



# 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" must be followed to prevent accidental burn or electrical shock.

- 1-1 Explanation of Warning Symbols
1. The meaning of the symbols used in this manual and attached to the product is as follows.
2. Very important instruction for safe use.
3. The warning messages are intended to prevent accidents to operating personnel such as burn and electrical shock.
4. The caution messages are intended to prevent damage to the instrument.
DCV: DC voltage ACV: AC voltage Ω: Resistance
Buzzer Diode Capacitance
Hz: Frequency DUTY: Duty cycle Ground
+: Plus -: Minus 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.
1. Never use meter on the electric circuit that exceed 3.6kVA.
2. Pay special attention when measuring the voltage AC 33Vrms (46.7 V peak) or DC 70V or more to avoid injury.
3. Never apply an input signal 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. Always keep your fingers behind the finger guards on the probe when making measurements.
8. Be sure to disconnect the test pins from the circuit when changing the function.
9. Never use meter with wet hands or in a damp environment.

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

CAUTION
1. 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.
2. 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.

Table with 3 columns: Function, Input, Maximum rating input value, Maximum overload Protection voltage. Rows include DCV (Hz/DUTY), ACV (Hz/DUTY), and Ω/Hz/DUTY/+/-. Max. rating is DC500V or AC500V. Max. overload is DC500V, AC500V or Peak Max. 700V.

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

## [2] APPLICATION AND FEATURES

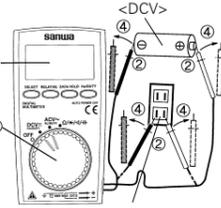
- 2-1 Application: This instrument is portable multimeter designated for measurement of weak current circuit.
2-2 Features:
- This multimeter is very thin type. Body thickness is 8.5mm.
- Sharp contrast LCD with character 13.6mm high is employed, and unit symbols is displayed on the screen of the LCD.
- 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 500V Max. CAT III)

## 5-2 Voltage, Hz/DUTY measurement

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

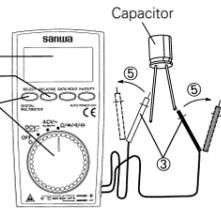
### 5-2-1 Voltage Measurement (DCV/ACV) Maximum rating input value DC/AC 500V

- 1) Applications: DCV: Measures batteries and DC circuits. ACV: Measures sine-wave AC voltage as lighting voltages.
2) Measurement procedure:
1) Set the function switch "DCV" or "ACV" function.
2) 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.
3) Read the value on the display.
4) 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 ACV ranges a figure of about 3~9 counts will stay on even if no input signal is present.
- The accuracy guaranteed frequency range is 40Hz to 400Hz.



### 2) Measurement procedure

- 1) Set the function switch at Ω/Hz/DUTY/nF function and select the function by SELECT switch.
2) Press the RELATIVE switch to make display show 00.0nF. (The "REL" mark illuminates in the upper right area of the display.)
3) Apply the black red test pin to capacitor.
4) Read the value on the display.
5) After measurement, remove the red and black test pins from the circuit measured.
- For measurement of 100nF 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. 5sec. at 10μ. Approx. 45sec. at 150μ F.)



## [6] 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 calibrated and inspected at least once a year to maintain the safety and accuracy.

- 6-1 Maintenance and inspection
1. Appearance: Is the appearance not damaged by falling?
2. Test leads: 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.

Safety: IEC 1010-1(EN61010-1)
DC: AC 500V: Designed to protection Class II requirement of IEC 1010-1, Pollution degree II.
EMC: EN50081-1 (EN55022), EN50082-1 (EN61000-4-2) EN50082-1 (EN61000-4-3), EN50082-1 (ENV50204)

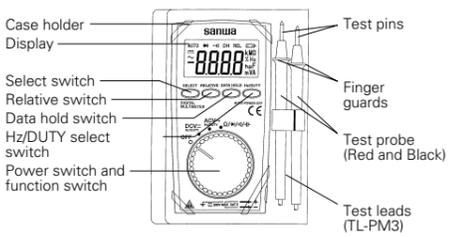
Installation Category(Overvoltage Category) II
Local Level
Appliance
Portable Equipment

### 8-2 Measurement Range and Accuracy

Accuracy assurance range: ±23±5°C 80%RH MAX. No condensation.

Table with 5 columns: Function, Range, Accuracy, Input Resistance, Remarks. Rows include DCV, ACV, Ω, and CAP. Accuracy ranges from ±(0.7%rdg+3dgt) to ±(10%rdg+15dgt).

## [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.

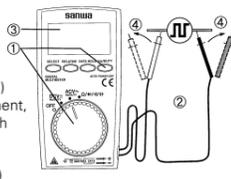
- 1) Power switch and function switch: Turn this switch to turn on and off the power and select the functions of DCV, ACV, Ω, Hz, Hz/DUTY.
2) Select switch: This switch uses it for the switching of Ω/Hz/DUTY/nF. In the case of the mode change as Ω → Hz → DUTY → nF → Ω.
3) Data hold switch: When this 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.)

### 5-2-2 Hz/DUTY Measurements Maximum rating input value 60.00kHz / 99%

WARNING
The setting and measurement (At the time of AC voltage input) of the Hz/DUTY are possible at the DCV function too. However, we recommend the use in the ACV function.

- 1) Applications: Measures frequency and duty of any circuit.
2) Measurement procedure

- 1) Set the function switch at ACV function. Push the Hz/DUTY switch one time, and select the Hz function. (The unit display is Hz display.) In the case of duty measurement, then push the Hz/DUTY switch one more time, and select the duty function. (The unit display is % display.)
2) Apply the red and black test pins to the circuit to measure.
3) Read the value on the display.
4) After measurement, remove the red and black test pins from the circuit measured.
- With measuring terminals disconnected, display may overflow or value may unsteadily fluctuate. There are not malfunctions.
- Input sensitivity varies according to frequency and wave-form.
- Please refer to 8-2 Measurement Range and Accuracy.
- It is only auto range mode.
- When it returns it to the voltage function after the Hz/DUTY measurement the range is fixed automatically. (DCV function is 400mV. ACV function is 4V.) Please stop measurement once to cancel the manual range. And please do measurement after the function is set up again.
- DATA HOLD function does not work when measuring frequency.
- The meter cannot measure frequency that does not go to and fro 0 voltage.



### 4) Relative measurement switch (RELATIVE)

Suppose that actual value is X1 when REL switch is pressed. Then, value of X-X1 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, Hz, Hz/DUTY 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 + function>
- In the case of canceled, please push the switch again.
- The Capacitance measurement is auto range mode only. After canceled relative 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 → DUTY → voltage measuring mode → Hz.
- When it returns it to the voltage function after the Hz/DUTY measurement the range is fixed automatically. (DCV function is 400mV. ACV function is 4V.) 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.

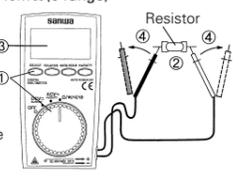
### 5-3 Resistance Measurement (Ω)

WARNING
Never apply voltage to the input terminal.

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

- 1) Application: Resistance of resistors and circuits are measured.
2) Measuring ranges: 400Ω ~ 40MΩ (6 range)
3) Measurement procedure

- 1) Set the function switch at Ω/Hz/DUTY/nF function.
2) Apply the black red test pin to measured circuit.
3) Read the value on the display.
4) 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 0.4V.

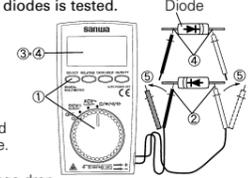


### 5-4 Testing Diode (Hz)

WARNING
Never apply voltage to the input terminal.

- 1) Application: The quality of diodes is tested.
2) Measurement procedure

- 1) Set the function switch at Ω/Hz/DUTY/nF function and select the function by SELECT switch.
2) Apply the black test pin to the cathode of the diode and the red test pin to the anode.
3) Make sure that the display shows a diode forward voltage drop.

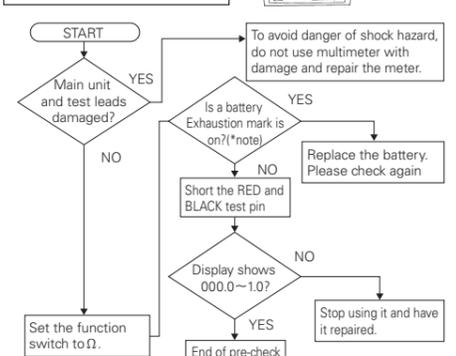


This digital multimeter has 4000(5000) counts max. display, however, its range may change even less than 4000(5000) counts depending on the using function or the measuring range.

## [5] MEASUREMENT PROCEDURE

### 5-1 Start-up Inspection

- WARNING
1. Be sure to pre-check the meter before use.
2. Do not use a damaged meter and test leads.
3. Check continuity of test leads.
4. 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.

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

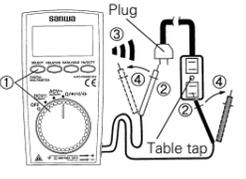
Judgment: When the items 3 and 4 are normal, the diode is good.
- The input terminals release voltage is about 1.5V.

### 5-5 Checking Continuity (nF)

WARNING
Never apply voltage to the input terminal.

- 1) Application: Checking the continuity of wiring and selecting wires.
2) Measurement procedure

- 1) Set the function switch at Ω/Hz/DUTY/nF function and select the function by SELECT switch.
2) Apply the red and black test pins to a circuit or conductor to measure.
3) The continuity can be judged by whether the buzzer sounds or not.
4) 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 10Ω ~ 100Ω.
- The input terminals release voltage is about 0.4V.



### 5-6 Capacity Measurement (nF)

WARNING
1. Never apply voltage to the input terminal.
2. This is not suitable for measurement of electrolytic condenser such as a large leakage condenser.

- 1) Application: Measures capacitance of capacity.

## [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:
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.

### 7-2 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
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.

- 2) Repair during the warranty period: The failed meter will be repaired in accordance with the conditions stipulated in 7-1 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.

7-3 SANWA Website
http://www.sanwa-meter.co.jp
E-mail: exp\_sales@sanwa-meter.co.jp

## [8] SPECIFICATIONS

8-1 General Specifications
Measuring Method: Δ Δ
Display: 4000 counts max.
Range selection: Auto ranges
Over display: "O.L" display
Polarity: Automatic selection (only "-" is displayed)
Low Battery Indication: E
Sampling rate: Approx. 3 times/sec.
Accuracy assurance temperature/humidity range: ±23±5°C 80%RH max. No condensation.
Operating temperature/humidity range: 0~40°C 80%RH max. No condensation.
Storage temperature/humidity range: -10~50°C 70%RH max. No condensation.
Environmental condition: Operating altitude <2000m, Pollution degree II
Power supply: Coin type lithium battery CR2032 (3V), 1 pcs.
Power consumption: Approx. 6mW TYP. (at DCV)
Battery life: Approx. 150 hours at DCV
Dimension and weight: 108(H)X56(W)X11.5(D)mm Approx. 50g
Accessories: Instruction manual 1, Case holder 1

Table with 3 columns: Function, Range, Accuracy, Remarks. Rows include Hz and DUTY. Accuracy ranges from ±(0.7%rdg+5dgt) to ±(10%rdg+15dgt).

Accuracy in the case of sine wave.
- Do not use the tester near places where strong electromagnetic waves and traces are generated or strong electrical voltages are generated.
Accuracy calculation
For example: Measurement DCmV
Displayed value: 100.0mV
Accuracy: 400mV range ±(0.7%rdg+3dgt)
Error: ±(10[mV]X0.7%+3dgt) = ±1.0[mV]
True value: 100.0[mV]±1.0[mV] (in a range of 99.0~101.0mV)
\*3[dgt] in the 400mV range corresponds to 0.3mV.

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True value: 100.0[mV]±1.0[mV] (in a range of 99.0~101.0mV)
\*3[dgt] in the 400mV range corresponds to 0.3mV.

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