

SP20 MULTITESTER

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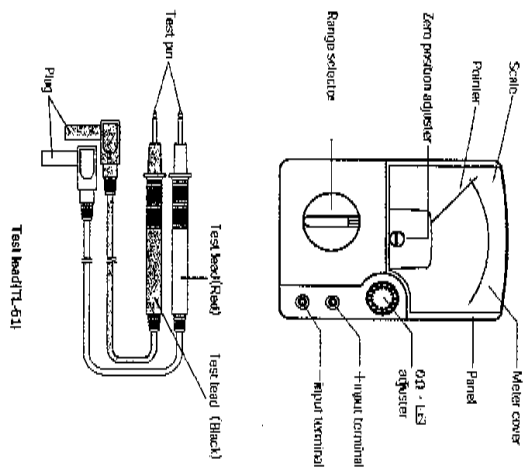
Instruction Manual

取扱説明書
使用法
保証書
保証書

[2] APPLICATION AND FEATURES

- 2-1 Application
This instrument is portable multimeter designated for measurement of weak current circuit.
- 2-2 Features
- Taut-band structure is adopted in the meter part.
- A stand is equipped.

[3] NAME OF COMPONENT UNITS

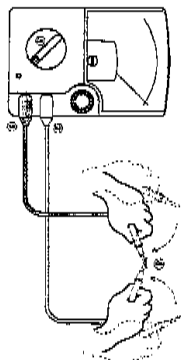
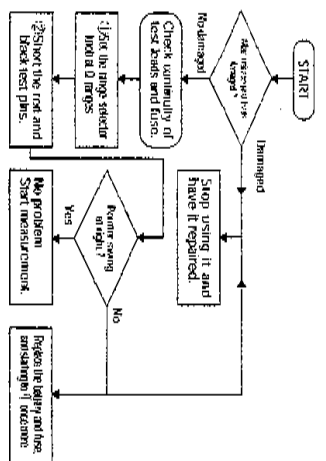


④ 92.05 ④

[4] MEASUREMENT PROCEDURE

4-1 Start-up Inspection

1. Never use meter if the meter or test leads are damaged or broken.
2. Make sure that the test leads are not cut or otherwise damaged.



1-2 Warning instruction for safe use

⚠ WARNING

To ensure that the meter is used safely, be sure to observe the instruction when using the instrument.

- Never use meter on the electric circuit that exceed 3k VA.
- Pay special attention when measuring the voltage of AC 30Vrms (42.4 Vpeak) or DC 60V or more to avoid injury.
- Never apply an input signals exceeding the maximum rating input value.
- Never use meter for measuring the line connected with equipment (i.e. motor) that generates inductor or surge voltage since it may exceed the maximum allowable voltage.

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

This instruction manual explains how to use your multimeter SP21 safely. Before use, please read this manual thoroughly. After reading it, keep it together with the product for reference to it when necessary.

The reduction guarantee the hearing "WARNING" "CAUTION" must be followed to prevent accidental burn or electrical shock.

1-1 Explanation of Warning Symbols

- ⚠: Very important instruction for safe use.
• The warning messages are intended to prevent accidents to operating personnel such as burn and electrical shock.
• The caution messages are intended to prevent damage to the instrument.
- ⚡: DC Voltage
Ω: Resistance
⚡: Fuse & Diode protection
⚡: Drop proof
- ⊕: Ground
⊖: Plus input
⊖: Minus input
⚡: Fuse
⚡: Drop proof

1-3 Maximum Overload Protection Input

Function (Range)	Input	Maximum overload protection input
DCV50 ~ 500		DC1000V, AC750V
ACV50 ~ 500		or PEAK MAX 1100V
DCV0.25 ~ 10		*DC, AC200V
ACV10		or PEAK MAX 250V
DC resistance	+	*DC, AC0.5A
DCA50μ	-	*DC, AC110A
Ω		Voltage not direct input/prohibited
DC2V		*DC, AC200V or PEAK MAX 250V

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

4-2 How to Set up Range (Selection of appropriate range)

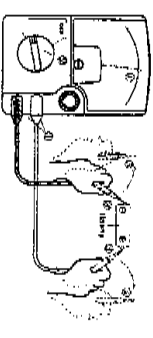
- ① When determining a measuring range, select a higher voltage than the value to be measured as well as where the pointer of a meter moves to a considerable extent. However, select the maximum range and measure in case the extent of value to be measured cannot be predicted.
② Appropriate range for measuring a resistance (Ω) Select the range that the pointer indicates approximately in the center.

4-3 Preparation for Measurement

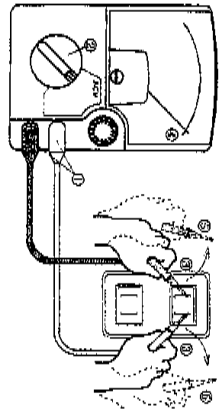
- Turn the zero position adjuster so that the pointer may align left to zero position. Select a range proper for the item to be measured and set the range selector accordingly.

4-4 Voltage Measurement

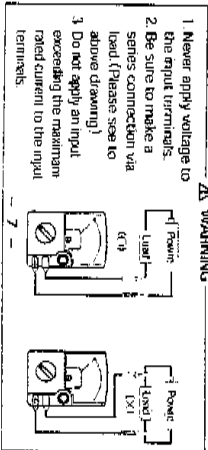
- ⚠ WARNING
- Never apply an input signals exceeding the maximum rating input value.
 - Be sure to disconnect the test pins from the circuit when changing the function.
 - Select the maximum range and measure in case the extent of value to be measured can not be predicted.
 - Always keep your fingers behind the finger guards on the probe when making measurements.
- 4-4-1 DCV Measurement (—) Maximum rating input value 500VDC
- 1) Applications
Measures batteries and d.c. circuits
- 2) Measuring ranges
0.25/2.5/10/50/100 (ranges)



- 4-4-2 ACV Measurement (→) Maximum rating input value 50VAC.
- ① Connect the test lead of the black plug to the -input terminal and the red plug to the + input terminal.
 - ② Set the range selector knob to an appropriate ACV range.
 - ③ Apply the red and black test pins to an appropriate circuit.
 - ④ Read the value of the pointer by V · A scale.
 - ⑤ After measurement, remove the red and black test pins from the circuit measured.
 - ⑥ Since this instrument adopts the mean value system for its AC voltage measurement circuit, AC waveform other than sine wave may cause error.
 - ⑦ Errors occur under such frequencies other than specified specification.

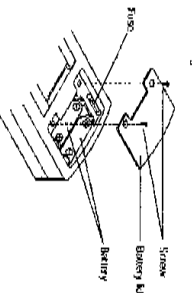


4-5 DCA Measurement (→) Maximum rating input value 0.25A DC

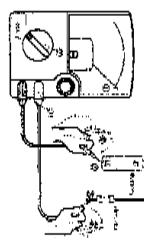


- 1 Never apply voltage to the input terminals.
 - 2 Be sure to make a series connection via lead (please see to above drawing).
 - 3 Do not apply an input exceeding the maximum rated current to the input terminals.
- △ WARNING
- Is the appearance not damaged by falling?
 - Test leads and fuse
 - Is the cord of the test leads not damaged?
 - Is the core wire not exposed at any place of the test leads?
- If your instrument falls in any of the above items, do not use it and have it repaired or replace it with a new one.
- Make sure that the test leads are not cut.
 - Calibration
- The calibration and inspection may be conducted by the dealer, or more information, please contact the dealer.

- 3- How to Replace Battery and Fuse
- △ WARNING
- 1 If the rear case of the battery lid is removed with input applied to the input terminals, you may get electrical shock. Before starting the work, please make sure that no voltage is applied.
 - 2 Be sure to use the fuse is same rating so as to ensure safety and performance of meter.
 - 3 When operator remove the battery lid, do not touch the internal parts or wire with hand.
- How to replace the battery?
- ① Remove the battery lid screw with a screwdriver.
 - ② Remove the battery lid and replace it with a new one.
 - ③ Strike out the battery lid and fix it with the screw.
 - ④ Match the battery lid and fix it with the screw.



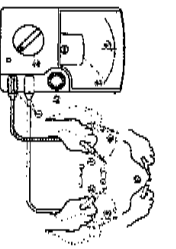
- ① Connect the testlead of the black plug to the -input terminal and the red plug to the +input terminal.
- ② Set the range selector knob to an appropriate DCA range.
- ③ Apply the black test pin to the negative potential side of the circuit to measure and the red test pin to the positive potential side.
- ④ Read the value of the pointer by V · A scale.
- ⑤ After measurement, remove the red and black test pins from the circuit measured.



4-6 Resistance Measurement (Ω)

- Never apply voltage to the input terminals.
- ① Connect the testlead of the black plug to the -input terminal and the red plug to the +input terminal.
 - ② Set the range selector knob to an appropriate Ω range.
 - ③ Short the red and black test pins and turn the Ω adjuster so that the pointer may align exactly to 0Ω.
 - ④ Apply the black and red test pin to the measured resistance.
 - ⑤ Read the value of the pointer by Ω scale.
 - ⑥ After measurement, remove the red and black test pins from the resistor measured.
- Note: Be sure to use the same rated fuse. In case a fuse other than the same rated one (SAFETY CAUTIONS) is used, error in indication occurs and/or circuit protection is made unable.

- Caution: If the pointer falls to swing up to 0 Ω even when the 0 Ω adjuster is turned clockwise fully, replace the internal battery with a fresh one.



4-7 Battery check

- △ WARNING
- Never apply an input signals exceeding the battery voltage to the input terminals.
- ① Connect the testlead of the black plug to the -input terminal and the red plug to the +input terminal.
 - ② Set the range selector knob to an appropriate μF or μF range.
 - ③ Apply the black test pin to the negative potential side of the circuit to measure and the red test pin to the positive potential side.
 - ④ Read the value of the pointer by μF .

4-8 Measuring Capacity (μF)

- △ WARNING
- 1 Never apply voltage to the input terminals.
 - 2 Do not measure as for a condenser of a charged condition.
- ① Connect the testlead of the black plug to the -input terminal and the red plug to the +input terminal.
 - ② Set the range selector knob to an appropriate $\mu F \times 1$ range.
 - ③ Short the red and black test pins and turn the 0Ω adjuster so that the pointer may align exactly to 0Ω.
 - ④ Apply the black and red test pin to the measured capacitor.
 - ⑤ 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.

4-9 DC High Voltage measurement (Optional HV Probe)

- △ WARNING
- The probe is designed for the measurement of very small direct current circuit. Never use the probe to measure high voltage in power lines, such as transmission and distribution lines; it is very dangerous.
- ① Connect the HV Probe of the black plug to the -input terminal and the red plug to the +input terminal.
 - ② Set the range selector knob to HV RANGE range.
 - ③ First, connect the clip (black) of the probe to the earth line (-) in the circuit to be measured, and then apply the measuring pin on the probe body to your measuring point.
 - ④ Read the value of the pointer by V · A scale, measured value in terms of kV.

- 4-10 Optional Temperature Probe (T-THP) Max value ±200°C
- ① Connect the pin of the temperature probe to the + input terminal and the black plug to the - terminal.
 - ② Set the range selector to AC PROBE range.
 - ③ Adjust the pointer to the 0Ω by the range selector.
 - ④ Connect the temperature probe from the + terminal and then connect the red plug.
 - ⑤ Connect the measuring pin to a point to be measured. Read the value on DC scale when the pointer is stabilize.

- 4-11 End of Measurement
- Turn off the range to prevent voltage applied to resistance and current ranges.

- [5] MAINTENANCE
- △ WARNING
1. This section is very important for safety. Read and understand the following instruction fully and maintain your instrument properly.
 2. The instrument must be clipped and inspected at least once a year to maintain the safety and accuracy.

How to replace the fuse?

- Fuse of the specified rating and type
0.5A/250V 4.63x30mm Blowout Capacity:300A
- ① Remove the battery lid screw with a screwdriver.
 - ② Pull out the fuse out of holder on the circuit board and replace it.
 - ③ Put back the battery lid where it was and tighten the screw.
 - ④ Check and see whether or not indications of respective ranges are normal.
- Please use spare fuse of a battery lid back side.

△ CAUTION

- 1 The panel and the case are not resistant to volatile solvent and must not be cleaned with thinner or alcohol.
- 2 For cleaning, use dry, soft cloth and wipe it lightly.
- 3 The panel and the case are not resistant to heat. Do not place the instrument near heat-generating devices (such as a soldering iron).
- 4 Do not store the instrument in a place where it may be subjected to vibration or from where it may fall.
- 5 For storing the instrument, avoid hot, cold or humid places or places under direct sunlight or where condensation is anticipated.

Following the above instructions, store the instrument in good preservation.

[6] AFTER-SALE SERVICE

- 6-1 Repair
- If the multimeter fails during use, check the following items before sending it for repair.
- Is the battery not exhausted?
 - Are the test leads not disconnected?
 - Is the fuse not blown?
- We repair defective product at cost. When mailing it to us for repair, do not use the same cardboard box in which it was delivered to you because it may receive damage in transit. Please send it in a box at least five times as large as the original box with enough cushioning material stuffed around it.

[7] SPECIFICATIONS

- 7-1 General Specifications
- AC Rectifier Form
- Meter Type : Half-wave rectifier form
- Accuracy Assurance : Temperature/Humidity Range : 21 ~ 25°C 75%RH max. No condensation
- Operating Temperature/Humidity Range : 3 ~ 43°C 80%RH max. No condensation
- Storage Temperature/Humidity Range : -10 ~ 50°C 70%RH max. No condensation
- Internal Battery : 6E (IEC) or UM 3.1 5V x 2
- Internal Fuse : $\phi 6.3 \times 30$ mm 0.5A/250V Fast Fuse
- Blowout capacity 500A
- Dimension and Weight
- 144(11) x 99(10) x 41(10)mm - approx 270g
- Accessories
- Instruction manual 1 Spare Fuse 1
- Test leads (TL-61) 1
- 7-2 Optional Accessories
- Clip adapter CL-11 (Red, Black 1set)
 - HV probe HV
 - Carrying case C-SP
 - Carrying Case C-SPH
 - Alligator Clip CL-5
 - IC Test Clip CL-5IC

7-3 Measurement Range and Accuracy

Accuracy assurance range: 23°C ±2°C 45 ~ 75%RH max

No condensation

Horizontal (±5°)

Altitude

ACV accuracy in the case of same wave AC.

Function	Full scale value	Accuracy	Remarks
DCV (→)	0.25/2.5/25/250/100	±3% span/1 full scale	Input impedance 20kΩ/V
ACV (→)	1.0/5.0/25.0/50.0	±3% span/1 full scale	Input impedance 50kΩ/V
DCA (→)	50 μA/2.5mA/25mA/0.25	±3% span/1 full scale	Input impedance 5kΩ/V
Ω	2k/20k/200k/2M	±3% of span	Voltage drop 0.25V
Battery Check	(4.3)(4.0)(3.0)(1.0)(0.4)		Max. Value: 2012
			Release voltage: 3V
Capacity (μF)			Peak indication of the maximum value by charged current in the capacitor.
HV	DC25kV	±2% with probe	Optional HV-10
Temp. °C	-20 ~ +200	±3% upper full scale	Optional TRP

Specifications and external appearance of the product described above may be revised for modification without prior notice.