SAFETY PRECAUTIONS

This instruction manual explains how to use your multitester SP-18D, safely.
Before use, please read this manual thoroughly. After reading it, keep it together with the product for reference to it when necessary.
The instruction given under the heading **"⚠WARNING" "⚠CAUTION"** must be followed to prevent accidental burn or electrical shock.

■ Warning Instruction for Safe Use

⚠ WARNING

To ensure that the meter is used safely, be sure to observe the instruction when using the instrument.
Please be careful that the protection circuit may be undermined by unjustifiable usage that does not follow the guidelines in the instruction manual.

1. Never use the meter on the electric circuits that exceed 6 kVA.
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 signals exceeding the maximum rating input value.
4. Never use the 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 the 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. Be sure to disconnect the test pins from the circuit when changing the function or range.
10. Before starting measurement, make sure that the function and range are properly set in accordance with the measurement.
11. Never use the meter with wet hands or in a damp environment.
12. Never open rear case except when replacing batteries or fuse. Do not attempt any alteration of original specifications.
13. To ensure safety and maintain accuracy, calibrate and check the tester at least once a year.
14. Indoor use.

PRECAUTION

1. Avoid giving the tester any excessive shock or vibration by loading it on the motorbike and the like.
2. Keep off dust and moisture from the tester.
3. Do not leave the tester for a long time in places of a high temperatrue (higher than 55 ℃) a high humidity (higher than 80 %), and dew condensation.
4. The meter cover is treated with antistatic coating. Do not wipe it hard or clean it with volatile solvent. Use a soft brush to remove dust.

⚠MAXIMUM OVERLOAD PROTECTION INPUT

Function (Range)	Maximu rating input value	Maximum overload protection input
DCV 120～600	Full scale value at the ranges	DC 1000 V, AC 750 V or PEAK MAX 1100 V
ACV 120～600		
DCV 0.3～30		*DC, AC 200 V or PEAK MAX 250 V
ACV 12～30		
DCA 30 m/0.3		
DCA 60 μ		
Ω	Voltage and current input prohibited	
1.5V	DC 2 V	

Note : AC voltage is regulated by rms value of sinusoidal wave.
"*" is within 5 second.

sanwa®

Thank you for purchasing a SANWA tester, Model SP-18D. You are kindly requested to thoroughly read this manual before use for safety. Especially, "SAFETY INFORMATION" and "MEASURING PROCEDURE" are important. Keep this manual together with the tester not to lose it.

SP-18D

MULTITESTER

INSTRUCTION MANUAL

SANWA ELECTRIC INSTRUMENT CO., LTD.
Dempa Bldg., 4-4 Sotokanda 2-Chome
Chiyoda-ku, Tokyo, Japan

MEASURING PROCEDURE

⚠ WARNING
Confirm the range to use before measurement.

■ Preparation for Measurement

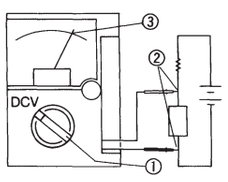
1. Adjustment of meter zero position:
   Turn the zero position adjuster so that the pointer may align right to the zero position.
2. Range selection:
   Select a range proper for the item to be measured set the range selector knob accordingly.

NOTE

When determining a measuring range, select such one for higher voltage than the value to be measured as well as where the pointer of a meter moves to a considerable extent. However, select the maximum range and measure in case the extent of value to be measured can not be predicted.

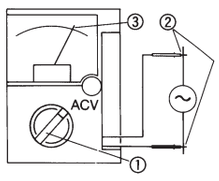
■ Measuring DCV ⎓

1. Set the range selector knob to an appropriate DCV range.
2. Apply the black test pin to the minus potential of measured circuit and the red test pin to the plus potential.
3. Read the move of the pointer by V and A scale.



■ Measuring ACV ～

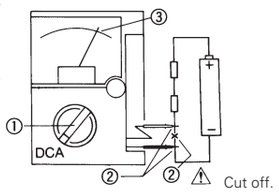
1. Turn the range selector knob to an appropriate ACV range.
2. Apply the test pin to the measured circuit.
3. Read the move of the pointer by V and A scale. (Use AC 12 V scale for 12 V range only.)
   - Since this instrument employs the means value system for its AC voltage measurement circuit, AC waveform other than sine wave may cause error.
   - There occurs error under such frequencies other than specified in the specification.



■ Measuring DCA ⎓

⚠ WARNING
Connect the meter in series with the load.

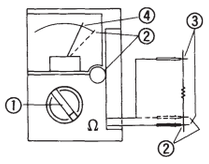
1. Turn the range selector knob to an appropriate DCA range.
2. Take out measured circuit and apply the black test pin to the minus potential of measured circuit and the red test pin to the plus potential.
3. Read the move of the pointer by V and A scale.



■ Measuring Ω

⚠ WARNING
Do not measure a resistance in a circuit where a voltage is present.

1. Turn the range selector knob to an appropriate Ω range.
2. Short the red and black test pins and turn the 0 Ω adjuster so that the pointer may align exactly to 0 Ω. (If the pointer fails to swing up to 0 Ω even when the 0 Ω adjuster is turned clockwise fully, replace the internal battery with a fresh one.)
3. Apply the test pin to measured resistance.
4. Read the move of the pointer by Ω scale.



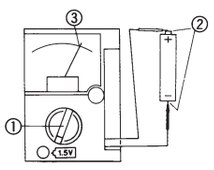
Note: The polarity of + and - turns reverse to that of the test pins when measurement is done in Ω range.

Note: Be sure to use the same rated fuse. In case a fuse other than the same rated one (see "SPECIFICATIONS") is used, error in indication occurs and/or circuit protection is made unable.

Note: Operating voltage of Ω range for this tester is 3 V and, accordingly, operator can make lighting test of LED. X10 range is optimum for the test.

■ Battery Test ▭, ◯

1. Set the selector knob to ▭ or ◯.
2. Apply the black test pin to the (-) battery terminal and red test pin to the (+) battery terminal.
3. Read the move of the pointer ▭ or ◯ scale.
   - ▭ range: 20 Ω load
     For measure the cylindrical type battery (R03, R6, R14, R20, LR03, LR6, LR14, LR20, etc.)
   - ◯ range: 60 kΩ load
     For measure the button type battery (SR43, SR44, LR43, LR44, PR41, PR44, etc.)



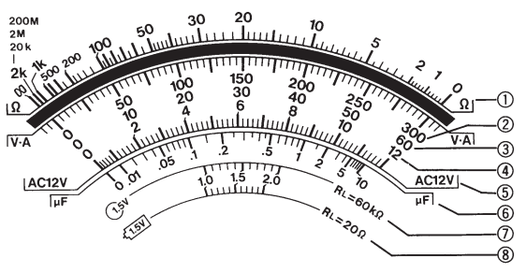
■ Measuring Capacity μF

1. Set the range selector knob to μF X1 or μF X100.
2. Measure capacitance by applying the test pin to the capacitor to be measured after 0 Ω adjustment made in the same manner as in the resistance measurement.
3. The pointer moves full scale by the charge current to the capacitor. However, the pointer starts gradual returning from a certain point. Read the indicated maximum value on μF scale.

Note: Be sure to short circuit the both ends of the capacitor for discharge prior to the initial measurement or in such case to measure after the measurement was once made.

Note: Pay due attention to the polarity (+ and -) of the capacitor. (Connect + side of the capacitor to black test pin of the tester.)

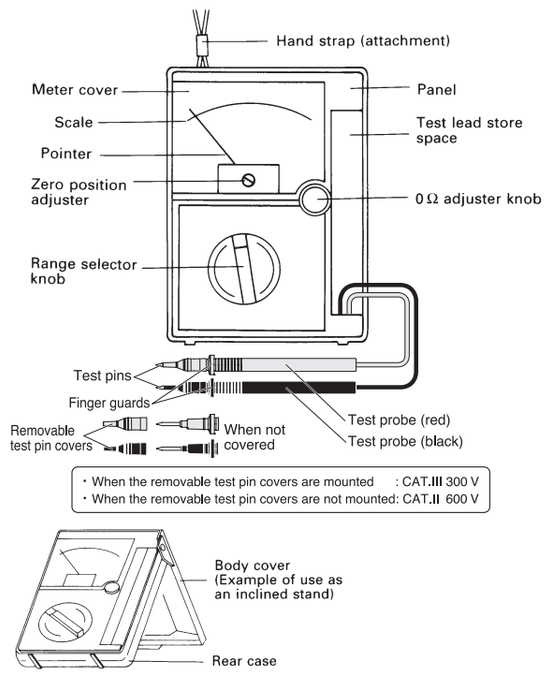
SCALE READING



①	Ω X 100 k	X 100 k
	Ω X 1 k	X 1 k
	Ω X 10	X 10
	Ω X 1	X 1
②	DCV 30	X 0.1
	DCV 3	X 0.01
	DCV 0.3	X 0.001
	ACV 300	X 1
	ACV 30	X 0.1
	DCA 0.3	X 0.001
	DCA 30 m	X 0.1
③	DCV 600	X 10
	ACV 600	X 10
	DCA 60 μ	X 1

④	DCV 120	X 10
	DCV 12	X 1
	ACV 120	X 10
⑤	ACV 12	X 1
⑥	μF X 100	X 100
	μF X 1	X 1
⑦	1.5V	X 1
⑧	▭ 1.5V	X 1

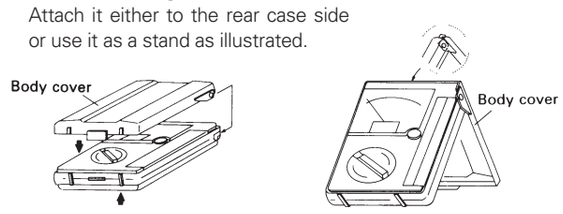
NAMES OF COMPONENTS



BODY COVER, TEST LEADS, HAND STRAP

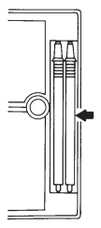
■ Use of Cover (example for the body cover)

When this tester is out of use:
Attach the cover to the panel face for safekeeping.
When measuring:
Attach it either to the rear case side or use it as a stand as illustrated.



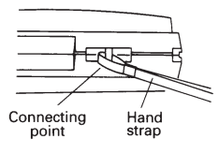
■ Store of Test Leads

When placing the test leads in the storing space, roll it 3 times, then put in the test pin side first for store in the place (test lead store space) as illustrated.



■ Attachment of Hand Strap

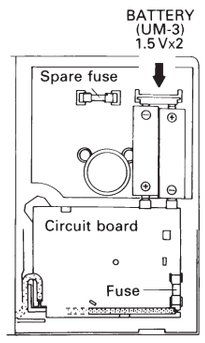
1. Loosen the screw fixing the rear case and remove it.
2. Hand strap is attached to connecting point.
3. Put back the rear case was and fix it with the screw.



MAINTENANCE

■ How to Replace Battery

1. Loosen the screw fixing the rear case and remove it.
2. Replace R6 (UM-3) dry battery.
3. Put back the rear case where it was and fix it with the screw.



■ How to Replace Fuse

If an overload above lighting voltage (about 100 V) is applied to DCA and Ω ranges, the fuse is blown to protect the circuit.

1. Loosen the screws fixing the rear case and remove it.
2. Pull out the fuse out of holder on the circuit board and replace it.
3. Put back the rear case where it was and tighten the screws.
4. Check and see whether or not indications of respective ranges are normal (check other parts for any failures).

⚠ WARNING
- Be sure to use the fuse in same rating (0.5 A/250 V) so as to ensure safety and performance of tester.
- Do not absolutely use the fuse in different rating or short-circuit fuse holder terminals with copper wire.
- When operator removes the rear case, do not touch the internal parts or wire with hand.

SPECIFICATIONS

■ Measurement Range and Accuracy

Accuracy assurance range : 23±2 ℃ 75 %RH max.
No condensation
Attitude : Horizontal (±5°)
ACV accuracy in the case of sine wave AC.

Function	Full scale value	Accuracy	Remarks
DCV⎓	0.3	±3 % against full scale	Input impedance 5 kΩ
	3-12-30-120-600		Input impedance 20 kΩ/V
ACV ～	12-30-120-300-600	±3 % against full scale	Input impedance 9 kΩ/V Freq. (within ±3 % f.s.) 30 Hz-70 kHz (12 V range) 30 Hz-20 kHz (30 V range)
DCA⎓	60 μ-30 m-0.3	±3 % against full scale	Voltage drop 0.3 V Not including the resistance of the fuse
Ω	2 k-20 k-2 M (X1) (X10) (X1 k)	±3 % of arc	Center value 20 Ω Max. value 2 kΩ Release voltage 3 V
	200 M (X100 k)	±5 % of arc	
Battery load voltage	▭ 2.0 V	——	Load resistance 20 Ω
	◯ 2.0 V	——	Load resistance 60 kΩ
Capacity (μF)	10-1000	——	Pointer indication of the maximum move by charged current in the capacitor.

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.

■ General Specification

Items	Specification
Drop shock proof	Taut-band structure is adopted in the meter section. The meter section is designed to withstand shock.
Cricuit protection	The circuit is proected by fuse even when voltage of up to AC 250 V is impressed on each range for 5 seconds.
Internal battery	R6 (IEC) or UM-3 1.5 V X 2
Internal fuse	0.5 A/250 V Ø5 X 20 mm Fast acting fuse
Accuracy assurance Temperature/Humidity range	23±2 ℃, 75 %RH max. no condensation
Operating temperature and humidity range	0 ~ 43 ℃, 80 %RH max. no condensation
Withstand voltage	3 kV AC (1 min.) between input test pin and case
Dimensions and Mass	159.5 X 129 X 41.5 mm/ approx. 320 g
Accessories	Instruction manual 1, Hand strap 1, Spare fuse 1 (contained in the rear case)

■ Optional Accessories

Alligator clip CL-14 IC test clip TL-9IC

APPLICATION AND FEATURE

■ Application

This instrument is portable multitester designated for measurement of weak current circuits.

■ Feature

- Our technology has made it possible to measure high resistance (up to maximum 200 MΩ) with low voltage.
- Band meter of drop shock type with high sensitivity has been employed.

The specifications described in this manual are subject to chage without notice.

AFTER-SALE SERVICE

■ 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 fuses, test leads, 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.

■ 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 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.

■ SANWA web site

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