sanwa

CD800a

DIGITAL MULTIMETER

INSTRUCTION MANUAL

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【1】SAFETY PRECAUTIONS Before use, read the following safety precautions.

This instruction manual explains how to use your new digital multimeter CD800a 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 of "⚠ WARNING" 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.

⏚ : Ground ▶| : Diode ⊟ : Fuse
•)) : Buzzer ⊣⊢ : Capacitance Ω : Resistance
⎓ : Direct current(DC) Hz : Frequency
% : Duty cycle ~ : Alternating current(AC)
⧈ : 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 instruction when using the instrument.
1. Never use meter on the electric circuits that Exceed 3 kVA.
2. Never apply an input signal exceeding the maximum rating input value.
3. Never use meter if the meter or test leads are damaged or broken.
4. Pay special attention when measuring the voltage of AC 30 Vrms(42.4 V peak) or DC 60 V or more to avoid injury.
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 uncased meter.
7. Be sure to use a fuse of the specified rating or type. Never use a substitute of the fuse or never make a short circuit of the fuse.
8. When connecting and disconnecting the test leads, first connecting the ground lead(black one). When disconnecting them, the ground lead must be disconnected last.
9. Always keep your fingers behind the finger guards on the probe when making measurements.

10. Be sure to disconnect the test pins from the circuit when changing the function.
11. Before starting measurement, make sure that the function and range are properly set in accordance with the measurement.
12. Never use meter with wet hands or in a damp environment.
13. Never open tester case except when replacing batteries or fuse. Do not attempt any alteration of original specifications.
14. Do not use the device near an item of strong electromagnetic generation or a charged item.
15. To ensure safety and maintain accuracy, calibrate and check the tester at least once a year.
16. The multimeter is for indoor use only.

1-3 Overload protections

Function	Input terminals	Maximum rating input value	Maximum overload protection input
V	(Red) ⊕	DC・AC 600 V	DC 600 V AC 600 V or Peak Max 840 V
Ω / ▶| / •)) / ⊣⊢	(Red) ⊕	⚠Voltage and Current input prohibited	
Hz / %	(Black) ⊖	DC・AC 600 V	
mA	(Black) ⊖	DC・AC 400 mA	0.5 A / 250 V Fuse

※AC voltage is regulated by rms, valus of sinusoidal wave.

⚠ 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.

【2】APPLICATION AND FEATURES

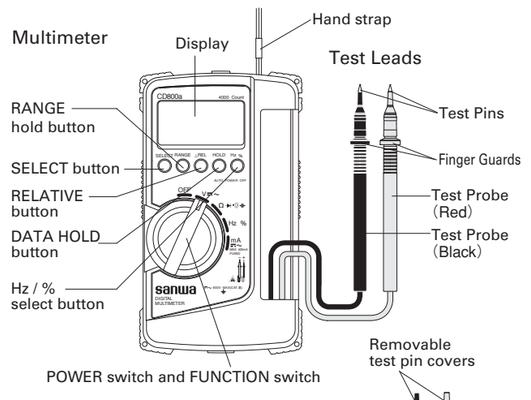
2-1 Applications

This instrument is portable digital multimeter designed for measurement of weak current circuits. It plays an important role in circuitry analysis by using additional functions as well as measurements of small type communication equipment, electrical home appliance, lighting voltage and batteries of various type.

2-2 Features

- Sharp contrast LCD with character 17.5 mm high is employed, and unit symbols are displayed on the screen of the LCD.
- Frequency, capacitance and duty cycle measurement function.
- Attachment body cover is used for protection of the meter and as a tilt stand.
- The current function is protected by a fuse.

【3】NEME 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.

4-1 Function Switch

Turn this switch, to turn on and off the power and to select the functions of V ⎓~, Ω/▶|/•))/⊣⊢ , Hz/%, mA ⎓~

4-2 SELECT : Measurement Function Select

When the SELECT button is pressed (→), the functions change as follows.
- In the case of V, mA, the modes change as : ⎓ → ~ → ⎓
- In the case of Ω, ▶|, •)), ⊣⊢, the modes change : Ω → ▶| → •)) → ⊣⊢ → Ω

4-3 RANGE : Range Hold

Press the RANGE button momentary to set the manual range mode, then 'AUTO' disappears in the display. In manual range mode, press the button again to step through the ranges. To return to the auto mode, press the button for 1 sec. or more, then 'AUTO' is shown.
※Manual mode is not available in ⊣⊢ , Hz, duty measurement, diode check, cont. buzzer functions.

4-4 △REL : Relative Mode

Relative zero allows the user to offset the meter consecutive measurements with the displaying reading as the reference value. Press the △REL button momentarily to activate and to exit relative zero mode.

4-5 HOLD : Data Hold

When the HOLD button is pressed, the display is hold ('DH' is shown on the display). The display will not be changed while the function is active. Press the button again to cancel the function.('DH' on the display disappears.)
※DATA HOLD function does not work when measuring frequency.

4-6 Hz/% : Frequency and duty cycle select button

Frequency and duty cycle measurement functions are activated alternatively by pressing the button. In the case of the mode change as Hz → %

4-7 Auto Power Off

The meter will enter a low power consumption sleep mode automatically to extend battery life after approximately 30 minutes of no function switch or push button operations. To wake up the meter from Auto Power Off, press any buttons momentarily or turn the function switch to the OFF position. Then turn back on again. To disable the Auto Power Off feature, press the SELECT button while turning the function switch on.
※Always turn the function switch to the OFF position when the meter is not in use.

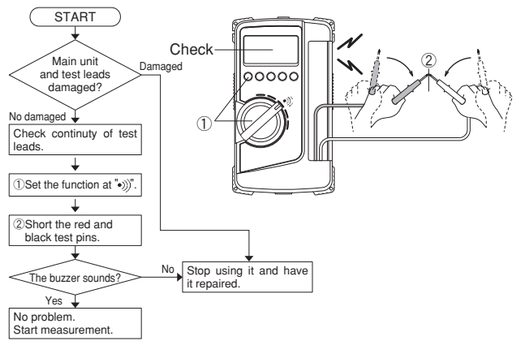
【5】MEASUREMENT PROCEDURE

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 & fuse.

※ No display may suggest that a battery be exhausted.



5-2 Voltage measurement

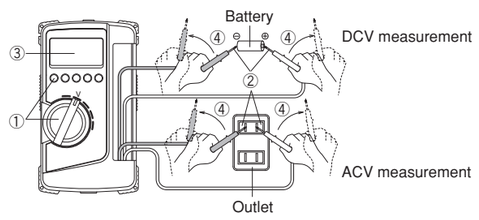
⚠ WARNING

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.

DCV / ACV : Maximum rating input value 600 V DC/AC

1) Applications
DCV : Voltage of the battery and DC circuit are measured.
ACV : Sine wave AC voltage, such as lighting voltage, is measured.
2) Measuring ranges
DCV : 5 ranges from 400 mV to 600 V
ACV : 4 ranges from 4 V to 600 V

3) Measurement procedure
① Set the FUNCTION switch at "V" and select either DC or AC 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 (Bandwidth 40 ~ 400 Hz)
◇ 400 mV AC range is not specified.
◇ In the manual mode of the ACV function, the CD800a can be set to the 400 mV range and shows an approximate value. But its accuracy is not guaranteed.
◇ In the AC 4 V range, a figure of about 3~9 counts will stay on even if no input signal is present. But it is not malfunction.
◆ Use Hz/% function for making Hz and duty cycle measurements.



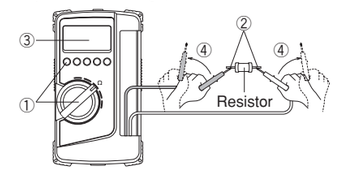
5-3 Resistance Measurement (Ω)

⚠ WARNING

Never apply voltage to the input terminals.

1) Applications
Resistance of resistors and circuits are measured.
2) Measuring ranges
6 ranges from 400 Ω to 40 MΩ.

3) Measurement procedure
① Set the FUNTION switch at Ω/▶|/•))/⊣⊢ and select Ω with the SELECT button.
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.
Note : 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: <0.4 VDC typical.
● When the presence of voltage, resistance measurement can not work.

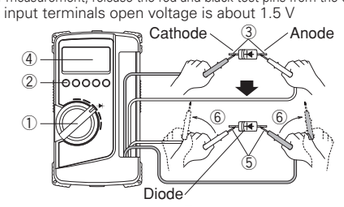


5-4 Testing Diode (▶|)

⚠ WARNING

Never apply voltage to the input terminals.

1) Applications
The quality of diodes is tested.
2) How to use
① Set the FUNTION switch at Ω/▶|/•))/⊣⊢ .
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 Replace the red and black test pins, make sure that the display is "OL" reading.
⑥ After measurement, release the red and black test pins from the object measured.
● The input terminals open voltage is about 1.5 V

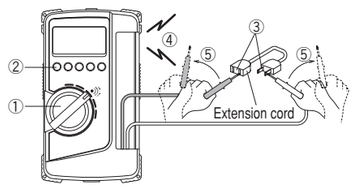


5-5 Checking Continuity (•))

⚠ 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 FUNTION switch at Ω/▶|/•))/⊣⊢ .
② Select •)) by pressing the SELECT button.
③ Apply the red and black test pins to a circuit or conductor 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.
● Threshold : 10~120 Ω



5-6 Capacitance Measurement (⊣⊢)

⚠ WARNING

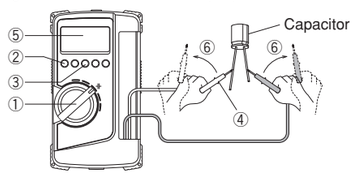
Never apply voltage to the input terminals.

⚠ 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.

1) Applications
Measures capacitance of low leakage condenser such as film condenser.
2) Measuring ranges
5 ranges from 50.00 nF to 100.0 μF (Auto range).

3) Measurement procedure
① Set the FUNTION switch at Ω/▶|/•))/⊣⊢ .
② Select ⊣⊢ by pressing the SELECT button.
③ Press the REL button for zero setting (00.00 nF).
④ Apply the red and black test pins to a conductor to measure.
⑤ Read the value on the display.
⑥ After measurement, release the red and black test pins from the object measured.
● Manual range is not available in capacitance measurement.
● Readings are unstable because of stray capacitance in test leads or noise.

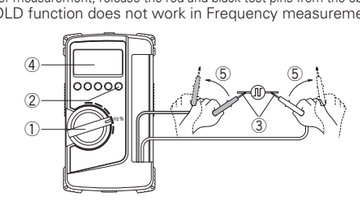


5-7 Hz / % Measurements (Hz / %)

⚠ WARNING

Never apply an input signal exceeding the maximum rating input value.

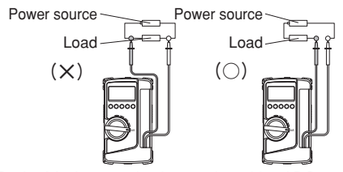
1) Applications
Measures frequency and duty of any circuit.
2) Measuring ranges
6 ranges from 5 Hz to 100 kHz (Auto range)
Duty Cycle : 20 %~80 %
3) Measurement procedure
① Set the function switch at Hz / % function.
② Select Hz by pressing Hz/% selection button.
③ Apply the red and black test pins to 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.
● HOLD function does not work in Frequency measurement function.



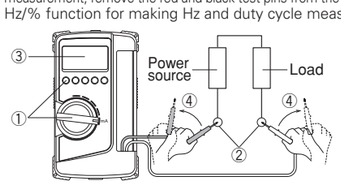
5-8 Current Measurement

⚠ WARNING

1. Never apply voltage to the input terminals.
2. Be sure to make a series connection via load.
3. Do not apply an input exceeding the maximum rated current to the input terminals.
4. Before starting measurement, turn OFF the power switch of the circuit to separate the measuring part, and then connect the test leads firmly.



● DCmA : Maximum rating input value 400 mADC
● ACmA : Maximum rating input value 400 mAAC
1) Applications
DCA : Current in batteries and DC circuits is measured.
ACA : Current in AC circuits is measured.
2) Measuring ranges
DC/ACmA : 2 ranges for 400.0 mA and 40.00 mA.
3) Measurement procedure
① Set the function switch at "mA" and select either DC or AC with the SELECT button.
② In the circuit to measure and apply the red and black test pins in series with load.
● For measurement of DCA, 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 in series with load.
● For measurement of ACV, apply the red and black test pins to the circuit to measure in series with load.
③ Read the value on the display.
④ After measurement, remove the red and black test pins from the circuit measured.
◆ Use Hz/% function for making Hz and duty cycle measurements.



【6】MAINTENANCE

⚠ WARNING

1. The 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?
Note : If the built-in fuse is blown, only the current measurement becomes impossible. Make sure that the test leads are not cut, referring to the section 5-1.

6-2 Calibration

The manufacturer may conduct the calibration and inspection. For more information, please contact the dealers.

6-3 Battery and Fuse Replacement

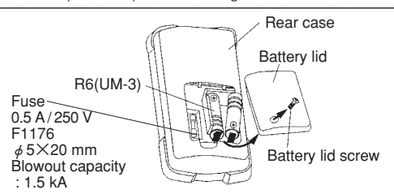
⚠ WARNING

1. If the rear case or the battery lid is removed with input applied to the input terminals, you may get electrical shock. Before starting the work, always make sure that no input is applied.
2. Before starting the work, be sure to turn OFF the main unit power and release the test leads from the circuit.
3. Be sure to use a fuse of the specified rating or type. Never use a substitute of the fuse or never make a short circuit of the fuse.

① Remove the battery lid screw with a screwdriver.
② Take out the battery or fuse and replace it with a new one.
③ Attach the battery lid and fix with the screw.

⚠ CAUTION

Set battery with its polarities facing in the correct directions.



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. For cleaning, use dry, soft cloth and wipe it lightly.
3. The panel and the case are not resistant to heat. Do not place the instrument near heat-generating devices (such as a soldering iron).
4. Do not store the instrument, in a place where it may be subjected to vibration or from where it may fall.
5. For storing the instrument, avoid hot, cold or humid places or places under direct sunlight or where condensation is anticipated.

【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 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 Specification

Measuring	ΔΣmethod
Display	3 3/4 digit, 4000 counts
Sampling Rate	Approx.3 times/sec
Range Selection	Auto and Manual ranges (Manual range or Auto renge only)
Over ranging Indication	"OL" mark indication (except AC/DC 600 V ranges)
Polarity Indication	Automatic selection("−" is indicated when negative voltage is inputted.)
Low Battery Indication	Below approx. 2.4 V "⊟" mark indication
Environmental Condition	Operating altitude <2000 m / Pollution degree Ⅱ
Operating temperature	5 ℃~40 ℃ humidity range: Maximum 80 % RH for temperatures up to 31 ℃ decreasing linearly to 50 % RH at 40 ℃
Storage temperature / humidity range	-10 ℃~50 ℃ 70 %R.H. max. No condensation. (remove batteries)
Power Supply	R06×2
AC sensoring	Average sensoring
Battery Life	30 min. (auto power save)
Dimension	*L* 176 mm×*W* 104 mm×*H* 46 mm
Mass	Approx. 340 g
Power consumption	Approx. 7 mW TYP. (at DCV)
Battery life	Approx. 500 hours at DCV
Fuse	0.5 A / 250 V Fast Acting Fuse, Parts number:F1176
Accessories	Instruction manual

8-2 測定範囲及び確度 / Measurement Range and Accuracy

確度保証範囲：温度23±5 ℃ 湿度：80 %R.H.以下 結露のないこと
Accuracy assurance range : 23±5 ℃&less than 80 % R.H. No Condensation

rdg(reading)：読取値、dgt(digit)：最終桁のカウント数

ファンクション&レンジ Function&Range		確 度 Accuracy	入力抵抗 Input Impedance	備 考 Remarks
直流電圧 DCV DC Voltage	400.0 mV	±(0.7 %rdg+3dgt)	≧100 MΩ	
	4.000 V	±(1.1 %rdg+3dgt)	Approx. 11 MΩ	
	40.00 V		約10 MΩ Approx. 10 MΩ	
	400.0 V			
	600 V			
交流電圧 ACV AC Voltage	4.000 V	±(1.6 %rdg+9dgt)	Approx. 11 MΩ	※正弦波交流おける確度 確度保証周波数範囲40～400 Hz ※Accuracy in the cace of sin wave 40～400 Hz
	40.00 V	±(1.6 %rdg+5dgt)	約10 MΩ Approx. 10 MΩ	
	400.0 V			
	600 V			
抵抗 Ω Resistance	400.0 Ω	±(1.5 %rdg+5dgt)	開放電圧：DC約 0.4 V Open voltage : Approx.DC 0.4 V 測定電流は被測定抵抗の抵抗によって変化します。 The measurering current changes according to the resistance of the resistor to measure.	
	4.000 kΩ	±(1.2 %rdg+5dgt)		
	40.00 kΩ			
	400.0 kΩ			
	4.000 MΩ	±(2.0 %rdg+3dgt)		
	40.00 MΩ	±(4.0 %rdg+3dgt)		
静電容量 ⊣⊢ Capacitance	50.00 nF	±(5.0 %rdg+10dgt)	※オートレンジのみ。 ※Auto range only. 表示されている値をリラティブ機能によってキャンセルした後の確度。 Accuracy was measured after canceling didplay value by relative key	
	500.0 nF			
	5.000 μF			
	50.00 μF			
	100.0 μF			
周波数 Hz Frequency	5.000 Hz	±(0.5 %rdg+3dgt)	※オートレンジのみ。 ※Auto range only. 1 Hz~1 kHz 4 Vrms~250 Vrms 1 kHz~100 kHz 4 Vrms~20 Vrms	
	50.00 Hz			
	500.0 Hz			
	5.000 kHz			
	50.00 kHz			
	100.0 kHz			
デューティー比 % Duty Cycle	20~80 %	±(0.5 %rdg+5dgt)	※オートレンジのみ。 ※Auto range only. 5 Hz~60 Hz 3 Vrms~30 Vrms 60 Hz~200 Hz 4.9 Vrms~30 Vrms	
直流電流 DCmA DC Current	40.00 mA	±(2.2 %rdg+5dgt)	約1 Ω Approx. 1 Ω ヒューズ抵抗を除く Without resistance of Fase	
	400.0 mA			
交流電流 ACmA AC Current	40.00 mA	±(2.8 %rdg+5dgt)	約1 Ω Approx. 1 Ω ヒューズ抵抗を除く Without resistance of Fase	※正弦波交流おける確度 確度保証周波数範囲 40～400 Hz ※Accuracy in the cace of sin wave 40～400 Hz
	400.0 mA			
Checking Continuity •))		10～120 Ω以下で発音・開放電圧：DC約0.4 V Buzzer sounds at less than 10~120 Ω・Open voltage:Approx.DC 0.4 V		
Testing Diode ▶			開放電圧：DC約1.5 V Open voltage: Approx. DC 1.5 V	

※トランスや大電流路など強磁界の発生している近く、また無線機など強電界の発生している近くでは正常な測定ができない場合があります。

確度計算方法 / Accuracy calculation

例）直流電圧測定(DCmV) / For example…Measurement 400 mVDC Range.
表示値 / Display value : 100.0[mV]
レンジ確度 / Accuracy : 400.0[mV] レンジ / Range…±(0.3 %rdg+4dgt)
誤差 / Error : ±(100.0[mV]×0.3 %rdg+4dgt)=±0.7[mV]
計算式 / Calculation : 100.0[mV]±(100.0[mV]×0.3 %rdg+4dgt)
真値 / True value : In a range of 099.3[mV]~100.7[mV]の範囲内。
※400.0[mV]レンジにおける4[dgt]とは、0.4[mV]に相当します。
※4[dgt] in the 400.0[mV]range correspond to 0.4[mV]

ここに掲載した製品の仕様や外観は改良等の理由により、予告なしに変更することが有りますのでご承知ください。
Specifications and external appearance of the product described above may be revised for modification without prior notice.