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

This instruction manual explains how to safely use your new PM33a digital multimeter with clamp sensor. Before use, please read this manual thoroughly. After reading it, keep it together with the product so you can refer to it when necessary.
Using this product in ways not specified in this manual may damage its protection function.
Instructions given under the "⚠WARNING" and "⚠CAUTION" headings must be followed to prevent accidental burns or electrical shock.

1-1 Explanation of Warning Symbols

The meanings of the symbols used in this manual and on the product are 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.

⎓ : Direct current (DC) ⏚ : Ground ∼ : Alternating current (AC)
⊣⊢ : Capacitance Ω : Resistance Hz : Frequency
•)) : Continuity DUTY : Duty cycle
→| : Diode ⧈ : Double insulation (Protection Class II)
——⊕ : Plus input (Red)
——⊖ : Minus input (Black)

1-2 Warning Instruction for Safe Use

⚠ WARNING

To ensure the meter is used safely, be sure to observe the instructions when using the instrument.
1. Never use meter on the electric circuits that Exceed 3.6 kVA.
2. Pay special attention when measuring voltages of AC 33 Vrms (46.7 V peak) or DC 70 V or more to avoid injury.
3. The clamp sensor provided with this instrument is exclusively for low-voltage use. Perform clamp current measurement with 600 V or less lines.
4. Never apply an input signal exceeding the maximum rating input value.
5. 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.
6. Never use meter if the meter or test leads are damaged or broken.
7. Never use uncased meter.
8. Always keep your fingers behind the finger guards on the probe and the clamp sensor barrier when making measurements.
9. Be sure to disconnect the test pins from the circuit when changing the function.
10. Before starting measurement, make sure that the function and range are properly set in accordance with the measurement.
11. Never use meter with wet hands or in a damp environment.
12. Never open the instrument case except when replacing batteries. Do not attempt any alteration of original specifications.
13. To ensure safety and maintain accuracy, calibrate and check the instrument at least once a year.
14. The instrument is for indoor use only.

⚠ CAUTION

1. Correct measurement may not be possible in areas exposed to strong magnetic fields generated by electrical equipment such as a transformer or large current path, electromagnetic waves generated by wireless equipment, or areas where electrostatic charges are generated.
2. This instrument may malfunction or may not be able to take correct measurements with special waveforms such as those produced by an inverter circuit.

1-3 Overload Protections

Function	Input terminals	Maximum rating input value	Maximum overload protection input
DCV · ACV	—⊕ (Red)	DC/AC 600 V	600 V DC/AC
Hz / DUTY	—⊖ (Black)	⚠Voltage and current input prohibited	
Ω/ •)) /→|			
⊣⊢			
DCA · ACA	Clamp sensor section	DC/AC 100 A ⚠Voltage input prohibited	100 A DC/AC

Note: AC voltage is regulated by rms, values of sinusoidal wave.

[2] APPLICATION AND FEATURES

2-1 Applications

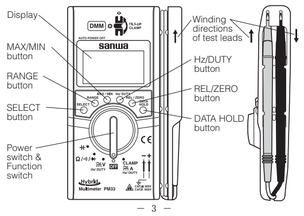
This instrument is a pocket-type digital multimeter with clamp sensor designed for measurement of weak current circuits (CAT. II 600 V, CAT. III 300 V). It plays an important role in circuitry analysis using additional functions, as well as enabling measurement of small type communication equipment, electrical home appliances, lighting voltage and batteries of various types.
A current clamp sensor is also provided that can measure up to 100 A DC/AC, allowing measurement of the electric consumption of equipment that uses an automotive battery or AC power supply. This can be done by simply clamping a single line of electrical wiring in the device being measured.

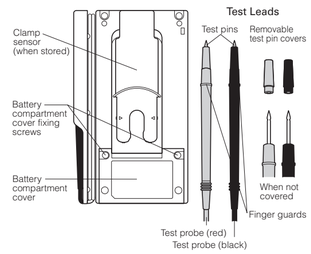
2-2 Features

- The instrument is compact and lightweight and has been designed in accordance with the safety standard EN 61010-1.
- Provided with a current clamp sensor that can measure up to 100 A DC/AC.
- The clamp sensor has a thin U-shaped sensor design that is 7 mm thick. Also because the inclination angle of the sensor is variable between 0 ° and 180 °, the display section of the main unit can be adjusted to an easy-to-view angle.
- Provided with RANGE hold, MAX/MIN hold, REL/ZERO and DATA HOLD functions that are convenient for measurement.
- When the Hz/DUTY measurement function is used during the activation of the ACV/ACA function, the frequency and duty ratio of the signals that are being measured can also be measured.
- Provided with an Auto Power Off function (approx. 30 min.), which can also be canceled.
- The storable sections of the test leads and test probes use an elastomeric material that is easy to wind and store.

[3] NAME OF COMPONENT UNITS

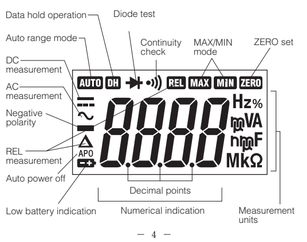
3-1 Multimeter





Removable test pin covers
When not covered : CAT. Ⅱ 600 V
When covered : CAT. Ⅲ 300 V

3-2 Display



[4] DESCRIPTION OF FUNCTIONS

⚠ WARNING

When canceling an operation, do not turn the function switch during measurement.

4-1 Power Switch & Function Switch (All Functions):

Turn this switch to turn the power ON and OFF and to select the measurement function.

4-2 SELECT Button (V · Ω/•))/→| · CLAMP A positions):

As this button is pressed, the function switches in the order of the arrows (→) as shown below.
- V position: AC voltage (∼) → DC voltage (⎓) → AC voltage (∼)
- Ω/ •)) /→| position: Resistance measurement (Ω) → Continuity check (•)) → Diode test (→|) → Resistance measurement (Ω)
- CLAMP A position: AC current (∼) → DC current (⎓) → AC current (∼)

4-3 RANGE Button (DCV · ACV · Ω · ⊣⊢· Functions)

Press this button to engage the manual mode and fix the range (extinguished AUTO).
When the manual mode is engaged, each press of this button changes the range. Select an appropriate range while confirming the unit and the position of the decimal point on the display. To restore the auto range, keep this button depressed for more than 1 second (lit AUTO).
●This button cannot be used when in Hz/DUTY measurement.

4-4 MAX/MIN Button

(DCV · ACV · Ω · •)) · →| · ⊣⊢ · DCA · ACA Functions):

Press this button to enter the MAX/MIN mode. As this button is pressed, the measurement range switches in the order of the arrows (→) as shown below.
- MAX value indication (lit MAX) → MIN value indication (lit MIN) → Current measurement value indication (blinking MAX MIN) → MAX value indication (lit MAX)
- MAX value indication:
  Displays the maximum value of the values measured since the engagement of the MAX/MIN mode.
- MIN value indication:
  Displays the minimum value of the values measured since the engagement of the MAX/MIN mode.

- Current measurement value indication:
  Holds in memory the maximum and minimum values while displaying the current measurement value. Press this button to confirm the maximum and minimum values by switching between the MAX and MIN value indications.
  To disengage the MAX/MIN mode, keep this button depressed for more than 1 second.

●When the function or range is switched, the MAX/MIN mode will be canceled.

4-5 Hz/DUTY Button (ACV · ACA Functions):

Press this button to switch the mode to Hz/DUTY measurement. Each time this button is pressed when the ACV or ACA function is selected, the mode switches in the order of the arrows (→) as shown below.
ACV or ACA measurement → Hz measurement → DUTY measurement → ACV or ACA measurement.

4-6 REL/ZERO Button

(DCV · ACV · Ω· •)) · →| · ⊣⊢ · DCA · ACA Functions):

Press this button to enter the REL measurement mode when the DCV, ACV, Ω, •)) , →| , ⊣⊢ , or ACA function is activated (lit REL △).
The measurement range will be fixed, and the displayed value will be set to zero using the input value at the time of pressing the button as the reference value. To cancel the REL measurement, press this button again.
Pressing this button in the DCA mode sets the displayed value to ZERO (lit REL).
The value at the time the button is pressed will be canceled, and the display will show 0.0 A.
To deactivate the ZERO set function, press the button again and keep it depressed for more than 1 second.

Ex.) Display after the REL/ZERO button is pressed during DC 3.000 V input

Actual input value	Display in REL measurement
DC 6.000 V	△DC 3.000 V
DC 3.000 V	△DC 0.000 V
DC 1.000 V	△DC -2.000 V

●When the function or range is switched, the REL measurement or ZERO set will be canceled.

4-7 DATA HOLD Button (All Functions)

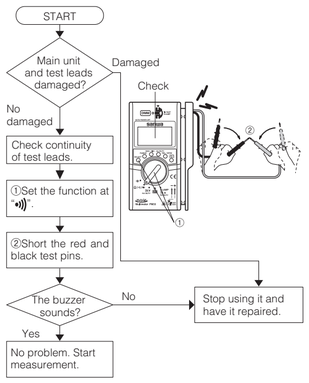
When this button is pressed, the DH will be lit in the display and the value displayed at that time will be maintained. The display will stay the same even if the measurement input changes. Pressing this button again will cancel the DATA HOLD mode and restore the measurement mode.
●When the function or range is switched, the DATA HOLD mode will be canceled.

4-8 Auto Power Off (APO):

The power and display will be turned off automatically when no switch or button operation is made for about 30 minutes after the power was turned on.
When a button is pressed or the function switch is turned during measurement, the time until the Auto Power Off will be extended an additional 30 minutes. To wake up from the Auto Power Off mode, press the button again. When returned, the value at the time of the Auto Power Off will be displayed using the DATA HOLD mode. To disable this function, turn the function switch while pressing any button (except the SELECT or DATA HOLD button) to turn on the power (lit APO). When the Auto Power Off mode is engaged, the APO is lit in the display.
●Although power consumption in the Auto Power Off mode the is less than 1/100 of that of the turned-on status, be sure to set the power switch to OFF as soon as measurement is complete.

4-9 Low Battery Indication

When the built-in batteries are exhausted and the battery voltage drops below about 2.3 V, the ▭ will appear in the display. If this icon is lit, replace the batteries with new ones (two at the same time).



[5] MEASUREMENT PROCEDURE

5-1 Start-Up Inspection

⚠ WARNING

1. Make sure that no low battery indication appear in the display.
2. Never use meter if the meter or test leads are damaged or broken.
3. Check continuity of test leads.

Note: If there is no display, the batteries may be exhausted.

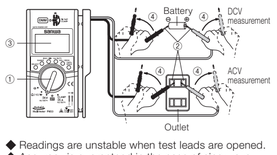
5-2 Voltage Measurement

⚠ 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.

Function	Max. rating input value	Measurement range
DCV	DC 600.0 V	660.0 mV, 6.600 V, 66.00 V, 600.0 V
ACV	AC 600.0 V	660.0 mV, 6.600 V, 66.00 V, 600.0 V

1) Applications
   DCV: Voltage of the battery and DC circuit are measured.
   ACV: Sine wave AC voltage, such as lighting voltage, is measured.
2) Measurement procedure
   ① Set the function switch to the "V" position and select either DCV or ACV with the SELECT button.
   ② Apply the red and black test pins to the circuit to measure.
   • For measurement of DCV, 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.
   • For measurement of ACV, apply the red and black test pins to the circuit to measure.
   ③ The reading of voltage is shown on the display.
   ④ After measurement, release the red and black test pins from the object measured.



◆ Readings are unstable when test leads are opened.
◆ Accuracy is guaranteed in the case of sine wave.

◆ The frequencies where accuracy is guaranteed in the ACV measurement are 40 ~ 100 Hz in the 660 mV range and 40 ~ 400 Hz in other ranges.
◆ Although the terminals to be measured are short-circuited in the AC 660 mV and AC 6.6 V ranges, up to 10 counts may remain in the AC 660 mV range and up to 7 counts may remain in the AC 6.6 V range.
◆ Measurement of an inverter power supply circuit may cause a malfunction.

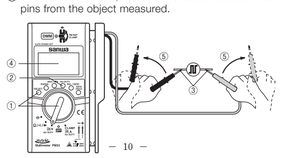
5-3 Frequency/DUTY Measurements (Hz / %)

⚠ WARNING

1. Never apply an input signal exceeding the maximum rating input value.
2. Do not turn the function switch during measurement.
3. Do not hold the test probe by a section closer to the test pin side behind the finger guard.

Function	Max. rating input value	Measurement range
Hz/DUTY	66.00 kHz (600 Vrms or less)	660.0 Hz, 6.600 kHz, 66.00 kHz 20.0 % ~ 80.0 % at 50/60 Hz

1) Applications: Measuring the frequency and duty of any circuit.
2) Measurement procedure
   ① Set the function switch at the V position and press the SELECT button to select ACV.
   ② Press Hz/DUTY button to select the frequency (Hz) measurement or DUTY ratio measurement.
   ③ Apply the red and black test pins to a conductor to measure.
   ④ Read the value on the display.
   ⑤ After measurement, release the red and black test pins from the object measured.



◆ When the input terminal is not connected, the display may fluctuate and be unstable. This is not a malfunction.
◆ The frequency measurement range is 20 Hz ~ 66 kHz. The input sensitivity with sine wave alternating current is 10 ~ 600 Vrms.
◆ Measurement of an inverter power supply circuit may cause a malfunction.
◆ Measurement with DC-coupled input is not possible.

5-4 Resistance Measurement (Ω)

⚠ WARNING

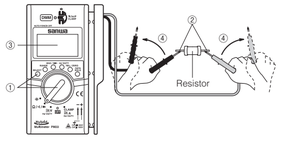
Never apply voltage to the input terminals.

⚠ CAUTION

When high resistance is measured, the displayed value may fluctuate due to external induction.

Function	Max. rating input value	Measurement range
Ω	66.0 MΩ	660.0 Ω, 6.600 kΩ, 66.00 kΩ, 660.0 kΩ, 6.600 MΩ, 66.0 MΩ

1) Applications: Measuring the resistance of resistors and circuits.
2) Measurement procedure
   ① Set the function switch to the Ω/•)) /→| position.
   ② Apply the red and black test pins to an object to measure.
   ③ The reading is shown in the display.
   ④ After measurement, release the red and black test pins from the object measured.



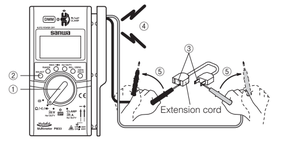
◆ If measurement is likely to be influenced by noise, shield the object to measure with negative potential (COM). If a finger touches a test pin during measurement, measurement will be influenced by the resistance in the human body, and that results in measurement error.
◆ Open circuit voltage: Approx. 0.78 V in 660 Ω range
Approx. 1.2 V in other range
◆ Resistance cannot be measured when voltage is present.

5-5 Checking Continuity (•))

⚠ WARNING

Never apply voltage to the input terminals.

1) Applications: Checking the continuity of wiring and selecting wires.
2) How to use
   ① Set the function switch to the Ω/•)) /→| position.
   ② Select "•))" by pressing the SELECT button.
   ③ Apply the red and black test pins to a circuit or conductor wire to measure.
   ④ The continuity can be judged by whether the buzzer sounds or not.
   ⑤ After measurement, release the red and black test pins from the object measured.



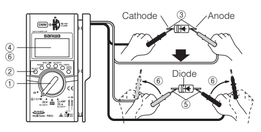
◆ The buzzer sounds when the resistance of the circuit to be measured is less than approx. 30 Ω.
◆ The open circuit voltage between the input terminals is approx. 0.78 V.

5-6 Testing Diodes (→|)

⚠ WARNING

Never apply voltage to the input terminals.

1) Applications: Testing the quality of diodes.
2) How to use
   ① Set the function switch to the Ω/•)) /→| position.
   ② Select "→|" by pressing the SELECT button.
   ③ Apply the black test pins to the cathode of the diode and the red test pin to the anode.
   ④ Make sure that the display shows a diode forward voltage drop.
   ⑤ After replacing the red and black test pins, connect the red test pin to the cathode of the diode and connect the black test pin to the anode.
   ⑥ Make sure display is the same as when the test lead is not connected (OL indication).
   Note: Successful completion of steps ④ and ⑤ indicates that there is no problem with the diode.
   ⑦ After measurement, release the red and black test pins from the object measured.



◆ The open voltage of the input terminals is almost the same as the battery voltage.

5-7 Capacitance Measurement (⊣⊢)

⚠ WARNING

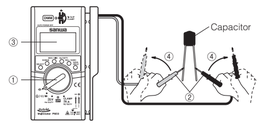
Never apply voltage to the input terminals.

⚠ CAUTION

1. Discharge the capacitance before measurement.
2. This is not suitable for measurement of electrolytic condenser such as a large leakage condenser.
3. It takes a while to measure large capacitance.

Function	Max. input rating value	Measurement range
⊣⊢	66.00 mF	6.600 nF, 66.00 nF, 660.0 nF, 6.600 µF, 66.00 µF, 660.0 µF 6.600 mF, 66.00 mF

1) Applications: Measuring the capacitance of low leakage condenser such as film condenser.
2) How to use
   ① Set the function switch to the ⊣⊢ position.
   ② Apply the red and black test pins to a conductor to measure.
   ③ Read the value on the display.
   ④ After measurement, release the red and black test pins from the object measured.



◆ When the 6.600 nF or 66.00 nF range is used, use the REL mode to set the values that remain on the display to "0" (cancelled) before the measurement is performed.
◆ Readings are unstable because of stray capacitance in test leads or noise.

[6] MAINTENANCE

⚠ WARNING

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

6-1 Maintenance and Inspection

1) Appearance
   • Has the appearance been damaged by falling?
2) Test leads
   • Is the test lead cord damaged?
   • Is the core wire exposed at any place on the test leads?
   If the built-in fuse is blown, current measurement is impossible. Make sure that the test leads are not cut, referring to the section 5-1.

6-2 Calibration

The manufacturer may conduct calibration and inspection. For more information, please contact your dealer.

6-3 Battery Replacement

⚠ WARNING

1. To avoid electric shock, do not remove the battery compartment cover when input is applied to the measurement terminal and clamp sensor or when measurement is being performed.
2. Be sure to confirm that the function switch is set to "OFF" before replacing the batteries.

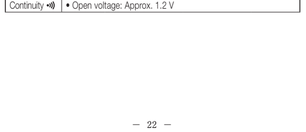
⚠ CAUTION

Set the batteries with their polarities facing in the correct directions.

① Remove the two fixing screws from the battery compartment cover.
② Slide the battery compartment cover downward to remove it.

③ Replace both of the two batteries in the battery compartment with new ones.
④ Place the battery compartment cover and tighten the fixing screws.

• About the batteries when shipped from the factory
The batteries incorporated when shipped from the factory are monitor batteries, so their service life may be shorter than that of brand-new batteries. A monitor battery is a type of battery used to check the functions of and performance of the product.



6-4 Storage

⚠ CAUTION

1. The panel and the case are not resistant to volatile solvent and must not be cleaned with thinner or alcohol.
2. The panel and the case are not resistant to heat. Do not place the instrument near heat-generating devices (such as a soldering iron).
3. Do not store the instrument, in a place where it may be subjected to vibration or from where it may fall.
4. For storing the instrument, avoid hot, cold or humid places or places under direct sunlight or where condensation is anticipated.
5. When the instrument is not going to be used for extended time, be sure to remove the batteries.

5-8 Clamp Current Measurement (CLAMP A)

⚠ WARNING

1. The clamp sensor of this instrument is exclusively for low voltage. Perform the clamp current measurement on a line with 600 V or less.
2. Do not turn the function switch during measurement.
3. During measurement, do not hold the clamp sensor at any point beyond the barrier.
4. To prevent electric shock, be sure to store the test probe and test lead in their designated storage compartments.

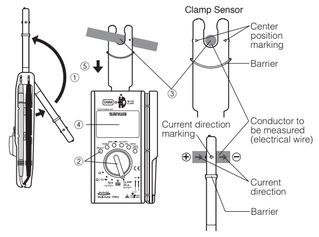
⚠ CAUTION

1. The measurable diameter of a conductor is 10 mm. Do not force a cable with an outer diameter of more than 10 mm into the clamp sensor section. Also do not apply external force to the clamp sensor section.
2. Make sure that the conductor to be measured is aligned with the center of the arrows on the clamp sensor. Otherwise, a measurement error will result.
3. Do not let this instrument come near a conductor in which large current flows or place it on a strong magnetic field. Such an environment may cause a current value to be displayed even though no measurement is made (an error may occur). Since the clamp sensor of this instrument is a U-shaped open-type sensor, it is more susceptible to such an environment compared than a closed-type sensor.

Function	Max. input rating value	Measurement range
DCA	DC 100.0 A	DC 100.0 A
ACA	AC 100.0 A	AC 100.0 A

1) Applications
   DCA: Measures the current consumption of devices such as an automotive battery.
   ACA: Measures the sine wave alternating current with 40 ~ 400 Hz frequency of power supply facilities.
2) Measurement procedure
   ① Raise the clamp sensor from the rear of the main unit.
   ② Set the function switch to the CLAMP A position, and press the SELECT button to select DCA or ACA.
   • DCA: Use the ZERO set function to set the display value to "0.0 A" before measurement.

• ACA: No adjustment is necessary.
③ Align one line of the conductor to be measured with the center of the arrows on the clamp sensor.
• DCA: Point the object to be measured in the same direction as the current direction marking. If it is pointed in the opposite direction, "–" will be displayed.
• ACA: The current direction of the object to be measured is irrelevant.
④ Read the measurement value in the display.
⑤ After measurement, remove the conductor from the clamp sensor.



◆ When the position of this instrument is changed during DCA measurement, the display may fluctuate due to geomagnetism.
◆ Because the AC sensing system of this instrument is an average value system, an error in the measured value will occur with waveforms other than sine waves.
◆ Accuracy is guaranteed in ACA measurement between 40 ~ 400 Hz.
◆ Measurement of an inverter power supply circuit may cause a malfunction.

[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 fuses, 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 and installation polarity of the built-in batteries.
   • Continuity 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

Measurement	Double integral method
Display	Max. 6600 count
Over ranging indication	"OL" mark indication
Range selection	Auto and manual ranges
Polarity selection	Automatic selection (– display only)
Low battery indication	Displayed when built-in batteries are exhausted (to 2.3 V or less) with ▭ lit or blinking in display
Sampling rate	Approx. 3 times/sec
Current measurement system	CT clamp
Max. clamp conductor diameter	10 mm
AC sensoring	Average sensoring
Environmental condition	Operating altitude <2000 m, indoor use, pollution degree 2
Accuracy-guaranteed temperature/humidity range	23 ± 5 °C, <80 % RH (without condensation)
Operating temperature/ humidity range	5 ~ 40 °C, <80 % RH (without condensation)
Storage temperature/ humidity range	–10 ~ 50 °C, <80 % RH (without condensation)
Power supply	Two LR03 alkaline batteries
Auto power off	Power off after approx. 30 minutes since last operation
Power consumption	Approx. 7 mW TYP (at DCV)
Dimensions & mass	130 (*L*) x 75 (*W*) 19.9 (*D*) mm (excluding protrusions), approx. 160 g (including batteries)
Test lead length	Approx. 60 cm for both red and black
Safety standard	EN61010-1, EN61010-2-030, EN61010-2-033, EN61010-2-032 CAT. III 300 V, CAT. II 600 V, EN61010-031
EMC directive, RoHS directive	IEC61326(EMC), EN50581(RoHS)
Accessories	Instruction manual

MEASUREMENT CATEGORY
CAT II: Primary electrical circuits in equipment connected to an AC electrical outlet by a power cord.
CAT III: Primary electrical circuits of heavy equipment connected directly to the distribution panel, and feeders from the distribution panel to outlets.

8-2 Measurement Range and Accuracy

Accuracy assurance range: 23 ± 5 °C & less than 80 % R.H. No Condensation

Function	Range	Accuracy	Input impedance	Remarks
DCV ⎓ DC Voltage	660.0 mV	±(1.1 %rdg+3dgt)	≥100 MΩ	
	6.600 V	±(0.7 %rdg+3dgt)	Approx. 11 MΩ	
	66.00 V	±(0.8 %rdg+3dgt)	Approx. 10 MΩ	
	600.0 VΩ	±(1.1 %rdg+3dgt)		
ACV ∼ AC Voltage	660.0 mV	±(1.6 %rdg+10dgt)	≥100 MΩ	• Accuracy-guaranteed range: 40 ~ 100 Hz
	6.600 V	±(1.4 %rdg+6dgt)	Approx. 11 MΩ	• Accuracy-guaranteed range: 40 ~ 400 Hz • Accuracy in the case of sin wave
	66.00 V		Approx. 10 MΩ	
	600.0 V			
Resistance Ω	660.0 Ω	±(1.5 %rdg+7dgt)	• Open voltage: Approx. 1.2 V	
	6.600 kΩ	±(0.9 %rdg+3dgt)	• Open voltage: Approx. 0.78 V • The measuring current changes according to the resistance of the resistor to measure.	
	66.00 kΩ			
	660.0 kΩ			
	6.600 MΩ	±(2.0 %rdg+3dgt)		
	66.0 MΩ	±(4.0 %rdg+3dgt)		
Testing Diode →|	• Open voltage: Almost battery voltage			
Checking Continuity •))	• Buzzer sounds at less than 30 Ω • Open voltage: Approx. 1.2 V			

Capacitance ⊣⊢	6.600 nF	±(5.0 %rdg+10dgt)	• Accuracy was measured after canceling display value by the REL function.
	66.00 nF		
	660.0 nF		
	6.600 µF		
	66.00 µF		
	660.0 µF		
	6.600 mF	±(7.0 %rdg+10dgt)	
	66.00 mF		
Hz Frequency	660.0 Hz	±(0.5 %rdg+3dgt)	• Measurement range: 20 Hz ~ 66 kHz • Accuracy with input voltage sensitivity of 10 ~ 600 Vrms sin wave AC
	6.600 kHz		
	66.00 kHz		
DUTY	20.0 ~ 80.0 %	±(0.5 %rdg+5dgt)	• 50/60 Hz rectangular wave, accuracy at 10 ~ 60 Vpp
DCA ⎓ Direct Current	100.0 A	±(2.0 %rdg+5dgt)	• Accuracy was measured after canceling display value by the ZERO set function.
ACA ∼ Alternating Current	100.0 A	±(2.0 %rdg+5dgt)	• Accuracy-guaranteed range: 40 ~ 400 Hz • Accuracy in the case of sin wave

rdg: reading dgt: digits

Note: Correct measurement may not be possible in areas exposed to strong magnetic fields generated by electrical equipment such as a transformer or large current path, electromagnetic waves generated by wireless equipment, or areas where electrostatic charges are generated.

Accuracy calculation

Ex.) Measurement of DC voltage (DCmV)
Display value: 100.0 mV
Range accuracy: 660 mV range … ± (1.1 %rdg±3dgt)
Error: ± (100.0 mV x 1.1 %±3dgt) = ±1.4 mV
True value: 100.0 mV ± 1.4 mV (in a range of 98.6 ~ 101.4 mV)
Note: 3dgt in the 660 mV range corresponds to 0.3 mV.

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