

sanwa®



CD5002
CD5004

デジタルマルチメータ
DIGITAL MULTIMETER

取扱説明書
INSTRUCTION MANUAL



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[1] SAFETY PRECAUTIONS: Before use, read the following safety precautions

This instruction manual explains how to use your CD5002/CD5004 digital multimeter safely. 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. Using this product in ways not specified in this manual may damage its protection function.

The instructions given under the headings of “ WARNING” and “ CAUTION” must be followed to prevent accidental burn and electrical 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 instruction 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 which may damage the product.

Symbols attached to the product

 : Refer to the instruction manual before use.

 : High voltage. Do not touch.

 : Double insulation or reinforced insulation  : Ground

 : Resistance  : Continuity buzzer  : Capacitance

 : Backlight  : Diode test  : Temperature measurement

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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 instrument.

1. This instrument is a digital multimeter for metering low voltages. Never use it on electric circuits that exceed 1000 V.
2. Never apply an input signal exceeding the maximum rating input value (see section 1-3).
3. Never use the instrument for measuring the line connected with equipment (i.e., motors) that generates induced or surge voltage since it may exceed the maximum allowable voltage.
4. Never use the instrument if it is damaged or broken; the same applies to the test leads.
5. Never use the instrument with the case or battery lid removed.
6. During measurement, do not hold the test pin side of the flange of the test leads.
7. Do not turn the rotary switch to change the function during measurement.
8. Be sure to check the rotary switch position, measurement range, and measurement terminals for each measurement.
9. Never use the instrument when it is wet or with wet hands.
10. Never attempt to repair or modify the product, except for battery and fuse replacement.
11. Be sure to perform start-up inspection and annual inspection.
12. This instrument is for indoor use only.
13. When measuring equipment containing a hazardous charged part, follow your local and national safety standards.
14. Do not use the instrument in a method other than specified. Otherwise, the protection function may be spoiled.
15. Do not use the Bluetooth function in hospitals or other medical facilities where electronic or wireless equipment is prohibited. Doing so may interfere with medical devices and potentially cause accidents.



CAUTION

1. Correct measurement may not be performed when using the instrument near transformers, high current paths, or other sources of strong magnetic fields, near radio transmitters or other sources of electromagnetic radiation, or near charged objects.
2. The instrument may malfunction or correct measurement may not be performed when measuring special waveform such as that of the inverter circuit.

1-3 Maximum Overload Protection Input

Rotary switch position	Input terminal	Max. rated input value	Max overload protection input value
ACV · DCV · Hz	VHz · Ω	DC/AC 999.9 V	DC/AC 1000 V
$\cdot \Omega$ · mA $\cdot \text{V}$ · $^{\circ}\text{C}$	mA · $^{\circ}\text{C}$ and COM	$\triangle$ Do not input a voltage or current.	DC/AC 1000 V
DCA · ACA	A and COM	DC/AC 10 A $\triangle$ Do not input a voltage.	10 A/1000 V fuse Breaking capacity 30 kA

[2] APPLICATIONS AND FEATURES

2-1 Applications

This instrument is a true RMS (root mean square) digital multimeter designed for measurements within the range of CAT. IV 600 V and CAT. III 1000 V. It is suitable for measuring general-purpose low-voltage circuits.

2-2 Features

- Safety design in compliance with the IEC61010-1. Current terminals are provided with safety caps.
- Full 4-digit 9999 count.
- True RMS conversion method for AC measurement.
- Temperature measuring function provided.
- Auto Hold function automatically holds the measurement value once it stabilizes (only during voltage measurement).
- Large, easy-to-see display.
- Compact, lightweight, easy-to-hold design.
- Test probes can be secured to the body.
- Auto power off after approx. 30 minutes of inactivity (can be cancelled).
- Bright backlight.
- Bluetooth (BLE) communication function (CD5004 only).

Measurement Category (Overvoltage Category)

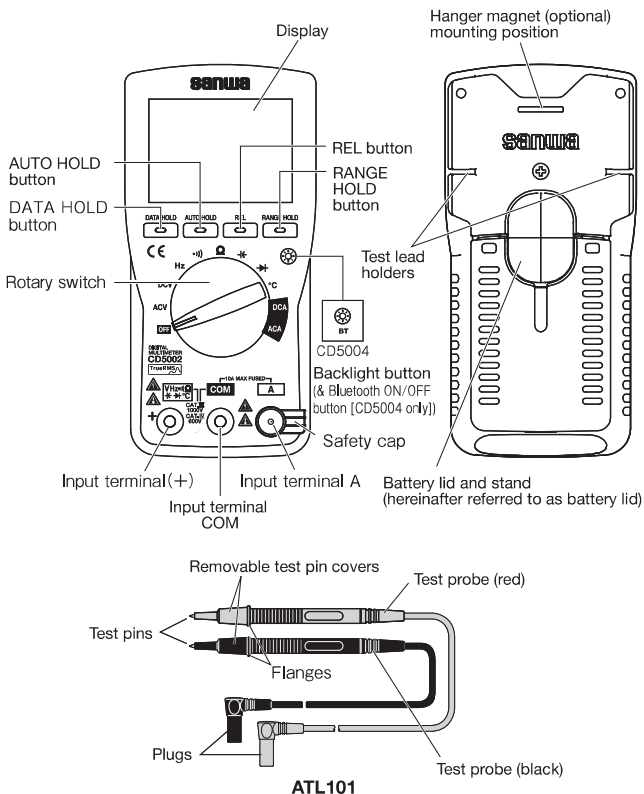
CAT II : Line on the primary side of equipment with the power cord to be connected to the receptacle.

CAT III : Line from the primary side or branch of equipment which directly takes in electricity from a distribution board to the receptacle.

CAT IV : Line from the service conductor to the distribution board.

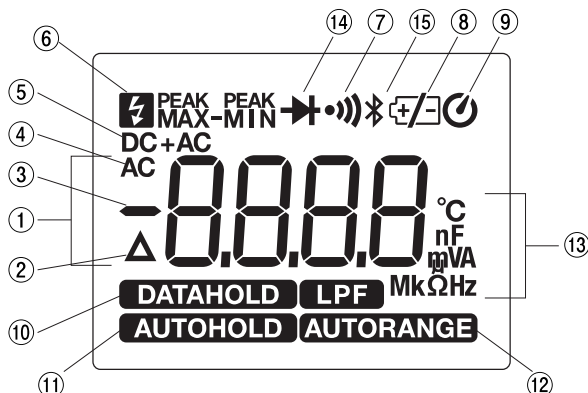
[3] NAMES OF COMPONENT UNITS

3-1 Main Unit and Test Leads



- When the removable test pin covers are mounted: CAT.IV 600 V, CAT.III 1000 V
- When the removable test pin covers are not mounted: CAT.II 1000 V

3-2 Display



①	Numeral display part
②	Relative mode
③	Polarity (-)
④	AC measurement function
⑤	DC measurement function
⑥	Voltage warning indicator
⑦	Continuity check
⑧	Low battery warning
⑨	Auto Power OFF
⑩	Data Hold mode
⑪	Auto Hold mode
⑫	Auto Range mode
⑬	Measurement units
⑭	Diode test
⑮	Bluetooth (CD5004 only)

PEAK MAX-MIN, **+AC**, **LPF** : Not used with this instrument

[4] DESCRIPTION OF FUNCTIONS

4-1 Rotary Switch

Use this switch to turn the power on and off and to select various functions.

4-2 Data Hold Function: DATA HOLD Button

When the DATA HOLD button is pressed, **DATAHOLD** lights up on the display, and the current display value is held (retained). The display will not change even if the measurement input fluctuates. Pressing the button again will turn off **DATAHOLD**, release the hold mode, and restore the measurement mode.

4-3 Auto Hold Function: AUTO HOLD Button

When the AUTO HOLD button is pressed during voltage measurement, **AUTOHOLD** lights up on the display, and the device enters the Auto Hold mode, holding the current display value.

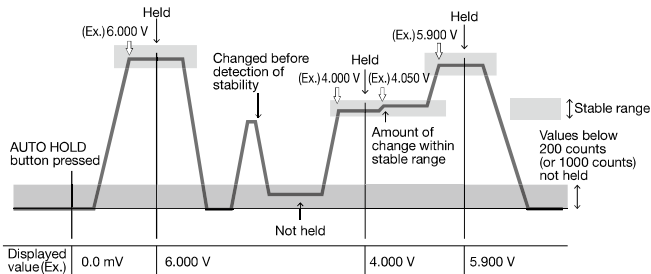
When a new stable measurement value is detected in the Auto Hold mode, the buzzer sounds, and the new measurement value is automatically held. If the test leads are removed, the last detected measurement value is held. Pressing the button again cancels the Auto Hold mode.

This function is only available in the **ACV** and **DCV** settings.

Note:

- The measurement value will be held if there is a change greater than 4% from the measurement value held the last time and if the fluctuation of the measurement value is within 4% for 3 consecutive times.
- Values below 200 counts for each range will not be held (with the exception of 1000 counts for the 999.9 mV AC range).
- During ACV measurement where the test leads are open, the Auto Hold mode may be activated due to noise or induced voltage in the 999.9 mV AC range. Should this be the case, select a range above 9.999 V AC using the Range Hold function.
- In the Auto Hold mode, the REL button and RANGE HOLD button are disabled.
- Pressing AUTO HOLD button in the Data Hold mode switches the mode to the Auto Hold mode.

• Auto Hold Operation Example



4-4 Relative Measurement Function: REL Button

When the REL button is pressed, **Δ** lights up on the display, showing the value based on the input value which is set to 0 (reference) at the time the button is pressed. Pressing the button again will cancel the display.

This function is only available in the **ACV**, **DCV**, **Ω**, **°C**, **Hz**, **DCA**, and **ACA** settings.

4-5 Range Hold Function: RANGE HOLD Button

Pressing the **RANGE HOLD** button switches the device to the Manual mode, and the range is fixed (the **AUTORANGE** indicator on the display will turn off). In the Manual mode, each press of this button will shift the range, so select the appropriate range while checking the unit and the position of the decimal point on the display.

To return to the Auto Range mode, press and hold this button for more than 1 second (the **AUTORANGE** indicator on the display will light up).

This function is only available in the **ACV**, **DCV**, **Ω**, **DCA**, and **ACA** settings.

4-6 Backlight Function: Button

Pressing the  button turns on the backlight of the display. Pressing the button again turns it off. To conserve battery power, turn off the backlight after use.

Note:

- The backlight does not turn off automatically.

4-7 Auto Power OFF Function

This instrument incorporates the Auto Power OFF function that turns off the display automatically about 30 minutes after the last operation, conserving battery power. To reactivate the instrument, press the DATA HOLD or RANGE HOLD button, or turn the rotary switch to the OFF position and then turn it back again.

To disable the Auto Power OFF function, turn the rotary switch from the OFF position to any other position while pressing and holding the RANGE HOLD button. Release the RANGE HOLD button once the display shown on the right appears.



Then, if the instrument starts up with the  indicator turned off, it means that the Auto Power OFF function is disabled.

Note:

- Approximately 1 minute before the display turns off, the buzzer will sound 5 times.
- Disabling the Auto Power OFF function and the buzzer cannot be done simultaneously. (see section 4-10).
- Even when the Auto Power OFF function is activated, a small amount of current still flows. So be sure to turn the rotary switch to the OFF position once the measurement is completed.

4-8 Low Battery Indication

The  indicator lights up on the display when the batteries have discharged down to a supply voltage of about 2.5 V or less. Replace the batteries when this indicator lights up (see section 6-4).

4-9 Voltage Warning Indicator and Buzzer

The  indicator is displayed when AC or DC voltage exceeding 30 V may be applied to the input terminal. Also the buzzer sounds twice when the input voltage exceeds 30 V from below 30 V.

This warning function operates even when the measured value display is fixed by the Data Hold mode (see section 4-2). (The measured value does not change.)

This function is only available in the **ACV** and **DCV** settings.

4-10 Buzzer Deactivation Function

While pressing and holding the REL button, turn the rotary switch from the OFF position to any desired position. When the display shown on the right appears, release the REL button. The instrument will start up with the buzzer deactivated.



To reactivate the buzzer, turn the rotary switch to the OFF position and then turn it back to any desired position.

Note:

- The buzzer cannot be deactivated simultaneously with the deactivation of the Auto Power OFF function (see section 4-7).

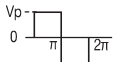
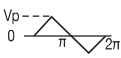
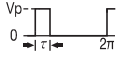
4-11 AC Detection Method

This instrument uses the true RMS (root mean square) method, representing the magnitude of AC as the same work amount as DC. With the true RMS circuit, it is capable of measuring the RMS value of non-sinusoidal waves such as sine waves, square waves, and triangle waves.

4-12 Crest Factor

The Crest Factor (CF) is represented by the ratio of the peak value of a signal to its RMS value. For the most common waveforms such as sine waves and triangle waves, the CF is relatively low.

On the other hand, waveforms similar to pulse trains with low duty cycles will have a high CF. Refer to the table below for the voltage and crest factor of typical waveforms.

	Input Waveform	0 to Peak V_p	RMS value V_{rms}	Average Value V_{avg}	Crest Factor V_p / V_{rms}	Form Factor V_{rms} / V_{avg}
Sine Wave		V_p	$\frac{V_p}{\sqrt{2}}$ $\approx 0.707 V_p$	$\frac{2 V_p}{\pi}$ $\approx 0.637 V_p$	$\sqrt{2}$ ≈ 1.414	$\frac{\pi}{2\sqrt{2}}$ ≈ 1.111
Square Wave		V_p	V_p	V_p	1	1
Triangle Wave		V_p	$\frac{V_p}{\sqrt{3}}$ $\approx 0.577 V_p$	$\frac{V_p}{2}$ $\approx 0.5 V_p$	$\sqrt{3}$ ≈ 1.732	$\frac{2}{\sqrt{3}}$ ≈ 1.155
Pulse		V_p	$\sqrt{\frac{\tau}{2\pi}} \cdot V_p$	$\frac{\tau}{2\pi} \cdot V_p$	$\sqrt{\frac{2\pi}{\tau}}$	$\sqrt{\frac{2\pi}{\tau}}$

Voltages of Various Forms

Note:

- The AC voltage measurement of this instrument is AC-coupled. The DC component of the input signal is cut off.

4-13 Bluetooth Function (CD5004 Only): Button

Press and hold the  button;  will blink on the display.

In this state, the instrument can connect to a device with the Bluetooth app installed. Once connected, the blinking  will become steady. While a Bluetooth connection is active, the auto power-off function is disabled. To deactivate the Bluetooth function, press and hold the  button.

- For details about the app compatible with the CD5004, visit the CD5004 product page on our website.
- The communication range is approximately 5 m but may vary depending on radio wave conditions. In environments with obstacles such as metallic objects or walls, or where strong magnetic fields or electromagnetic waves are present, the range may be significantly reduced.
- If the low battery warning indicator lights up, Bluetooth connection may fail. Additionally, if the warning indicator lights up after a connection has been established, replace the batteries as soon as possible.

[5] MEASUREMENT PROCEDURE



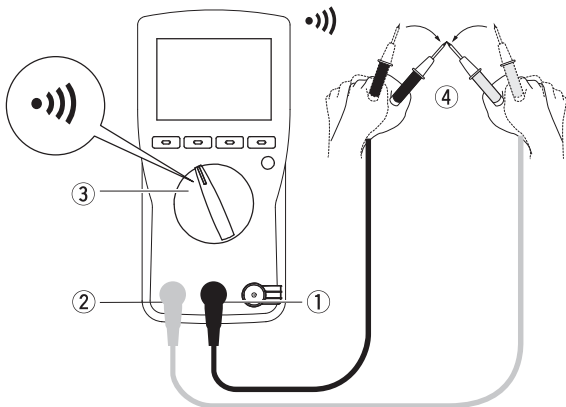
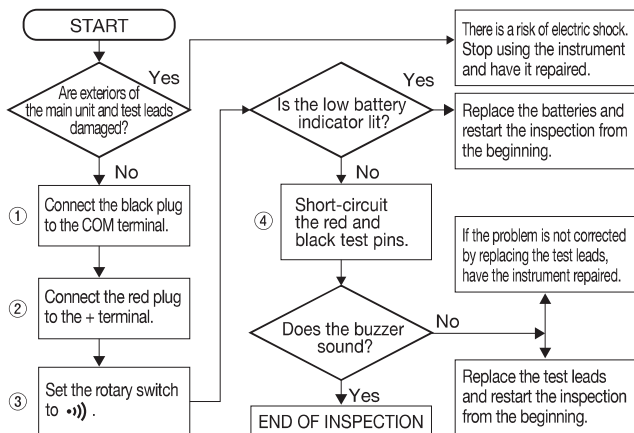
WARNING

1. Do not apply an input signal exceeding the maximum rated input of each function.
2. During measurement, do not turn the rotary switch.
3. During measurement, do not touch the test pin side of the flange of the test lead.
4. When measurement has been finished, remove the test pins from the measured object and return the rotary switch to the OFF position.
5. Use test leads that are compatible with the measurement category of the measured object. When combining main units and test leads with different measurement categories, the combination will be limited by the lower measurement category.

5-1 Start-up Inspection

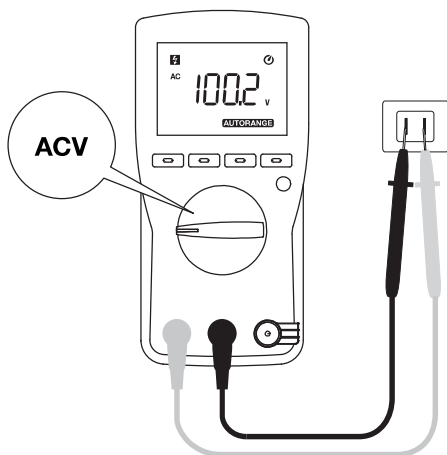
Perform the following pre-operational check for safety.

- External appearance: Check that the main unit is free of abnormality or damage due to dropping, etc.
- Accessories: Check that there are no abnormalities such as disconnections or cracks in the test leads.
- Check that the  indicator is not lit. If it is lit, replace the batteries with new ones. If nothing is displayed on the display, the batteries might have been totally discharged. (See section 6-4.)
- Check that there is no disconnection in the test leads by setting the rotary switch to the  position and short-circuiting the test pins.
- Make sure your hands and the main unit are not wet.



5-2 AC Voltage Measurement (ACV)

Rotary switch position	Max. rated input value	Range
ACV	AC 999.9 V	999.9 mV/9.999 V/99.99 V/999.9 V

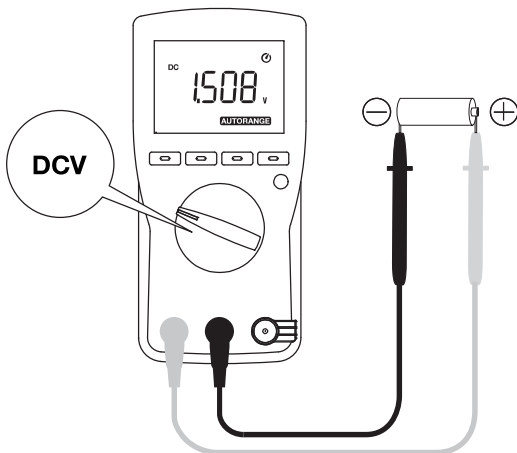


Note:

- The displayed value may fluctuate when the test leads are open, but this is not a malfunction.
- Measurement of an inverter power supply circuit may cause a malfunction.

5-3 DC Voltage Measurement (DCV)

Rotary switch position	Max. rated input value	Range
DCV	DC 999.9 V	999.9 mV/9.999 V/99.99 V/999.9 V



Note:

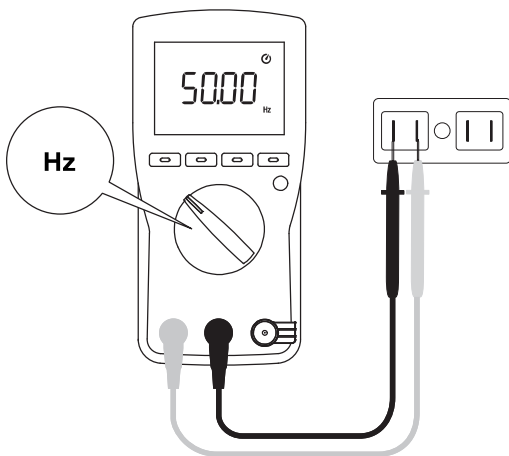
- The displayed value may fluctuate when the test leads are open, but this is not a malfunction.

5-4 Frequency Measurement (Hz)

⚠ CAUTION

Never use the instrument for measuring frequencies to ground as the earth leakage breaker may trip.

Rotary switch position	Max. rated input value	Range
Hz	99.99 kHz (≤ 1000 Vrms)	9.999 Hz/99.99 Hz/999.9 Hz/ 9.999 kHz/99.99 kHz (Auto range only)



Note:

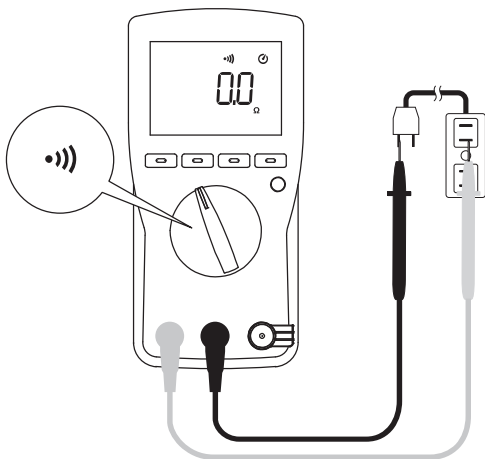
- Due to the low input resistance, a large amount of current will flow during measurement. Never use the instrument for measuring circuits or devices having a small current capacity.
- The displayed value may fluctuate when the test leads are open, but this is not a malfunction.
- Zero cross (+ potential → - potential → + potential) frequencies can be measured. Frequencies of + potential only or - potential only such as logic pulses cannot be measured.
- When this function is used, the data hold and relative function cannot be used.

5-5 Continuity Check (•)))

⚠ WARNING

Never apply an external voltage to the measurement terminals.

Rotary switch position	Max. rated input value	Range
•)))	999.9 Ω	999.9 Ω



Note:

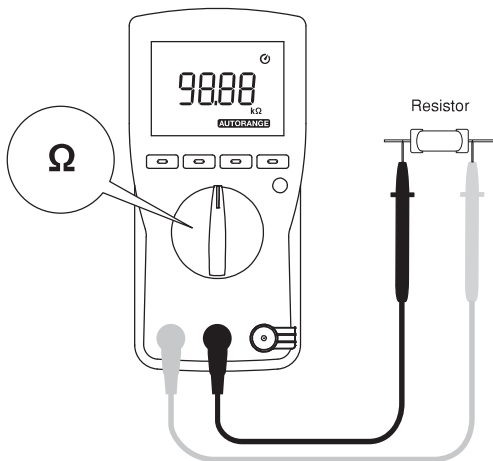
- Open circuit voltage: Approx. 0.6 V DC.
- Continuity buzzer sound range: Approx. 30 to 70 Ω or less.

5-6 Resistance Measurement (Ω)

⚠ WARNING

Never apply an external voltage to the measurement terminals.

Rotary switch position	Max. rated input value	Range
Ω	99.99 M Ω	999.9 Ω /9.999 k Ω /99.99 k Ω /999.9 k Ω / 9.999 M Ω /99.99 M Ω



Note:

- The open voltage across the measurement terminals is about 1.0 V DC or less.
- If the measurement is affected by noise, shield the measured object with the potential of COM (-).
- If a test pin or the measured object is touched by a finger during measurement, a measurement error will result due to the resistance of the human body.

5-7 Capacitance Measurement ($\overline{\leftarrow}$)

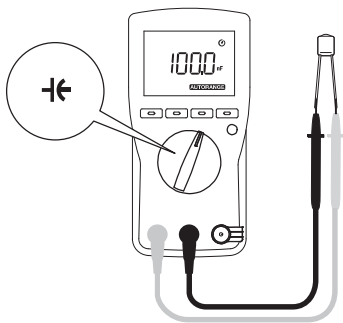
WARNING

Never apply an external voltage to the measurement terminals.

CAUTION

1. Remove electric charge in the capacitor prior to measurement.
2. Because this instrument applies a current to the capacitor to measure, it is not suitable for measurement of electrolytic capacitors having a large leak current as a large error will occur.
3. For capacitors having large capacitance, measurement takes a longer time (approx. 10 sec. in the 99.99 mF range)

Rotary switch position	Max. rated input value	Range
$\overline{\leftarrow}$	99.99 mF	999.9 nF/9.999 μ F/99.99 μ F/999.9 μ F/ 9.999 mF/99.99 mF



Note:

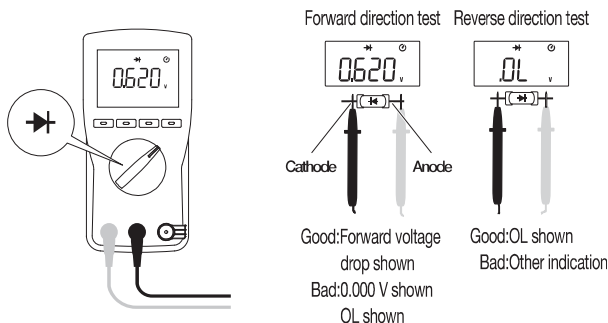
- The display may become unstable due to the flowing capacitance of ambient noise or the test leads. To minimize the effects of the floating capacitance, connect the measured object (capacitor) directly to the + measurement terminal and COM (-) terminal whenever possible.
- The capacitance measurement is available in the auto range only.

5-8 Diode Test (→)



WARNING

Never apply an external voltage to the measurement terminals.



Note:

- The open voltage between the measuring terminals is approx. 3.2 V DC.
- If the forward voltage of the diode exceeds the open voltage, “OL” will be displayed even during a forward direction test.

5-9 Temperature Measurement (°C)



WARNING

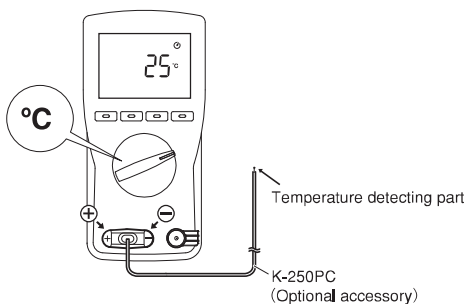
Measuring temperature involves such hazard as getting burnt depending on temperatures to measure and measuring environment.



CAUTION

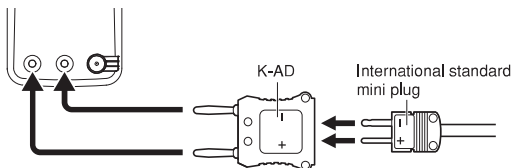
Do not apply a voltage above 50 mV DC to the input terminal.

Rotary switch position	Measurement range	Range
°C	-40 to 800 °C	800 °C



Note:

- The temperature measurement function of this instrument is designed for K-type thermocouples.
- A temperature sensor is not included with this product. Please purchase it separately.
- Insert the + plug of the optional K-250PC temperature sensor into the + terminal, and the – plug into the COM terminal. Ensure the polarity is correct.
- If the thermocouple has a broken wire, “OL” will be displayed.
- If this instrument is moved to an environment with a significantly different ambient temperature, measurement errors may occur until the internal temperature stabilizes to match the ambient temperature.
- Short-circuiting the input terminals will cause the display to show the ambient temperature.
- By using the optional K-type adapter (K-AD), a temperature sensor with an international standard mini plug can be connected.



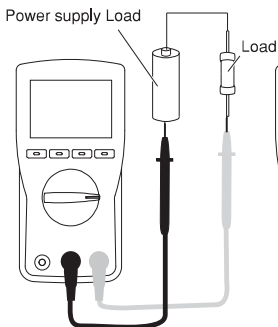
5-10 DC Current / AC Current Measurement (DCA / ACA)

WARNING

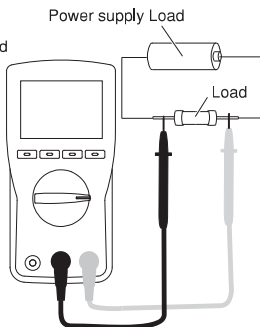
1. Never apply a voltage to the measuring terminals.
2. Never apply an input exceeding the maximum rated current.
3. Be sure to connect this instrument in series via a load.



Correct measuring method



Wrong measuring method

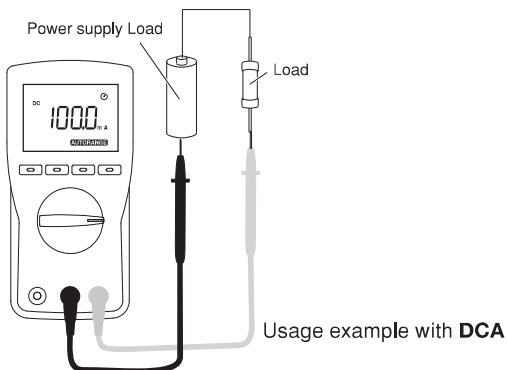


4. To prevent overheating due to heat generation during current measurement, limit the measurement time to 10 seconds or less for currents of 6 A or more, with a minimum interval of 5 minutes between measurements.
5. Straighten the test leads during measurement to prevent overheating.

CAUTION

Be sure that the built-in fuse has not blown.

Rotary switch position	Max. rated input	Range
DCA	10 A	999.9 mA / 9.999 A
ACA	10 A	999.9 mA / 9.999 A



Note:

- During current measurement, the internal resistance of the current range is placed in series, causing a drop in current. This effect becomes more significant in low-resistance circuits.
- If the displayed value remains almost unchanged when an input signal is applied, or if it is significantly smaller than the expected current value, it is possible that the input terminal connection or rotary switch position is incorrect, or that the fuse has blown. Check for these potential issues.
- Continuously measurable range: Less than 6 A (for 6 A or more, measurement time must be within 10 seconds with a measurement interval of at least 5 minutes).
- For extended measurements, use the optional ACS101 clamp sensor.

[6] MAINTENANCE



WARNING

1. This section is very important for safety. Read and understand the following descriptions thoroughly and maintain your instrument properly.
2. The instrument must be calibrated and inspected at least once a year to maintain the safety and accuracy.

6-1 Maintenance and Inspection

1) Appearance:

Is the instrument not damaged due to falling or other cause?

2) Test leads:

Are the test leads not damaged or the core wires not exposed from the test leads?

If any of the above problems exists, stop using the instrument and request for repair.

6-2 Calibration

For more information, please contact Sanwa's authorized agent / distribution service provider, listed on our website. (See section 7-3.)

6-3 Cleaning and Storage



CAUTION

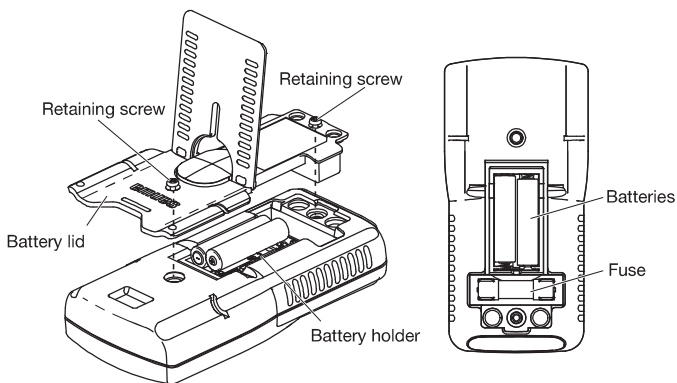
1. The main unit is not resistant to volatile solvent and must not be cleaned with thinner or alcohol. For cleaning, use dry, soft cloth and wipe it lightly.
2. The main unit is not resistant to heat. Do not place it near heat-generating devices.
3. Do not store the instrument in a place where it may be subjected to vibration or where it may fall.
4. Do not store the instrument in places under direct sunlight, or hot, cold or humid places or places where condensation is anticipated.
5. If the instrument will not be used for a long time, be sure to remove the batteries.

6-4 Battery/Fuse Replacement

WARNING

1. To avoid electric shock, do not remove the battery lid while an input is applied to the measured terminal or during measurement.
2. Make sure that the rotary switch is set to the OFF position before replacing the batteries and fuse.

- ① Set up the stand and loosen the battery lid retaining screws (x 2) with a Phillips screwdriver.
- ② When the battery lid lifts up, remove it from the unit.
- ③ Battery replacement: Replace both batteries in the battery holder with new ones, ensuring correct polarity.
Fuse replacement: Replace the fuse in the fuse holder with a new one.
- ④ Attach the battery lid and retaining screws in the original positions.



[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 a 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 a Sanwa authorized agent / distributor / service provider, listed in our website, in your country with above information. An instrument sent to a Sanwa / agent / distributor without above information will be returned to the customer.

Note:

- 1) Before requesting repair, check the following: Battery capacity, installation polarity, continuity of the test leads, and whether the fuse has blown.
- 2) Repair during the warranty period:
The failed instrument 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 a Sanwa authorized agent / service provider in advance. The minimum retention period of service functional parts is six (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.
- 5) Specifications of the Replacement Fuse

<Product Code>	<Dimensions>	<Rated Current/Voltage>	<Breaking Capacity>
F1201	ø10×38 mm	10 A/1000 V	30 kA

7-3 SANWA Website

<https://www.sanwa-meter.co.jp>

E-mail: exp_sales@sanwa-meter.co.jp

[8] SPECIFICATIONS

8-1 General Specifications

Operation method	$\Delta-\Sigma$ method
AC detection method	True RMS (AC coupling)
Display	Max. 9999 counts
Sampling rate	Approx. 5 times/sec. (DCV)
Over-range display	"OL" shown in numeric section
Range selection	Auto and Manual
Polarity switching	Automatic selection (Only "-" is displayed.)
Battery low warning	 lights up on display when supply voltage from internal batteries drops below about 2.5 V.
Operating environmental conditions	Altitude no more than 2000 m, indoor use, environmental pollution degree II
Operating temperature / humidity	Temperature: 5 to 40 °C Humidity is as follows (without condensation). 5 to 31 °C: Max. 80 % RH 31 to 40 °C: Linearly decreases from 80 % RH to 50 % RH.
Storage temperature / humidity	Temperature -10 to +40 °C: No more than 80 % RH, without condensation Temperature +40 to +50 °C: No more than 70 % RH, without condensation (Remove batteries when instrument is not to be used for long time.)
Power supply	LR03 / AAA alkaline battery, 1.5 V x 2
Auto power off	Instrument power is turned OFF in about 30 min. after last operation. Standby current: Approx. 2 μ A
Communication interface	Bluetooth® 5.1, measurement data transfer to iOS/Windows 10 devices (for use in Japan only) Measurement data transferred at intervals of approx. 1 sec.

Power consumption	Approx. 2.3 mA (DCV measurement, backlight off) Approx. 2.9 mA (DCV measurement, Bluetooth communication with CD5004)
Battery life	Approx. 460 hours (DCV measurement, backlight off) Approx. 340 hours (DCV measurement, Bluetooth communication with CD5004)
Dimensions / mass	149 (<i>H</i>) x 72 (<i>W</i>) x 37 (<i>D</i>) mm, approx. 250 g (excluding protrusions, including batteries)
Safety standards	IEC61010-1, IEC61010-2-030, IEC61010-2-033 CAT. IV 600 V, CAT. III 1000 V IEC61010-031
EMC Directive	IEC61326
Accessories	Instruction manual, test leads (ATL101), LR03 / AAA alkaline battery x 2

8-2 Optional Accessories

Hanger magnet: HM-1

Clamp sensor: ACS101

Clip adapter: CL-15a

K-type thermocouple temperature sensor: K-250PC

K-type sensor adapter: K-AD

8-3 Measuring Range and Accuracy

Temperature: 23 ± 5 °C, humidity: 80 % RH max. (no condensation)

rdg (reading): Read value

dgt (digit): Number of counts of last digit

ACV : AC Voltage

Range	Accuracy	Input resistance	Remarks
999.9 mV	±(1.0 %rdg + 5dgt)	Approx. 11 MΩ	• Accuracy guarantee frequency range: 40 to 400 Hz (sine wave) - Measurement not possible when frequency exceeds 1 kHz. • Accuracy guarantee range ≥5% of each range • Crest factor At half scale: ≤3 At full scale: ≤1.5
9.999 V			
99.99 V			
999.9 V		Approx. 10 MΩ	

DCV : DC Voltage

Range	Accuracy	Input resistance	Remarks
999.9 mV	$\pm (0.5 \%rdg + 2dgt)$	Approx. 11 M Ω	
9.999 V			
99.99 V		Approx. 10 M Ω	
999.9 V			

Hz : Frequency

Range	Accuracy	Remarks
9.999 Hz	$\pm(0.1 \%rdg + 5dgt)$	- Auto range only - Sensitivity: Approx. ≥ 3 Vrms - Measurement not possible when frequency is less than 1 Hz. - Input resistance: Approx. 900 kΩ
99.99 Hz		
999.9 Hz		
9.999 kHz		
99.99 kHz		

•)) : Continuity Check

Continuity buzzer activation range: Sounds at approx. 30 to 70 Ω or less.
 Open circuit voltage: Approx. 0.6 V DC.

Ω : Resistance

Range	Accuracy	Remarks
999.9 Ω	$\pm(0.5 \%rdg + 5dgt)$	Open circuit voltage: Approx. ≤ 1.0 V
9.999 k Ω		
99.99 k Ω		
999.9 k Ω		
9.999 M Ω	$\pm(1.5 \%rdg + 5dgt)$	
99.99 M Ω	$\pm(5.0 \%rdg + 5dgt)$	

F : Capacitance

Range	Accuracy	Remarks
999.9 nF	$\pm(5 \%rdg + 5dgt)$	• Auto range only • Accuracy for film capacitors or equivalent or better with lower leakage current • Accuracy guarantee range: ≥ 5 nF
9.999 μ F		
99.99 μ F		
999.9 μ F		
9.999 mF		
99.99 mF		

$\rightarrow$: Diode test

Open-circuit voltage: Approx. 3.2 V DC

$^{\circ}\text{C}$: Temperature

Range	Accuracy	Remarks
800 $^{\circ}\text{C}$	$\pm(3.0 \%rdg + 3dgt)$	• Measurable range: -40 to 800°C • Accuracy for K-type thermocouple • Thermocouple accuracy not included

DCA: DC Current

Range	Accuracy	Input resistance	Remarks
999.9 mA	$\pm (1.0 \% \text{rdg} + 5 \text{dgt})$	Approx. 0.01 Ω	• Input resistance excludes fuse resistance • Continuously measurable range: <6 A (>6 A: measurement time ≤ 10 sec., measurement interval ≥ 5 min.)
9.999 A			

ACA: AC Current

Range	Accuracy	Input resistance	Remarks
999.9 mA	$\pm (1.0 \% \text{rdg} + 5 \text{dgt})$	Approx. 0.01 Ω	• Input resistance excludes fuse resistance • Accuracy guaranteed frequency range: 40 to 400 Hz (sine wave) Measurement not possible when frequency exceeds 1 kHz • Accuracy guaranteed range $\geq 5\%$ of each range • Crest factor At half scale: ≤ 3 At full scale: ≤ 1.5 • Continuously measurable range: <6 A (>6 A: measurement time ≤ 10 sec., measurement interval ≥ 5 min.)
9.999 A			

Accuracy calculation method

Example: AC voltage measurement (ACV)

Indicated value: 200.0 V

Range accuracy: 999.9 V range ... $\pm (1.0 \% \text{rdg} + 5 \text{dgt})$

Error: $\pm (200.0 \text{ V} \times 1.0 \% + 5 \text{dgt}) = \pm 2.5 \text{ V}$

True value: 200.0 V $\pm 2.5 \text{ V}$ (in a range of 197.5 V and 202.5 V)

* In the 999.9 V range, 5 dgt corresponds to 0.5 V.

The product specifications described in this manual and its appearance are subject to change without notice for improvement or other reasons.

sanwa®

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