

## GENERAL CATALOG

Digital Multimeter, Clamp Meter, Insulation Resistance Tester, Analog Multimeter, Various Instruments, Accessories

Distributed by

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

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Digital Multimeter

Clamp Meter, Insulation Resistance Tester

Analog Multitester

Various Instruments

Accessories

# PC20/LAN

PC20/LAN allows for the centralized control of digital multimeter on the LAN by a PC.



## PC20 / LAN adds comfort to the measurement environment.

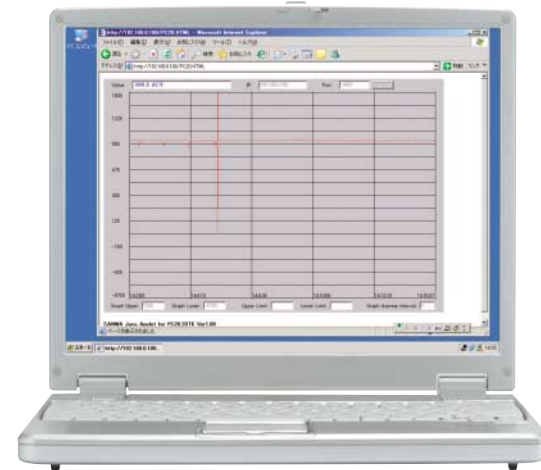
The PC20 / LAN is an economical package product that includes, digital multimeter "PC20", Ethernet adapter "KB-LAN", and software "PC LINK PLUS". This complete set allows the digital multimeter "PC20" to be used on an Ethernet LAN. PC20 / LAN revolutionizes your measurement environment.

## LAN operations support extensive measurement environments.

LAN is a network connected to terminals of PCs and printers in a same building via UTP cables so as to allow for the sending, receiving and sharing of data. As LANs are constructed in ordinary homes today, not to mention offices, factories, and educational institutes such as universities, environments that allow for monitoring of measurement results at remote places are essential. PC20 / LAN can be used over the Ethernet (on the LAN) to support the measurement environment in the network era.

### When connected to the LAN:

When a digital multimeter (PC series) is directly connected to a PC using a RS232C / USB cable, the distance between measuring and monitoring places is limited (approximately 15 to 13m). In the meanwhile, in an environment where a LAN is established, measurement results can be monitored and recorded from every PC on the LAN.

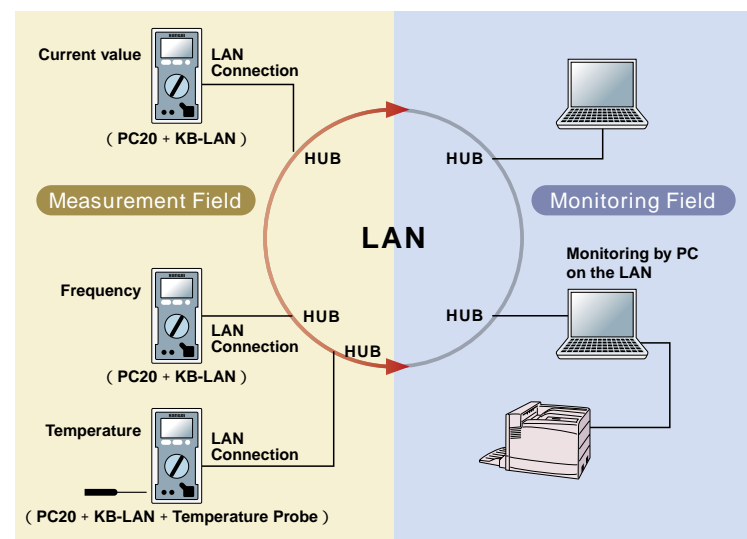


Screen viewed from web browser \* English version is also available.

## You can monitor the measurement environment on your web browser.

TCP / IP is a collection of protocols (rules and procedures) for communication on the Internet and LAN. Each PC is given an individual address (e.g. 192.168.0.1) on the LAN. An address number is also given to a digital multimeter, which is recognized as one of the terminals on the LAN. When this address is typed in the address bar on the web browser (IE, etc.) introduced to your PC, the measurement results can be monitored from each PC on the LAN.

\* An IP address can be obtained by automatic acquisition or by manual setting.  
\* For data saving, PC Link Plus is required (sold separately).  
\* You can customize the Web screen in an environment that allows for Java programming.



Example of PC20+KB-LAN Connection

### PC20 / LAN (Package Product)

- PC20 • Test Lead (TL-21)
- KB-LAN (LAN Adapter)
- AC Adapter for KB-LAN
- CL-11 (Clip Adapter) • Instruction Manual



### KB-LAN

- KB-LAN (LAN Adapter)
- AC Adapter for LAN Adapter
- Instruction Manual

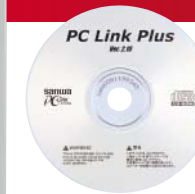


# PC Link System

Enhanced operation efficiency by means of data retrieval software, PC Link Plus, which can handle measurements for up to a maximum of 8 channels.



Example of PC Link Plus screen



A wide variety of applications ranging from business and educational institutions to personal users.



The PC Link system is the software dedicated to a PC for retrieving data outputted from a SANWA digital multimeter (PC series). The operation screen displays graphs in real time to allow you to check changes in measured values (voltage, current, etc.) with ease. Measured data can be saved on a CSV file, so it is easily processed on Excel. The ease of use in a variety of applications from data retrieval, processing and analysis holds this system in high esteem, resulting in its extensive acceptance for business, education and personal use.

Applicable Models PC20, PC500, PC510, PC520M, PC5000

PC Link Plus  
Max 8 Channels

PC Link  
Single Channel

## Flexible support for diversified environments

A digital multimeter set at a certain measuring point concurrently monitors and measures various factors such as voltage, current and frequency on up to 8 channels (with the use of PC Link Plus). RS232C, USB or LAN cable can be used to allow flexible connection between a digital multimeter and a PC. Concurrent measurements can be made even in an environment with various interfaces mixed.

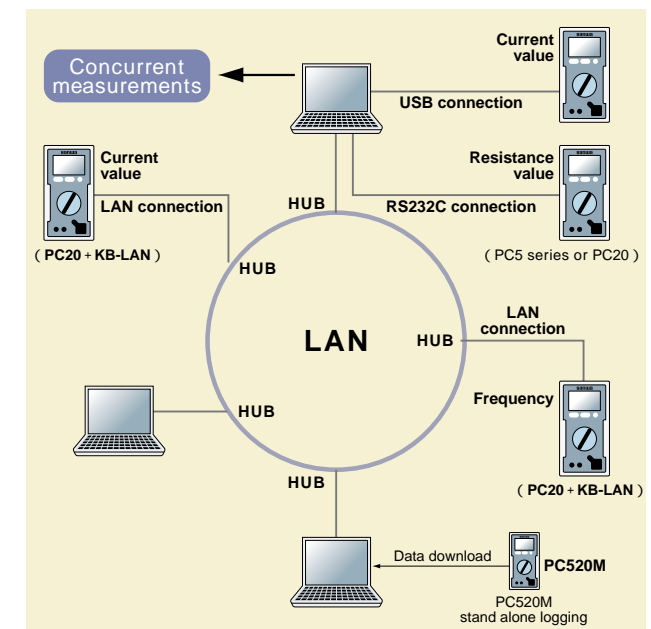
\* PC connecting cable is available as an option.

### Major features:

- Automatically detects a port connected with a digital multimeter (except the case of LAN connection).
- The retrieval interval can be set from 1 second.
- Allows viewing the previous screen while retrieving data.
- Allows automatic retrieval by schedule setting.
- Allows data saving in a CSV format with the date and time appended.
- The Y axis of a graph can be divided into 10.
- Allows automatic e-mail transmission attached with measurement data (Outlook Express Ver.6 and higher)
- Allows data import to Excel in up to 65,536 lines.

### PC Link Plus operating environment

OS : Windows98 / 98SE / ME / 2000 / XP  
\* KB-LAN (LAN adapter) can be used only with Windows2000 / XP. WindowsNT4.0 is not supported.  
CPU : Pentium • 450MHz or better  
Memory : 128MB or better (for 8 channels logging)  
Resolution : 800 x 600 or above



The latest version of PC Link Plus is Ver2.10. (March, 2005)  
Free version-up service is available in our website.

<http://www.sanwa-meter.co.jp/>

### Optional accessories for PC Link products



# Digital Multimeters

## What is Digital Multimeter?

A digital multimeter is a convenient measuring instrument that allows by itself the measurement of DC voltage, AC voltage, DC current, AC current and resistance( Pocket type DMM normally cannot be used for the measurement of current for safety reasons ). In addition to these basic measuring functions, most models are provided with features such as a diode test function and continuity buzzer. Some of recent products feature the measurement of frequency and capacitor capacity. Some have added functions of maximum and minimum value hold and relative value measurement as well as data hold and range hold functions. The advent of DMMs( PC series )connectable to a PC makes it possible to let a PC assume the function of expensive recording meters and recorders.

## Advantages of digital multimeters( DMMs )

1. Highly accurate measurement. Higher accuracy( 1% or less )compared with an analog multimeter( approximately 3% ).
2. Reduced measuring loss due to high internal impedance( low voltage drop between terminals ).
3. No reading error. No parallax error and reading error by a user as occurs with an analog multimeter.

## Four key points in choosing a suitable model

### 1. What are the necessary measuring functions?

Choose the necessary functions, except voltage and resistance measurement.( including need for the measurement of current( 400mA, 10A, 12A, 20A ), capacitor, frequency, temperature and measurement of 4-20mA, etc. )

### 2. Other necessary functions

Functions required differ depending on where the measurement is taken.

- 1 ) To record measured values concurrently with the process of measurement  
To fix data by the data hold function.  
To secure the test lead in the holster.
- 2 ) To check changes in measured values  
Measurement of maximum values, minimum values, and relative values.

### 3. For measurements of waveforms of non-sine waves, choose a model supporting measurements by RMS values.

In measuring distorted sine and non-sine waves( square wave, triangular wave, pulse ), significant errors occur in measurement by models making measurements by mean values.

#### There are two types of RMS values.

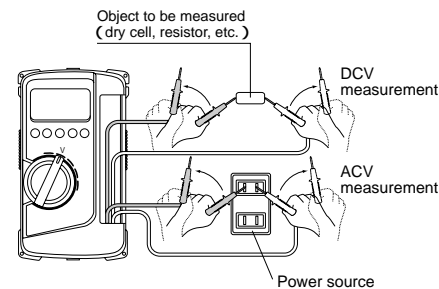
AC-Coupled true RMS value: Adapted to measurements of distorted sine and non-sine waves of the AC  
AC + DC-coupled true RMS value: Adapted to measurements of waveform containing a DC component.

### 4. Other functions

There are other types including a function to transfer data during measurement to a PC in real time and a function to record measured data in a built-in memory. To transfer data to a PC, optional connecting cables and data retrieval software( PC Link or PC Link Plus ) are required in addition to a DMM of PC series.

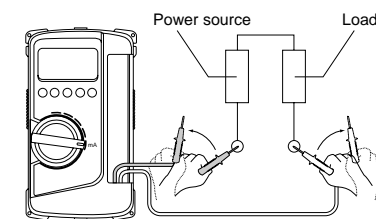
## Measurement

### Voltage, Resistance measurement



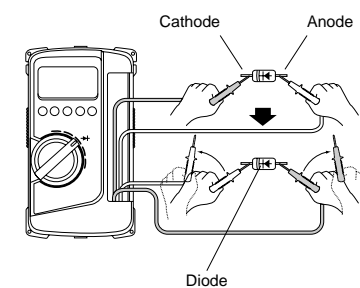
In making measurements, connect your DMM in parallel with an object to be measured. Do not apply signals exceeding the maximum rated input voltage.

### Current measurement



In making measurements, connect your DMM in series with an object to be measured. Do not apply signals exceeding the maximum rated input current.

### Diode test



When the black test lead is connected to the cathode side of the diode and the red test lead to the anode side, the forward voltage can be measured. In contrast, if the black test lead is connected to the anode side of the diode and the red test lead to the cathode side, the reverse voltage can be measured and "OL" display appears.

## High accuracy & high resolution( PC Link )

### PC5000



50000 & 500000 Count

4-4 / 5 digits 50000 count  
( Selectable 5-4 / 5 digits 500000 count for DCV & Hz )  
0.03% best accuracy  
AC / AC + DC True RMS  
Fast speed bar graph  
Capacitance measurement( 5000 count )  
Not suitable for measurement of condensers with large leak current.  
4-20mA% measurement  
dBm 20 selectable reference impedance  
Line frequency( AC sine wave )measurement  
Logic frequency measurement  
Duty cycle measurement  
Capture( peak hold ) 0.8ms in duration  
MAX, MIN, MAX-MIN recording mode  
Peak hold  
Data hold, Range hold  
Relative value  
Auto power off( 17min. X cancelable )  
Alarm for improper test lead insertion to current terminal  
Protective holster with wall hanger and lead holder  
Tilt stand  
Optical link RS232C / USB interface( optional )

**Display** : numeral display 50000 & 500000 selectable  
Bar graph 52 segments  
**Sampling rate** : 5 times / sec. for 50000 count numeral display , 1.25 times / sec. for 500000 count numeral display 60 times / sec. for bar graph  
**Bandwidth** : V : 45Hz - 1kHz, 1kHz - 20kHz( below 500V ),  
A : 45Hz - 1kHz  
**Safety** : IEC61010-1( EN61010-1 ) 2001-02 CAT. 600V  
Max. / CAT. 1000V Max.  
**Battery life** : Approx. 120h( alkaline battery )at DCV range



Function	Measuring range	Best accuracy	Resolution	Input impedance
DCV	500m/5/50/500/1000V	±( 0.03%+2 )	0.01mV	10M
ACV	500m/5/50/500/1000V	±( 0.8%+60 )	0.01mV	
DCA	500µ/5m/50m/500m/5/10A	±( 0.1%+20 )	0.01µA	
ACA	500µ/5m/50m/500m/5/10A	±( 1.0%+40 )	0.01µA	
Resistance	500/5k/50k/500k/5M/50M	±( 0.2%+6 )	0.01	
Capacitance	50n/500n/5µ/50µ/500µ/9999µF	±( 0.8%+3 )	0.01nF	
Frequency	5Hz - 200kHz	±( 0.002%+4 )	0.0001Hz	
Logic frequency	5Hz - 2MHz	±( 0.002%+4 )	0.0001Hz	
Duty cycle	0.1% - 99.99%	±( 3d / kHz+2 )		
dBm	-11.76dBm - 54.25dBm at 600	±( 0.25dB+2 )		
4 - 20mA%	4mA=0%, 20mA=100%	±25d	0.01%	
Continuity	Buzzer sounds at between 20 and 200 . Open voltage : approx. 3V			
Diode test	Open voltage : approx. 3.5V			

### Optional accessories

Software : PC Link , PC Link Plus  
Optical PC link cable : KB-RS2 , KB-USB2  
Clamp probe : CL124, CL140, CL-20D, CL-22AD, CL33DC  
Temperature probe : T-300PC( PC Link software will be necessary to use. )  
Test lead : TL-21M  
Carrying case : C-CD

## High accuracy & built-in memory( PC Link )

### PC520M



43,000 points data logging in built-in memory

3-4 / 5 digits 5000 count  
0.08% best accuracy AC True RMS  
Fast speed bar graph  
Capacitance measurement  
Not suitable for measurement of condensers with large leak current.  
K type temperature -50 ~ 1000  
Optional accessory K-AD is necessary.  
K type temp. sensor K-250PC is included as a standard accessory.  
Frequency measurement( AC sine wave only )  
Data hold / Range hold  
Auto power off( 17min. X cancelable )  
Test lead resistance zero adjustment function  
Alarm for improper test lead insertion to current terminal  
Protective holster with wall hanger and lead holder  
Tilt stand  
Optical link RS232C / USB interface( optional )

### Data Logging Mode

43,000 data points in built-in memory  
Selection of measurement interval  
0.05s/1s/20s/40s/1min/2min/4min/8min  
( DCV, ACV, DCA, ACA )  
0.2s/1s/20s/40s/1min/2min/4min/8min( , )  
0.4s/1s/20s/40s/1min/2min/4min/8min( Hz )  
Auto-standby mode during data logging to extend battery life  
Auto-stop of data logging when batteries are low to guarantee accuracy of every logged datum  
Export logged data to PC

**Display** : numeral display 5000 , bar graph 52 segments  
**Sampling rate** : 5 times / sec. , 60 times / sec. for bar graph  
**Bandwidth** : 40Hz - 20kHz( below 500V ), 40Hz - 1kHz( ACA )  
**Safety** : IEC61010-1( EN61010-1 ) 2001-02 CAT. 600V  
Max. / CAT. 1000V Max.  
**Battery life** : Approx. 150h( alkaline battery )at DCV range



Function	Measuring range	Best accuracy	Resolution	Input impedance
DCV	50m/500m/5/50/500/1000V	±( 0.08%+2 )	0.01mV	10M
ACV	50m/500m/5/50/500/1000V	±( 0.5%+3 )	0.01mV	
DCA	500µ/5m/50m/500m/5/10A	±( 0.2%+4 )	0.1µA	
ACA	500µ/5m/50m/500m/5/10A	±( 0.6%+3 )	0.1µA	
Resistance	50/500/5k/50k/500k/5M/50M	±( 0.2%+2 )	0.01	
Capacitance	50n/500n/5µ/50µ/500µ/9999µF	±( 0.8%+3 )	0.01nF	
Temperature	-50 ~ 1000 ( thermocouple K type )	±( 0.3%+3 )	1	
Frequency	5Hz - 125kHz	±( 0.01%+2 )	0.001Hz	
Continuity	Buzzer sounds at between 20 and 120 . Open voltage : approx. 3V			
Diode test	Open voltage : approx. 3.5V			

### Optional accessories

Software : PC Link, PC Link Plus  
Optical PC link cable : KB-RS2, KB-USB2  
Clamp probe : CL124, CL140, CL-20D, CL-22AD, CL33DC  
Temperature probe : T-300PC( PC Link software will be necessary to use. )  
K-8-250 - 800  
K type adapter : K-AD  
Test lead : TL-21M  
Carrying case : C-CD



ALL-IN-ONE DMM



CD800a

**Tough body cover**  
 3-3 / 4 digits 4000 count  
 0.7% best accuracy  
 Capacitance measurement  
 Not suitable for measurement of condensers with large leak current.  
 Frequency measurement( AC sine wave only )  
 Data hold / Range hold  
 Relative value  
 Auto power off( 30min. X cancelable )  
 Low power ohm( input voltage 0.4V )at continuity range

Solid & protective body cover that can also be used as a tilt stand  
 Chip holder behind the body cover

**Display** : numeral display 4000  
**Sampling rate** : 2 times / sec.  
**Bandwidth** : 40 ~ 400Hz  
**Safety** : IEC61010-1 CAT. 600V Max.



Using cover as a tilt stand



Function	Measuring range	Best accuracy	Resolution	Input impedance
DCV	400m/4/40/400/600V	±( 0.7%+3 )	0.1mV	10M ~ 100M
ACV	4/40/400/600V	±( 1.6%+9 )	0.001V	
DCA	40m/400mA	±( 2.2%+5 )	0.01mA	
ACA	40m/400mA	±( 2.8%+5 )	0.01mA	
Resistance	400/4k/40k/400k/4M/40M	±( 1.5%+5 )	0.1	
Capacitance	50n/500n/5μ/50μ/100μF	±( 5%+10 )	0.01nF	
Frequency	5Hz ~ 100kHz	±( 0.5%+3 )		
Duty cycle	20% ~ 80%	±( 0.5%+5 )		
Continuity	Buzzer sounds at between 10 and 120 . Open voltage : approx. 0.4V			
Diode test	Open voltage : approx. 1.5V			
Bandwidth	40 ~ 400Hz			
Fuse / Battery	0.5A/250V 1.5kA 5.2 x 20 ceramic	R6P x 2		
Size / Weight	H176 x W104 x D46mm/approx. 340g			
Standard accessories included	Hand strap , Instruction manual			

Optional accessories

Clip adapter : CL-11, TL-8IC

Slim compact



DA-50C

**Easy to use slim body**  
 3-3 / 4 digits 4000 count  
 0.6% best accuracy  
 Fast speed bar graph  
 Frequency measurement( AC sine wave only )  
 Low power ohm( input voltage 0.4V )at continuity range

Max / Min recording measurement  
 Data hold / Range hold  
 Relative value  
 Auto power off( 30min. X cancelable )

**Display** : numeral display 3999, bar graph 40 segments  
**Sampling rate** : 2 times / sec., 20 times / sec. for bar graph  
**Bandwidth** : 45 ~ 100Hz( 400mV ), 45 ~ 500Hz( 4V and above )



Function	Measuring range	Best accuracy	Resolution	Input impedance
DCV	400m/4/40/400/600V	±( 0.6%+2 )	0.1mV	DCV: 10M ~ 100M
ACV	400m/4/40/400/600V	±( 1.4%+5 )	0.1mV	10M ~ 100M
DCA	40m/10A	±( 1.4%+2 )	0.01mA	ACV: 10M ~ 100M
ACA	40m/10A	±( 1.8%+5 )	0.01mA	10M ~ 100M
Resistance	400/4k/40k/400k/4000k/40M	±( 0.8%+2 )	0.1	
Frequency	99.99/999.9/9.999k/99.99k/999.9kHz	±( 0.3%+3 )	0.01Hz	
Continuity	Buzzer sounds at less than 40 . Open voltage : approx. 0.4V			
Diode test	Open voltage : approx. 2.2 ~ 3.3V			
Bandwidth	45 ~ 100Hz( 400mV ) 45 ~ 500Hz( higher than 4V )			
Fuse / Battery	0.5A/250V 5.2 x 20mm 10A/250V 5.2 x 20mm	R03 x 2		
Size / Weight	H145 x W82 x D30mm/approx. 200g			
Standard accessories included	Test Lead( TL-61 ), Instruction manual			

Optional accessories

Clamp probe : CL-20D, CL-22AD, CL33DC Carrying case : C-DA Clip adapter : CL-11, TL-8IC



DA32 ( with carrying case )

**Easy to carry portable case attached**  
 3-3 / 4 digits 3200 count  
 0.5% best accuracy  
 Fast speed bar graph  
 Micro-current range 320~3200μA  
 Data hold / Range hold  
 Auto power off( 10min. X cancelable )  
 Carrying case attached  
 Safety cap for the 10A terminal

**Display** : numeral display 3999, bar graph 40 segments  
**Sampling rate** : 2 times / sec., 20 times / sec. for bar graph  
**Bandwidth** : 40 ~ 400Hz



Function	Measuring range	Best accuracy	Resolution	Input impedance
DCV	320m/3.2/32/320/600V	±( 0.5%+2 )	0.1mV	DCV: 10M ~ 100M
ACV	3.2/32/320/600V	±( 1.2%+4 )	0.1mV	10M ~ 100M
DCA	320μ/3200μ/32m/320m/10A	±( 1.4%+2 )	0.01mA	ACV: 10M ~ 100M
ACA	320μ/3200μ/32m/320m/10A	±( 1.8%+5 )	0.01mA	10M ~ 100M
Resistance	320/3.2k/32k/320k/3200k/30M	±( 1.2%+3 )	0.1	
Continuity	Buzzer sounds at approx. 20 . Open voltage : approx. 1.3V			
Diode test	Open voltage : approx. 3V			
Bandwidth	40 ~ 400Hz			
Fuse / Battery	0.5A/250V 5.2 x 20mm 10A/250V 6.5 x 30mm	R03 x 2		
Size / Weight	H145 x W82 x D30mm/approx. 200g			
Standard accessories included	Test lead( TL-61 ), Carrying case( C-DA32 ), Instruction manual			

Optional accessories

Clamp probe : CL-20D, CL-22AD, CL33DC Clip adapter : CL-11, TL-8IC

Safety Multimeter



CD750P

**Full-range 750V overload protection circuit**  
 3-3 / 4 digits 4000 count  
 Giving priority to the safety  
 750V high overload protection circuit is equipped.  
 1000V withstand fuse is installed.  
 3 terminals with cover design to ensure safety.  
 With carrying case to store test leads

**Display** : numeral display 4000  
**Sampling rate** : 2 times / sec.  
**Bandwidth** : 40 ~ 500Hz  
**Safety** : IEC61010-1 CAT.III 600V Max. / CAT.II DC1000V, AC750V Max.



Function	Measuring range	Best accuracy	Resolution	Input impedance
DCV	400m/4/40/400/1000V	±( 0.7%rdg+5dgt )	0.1mV	DCV: 10M ~ 100M
ACV	4/40/400/750V	±( 1.6%rdg+9dgt )	0.001V	10M ~ 100M
Resistance	400/4k/40k/4M/40M	±( 1.5%rdg+10dgt )	0.1	ACV: 10M ~ 11M
Continuity	Buzzer sounds at less than 10 ~ 200 . Open voltage : approx. 0.4V			
Diode Test	Open voltage : approx. 1.5V			
Bandwidth	40 ~ 500Hz			
Fuse / Battery	0.44A / 1000V IR10kA 10X35mm ( DMM-B44 / 100 Bussmann, Inc. )	R03 x 2		
Size / Weight	H157.5 X W70 X D38.5mm / 220g			
Standard accessories included	Test lead( TL-122 ), Carrying case( C-NH7 ), Instruction manual			

Optional accessories

Clamp probe : CL-20D, CL-22AD, CL33DC High voltage probe : HV-60

Pocket type



PM10

**Tough but compact DMM**  
 3-3 / 4 digits 3200 count  
 0.8% best accuracy  
 Analog bar graph  
 Compact storage of test leads  
 Test lead can be snapped into a fixed position atop the case.

**Display** : numeral display 3200, bar graph 32 segments  
**Sampling rate** : 2 times / sec., 12 times / sec. for bar graph  
**Bandwidth** : 45 ~ 400Hz  
**Safety** : IEC61010-1 CAT. 300V Max. / CAT. 500V Max.



Function	Measuring range	Best accuracy	Resolution	Input impedance
DCV	320m/3.2/32/320/500V	±( 0.8%+4 )	0.1mV	DCV: 10M ~ 100M
ACV	3.2/32/320/500V	±( 2.3%+8 )	0.001V	10M ~ 100M
Resistance	320/3.2k/32k/320k/3.2M/30M	±( 2.0%+4 )	0.1	ACV: 10M ~ 11M
Continuity	Buzzer sounds at less than 20 . Open voltage : approx. 1.3V			
Diode test	Open voltage : approx. 3V			
Bandwidth	45 ~ 400Hz			
Battery	Button battery LR-44 x 2			
Size / Weight	H117 x W76 x D18mm/approx. 110g			
Standard accessories included	Instruction manual			

Optional accessories

Clip adapter : CL-13

PM3

**8.5mm thick body with multi-function**  
 3-3 / 4 digits 4000 count  
 0.7% best accuracy  
 Capacitance measurement  
 Not suitable for measurement of condensers with large leak current.  
 Frequency measurement( AC sine wave only )  
 Duty cycle  
 Data hold  
 Relative value  
 Auto power off( 15min. X cancelable )

**Display** : numeral display 4000  
**Sampling rate** : 3 times / sec.  
**Bandwidth** : 40 ~ 400Hz  
**Safety** : IEC61010-1 CAT. DC AC500V Max.



Function	Measuring range	Best accuracy	Resolution	Input impedance
DCV	400m/4/40/400/500V	±( 0.7%+3 )	0.1mV	DCV: 10M ~ 100M
ACV	4/40/400/500V	±( 2.3%+10 )	0.001V	10M ~ 100M
Resistance	400/4k/40k/400k/4M/40M	±( 2.0%+5 )	0.1	ACV: 10M ~ 11M
Capacitance	4n/40n/400n/4μ/40μ/200μF	±( 5.0%+10 )	0.001nF	
Frequency	9.999/99.999/999.9/9.99k/60.00kHz	±( 0.7%+5 )	0.1	
Duty Cycle	0.1 ~ 99%			
Continuity	Buzzer sounds at less than 10 ~ 120 . Open voltage : approx. 0.4V			
Diode Test	Open voltage : approx. 1.5V			
Bandwidth	40 ~ 400Hz			
Battery	Coin type lithium battery CR2032( 3V ) x 1			
Size / Weight	H108 x W56 x D11.5mm/approx. 85g			
Standard accessories included	Case holder( C-PM3 ), Instruction manual			

Optional accessories

Clip adapter : CL-13



PM7a

**Updated longtime seller**  
 3-3 / 4 digits 4000 count  
 0.7% best accuracy  
 Range hold  
 Auto power off( 15min. )  
 Low power ohm( input voltage 0.4V )at continuity range  
 Power saving design

**Display** : numeral display 4000  
**Sampling rate** : 3 times / sec.  
**Bandwidth** : 40 ~ 400Hz



Function	Measuring range	Best accuracy	Resolution	Input impedance
DCV	400m/4/40/400/500V	±( 0.7%+3 )	0.1mV	DCV: 10M ~ 100M
ACV	4/40/400/500V	±( 2.3%+10 )	0.001V	10M ~ 100M
Resistance	400/4k/40k/400k/4M/40M	±( 2.0%+5 )	0.1	ACV: 10M ~ 11M
Continuity	Buzzer sounds at less than 10 ~ 120 . Open voltage : 0.4V			
Diode test	Open voltage : approx. 1.5V			
Bandwidth	40 ~ 400Hz			
Battery	Button battery LR-44 x 2			
Size / Weight	H115 x W57 x D18mm/approx. 85g			
Standard accessories included	Instruction manual			

Optional accessories

Clip adapter : CL-11, TL-8IC



PS8a

**Solar charge battery DMM**  
 3-3 / 4 digits 4000 count  
 0.7% best accuracy  
 Range hold  
 Auto power off( 15min. )  
 Low power ohm( input voltage 0.4V )at continuity range  
 Power saving design

**Display** : numeral display 4000  
**Sampling rate** : 3 times / sec.  
**Bandwidth** : 40 ~ 400Hz



Function	Measuring range	Best accuracy	Resolution	Input impedance
DCV	400m/4/40/400/500V	±( 0.7%+3 )	0.1mV	DCV: 10M ~ 100M
ACV	4/40/400/500V	±( 2.3%+5 )	0.001V	10M ~ 100M
Resistance	400/4k/40k/400k/4M/40M	±( 2.0%+5 )	0.1	ACV: 10M ~ 11M
Continuity	Buzzer sounds at less than 10 ~ 120 . Open voltage : 0.4V			
Diode test	Open voltage : approx. 1.5V			
Bandwidth	40 ~ 400Hz			
Battery	Amorphous solar battery + manganese dioxide lithium secondary battery			
Size / Weight	H115 x W57 x D18mm/approx. 85g			
Standard accessories included	Instruction manual			

Optional accessories

Clip adapter : CL-11, TL-8IC



# Clamp meters

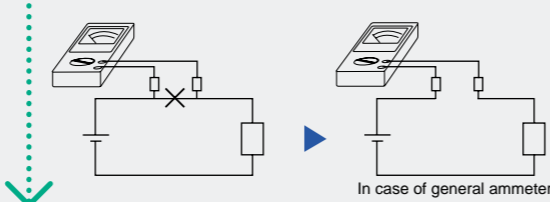
## What is Clamp Meter?

Clamp meters are convenient measuring instruments that allow the measurement of current simply by clamping a wire while being energized without cutting a circuit. In cases of measurement by a multimeter and digital multimeter, the circuit must be cut to measure current. In contrast, with a clamp meter, current can be measured simply by clamping a live wire over its sheath. In addition to its simple operation, it allows safe measurement of a higher current ( Use a type for higher current measurement such as DCM2000AD ) since it is not directly connected to the circuit.

Like a multimeter and insulation resistance tester, there are analog and digital types of clamp meters. The measuring range is typically about 20A to 200A or 400A both for DC and AC. As a special type, there are products allowing for the measurement of a higher current of 2,000A. Some types are also available to allow measurements of fine current of few milliamps for the purpose of detecting leakage current. Others allow the measurement by true RMS values for measurement of current of distorted AC waveforms other than of sine waves, for inverter power supply and switching power supply.

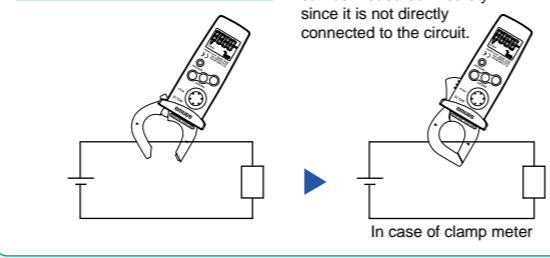
### Measurement by multimeter

Cut the wiring on the circuit and connect a multimeter in series with the circuit.



### Measurement by clamp meter

Simply clamp the wiring, and current can be measured in safety since it is not directly connected to the circuit.



## Four key points in choosing a suitable model

### 1. What are objects to be measured?

Models to be chosen differ depending on what you intend to measure, AC current, DC current or leakage current.

### 2. Measurable conductor sizes

A wide range of sizes are available from 21mm to 53mm in diameter according to measurable conductor sizes and measuring places.

### 3. Is true RMS measurement required?

A clamp meter of the mean-value type cannot provide accurate results in the measurement of an inverter circuit and a motor circuit having many distortions. To make measurements for such circuits, a clamp meter of the true RMS type is required.

### 4. Other functions

Other types are available featuring a tester function and recorder output function in addition to current measurement.

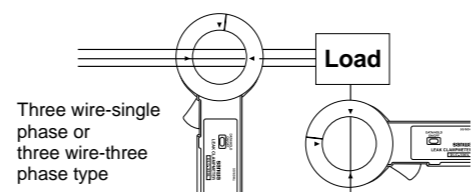
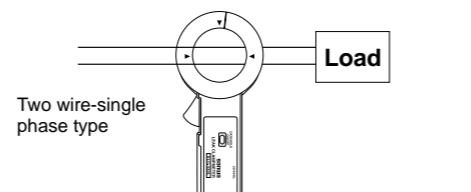
## True RMS measurement

A clamp meter of the mean value type detects the mean value of sine waves in AC measurement, multiplies the value 1.11 times ( sine wave AC ) and indicates it as the effective value. It even indicates the waveform of a distorted wave and the non-sine wave with different form factors in values multiplied 1.11 times, so indication errors occur as a result. For these measurements, use a clamp meter of the true RMS type that detects and indicates the true RMS value itself. DCL20R ( digital )

## Measurement of leakage current

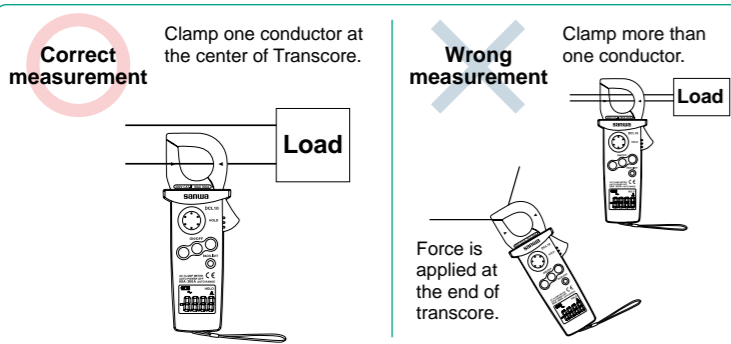
Unlike ordinary current measurement, it is required to clamp all two wires ( two wire-single phase ) or three wires ( three wire-single phase or three wire-three phase ) for measuring leakage current. The earthing wire also can be measured.

### Measurement by clamp meter



## Measuring method by clamp meter

For measuring current using a clamp meter, clamp one conductor ( wire ) to be measured. If two wires ( parallel lines ) are clamped, current measurement cannot be made. Take a measurement at the center of the clamped portion to minimize measuring errors. A line separator is conveniently used in measuring the consumption current of home electric appliances. There are line separators that can amplify measured current 10 times to allow measurement by amplifying current lower than 1A. When DC current ( DCA ) is measured using a clamp meter for DC current, the current is indicated in a negative value ( - ) when the direction of the current is reversed. By using this function, you can know whether your car battery is at the state of charge or discharge.



AC

CE



## DCL10 (with carrying pouch) NEW

ACA mini clamp meter with backlight

Slim core for narrow space  
Backlight  
Marks to make sure the object is properly clamped  
Data hold  
Auto power off (30min.)

Sampling rate : 2 times / sec.  
Bandwidth : 45 ~ 400Hz  
Safety : IEC61010-1( EN61010-1 )2001-02 CAT. 300V Max. / CAT. 600V

Max 300A AP OFF DATA HOLD BACK LIGHT

Function	Measuring range	Best accuracy	Resolution
ACA	60/300A	± (1.5%+5)	0.01A
Bandwidth	45 ~ 400Hz		
Display	6000		
Clamp diameter/Conductor size	25mm/10×25mm		
Withstand voltage	Less than 3700Vrms		
Battery	R03×2		
Size / Weight	H145×W54×D28mm/approx. 120g		
Standard accessories included	Carrying pouch (C-DCL10), Instruction manual		

CE



## DCM60L (with case)

Low cost & DMM functions

Measurable AC 0.1A ~ 600A  
ACV & Resistance measurement  
Small design & easy to carry  
Data hold  
Continuity check buzzer

Sampling rate : 2 times / sec.  
Bandwidth : 50 ~ 500Hz  
Safety : IEC61010-1( EN61010-1 )2001-02 CAT. 300V Max. / CAT. 600V

### Optional accessories

Clip adapter : CL-11, TL-8IC

Max 600A DATA HOLD DCV

Function	Measuring range	Best accuracy	Resolution
ACA	200/600A	± (2.0%+5) ( 50 ~ 60Hz ) ± (2.9%+5) ( 60 ~ 500Hz )	0.1A
ACV	200/600V	± (1.5%+5) ( 50 ~ 500Hz )	0.1V
Resistance	200	± (1.9%+3)	0.1
Continuity	Buzzer sounds at less than approx. 100 . Open voltage: approx. 1.6V		
Bandwidth	50 ~ 500Hz		
Display	1999		
Clamp diameter/Conductor size	21mm/10×30mm		
Withstand voltage	Less than 3700Vrms		
Battery	R03×2		
Size / Weight	H187×W50×D29mm/approx. 210g		
Standard accessories included	Test lead (TL-88), Carrying case (C-DCM60), Instruction manual		

CE



## DCM400

Low cost & DMM functions

4000 count / 42 segment analog bar graph  
Frequency measurement by clamping and using test lead  
Data hold  
Continuity check buzzer  
Auto power off (30min.)  
Low battery power indication

Sampling rate : 2 times / sec. for numeral display  
Bandwidth : 50 ~ 60Hz ( ACA : 1.9% ± 5 ), 60 ~ 500Hz ( ACA : 2.5% ± 5 ), 50 ~ 500Hz ( ACV )

Safety : IEC61010-1( EN61010-1 )2001-02 CAT. 300V. / CAT. 600V

### Optional accessories

Clip adapter : CL-11, TL-8IC

Max 400A Hz DATA HOLD DCV

Function	Measuring range	Best accuracy	Resolution
ACA	40/400A	± (1.9%+5)	0.01A
ACV	400/600V	± (1.5%+5)	0.1V
DCV	400/600V	± (1%+2)	0.1V
Resistance	400	± (1%+2)	0.1
Frequency ( A )	20 ~ 4k/10kHz	± (0.1%+1)	0.01Hz
Frequency ( V )	4k/40k/400k/1MHz		0.01kHz
Continuity	Buzzer sounds at less than approx. 40 . Open voltage : approx. 1.5V		
Bandwidth	50 ~ 60Hz ( ACA : 1.9% ± 5 ) 60 ~ 500Hz ( ACA : 2.5% ± 5 ), 50 ~ 500Hz ( ACV : 1.5 ± 5 )		
Display	4000		
Clamp diameter/Conductor size	25mm/10×34mm		
Withstand voltage	Less than 3700Vrms		
Battery	R03×2		
Size / Weight	H193×W50×D28mm/approx. 230g		
Standard accessories included	Test lead (TL-88), Carrying case (C-DCM400), Instruction manual		

CE



## DCM2000 (with case)

AC current 2000A & DMM functions

AC current measurement up to 2000A  
Auto power off (10 min.)  
Data hold

Display : numeral display 1999  
Sampling rate : 2 times / sec.  
Bandwidth : 50 / 60Hz  
Safety : IEC1010-2 CAT.III 600V Max.

### Optional accessories

Clip adapter : CL-11, TL-8IC, CL-15  
Test lead : TL-21M

Max 200A AP OFF DATA HOLD RNG HOLD DCV

Function	Measuring range	Best accuracy	Resolution
ACA	20/200/2000A	± (1.2%rdg+8dgt)	
ACV	2/20/200/600V	± (1.2%rdg+8dgt)	
DCV	2/20/200/600V	± (0.7%rdg+5dgt)	
Resistance	200/2k/20k/200k/2000k/20M	± (1.2%rdg+5dgt)	
Bandwidth	50/60Hz		
Battery	R03×2		
Size / Weight	H240×W85×D34mm/350g		
Standard accessories included	Test lead (TL-21), Carrying case (C-DCM2000), Instruction manual		

**Analog Type**



**CAM600S**(with case)  
 AC600A, AMT functions  
 AC current measurable max. 600A  
 Long analog pointer with "pointer lock" function  
 Temperature measurement with optional probe

**Display** : Analog pointer  
**Bandwidth** : 50 / 60Hz  
**Safety** : IEC61010-1(EN61010-1)2001-02 CAT. 600V

**Optional accessories**  
 Temperature probe : T-THP  
 Clip adapter : CL-11, TL-8IC, CL-15  
 Test lead : TL-21M

Function	Measuring range	Accuracy
ACA	6/15/60/150/600A	±3% of full scale*
ACV	150/300/600V	±3% of full scale
DCV	60V	±3% of full scale
Resistance	1k/100k	3% of arc
Temperature	-10 ~ +200 ( optional probe "T-THP" is necessary )	

Bandwidth	50/60Hz
Clamp diameter/Conductor size	36mm/10 x 50mm
Withstand voltage	5550VAC
Battery	R03 x 1
Size / Weight	H221 x W97 x D43mm/420g
Standard accessories included	Test lead( TL-21 ), Carrying case( C-CAM6 ), Instruction manual

\*4% in 300 ~ 600A

**DC / AC**



**DCM400AD**(with case)  
 Suitable for automotive maintenance & DMM functions  
 4000 count / 42 segment analog bar graph  
 DC / AC current 40A/400A  
 Data hold / Range hold  
 Relative value  
 Continuity check buzzer  
 Auto power off( 30min. )  
 Low battery power indication

**Display** : numeral display 3999, bar graph 42 segments  
**Sampling rate** : 2 times / sec. 12 times / sec. for bar graph  
**Bandwidth** : 50 ~ 500Hz  
**Safety** : IEC61010-1(EN61010-1)2001-02 CAT. 300V / CAT. 600V

**Optional accessories**  
 Clip adapter : CL-11, TL-8IC

Function	Measuring range	Best accuracy	Resolution
ACA	40/400A	±( 2%+10 )	0.01A
DCA	40/400A	±( 2.5%+10 )	0.01A
ACV	400/600V	±( 1.5%+5 )	0.1V
DCV	400/600V	±( 1%+2 )	0.1V
Resistance	400	±( 1%+2 )	0.1
Continuity	Buzzer sounds at less than approx. 40 . Open voltage : approx. 1.5V		

Bandwidth	50 ~ 500Hz
Display	4000
Clamp diameter/Conductor size	25mm/10 x 34mm
Withstand voltage	Less than 3700Vrms
Battery	LR03 x 2
Size / Weight	H193 x W50 x D28mm/approx. 230g
Standard accessories included	Test lead( TL-88 ), Carrying case( C-DCM400 ), Instruction manual

**DCM-22AD**(with case)  
 DC / AC compact type & DMM functions  
 DC / AC current measurable max. 200A  
 Continuity check buzzer  
 Data hold  
 Slim core for narrow space

**Display** : numeral display 1999  
**Sampling rate** : 2 times / sec. for numeral display  
**Bandwidth** : 40 ~ 400Hz( ACA ), 40 ~ 500Hz( ACV )

**Optional accessories**  
 Clip adapter : CL-11, TL-8IC

Function	Measuring range	Best accuracy	Resolution
ACA	20/200A	±( 2%+5 )	0.01A
DCA	20/200A	±( 2%+2 )	0.01A
ACV	2/20/200/500V	±( 2%+5 )	0.001V
DCV	2/20/200/500V	±( 1.5%+2 )	0.001V
Resistance	2k/20k/200k/2000k	±( 2%+5 )	0.001k
Continuity	Buzzer sounds at less than approx. 400 . Open voltage : approx. 0.43V		

Bandwidth	40 ~ 400Hz( ACA ), 40 ~ 500Hz( ACV )
Display	1999
Clamp diameter/Conductor size	22mm/10 x 21mm
Withstand voltage	2000VAC
Battery	R03 x 2
Size / Weight	H179 x W56 x D26.5mm/140g
Standard accessories included	Test lead( TL-61 ), Carrying case( C-CL ), Instruction manual

**DCM2000AD**(with case)  
 DC / AC current measurable max. 2000A & DMM functions  
 DC / AC current measurable max. 2000A  
 Auto power off( 10min. )  
 Data hold / Range hold

**Display** : numeral display 4000  
**Sampling rate** : 2 times / sec.  
**Bandwidth** : 50 / 60Hz  
**Safety** : IEC61010-1(EN61010-1)2001-02 CAT. 600V Max.

**Optional accessories**  
 Clip adapter : CL-11, TL-8IC, CL-15  
 Test lead : TL-21M

Function	Measuring range	Best accuracy	Resolution
ACA	40/400/2000A	±( 1.5%+8 )	0.01A
DCA	40/400/2000A	±( 1.5%+8 )	0.01A
ACV	400m/4/40/400/600V	±( 1.2%+8 )	0.1mV
DCV	400m/4/40/400/600V	±( 1.2%+8 )	0.1V
Resistance	400/4k/40k/400k/4000k/40M	±( 1.5%+8 )	0.1
Frequency	100/1k/10k/100k/1000kHz	±( 0.5%+3 )	0.1Hz
Continuity	Buzzer sounds at less than approx. 40 . Open voltage : approx. 1.5V		

Bandwidth	50/60Hz
Display	4000
Clamp diameter/Conductor size	53mm/20 x 60mm
Withstand voltage	5550VAC
Battery	R03 x 2
Size / Weight	H240 x W84 x D34mm/approx. 400g
Standard accessories included	Test lead( TL-21 ), Carrying case( C-DCM2000 ), Instruction manual

**True RMS**



**DCL20R**(with carrying pouch)  
 RMS mini clamp meter with backlight  
 True RMS  
 Slim core for narrow space  
 Backlight  
 Marks to make sure the object is properly clamped  
 Data hold  
 Auto power off( 30min. )

**Sampling rate** : 2 times / sec.  
**Bandwidth** : 45 ~ 400Hz  
**Safety** : IEC61010-1(EN61010-1)2001-02 CAT. 300V Max. / CAT. 600V

Function	Measuring range	Best accuracy	Resolution
ACA	60/300A	±( 1.9%+5 )	0.01A
Bandwidth	45 ~ 400Hz		
Display	6000		
Clamp diameter/Conductor size	25mm/10 x 25mm		
Withstand voltage	Less than 3700Vrms		
Battery	R03 x 2		
Size / Weight	H145 x W54 x D28mm/approx. 120g		
Standard accessories included	Carrying pouch( C-DCL10 ), Instruction manual		



**DCM2000R**(with case)  
 True RMS AC / DC current 2000A & DMM functions  
 AC / DC current measurement up to 2000A  
 Auto power off( 10 min. )  
 Data hold / Range hold

**Display** : numeral display 4000  
**Sampling rate** : 2 times / sec.  
**Bandwidth** : 50 / 60Hz  
**Safety** : IEC61010-2 CAT.III 600V Max.

Function	Measuring range	Best accuracy	Resolution
ACA	40/400/2000A	±( 1.5%rdg+8dgt )	
DCA	40/400/2000A	±( 1.5%rdg+8dgt )	
ACV	400m/4/40/400/600V	±( 1.2%rdg+8dgt )	
DCV	400m/4/40/400/600V	±( 1.2%rdg+8dgt )	
Resistance	400/4k/40k/400k/4000k/40M	±( 1.5%rdg+8dgt )	
Frequency	100/1k/10k/100k/1000kHz	±( 0.5%rdg+3dgt )	

Bandwidth	50/60Hz
Battery	R03 x 2
Size / Weight	H240 x W85 x D34mm/400g
Standard accessories included	Test lead (TL-21), Carrying case (C-DCM2000), Instruction manual

**Leak current**



**DLC-400A**(with case)  
 Leak current measurement, DMM functions, recorder output terminal  
 0.01mA( leakage current resolution ) to 400A  
 wide 6 ranges  
 Data hold  
 Data transfer to a recorder( output : DC200mV max. )

**Display** : numeral display 1999  
**Sampling rate** : 2 times / sec.  
**Bandwidth** : 50 / 60Hz

Function	Measuring range	Best accuracy	Resolution
ACA	20m/200m/2000m/20/200/400A	±( 1%+0.25%RNG )	0.01mA
ACV	2/20/200/600V	±( 1%+0.5%RNG )	0.001V
DCV	200m/2/20/200/600V	±( 1%+0.5%RNG )	0.1mV
Resistance	200/2k/20k/200k/2000k/20M	±( 1%+0.5%RNG )	0.1

Bandwidth	50/60Hz
Display	1999
Clamp diameter/Conductor size	38mm/10 x 40mm
Withstand voltage	2000VAC
Battery	R03 x 2
Size / Weight	H205 x W84 x D34mm/approx. 390g
Standard accessories included	Test lead( TL-61 ), Carrying case( C-LCM ), Instruction manual



**DLC-330L** (with case)  
 Leak current measurement, analog bar graph display  
 Analog bar graph  
 Leak current measurable AC30m ~ 300A, 4 ranges  
 Slim core but able to clamp max. 10 x 36mm conductor  
 Auto power off( 10min. )  
 Data hold

**Display** : numeral display 3200  
**Sampling rate** : 2 times / sec. for numeral display , 12 times / sec. for bar graph  
**Bandwidth** : 50 / 60Hz

Function	Measuring range	Best accuracy	Resolution
ACA	30m/300m/30/300A	±( 1.2%+5 )	0.01mA
Bandwidth	50/60Hz		
Display	3200		
Clamp diameter/Conductor size	32mm/10 x 36mm		
Withstand voltage	2000VAC		
Battery	LR-44( 1.5V ) x 2		
Size / Weight	H162 x W64 x D23mm/125g		
Standard accessories included	Carrying case( C-DLC330L ), Instruction manual		



# Clamp Sensors

## What is Clamp Sensor?

A clamp sensor allows the measurement of AC and DC current and fine AC current of milliamp level (leakage current) by connecting to a DMM without connecting a wire as in the case of a clamp meter. Its combined use with DMM of PC series connectable to a PC allows the recording and monitoring of the measurements on a PC of consumption current for home electric appliances and leakage current running through an earthing wire.

**Measurable current differs by models. Check it before use.**

ACA ..... **CL-20AD, CL-22AD, CL124, CL140**

DCA ..... **CL-22AD, CI-33DC**

AC Leak current ..... **CL124, CL140**

## Prior to making a measurement

The following description is given on a digital multimeter of 5000-count display type (PC520M), but it also applies to 1999-count and 3999-count display types. Check a DMM compatibly used with a clamp sensor (Refer to the information of compatible models of each product in p. 28). Values are indicated in mV, which should be read in mA by multiplying a factor for each product. Models RD700 and RD701 have a separate fixed range of 400.0mV AC / DC (high impedance 1000M) for exclusive use with an adaptor probe to give clear viewing of milli-volt display.

### e.g. When PC520M is used with CL-22AD

Fix the range at 500mV and set the clamp probe at 20 ~ 200A range. In this case, the measured value is obtained by multiplying the indicated value of the multimeter by the factor given below.

### e.g. When CL-22AD is used

DCA measurement DC500mV range

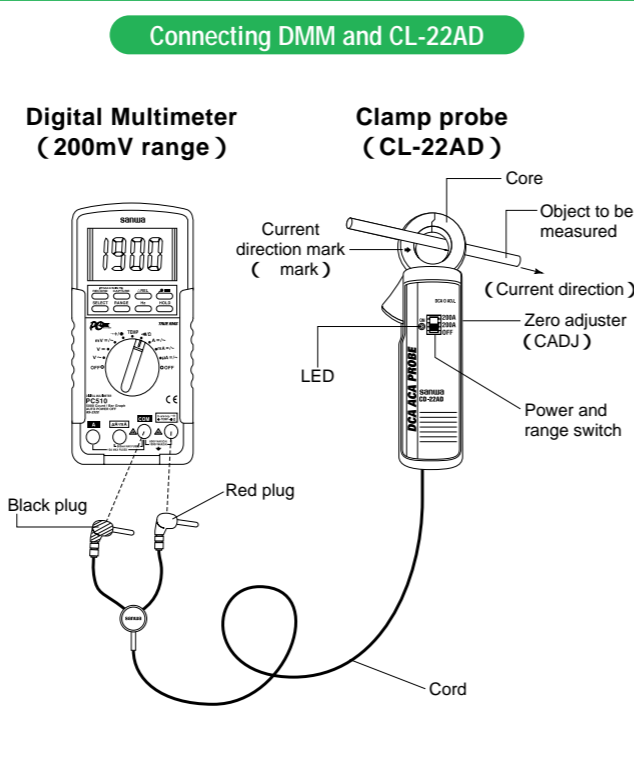
ACA measurement AC500mV range

20A range...Reading  $\times 0.1$

200A range...Reading  $\times 1$

When CL22AD is set to the 20A range, it will be measured as 1.900A if the DMM indicates 19.00mV (19.00  $\times 0.1$ ).

## Connecting DMM and CL-22AD



## Clamp Sensor



### CL140 (with case)

NEW

LEAK

Micro / leak current (AC)

No battery Length : 2m

Range	1A	Applicable digital multimeter
Resolution	1mA	PC5000 PC520M PC510 PC500 PC20 RD701 RD700 CD751 CD731 CD721 CD721NH
Measuring range	0 ~ 1000mA (1A)	
Accuracy / Frequency range	$\pm (1.0\%rdg + 0.1mV)$ (50Hz/60Hz) $\pm (2.0\%rdg + 0.1mV)$ (40Hz ~ 1kHz)	
Maximum allowable input*	200A continuous (50/60Hz)	
Output impedance	Approx. 200	
Core diameter	Approx. 40mm max.	
Size / Weight	H128 x W81 x D36mm/approx. 240g	
Standard accessories included	Carrying case (C-CL140), Instruction manual	

\* Allowable limit value in case of making an operational error, and output accuracy is not under warranty. Output voltage : AC100mV when measuring max. current.

### CL33DC (with case)

DC current

R03  $\times 2$  Length : 1.8m Battery life : approx. 70H

Range	DC300A	DC30A	Applicable digital multimeter
Resolution	0.1A	0.01A	PC5000 PC520M PC510 PC500 PC20 RD701 RD700 DA-50C CD751 CD731 CD721 CD721NH DA32
Minimum scale	5A 10A	0.5A 1A	TA55 (Analog)
Standard accessories included	Carrying case (C-CL), Instruction manual		

Resolution of TA55 (Analog) on 1999 display when measuring 199A max. at 300A range and 19A max. at 30A range. Resolution is one digit bigger at the upper range. Output voltage : DC300mV when measuring max. current at each range.

### CL-22AD (with case)

DC / AC current

R03  $\times 2$  Length : 1.8m Battery life : approx. 70H

Range	DC200A	DC20A	AC200A	AC20A	Applicable digital multimeter
Resolution	0.1A	0.01A	0.1A	0.01A	PC5000 PC520M PC510 PC500 RD701 RD700 DA-50C
	0.1A	0.01A	1A	0.1A	PC20 CD751 CD731 CD721 CD721NH DA32
Standard accessories included	Carrying case (C-CL), Instruction manual				

Output voltage : DC200mV/AC200mV (0 ~ 400Hz) when measuring max. current at each range. Waveform measurement by oscilloscope is impractical.

### CL-20D

AC current

No battery Length : 1.8m

Range	AC200A	AC20A	Applicable digital multimeter
Resolution	0.1A	0.01A	PC5000 PC520M PC510 PC500 PC20 RD701 RD700 DA-50C CD751 CD731 CD721 DA32
Standard accessories included	Instruction manual		

Output voltage : AC2V (AC200A (50 ~ 400Hz), AC20A (50/60Hz) when measuring max. current at each range.)

### Optional accessories

Carrying case : C-CL

## Clamp Sensor



### CL124 (with case)

NEW

LEAK

Micro / leak current (AC)

No battery Length : 2m

Range	1A	Applicable digital multimeter
Resolution	1mA	PC5000 PC520M PC510 PC500 PC20 RD701 RD700 CD751 CD731 CD721 CD721NH
Measuring range	0 ~ 1000mA (1A)	
Accuracy / Frequency range	$\pm (1.0\%rdg + 0.1mV)$ (50Hz/60Hz) $\pm (2.0\%rdg + 0.1mV)$ (40Hz ~ 1kHz)	
Maximum allowable input*	100A continuous (50/60Hz)	
Output impedance	Approx. 180	
Core diameter	Approx. 24mm max.	
Size / Weight	H100 x W60 x D26mm/approx. 150g	
Standard accessories included	Carrying case (C-CL140), Instruction manual	

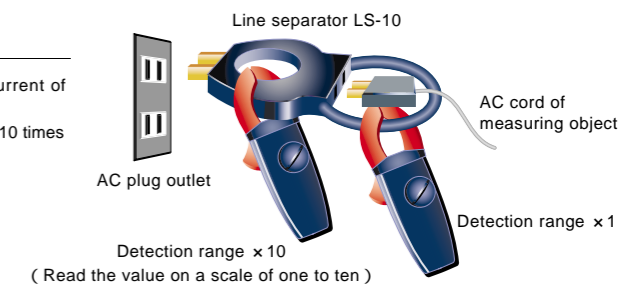
\* Allowable limit value in case of making an operational error, and output accuracy is not under warranty. Output voltage : AC100mV when measuring max. current.

## Line separator



### LS-10

Suitable for measuring consumption current of house hold appliances  
Detection range scaling factor = 1 time / 10 times  
Rated voltage = AC125V  
Rated current = AC12A  
Core diameter = 32mm  
H165 x W65 x D20mm / 110g



# Insulation Resistance Testers

## What is Insulation Resistance Tester?

The measurement of insulation resistance is performed to check the insulation status of electric equipments and circuits, which constitutes one of the important measuring items for safety control. The measurement of the insulation of electric equipments and circuits is made using an insulation resistance tester by stopping the operation of the electric equipments and circuits ( by stopping power distribution ). Voltage of several megohms to tens of megohms is measured in case of the measurement of insulation resistance of electronic parts and electric equipments, and voltage of 1M or less is measured in case of electric works for interior wiring and others.

### Is not the resistance range of a tester adequate for the measurement of insulation resistance?

The resistance of a digital multimeter or multimeter covers the applied voltage( measured voltage ) of approx. 0.3V up to 12V. An insulation resistance tester needs to make measurements at voltage higher than the working voltage of a circuit and electric and electronic equipment to be measured. The table on the right lists examples of rated voltage and uses of the insulation resistance tester.

### Examples of major applications of insulation resistance tester

Rated measurement voltage	General electric equipments	Electric equipments and circuits
25V 50V	Insulation measurement at safe voltage Insulation measurement of telephone circuit equipments and explosion-proof equipments	Insulation measurement of telephone circuits
100V 125V	Insulation measurement of control equipments	Insulation measurement for maintaining and controlling low-voltage distribution wiring and equipments of 100V or less Insulation measurement for maintaining and controlling low-voltage wiring and equipments of 200V class or lower
250V	Insulation measurement of low-voltage distribution circuits and equipments	Insulation measurement for maintaining and controlling low-voltage wiring and equipments of 400V class or lower Insulation measurement of 100V, 200V and 440V classes at the time of new installation
500V	Insulation measurement of newly installed distribution circuits, and circuits and equipments of 600V or less ( General )	Insulation measurement for maintaining and controlling low-voltage wiring and equipments of lower than 600V Insulation measurement of 100V, 200V and 400V distribution wiring at the time of new installation
1000V	Insulation measurement of circuits, equipments, and facilities of higher than 600V ( General )	Insulation measurement of equipments normally operating at high working voltage ( e.g. high-voltage cable, high-voltage electric equipment, and communications equipment using high voltage )

## Three key points in choosing a suitable model

### 1. Analog type or digital type?

Analog type is suitable for visually checking the measurement. Digital type is suitable for verifying the measurement by precise values.

### 2. What do you like to measure by your insulation resistance tester?

For measurement of electronic circuits and the like( See Figure below )  
For easy reading of higher resistance : DM series / Digital type  
For use in measurement in electric works and the like( See Figure below )  
For easy reading of lower resistance : PDM series / Digital type

### 3. Required rated voltage

A wide voltage range is available from 15V( optimum for maintaining and controlling elevators ) up to 1000V / 2000M  
There are types allowing two to three ranges by one unit.

## Measuring method of low-voltage circuit

In order to measure the insulation resistance of a low-voltage circuit, use an insulation resistance tester with the rated voltage of 500V. Open switches in the distribution board, shut off the power distribution and measure the insulation resistance between wires on the circuit and between wire and ground. If the measured value is below the reference value, open all branch switches and make measurements separately for each branch line of the mains line. The insulation resistance value of the low-voltage circuit is stipulated according to the Electrical Equipment Standard.

Use voltage class of circuit	Insulation resistance value
300V or less When voltage to ground is 150V or less( Voltage to ground: Voltage between wire and the earth in case of a ground type circuit, and voltage between wires in case of a non-ground type circuit. The same applies hereinafter. )	0.1M
Other cases	0.2M
More than 300V	0.4M

## Pocket size / Digital

**mobiken** Series Pocket size meter but with high accuracy and wide ranges. Sensor / Probes can be all neatly contained and protected within the folding case. Easy to carry in a shirt pocket.



### DG6

NEW

Suitable for low voltage insulation measurement for relay switch, telephone installation, and fire alarm.

Test voltage DC25V / 15V  
Wide measurement range 1k ~ 40M  
High resolution 0.001M ( 1k )  
Data hold  
Zero ohm adjustment function ADJ( REL )  
Auto power save( 30min. )

Sampling rate : 2 times / sec. for numeral display,  
20 times / sec. for bar graph

APS DATA HOLD

25V 40M 15V 40M

Function	Best accuracy	Resolution
M	4/40M ± ( 2%+0 - 7 )	0.001M
Display	4000	
Battery	Silver oxide cell( SR44 ) × 2	
Size / Weight	H117 × W76 × D18mm/approx. 125g	
Standard accessories included	Clip lead( CL-15 black only ), Instruction manual	



### DG7

NEW

Suitable for low voltage insulation measurement for telephone installation and fire alarm.

Test voltage DC50V / 25V  
Wide measurement range 1k ~ 40M  
High resolution 0.001M ( 1k )  
Data hold  
Zero ohm adjustment function ADJ( REL )  
Auto power save( 30min. )

Sampling rate : 2 times / sec. for numeral display,  
20 times / sec. for bar graph

APS DATA HOLD

50V 40M 25V 40M

Function	Best accuracy	Resolution
M	4/40M ± ( 2%+0 - 4 )	0.001M
Display	4000	
Battery	Silver oxide cell( SR44 ) × 2	
Size / Weight	H117 × W76 × D18mm/approx. 125g	
Standard accessories included	Clip lead( CL-15 black only ), Instruction manual	



### DG8

NEW

Suitable for low voltage insulation measurement for relay switch and telephone installation.

Test voltage DC50V / 15V  
Wide measurement range 1k ~ 40M  
High resolution 0.001M ( 1k )  
Data hold  
Zero ohm adjustment function ADJ( REL )  
Auto power save( 30min. )

Sampling rate : 2 times / sec. for numeral display,  
20 times / sec. for bar graph

APS DATA HOLD

50V 40M 15V 40M

Function	Best accuracy	Resolution
M	4/40M ± ( 2%+0 - 4 )	0.001M
Display	4000	
Battery	Silver oxide cell( SR44 ) × 2	
Size / Weight	H117 × W76 × D18mm/approx. 125g	
Standard accessories included	Clip lead( CL-15 black only ), Instruction manual	



### DG9

NEW

Suitable for low voltage insulation measurement for telephone installation and emergency broadcasting equipment.

Test voltage DC125V / 50V  
Wide measurement range 1k ~ 40M  
High resolution 0.001M ( 1k )  
Data hold  
Auto power save( 30min. )

Sampling rate : 2 times / sec. for numeral display,  
20 times / sec. for bar graph

APS DATA HOLD

125V 400M 50V 40M

Function	Best accuracy	Resolution
M	4/40M( 50V ) ± ( 2%+0 - 4 ) 40/400M ( 125V ) ± ( 2%+2 )	0.001M 0.01M
Display	4000	
Battery	Silver oxide cell( SR44 ) × 2	
Size / Weight	H117 × W76 × D18mm/approx. 125g	
Standard accessories included	Clip lead( CL-15 black only ), Instruction manual	



## Digital Type



### DG525

- 2 test voltage ranges
- Test voltage DC500V / 250V
- Auto range
- Auto power off( 1min. )
- Backlight
- Data hold
- Low battery power indication

Display : numeral display 1999

**Optional accessories**

Carrying case : C-M53



**500V**  
**2000MΩ**

**250V**  
**2000MΩ**

Rated voltage	2 ranges
M	2/20/200/2000M ( 4 auto ranges )
Accuracy	2/20/200M : Within ±( 2%+2 ) 2000M : within ±( 5%+2 )
ACV	200/600V( 2 auto ranges )
Accuracy	Within ±( 1%+0.5%RNG+1 )
Battery	LR6×6
Size / Weight	H175×W115×D55mm/approx. 600g
Standard accessories included	Test lead( red/black with plug )and clip lead connecting to pin( TL-M54 ), Instruction manual



### DG251

- 2 test voltage ranges
- Test voltage DC250V / 125V
- Auto range
- Auto power off( 1min. )
- Backlight
- Data hold
- Low battery power indication

Display : numeral display 1999

**Optional accessories**

Carrying case : C-M53



**250V**  
**2000MΩ**

**125V**  
**2000MΩ**

Rated voltage	2 ranges
M	2/20/200/2000M ( 4 auto ranges )
Accuracy	2/20/200M : Within ±( 2%+2 ) 2000M : within ±( 5%+2 )
ACV	200/600V( 2 auto ranges )
Accuracy	Within ±( 1%+0.5%RNG+1 )
Battery	LR6×6
Size / Weight	H175×W115×D55mm/approx. 600g
Standard accessories included	Test lead( red/black with plug )and clip lead connecting to pin( TL-M54 ), Instruction manual



### M53

- 2 test voltage ranges for elevator maintenance
- Test voltage DC500V / 15V
- Auto range
- Auto power off( 1min. )
- Low battery power indication
- Remote speed measurement( Speed meter SE-9000 is necessary. )

Display : numeral display 1999

**Optional accessories**

Carrying case : C-M53



**500V**  
**200MΩ**

**15V**  
**20MΩ**

Rated voltage	2 ranges
M	2/20/200M ( 3 auto ranges )
Accuracy	Within ±( 2%+2 )
ACV	200/750V( 2 auto ranges )
Accuracy	Within ±( 1%+0.5%RNG+1 )
DCV	20/750V( 2 auto ranges )
Accuracy	Within ±( 0.5%+0.5%RNG+1 )
Battery	LR6×6
Size / Weight	H175×W115×D55mm/approx. 600g
Standard accessories included	Test lead( red/black with plug )and clip lead connecting to pin( TL-M54 ), Instruction manual

## Analog Type



### DM1528S

- 3 test voltage ranges
- Test voltage DC1000V / 500V / 250V
- One-shot or continuous measurement push switch
- DCV measurement range( DC60V )
- Auto discharge function
- Inner battery check range
- Shoulder Strap

Safety : IEC61010-1( EN61010-1 )2001-02 CAT. 600V



**1000V**  
**2000MΩ**

**500V**  
**1000MΩ**

**250V**  
**500MΩ**

DM1528S	
Insulation resistance( M )	0.2 - 2 - 1000 - 2000M 1000V 0.5 - 1 - 500 - 1000M 500V 0.1 - 0.5 - 200 - 500M 250V
Accuracy	± 5% of reading ( 1st effective measurement range : written in thick print above ) ± 10% of reading ( 2nd effective measurement range : written in small type above )
ACV	600V
Accuracy	± 5% of full scale( 50 - 60Hz sine wave )
DCV	60V
Accuracy	± 5% of full scale
Battery	6LR61( 9V )× 1
Size / Weight	H144×W99×D43mm/approx. 310g
Standard accessories included	Test lead( TL-508S ), Carrying case( C-08S ), Instruction manual



### DM5218S

- 3 test voltage ranges
- Test voltage DC500V / 250V / 125V
- One-shot or continuous measurement push switch
- DCV measurement range( DC60V )
- Auto discharge function
- Inner battery check range
- Shoulder Strap

Safety : IEC61010-1( EN61010-1 )2001-02 CAT. 600V



**500V**  
**1000MΩ**

**250V**  
**500MΩ**

**125V**  
**200MΩ**

DM5218S	
Insulation resistance( M )	0.5 - 1 - 500 - 1000M 500V 0.1 - 0.5 - 200 - 500M 250V 0.05 - 0.2 - 100 - 200M 125V
Accuracy	± 5% of reading ( 1st effective measurement range : written in thick print above ) ± 10% of reading ( 2nd effective measurement range : written in small type above )
ACV	600V
Accuracy	± 5% of full scale( 50 - 60Hz sine wave )
DCV	60V
Accuracy	± 5% of full scale
Battery	6LR61( 9V )× 1
Size / Weight	H144×W99×D43mm / approx. 310g
Standard accessories included	Test lead( TL-508S ), Carrying case( C-08S ), Instruction manual



### DM1008S

- Single test voltage range
- Test voltage DC1000V
- One-shot or continuous measurement push switch
- DCV measurement range( DC60V )
- Auto discharge function
- Inner battery check range
- ACV measurement range
- Shoulder Strap

Safety : IEC61010-1( EN61010-1 )2001-02 CAT. 600V



**1000V**  
**2000MΩ**

DM1008S	
Insulation resistance( M )	1 - 2 - 1000 - 2000M
Accuracy	± 5% of reading ( 1st effective measurement range : written in thick print above ) ± 10% of reading ( 2nd effective measurement range : written in small type above )
ACV	600V
Accuracy	± 5% of full scale( 50 - 60Hz sine wave )
DCV	60V
Accuracy	± 5% of full scale
Battery	6LR61( 9V )× 1
Size / Weight	H144×W99×D43mm/approx. 310g
Standard accessories included	Test lead( TL-508S ), Carrying case( C-08S ), Instruction manual



### DM508S

- Single test voltage range
- Test voltage DC500V·1000M
- One-shot or continuous measurement push switch
- DCV measurement range( DC60V )
- Auto discharge function
- Inner battery check range
- Shoulder Strap

Safety : IEC61010-1( EN61010-1 )2001-02 CAT. 600V



**500V**  
**1000MΩ**

DM508S	
Insulation resistance( M )	0.5 - 1 - 500 - 1000M
Accuracy	± 5% of reading ( 1st effective measurement range : written in thick print above ) ± 10% of reading ( 2nd effective measurement range : written in small type above )
ACV	600V
Accuracy	± 5% of full scale( 50 - 60Hz sine wave )
DCV	60V
Accuracy	± 5% of full scale
Battery	6LR61( 9V )× 1
Size / Weight	H144×W99×D43mm/approx. 310g
Standard accessories included	Test lead( TL-508S ), Carrying case( C-08S ), Instruction manual



# Analog Multimeters (circuit testers)

## What is Analog Multimeter?

Analog multimeters basically make measurements of DC voltage, AC voltage, DC current and resistance. Except some special products, they have no function to measure the AC current. Characteristics of recent analog multimeters include the extended measuring range function (particularly for fine voltage and current) with an amplifier installed, the function to allow the measurement of capacitor capacity, and the zero-center meter function. To enhance operability and usability, some products include the auto range function, automatic polarity switching function, and a structure integrating a case to allow the storage of a test lead. There are some testers that allow the measurement of hFE (DC current amplification factor) of a transistor and temperature measurement using a temperature sensor, which is offered as an optional accessory.

## Advantages of analog multimeters

1. Easy to read the mean value of values changing in short cycles.  
\* A digital tester does not give stable value determination.
2. No need for the operating power supply except for resistance range (excluding Model EM7000 integrating an amplifier, and CX506a integrating an oscillator) and zero-center function.
3. Suited for judgment based by intuition (in continuity test etc.).

## Four key points in choosing a suitable model

### 1. What are the necessary measuring functions?

Choose the necessary measuring functions in addition to voltage and resistance.

Need for the measurement of current (0.25A, 0.3A, 30A), DC only.

Measurements for remaining dry battery capacity, capacitor, and frequency.


Measurement of DC high voltage with the use of an optional accessory.


### 2. Other necessary functions

1) The needle occasionally swings to the opposite direction in DC voltage measurement.

Check the polarity by the zero-center meter function.

2) Hard to check for continuity.

Use an LED light-up type in noisy places 

Use a buzzer type to verify with sounds. 

### 3. Graduation of scale

There are two general types of graduation of the measuring range:

- 2.5, 5, 10, 50, 250, 500V
- 3, 12, 30, 120, 600V

For measurement of a car battery (24V), measurement in the 30V range of is suitable. Choose a type suitable for your intended application.

### 4. Other functions

Other types are furnished with an auto range function allowing the automatic optimal setting of voltage and resistance. There are also types integrating a transistor transmitter and others integrating a current-limiting fuse with breaking capacity of 100kA for enhanced safe operation.

## Basic measuring method

### Check the range before making a measurement

Most problems with a tester are caused by overcurrent and drop of the tester. Failures due to overcurrent are most frequently caused by voltage applied to a current range and resistance range with lower internal resistance (thereby causing overcurrent of tens to hundreds times to run through the circuit). Although some testers include a meter protector and a circuit protector using a diode, it is recommended to check the range before measuring.

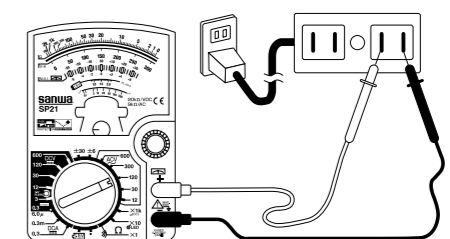
### For measuring unknown values

In measuring unknown current and voltage values, find an approximate value at the maximum range first and then make adjustments to the optimum range (1000V to 250V range in case of voltage measurement). This method prevents a failure caused by incorrect range adjustment.

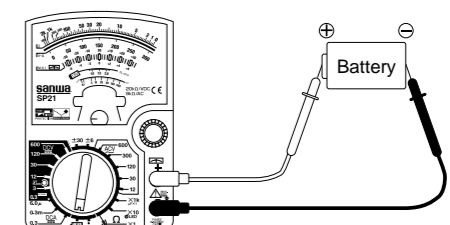
\* Do not change the range during measurement.

## Examples

AC100V plug outlet



Battery voltage



## PDM508S

Single test voltage range

- Test voltage DC500V·100M
- One-shot or continuous measurement push switch
- DCV measurement range( DC60V )
- Auto discharge function
- Inner battery check range
- ACV measurement range
- Shoulder Strap

Safety : IEC61010-1( EN61010-1 )2001-02 CAT. 600V



## 3 ranges

## DM-1527

3 test voltage ranges

- Test voltage DC1000V / 500V / 250V
- Auto discharge function
- Two-stage push switch ( Power ON Lock )
- LED high voltage indicator
- Inner battery check range
- ACV measurement range
- Dust & drip protective panel design



## DM-5257

3 test voltage ranges

- Test voltage DC500V / 250V / 100V
- Auto discharge function
- Two-stage push switch ( Power ON Lock )
- LED high voltage indicator
- Inner battery check range
- ACV measurement range
- Dust & drip protective panel design



## AD 500V 100MΩ

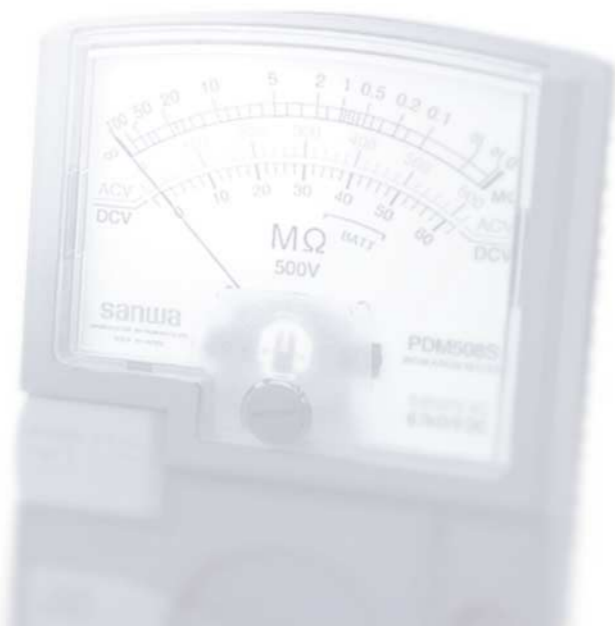
PDM508S	
Insulation resistance( M )	0.05 - 0.1 - 50 - 100M
Accuracy	± 5% of reading ( 1st effective measurement range : written in thick print above ) ± 10% of reading ( 2nd effective measurement range : written in small type above )
ACV	600V
Accuracy	± 5% of full scale( 50 - 60Hz sine wave )
DCV	60V
Accuracy	± 5% of full scale
Battery	6LR61( 9V )× 1
Size / Weight	H144 × W99 × D43mm/approx. 310g
Standard accessories included	Test lead( TL-508S ), Carrying case( C-08S ), Instruction manual

## AD 1000V 2000MΩ 500V 1000MΩ 250V 500MΩ

DM-1527	
Insulation resistance( M )	0 - 2 - 200 - 2000M 1000V 0 - 2 - 100 - 1000M 500V 0 - 1 - 50 - 500M 250V
Accuracy	± 5% of reading ( 1st effective measurement range : written in thick print above ) ± 3% of scale length ( 2nd effective measurement range : written in small type above )
ACV	600V
Accuracy	± 5% of full scale( 50 - 60Hz sine wave )
Battery	R6P × 6
Size / Weight	H175 × W118 × D55mm/approx. 520g
Standard accessories included	Test lead( TL-507 ), Carrying case( C-06 ), Instruction manual

## AD 500V 1000MΩ 250V 500MΩ 100V 200MΩ

DM-5257	
Insulation resistance( M )	0 - 2 - 100 - 1000M 500V 0 - 1 - 50 - 500M 250V 0 - 1 - 20 - 200M 100V
Accuracy	± 5% of reading ( 1st effective measurement range : written in thick print above ) ± 3% of scale length ( 2nd effective measurement range : written in small type above )
ACV	600V
Accuracy	± 5% of full scale( 50 - 60Hz sine wave )
Battery	R6P × 6
Size / Weight	H175 × W118 × D55mm/approx. 520g
Standard accessories included	Test lead( TL-507 ), Carrying case( C-06 ), Instruction manual



## FET Tester



### EM7000

NEW

High sensitivity for measurement of lower capacitance

High input impedance( DCV2.5 ~ 12M /V ), and 0.12μA range( DCA )  
Bandwidth 40Hz ~ 1MHz AC sign wave  
Rectangular pulse P-P( Peak to Peak ) measurement( duty cycle 20% and above )  
Wide ohm range 0.2 ~ 200M

Bandwidth : 40Hz ~ 1MHz( 12V range and below )  
Safety : IEC61010-1( EN61010-1 )2001-02 CAT. 600V Max.

#### Optional accessories

High voltage probe : HV-50  
Carrying case : C-CA  
Clip adapter : CL-11, TL-8IC, CL-15  
Test lead : TL-21M



Function	Measuring range	Accuracy
DCV	0.3/1.2/3/12/30/120/300/1000V	±3% of full scale
±DCV	±0.15/0.6/1.5/6/15/60/150/600V	±7% of full scale
ACV rms( 50 / 60Hz )	3V( approx. 2.5M ) 12V( approx. 1.1M ) 30V( approx. 800k ) 120/300V( approx. 800k ) 750V( approx. 10M )	±5% of full scale
ACV P-P	Sine wave: 8.4V( approx. 2.5M /V ) 33V( approx. 1.1M /V ) 84V( approx. 800M /V ) 330/840V( approx. 800k /V )	±5% of full scale
	Square symmetric wave: 8.4V( 2.5M /V ) Triangular symmetric wave: 8.4V( 2.5M /V )	±6% of full scale
DCA	0.12μ/0.3m/3m/30m/300m/6A	±4% of full scale
DCA( NULL )	±0.06μ/±0.15m/1.5m/15m/150mA	±7% of full scale
ACA	6A	±3% of full scale
Resistance	2k/20k/200k/2M/20M/200M	±3% of arc
dB	-10 ~ +51dB	±3% of arc
Bandwidth	40Hz ~ 1MHz( below 12V range )	
Battery	R6P 1.5V × 2, 6F22 9V × 1	
Fuse	5.0 × 20mm ceramic( 250V / 0.5A ) 5.0 × 20mm ceramic( 250V / 6.3A )	
Size / Weight	H165 × W106 × D46mm / approx. 375g	
Standard accessories included	Test lead( TL-21 ), Spare fuse, Instruction manual,	

The value in ( ) at DCV and ACV is input resistance.

## Multi-function model



### CX506a

NEW

Capacitor & Transistor checker( built-in oscillator )

26ch switch, wide range measurement  
Capacitance measurement 50pF ~ 2000μF  
High input impedance 50k /V( DC3 ~ 300Vrange )  
Switchable DC polarity

Bandwidth : 40Hz ~ 30kHz( 3V and 12V ),  
40Hz ~ 10kHz( 30V range )  
Safety : IEC61010-1( EN61010-1 )2001-02 CAT. 600V Max.

#### Optional accessories

High voltage probe : HV-50  
Carrying case : C-CA  
Clip adapter : CL-11, TL-8IC, CL-15  
Test lead : TL-21M



Function	Measuring range	Accuracy
DCV	120m( 4k ) 3/12/30/120 300( 50k /V ) 1000V( 15k )	120m : ±4% ±2.5% of full scale
ACV	3/12/30/120/300/750V( 8k /V )	±3% of full scale ( Less than 12V range : ±4% )
DCA	30μ/0.3m/3m/30m/0.3A	±2.5% of full scale
Resistance	5k/50k/500k/5M/50M	±3% of arc
Capacitance	C1 : 50p ~ 0.2μF C2 : 0.01μ ~ 20μF C3 : 1 ~ 2000μ	C1/C2 ±6% of arc
hFE( DC Current Amplification Factor )	Transistor hFE: 0 ~ 1000	-
Bandwidth	40 ~ 30kHz( 12V: 40Hz ~ 30kHz 30V ~ : 40Hz ~ 10kHz )	
Battery	R6P × 2, 6F22 × 1	
Fuse	5.0 × 20mm ( 250V/0.5A ) arc-extinguishing material in ceramic tube	
Size / Weight	H165 × W106 × D46mm/ approx. 370g	
Standard accessories included	Test lead( TL-21 ), Alligator Clip lead( CL-506 ) Instruction manual, Spare fuse	

The value in ( ) at DCV and ACV is input resistance.



### YX-361TR

Wide measurement range

Total 35 wide ranges ( 24ch sw + additional functions )  
±DCV zero center meter  
LED for continuity check  
OUTPUT terminal( series capacitor terminal )  
Battery check

#### Optional accessories

High voltage probe : HV-10  
Carrying case : C-YS  
Clip adapter : CL-11, TL-8IC



Function	Measuring range	Accuracy
DCV ( NULL )	0.1/0.5/2.5/10/50/250/1000V( 20k /V ) ±5/25V( 40k /V )	±2.5% of full scale ±2.5% of full scale
ACV	2.5/10/50/250/1000V( 9k /V )	±3% of full scale ( 3V : ±5% )
DCA	50μ/2.5m/25m/0.25A	±2.5% of full scale
Resistance	2k/20k/200k/2M/20M	±3% of arc
dB	-10 ~ +62dB	±3% of full scale ( 3V : ±5% )
Continuity	LED : emitting light at 10 or less. Open voltage : 3V	
Battery check	1.5V	
Bandwidth	40 ~ 30kHz( less than 30V : ±3% ) 30 ~ 100kHz( less than 30V : ±1dB )	
Battery	R6P × 2, 6F22 × 1	
Fuse	5.2 × 20mm( 250V / 0.5A )	
Size / Weight	H150 × W100 × D37mm / approx. 290g	
Standard accessories included	Test lead( TL-61 ), Instruction manual	

The value in ( ) at DCV and ACV is input resistance.

## SH-88TR

Zero center meter( NULL )

Total 35 wide ranges ( 22ch sw + additional functions )  
Capacitance measurement 1μF ~ 1F  
LED for continuity check

#### Optional accessories

High voltage probe : HV-10  
Carrying case : C-YS  
Clip adapter : CL-11, TL-8IC



Function	Measuring range	Accuracy
DCV ( NULL )	120m/3/12/30/120/300/1200V( 20k /V ) ±6/15/60/150/600V( 40k /V )	±2.5% of full scale ±2.5% of full scale
ACV	3/12/30/120/300/1200V( 9k /V )	±3% of full scale ( 3V : ±5% )
DCA	50μ/3m/30m/0.3A	±2.5% of full scale
Resistance	3k/30k/300k/3M/30M	±3% of arc
dB	-10 ~ +63dB	±3% of full scale ( 3V : ±5% )
Capacitance	1000μ/0.01/0.1/1F	
Continuity	LED : emitting light at 10 or less. Open voltage : 3V	
Bandwidth	40 ~ 30kHz( less than 30V : ±3% ) 30 ~ 100kHz( less than 30V : ±1dB )	
Battery	R6P × 2, 6F22 × 1	
Fuse	5.2 × 20mm( 250V/0.5A )	
Size / Weight	H150 × W100 × D36mm/ approx. 280g	
Standard accessories included	Test lead( TL-61 ), Instruction manual	

The value in ( ) at DCV and ACV is input resistance.

## High input impedance

### AU-32 AU-31

Auto range, High input impedance

Auto range selection( V, )  
Auto polarity  
High input impedance 1 ~ 10M  
Series capacitor input AU-31 ACV only  
Auto 0 adjustment  
Inner battery check  
DC / AC auto selection AU-32 only  
5 ranges DC / AC current AU-32 only

Bandwidth : 40 ~ 10kHz( 0.25V : ±5% ), 40 ~ 600Hz  
( 2.5V and above : ±5% )  
: 40 ~ 10kHz( 0.3V : ±5% ), 40 ~ 1kHz  
( 3V and above : ±4% )

#### Optional accessories

High voltage probe : HV-50  
Carrying case : C-SP  
Clip adapter : CL-11, TL-8IC



AU-32



Function	Measuring range	Accuracy
DCV	±250m( approx. 1M /V ) 2.5/10/50/250/500V( 10M /V )	±3% of full scale
ACV	250m( approx. 1M /V ) 2.5/10/50/250/500V( 10M /V )	±3% of full scale
DCA	±250μ/2.5m/25m/250m/2.5A	±3% of full scale
ACA	250μ/2.5m/25m/250m/2.5A	±3% of full scale
Resistance	20k/200k/2M/20M/200M	±3% of arc
dB	-10/+10/+22/+36/+50/+56dB	-
Bandwidth	40 ~ 10kHz( 0.25V : ±5% ), 40 ~ 600Hz( 2.5V ~ : ±5% )	
Battery	R03 × 4	
Fuse	5.2 × 20mm( 250V/0.3A )	
Size / Weight	H48 × W110 × D124mm/ approx. 290g	
Standard accessories included	Test lead( TL-61 ), Instruction manual	

The value in ( ) at DCV and ACV is input resistance.

Function	Measuring range	Accuracy
DCV	±300m( approx. 1M /V ) 3/12/60/300/1000V( 10M /V )	±3% of full scale
ACV	300m( approx. 1M /V ) 3/12/60/300/1000V( 10M /V )	±3% of full scale
DCA	±300m/3A	±3% of full scale
ACA	300m/3A	±3% of full scale
Resistance	20k/200k/2M/20M/200M	±3% of arc
dB	-9/+11/+23/+37/+51/+62dB	-
Bandwidth	40 ~ 10kHz( 0.3V : ±5% ) 40 ~ 1kHz( 3V ~ : ±4% )	
Battery	R03 × 4	
Fuse	5.2 × 20mm( 250V/0.5A )	
Size / Weight	H48 × W110 × D124mm/ approx. 290g	
Standard accessories included	Test lead( TL-61 ), Instruction manual	

The value in ( ) at DCV and ACV is input resistance.

## Drop shock proof meter

### YX360TRF

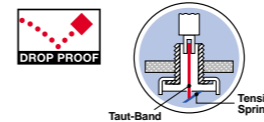
Best seller drop shock proof meter

Drop shock proof meter  
Null( zero center )meter ±5 / ±25 in DCV  
High resistance up to 200M with low voltage  
Protective body cover  
Capacitance, dB, Li measurement

Bandwidth : 30 ~ 100kHz( AC10V )  
Safety : IEC61010-1( EN61010-1 )2001-02 CAT. 600V Max. / CAT. 1000VDC / 750VAC Max.

#### Optional accessories

hFE probe : HFE-6T  
Clip adapter : CL-11, TL-8IC  
High voltage probe : HV-10T



Function	Measuring range	Accuracy
DCV ( NULL )	0.1V( 20k /V ) 0.25/2.5/10/50( 20k /V ) 250/1000V( 9k /V ) ±5 / 25V( 40k /V )	±5% of full scale ±3% of full scale ±5% of full scale
ACV	10 / 50 / 250 / 750V( 9k /V )	±4% of full scale
DCA	50μ / 2.5m / 25m / 0.25A	*1 ±5% of full scale
Resistance	2k / 20k / 200k / 2M ( X1 / X10 / X100 / X1k ) 200M ( X100k )	±3% of arc ±5% of arc
Load current( LI )	0 ~ 150m / 15m / 1.5m / 15μ / 1.5μA	
Capacitance	10μF	*2
dB	-10dB ~ +22dB( for 10VAC ) ~ +62dB	-
DC high voltage	DC25kV( optional probe "HV-10T" is necessary )	-
hFE	1000 at ×10 range( optional probe "HFE-6T" is necessary )	-
Battery	R6( IEC ) or UM-31.5V × 2	
Fuse	5.2 × 20mm( 250V / 0.5A )	
Size / Weight	H159.5 × W129 × D41.5mm / approx. 320g	
Standard accessories included	Instruction manual, Test lead( TL-61T ), Hand strap	

The value in bracket at DCV and ACV is input resistance.  
\*1 Not including the resistance of fuse.  
\*2 Pointer indication of the maximum value by charged current in the capacitor.

## Drop shock proof meter



### SP21

#### Continuity check buzzer

- Drop shock proof taut-band meter
- ± DCV zero center meter
- Fuse and diode protection
- Battery check
- Tilt stand

Bandwidth : 40 ~ 100kHz( AC12V )  
Safety : IEC61010-1( EN61010-1 )2001-02 CAT. 600V

#### Optional accessories

High voltage probe : HV-20  
Carrying case : C-SPH or C-SP  
Clip adapter : CL-11, TL-8IC, CL-15



### SP20

#### DC high voltage & temperature measurable

- 20ch measurement ranges
- Capacitance measurement 500µF
- Tilt stand
- DC high voltage and temperature measurement ( with optional accessories )

Bandwidth : 40 ~ 100kHz( AC10V )

#### Optional accessories

High voltage probe : HV-10  
Temperature probe : T-THP  
Carrying case : C-SPH or C-SP  
Clip adapter : CL-11, TL-8IC



### SP-18D

#### Protective body cover

- Low power ohm( 3V )measurement upto 200M
- Capacitance measurement 0.01µF ~ 1000µF
- LED check by 3V terminal voltage at resistance range
- Battery check
- Protective body cover

Bandwidth : 30 ~ 80kHz( AC12V ), 30 ~ 20kHz ( AC30V )

#### Optional accessories

Clip adapter : CL-11, TL-8IC



### TA55

#### 30A range for automotive

- High level panel visibility
- Continuity check buzzer
- Tilt-stand
- Measurable upto DC30A / DC300A with optinal clamp probe

Bandwidth : 40 ~ 5kHz

#### Optional accessories

Clamp probe : CL33DC  
Carrying case : C-SPH or C-SP  
Clip adapter : CL-11, TL-8IC  
Test lead : TL-91M



Function	Measuring range	Accuracy
DCV	0.3/5k Y3/12/30/120/600V( 20k /V ) ± 6/30V( 20k /V )	±3% of full scale ±5% of full scale
ACV	12/30/120/300/600V	±3% of full scale
DCA	60µ/30m/0.3A	±3% of full scale
Resistance	2k/20k/2M	3% of arc
Capacitance	500µF	*1
Continuity	Buzzer sounds at less than approx. 10 . Open voltage: 3V	
Bandwidth	40 ~ 100kHz( AC12V )	
Battery	R6P × 2	
Fuse	6.3 × 30mm( 250V/0.5A )	
Size / Weight	H144 × W99 × D41mm/approx. 270g	
Standard accessories included	Test lead( TL-21 ), Instruction manual	

\*1 The value in ( ) at DCV and ACV is input resistance.  
\*1 Pointer indication of the maximum move by charged current in the capacitor.



Function	Measuring range	Accuracy
DCV	0.25/2.5/10/50/100V( 20k /V )500V( 9k /V )	±3% of full scale
ACV	10/50/250/500V( 9k /V )	±3% of full scale
DCA	50µ/2.5m/25mA	±3% of full scale
Resistance	2k/20k/200k/2M	3% of arc
Capacitance	500µF	*1
DC high voltage	DC25kV( Optional probe "HV-10" is necessary )	—
Temperature	-10 ~ +200 ( Optional probe "T-THP" is necessary )	±3%( T-THP )
Bandwidth	40 ~ 100kHz( AC10V )	
Battery	R6P × 2	
Fuse	6.3 × 30mm( 250V/0.5A )	
Size / Weight	H144 × W99 × D41mm/approx. 270g	
Standard accessories included	Test lead( TL-61 ), Instruction manual	

\*1 The value in ( ) at DCV and ACV is input resistance.  
\*1 Pointer indication of the maximum move by charged current in the capacitor.



Function	Measuring range	Accuracy
DCV	0.3/3/12/30/120/600V( 20k /V )	±3% of full scale
ACV	12/30/120/300/600V( 9k /V )	±3% of full scale
DCA	60µ/30m/0.3A	±3% of full scale
Resistance	2k/20k/200k/200M	3% of arc
Battery check	1.5V/1.5V Coin battery	—
Capacitance	1000µF	*1
Bandwidth	30 ~ 80kHz( AC 12V ) 30 ~ 20kHz( AC 30V )	
Battery	R6P × 2	
Fuse	5.2 × 20mm( 250V/0.5A )	
Size / Weight	H159.5 × W129 × D41.5mm / approx. 320g	
Standard accessories included	Instruction manual	

\*1 The value in ( ) at DCV and ACV is input resistance.  
\*1 Pointer indication of the maximum move by charged current in the capacitor.



Function	Measuring range	Accuracy
DCV	0.3/3/16/30/60V( 20k /V )	±3% of full scale
ACV	30/120/300V( 9k /V )	±4% of full scale
DCA	0.5/3/30A	±5% of full scale
Resistance	2k/20k/200k/2M	3% of arc
Continuity	Buzzer sounds at less than approx. 10 . Open voltage : 3V	
Bandwidth	40 ~ 5kHz	
Battery	R6P × 2	
Fuse	6.3 × 30mm( 250V/3A )	
Size / Weight	H142 × W97 × D38mm/approx. 300g	
Standard accessories included	Test lead( TL-91 ), Instruction manual	

\*1 The value in ( ) at DCV and ACV is input resistance.

## Slim compact AMT



### CP-7D

#### 23mm thick small size

- Wide scale panel with mirror
- Affixed test leads providing better safety
- High-precision, non-flammable, smokeless metal-oxide film resistor
- Battery check
- Fuse and diode circuit protection

Bandwidth : 30 ~ 100kHz( AC10V ),  
30 ~ 20kHz( AC50V )

#### Optional accessories

Carrying case : C-CP  
Clip adapter : CL-11, TL-8IC



### AP33

NEW

#### Small pocket size

- Elastomer material absorbs shock from fall
- High-durability nylon-woven copper lead
- Using elastomer material improves flexibility and reduces the stress on the lead wire and the probe when bent.

Bandwidth : 40 ~ 10kHz( 50V and below )  
Safety : IEC61010 CAT. 300V CAT. 500V

#### Optional accessories

Clip adapter : CL-15

## For power line



### PW-100Fb( with case )

#### High performance AMT with intensified safety

- For lower voltage circuit( 500V and below )with large capacitance
- ± DCV measurement, polarity switch
- Current-limiting fuse that can interrupt 100kA, is installed.
- Carrying case

Bandwidth : 40 ~ 20kHz( 50V and below : 3% )



### VS-100( with case )

#### Current-limiting fuse, 100kA interrupting rating, is installed.

- For lower voltage circuit( 500V and below )with large capacitance
- Current-limiting fuse that can interrupt 100kA, is installed.
- All ranges are protected from input voltage upto 500V
- Carrying case

Bandwidth : 40 ~ 5kHz( 50V and below )



Function	Measuring range	Accuracy
DCV	0.25/2.5/10/50/250/500V( 4k /V )	±3%
ACV	10/50/250/500V( 4k /V )	±4%
DCA	0.25m/25m/500mA	±3%
Resistance	2k/20k/1M	±3% arc
Load current( LI )	0 ~ 74mA/7.4mA/150µA	—
Battery check	0.9 ~ 1.5V	—
dB	-20 ~ -36dB	—
Bandwidth	30 ~ 100kHz( AC10V ) 30 ~ 20kHz( AC50V )	
Battery	R6P × 1	
Fuse	5.2 × 20mm( 250V/0.5A )	
Size / Weight	H119 × W85 × D23mm/approx. 140g	
Standard accessories included	Test lead( TL-84 ), Instruction manual	

The value in ( ) at DCV and ACV is input resistance.



Function	Measuring range	Accuracy
DCV	10/50/250/500V( 2k /V )	±5%
ACV	50/250/500V( 2k /V )	±5%
Battery check	1.5V/9V	—
DCA	25m/250mA	±5%
Resistance	5k/500k	±3% arc
Bandwidth	40 ~ 20kHz( less than 50V )	
Battery	R03 × 1	
Fuse	5 × 20mm( 250V/0.5A )	
Size / Weight	H126 × W87 × D30mm/approx. 185g	
Standard accessories included	Instruction manual	

The value in ( ) at DCV and ACV is input resistance.



Function	Measuring range	Accuracy
DCV	0.1/1/5/50/250/750V( 20k /V )	±3%
ACV	6/30/300/600V( 9k /V )	±3%
Resistance	5k/500k/5M	±3% arc
Bandwidth	40 ~ 20kHz( less than 50V : 3% )	
Battery	R6P × 2	
Fuse	5.2 × 20mm( 250V/0.5A ) Current-limiting fuse( 600V/3A ) Breaking capacity 100kA	
Size / Weight	H150 × W100 × D36mm/approx. 280g	
Standard accessories included	Test lead( TL-100F ), Carrying case( C-PW ), Instruction manual	

The value in ( ) at DCV and ACV is input resistance.



Function	Measuring range	Accuracy
DCV	10/50/250/500V( 4k /V )	±3%
ACV	10/50/250/500V( 4k /V )	±3%
Resistance	2k/20k/2M	±3% arc
Bandwidth	40 ~ 5kHz( less than AC50V )	
Battery	R6P × 2	
Fuse	Current-limiting fuse 600V/3A, Breaking capacity 100kA Glass-tube fuse 6.3 × 30mm 0.25A/250V, Breaking capacity 100A	
Size / Weight	H144 × W96 × D56mm/approx. 400g	
Standard accessories included	Test lead( TL-100-0M ), Carrying case( C-VS ), Instruction manual	

The value in ( ) at DCV and ACV is input resistance.

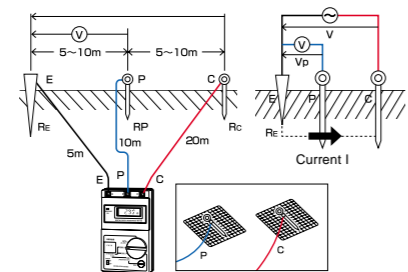
# Earth Testers

## Purpose of earth resistance

When some extraordinary cases occur, fault current and overcurrent may cause damages to equipment or a risk to humans because the equipment is not grounded. To prevent such risks, grounding plays an important role to assure safety. Grounding provides an escape way to electricity from an electric appliance through metal rod driven into the ground. After grounding works are performed to prevent hazards and assure safety, the earth resistance is measured. To measure the earth resistance, two grounding rods are stuck into the ground. Assuming that two rods are E and C, AC current I is applied between E and C. The earth resistance can be measured from the voltage generated between E and C. The relation between the current I and voltage V is expressed as follows. From this the earth resistance R obtained this way includes not only the

earth resistance at the grounding electrode E but also the earth resistance at the grounding electrode C. If a third grounding electrode P is provided between the grounding electrodes E and C, the earth resistance  $R_E$  at the grounding electrode E alone can be obtained from the current I and voltage  $V_p$  between E and C.

\* Although the grounding electrode P, too, has a resistance zone, it hardly affects the measurement because the impedance of the power supply of AC constant current is high.



## Arrangement of grounding rods

### Three-electrode method

Arrange the earth E and auxiliary grounding rods P and C in a straight line at intervals of about 5 to 10m.

\* If they cannot be arranged in a straight line because of the presence of an obstacle, arrange E-P and E-C at angles of about 30 degrees or less.

### Two-electrode method

If an earth E whose grounding resistance is known is present nearby, the unknown grounding resistance can be measured by using it. Connect the terminal E of the earth resistance meter and the earth E by a cord. Measurements are taken between E and P / C assuming P and C terminals as one terminal.

\* The indicated value includes the known resistance value of the earth E. Subtract the grounding resistance of E to obtain the true value.

Sand, gravel and frozen soil Expose soil.  
Concrete Use a net. Flush enough water on the net to let it have a close contact with the ground.

× Asphalt Cannot be measured.

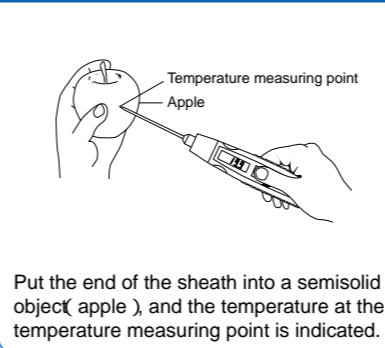
# Thermo Meters

There are two types of Thermo meters used in general: mercury thermo meter and alcohol thermo meter. For industrial use, an electric thermo meter with separate temperature detection element and display element is often used.

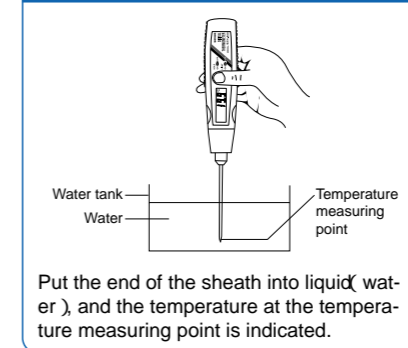
Sensor Type	Thermistor type	Thermocouple	Platinum resistance bulb
Feature	Measurements are made by using changes in electric resistance (inverse proportion). This type is low-priced but not suitable for measurements of high temperature (300 degrees or more).	Measurements are made by using temperature difference of contacts when two types of metal wires are electrically connected. It responds quickly, is easy to be processed and operates easily.	It is more accurate than a thermocouple and suitable for low temperature measurement. However, it does not respond quickly and is not suitable for the measurement of minute spots.
Sanwa Product	Use T-THP.	Use K-8 series.	STH500, STH500C T-300PC (for PC5 series and PC20) T-450 (for STH-500C)

## Temperature measurement method

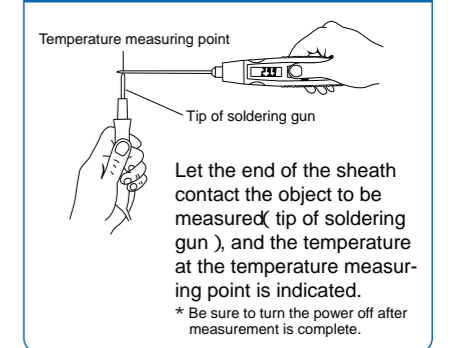
### 1. Measurement of semisolid object



### 2. Measurement of liquid



### 3. Measurement of surface temperature



## Thermo Meter

### TH3

High accuracy & resolution

- Easy to carry in a shirt pocket
- Sensor probe can be snapped into a fixed position atop the case
- Data hold, Max / Min hold
- Relative value
- Nonslip sensor holder
- Auto power save (30min.)



## mobiken Series

Pocket size meter but with high accuracy and wide ranges. Sensor / Probes can be all neatly contained and protected within the folding case. Easy to carry in a shirt pocket.

## APS

Measuring range	-50.0 ~ 200.0
Resolution	0.1
Accuracy	±(0.5%+0.5)
Sampling rate	Approx. 2 times/sec.
Display	3999
Sensor	Platinum foil thermometric resistor (100 at 0 ) Sheath type Pt 100 2 x 64 JIS B class
Response	Approx. 7 sec. interval (speed of sensor's response to achieve the level of 90%)
Battery	SR-44 x 2
Power consumption	Approx. 18mW
Accuracy assure temperature	23 ± 7 max. 80% RH No condensation
Operating temperature	0 ~ 40 max. 80% RH No condensation
Storage temperature	-10 ~ 50 max. 80% RH No condensation
Size / weight	H117 x W76 x D18mm/Approx. 120g
Standard accessories included	Instruction manual

### STH-500

Direct-coupled sensor  
(Platinic thin film thermoresistor)



### STH-1200

Sensor-replaceable (K-type)  
(Optional sensor probe required)



### STH-500C

Sensor-replaceable  
(Optional sensor probe required)



Easy to use palm design  
Sensor-replaceable unit (STH-500C / STH-1200)  
Suitable for measurement of liquid and foods  
Backlight  
Data hold

## Optional accessories

Carrying case : C-STH

### T-450

For STH-500C  
(Sheath type / -50.0 ~ 450)

### K-600

For STH-1200  
(Sheath type / -50.0 ~ 600)

### K-1000

For STH-1200  
(Sheath type / -50.0 ~ 1200)

## Earth Tester



### PDR-200DG

Direct reading digital earth tester

- Easy to use portable design
- AC 30V range to avoid indication errors caused by leak current
- Easy self calibration
- Power saving design with push switch
- Low battery power indication

Earth resistance measuring range	200/2000 Resolution 0.1/1 Accuracy ±(3%+5)
Earth AC voltage measuring range	0 ~ 30V Resolution : 0.1V Accuracy ±(3%+5)
Display	LCD Max. 1999 with overrange indication
Operation	Constant current system (tripolar or bipolar)
Battery	R6P x 6
Size / Weight	W163 x H100 x D47mm/470g
Standard accessories included	Carrying case for PDR-200DG (C-PDR200), Earth bar set (SET-PDR201), Carrying bag for PDR-200DG and accessories (C-PDRCB), Instruction manual



### PDR-301

Analog type display

- Phase detection system circuit for stable measurement
- Easy self calibration
- AC 30V range to avoid indication errors caused by leak current
- Power saving design with push switch
- Exorbitance warning LED of auxiliary earth electrode resistance

## Optional accessories

Carrying case : C-PDR300

# Lux Meters

Various environments need appropriate illumination, whether it be ordinary homes, offices, or factories. Inadequate illumination or too much illumination can lead to false recognition, reduced work efficiency, and loss of vision caused by fatigue. Since appropriate illumination helps to improve work efficiency and assure work safety, the control of illumination is re-

garded as a very important element. The illuminance meter indicates, by values in the unit of LUX, how much light shines on each place. It is used for the purpose of assuring appropriate illumination suitable for every environment. JIS ( Japanese Industrial Standards ) has a standard given below as recommended values for each environment.

Type	LUX	1500	700	300	150	70	30	15	-LUX-
Housing			*Sewing, Dark material )	*Studying, Sewing *Reading, Long time or small letters )	*Reading *Makeup *Eating meal	Living room, child room, reception room, dining room, kitchen	Hall, stairway, corridor, escape stairway, garage		
School			*Precision drawing *Machine-sewing *Precision experiment	Drafting room *Blackboard *Sewing *Library reading room *Precision machining	Ordinary classroom, special classroom, library reading room	Auditorium, meeting room, hallway, stairway	Escape stairway		
Office			*Designing *Drawing *Typing *Calculation *Key-punching	Office, drafting room, gage board, telephone exchange room, distribution board	Executive room, conference room, reception room, hall, elevator	Work room, change room, stairway, warehouse	Escape stairway		
Road, park						Tunnel of expressway ( illumination at the entrance and exit should be higher than this value. )	70 ~ 15 Tunnel	15 ~ 3 Road with busy traffic	1.5 ~ 0.3 Road with scarce traffic, road in residential areas, park, other open spaces
Hospital	Surgical table 10,000 over	*Autopsy *First-aid treatment *Drug formulation	Surgical room, first-aid station, ocular inspection, drug preparation *Technological research *Injection	Clinic, examination room, dispensary, waiting room, medical office	Doctor's room, hospital room, X-ray room, medicine room				
Theater, movie theater				*Ticket counter, doorway, back stage	Projection booth, corridor, stairway	Spectators' seat ( during a break ) escape stairway, garden		3 ~ 1.5 Spectators' seats ( while showing )	
Inn, hotel				Accounting office	Front desk, dining room	Guest room, amusement hall, corridor, lobby			
Diner, restaurant				*Sample case	*Register, kitchen, *dining table	Guest room, waiting room hallway			
Beauty parlor, barber				*Hairdo *Hair setting *Makeup	*Hairdo, *dressing	In shop			
Shop			*Highlighted display in show window *Highlighted show case	*Highlighted display in shop *Show window, ordinary show case	Ordinary display of shop Overall shop				
Department store			*Show window, main part on the 1st floor *Highlighted show case	Ordinary display Ordinary show case	Atmospheric display				

The combined use of local illumination is allowed in places marked with \*. In these cases, it is desirable that the overall illumination should be 1 / 10 or more of the illumination by the local illumination.  
\* Reference: Illumination level JIS 9110

# Optical Power Meters

## Laser power meters

Laser power meters are measuring instruments that let a laser beam emitted from a laser light source enter the sensor light receiver and indicate the value by converting light energy into electric signals. The unit used for this purpose is W( watt ). The laser power meter is used for checking the light power of and maintaining laser-operating equipment. Since silicon photo diode used at the receiver of the laser power meter has different photoelectric conversion ratios according to the wavelength of the light received, it needs to be calibrated by the measuring wavelength.

\* It is possible to obtain approximate value for the measuring wavelength based on a spectral sensitivity characteristic graph of the silicon photo diode.

### Reference: Main laser wavelength

830nm Infrared semiconductor laser  
780nm Infrared semiconductor laser  
( e.g. Used for CD player, MD recorder,  
etc. )  
670nm Visible semiconductor laser

633nm He-Ne laser, red semiconductor  
laser ( e.g. Used for DVD player, bar-code  
reader, etc. )  
532nm Green laser  
488nm Argon ion laser  
405nm Purple-blue laser

## Optical power meters

Optical power meters are measuring instruments that indicate the power of an outgoing beam from an optical fiber connector by converting it into electric signals. It is mainly used for installation and maintenance of optical fiber and optical LAN. The unit of fiber light is generally expressed in W( watt ) and dBm related to 1mW expressed in logarithm.

### Conversion of dBm into mW [dBm]=10 log 10[mW]

10dBm = 10mW 0dBm = 1mW -10dBm = 100μW -20dBm = 10μW  
-30dBm = 1μW -40dBm = 100nW -50dBm = 10nW -60dBm = 1nW

### Wavelength for each model

For long wave and long wavelength( 1310nm,1550nm )

For short wave and long wavelength( 650nm,780nm,800nm,850nm,880nm )

\* Please contact us for products handling wavelengths other than the ones given above.

## Optical power meter



### OPM-360

For fiber light( long wavelength 2 ranges )  
Optical SC type fiber connector

Direct reading 2 wavelength ranges( 1310/1550nm )  
2 types power supply( AC adapter or inner re-chargeable battery )  
4 digits digital display( -60.00 ~ 0.00dBm/1nW ~ 1mW )  
Consult us regarding FC type connector.

DATA HOLD REL

Display	4-digit digital
Measurable wavelengths	1310/1550nm( 2 ranges )
Optical power measuring range	-60.00 ~ 0.00dBm/1.00nW ~ 1.000mW
Ranges	Automatic
Accuracy	±5% @ reference wavelength of -23dBm/5μW )
Photosensor	InGaAs-Pin photodiode 1mm
Battery	Inner rechargeable battery or AC adapter( AD-30 )
Size / Weight	H164 x W85 x D35mm/400g
Standard accessories included	AC adapter( AD-30 ), Instruction manual
	Accuracy : 18 ~ 25 max. 80% RH no condensation



### OPM37LAN

For fiber light( short wavelength 5 ranges )  
Optical FC type fiber connector

dBm and W measurement  
Relative value  
Offsetting, data averaging( 20-data sequential averaging )  
Direct reading wavelength( 650, 780, 800, 850, 880nm )  
RS-232C interface  
Various connectors can be equipped by changing optical connector adapter.  
2m long sensor extension cord

DATA HOLD REL

Display	4-digit digital
Ranges	Automatic, 8 ranges
Optical sensor	Si photodiode( sensor surface area 5.8 x 5.8mm )
Optical power measuring range	-60.00dBm ~ +13.00dBm 1.000nW ~ 20.00mW
Optical input type	Direct to photodiode
Reference wavelengths	650nm, 780nm, 800nm, 850nm, 880nm
Accuracy	±5% @ reference wavelength of -20dBm/10μW )
Resolution	dBm/dB( REL )mode : 0.01dB W/W( REL )mode : 0.01%
Measuring cycle	3.33 times/sec.
Battery	006P type Alkaline battery or AC adapter( AD-30 )
Size / Weight	Main body : H164 x W85 x D35mm/300g Sensor head : 25 x 26mm/25g
Standard accessories included	Optical sensor, Extension cord, AC adapter( AD-30 ) FC-type( F01 )connector adapter, Instruction manual
	Accuracy : 18 ~ 25 max. 80% RH no condensation

### Optional accessories

RS232C cable : KB-RS-OPM  
SC-type optical connector adapter : OPA-F04  
Simplex TOSLINK type optical connector adapter : OPA-F05  
Consult us regarding other type of connector.



Sensor extension cord( 2m )

## Lux Meter



### LX2

Easy to use lux meter

Small stick shape sensor probe( sensor diameter 9mm )  
3999 count with analog bar graph  
Silicon photodiode  
Measuring range 0.1lx ~ 399.9klx  
Data hold  
Auto power save( 30min. )  
Cord length 900mm

APS DATA HOLD

Optical sensor	Si photodiode with approximated relative luminous efficiency( 9mm )
Display	Numeric : 3999 full scale, Bargraph:42-segment
Sampling rate	Approx. 2 times/sec. for numeral display. Approx. 20 times/sec. for bar graph.
Measuring range	400.0/4000/40.00k/400.0klx ± ( 7%+1 ) below 3000 lx ± ( 10.5%+1 ) 3000 lx or higher Compatible JIS standard A class 23 ±2
Temperature Characteristics	±5% at 23 within operating temperature/humidity range
Relative spectral sensitivity	Approximation of spectral luminous efficiency of the standard photometric observer
Grazing-incidence light characteristics	Cosine curve approximation
Battery	SR-44 or LR-44 x 2
Power consumption	Approx. 10mW
Operating temperature	0 ~ 40 max. 80% RH no condensation
Storage temperature	-10 ~ 50 max. 80% RH no condensation
Size / weight	Main body : H117 x W76 x D18mm/ approx. 120g Sensor probe : H84 x W16 x D10mm
Standard accessories included	Instruction manual

## mobiken Series

Pocket size meter but with high accuracy and wide ranges. Sensor / Probes can be all neatly contained and protected within the folding case. Easy to carry in a shirt pocket.



### LX3132

Max 10000 lux measurable

Various light source can be measured such as filament lamp, fluor lamp, and mercury lamp.  
Silicon photodiode  
Taut-band drop shock proof meter

### Optional accessories

Carrying case : C-01



## Laser power meter



### mobiken Series

Pocket size meter but with high accuracy and wide ranges. Sensor / Probes can be all neatly contained and protected within the folding case. Easy to carry in a shirt pocket.

#### LP1

Optical power up to max. 40W measurable  
Direct reading wavelength customization

Wide optical power measurement range :  
Silicon photodiode  
Sensor can be all neatly contained and protected within the folding case.  
Max / Min hold  
Auto power save( 30min. )  
500mm sensor cord

##### Wavelength customization

The standard LP1 is calibrated at 633 nm but can also read any other wavelength in the 400 ~ 1100 nm range using a chart inside the case cover.

We can calibrate directly to any other 400 ~ 1100 nm wavelength for special orders, with a 4 month lead time, so please contact our authorized agent if necessary.

APS Max HOLD

Optical sensor	Si photodiode( 9mm )
Wavelength range	400nm ~ 1100nm
Wavelength	633nm( He-Ne laser reference wavelength ) Convert by a table of spectral sensitivity characteristic( representing value )
Display	Numeric: 3999 full scale, Bargraph : 42-segment
Sampling rate	Approx. 2 times/sec. for numeral display. Approx. 20 times/sec. for bar graph.
Measuring range	40.00u/400.0u/4.000m/40.00mW
Accuracy	± 5%( 1mW : 4mW range, 633nm ) 23 ± 2
Battery	SR-44 or LR-44 x 2
Power consumption	Approx. 6mW
Operating temperature	0 ~ 40 max. 80% RH no condensation
Storage temperature	-10 ~ 50 max. 80% RH no condensation
Size / weight	H117 x W76 x D18mm/ approx. 120g Sensor probe : H84 x W16 x D10mm
Standard accessories included	Instruction manual



#### OPM-572( with case )

For He-Ne, argon, and semiconductor laser

IR beam visual check sensor  
No power source / battery necessary.  
Output terminal for optical wave monitoring  
Direct reading wavelength( 485 ~ 515/610 ~ 640/650 ~ 690/760 ~ 830nm )

Indicator	Taut-band Meter
Measurable wavelengths	485 ~ 515/610 ~ 640/650 ~ 690/760 ~ 830nm( 4 ranges )
Optical power measuring range	0.01 ~ 30mW
Ranges	0.3/1/3/10/30mW( 5 ranges )
Accuracy	± 5% of full scale( @ reference wavelength )
Photosensor	Si photodiode( IR beam visual sensor )
Size / Weight	H163 x W100 x D48mm/280g Sensor head : H126 x W15 x D4mm/40g
Standard accessories included	Carrying case( C-01 ), Analog output cords( red and black ) Instruction manual



#### OPM-572MD( with case )

For He-Ne, semiconductor, and MD laser

Stick sensor and MD ( Mini Disk ) shape sensor are attached.  
No power source / battery necessary.  
Output terminal for optical wave monitoring  
IR beam visual check sensor

Indicator	Taut-band Meter
Measurable wavelengths	610 ~ 640/650 ~ 690/760 ~ 830nm( 3 ranges ), 760 ~ 830nm for MD
Optical power measuring range	0.01 ~ 30mW
Ranges	0.3/1/3/10/30mW( 5 ranges )
Accuracy	± 5% of full scale( @ reference wavelength )
Photosensor	Si photodiode( IR beam visual sensor ) H163 x W100 x D48mm/280g Sensor head : H126 x W15 x D4mm/40g MD photosensor( equivalent to the shape of Mini Disk )
Standard accessories included	Carrying case( C-01 ), Analog output cords( red and black ) Instruction manual



#### OPM35S

For space light measurement

Silicon photodiode  
Measurable up to 50.00mW  
Relative value  
Max hold, data averaging( 20-data sequential averaging )  
Direct reading wavelength( 488, 633, 670, 780, 830nm )  
RS-232C interface

##### Optional accessories

RS232C cable : KB-RS-OPM

REL Max HOLD

Display	4-digit digital
Ranges	Automatic, 5 ranges
Optical sensor	Si photodiode( sensor surface area 10x10mm )
Optical power measuring range	0.001μW ~ 50.00mW
Optical input type	Direct to photodiode
Reference wavelengths	488nm, 633nm, 670nm, 780nm, 830nm
Accuracy	± 5%( @ reference wavelength of 100μW )
Resolution	W/REL mode : 0.01%
Measuring cycle	3.33 times/sec.
Battery	006P type Alkaline battery or AC adapter( AD-30 )
Size / Weight	H164 x W85 x D35mm/300g Sensor head : H126 x W15 x D4mm/40g
Standard accessories included	Optical sensor, AC adapter( AD-30 ), Instruction manual

Accuracy : 18 ~ 25 max. 80% RH no condensation

## Cord Tester



#### CS-10VB

Multiple Cord Tester

Continuity, faint open circuit, insulation between terminals of multiple cords  
Test voltage DC250/500V for insulation  
Faulty data hold  
LED and buzzer for judgment

Type	2 ~ 10 line type
Test voltage	Continuity : DC12V Insulation : DC250/500V
Test value( resistance )	1M ~ 500M
Resolution	LED( green )blink, buzzer
Notes	For multiple cables
Size / Weight	H175 x W345 x D220mm/5kg
Standard accessories included	Adopter box( CSB-2 ), Instruction manual



#### OPM36M

For DVD-RAM, CD, MD laser power measurement

Silicon photodiode  
Stick type sensor for DVD-RAM, CD, and MD is included as a standard accessory.  
Measurable up to 50.00mW  
Relative value  
Max hold, data averaging( 20-data sequential averaging )  
Direct reading wavelength ( 633nm for DVD, 780nm for CD&MD )  
RS-232C interface

##### Optional accessories

RS232C cable : KB-RS-OPM

REL Max HOLD

Display	4-digit digital
Ranges	Automatic, 5 ranges
Optical sensor	Si photodiode( sensor surface area 10x10mm )
Optical power measuring range	0.001μW ~ 50.00mW
Optical input type	Direct to photodiode
Reference wavelengths	Wavelengths used by DVD( 633 ~ 650nm ), CD( 780nm ), MD( 780nm )
Accuracy	± 5%( @ reference wavelength of 100μW )
Resolution	W/REL mode : 0.01%
Measuring cycle	6.66 times/sec.
Battery	006P type Alkaline battery or AC adapter( AD-30 ) H164 x W85 x D35mm/300g CD sensor : H126 x W15 x D4mm/40g MD sensor : H68 x W72 x D6mm/30g DVD-RAM sensor : H123 x W138 x D8mm/80g
Size / Weight	
Standard accessories included	DVD-RAM sensor, MD sensor CD/DVD-ROM sensor( stick type ), AC adapter( AD-30 ), Instruction manual

Accuracy : 18 ~ 25 max. 80% RH no condensation



#### CAD-3L

3-Line Type Cord Tester

Continuity and insulation between each couple of 2 lines( 1-2, 2-3, and 1-3 )  
Resistance value setting dial equipped  
Test voltage DC100/250/500V for insulation  
Automatic and manual mode  
LED and buzzer for judgment

Type	3 line type
Test voltage	Continuity : AC10kHz Insulation : DC100/250/500V
Test value( resistance )	1M ~ 1000M
Resolution	LED( green )blink, buzzer
Notes	For 3 plug lines
Size / Weight	H155 x W375 x D230mm/3.4kg
Standard accessories included	Adopter box( CAD-3 ), Instruction manual



#### OPM-570L( with case )

For semiconductor laser

Wavelength 650 ~ 680nm visible semiconductor laser  
Wavelength 760 ~ 830nm infrared semiconductor laser  
No power source / battery necessary.  
4mm thick sensor head

Indicator	Taut-band Meter
Measurable wavelengths	760 ~ 830nm/650 ~ 680nm( 2 ranges )
Optical power measuring range	0.01 ~ 10mW
Ranges	0.3/1/3/10mW( 4 ranges )
Accuracy	± 5% of full scale( @ reference wavelength )
Photosensor	Si photodiode
Size / Weight	H163 x W100 x D46mm/250g Sensor head: H126 x W15 x D4mm/40g
Standard accessories included	Carrying case( C-01 ), Instruction manual



#### CAD-2L

Cord Tester

Insulation and continuity of mass-produced cord with plugs  
Test voltage DC100/250/500V for insulation  
Automatic and manual mode  
LED and buzzer for judgment

Type	2 line type
Test voltage	Continuity : AC10kHz CAD-2M Insulation : DC1000V CAD-2L Insulation : DC 100/250/500V
Test value( resistance )	1M ~ 1000M
Resolution	LED( green )blink, buzzer
Notes	For 2 plug lines
Size / Weight	H155 x W375 x D230mm/3.3kg
Standard accessories included	Adopter box( CAD-2 ), Instruction manual

# Tachometers/Speed Meters

# Calibrators

## Tachometer

### SE-200

Contact type digital tachometer



Ergonomic design & palm size  
Easy to use contact type  
One push button operation  
Auto data hold for 10 sec.  
Auto power off

#### DATA HOLD

SE-200	
Measuring range	60 - 20000rpm 1 - 333rps
Accuracy	x 1 range : ± 1dgt, x 10 range : ± 2dgt
Measuring method	Contact
Display	9999( LED display )
Battery	R6P x 4
Size	183 x 42 x 31mm
Weight	Approx. 210g
Standard accessories included	Contact adaptor( SE-200AD ) Contact rubber tip( SE-210AD ) Hexagonal wrench( SE-220AD ) Instruction manual

#### Optional accessories

Carrying case : C-SE2  
Tangential speed ring : SE-10( circumference 10cm, width 10mm ),  
SE-0.9( circumference 10cm, width 0.9mm )

### SE-100

Non contact type digital tachometer



Ergonomic design & palm size  
Free of measuring error, non contact type  
One push button operation  
Auto data hold for 10 sec.  
Auto power off  
LED to check right detection

#### DATA HOLD

SE-100	
Measuring range	60 - 50000rpm 1 - 833rps
Accuracy	x 1 range : ± 1dgt, x 10 range : ± 2dgt
Measuring method	Non contact
Display	9999( LED display )
Detection distance	10 - 150mm
Battery	R6P x 4
Size	170 x 42 x 31mm
Weight	Approx. 170g
Standard accessories included	Reflective mark 20 sheets, Instruction manual

#### Optional accessories

Carrying case : C-SE2  
Reflective mark : 20marks x 5sheets( total 100marks )

## Speed Meter

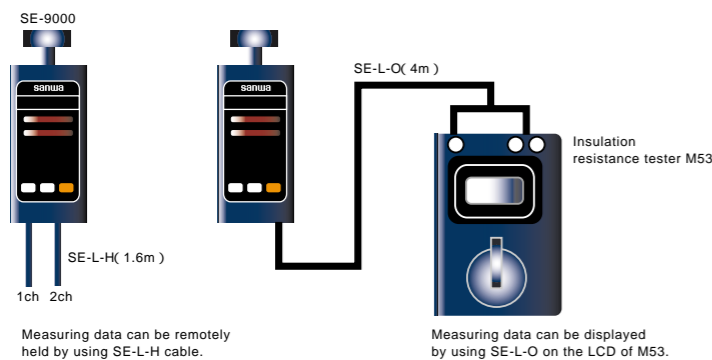
### SE-9000 SE-9000M( with external encoder )

For elevator maintenance, 2ch display

Suitable for elevator speed measurement of high building  
2 independent display  
Analog output terminal to record measuring data  
2 external hold terminals for remote control  
Remote control by external encoder  
Easy to read LED display  
Auto power off  
Low battery power alarm



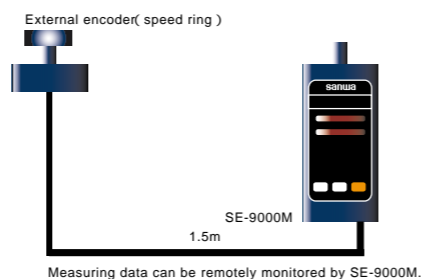
Remote control by SE-9000 / SE-9000M



#### AP OFF DATA HOLD

Measuring range	0 - 1999.9m/min. 4-digit Red LED display( 2 ch. X Max 999.9 ) ( LED at upper left in the display will blink when the measured value exceeds 999.9m/min. )
Measuring time	0.2 sec.( sampling time )
Accuracy	± 2dgt
Analog output	DC0 - 1999.9mV( at 0m/min. - 1999.9m/min. ) Analog output accuracy : ± ( 0.5% ± 1mV )
Data hold	Ch.1, Ch.2 isolated Operation by main switch or external hold switch
Auto power off	After 3 minutes of no operation except for during measurement
Battery	R6P x 4( with battery alarm )
Size / Weight	H174 x W50 x D50MM/Approx. 480g
Standard accessories included	Speed ring thickness 10mm( SE-10 ) x 1 Speed ring thickness 0.9mm( SE-0.9 ) x 1 Cord for hold input ( SE-L-H ) x 2 Cord for analog output( SE-L-O ) x 1 Hex wrench x 1, Carrying case ( C-SE ) x 1 External encoder ( speed ring ) x 1( SE-9000M only ) Instruction manual

Remote control by external encoder( SE-9000M only )



### STD5000M( Order production )



#### Overview

The STD5000M is a calibrator with soft touch buttons that can generate a desired DC voltage / current, AC voltage / current, resistance, frequency, etc. with a high degree of accuracy and stability.  
The STD5000M is with a memory function allowing a broad range of uses for the device.

#### Ranges

Voltage( DC·AC ) : 0 - 1000V( 6 ranges )  
Current( DC·AC ) : 0 - 2000mA( 6 ranges )  
Resistance1 : 0 - 500k ( 10 steps )  
Resistance2 : 24 steps fixed resistance value( 4 kinds 6 ranges )  
Hz : 30Hz - 999kHz( 5 ranges )

#### Features

High accuracy ± 0.03%( DCV DC mA )  
Reliable accuracy is achieved by using the standard voltage IC with a constant-temperature bath for the reference voltage and wire wound resistor and metal film resistor with high tolerance and low temperature coefficient for the resistance element.  
Calibrates 6 types of functions  
With the calibration elements of 6 functions( DCV, ACV, DCA, ACA, OHM, Hz ) incorporated, it can be used for calibrating and maintaining the DMM, DPM( digital power meter ), circuit tester and industrial instruments.  
Installs 90 ( 6x15 ) output memories  
With 90 ( 6x15 ) output memories installed, it is possible to save desired setting.  
User-friendly speedy operability  
Use of soft-touch push button switches for operation on the panel( except the power switch ). Use of semiconductor switches with greater heat resistance and durability for change switches of the circuit, and latch-type relays requiring less electro motive force.  
With overload protection device  
To enhance security, overload protection in case of low voltage and current generation is performed on the semiconductor circuit, and overload protection in case of medium and high voltage generation( 50V or more ) is achieved by releasing the output terminal and circuit.

### STD-2000( Order production )



#### Overview











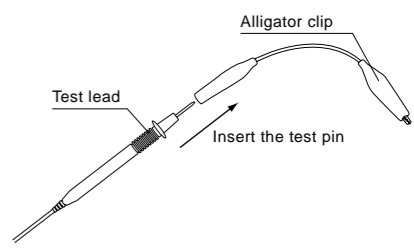

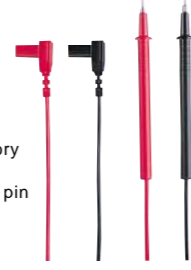













Desired value setting is possible by choosing a number for each digit.  
Five ranges can be switched respectively for each function of DC current, DC voltage, AC voltage, and AC current. The resistance is comprised of two types of terminals: a common terminal for 0-200k and 10 steps, and a terminal dedicated for switching of 6 ranges between 190 and 19M .

Function	Measuring range	Generation range	Resolution	Set accuracy	Maximum load
DCV	50mV	0 - 50mV	1µV	± ( 0.05%+30µV )	10mA
	500mV	0 - 500mV	10µV	± ( 0.03%+30µV )	
	5V	0 - 5V	100µV	± ( 0.03%+20µV )	
	50V	0 - 50V	1mV	± ( 0.03%+2mV )	
	500V	0 - 500V	10mV	± ( 0.03%+20mV )	
	1000V	0 - 1000V	100mV	± ( 0.05%+0.3V )	
ACV	50mV	0 - 50mV	1µV	± ( 0.05%+50µV )	10mA
	500mV	0 - 500mV	10µV	± ( 0.06%+100µV )	
	5V	0 - 5V	100µV	± ( 0.06%+4mV )	
	50V	0 - 50V	1mV	± ( 0.06%+4mV )	
	500V	0 - 500V	10mV	± ( 0.06%+40mV )	
	1000V	0 - 1000V	100mV	± ( 0.1%+0.4V )	
DCA	50µA	0 - 50µA	1nA	± ( 0.05%+30nA )	13V
	500µA	0 - 500µA	10nA	± ( 0.05%+2µA )	
	5mA	0 - 5mA	1µA	± ( 0.05%+2µA )	
	50mA	0 - 50mA	10µA	± ( 0.05%+20µA )	
	200mA	0 - 200mA	100µA	± ( 0.1%+300µA )	
	500µA	0 - 500µA	1nA	± ( 0.12%+60nA )	
ACA	50µA	0 - 50µA	1nA	± ( 0.12%+80nA )	13V
	500µA	0 - 500µA	10nA	± ( 0.1%+0.5µA )	
	5mA	0 - 5mA	100nA	± ( 0.1%+0.5µA )	
	50mA	0 - 50mA	1µA	± ( 0.1%+5µA )	
	500mA	0 - 500mA	10µA	± ( 0.1%+50µA )	
	2000mA	0 - 2000mA	100µA	± ( 0.15%+0.5mA )	
OHM1	40 - 99.9Hz	0.1Hz		± 0.01%	13V
Frequency	40 - 999Hz	1Hz		#	
	40 - 9.99kHz	10Hz		#	
	0 - 99.9kHz	100Hz		#	
	0 - 999kHz	1kHz		#	
	0 - 7V	0.1V		± 0.5%+0.4V	
	Function	Measuring range	Accuracy		
OHM2	160/260/360/460	± ( 0.05%+0.1 )			
	1.6k/2.6k/3.6k/4.6k	± ( 0.05% )			
	16k/26k/36k/46k	± ( 0.05% )			
	160k/260k/360k/460k	± ( 0.05% )			
	1.600k/2.600k/3.600k/4.600k	± ( 0.05% - 0.08% )			
	16M/26M/36M/46M	± ( 0.05% - 0.2% )			
Memory	6 x 15( 90 )				
50mV adjust digit	4-1/2 digit( except for 700V, 700mA, OHM2 )				
Max. display	50099				
Output adjust	LOCAL( surface panel )				
Operating range	23 ± 3 below 70%RH				
Preheating time	30 - 60m.				
Power supply	AC100V ± 10%, 50Hz, 60Hz				
Power consumption	30VA				
Protection	DC/AC20V UP range with over-load protection circuit/reset switch DC/AC0.2/2V, DC/ACmA with over-load protection circuit				
Size / Weight	H180 x W480 x D580mm/25kg				
Standard accessories included	Instruction manual				

Function	Measuring range	Best accuracy
DCV	0.2/2/20/200/700( V )	± ( 0.05% + 2 )
ACV	0.2/2/20/200/700( V )	± ( 0.1% + 4 )
DCA	0.2m/2m/20m/200m/700m( A )	± ( 0.05% + 2 )
ACA	0.2m/2m/20m/200m/700m( A )	± ( 0.05% + 3 )
Resistance1	0 - 200k	± ( 0.05% + 3 )
Resistance2	190/1.9k/19k/190k/1.9M/19M( )	± ( 0.05% )
Power supply	AC100V ± 10%, 50Hz, 60Hz	
Power consumption	30VA	
Insulation	Connecting at 1000pF/10M between circuit earth and case( DCV20VUP:0.22µF/10M )	
Size / Weight	H192 x W483 x D499mm/14.5kg	
Standard accessories included	Instruction manual	

Use of electronic soft-touch push button switches except the power switch.  
Speedy value setting and operation are possible. The relay of the low thermal electromotive force type and semiconductor switch are used for circuit switches to enhance heat resistance and durability.  
Overload protection in case of low voltage and current is performed on the semiconductor circuit, and overload protection in case of medium and high voltage is achieved by releasing the output terminal and output voltage circuit to assure safety. When overload current runs in the voltage range of 20V or more, the LED for DC and AC resetting lights up to give warning.



<p><b>Test lead</b></p> <p><b>TL-21</b></p>  <p>IEC1010 CAT. 600V CAT. 1000V Length 1m Clip adapter CL-11 TL-8IC CL-15</p>	<p><b>TL-21M</b></p>  <p>0.7mm shape-memory alloy test pin Exchangeable 2mm pin Length 1m Clip adapter CL-11 TL-8IC CL-15</p>	<p><b>TL-61</b></p>  <p>Length 0.9m Clip adapter CL-11 TL-8IC</p>	<p><b>Clip adapter</b></p> <p><b>CL-11</b></p>  <p>Alligator clip ( use with test leads by inserting pins into socket ) ( small size ) Length 0.2m</p>	<p><b>CL-13</b></p>  <p>Alligator clip ( use with test leads by inserting pins into socket ) IEC1010 CAT. 1000V Length 70mm</p>	<p><b>CL-15</b></p>  <p>Alligator clip ( use with test leads by inserting pins into socket ) ( big size ) Length 0.2m</p>
<p><b>TL-82</b></p>  <p>IEC1010 CAT. 1000V Length 1m Clip adapter CL-13</p>	<p><b>TL-84</b></p>  <p>Length 0.9m Clip adapter CL-11 TL-8IC</p>	<p><b>TL-88</b></p>  <p>IEC1010 CAT. 600V Length 1.1m Clip adapter CL-11 TL-8IC</p>	<p><b>TL-8IC</b></p>  <p>IC clip ( use with test leads by inserting pins into socket ) Length 0.2m</p>	<p><b>Clip lead for hFE measurement</b></p> <p><b>CL-506</b></p>  <p>Length 0.3m</p>	<p>How to use : CL-11, CL-13, CL-15, TL-8IC</p> 
<p><b>TL-91</b></p>  <p>Length 1m Clip adapter CL-11 TL-8IC</p>	<p><b>TL-91M</b></p>  <p>TL-61 and TL-91 are compatible 0.7mm shape-memory alloy test pin Exchangeable 2mm pin Length 1m Clip adapter CL-11 TL-8IC</p>	<p><b>TL-95</b></p>  <p>4mm pin at body side Length 1m Clip adapter CL-11 TL-8IC</p>	<p><b>AC adapter</b></p> <p><b>AD-72AC( 220V )</b> <b>AD-71AC( 100V )</b></p>  <p>Length 1.9m</p>	<p><b>Optical link</b></p> <p><b>KB-LAN</b></p>  <p>Optical link LAN adapter AC adapter for this item included Length 1.3m</p>	<p><b>KB-USB1</b></p>  <p>Optical link USB PC connection cable Length 1.3m</p>
<p><b>TL-507</b></p>  <p>Length 1m</p>	<p><b>TL-508S</b></p>  <p>Length 1m</p>	<p><b>TL-M54</b></p>  <p>Length 1m</p>	<p><b>KB-USB2</b></p>  <p>Optical link USB PC connection cable Length 1.5m</p>	<p><b>KB-RS1</b></p>  <p>Optical link RS-232C PC connection cable Length 1.9m</p>	<p><b>KB-RS2</b></p>  <p>Optical link RS-232C PC connection cable Length 1.9m</p>
<p><b>TL-100-OM</b></p>  <p>Length 1m</p>	<p><b>HV probe</b></p> <p><b>HV-10</b></p>  <p><b>HV-20</b> 480M resistor Measurement for 0 ~ 30kV or 25kV Length 1m</p>	<p><b>HV-50</b></p>  <p><b>HV-60</b> 1000M resistor Measurement for 0 ~ 30kV or 25kV Length 1.2m</p>	<p><b>PC Link Plus / PC Link</b></p> <p><b>PC Link Plus</b> <b>PC Link</b></p>  <p>CD-ROM</p>	<p><b>PC Communication Set</b></p> <p><b>A : KB-RS1 + PC Link</b> <b>B : KB-RS2 + PC Link</b> <b>C : KB-USB1 + PC Link</b> <b>D : KB-USB2 + PC Link</b></p>	

Temperature sensor

T-THP



-20 ~ 200  
Thermistor probe  
Sensor : 2.5 x 31mm  
Length 0.9m

T-300PC



-50 ~ 300  
Platinic thin film  
Sensor : 3.2 x 135mm  
Length 2.2m  
Accuracy : ± 1.9

K-250PC



-50 ~ 250  
Linear thermocouple K type  
Length 1m

Carrying case

C-CA



180 x 150 x 50mm

C-C7  
C-SP



165 x 140 x 50mm  
Soft case

C-CD



190 x 145 x 70mm

K-8-250



-50 ~ 250  
Surface shape thermocouple K type  
Sensor : 15 x 16mm  
Length 1m

K-8-300



-50 ~ 300  
Sheath shape thermocouple K type  
Sensor : 3.1 x 150mm  
Length 1.2m

K-8-500



-50 ~ 500  
Surface shape thermocouple K type  
Sensor : 15 x 16mm  
Length 1m

C-CDS



175 x 110 x 45mm

C-CP



130 x 120 x 30mm

C-DA



160 x 125 x 45mm

K-8-650



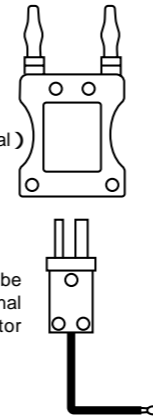
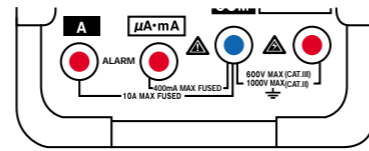
-50 ~ 650  
flexible thermocouple K type  
Sensor : 1 x 300mm  
Length 1.4m

K-8-800



-50 ~ 800  
Sheath shape thermocouple K type  
Sensor : 3.1 x 150mm  
Length 1.2m

To use K8 series,  
K-AD adapter is required.



C-SPH



160 x 150 x 55mm

C-YS



160 x 140 x 40mm

C-CL



190 x 90 x 45mm  
Soft case

K-AD



Thermocouple K type adaptor for connecting to  
K-8-250 ~ K-8-800  
Length 50mm

Notice :

RD700 / 701 can only measure  
-20 ~ 300 ( max ) regardless of the  
specification of temperature probe.  
Accuracy of K-8-XXX  
-40 ~ 330 : ± 2.5  
330 ~ 1200 : ± 0.75% of measured  
temperature

K-AD ( optional )

K type temperature probe  
with international  
miniature connector

C-PC10/S



240 x 155 x 65mm

C-NH7

Picture not available

180 x 140 x 60mm

T-450



-50 ~ 450  
Platinic thin film  
Sensor : 3.2 x 135mm  
Length 1.7m

K-600



-50 ~ 600  
Sheath shape thermocouple K type  
Sensor : 1.6 x 150mm  
Length 2.3m

K-1000



-50 ~ 1200  
Sheath shape thermocouple K type  
Sensor : 4.8 x 500mm  
Length 2.6m

Holster

H-70



H-50



### Digital Multimeter comparative chart

Model	PC5000	PC520M	PC510	PC500	PC20	RD700 / 701
Digit	50000/500000	5000	5000	5000	4000	4000
Category	CAT. 600V	CAT. 600V	CAT. 600V	CAT. 600V	CAT. 600V	CAT. 600V
CE						
Range	A/M	A/M	A/M	A/M	A/M	A/M
DCV( V )	500m 5 50 500 1000 -	50m 500m 5 50 500 1000	50m 500m 5 50 500 1000	50m 500m 5 50 500 1000	400m 4 40 400 1000 -	400m 4 40 400 1000 -
ACV( V )	500m 5 50 500 1000 -	50m 500m 5 50 500 1000	50m 500m 5 50 500 1000	50m 500m 5 50 500 1000	4 40 400 750 - -	400m 4 40 400 1000 -
DCA( A )	500 μ 5000 μ 50m 500m 5 10	500 μ 5000 μ 50m 500m 5 10	500 μ 5000 μ 50m 500m 5 10	500 μ 5000 μ 50m 500m 5 10	400 μ 4000 μ 40m 400m 4 10	400 μ 4000 μ 40m 400m 4 10
ACA( A )	500 μ 5000 μ 50m 500m 5 10	500 μ 5000 μ 50m 500m 5 10	500 μ 5000 μ 50m 500m 5 10	500 μ 5000 μ 50m 500m 5 10	400 μ 4000 μ 40m 400m 4 10	400 μ 4000 μ 40m 400m 4 10
Resistance( Ω )	500 5k 50k 500k 5M 50M -	50 500 5k 50k 500k 5M 50M	50 500 5k 50k 500k 5M 50M	50 500 5k 50k 500k 5M 50M	400 4k 40k 400k 4M 40M -	400 4k 40k 400k 4M 40M -
Capacitance( F )	50n 500n 5 μ 50 μ 500 μ 9999 μ	50n 500n 5 μ 50 μ 500 μ 9999 μ	50n 500n 5 μ 50 μ 500 μ 9999 μ	50n 500n 5 μ 50 μ 500 μ 9999 μ	40n 400n 4 μ 40 μ 100 μ -	500n 5 μ 500 μ 3000 μ -
Temperature( °C )min		-50	-50			-20
Temperature( °C )max		1000	1000			300
Frequency( Hz )min	5	5	5	5	-	50
Frequency( Hz )max	200k	125k	125k	125k	-	1M
Logic frequency( Hz )min	5	-	-	-	-	-
Logic frequency( Hz )max	2M	-	-	-	-	-
Continuity	BUZZER	BUZZER	BUZZER	BUZZER	BUZZER	BUZZER
Diode test						
Duty cycle		-	-	-	-	-
dBm		-	-	-	-	-
Auto power off					-	
Auto power save	-	-	-	-	-	-
Battery check	-	-	-	-	-	-
Data hold						
Range hold						
Peak hold		-	-	-	-	-
Relative value		-	-	-	-	-
4 - 20mA %		-	-	-	-	-
True RMS( AC+DC )		-	-	-	-	-
True RMS( AC )					-	RD701 Only
Auto zero adjust	-				-	-
Bar graph			ZOOM			
Max/Min		-	-	-	-	-
PC link						
Optional AC adapter connection	-	-	-	-	-	-
Dimension( H )mm	179	179	179	179	167	179
Dimension( W )mm	87	87	87	87	90	87
Dimension( D )mm	55	55	55	55	48	55
Weight( g )	460	460	460	460	330	460

Optional accessory is necessary.

### Digital Multimeter comparative chart

Model	CD751	CD731	CD721	CD750P	CD800a	DA-50C
Digit	3200	3200	3200	4000	4000	4000
Category	CAT. 600V	CAT. 600V	CAT. 600V	CAT.III 600V	CAT. 600V	-
CE						
Range	A/M	A/M	A/M	A	A/M	A/M
DCV( V )	320m 3.2 32 320 1000	320m 3.2 32 320 1000	320m 3.2 32 320 1000	400m 4 40 400 1000	400m 4 40 400 600	400m 4 40 400 600
ACV( V )	3.2 32 320 750 -	3.2 32 320 750 -	3.2 32 320 750 -	4 40 400 750 -	4 40 400 600 -	400m 4 40 400 600
DCA( A )	32 μ 320 μ 3200 μ 32m 320m 20	32 μ 320 μ 3200 μ 32m 320m 20	32m 320m 12 - - -	- - - - -	40m 400m - - -	40m 10 - - -
ACA( A )	32 μ 320 μ 3200 μ 32m 320m 20	32 μ 320 μ 3200 μ 32m 320m 20	32m 320m 12 - - -	- - - - -	40m 400m - - -	40m 10 - - -
Resistance( Ω )	320 3.2k 32k 320k 3.2M 30M -	320 3.2k 32k 320k 3.2M 30M -	320 3.2k 32k 320k 3.2M 30M -	400 4k 40k 4M 40M -	400 4k 40k 400k 4M 40M -	400 4k 40k 400k 4000k 40M -
Capacitance( F )	- - - - -	- - - - -	- - - - -	- - - - -	50n 500n 5 μ 50 μ 100 μ -	- - - - -
Temperature( °C )min	-	-	-	-	-	-
Temperature( °C )max	-	-	-	-	-	-
Frequency( Hz )min	-	-	-	-	5	99.99
Frequency( Hz )max	-	-	-	-	100k	999k
Logic frequency( Hz )min	-	-	-	-	-	-
Logic frequency( Hz )max	-	-	-	-	-	-
Continuity	BUZZER	BUZZER	BUZZER	BUZZER	BUZZER	BUZZER
Diode test						
Duty cycle	-	-	-	-	-	-
dBm	-	-	-	-	-	-
Auto power off	-					
Auto power save		-	-	-	-	-
Battery check	-	-	1.5V	-	-	-
Data hold						
Range hold						
Peak hold	-	-	-	-	-	-
Relative value	-	-	-	-	-	-
4 - 20mA %	-	-	-	-	-	-
True RMS( AC+DC )	-	-	-	-	-	-
True RMS( AC )	-	-	-	-	-	-
Auto zero adjust	-	-	-	-	-	-
Bar graph						
Max/Min	-	-	-	-	-	-
PC link	-	-	-	-	-	-
Optional AC adapter connection	-	-	-	-	-	-
Dimension( H )mm	165.5	165.5	165.5	157.5	176	145
Dimension( W )mm	78	78	78	70	104	82
Dimension( D )mm	41.5	41.5	41.5	38.5	46	30
Weight( g )	315	315	315	220	340	200

http://www.sanwa-meter.co.jp

http://www.sanwa-meter.co.jp

## Digital Multimeter comparative chart

Model	DA32	PM10	PM3	PM7a	PS8a
Digit	3200	3200	4000	4000	4000
Category	-	CAT. 300V	CAT. 500V	-	-
CE	-	-	-	-	-
Range	A/M	A	A	A/M	A/M
DCV( V )	320m	320m	400m	400m	400m
	3.2	3.2	4	4	4
	32	32	40	40	40
	320	320	400	400	400
	600	500	500	500	500
ACV( V )	3.2	3.2	4	4	4
	32	32	40	40	40
	320	320	400	400	400
	600	500	500	500	500
DCA( A )	320μ	-	-	-	-
	3200μ	-	-	-	-
	32m	-	-	-	-
	320m	-	-	-	-
	10	-	-	-	-
ACA( A )	320μ	-	-	-	-
	3200μ	-	-	-	-
	32m	-	-	-	-
	320m	-	-	-	-
Resistance( Ω )	320	320	400	400	400
	3.2k	3.2k	4k	4k	4k
	32k	32k	40k	40k	40k
	320k	320k	400k	400k	400k
	3.2M	3.2M	4M	4M	4M
Capacitance( F )	30M	30M	40M	40M	40M
	-	-	4n	-	-
	-	-	40n	-	-
	-	-	400n	-	-
	-	-	4μ	-	-
Temperature( °c )min	-	-	-	-	-
	-	-	-	-	-
	-	-	-	-	-
	-	-	9.999	-	-
	-	-	60k	-	-
Frequency( Hz )min	-	-	-	-	-
Logic frequency( Hz )min	-	-	-	-	-
Logic frequency( Hz )max	-	-	-	-	-
Continuity	BUZZER	BUZZER	BUZZER	BUZZER	BUZZER
Diode test	-	-	-	-	-
Duty cycle	-	-	-	-	-
dBm	-	-	-	-	-
Auto power off	-	-	-	-	-
Auto power save	-	-	-	-	-
Battery check	-	-	-	-	-
Data hold	-	-	-	-	-
Range hold	-	-	-	-	-
Peak hold	-	-	-	-	-
Relative value	-	-	-	-	-
True RMS( AC+DC )	-	-	-	-	-
True RMS( AC )	-	-	-	-	-
Auto zero adjust	-	-	-	-	-
Bar graph	-	-	-	-	-
Max/Min	-	-	-	-	-
PC link	-	-	-	-	-
Optional AC adapter connection	-	-	-	-	-
Dimension( H )mm	145	117	108	115	115
Dimension( W )mm	82	76	56	57	57
Dimension( D )mm	30	18	11.5	18	18
Weight( g )	200	110	85	85	85

## Clamp Meter comparative chart

Display Type	MINI	AC	AC	AC	AC	DC/AC	DC/AC	DC/AC	DC/AC	MINI	LEAK	LEAK
Model	DCL10	DCM60L	DCM400	DCM2000	CAM600S	DCM400AD	DCM-22AD	DCM2000AD	DCM2000R	DCL20R	DLC-400A	DLC-330L
Digit	6000	1999	4000	2000	-	4000	1999	4000	4000	6000	1999	3200
Category	CAT. 300V	CAT. 300V	CAT. 300V	CAT.III 600V	CAT. 600V	CAT. 300V	-	CAT. 600V	CAT.III 600V	CAT. 300V	-	-
CE	-	-	-	-	-	-	-	-	-	-	-	-
Clamp diameter( mm )	25	21	25	53	36	25	22	53	53	25	38	32
Withstand voltage	3700	3700	3700	5550	5550	3700	2000	5550	5550	3700	2000	2000
Range	A	A	A	M	M	A	M	M	M	A	M	A/M
DCA( A )	-	-	-	-	-	40	20	40	40	-	-	-
	-	-	-	-	-	400	200	400	400	-	-	-
	-	-	-	-	-	-	-	2000	2000	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
ACA( A )	60	200	40	20	6	40	20	40	40	60	20m	30m
	300	600	400	200	15	400	200	400	400	300	200m	300m
	-	-	-	2000	60	-	-	2000	2000	-	2000m	30
	-	-	-	-	150	-	-	-	-	-	20	300
DCV( V )	-	-	400	2	60	400	2	400m	400m	-	200m	-
	-	-	600	20	-	600	20	4	4	-	2	-
	-	-	-	200	-	-	200	40	40	-	20	-
	-	-	-	600	-	-	500	400	400	-	200	-
ACV( V )	-	200	400	2	150	400	2	400m	400m	-	2	-
	-	600	600	20	300	600	20	4	4	-	20	-
	-	-	-	200	600	-	200	40	40	-	200	-
	-	-	-	600	-	-	500	400	400	-	600	-
Resistance( Ω )	-	200	400	200	1k	400	2k	400	400	-	200	-
	-	-	-	2k	100k	-	20k	4k	4k	-	2k	-
	-	-	-	20k	-	-	200k	40k	40k	-	20k	-
	-	-	-	200k	-	-	2000k	400k	400k	-	200k	-
Frequency( Hz )	-	-	-	2000k	-	-	-	4000k	4000k	-	2000k	-
	-	-	-	20M	-	-	-	40M	40M	-	20M	-
	-	-	20 ~ 4k (when clamping)	-	-	-	-	100	100	-	-	-
	-	-	10k (when clamping)	-	-	-	-	1k	1k	-	-	-
Backlight	-	-	4k	-	-	-	-	10k	10k	-	-	-
	-	-	40k	-	-	-	-	100k	100k	-	-	-
	-	-	400k	-	-	-	-	1000k	1000k	-	-	-
	-	-	1M	-	-	-	-	-	-	-	-	-
True RMS	-	-	-	-	-	-	-	-	-	-	-	
Auto power off	-	-	-	-	-	-	-	-	-	-	-	
Peak hold	-	-	-	-	-	-	-	-	-	-	-	
Data hold	-	-	-	-	-	-	-	-	-	-	-	
Range hold	-	-	-	-	-	-	-	-	-	-	-	
Output terminal	-	-	-	-	-	-	-	-	-	-	-	
Bar graph	-	-	-	-	-	-	-	-	-	-	-	
Continuity	-	BUZZER	BUZZER	BUZZER	-	BUZZER	BUZZER	BUZZER	BUZZER	-	-	
Dimension( H )mm	145	187	193	240	221	193	179	240	240	145	205	162
Dimension( W )mm	54	50	50	85	97	50	56	84	84	54	84	64
Dimension( D )mm	28	29	28	34	43	28	26.5	34	34	28	34	23
Weight( g )	120	200	230	350	420	230	140	400	400	120	390	125

## Insulation Resistance Tester comparative chart

Display Type	DIGITAL						
Model	DG6	DG7	DG8	DG9	DG525	DG251	M53
Category	-	-	-	-	-	-	-
CE	-	-	-	-	-	-	-
Test voltage range	2	2	2	2	2	2	2
Insulation resistance	25V/4M·40M	50V/4M·40M	50V/4M·40M	125V/40M·400M	500V/2000M	250V/2000M	500V/200M
( Rated voltage / Maximum scale value )	15V/4M·40M	25V/4M·40M	15V/4M·40M	50V/4M·40M	250V/2000M	125V/2000M	15V/20M
ACV( V )	-	-	-	-	600	600	750
DCV( V )	-	-	-	-	-	-	750
Discharge	-	-	-	-	-	-	-
Backlight	-	-	-	-	-	-	-
Inner battery check	-	-	-	-	-	-	-
Meter structure	-	-	-	-	-	-	-
Data hold	-	-	-	-	-	-	-
Auto power save	-	-	-	-	-	-	-
Auto power off	-	-	-	-	-	-	-
Dimension( H )mm	117	117	117	117	175	175	175
Dimension( W )mm	76	76	76	76	115	115	115
Dimension( D )mm	18	18	18	18	55	55	55
Weight( g )	125	125	125	125	600	600	600

Display Type	ANALOG						
Model	DM1528S	DM5218S	DM1008S	DM508S	PDM508S	DM-1527	DM-5257
Category	CAT. 600V	CAT. 600V	CAT. 600V	CAT. 600V	CAT. 600V	-	-
CE	-	-	-	-	-	-	-
Test voltage range	3	3	1	1	1	3	3
Insulation resistance	1000V/2000M	500V/1000M	1000V/2000M	500V/1000M	500V/100M	1000V/2000M	500V/1000M
( Rated voltage / Maximum scale value )	500V/1000M	250V/500M	-	-	-	500V/1000M	250V/500M
	250V/500M	125V/200M	-	-	-	250V/500M	100V/200M
ACV( V )	600	600	600	600	600	600	600
DCV( V )	60	60	60	60	60	-	-
Discharge	-	-	-	-	-	-	-
Backlight	-	-	-	-	-	-	-
Inner battery check	-	-	-	-	-	-	-
Meter structure	BAND	BAND	BAND	BAND	BAND	BAND	BAND
Data hold	-	-	-	-	-	-	-
Auto power save	-	-	-	-	-	-	-
Auto power off	-	-	-	-	-	-	-
Dimension( H )mm	144	144	144	144	144	175	175
Dimension( W )mm	99	99	99	99	99	118	118
Dimension( D )mm	43	43	43	43	43	55	55
Weight( g )	310	310	310	310	310	520	520

## Analog Multitester comparative chart

Model	EM7000	CX506a	YX-361TR	SH-88TR	AU-32	AU-31	YX360TRF	SP21
Category	CAT. 600V	CAT. 600V	-	-	-	-	CAT. 600V	CAT. 600V
CE	-	-	-	-	-	-	-	-
DCV( V )	0.3	120m	0.1	120m	250m	300m	0.1	0.3
	1.2	3	0.5	3	2.5	3	0.25	3
	3	12	2.5	12	10	12	2.5	12
	12	30	10	30	50	60	10	30
	30	120	50	120	250	300	50	120
	120	300	250	300	500	1000	250	600
	300	1000	1000	1200	-	-	1000	-
	1000	-	-	-	-	-	-	-
ACV( V )	3	3	2.5	3	250m	300m	10	12
	12	12	10	12	2.5	3	50	30
	30	30	50	30	10	12	250	120
	120	120	250	120	50	60	750	300
	300	300	1000	300	250	300	-	600
	750	750	-	1200	500	1000	-	-
DCA( A )	0.12μ	30μ	50μ	50μ	250μ	300m	50μ	60μ
	0.3m	0.3m	2.5m	3m	2.5m	3	2.5m	30m
	3m	3m	25m	30m	25m	-	25m	0.3
	30m	30m	0.25	0.3	250m	-	0.25	-
	300m	0.3	-	-	2.5	-	-	-
	6	-	-	-	-	-	-	-
ACA( A )	6	-	-	-	250μ	300m	-	-
	-	-	-	-	2.5m	3	-	-
	-	-	-	-	25m	-	-	-
	-	-	-	-	250m	-	-	-
	-	-	-	-	2.5	-	-	-
Resistance( Ω )	2k	5k	2k	3k	20k	20k	2k	2k
	20k	50k	20k	30k	200k	200k	20k	20k
	200k	500k	200k	300k	2M	2M	200k	2M
	2M	5M	2M	3M	20M	20M	2M	-
	20M	50M	20M	30M	200M	200M	200M	-
	200M	-	-	-	-	-	-	-
Capacitance( F )	-	0.2μ	-	1000μ	-	-	10μ	500μ
	-	20μ	-	0.01	-	-	-	-
	-	2000μ	-	0.1	-	-	-	-
	-	-	-	1	-	-	-	-
Auto range	-	-	-	-	-	-	-	-
Low frequency output measurement	-	-	-	-	-	-	-	-
Continuity	-	-	LED	LED	-	-	-	BUZZER
Battery check	-	-	1.5V	-	-	-	-	1.5V
Auto polarity	-	-	-	-	-	-	-	-
Meter structure	BAND	BAND	PIVOT	PIVOT	PIVOT	PIVOT	BAND	BAND
Drop shock proof meter	-	-	-	-	-	-	-	-
Zero center meter	-	-	-	-	-	-	-	-
Temperature measurement	-	-	-	-	-	-	-	-
Protection circuit for power line	-	-	-	-	-	-	-	-
hFE	-	-	-	-	-	-	-	-
Dimension( H )mm	165	165	150	150	48	48	159.50	144
Dimension( W )mm	106	106	100	100	110	110	129	99
Dimension( D )mm	46	46	37	36	124	124	41.50	41
Weight( g )	375	370	290	280	290	290	320	270

Optional accessory is necessary.



## Analog Multitester comparative chart

Model	SP20	SP-18D	TA55	CP-7D	AP33	PW-100Fb	VS-100
Category	-	-	-	-	CAT. 300V	-	-
CE	-	-	-	-	-	-	-
DCV( V )	0.25	0.3	0.3	0.25	10	0.1	10
	2.5	3	3	2.5	50	1	50
	5	12	16	10	250	5	250
	10	30	30	50	500	50	500
	50	120	60	250	-	250	-
	100	600	-	500	-	750	-
ACV( V )	10	12	30	10	50	6	10
	50	30	120	50	250	30	50
	250	120	300	250	500	300	250
	500	300	-	500	-	600	500
	-	600	-	-	-	-	-
	-	-	-	-	-	-	-
DCA( A )	50 μ	60 μ	0.5	0.25m	25m	-	-
	2.5m	30m	3	25m	250m	-	-
	25m	300m	30	500m	-	-	-
	0.25	-	-	-	-	-	-
ACA( A )	-	-	-	-	-	-	
Resistance( Ω )	2k	2k	2k	2k	5k	5k	2k
	20k	20k	20k	20k	500k	500k	20k
	200k	200k	200k	1M	-	5M	2M
	2M	2M	2M	-	-	-	-
Capacitance( F )	500 μ	1000 μ	-	-	-	-	
Auto range	-	-	-	-	-	-	
Low frequency output measurement	-	-	-	-	-	-	
Continuity	-	-	BUZZER	-	-	-	
Battery check	1.5V	1.5V	12V	1.5V	1.5V/9V	-	
Auto polarity	-	-	-	-	-	-	
Meter structure	BAND	BAND	BAND	PIVOT	PIVOT	PIVOT	
Drop shock proof meter	-	-	-	-	-	-	
Zero center meter	-	-	-	-	-	-	
Temperature measurement	-	-	-	-	-	-	
Protection circuit for power line	-	-	-	-	-	-	
hFE	-	-	-	-	-	-	
Dimension( H )mm	144	159.5	142	119	126	150	
Dimension( W )mm	99	129	97	85	87	100	
Dimension( D )mm	41	41.5	38	23	30	36	
Weight( g )	270	320	300	140	185	280	

Optional accessory is necessary.

## ISO 9001 ( Quality assurance )

The manufacturing plant of Sanwa Tesmex Co., Ltd. obtained ISO9002 certification from the foundation "Japan Quality Assurance Organization( JQA )" in 1996. In October 2002, Sanwa Electric Instrument Co., Ltd. was organized as one company incorporating the manufacturing division and sales division. In November 2002, the company obtained ISO9001: 2000 certification ( JQA-1453 ).

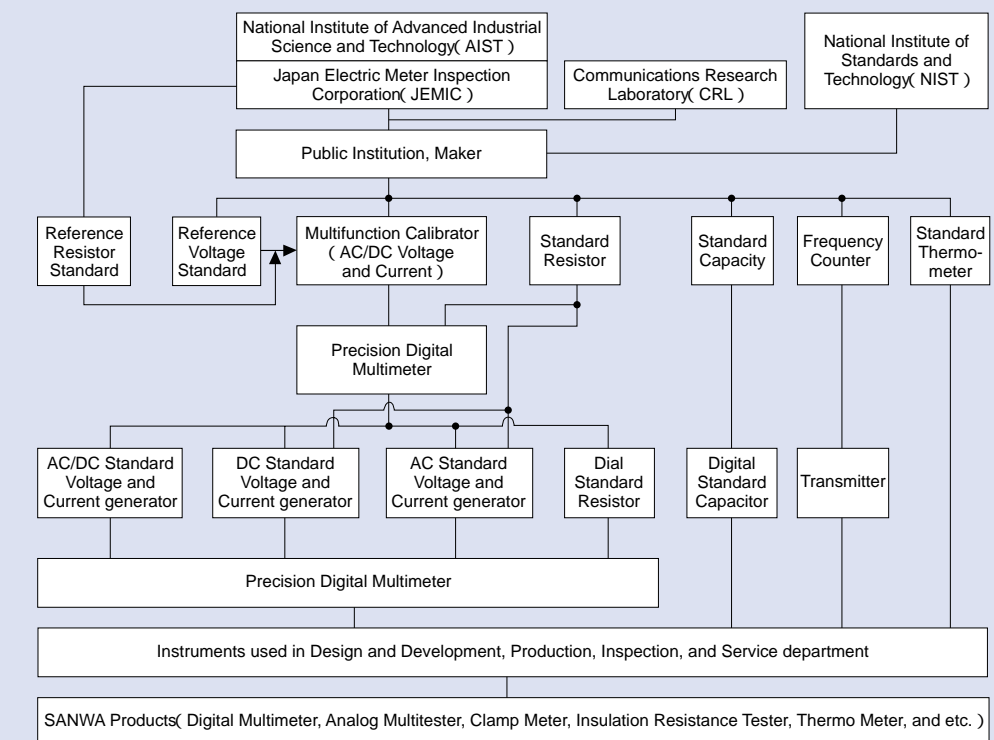
The scope of the registration covers the design, development, production and servicing of multi-meters, clamp meters, insulating-resistance testers, standard generators, light power meters, and laser power meters.



## Traceability

Traceability to prove the compliance with national and international standards is an essential factor for measuring instruments used as test instruments associated with quality assurance. Products of Sanwa are calibrated by reference samples which is periodically checked for its compliance with national standards. A calibration certificate and test data report are available on your request( a fee applies ).

### Traceability Flow Chart



## Repairs and servicing

Please contact an agent of Sanwa in your country for periodic calibration and repairs, which are offered on a chargeable basis. Please refer to the website of Sanwa for Sanwa's authorized agents.

## The International Safety Standard IEC61010

This Safety Standard which is established for protecting operators and environment stipulates safety requirements for measuring instruments and electric equipment. The IEC standard defines the degree of pollution, measurement classification, barrier, material, spatial distance and creepage distance to assure safety. The impulse withstand voltage as transitional energy is estimated from the measurement category and main power supply voltage to conduct tests for measuring instruments.

### Test voltage (impulse withstand voltage)

Nominal AC or DC line of main power supply and neutral voltage	CAT.	CAT.	CAT.
300V	2500V	4000V	6000V
600V	4000V	6000V	8000V
1000V	6000V	8000V	12000V

The output impedance of an impulse generator is 12 in the measurement category , and 2 in measurement categories and .

### CE marking

CE marking is a safety mark which can be attached only on a product meeting the safety requirements of the Directive of Council of the European Union ( EC Directive ). A product attached with the CE mark is designed so as to meet the requirements of the "Low Voltage Directive" and "EMC Directive" of the EC Directive. Low Voltage Directive: This Directive covers products of power supply voltage of 50V-1000V( AC )and 75V-1500V( D-C ), and it defines electric safety requirements against shocks, burns, etc. The applicable standard is EN61010 corresponding to IEC1010 give on the left. EMC Directive: This Directive stipulates conditions so as not to give out strong electromagnetic waves from equipment to the outer environment and to protect equipment from the effect of electromagnetic waves from the outside.

## Measurement category( overvoltage category )

The IEC standard classifies measuring circuits according to measurement categories for the safe use of a measuring instrument in low voltage facilities. The measurement categories are classified into I to IV. A larger number of the category denotes a spot involving higher transient energy. For safe measurement, wear protective gears such as insulated gloves and dust-proof glasses in an environment of CAT.

### Measurement category ( CAT. ):

Equipment used for measurement in low voltage facilities. Temporary overcurrent preventer, and electric measurement on ripple control unit, etc.

### Measurement category ( CAT. ):

Equipment used for measurement in building facilities. Distribution board, circuit breaker, wiring including cables, busbar, junction box, switch, receptacle, and industrial equipment located in fixed facilities, and other equipment such as a fixed motor connected to fixed facilities in a permanent manner.

### Measurement category ( CAT. ):

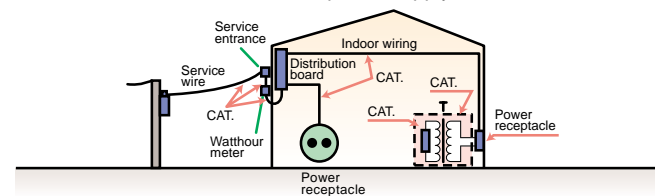
Equipment used for measurement performed on a circuit directly connected to low voltage facilities

Measurement on electric household appliances, portable tools and similar tools

### Measurement category ( CAT. ):

Equipment used for measurement on a circuit not directly connected to main power supply

Circuit not derived from the main power supply



## For safe measurement

### Method for safe use of measuring instrument

#### Multimeter

##### Voltage measurement

Never use a measuring instrument for a measurement category higher than specified. A tester not conforming to the international safety standard is for use with weak current. Never use these testers on a high power circuit of 250V or more ( excluding PW-100Fb, VS-100 ). Referring to measurement categories defined in the IEC standard, use a measuring instrument of equivalent or higher category. For instance, when a measuring instrument is used on a motor of facility of 200V main power supply, which corresponds to Category , use a measuring instrument of CAT. or higher.

##### Current measurement

Use special caution not to input voltage to the current measuring terminal in measurement. In current measurement, a meter is connected in series with the measuring circuit. For this reason, impedance inside the meter is low, thereby possibly causing a short-circuit fault. To prevent such a short-circuit fault and assure safe operation, fuses are installed for protection. Check the protection capability of the fuses. RD700 uses a quick-breaking ceramic fuse of rated voltage 250V and breaking current 1.5kA for the milliamp measuring circuit, which causes the fuse to blow out to prevent short-circuit when the main power supply is 250V or less and short circuit current is 1.5kA or less.

#### Clamp meter

Use all clamp meters for measurement of low voltage circuit of 600V or less. In choosing an appropriate model, special attention should be paid to the current measurement range and diameter of a conductor to be clamped.

#### Insulation resistance tester

The insulation resistance tester cannot be used on an measuring object in live-wire status.

If the measuring voltage is specified, choose a model of the specified voltage. It is a general practice to choose the measuring voltage equivalent to or a little higher than voltage usually applied to the measuring object.

Since the insulating-resistance tester measures resistance values by applying DC high voltage on a measuring object, the measurement may damage the measuring object if voltage is directly applied on the electronic circuit including the IC and LSI. The insulating-resistance tester generates DC high voltage during measurement. If an electric shock occurs, a falling accident from a high altitude may follow. Use special caution in operation at a high altitude. If your measuring instrument is provided with a voltage measuring function, use it at no higher than the maximum measuring voltage.

#### Thermo Meter( Temperature Probe )

The temperature sensor cannot be used for measurement in direct contact with a live part.

Use caution in handling a sharp-edged probe to avoid an injury.

The grip is heated in high temperature measurement. Use an appropriate jig to secure the probe in high temperature measurement.

#### Tachometer · Speed Meter

In measurement on a rotating motor ( measurement of speed for elevator in operation ), risks are involved due to the strong force of the measuring object. Use special caution in measurement to assure safety. Never touch the rotating part during measurement.

#### Laser Power Meter

Infrared semiconductor laser light is invisible to the naked eye. It may occasionally emit high power of 30mW or more, which may threaten vision if eyes are exposed to the light. Use special caution to avoid gazing at the light directly or exposing eyes to reflected light.

## Function marks and terminology used in **sanwa** General Catalog

### Function marks



**True RMS** ( True root-mean-square value )  
True RMS value. AC current and voltage of a non-sine wave can be measured by true RMS values.



**Frequency**  
Expressed in the unit of Hz ( hertz ). Commercial frequency of 50Hz/60Hz can be measured.



**Capacitor**  
Capacitor capacity( electrostatic capacity )is measured and expressed in the unit of F ( farad ),  $\mu$ F, etc.



**Continuity check**  
The LED lights up when the measuring object is electrically conducting.



**Continuity buzzer**  
The buzzer sounds when the measuring object is electrically conducting.



**Battery check**  
Battery voltage is measured and assessed by running a given current.



**hFE**  
Provided with graduations for measuring the DC current amplification factor( hFE )of a transistor.



**4-20mA**  
4-20mA for sending instrumentation signals. Expresses the current loop of 4mA as 0% and 20mA as 100%



**dBm**  
Scaling of voltage values is performed according to the reference impedance into dBm. Convenient for use with audio equipment.



**Temperature measurement**  
Temperature can be measured using the optional probe.



**Temperature measurement with PC Link**  
Temperature can be measured using the optional probe and PC Link software.( T-300PC is necessary. )



**Auto power off**  
Power is automatically turned off when a certain time has elapsed after power-up. Some models have a function to cancel this function.



**Auto power save**  
The display disappears to bring the device into the power-save state when a certain time has passed after power-up. Some models have a function to cancel this function.



**Data hold**  
A value indicated on the display is fixed. It is fixed even after the test lead is removed, and can be used as a record for reference purposes.



**Range hold**  
The range is fixed in the measurement of varying voltage and current which is difficult to read in the auto range.



**Measurement of relative value**  
A certain measured value is assumed as 0 and measured values after that are expressed by positive or negative values relative the value fixed as 0.



**Duty cycle**  
The duty cycle of repeating waveform is indicated on a percentage basis( % ). It can be used for the analysis of control signals.



**Capture( peak hold )**  
The peak value like in-rush current is indicated. The minimum pulse width capturable differs according to models.



**MAX / MIN**  
The minimum value and maximum value of measured values are recorded. The recorded values can be seen later on the display.



**Maximum value hold**  
The maximum value is held and displayed in the measurement of voltage, current and ADP.



**Zoom bar graph**  
The scale is changed so as to allow reading minute changes on the bar graph.



**Correction of resistance of test lead**  
This is a function to cancel the resistance portion of the internal circuit of the main body and test lead in the resistance measurement.



**Auto polarity**  
Puts the indicator at the center in the automatic standby status by the setting of the selector switch so as to allow measurement by positive and negative values.



**Polarity switch**  
The positive and negative polarity of the measuring terminal can be changed by this switch.



**Zero-ohm adjuster**  
Cancels the contact resistance and internal resistance of the test lead to allow the measurement of the resistance value of a measuring object alone.



**Zero-center meter( NULL )**  
Moves the indicator of the analog tester to the center of the scale( meter graduations )to make measurement of positive and negative voltage.



**DC / AC measurable**  
Both ACA and DCA are measurable.



**Drop shock proof**  
The meter element is furnished with a taut band and impact-resistant design enough to withstand a shock of drop.



**Low power ohm**  
Resistance is measured by applying voltage of approximately 0.4V or less on a measuring object. It is characterized by the fact that the semiconductor does not conduct at approximately 0.4V or less even in forward direction.



**Leakage current**  
A clamp meter that can make the measurement of leakage current have a range to allow measurements in milliamp.



**Backlight**  
Allows indicator reading in a dark place.



**Output terminal**  
Cancels the DC current portion of voltage mixed with DC and AC to measure the AC portion alone. It is used for the measurement of audio signals.



**Auto discharge**  
When the measurement of insulating resistance is complete, voltage charged in the measuring object is discharged.



**Scale lighting**  
This is a function for lighting the scale plate. It is the same function as the backlight function of digital display of the LCD.



**RS232C connection**  
The signal output terminal is provided to send data to a PC. RS232C is the name of the signal standard.



**USB connection**  
Data can be outputted by connection to the USB port of a PC.



**Fuse for power supply**  
Current-limiting fuse to break the conduction up to 100kA



**Insulating resistance**  
Insulating resistance can be measured( e.g. 500V/1000M )



**DC voltage**  
Mark for clamp meters with DCV function.

### Glossary

#### Accuracy / Tolerance

Correctness. JIS defines the term "accuracy" to be used for digital testers and "tolerance" for analog testers. The accuracy / tolerance differs depending on the range.

$\pm( \%+ ) = \pm( \%rdg+ dgt )$   
rdg is an abbreviation of "Reading" meaning a read value on digital display. "dgt" is an abbreviation of "Digit" meaning the least unit of digital display. For instance, " $\pm 2dgt$ " refers to error of  $\pm 2$  counts.

#### Full-scale value( fs )

It is the indication of tolerance expressed by percentage values relative to the full-scale value of the range.

#### Scale length

The tolerance in resistance measurement is expressed with reference to the scale length of the range.

#### Frequency characteristic

Frequency range of measurable signals in the measurement of AC voltage and current.

#### Input resistance( Impedance )

Internal resistance between measuring terminals. For instance, it is expressed as "M " with the DMM and as "K /V" with the AMT.

#### Clamp diameter

It gives a guide for the thickness of a clampable wire.

#### Clamp conductor size

Size of a maximum conductor shape.

#### Withstand voltage

It refers to insulating withstand voltage of the measuring instrument itself.

#### Range

The measuring range of a function is sub-divided and expressed as 2V/20V/200V, etc.

#### Auto range

The range is automatically increased or decreased in steps such as 2V/20V/200V and moves to the optimum range for measuring voltage.

#### Live-wire check

When a test lead is set at an insulating resistance measuring point on a measuring object, the ACV measuring status starts to check whether voltage is being supplied.

#### Display digit

Maximum number of display digits of the digital display. 1999 is expressed as 2000. Three and a half digits and four and a half digits are also used.

#### Function

Function for measuring voltage, current, resistance, electrostatic capacity and frequency.

#### Resolution

Displayable minimum value of the last digit. For instance, the resolution of the 1.999V range is 0.001V.