1. INTRODUCTION

Thank you for purchasing SANWA Digital Clamp Meter, DCM-22AD. You are kindly requested to thoroughly read this manual before use for safety.
Especially, Section "3. PRECAUTIONS FOR SAFETY MEASUREMENT" and Sections from 11 through 13 concerning the usage of the meter are important. Keep this manual together with the meter not to lose it.

2. APPLICATION AND FEATURES

1. Application of the Meter
   DCM-22AD is a compact type digital clamp meter for measurement in circuits with small or medium capacity at low voltage. It is operatable in both DC and AC currents. The meter is suitable for measuring DC currents in electrical equipment and automobile parts. It is also suitable for measuring AC currents in household appliances and power supply facilities.
   The meter is provided with a variety of functions. So, it enables the same measurements as ordinary circuit tester do.
2. Features
   - The meter permits measuring both DC and AC currents.
   - It has 4 ranges each for DC voltage, AC voltage and resistance.
   - It is furnished with the continuity beeper.
   - It is provided with the data hold function.
   - It is of one range control type, and the selection of range is accomplished with the rotary switch.

3. PRECAUTIONS FOR SAFETY MEASUREMENT

⚠ WARNING

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

1. This meter is a clamp meter exclusive for low voltage. Use it only for circuits of 500 V or below. If it is used for measuring the circuit exceeding 600 V, it may cause electrical shock or damage to the meter.
2. Pay special attention when measuring the voltage of AC 33 Vrms (46.7 V peak) or DC 70 V or more to avoid injury.
3. Never apply an input signal exceeding the maximum input value.
4. Never use meter if it is damaged or broken.
5. As for the meters (clamp meters) using test leads:
   - Be sure to use the specified model of test leads.
   - Never use the test bar or cord that is damaged.
   - During testing, never hold the test pin side of the test bar ahead of its finger guard.
6. Never use meter in the state that its case or battery cover is taken off.
7. Be sure to disconnect the test pins from the circuit when changing the function or range.
8. Before starting measurement, make sure that the function and range are properly set in accordance with the measurement.
9. Never use meter with wet hands or in a damp environment.
10. Never open meter case except when replacing batteries or fuses. Do not attempt any alterations of original specifications.
11. To ensure safety and maintain accuracy, calibrate and check the meter at least once a year.
12. When making an measurement of distorted AC wave shape other than AC sinusoidal wave.
    Pay attention not to become the state of overload, since the value may be indicated (displayed) less than an actual value.
13. Indoor use.

4. SPECIFICATIONS

The specifications and appearance are subject to change without prior notice for improvement.

1. Measuring range

Function	Range	Input impedance	Range selection
±DCA	20, 200	—	Manual
ACA	20, 200	—	Manual
±DCV	2, 20, 200, 500	10~11 MΩ	Automatic
ACV	2, 20, 200, 500	10~11 MΩ	Automatic
kΩ	2, 20, 200, 2000	(*)	Automatic
Continuity check •))	Threshold level : Approx.400~600 Ω(*)		

*: Open-circuit voltage: Approx. 0.43 V

2. Accuracy (Temperature: 23 °C ± 5 °C Humidity: Within 80 % RH, No condensation)

Function	Accuracy	Remarks
±DCA	± (2 % rdg + 2 dgt)	① A conductor to be measured, shall be clamped at the center of the iron core. ② DCA: shall be done after 0 ADJ. ③ ACA: 40 ~ 400 Hz (sin wave)
ACA	± (2 % rdg + 5 dgt)	
±DCV	± (1.5 % rdg + 2 dgt)	
ACV	± (2 % rdg + 5 dgt)	ACV40 ~ 400 Hz (sin wave) (AC 2 V range : 50 Hz, 60 Hz)
kΩ	± (2 % rdg + 5 dgt)	

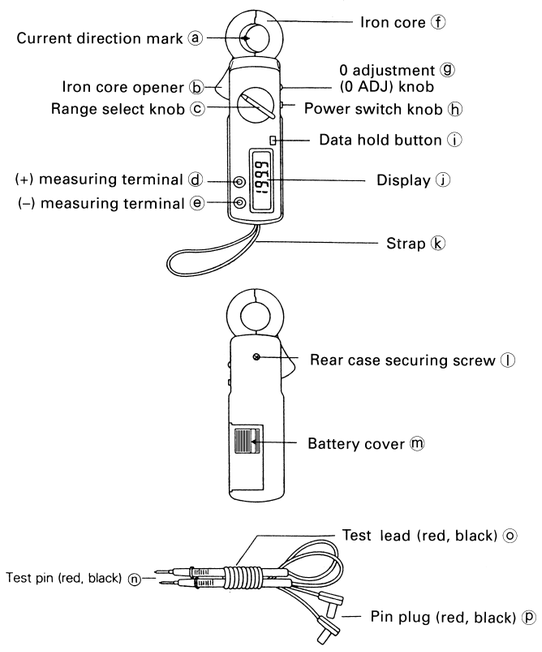
rdg: reading, dgt: digit (value of the lowest digit)

* Factory-preinstalled built-in battery
A battery for monitoring is preinstalled before shipping, therefore it may run down sooner than the battery life specified in the instruction manual.
The " battery for monitoring " is a battery to inspect the functions and specifications of the product.

3. Others

Maximum diameter of conductor to be clamped: ϕ 23 mm	
⚠ Applicable circuit voltage	600 V or less (DC/AC)
⚠ Withstand voltage (1 min.)	2000 V AC between iron core and rear case
⚠ Overload capacity (within 5 sec.)	
Current range	400 A DC/AC in max.
Voltage range	750 V DC/AC in max.
Resistance range	300 V DC/AC in max.
Continuity check	300 V DC/AC in max.
⚠ Over indication	The figure "1" at the highest digit flickers (excluding 500 V DC/AC ranges)
Operating method	Dual-slope integration method
Display	LCD with maximum indication of "1999"
Polarity indication	The sign "–" is indicated only at input with reversed polarity.
Battery consumption indication: The character "B" appears.	
Sampling rate	2 times/sec.
Data hold	The characters "DH" appears.
Operating temperature/humidity range: 0~50 °C, 80 % RH or below (no condensation)	
Storage temperature/humidity range: –10~60 °C, 70 % RH or below (no condensation)	
* Built-in battery	Two manganese dry battery R03
Current consumption	10 mA or less
Battery life	Approx. 48 hrs. for continuous operation (when measuring current)
Dimensions/Mass	179 x 56 x 26.5 mm/approx. 140 g
Accessories	Test lead set (TL-61) 1 set, Carrying case 1 pc., Instruction manual 1 copy

5. NAME OF EACH PARTS

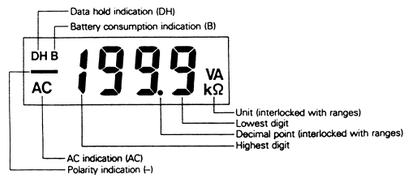


6. DISPLAY AND FUNCTIONS

This section describes the major contents and junctions of the display.

1. "DH" Indication
   When the data hold button ⓘ is pressed, the characters "DH" appear on the left side of the display ⓙ, the displayed data being held.
   Pressing the button ⓘ again makes the characters "DH" disappear, canceling the hold. With the characters "DH" displayed, the fluctuation of input does not vary the displayed value.
2. "B" Indication
   When the battery is consumed down to the level of approx. 1.25 V or below per cell, the character "B" appears on the left side of the display ⓙ.
   Batteries running out cause large measuring errors. Replace the batterys with new ones as soon as possible. See "7. REPLACING BATTERY" for the replacement procedure.
3. "–" Indication
   If a direct current is input with the polarity opposite to that specified, the sign "–" appears on the left side of the display ⓙ.
4. "AC" Indication
   When the range select knob is set to the AC range, the characters "AC" appears on the left side of the display ⓙ.

⚠ 5. Flicker of the figure "1" [Input over indication]
If an input is beyond the measuring range, the figure "1" at the highest digit flickers on the display ⓙ.
This is hazardous. Immediately stop measuring and check the measuring range.



7. REPLACING BATTERY

When the battery is consumed and the character "B" appears on the display ⓙ, replace the batterys in accordance with the following procedure.

1. Push the battery cover ⓜ in the direction indicated by ◁ and remove it.
2. Replace both batterys with new ones of the same type "R03".
3. Restore the battery cover ⓜ.

⚠ **Note** Never mistake the polarity of batterys when replacing them. Otherwise, circuit parts of the meter may be damaged.

8. CAUTIONARY SIGNS

The following cautionary signs appear on the meter and in this manual.

1. ⚠
Disobedience to instructions with this sign may lead to troubles of the meter and accidents such as electrical shock.

2. ⚡
This sign cautions that high voltage is applied to parts marked with it.

9. PREPARATION FOR MEASUREMENT

(See "5. NAME OF EACH PART")

1. Turn the power switch knob ⓗ to "ON", and the display ⓙ is illuminated.
2. Turn the range select knob ⓒ to a desired range.
3. In case of measuring voltage and measuring resistance, connect the test lead ⓞ to the measuring terminals ⓓ and ⓔ.
   Red pin plug ⓟ → (+) measuring terminal ⓓ.
   Black pin plug ⓟ → (–) measuring terminal ⓔ.

⚠ **Note 1** Be sure to disconnect the test lead from the measuring terminals when measuring current. It is dangerous to measure current with the test lead connected.

⚠ **Note 2** When the characters "DH" appear on the display ⓙ, press the data hold button ⓘ to make them disappear.

Note 3 After ending a measurement, be sure to turn the power switch knob ⓗ to "OFF" for preventing current consumption.

10. ENDING MEASUREMENT

1. Turn the power switch knob ⓗ to "OFF".
2. Make sure that all the indications have disappeared from the display ⓙ.

Note 1 Be sure to turn OFF the power switch after ending a measurement. It minimizes current consumption.

Note 2 Set the range select knob ⓒ to the "DCV" or "ACV" position when storing the meter. With the knob set to it, safety is ensured even in an erroneous measurement. Moreover, with the knob set to it, less current is consumed when turning ON the power switch. (The current range consumes current approx. 2 times the other ranges.)

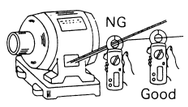
11. PROCEDURE FOR MEASURING CURRENT

Following the steps in "9. PREPARATION FOR MEASUREMENT", take the procedure below.

11.1 General Cautions on Measuring Current

1. Be sure to disconnect the test lead from the measuring terminals for preventing electric shock.
2. Fully close the iron core. Otherwise, errors may be produced. For the reason, prevent the iron core from being deformed. Also, prevent iron powder or dirt from sticking to the lead end of the halves of the iron core.
3. If placed close to a conductor carrying a large current or in a strong magnetic field, the meter may indicate a current value with no conductor clamped (an error is produced).
4. Clamp only one conductor for measurement.
   Clamping 2 or more conductors leads to erroneous measurement.

[Remark] Use the data gold (DH) function if the display is unreadable. The description of data hold (DH) appears in Section "6.DISPLAY AND FUNCTIONS".



Clamp Method for 2 or More Conductor

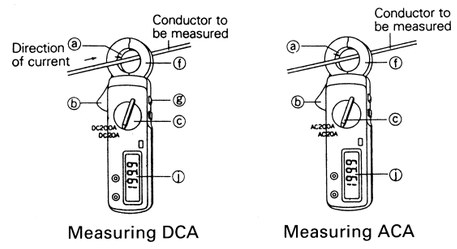
11.2 Procedure for Measuring Direct Current (DCA)

1. Set the range select knob ⓒ to the "DC 20 A" or "DC 200 A" range according to the magnitude of the current to be measured.
2. Turn the 0 adjustment knob ⓖ to display the figure [000].
3. Press the iron core opener ⓑ to open the iron core ⓕ. Then, place the conductor to be measured at the center of the iron core.
4. Let go of the iron core opener ⓑ to fully close the iron core ⓕ.
5. Read the indication on the display ⓙ.

Note 1 In the DCA range the indication is variable. So, display the figure [000] with the 0 adjustment knob ⓖ before starting a measurement.

Note 2 Harmonize the direction of the current to be measured with the current direction mark ⓐ. If the direction disaccords with mark, the polarity indication of "–" appears.

Note 3 If you change the posture of the meter during measurement, the reading may slightly vary due to the effect of the earth magnetism.



11.3 Procedure for Measuring Alternating Current (ACA)

1. Set the range select knob ⓒ to the "DC 20 A" or "DC 200 A" range according to the magnitude of the current to be measured.
2. Press the iron core opener ⓑ to open the iron core ⓕ. Then, place the conductor to be measured at the center of the iron core.
3. Let go of the iron core opener ⓑ to fully close the iron core ⓕ.
4. Read the indication on the display ⓙ.

[Remark 1] In AC 20 A range measurement, the figure 000 may not be shown on the display but the figure "1" or "2" may appear at the lowest digit even if the measured current is 0. This is not a fault.

[Remark 2] Is ACA range measurement, the 0 adjustment (0 ADJ) function in unavailable.

[Remark 3] Disregard the current direction mark ⓐ in cases other than cases involving the phase of current.

Note 1 Errors are produced in measurements of currents other than sinusoidal alternating current.

Note 2 Errors are enlarged in measurements out of the range of frequency from 40 Hz to 400 Hz.

12. PROCEDURE FOR MEASURING VOLTAGE

Following the steps in "9. PREPARATION FOR MEASUREMENT", take the procedure below.

⚠ 12.1 General Cautions on Measuring Voltage

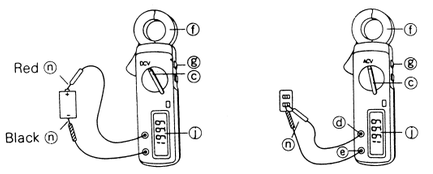
1. Never measure voltage exceeding 500 V.
   Even if the rating of 500 V is exceeded, the over indication (flicker of the figure "1" at the highest digit) is not made. However, measuring voltage exceeding the rating burns the circuit parts and thus dangerous.
2. Before starting a measurement, make sure that the battery cover is in pace. It leads to electric shock to measure voltage with the cover removed.

12.2 Procedure for Measuring DC Voltage (DCV)

1. Turn the range select knob ⓒ to "DCV".
2. Apply the black test pin ⓝ to the minus potential side of the circuit to be measured and the red test pin ⓝ to the plus potential side.
3. Read the indication on the display ⓙ.

[Remark 1] If the test pins are connected in the manner opposite to the step 2 above, the polarity indication of "–" appears on the display ⓙ.

[Remark 2] Neither the iron core ⓕ nor the 0 adjustment knob ⓖ have relation to voltage measurement.



12.3 Procedure for Measuring AC Voltage (ACV)

1. Turn the range select knob ⓒ to "ACV".
2. Apply the red and black test pins ⓝ to the circuit to be measured.
3. Read the indication on the display ⓙ.

[Remark 1] The polarity of the red and black test pins ⓝ has no relation to AC voltage measurement.

[Remark 2] In this measurement, the figure 000 may not be shown on the display but the figure "1" or "2" may appear at the lowest digit even if the measuring terminals ⓓ and ⓔ are short-circuited. If voltage to be measured is 30 mV or below, the display may be unsteady. However, neither case is a fault.

Note 1 Errors are produced in measurements with currents other than sinusoidal alternating current.

Note 2 Errors are enlarged in measurements out of the range of frequency from 40 Hz to 400 Hz.

13. PROCEDURE FOR MEASURING RESISTANCE AND CHECKING CONTINUITY

Following the steps in "9. PREPARATION FOR MEASUREMENT", take the procedure below:

⚠ 13.1 Measuring and Checking Continuity

For impressed portions, resistance cannot be measured or continuity cannot be checked. If the resistance is measured or the continuity is checked for such portions, the parts in the meter may be burnt.

[Remark 1] The terminal open-circuit voltage is approx. 0.43 V. Therefore, measurement is feasible in circuits. On the contrary, semiconductors cannot be checked for continuity/discontinuity because of the low voltage.

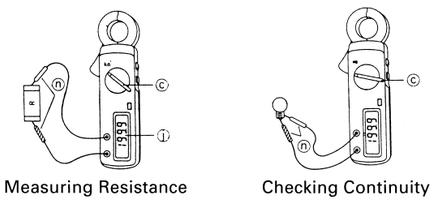
[Remark 2] The figure 000 may not be shown on the display but the figure from "1" through "5" may appear at the lowest digit even if the test pins ⓝ are short-circuited to obtain the 0 Ω state. This is not a fault.

13.2 Procedure for Measuring Resistance (kΩ)

1. Turn the range select knob ⓒ to "kΩ".
2. Surely apply the test pins ⓝ to the portion to be measured.
3. Read the indication on the display ⓙ.

Note Fingers in contact with either test pin ⓝ results in erroneous measurement.

[Remark] No 0 Ω adjuster is equipped.


Measuring Resistance

Checking Continuity

13.3 Procedure for Checking Continuity (•))

1. Turn the range select knob ⓒ to "•))".
2. Apply the test pins ⓝ to the portion to be checked.
3. If the resistance is approx. 400~600 Ω or below, the beeper sounds.

[Remark] In case the circuit resistance is large, the beeper does not sound even if the circuit is not disconnected. In this case, select the resistance (kΩ) range.

⚠ 14. GENERAL CAUTIONS ON HANDLING

1. Vibration and impact
   Avoid excessive vibrations and impacts such as those due to transport by motorcycle or drop. They may cause troubles.
2. Environment
   Do not leave the meter in the following environments for a long time:
   - In direct rays of the sun,
   - At a high temperature of 60 °C or above,
   - At a high humidity of 85 % or above,
   - At places where condensing takes place,
3. Battery consumption prevention
   To prevent the battery from running out, be sure to turn OFF the power switch after finishing a measurement.
4. Maintenance
   Slightly brush or wipe dirt off the display with a brush or cloth. Do not use thinner or alcohol for this purpose.

15. AFTER-SALES SERVICE

15.1 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 test leads, fuses, 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.

15.2 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

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 15.1 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.

15.3 SANWA web site

http://www.sanwa-meter.co.jp
E-mail : exp_sales@sanwa-meter.co.jp