

AP33 MULTITESTER

INSTRUCTION MANUAL

使用说明书

SANWA ELECTRIC INSTRUMENT CO., LTD.

三和电气株式会社

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[1] Safety Information – Prior to use, read the following precautions carefully. Thank you for selecting a SANWA Analog Multitester AP33. Prior to use, please read this instruction manual thoroughly to ensure correct and safe use. After reading it, please keep it together with the tester in a safe place for future reference. Be sure to observe instructions marked with WARNING and CAUTION to avoid accidents involving “shock hazards”, “injuries and damages.”

1-1 Description of Warning Symbols

Symbols and their meaning used on product and Instruction Manual.
⚠ :Indicates very important instructions for safe use.
⚠ :WARNING identifies instructions to CAUTION identifies information to avoid unsafe operation that may result in damages to the equipment.

~ :AC Ω :Resistance
+ :Positive - :Negative
☐ :Double insulation or reinforced insulation



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1-2 Warning Instructions for Safe Use

⚠ WARNING

Observe the instructions listed below in operating this equipment to avoid a fatal accident that may result in “electric shock” and “injuries.”

- Do not use the tester in a power line exceeding 3.6 kVA.
- Pay special attention when measuring the voltage of AC 33 V(46.7peak), DC 70 V or more to avoid injury.
- Do not input signals that exceed the maximum rated input value.
- Do not measure lines (such as motor lines) where inductive voltages and surge voltages will occur as they may exceed the maximum overload input value.
- Do not operate the meter when the main body or test lead is damaged or broken.
- Do not use the tester with its case removed.
- Do not change function during measurement.
- Confirm the function every time when making measurement.
- Do not use the tester with wet hand.
- Be sure to use the designated test leads.
- Do not attempt repair or modification, except for replacement of the built-in battery.
- Be sure to carry out startup checks and inspections at least once a year.
- This tester is for indoor use.

1-3 Maximum Overload Protective Input

Function(Range)	Input Terminal	*1 Max. Overload Protective Input
DCV	500 V	AC-DC 550 V or peak max770 V
	250 V/50 V	AC-DC 500 V or peak max700 V
	10 V	AC-DC 250 V or peak max350 V
ACV	500 V	AC-DC 550 V or peak max770 V
	250 V/50 V	AC-DC 500 V or peak max700 V
	250 mA	AC-DC 10 V or peak max14 V
DCA	25 mA	AC-DC 3 V or peak max4.2 V
	Ω	AC-DC 135 V or peak max189 V
Ω	×1 k	AC-DC 15 V or peak max21 V
	×10	AC-DC 35 V or peak max49 V
BATT.	9 V/1.5 V	AC-DC 35 V or peak max49 V

*1 (Tested by applying load 9 times for 0.5 sec. and once for 5 sec. every about one minute.)

1-4 General Handling Precautions

- Vibration:**
Do not place the tester on vehicles such as motorcycles as it is exposed to frequent vibration that causes a tester failure.
- Environment:**
Do not store the tester for long hours in places where it is exposed to direct sunlight, high temperature (over 60 °C), high humidity (over 85 %) or where condensation occurs.
- Electrification:**
The tester cover has been treated by antistatic coating. Do not rub it with cloth strongly.
- Maintenance:**
When servicing the tester, wipe off dust and dirt lightly with a brush or cloth. Do not use a solvent such as thinner and alcohol.
- Caution:**
Do not use the tester near places where strong electromagnetic waves are generated or charged substances are present.

[2] Application and Features

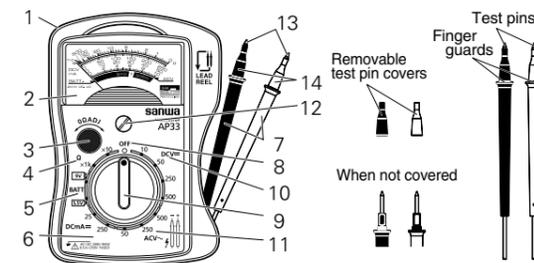
2-1 Application

This is a pocket type portable analog multitester designed for measuring small-capacity power lines. This tester is suitable for measuring voltages and testing continuity of household appliances and measuring voltages of electric light circuits, batteries, etc.

2-2 Features

- A pocket size AMT with a built-in shock absorbing rubber.

[3] Panel Description



- Protector
- Analog display
- 0 Ω adjuster
- Resistance range
- Battery test range
- DC current range
- Test leads
- (OFF)
- Range selector
- DC voltage range
- AC voltage range
- Meter 0-position adjuster
- Test pins
- Removable test pin covers

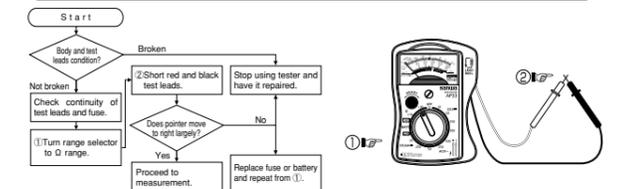
[4] Measuring Procedure

4-1 Startup Check

Turn the 0-position adjuster to align the pointer with the 0 position on the left end of the analog display.

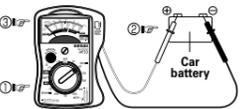
⚠ WARNING

- Do not use the tester when its body or test leads are damaged or broken.
- Make sure that the test leads are not cut.



4-2 DC Voltage (DC V) Measurement

- Turn the range selector to a desired range of “DC V”.
- Connect the black test pin to “-” (negative, ground) of a circuit to measure and the red test pin to “+” (positive, measuring point).
● Connect the tester in parallel with the power supply (circuit).
- Read the measured value on the DC V scale (black).
● An example of measurement: Voltages of commercial dry cells, car batteries and button batteries.



4-3 AC Voltage (AC V) Measurement

- Turn the range selector to a desired range of “AC V”.
- Regardless of +/- polarity, connect the test pins to a circuit to measure.
● Connect the tester in parallel with the power supply.
- Read the measured value on the AC V scale (red).
● An example of measurement: Voltages of household outlets.



⚠ WARNING

A measurement error will become larger when a voltage of waveform other than sine wave AC is measured.

4-4 DC Current (DC mA) Measurement

- Turn the range selector to a desired range of “DC mA”.
- Turn off the power switch of a circuit to measure to isolate the object to be measured.
- Connect the black test pin to the negative side of the circuit to measure and the red test pin to the positive side.



⚠WARNING: Connect the tester in series with the circuit.
④Read the measured value on the mA scale (black).

⚠WARNING: Never apply voltage.

4-5 Resistance (Ω) Measurement

- Turn the range selector to a desired range of “Ω”. Short the red and black test pins and then adjust 0 Ω with the 0 Ω adjuster.
- Connect the test pins to a resistor or circuit to measure.
- Read the measured value on the OHMS scale (green).



● An example of measurement: Check of wiring of resistors and cords.

⚠WARNING: Never attempt to measure resistance of lines with voltage.

4-6 Battery Load Voltage (BATT) Measurement

- A battery of 1.5 V and 9 V can be tested.
- Connect the red test pin to the ⊕ positive side of the battery and the black test pin to the ⊖ negative side.
- Judge the indication on the BAD? GOOD scale.



⚠CAUTION: The button battery cannot be measured.

⚠CAUTION: To prevent battery discharge, complete measurement quickly.

[5] Maintenance

⚠ WARNING

- This section is very important for safety. Read and understand the following instruction fully and maintain properly.
- The instrument must be calibrated and inspected once a year to maintain the safety and accuracy.

5-1 Maintenance and Inspection

- Check the appearance for any damage caused by a drop or for any other reason.
- Check the test lead for any damage or break. If the tester is in one of the above conditions, stop using it and have it repaired.

5-2 Calibration and Inspection

Contact the authorized agent of Sanwa Electric Instrument Co., Ltd. for calibration and inspection of the equipment.

5-3 Storage

⚠ CAUTION

- The body is sensitive to volatile solvents. Do not wipe it with thinner and alcohol.
- The body is sensitive to heat. Do not place the tester near heat-generating sources.
- Do not keep the tester in places where the tester may be exposed to vibration or where there is a risk of falling down.
- Do not keep the tester in places where it is exposed to direct sunlight, high temperature, low temperature, high humidity or condensation.
- When the tester is not used for an extensive period of time, be sure to remove internal batteries from it.

5-4 Replacement of the Battery and Fuse

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.

- Unfasten two screws on the backside of the body using a screwdriver to remove the rear case.
- Remove the battery or fuse and replace it with new ones.
Battery: R03 (AAA battery) 1.5 V X 1
Fuse: φ5 X 20, 0.5 A/250 V
- Put the rear case and fasten the screws.

[6] After-Sales Service

6-1 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 fuses, disposables batteries, or any product or parts, which have been subject to one of the following causes:

- A failure due to improper handling or use that deviates from the instruction manual.

- A failure due to inadequate repair or modification by people other than Sanwa service personnel.
- A failure due to causes not attributable to this product such as fire, flood and other natural disaster.
- Non-operation due to a discharged battery.
- A failure or damage due to transportation, relocation or dropping after the purchase.

6-2 Repair

Customers are asked to provide the following information when requesting services:

- Customer name, address, and contact information
- Description of problem
- Description of product configuration
- Model Number
- Product Serial Number
- Proof of Date-of-Purchase
- Where you purchased the product

- Prior to requesting repair, please check the following:
Capacity of the built-in battery, polarity of installation and discontinuity of the test leads.

- Repair during the warranty period:
The failed meter will be repaired in accordance with the conditions stipulated in 6-1 Warranty and Provision.

- 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.

- 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.

6-3 SANWA web site

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

[7] Specifications

Item	Specifications
Meter	Moving-coil, pivot type
Built-in fuse	0.5 A / 250 V, φ 5 × 20 mm fast acting fuse
Built-in battery	R03 (AAA battery) 1.5 V × 1
Operating temperature & humidity	5 - 40 °C, 80 % RH or below, no condensation. 80 % RH (max.) at 5 ~ 31 °C and linear decrease from 80 % RH to 50 % RH at over 31 °C and up to 40 °C.
Storage temperature & Humidity	-10 - 50 °C, 70 % RH MAX. No condensation.
Operating environment	Max. 2000 m, Pollution degree II, indoor use
Dimensions	126(H) × 87(W) × 30(D) mm
Mass	Approx. 185 g
Standard accessory	Instruction manual

Guaranteed accuracy range: 23 °C ± 2 °C, 75 % RH max.

	Measuring Range	Accuracy
DC voltage	10/50/250/500 V (2 kΩ/V)	± 5 % of full scale
AC voltage	50/250/500 V (2 kΩ/V)	
DC current	25 m/250 mA	± 3 % of scale length
Ω (OHMS)	×10 (10k) ----- ×1k (1M)	
BATT	1.5 V load approx 14 Ω 9 V load approx 420 Ω	—

⚠ The specifications are subject to change without notice.

[1] 安全项目 – 使用前请务必阅读 –

感谢您购买AP33型模拟万用表。

请在使用前仔细阅读本使用说明书，以便正确、安全地使用。为方便阅读，请与产品一起仔细保管。

请务必遵守文中记载的“警告”和“注意”事项，防止发生烧伤、触电以及因本仪器故障而引起的事件。

1-1 警告标记等符号说明

本仪器和《使用说明书》上的使用符号及其含义

△：为安全使用而特别表示的重要事项。

：警告提示用以防止烧伤和触电等人身事故的发生。

：注意提示用以防止使用本仪器时有可能发生的损坏。

~：交流 (AC) =：直流 (DC) Ω：电阻

+：正 -：负

□：双重绝缘或强化绝缘

1-2 安全使用警告说明

△警告

下述项目用以防止烧伤和触电等人身事故的发生。使用本仪器时请务必遵守。

1. 不可使用超过3.6 KVA的电源线。
2. AC 33 Vrms (46.7 V峰值)、DC 70 V以上的电压对人体十分危险，请务必注意。
3. 不可输入超过最大额定输入值的信号。
4. 在产生感应电压和电涌电压的地方（如电动机电线等）因其数值可能超过最大过载输入值，故不可测量此处电线。
5. 当主体或测试导线破损或损坏时，不可使用本仪器。
6. 在壳体拆开状态下不可使用。
7. 测量过程中不可转换到其他功能。
8. 每次测量时必须确认功能。
9. 在本仪器或手沾水情况下不可使用。
10. 测试导线必须使用指定的型号。
11. 除更换内置电池外，不可进行维修和改造。
12. 作业前进行确认，且每年至少进行一次校验检查。
13. 必须在室内使用。

1-3 输入最大过载保护

功能 (范围)	输入端子	*1 最大过载保护输入值
DCV	500 V	AC·DC 550 V或最大峰值770 V
	250 V/50 V	AC·DC 500 V或最大峰值700 V
	10 V	AC·DC 250 V或最大峰值350 V
ACV	500 V	AC·DC 550 V或最大峰值770 V
	250 V/50 V	AC·DC 500 V或最大峰值700 V
DCA	250 mA	AC·DC 10 V或最大峰值14 V
	25 mA	AC·DC 3 V或最大峰值4.2 V
Ω	×1 k	AC·DC 135 V或最大峰值189 V
	×10	AC·DC 15 V或最大峰值21 V
电池	9 V/1.5 V	AC·DC 35 V或最大峰值49 V

* (每隔约1分钟，输入0.5秒，此操作反复9次，再输入1次5秒内，进行测试。)

1-4 使用时的一般注意事项

1. 振动：请勿将本仪器装载在摩托车等物品上以免因过度振动造成损坏。
2. 环境：不可长时间放置在阳光直射、高温(60℃以上)、潮湿(85%以上)和结露的地方。
3. 带电：仪表盖已进行防静电涂层处理。请勿用布等用力擦拭。
4. 维护：维修本仪器时，使用笔和布等轻轻地抹拭即可。请勿使用稀释剂和酒精类溶剂。
5. 注意：请勿在有强电磁波产生以及带电物体的附近使用本仪器。

[2] 用途和特点

2-1 用途

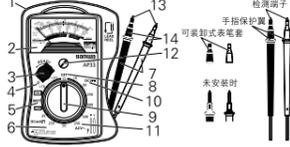
本仪器设计为袖珍型便携式模拟万用表，专用于测量小容量电路。适宜用于测量家电产品的电压，测试其导通性，测量照明线路电压以及各种电池电压。

2-2 特点

- 本仪器为袖珍型AMT，内置吸收冲击的橡胶减震块。

[3] 各部件名称

1. 保护器
2. 刻度盘
3. 0 Ω调整器
4. 电阻档
5. 电池测试档
6. 直流电流档
7. 测试导线
8. «OFF (关)»
9. 转换档旋钮
10. 直流电压档
11. 交流电压档
12. 仪表零位调整器
13. 测试笔
14. 可装卸式表笔套



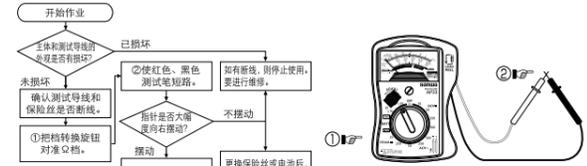
[4] 测量方法

4-1 作业前确认

旋转零位调整器，把仪表指针调整到刻度盘左端的零位上。

△警告

1. 主体或测试导线有损伤或损坏时不可使用。
2. 确认测试导线没有断裂。



4-2 测量直流电压 (DC V)

①将档转换旋钮设置在“DC V”的适当量程内。

②将黑色测试笔连接到被测电路的 - (负、接地) 极上，红色测试笔连接到 + (正、测量点) 极上。

· 本仪器与电源 (电路) 并联。

③通过DCV刻度盘 (黑色) 读取测量值。

· 测量实例：市面销售的干电池、汽车用蓄电池的电压、钮扣电池



4-3 测量交流电压 (AC V)

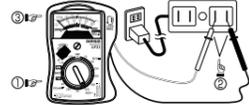
①将档转换旋钮设置在“AC V”的适当量程内。

②由于采用交流电，因此与 +、- 极性无关。将测试笔连接在电路上。

· 把本仪器与电源并联。

③通过ACV刻度盘 (红色) 读取测量值。

· 测量实例：家用插座电压。



△警告

在测量除正弦波交流电之外的其他波形电压时，测量误差较大。

4-4 测量直流电流 (DC mA)

①将档转换旋钮设置在“DC mA”的适当量程内。

②切断被测电路的电源开关以断开被测部分。

③将黑色测试笔连接到被测电路的负极上，将红色测试笔连接到正极上。

△警告：将本仪器与电路串联。

④通过mA刻度盘 (黑色) 读取指示值。

△警告：切不可加载电压。



4-5 测量电阻 (Ω)

①把档转换旋钮设置在“Ω”适当量程内，使红黑两色测试笔短路，通过 0 Ω调整器，进行0 Ω调整。

②将测试笔连接到电阻器和被测电路上。

③读取OHMS刻度盘 (绿色) 上的测量值。

· 测量实例：检查电阻器和电线的连接。

△警告：切不可测量载有电压的电路电阻。



4-6 测量电池负荷电压 (BATT)

①测试1.5 V和9 V电池。

②将红色测试笔连接到电池的正极上，将黑色测试笔连接到负极上。

③根据BAD (不好)? GOOD (好) 的刻度的指示进行判断。

△注意：不可测量钮扣电池。

△注意：为避免消耗电池能量，应快速测量。



[5] 维修管理

5-1 维修检查

- 1) 外观：外观是否因掉落等原因而损坏?
- 2) 测试导线：测试导线是否有损伤或芯线裸露的地方? 如果出现上述情况，应停止使用，进行维修。

5-2 校正、检查

详细情况请向三和电气仪器株式会社垂询。请参阅项目6-3。

5-3 保管

△注意

1. 本仪器主体易受挥发性溶剂影响，请勿用稀释剂或酒精抹拭。
2. 主体易受热源影响，不可放置在高热的地方。
3. 请勿将其放置在有振动较多和易掉落的地方。
4. 请勿将其放置在阳光直射、高热、低温、潮湿和结露的地方。
5. 长期不用时，必须取出内置电池。

5-4 电池、保险丝的更换

关于出货时已安装的电池。

工厂出货时产品内有安装样品电池，它可能在记载的寿命日期前用完电。

※样品电池只是为了确认产品功能及性能所用。

①拆卸主体背面的两个螺丝，松动后，卸下后盖。

②取出里面的电池或保险丝，更换新的电池或保险丝。

电池：R03 (7号电池) 1.5 V×1

保险丝：φ5×20、0.5 A/250 V

③后盖复位后，拧紧螺丝。

[6] 售后服务

6-1 担保和规定

三和向其最终用户和产品经销商提供综合担保服务。根据三和的通用担保规定，在正常使用情况下，自购买之日起一年内，对每台仪器因工艺或结构因素而产生的缺欠进行担保。

三和保留对所有担保索赔的检查权，以确定担保规定的适用范围。本担保规定不适用于保险丝、电池、部件以及属于下述其中一种情况的产品：

1. 未按照使用说明书进行操作以及使用不当而引起的故障。
2. 非三和维修人员维修或改造不充分而引起的故障。

3. 因火灾、洪水或其他天灾等非本产品原因而引起的故障。
4. 电池电量耗尽引起的操作停止。
5. 采购后，因运输、搬运或掉落等引起的故障或损坏。

本担保规定只在购买的国家或日本国内有效，且只适用于从三和授权代理店购买的产品。

6-2 维修

用户提出维修要求时，需提供下述信息。

1. 姓名、地址和联络方式
2. 问题说明
3. 产品状况说明
4. 型号
5. 产品编号
6. 购买日期证明
7. 购买地点

请与我公司网站记载的三和授权代理店/经销商/服务提供商取得联系。若未提供上述信息给三和/代理商/经销商，产品有时会被退回。

注释

- 1) 委托维修前，请确认下述事项。
电池的余量、极性和测试导线的断线状况
- 2) 保修期内的维修
有故障的仪表应根据6-1项担保与规定的条件进行维修。
- 3) 保修期外的维修
维修费和运输费有时会高于产品价格。
请事先向三和授权代理商或服务提供商垂询。
服务部件的最低保留期间为停止制造后6年。
该保留期间是指维修担保期间。但请注意，一旦此类部件因停止生产等原因而短缺时，维修担保期间将相应缩短。
- 4) 维修产品运输时注意事项
为确保产品运输期间的安全性，请使用比产品大5倍以上的箱子包装，箱内填满缓冲材料，并在箱子表面清晰标明《内置维修产品》的字样。产品往返运输费用由用户承担。

[7] 技术规格

项目	技术规格
仪表	可动线圈型、支枢式
内置保险丝	0.5 A · 250 V φ5×20 mm快速熔断器
电源	R03 (7号电池) 1.5 V×1
操作温度和湿度	在5-40℃时，80 %RH以下，不结露。 在5-31℃时，80 %RH (最大)，在31℃以上40℃以下时，从80 % RH直线降至50 % RH。
操作环境	最高2000米以下，污染度II，室内使用。
尺寸	126 (高) ×87 (宽) ×30 (厚) 毫米
质量	约185克
标准附件	使用说明书

容许差保证范围：23℃±2℃、75 % RH以下

	测量范围	容许差	
DC V	10/50/250/500 V (2 kΩ/V)	最大刻度值的±5 %以内	
AC V	50/250/500 V (2 kΩ/V)		
DC	A 25 m/250 mA		
Ω (OHMS)	×10 (10 k)	开放电压 1.5 V	刻度长度的±3 %以内
	×1 k (1 M)		
电池	1.5 V负荷电阻约14 Ω	-	
	9 V负荷电阻约420 Ω		

△ 上述技术规格如有变更，恕不另行通知。

MEMO