Hz~500Hz	$\pm(2.7\%rdg+5dgt)$		
40.00V	50Hz/60Hz	$\pm(2.2\%rdg+5dgt)$		
	60Hz~500Hz	$\pm(2.7\%rdg+5dgt)$		
400.0V	50Hz/60Hz	$\pm(2.2\%rdg+5dgt)$		
	60Hz~500Hz	$\pm(2.7\%rdg+5dgt)$		
600V	50Hz~500Hz	$\pm(3.2\%rdg+5dgt)$		

It may malfunction when measuring voltage/current in the inverter circuit.

Ω

Range	Accuracy	Remarks
400.0 Ω	$\pm(1.7\%rdg+6dgt)$	Open circuit voltage: Approx DC0.4V
4.000k Ω	$\pm(1.2\%rdg+4dgt)$	
40.00k Ω		
400.0k Ω		
4.000M Ω	$\pm(1.7\%rdg+4dgt)$	
40.00M Ω	$\pm(2.7\%rdg+4dgt)$	

Continuity Check (\cdot)))

Measuring range: 400.0 Ω

Buzzer sound range: 0 Ω ~65 Ω ($\pm 55\Omega$)

Open circuit voltage: Approx. 0.4 VDC

Diode test (\rightarrow)

Open circuit voltage: Approx. 1.6 VDC

Test current: 0.4mA (typical)