

1-1 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.

- Never use meter on the electric circuits that Exceed 3.6 kVA.
- Wear insulating protective gear when using the meter with equipment containing a hazardous live part. Also be sure to observe your local and national safety rules.
- The clamp sensor provided with this instrument is exclusively for low-voltage use. Perform clamp current measurement with 600 V or less lines.
- 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 unsecured meter.
- Always keep your fingers behind the finger guards on the probe

- Be sure to disconnect the test pins from the circuit when changing the function.
- Before starting measurement, make sure that the function and range are properly set in accordance with the measurement.
- Never use meter with wet hands or in a damp environment.
- Never open the instrument case except when replacing batteries. Do not attempt any alteration of original specifications.
- To ensure safety and maintain accuracy, calibrate and check the instrument at least once a year.
- The instrument is for indoor use only.

▲ CAUTION

- 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.
- 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		DC/AC 600 V	600 V DC/AC
Ω / $\frac{1}{f}$ / $\frac{1}{C}$		Voltage and current input prohibited	
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

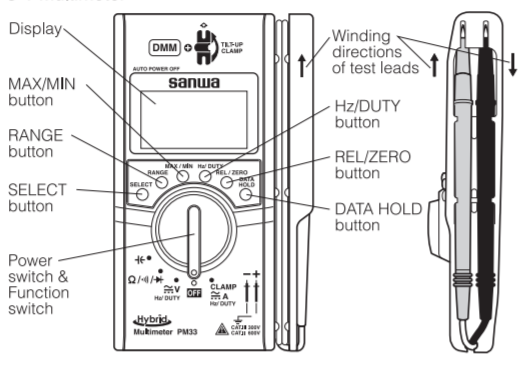
additional functions, as well as enabling measurement of small type communication equipment, electrical home appliances, lighting voltage and batteries of various types. A current clamp sensor is also provided that can measure up to 100 A DC/AC, allowing measurement of the electric consumption of equipment 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

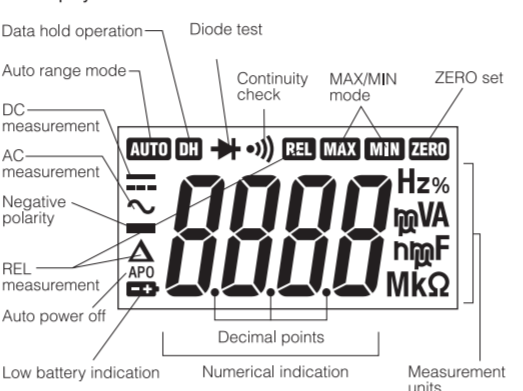
- The instrument is compact and lightweight.
- Provided with a current clamp sensor that can measure up to 100 A DC/AC.
- The clamp sensor has a thin U-shaped sensor design that is 7 mm thick. Also because the inclination angle of the sensor is variable between 0 ° and 180 °, the display section of the 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 elastic material that is easy to wind and store.

[3] NAME OF COMPONENT UNITS

3-1 Multimeter



3-2 Display



4-7 DATA HOLD Button (All Functions)

When this button is pressed, the 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 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).

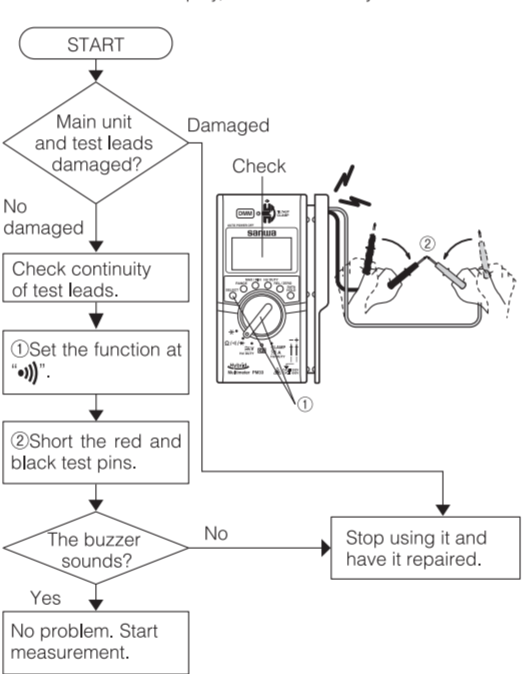
[5] MEASUREMENT PROCEDURE

5-1 Start-Up Inspection

▲ WARNING

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

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



- 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 (⎓)

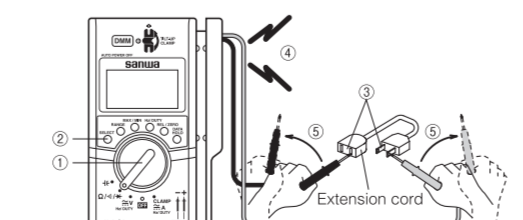
▲ WARNING

Never apply voltage to the input terminals.

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, 66.000 kΩ, 660.00 kΩ, 6.6000 MΩ, 66.000 MΩ

- Applications: Checking the continuity of wiring and selecting wires.
- How to use
 - Set the function switch to the Ω/⎓/⎓ position.
 - Select "⎓" by pressing the SELECT button.
 - Apply the red and black test pins to a circuit or conductor wire 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.



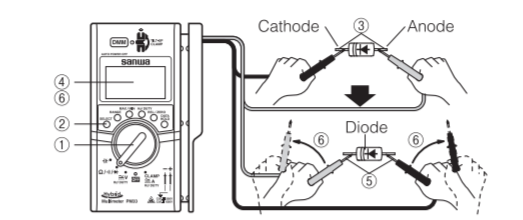
- The buzzer sounds when the resistance of the circuit to be measured is less than approx. 30 Ω.
- The open circuit voltage between the input terminals is approx. 0.78 V.

5-6 Testing Diodes (⎓)

▲ WARNING

Never apply voltage to the input terminals.

- Applications: Testing the quality of diodes.
- How to use
 - Set the function switch to the Ω/⎓/⎓ position.
 - Select "⎓" by pressing the SELECT button.
 - Apply the black test pins 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.
 - 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.
 - Make sure display is the same as when the test lead is not connected (OL indication).
 - Note: Successful completion of steps ① and ③ indicates that there is no problem with the diode.
 - After measurement, release the red and black test pins from the object measured.

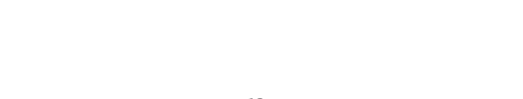


- The open voltage of the input terminals is almost the same as the battery voltage.

5-7 Capacitance Measurement (⎓)

▲ WARNING

Never apply voltage to the input terminals.



[6] MAINTENANCE

▲ WARNING

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

6-1 Maintenance and Inspection

- Appearance
 - Has the appearance been damaged by falling?
- 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

- 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.
- 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.

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

[8] SPECIFICATIONS

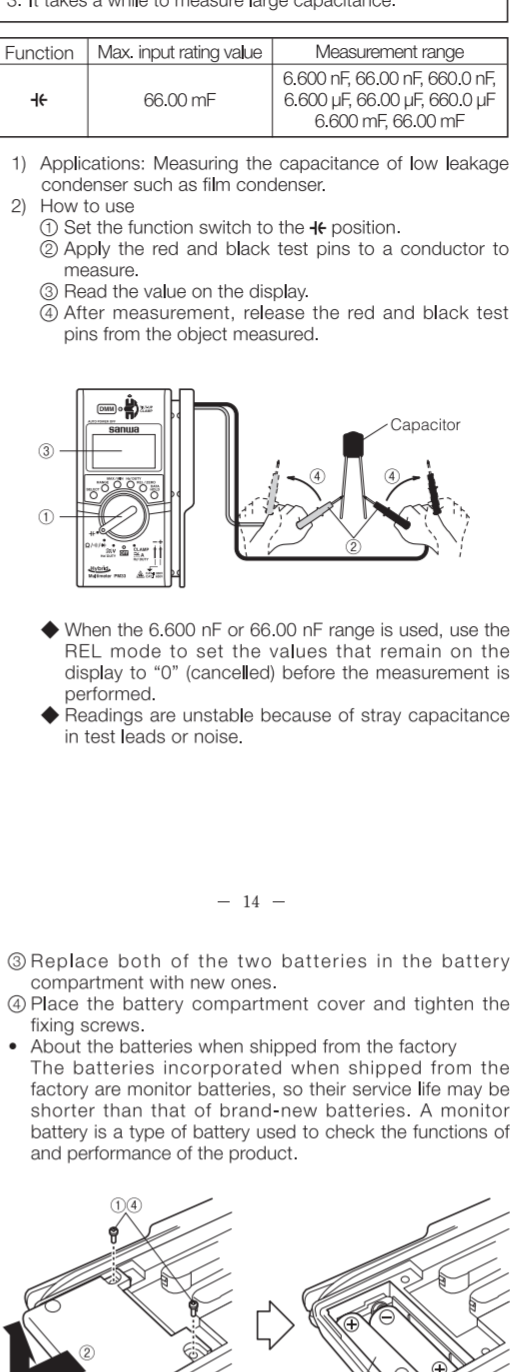
8-1 General Specifications

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 sensing	Average sensing
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 (H) x 75 (W) 119.9 (D) mm (excluding protrusions), approx. 160 g (including batteries)
Test lead length	Approx. 60 cm for both red and black
Safety standard	EN61010-1:2010, EN61010-2:030:2010, EN61010-2-033:2012, EN61010-2-032:2012, CAT. II 300 V, CAT. III 600 V, EN61010-031:2002
EMC directive	CE01236-1:2012(EMC), CE01236-2:12012(EMC), CE01236-2:2:2012(EMC)
Accessories	Instruction manual

6-4 Storage

▲ CAUTION

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



6-5 Calibration

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

6-6 Battery Replacement

▲ WARNING

- 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.
- 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.

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

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	660.0 mV	±(1.1 %rdg+3dgt)	≥100 MΩ	• Accuracy-guaranteed range: 40 - 100 Hz
	6.600 V	±(0.7 %rdg+3dgt)	Approx. 11 MΩ	
	66.00 V	±(0.8 %rdg+3dgt)	Approx. 10 MΩ	
ACV	660.0 mV	±(1.6 %rdg+10dgt)	≥100 MΩ	• Accuracy-guaranteed range: 40 - 400 Hz
	6.600 V	±(1.4 %rdg+6dgt)	Approx. 11 MΩ	
	66.00 V	±(1.4 %rdg+6dgt)	Approx. 10 MΩ	
Resistance Ω	660.0 Ω	±(1.5 %rdg+7dgt)	• Open voltage: Approx. 1.2 V	• Open voltage: Approx. 0.78 V • The measuring current changes according to the resistance of the resistor to measure.
	6.600 kΩ	±(0.9 %rdg+3dgt)		
	66.00 kΩ	±(2.0 %rdg+3dgt)		
Testing Diode	• Open voltage: Almost battery voltage			
	• Buzzer sounds at less than 30 Ω			
Checking Continuity	• Open voltage: Approx. 1.2 V			

8-5 Clamp Current Measurement (CLAMP A)

▲ WARNING

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

▲ CAUTION

- 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.
- 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.
- 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

- 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.
- Measurement procedure
 - Raise the clamp sensor from the rear of the main unit.
 - 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.

- 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:

- 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's agent / distributor without those information will be returned to the customer.

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

Capacitance	6.600 nF	±(5.0 %rdg+10dgt)	• Accuracy was measured after canceling display value by the REL function.
	66.00 nF		
	660.0 μF		
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	100.0 A	±(2.0 %rdg+5dgt)
ACA	Direct Current	100.0 A	±(2.0 %rdg+5dgt)
	Alternating Current	100.0 A	±(2.0 %rdg+5dgt)

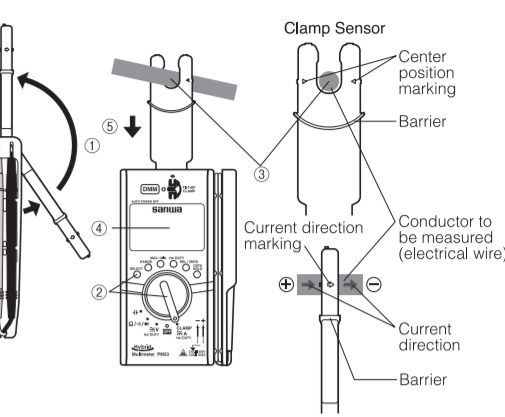
rdg: reading dgt: digits

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.

- ACA: No adjustment is necessary.
- 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.
- Read the measurement value in the display.
- 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.

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