



PM3

DIGITAL MULTITESTER INSTRUCTION MANUAL

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[1] SAFETY PRECAUTIONS

Before use, read the following safety precautions
This instruction manual explains how to use your multimeter PM3 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.

1-1 Explanation of Warning Symbols

The meaning of the symbols used in this manual and attached to the product is as follows.
⚠: 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.

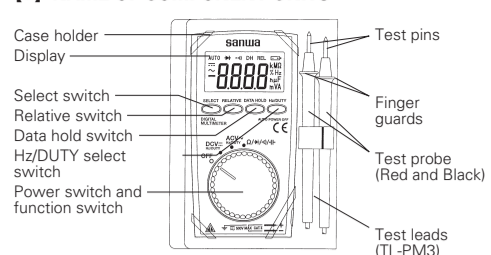
DCV \equiv : DC voltage ACV \sim : AC voltage Ω : Resistance
 $\bullet\bullet$: Buzzer \blacktriangleright : Diode \oplus : Capacitance
 Hz: Frequency DUTY: Duty cycle \oplus : Ground
 +: Plus \square : Minus \square : Double insulation

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 3.6 kVA.
- Pay special attention when measuring the voltage AC 33 Vrms (46.7 V peak) or DC 70 V or more to avoid injury.
- Never apply an input signal exceeding the maximum rating input value.
- 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.
- Never use meter if the meter or test leads are damaged or broken.
- Never use uncased meter.
- Always keep your fingers behind the finger guards on the probe when making measurements.
- Be sure to disconnect the test pins from the circuit when changing the function.
- Never use meter with wet hands or in a damp environment.

[3] NAME OF COMPONENT UNITS



[4] DESCRIPTION OF FUNCTIONS

WARNING
In the case of action or cancel that function as follows, do not turn the function switch in the condition applied input.

- Power switch and function switch**
Turn this switch to turn on and off the power and select the functions of DCV, ACV, Ω , $\bullet\bullet$, \blacktriangleright , \oplus .
- Select switch**
This switch uses it for the switching of Ω / \blacktriangleright / $\bullet\bullet$ / \oplus . In the case of the mode change as $\Omega \rightarrow \blacktriangleright \rightarrow \bullet\bullet \rightarrow \oplus \rightarrow \Omega$.
- Data hold switch**
When this switch is pressed, the data display at that time continues (DH lights on the display). When the measuring input changes, the display will not change. When this switch is pressed again, the hold status is canceled you can return to the measuring status. (DH on the display disappears.)
(DATA HOLD function does not work when measuring frequency.)

4) Relative measurement switch (RELATIVE)
Suppose that actual value is X1 when REL switch is pressed. Then, value of X-1 is displayed for actual input value X after that. Each time pressing REL switch, value of X1 is updated. This function is except the Hz/DUTY measurement mode.

<In the case of use at the DCV and ACV function>
 • In the case of canceled, please push the switch again.
 • The measurement range is fixed to the range in the point that pushed the switch. About measurement after this, the range is fixed. To return to the auto range, please stop measurement once and set the function again.

• Do not measure any signal that exceeds the maximum of current range.
<In the case of use Ω , $\bullet\bullet$, \blacktriangleright function>
 • When "O.L." is displayed, setting and cancellation are not possible.
 • In the case of canceled, please push the switch again.
 • The resistance measurement range is fixed to the range in the point that pushed the switch. About measurement after this, the range is fixed. To return to thmng, please stop measurement once and set the function again.

<In the case of use \oplus function>
 • In the case of canceled, please push the switch again.
 • The Capacitance measurement is auto range mode only. After canceled mode, it is possible measurement with the auto range.

5) Hz/DUTY (Frequency/Duty) switch
This switch uses it for the switching of Hz/DUTY. In the case of the mode change as Hz \rightarrow DUTY \rightarrow voltage measuring mode \rightarrow Hz.
 • When it returns it to the voltage function after the Hz/DUTY measurement the range is fixed automatically. (DCV function is 400 mV. ACV function is 4 V.) Please stop measurement once to cancel the manual range. And please do measurement after the function is set up again.

6) Auto power off
The power of the meter will automatically turned off after the beep if no operation is done for about 15 minutes. To reset the meter, press any button of the RELATIVE, DATA HOLD, or Hz/DUTY. To cancel this function, press the SELECT switch, or change the function switch from the OFF to a desired function while holding the SELECT switch pressed, and then release the SELECT switch after a couple of minutes. Set the function switch to OFF when meter is not in use.

5-3 Resistance Measurement (Ω)

WARNING

Never apply voltage to the input terminal.

CAUTION

The reading may vary because of external inductance when measuring high resistance value.

- Application: Resistance of resistors and circuits are measured.
- Measuring ranges: 400 Ω ~ 40 M Ω (6 range)
- Measurement procedure
 - Set the function switch at Ω / \blacktriangleright / $\bullet\bullet$ / \oplus function.
 - Apply the black red test pin to measured circuit.
 - Read the value on the display.
 - After measurement, remove the red and black test pins from the circuit measured.
- If measurement is likely to be influenced by noise, shield the object to measure with negative potential (test lead black).
- The input terminals release voltage is about 0.4 V.

5-4 Testing Diode (\blacktriangleright)

WARNING

Never apply voltage to the input terminal.

- Application: The quality of diodes is tested.
- Measurement procedure
 - Set the function switch at Ω / \blacktriangleright / $\bullet\bullet$ / \oplus function and select the function by SELECT switch.
 - Apply the black test pin to the cathode of the diode and the red test pin to the anode.
 - Make sure that the display shows a diode forward voltage drop.

[7] AFTER-SALE SERVICE

7-1 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 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.

7-2 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

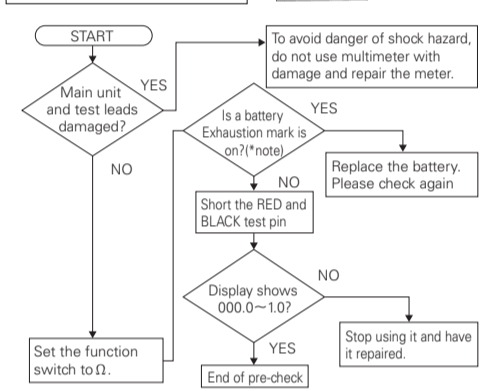
Please contact Sanwa authorized agent / distributor / service provider, listed in our website, in your country with above information. An instrument sent to Sanwa / agent / distributor without those information will be returned to the customer.

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

• This digital multimeter has 4000(5000) counts max. display, however, its range may change even less than 4000(5000) counts depending on the using function or the measuring range.

[5] MEASUREMENT PROCEDURE

- Start-up inspection
 - Be sure to pre-check the meter before use.
 - Do not use a damaged meter and test leads.
 - Check continuity of test leads.
 - When a battery exhaust mark appears in the display, replace the battery with a new one.



* note: Non-marking may suggest that a battery be exhausted.

- Replace the red and black test pins, make sure that the displays the same as that when the test leads are released.
- After measurement, release the red and black test pins from the object measured.

Judgment: When the items ③ and ④ are normal, the diode is good.
 • The input terminals release voltage is about 1.5 V.

5-5 Checking Continuity ($\bullet\bullet$)

WARNING

Never apply voltage to the input terminal.

- Application: Checking the continuity of wiring and selecting wires.
- Measurement procedure
 - Set the function switch at Ω / \blacktriangleright / $\bullet\bullet$ / \oplus function and select the function by SELECT switch.
 - Apply the red and black test pins to a circuit or conductor to measure.
 - The continuity can be judged by whether the buzzer sounds or not.
 - After measurement, release the red and black test pins from the object measured.
- The buzzer sounds when the resistance in a circuit to measure is less than about 10 Ω ~ 100 Ω .
- The input terminals release voltage is about 0.4 V.

5-6 Capacity Measurement (\oplus)

WARNING

- Application: Measures capacitance of capacity.
- Never apply voltage to the input terminal.
- This is not suitable for measurement of electrolytic capacitor such as a large leakage capacitor.

1) Application: Measures capacitance of capacity.

- Never open tester case except when replacing batteries. Do not attempt any alteration of original specifications.
- To ensure safety and maintain accuracy, calibrate and check the tester at least once a year.
- The multimeter restricts in use in indoor.

CAUTION

- Correct measurement may not be performed when using the meter in the ferromagnetic / intense electric field such as places near a transformer, a high-current circuit, and a radio.
- The meter may malfunction or correct measurement may not be performed when measuring special waveform such as that of the inverter circuit.

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.

1-3 Maximum Overload Protection Input

Function	Input	Maximum rating Input value	Maximum overload Protection voltage
DCV (Hz/ DUTY)	+ , -	DC 500 V	DC 500 V, AC 500 V or Peak Max. 700 V
ACV (Hz/DUTY)	+ , -	AC 500 V	
Ω / \blacktriangleright / $\bullet\bullet$ / \oplus		Δ Voltage and current Input prohibited	

*: AC voltage is regulated by rms value of sinusoidal wave.

[2] APPLICATION AND FEATURES

- 2-1 Application**
This instrument is portable multimeter designated for measurement of weak current circuit.
- 2-2 Features**
 - This multimeter is very thin type. Body thickness is 8.5 mm.
 - Sharp contrast LCD with character 13.6 mm high is employed, and unit symbols is displayed on the screen of the LCD.
 - Addition function: Hz/Duty, Relative and Data Hold.
 - Auto power off (15 min.) It is able to cancel it.
 - The instrument has been designed in accordance with the safety standard IEC 1010-1. (DC/AC 500 V Max. CAT III)

5-2 Voltage, Hz/DUTY measurement

WARNING

- Never apply an input signal exceeding the maximum rating input value.
- Be sure to disconnect the test pins from the circuit when changing the function.
- Always keep your fingers behind the finger guards on the probe when making measurements.

5-2-1 Voltage Measurement (DCV, ACV)

- Maximum rating input value DC/AC 500 V**
- Applications**
DCV \equiv : Measures batteries and DC circuits.
ACV \sim : Measures sine-wave AC voltage as lighting voltages.
 - Measurement procedure**
 - Set the function switch "DCV" or "ACV" function.
 - 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.
 - Read the value on the display.
 - After measurement, remove the red and black test pins from the circuit measured.
 - The display fluctuates when the test leads are removed. This is not malfunction.
 - Since this instrument employs the means value system for its AC voltage measurement circuit, AC waveform other than sine wave may cause error.
 - In the AC 4 V ranges a figure of about 3~9 counts will stay on even if no input signal is present.
 - The accuracy guaranteed frequency range is 40 Hz to 400 Hz.

2) Measurement procedure

- Set the function switch at Ω / \blacktriangleright / $\bullet\bullet$ / nF function and select the function by SELECT switch.
- Press the RELATIVE switch to make display show 00.00 nF. (The "REL" mark illuminates in the upper right area of the display.)
- Apply the black red test pin to capacitor.
- Read the value on the display.
- After measurement, remove the red and black test pins from the circuit measured.
- For measurement of 100 nF or below, the display will not stabilize due to the influence of ambient noise and floating capacity.
- Necessarily please discharge the electric charge that was charged to the condenser before measurement.
- As the capacitance increases, the measuring time becomes longer. (Example: approx. 5 sec. at 10 μ . Approx. 45 sec. at 150 μ F.)

[6] MAINTENANCE

WARNING

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

6-1 Maintenance and inspection

- Appearance: Is the appearance not damaged by falling?
- Test leads: Are you having the problem with "the test leads are damaged, and the cable core and white coating inside of the test leads are exposed"? (We use double insulation test leads. If you could see the test leads as above condition, you need to change the new one). Please do not use as it is, if applicable, of the above items. Please have it serviced.

Safety: EN61010-1, EN61010-2-030, EN61010-2-033, EN61010-031
 \approx DC-AC 500 V: Designed to protection Class II requirement of IEC 1010-1, Pollution degree II.
 EMC: EN61326-1: 2013
 RoHS: EN50581

Measurement Category (Overvoltage Category) II

: Local Level
 Appliance
 Portable Equipment

8-2 Measurement Range and Accuracy

Accuracy assurance range: 23 \pm 5 $^{\circ}$ C 80 %RH MAX. No condensation.

Function	Range	Accuracy	Input Resistance	Remarks
DCV \equiv	400.0 mV	$\pm(0.7 \% \text{rdg}+3 \text{dgt})$	$\geq 100 \text{ M}\Omega$	Approx. 11 M Ω
	4.000 V	$\pm(1.3 \% \text{rdg}+3 \text{dgt})$	Approx. 11 M Ω	
	40.0 V	$\pm(1.3 \% \text{rdg}+3 \text{dgt})$	Approx. 10 M Ω	
	500 V	$\pm(1.3 \% \text{rdg}+3 \text{dgt})$	Approx. 10 M Ω	
ACV \sim	4.000 V	$\pm(2.3 \% \text{rdg}+10 \text{dgt})$	Approx. 11 M Ω	*Accuracy in the case of sine wave. *Frequency range: 40~400 Hz
	40.0 V	$\pm(2.3 \% \text{rdg}+10 \text{dgt})$	Approx. 10 M Ω	
	400.0 V	$\pm(2.3 \% \text{rdg}+5 \text{dgt})$	Approx. 10 M Ω	
	500 V	$\pm(2.3 \% \text{rdg}+5 \text{dgt})$	Approx. 10 M Ω	
Ω	400.0 Ω	$\pm(2.0 \% \text{rdg}+5 \text{dgt})$	$\geq 10 \text{ M}\Omega$	*Open voltage: Approx. 0.4 V *The measuring current changes according to the resistance measure.
	4.000 k Ω	$\pm(2.0 \% \text{rdg}+5 \text{dgt})$	$\geq 10 \text{ M}\Omega$	
	40.0 k Ω	$\pm(2.0 \% \text{rdg}+5 \text{dgt})$	$\geq 10 \text{ M}\Omega$	
	400.0 k Ω	$\pm(2.0 \% \text{rdg}+5 \text{dgt})$	$\geq 10 \text{ M}\Omega$	
CAP. \oplus	5.000 nF	$\pm(5.0 \% \text{rdg}+15 \text{dgt})$	$\geq 10 \text{ M}\Omega$	*Accuracy was measured after canceling display value by relative key.
	50.0 nF	$\pm(5.0 \% \text{rdg}+15 \text{dgt})$	$\geq 10 \text{ M}\Omega$	
	500.0 nF	$\pm(5.0 \% \text{rdg}+15 \text{dgt})$	$\geq 10 \text{ M}\Omega$	
	5.000 μ F	$\pm(5.0 \% \text{rdg}+15 \text{dgt})$	$\geq 10 \text{ M}\Omega$	

Function	Range	Accuracy	Remarks
Hz	9.999 Hz	$\pm(0.7 \% \text{rdg}+5 \text{dgt})$	*Accuracy in the case of sine wave. 9.999 Hz~9.999 kHz: 10 Vrms~250 Vrms. 60.00 kHz: 40 Vrms~100 Vrms.
	99.99 Hz		
	999.9 Hz		
	9.999 kHz		
DUTY	0.1~99 %	—	About input sensitivity and frequency characteristic: (Square wave DUTY 50 % input) 2.5 V 0 to peak input: ≥ 1 kHz 6 V 0 to peak input: ≥ 10 kHz 40 V 0 to peak input: ≥ 60 kHz
	BUZZER $\bullet\bullet$	—	• Buzzer sounds at less than 10~120 Ω • Open voltage: Approx. 0.4 V
DIODE \blacktriangleright	—	—	Open voltage: Approx 1.5 V

Accuracy in the case of sine wave.
 • Do not use the tester near places where strong electromagnetic waves and trance are generated or strong electrical voltages are generated.
 • Accuracy calculation
 For example: Measurement DCmV
 Displayed value: 100.0 mV
 Accuracy: 400 mV range: $\pm(0.7 \% \text{rdg}+3 \text{dgt})$
 Error: $\pm(100[\text{mV}] \times 0.7 \% + 3[\text{dgt}]) = \pm 1.0[\text{mV}]$
 True value: $\pm 100.0[\text{mV}] \pm 1.0[\text{mV}]$ (In a range of 99.0~101.0 mV)
 * 3[dgt] in the 400 mV range corresponds to 0.3 mV.

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