



CDA-701

DIGITAL MULTIMETER

INSTRUCTION MANUAL

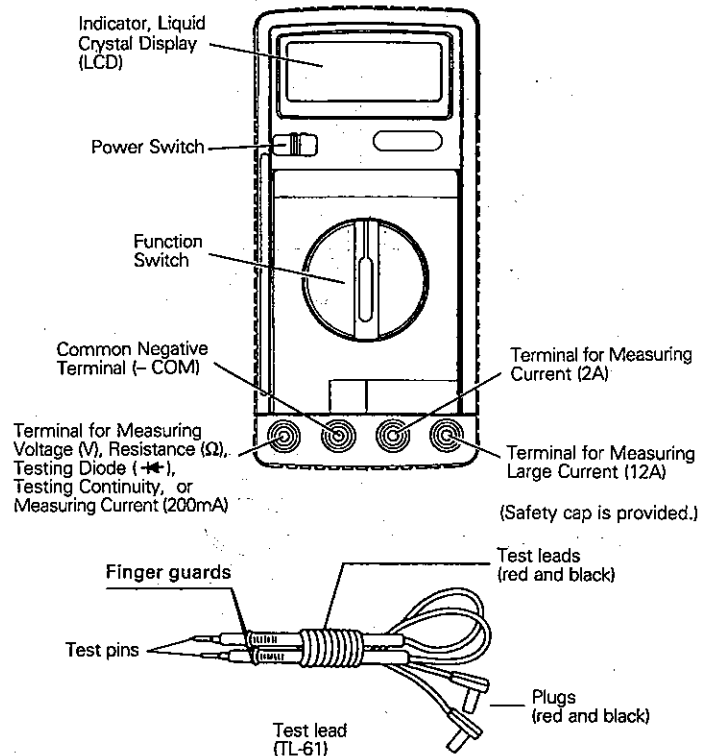
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INTRODUCTION

Thank you very much for purchasing SANWA Digital Multimeter, Model CDA-701. We hope that you will use it properly after carefully reading usages and precautions about the tester. To ensure safety and maintain accuracy, it is advisable to calibrate and check up the meter at least once a year.

NAME AND FUNCTION OF EACH PART



⚠ PRECAUTIONS DURING MEASUREMENT

- When measure half-wave rectified voltage by DCV range, a voltage greater than the value displayed may actually be measured. Therefore, the maximum allowable input voltage may be exceeded, resulting in damage to the multimeter.
- Be sure to use the exclusive test leads, TL-61.
- When measuring for the 12A range, do in a short time (abt. 30 sec.) to avoid heat generation.
- About the measurement of the place where induced electromotive or surge voltage is generated (for example, electric motor or the like). Even when the measurement within the maximum allowable voltage is performed in a line inspecting system, it is advisable not to use the instrument because it may sometimes occur that induced electromotive or surge voltage caused by inducing object exceeds the maximum allowable voltage and damages the instrument.
- When measuring for the $M\Omega$ range, note that some time is required before the indication becomes stable.
- When measuring a.HIGH RESISTANCE: Shield the object to be measured from exposure to noises because external noises cause an adverse effect to this meter, thus resulting in an indication of unstable figures.
- Measuring the current for the high voltage circuit involves the withstand voltage on the product and also danger so make measurements very carefully.

PREPARATIONS FOR MEASUREMENT

1. When POWER switch is turned on, a little time is taken before LCD display shows indication, and all the indications are lit for a short time.
2. If **[BT]** mark is lit, the internal batteries have worn out. Replace them with fresh ones.
3. Connect the TEST LEADS as follows.
 Connect the RED test lead to either terminal "V/ Ω / \rightarrow / \rightarrow /" "2A", "200mA" or "12A", then BLACK test lead to terminal "-COM".
4. Operate FUNCTION SWITCH to set to V, Ω , \rightarrow , 200mA, or 12A as desired.

FUNCTION ALLOWING MEASUREMENT TO BE AUTOMATICALLY SWITCHED TO AC OR DC

1. On the voltage (or current) that needs to be measured, this meter functions to first detect if it is of DC (or dc) or AC (or ac), then allows the measurement function to be automatically switched to DC or AC. If the measurement function has been switched to AC, you'll see indication 'AC' at the LCD indicator. Note however that this function works only when the meter has been set to a condition that allows V (volts), mA (milliamperes), or A (amperes) to be measured.

FUNCTION "CONTROLLING RANGE"

1. When measuring a voltage or resistance, remember the following: The decimal point shifts to the upper range with count figures 2000 when the range is made larger. The decimal point shifts to the lower range with count figures 180 when the range is made smaller. The shifting of the decimal point as described above is caused because the range switching has been set to the automatic range for this meter model CDA-701.
2. Function "CONTROLLING RANGE" on this meter doesn't allow the range to be set manually.

INDICATION WHEN OVERFLOW

1. If the figures to be measured go beyond 2000 in any measurement range, an indication of figures 1000 will be made, with the first of four figures blinking. At this time however, a decimal point, measurement unit, and symbol all will be indicated and the indications continue.
2. (Note) An indication of OVER RANGE that may be made after switching to "ohm (Ω)" range has nothing to do with a troubled meter.

FUNCTION "BUZZER"

1. Interrupted buzzes may be heard when the figures to be counted for measurement exceed 2000 during measuring other than the time of measuring RESISTANCE or testing DIODE.
2. Also note that continued buzzes will be produced for a level lower than the threshold level (600 Ω) when testing an ELECTRICAL CONTINUITY.

BEFORE MEASURING


1. Turn the power switch ON to see that characters and symbols are indicated at the same time and a little time after turning the power switch ON.
2. If characters "BT" is indicated and doesn't go off after turning the power switch ON or during operating the meter, the meter cells need to be replaced with new ones because they have been consumed up.

12A Terminal

This measuring terminal is used only for measurement in "12A" range. This "12A" terminal does not incorporate such protection circuit as fuse and is connected to "-COM" terminal with 0.01 Ω , so it is very dangerous if a large capacity power source is directly applied to the meter, the meter becomes into a short condition and a large current flows across the test leads. To avoid such danger by erroneous operation, the measurement in "12A" range should be limited only to the circuit by way of breaker of 15A below.

Note: If the contact resistance is large, heat will be generated to damage the body of the meter. To avoid this trouble, make measurements in about 30 seconds.



Low Battery Capacity Indication

If "" mark is indicated at the indicator, replace the batteries with new ones because they have been almost consumed up to their capacities.

SAFETY INFORMATION

Symbols

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

-  Disobedience to instructions with this sign may lead to troubles of the multimeter and accidents such as electrical shock.
-  This sign cautions that high voltage is applied to parts marked with it.

READ FIRST: SAFETY INFORMATION

WARNING

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

1. Never use meter on the electric circuit that exceed 3k VA.
2. Pay special attention when measuring the voltage of AC 30 Vrms (42.4V peak) or DC60V or more to avoid injury.
3. Never apply an input signals exceeding the maximum rating input value.
4. Never use meter for measuring the line connected with equipment (i.e. motors) that generates induced or surge voltage since it may exceed the maximum allowable voltage.
5. Never use meter if the meter or test leads are damaged or broken.
6. Never use uncased meter.
7. Be sure to use a fuse of the specified rating or type. Never use a substitute of the fuse or never make a short circuit of the fuse.
8. Always keep your fingers behind the finger guards on the probe when making measurements.
9. Never apply voltage to the current terminal. If voltage is applied to the terminal, the meter occurs short-circuit. Be sure to put the safety cup in the terminal so as to prevent the test lead from inserting into the wrong terminal, especially because no fuse protection is employed to the terminal exclusive for large current.
10. Be sure to disconnect the test pins from the circuit when changing the function or range.
11. Before starting measurement, make sure that the function and range are properly set in accordance with the measurement.
12. Never use meter with wet hands or in a damp environment.
13. Never use test leads other than the specified test leads.
14. Never open tester case except when replacing batteries or fuses. Do not attempt any alteration of original specifications.
15. To ensure safety and maintain accuracy, calibrate and check the tester at least once a year.

SAFETY CAP

- A safety cap has been attached to 12A measuring terminal. The measuring equipment may be damaged, or a person who measures voltage may be endangered when measuring a voltage with 12A terminal.
- Upon this, the safety cap is attached to 12A measuring terminal as one of the preventive measurements to avoid error insertion of the measuring terminal.
- When using 12A measuring terminal, leave the safety cap attached to V or 2mA measuring terminal.
- Make sure to keep the safety cap attached to 12A measuring terminal after measuring large amounts of currents.

Circuit Protection Fuse

- When excess current flows across the tester in the measurement of 200mA • 2A, the fuse is blown but protects the circuit.
- For the replacement of the fuse, remove the screw in the rear case and detach the case.

REPAIR

We offer the repair service to fix your faulty products at actual expense to be born by you. To expedite and ensure the delivery time of repaired products, please send your faulty products to us or any our agents by clarifying the detail description of the trouble. You will be informed of the expense including transportation charge after completion of the repair. As soon as we confirm your remittance, we will dispatch your repaired products.

When you send your products to us, do not use the box in which the products were originally contained to avoid damage in transit.

For secure transportation,

1. Use a box 5 times bigger bulk than the original one.
2. Stuff enough cushion in it.
3. Write "Faulty product enclosed" on it.

If the damage has developed into the inside of LSI, printed circuit board and other main components of the product as a result of applying the overvoltage (including pulse component and surge) that exceeds the voltage specified for overload protective circuit function, the repairing expense will be higher than the purchasing cost.

In this case, we will recommend you to buy a new one.

FOR INFORMATION OR ENQUIRIES

Ask the shop where you bought the products for any detailed information on repair, how to purchase replacing parts (such as fuse) or optionally sold accessories, as well as questions and complaints, etc. on our products.

Measuring V

Set FUNCTION switch to "V" position. Connect the test leads to "-COM" and "V" measuring terminals. In DC 200mV range, an arbitrary value is indicated with the test leads in an open condition. And, when external inductance is large, excess burden is alarmed and range up and range down may be repeated. Such phenomenon is created because input resistance is about 100MΩ. It is, however, not considered abnormal. In AC measurement, values are indicated after conversion of mean value rectification and RMS value, so some errors may be produced when waves other than sine wave are measured.

When measuring a voltage at the highest sensitivity or when the input terminal is being disconnected. Remember that figures can be indicated or symbol "AC" can blink.

Measuring Ω

Set FUNCTION switch "Ω" position. Connect the test leads to "-COM" and "Ω" measuring terminals. When the test leads are shorted, about three counts remain in 200Ω range. Values may sometimes be unstable because the tester is apt to be influenced by external noises in the measurement of high resistances. In such a case, measured objects should be well-shielded. As measured voltage is as low as about 0.43V, incircuit measurement is possible.

Testing Continuity

Set FUNCTION switch to ")))" position. Connect the test leads to "-COM" ")))" measuring terminals. When the test leads are shorted, the buzzer sounds and "000kΩ" is indicated in the display. The buzzer sounds at about 600Ω or below. As measured voltage is as low as about 0.43V, incircuit checking is possible.

Checking Diodes

Set FUNCTION switch to "➔" position. Connect the black test lead to "-COM" measuring terminal and the red test lead to "➔" measuring terminal. Forward voltage drop is indicated in the display when the black test lead is connected to the cathode side of checked diode and the red test lead to its anode side. When the test leads are connected in the reverse direction, about the same value is indicated as that when the test leads are detached.

Measurement in 12A Range

Set FUNCTION switch to "12A" range. The test leads are connected to "-COM" and "12A" measuring terminals. Be sure to refer the article of **12A terminal**.

Measurement in 200mA•2A Ranges

Set FUNCTION switch to a desired current measuring range. The test leads are connected to "-COM" and "200mA or 2A" measuring terminals. Refer to the article of **Circuit Protection Fuse**.

● PRECAUTIONS · MAINTENANCE AND USAGE

1. Avoid storing the meter under the direct rays of the sun or in a high temperature and humidity.
2. Do not wipe the meter with thinner and the like or place it near a heated soldering iron and the like as the panel and rear case are made of plastic resin.
3. Avoid using the meter in a high or low temperature and high humidity.
4. Do not perform measurement with wet hands. It is very dangerous to do so especially when high voltages are measured.
5. Do not measure voltages higher than the specified.
6. Take care that indication may be unstable when measurement is performed near devices generating noises or in the place where temperature changes suddenly and drastically.
7. Do not perform measurement with the meter partly disassembled.

GENERAL SPECIFICATIONS

Conversion system:	Dual integration type
Indications:	3-1/2 digits, LCD; height of figure, 17.7mm; max. figures, 1999, units and symbols
Switching to DC/AC:	Automatic detecting and switching
switching digit range:	Automatic switching
Indicating excess input:	Figures "1000" indicated, with the first digit blinking. Also alarmed with buzzes.
Indicating polarities:	Automatic switching (Negative mark "--" indicated only when negative input is made)
Indicating need for replacing cells:	Characters "BT" indicated when cell voltage is $1.2 \pm 0.1V$ or less.
No., sampling times:	Twice/second
Temperature and humidity assuring limit of error:	$23^\circ \pm 5^\circ C$ and 80% RH max. (no condensation)
Operating temperature and humidity:	5° to $40^\circ C$ and 80% RH max. (no condensation)
Storage temperature and humidity:	-10° to $60^\circ C$ and 70% RH max. (no condensation)
Power source:	SUM-3 (R6 or 1.5V) X 2 cells
Power consumption:	3.5mV, typical (when power source voltage is $\pm 1.5V$)
Withstand voltage:	3kV ac (one minute), input terminal to enclosure
Dimensions:	163 (H) X 78 (W) X 30 (D) mm
Attachments:	Set of test leads (TL-61) and copy of Operator's Manual
Weight:	250 g, approx.

OPTIONAL ACCESSORIES

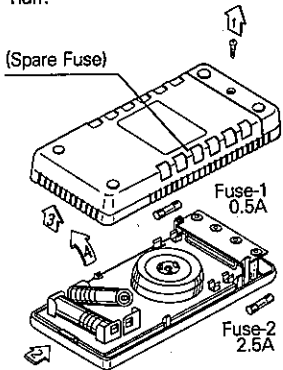
1. Carrying case (C-FE)

Please understand that the specifications of the meter may be changed for improvement without notice.

HOW TO REPLACE CELLS AND FUSE

Disassembling the Enclosure of Meter;

1. When a \oplus type screwdriver, unscrew the screw-1 shown at left.
2. Push the rear-side half of enclosure in direction of arrow 2.
3. Pull up to remove the face-side half of enclosure from the rear-side half.



4. Remove the cells or fuse.
5. When reassembling, do the reverse of disassembling.

Replacing Cell;
Replace the two dry cells with new ones of model SUM-3(R6) taking care not to mistake polarities on replacement cells.

Replacing Fuse:
Replace the fuse with a new standard one of 0.5A/250V or 2.5A/250V ($\phi 5.2-20mm$).

ACCURACY

Note: The temperature and humidity assuring every limit of error are $23^\circ \pm 5^\circ C$ and 80% RH (no condensation), respectively.

Measuring Range	Input Impedance	Limit of Error	Max. Input, permissible	
DC (V)	0.2V	About $5M\Omega$	$\pm(0.6\% \text{ rdg}+2 \text{ dgt})$	1000V dc
	2V	"	$\pm(1.0\% \text{ rdg}+2 \text{ dgt})$	
	20V	"	"	
	200V	"	"	
AC (V)	2V	About $5M\Omega$	$\pm(0.8\% \text{ rdg}+5 \text{ dgt})$	750V ac
	20V	"	$\pm(1.2\% \text{ rdg}+5 \text{ dgt})$	
	200V	"	"	
	750V	"	"	
DC (A)	200mA	About 1Ω	$\pm(1.5\% \text{ rdg}+2 \text{ dgt})$	200mA dc
	2A	" 0.1Ω	$\pm(1.5\% \text{ rdg}+2 \text{ dgt})$	2A dc*
	12A	" 0.01Ω	$\pm(2.0\% \text{ rdg}+2 \text{ dgt})$	12A dc*
AC (A)	200mA	About 1Ω	$\pm(1.5\% \text{ rdg}+5 \text{ dgt})$	200mA ac
	2A	" 0.1Ω	$\pm(1.5\% \text{ rdg}+5 \text{ dgt})$	2A ac*
	12A	" 0.01Ω	$\pm(2.0\% \text{ rdg}+5 \text{ dgt})$	12A ac*
(OHM)	200 Ω	(Open-circuit voltage, every range: 0.43V approx.)	$\pm(1.0\% \text{ rdg}+4 \text{ dgt})$	250V ac/dc* LCD goes off, then on.
	2k Ω		$\pm(1.0\% \text{ rdg}+2 \text{ dgt})$	
	20k Ω		"	
	200k Ω		"	
	2000k Ω		"	
	20M Ω		$\pm(4.0\% \text{ rdg}+2 \text{ dgt})$	
CONT (Electrical continuity)	2k Ω	Buzzer ON	600 Ω max.	250V ac/dc*
DIODE	—	OPEN: 1.3V, approx.		
Switching sensitivity dc to ac	V	$5M\Omega$	100mV ac	
	200mA	1Ω	10mA ac	
	2A	0.1Ω	100mA ac	
	12A	0.01Ω	1A ac	

Note:

1. Every maximum allowed input marked * in above table is that allowed for one minute. Avoid making input for long time to prevent causing an internal damage to the meter.
2. Adjusting: Make an input of 0.19V dc, then adjust with VR-1 or make an input of 1.9V ac, then adjust with VR-2.
3. Dgt: Every dgt includes figures obtained after the input terminal is made short circuited.
4. Frequency characteristic is from 40 Hz to 500 Hz.