

sanwa



sanwa

三和電気計器株式会社

本社=東京都千代田区外神田2-4-4・電波ビル

郵便番号=101-0021・電話=東京(03)3253-4871(☎)

大阪営業所=大阪市浪速区恵美須西2-7-2

郵便番号=556-0003・電話=大阪(06)6681-7361(☎)

SANWA ELECTRIC INSTRUMENT CO.,LTD.

Dempa Bldg,Sotokanda2-Chome Chiyoda-Ku,Tokyo.,Japan

PC1000

DIGITAL MULTIMETER

取扱説明書

INSTRUCTION MANUAL



[1] Safety Precautions : Before use, read the following safety precautions

This instruction manual explains how to use your new digital multimeter PC1000 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

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.
- ▲ : Dangerous voltage (Take care not to get an electric shock in voltage measurement.)
- ⊥ : Ground (Allowable applied voltage range between the input terminal and earth.)
- : Direct current (DC)
- ~ : Alternating current (AC)
- rpm : Revolution per minute
- ⊞ : Fuse
- : Double insulation (Protection Class II)

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 3k VA.
2. Never apply an input signals 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(42.4V peak) or DC 60V 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. To ensure safety and maintain accuracy, calibrate and check the tester at least once a year.
15. Indoor use.

[2] APPLICATION AND FEATURES

2-1 Application

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

- 40,000 counts display
- The instrument has been designed in accordance with the safety standard IEC 1010-1.
- The main unit case and the circuit board is made of fire-retarding materials.
- The current function is protected by a fuse.
- RS232C Interface
- rpm measurement
- Capacity measurement is wide range (4nF~400 μ F)
- This equipment is designed to issue an alarm if a function other than the current (μ m, mA) is selected with test lead plug inserted in the current (μ m, mA) measuring terminal in order to prevent misinsertion of the current terminal.

[4] DESCRIPTION OF FUNCTIONS

1) Function Switch

Turn this switch to turn on and off the power and to select the functions of * mV / V / Ω / Φ / * / * / Hz / rpm / μ A / mA / 12A *.

2) Auto Power Save

Power is automatically turned OFF, clearing every display, approx. 30 min. after the last operation. To operate the tester again, press the \bigcirc \blacktriangleright | switch, reapply power. To cancel auto power save for long time measurement, turn function switch from OFF position to position of desired function while holding down \bigcirc \blacktriangleright | switch. Then, release \bigcirc \blacktriangleright | switch approx. 3sec. after.

3) Battery Voltage Drop Warning Display

if the internal battery has been consumed and the voltage drops, the display shows "BAT": If it is flashing or lit, replace the battery with a new one.

4) Push Switches

Data hold switch (HOLD)

When this switch is pressed, the data display at that time continues(HOLD 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 and you can return to the measuring status. (HOLD on the display disappears.)

Relative measurement switch (REL)

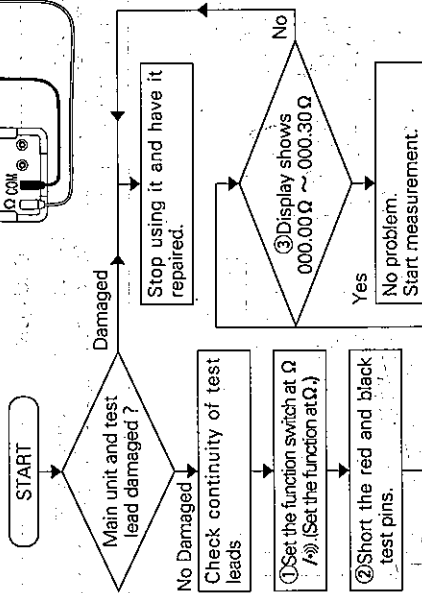
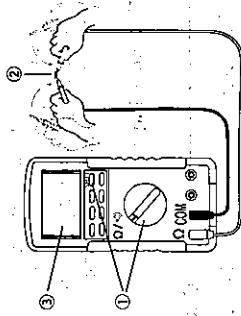
Pressing REL switch lights up REL mark. Suppose that actual value is X1 when REL switch is pressed. Then, value of X-X1 is displayed for actual input value X after that. Each time pressing REL switch, value of X1 is updated. To cancel the function, hold down REL switch until REL mark is cleared from display.

[5] MEASUREMENT PROCEDURE

5-1 Start-Up Inspection

⚠ WARNING

1. Never use meter if the meter or test leads are damaged or broken.
2. Make sure that the test leads are not cut or otherwise damaged.



5-2 Voltage Measurement

⚠ WARNING

1. Never apply an input signals 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 \approx : Maximum rating input value 500VDC at "mV"
- : Maximum rating input value 1000VDC at "V"
- ACV \sim : Maximum rating input value 500VAC at "mV"
- : Maximum rating input value 750VAC at "V"

1) Applications

Resistance of resistors and circuits are measured.

2) Measuring ranges

5 ranges from 400mV to 750V(at ACV) or 1000V(at DCV)

3) Measurement procedure

- 1) Connect the black test lead to COM, measuring terminal and the red test lead to "mV-V" measuring terminal.
- 2) Set the function switch at "mV" or "V" and select either " \approx " or " \sim " with the SHIFT switch.
 - 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) Apply the red and black test pins to the circuit to measure.

4) Read the value on the display.

5) After measurement, release the red and black test pins from the object measured.

(See fig - 4, page10)

- To cut DC components in the input signal in measuring AC, insert a DC prevention capacitor (0.2 μ F / 1000V) in the input terminal.





● True Root Mean Square Value

When measurement is taken by "average value detection r.m.s.", no error is caused as the input signal is sine wave with no distortion. However, if the input waveform is distorted sine wave or non-sinusoidal wave, conversion to root mean square values is very difficult, resulting in a large error.

When measurement is taken by true r.m.s., the measurement value of input signal becomes the scale of the signal power and therefore provide more effective values than those obtained by average value detection. This multimeter employs this true RMS (Root Mean Square) circuit, which enables measurement of sine wave and non-sinusoidal waves like square wave and triangular wave in r.m.s.

● Crest Factor

The crest factor (CF) is expressed by a value obtained by dividing the peak value of the signal by its RMS value. Most common waveforms such as sine wave and triangular wave have a relatively low crest factor. Waveforms similar to a pulse train of low duty cycle have a high crest factor. The voltages and crest factors of typical waveforms are shown in the table.
Note that measurement should be taken with the crest factor below 3.

Input Waveform	0 to Peak P	RMS value V_{rms}	Average value V_{avg}	Crest factor P/V_{rms}	Form factor $P/V_{rms} / V_{avg}$
Sine wave 	1.414	1.000	0.900	1.414	1.111
Square wave 	1.000	1.000	1.000	1	1.000
Triangular wave 	1.732	1.000	0.866	1.732	1.155
Pulse  $D = \frac{t_p}{T}$	2.000	$2\sqrt{D}$	$2 \cdot D$	$\frac{1}{\sqrt{D}}$	$\frac{1}{\sqrt{D}}$

Voltages and Crest Factors of Various Waveforms

5-3 Resistance Measurement and Checking Continuity and Testing Diode and Capacity Measurement

⚠ WARNING

Never apply voltage to the input terminals.

5-3-1 Resistance Measurement

1) Applications

Resistance of resistors and circuits are measured.

2) Measuring ranges

6 ranges from 400Ω to 40MΩ

3) Measurement procedure

- ① Connect the black test lead to COM measuring terminal and the red test lead to "Ω" measuring terminal.
- ② Set the function switch at "Ω/⌘" and turn the SHIFT switch to "Ω".
- ③ Apply the red and black test pins to an object to measure.
- ④ Read the value on the display.
- ⑤ After measurement, release the red and black test pins from the object measured.

(See fig - 5, page 12)

- In 400Ω range, exact measurement is obtained by short-circuiting test pins and displaying "zero" with REL switch.
- If measurement is likely to be influenced by noise, shield the object to measure with negative potential (COM).
- If a test pin is touched by a finger during measurement, measurement will be influenced by the resistance in the human body to result in measurement error.
- The input terminals release voltage is about 1.3V.

5-3-2 Checking Continuity

1) Application

Checking the continuity of wiring and selecting wires.

2) How to use

- ① Connect the black test lead to COM measuring terminal and the red test lead to "Ω/⊘" measuring terminal.
- ② Set the function switch at "Ω/⊘" and turn the SHIFT switch to "⊘".
- 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.

(See fig - 6, page13)

• The buzzer sounds when the resistance in a circuit to measure is less than about 40Ω.

• The input terminals release voltage is about 1.3V.

5-3-3 Testing Diode

1) Application

The quality of diodes is tested.

2) How to use

- ① Connect the black test lead to COM measuring terminal and the red test lead to "→|←" measuring terminal.
- ② Set the function switch at "→|←" and turn the SHIFT switch to "→|←".
- 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 Apply the red test pins to the cathode of the diode and the black test pin to the anode.

⑥ Make sure that the display is the same as that when the test leads are released.

⑦ After measurement, release the red and black test pins from the object measured.

Judgement: When the items ④ and ⑥ are normal, the diode is good.

(See fig - 7, page14)

• The input terminals release voltage is about 5V.

5-3-4 Capacity Measurement

1) Application

Measures capacitance of capacity.

2) Measuring ranges

6 ranges from 4nF to 400 μF

3) Measurement procedure

① Connect the black test lead to COM measuring terminal and the red test lead to "←|→" measuring terminal.

② Set the function switch at "←|→" and turn the SHIFT switch to "←|→".

③ Apply the red and black test pins to capacitor.

④ Auto range function sets proper range.

When proper range is obtained, press RING switch to hold the range.

⑤ Release the red and black test pins from the capacitor.

⑥ Display "zero" with REL switch.

⑦ Reconnect capacitor.

⑧ Read the value on the display.

⑨ After measurement, release the red and black test pins from the object measured.

(See fig - 8, page15)

• In 4nF and 40nF ranges, large value is left, especially when disconnecting measuring terminals. This is not malfunction.

• In nF range, display is unstable due to ambient noise and floating capacity of test leads. Therefore, directly connect object to be measured to "←|→" input terminal and common input terminal.

• Bar graph does not function in capacity measurement.

5-4 Frequency Measurement and RPM Measurement

⚠ WARNING

1. Never apply an input signals 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.

5-4-1 Frequency Measurement

- 1) Application
Measures frequency of AC circuit.
- 2) Measuring ranges
5 ranges from 99.99Hz to 999kHz
- 3) Measurement procedure

- ① Connect the black test lead to COM measuring terminal and the red test lead to "Hz" measuring terminal.
- ② Set the function switch at "Hz / rpm" and turn switch at "Hz".
- ③ Apply the red and black test pins to an object to measure.
- ④ Read the value on the display.
- ⑤ After measurement, release the red and black test pins from the object measured.

(See fig - 9, page16)

- Measurement is possible only in auto range. Manual setting is not available.
- With measuring terminals disconnected, display may overflow or value may unsteadily fluctuate. There are not malfunctions.
- Input is AC-coupled.

Table of Input Sensitivity in Frequency Measurement (RMS Sine Wave)

Input sensitivity display	10Hz	~	40kHz	~	300kHz	~	1MHz
	4V		4V		5V		15V

- Input sensitivity varies according to frequency and waveform. The table above is just for reference for sensitivity.

5-4-2 RPM Measurement

- 1) Application

Measures RPM of a automobile.

- 2) Measuring ranges

3 ranges from 6000rpm to 600krpm

- 3) Measurement procedure

- ① Connect the black test lead to COM measuring terminal and the red test lead to "rpm" measuring terminal.
- ② Set the function switch at "Hz / rpm" and turn switch at "Hz".
- ③ Apply the red and black test pins to an object to measure.
- ④ Read the value on the display.
- ⑤ After measurement, release the red and black test pins from the object measured.

(See fig - 10, page17)

- Measurement is possible only in auto range. Manual setting is not available.
- With measuring terminals disconnected, display may overflow or value may unsteadily fluctuate. There are not malfunctions.
- Input is AC-coupled.
- The measurement possible minimum input voltage is about 4V.
- Bar graph does not function in rpm measurement.

5-5 Current Measurement: μA , mA, A

WARNING

1. Never apply voltage to the input terminals.
2. Be sure to make a series connection via load. (See fig - 11, page18)
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 connect the test leads firmly.
5. If the equipment has issued an alarm that prevent misinsertion of the current terminals, select a correct function and insert the terminal correctly.
6. 10A for 30 second max with 5 minutes cool down.

5-5-1 Current Measurement: μA , mA

- DCA = : Maximum rating input value 400mADC
- ACA ~ : Maximum rating input value 400mAAC

1) Applications

- DCA : Current in batteries and d.c. circuits is measured.
- ACA : Current in a.c. circuits is measured.

2) Measuring ranges

- 4 ranges for 400 μA , 4mA, 40mA, 400mA

3) Measurement procedure

- ① Connect the black test lead to COM measuring terminal and the red test lead to μA mA measuring terminal.
- ② Set the function switch at '400 μA ' or '4mA' or '40mA' or '400mA' and select either '=' or '~' with the SHIFT switch.
- ③ 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 ACA, apply the red and black test pins to the circuit to measure in series with load.
- ④ Read the value on the display.
- ⑤ After measurement, remove the red and black test pins from the circuit measured.

(See fig - 12, page19)

5-5-2 Current Measurement: 12A

- DCA = : Maximum rating input value 12ADC
- ACA ~ : Maximum rating input value 12AAC

1) Applications

- DCA : Current in d.c. circuits is measured.
- ACA : Current in a.c. circuits is measured.

2) Measuring ranges

- 1 range of 12A

3) Measurement procedure

- ① Connect the black test lead to COM measuring terminal and the red test lead to 12A measuring terminal.
- ② Set the function switch at '12A' and select either '=' or '~' with the SHIFT switch.
- ③ 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 ACA, apply the red and black test pins to the circuit to measure in series with load.
- ④ Read the value on the display.
- ⑤ After measurement, remove the red and black test pins from the circuit measured.

(See fig - 13, page20)

5-6 How to use optional products

⚠ WARNING

1. Never apply an input signals exceeding the maximum rating input value of optional products.
2. Be sure to disconnect the test pins from the circuit when changing the function.

5-6-1 Clamp probe : CL-20D

- 1) Applications
It is suitable for measurement of alternating current in electric equipment and power supplies.
- 2) Measuring ranges
2 ranges for 20A, 200A
- 3) Measurement procedure
① Connect the black plug to COM measuring terminal and the red plug to V measuring terminal.
② Set the function at "V" and select AC ~ with the SHIFT switch.
③ Press the RNG switch to hold the 4V range.
④ Select either 20A or 200A with selector knob of clamp meter.
⑤ Open the clamp part, have electric wire (one line) clamped, and close the clamp part perfectly. *1
⑥ Read the value on the display. *1
⑦ After measurement, open the clamp part and release clamp probe from the electric wire.

(See fig - 14, page22)

*1: Read the value on the display as follows

Measuring range	Multiplier	Unit
20A	X 10	A
200A	X 100	A

5-6-2 Clamp probe : CL-22AD

1) Applications

- ACA : It is suitable for measurement of alternating current in electric equipment and power supplies.
- DCA : An electric current of electric circuit of a car and a consumption electric current of direct current apparatus are measured.

2) Measuring ranges

ACA : 2 ranges for 20A, 200A
DCA : 2 ranges for 20A, 200A

3) Measurement procedure

- ① Connect the black plug to COM measuring terminal and the red plug to V measuring terminal.
- ② Set the function at "mV".
- ③ Select either DC ~ or AC ~ with the SHIFT switch.
- ④ Select either 20A or 200A with selector knob of clamp meter.
*The zero point varies when the DCA is measured, so be sure to check that the multimeter indicates zero. If not zero, adjust the indication to the zero point by turning the Zero Adjusting Knob (0ADJ).
- ⑤ Open the clamp part, have electric wire (one line) clamped, and close the clamp part perfectly.
- ⑥ Read the value on the display. *2
- ⑦ After measurement, open the clamp part and release clamp probe from the electric wire.

(See fig - 15, page23)

*2: Read the value on the display as follows

Measuring range	Multiplier	Unit
20A	X 1/10	A
200A	X 1	A

5-6-3 Clamp probe : CL33DC

1) Applications

DCA : An electric current of electric circuit of a car and a consumption electric current of direct current apparatus are measured.

2) Measuring ranges

DCA : 2 ranges for 30A, 300A

3) Measurement procedure

- ① Connect the black plug to COM measuring terminal and the red plug to V measuring terminal.
- ② Set the function at "V" and select either DC with the SHIFT switch.

③ Press the RING switch to hold the 400mV range.

④ Select either 30A or 300A with selector knob of clamp meter.

* The zero point varies, so be sure to check that the multimeter indicates zero. If not zero, adjust the indication to the zero point by turning the Zero Adjusting Knob (OAJJ).

⑤ Open the clamp part, have electric wire (one line) clamped, and close the clamp part perfectly.

⑥ Read the value on the display. *3

⑦ After measurement, open the clamp part and release clamp probe from the electric wire.

(See fig - 16, page24)

*3: Read the value on the display as follows

Measuring range	Multiplier	Unit
30A	X1/10	A
300A	X1	A

5-6-4 Temperature probe : T-300PC

1) Applications

It is used this product when temperature is measured to 300°C from -50°C.

2) Measuring ranges

1 range of -50°C to 300°C

3) Measurement procedure

① Connect the black plug to COM measuring terminal and the red plug to V measuring terminal.

② Set the function at "Ω/Ω" and turn the switch to "Ω"

③ Press the RING switch to hold the 4kΩ range.

④ Apply the sensor to an object to measure.

⑤ Read the value on the display. *4

⑥ After measurement, release the sensor from the object measured.

(See fig - 17, page25)

*4: When measuring temperature, please neglect the value of kohm indicated on LCD of multimeter. The exact value of measured temperature is shown only on the window of PC Link.

[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?

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 calibration and inspection may be conducted by the manufacturer. For more information, please contact the manufacturer.

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 Remove the battery lid.
- ③ Take out the battery or fuse and replace it with a new one.
- ④ Attach the battery lid and fix it with the screw.

(See fig - 18, page27)

⚠ CAUTION

Set a battery with its polarities facing in the correct directions.

6-4 Storage

⚠ WARNING

1. The panel and the case are not resistant to volatile Solvent and must not be cleaned with thinner or alcohol. For cleaning, use dry, soft cloth and wipe it lightly.
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.

Following the above instructions, store the instrument in good environment. (See 8-1, page58)

[7] AFTER-SALE SERVICE

7-1 Repair

If the multimeter fails during use, check the following items before sending it for repair.

- Is the fuse not blown?
 - Is the battery not exhausted?
- We repair defective product at cost. When mailing it to us for repair, do not use the same cardboard box in which it was delivered to you because it may receive damage in transit.
Please send it in a box at least five times as large as the original box with enough cushioning material stuffed around it.

7-2 For Information or Enquiries

If you need information regarding purchase of repair parts or if you have any other sales related questions, please contact the dealer, selling agent, or maker.

[8] SPECIFICATIONS

8-1 General Specifications

Measuring Method : Integral action
Display : Counter ... 39999 counts in max.
(3999 counts for capacity measurement)
(9999 counts for frequency measurement)
(59999 counts for rpm measurement)
Bar graph ... 40 segments in max.
Range Selection : Auto and Manual ranges
Over Display : Flickering of the highest digit (except for 12A)
Polarity : Automatic selection (only "-" is displayed)
Battery Discharge Display : Display flickers at approx.
2.5±0.2V

Sampling Rate : 2 cycles / sec.
...Numeric displays except capacity measurement
One cycles / sec.
...Capacity measurement
1 cycles / sec.

...Bar graph display

Accuracy Assurance : Temperature / Humidity Range

: 18~28°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 : R06 (IEC) dry battery, 2 pieces

Power Consumption : Approx. 27 mW TPY (at DCV)

Approx. 17 mW TPY (at auto power save)

(A little power is consumed even at auto power save to maintain data internally stored by memory function.)

Battery Life : Approx. 70hours or at DCV

Fuse Protection : 250V / 0.5A fuse

Blowout capacity : 10kA φ 5.2X20mm

250V / 12A fuse

Blowout capacity : 10kA φ 6.3X30mm

Blowout capacity : 179(H) X 87(W) X 51(D)mm, approx. 410 g

Accessories

: Instruction manual

Test Leads (TL-21)

Clip adapter (CL-11) (PC1000S)

PC Link Setup Disk (PC1000S)

RS-232C Interface Cable (KB-RS1 : PC1000S)

Holster (C-CDH)

Spare fuse (250V / 0.5A) 1

Spare fuse (250V / 12A) 1

(contained in the rear case)

MEMO

Options : Carrying case C-CD
Clamp probe CL-20D, CL-22AD, CL33DC
Temperature probe T-300PC

Safety : Designed to Protection Class II requirement of IEC 1010-1.
(Max. 1000VDC, 750VAC overvoltage category II)
(Max. DC · AC600V overvoltage category III)

EMC : EN50082-1 (IEC 801-2, 3, 4)

Installation Category(Overvoltage Category) II : Local Level
Appliances
Portable Equipment
Installation Category(Overvoltage Category) III : Distribution Level
Fixed Installation