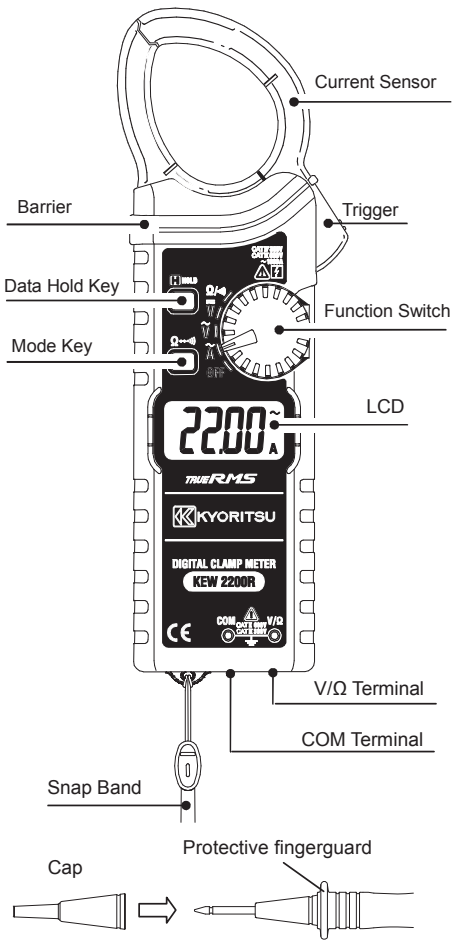
INSTRUCTION MANUAL

DIGITAL CLAMP METER

KEW2200R



Barrier and protective fingerguard
It is a part providing protection against electrical shock and ensuring the minimum required air and creepage distances.
Cap
Test leads can be used under the CAT II and CAT III and CAT IV environments by attaching a protective cap as illustrated below. Use of our protective cap offers different lengths suitable for the test environments.
When the instrument and the test lead are combined and used together, whichever lower category either of them belongs to will be applied.

KYORITSU ELECTRICAL INSTRUMENTS WORKS, LTD.

1. Safety Warnings

This instrument has been designed, manufactured and tested according to IEC 61010: Safety requirements for Electronic Measuring apparatus, and delivered in the best condition after passed the inspection. This instruction manual contains warnings and safety rules which must be observed by the user to ensure safe operation of the instrument and retain it in safe condition. Therefore, read through these operating instructions before using the instrument.

⚠ WARNING

- Read through and understand the instructions contained in this manual before using the instrument.
- Keep the manual at hand to enable quick reference whenever necessary.
- The instrument is to be used only in its intended applications.
- Understand and follow all the safety instructions contained in the manual.
- It is essential that the above instructions are adhered to.
- Failure to follow the above instructions may impair the protection provided by the instrument and test leads, and may cause injury, instrument damage and/or damage to equipment under test.
- Kyoritsu is by no means liable for any damage resulting from the instrument in contradiction to this cautionary note.

The symbol ⚠ indicated on the instrument means that the user must refer to the related parts in the manual for safe operation of the instrument. It is essential to read the instructions wherever the symbol ⚠ appears in the manual.

⚠ **DANGER** is reserved for conditions and actions that are likely to cause serious or fatal injury.
⚠ **WARNING** is reserved for conditions and actions that can cause serious or fatal injury.
⚠ **CAUTION** is reserved for conditions and actions that can cause injury or instrument damage.
- Marks listed below are used on this instrument.

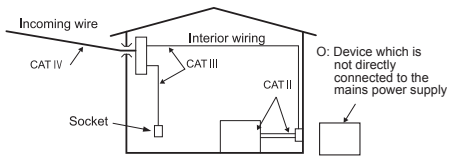
⚠ User must refer to the manual.
⧈ Instrument with double or reinforced insulation.
Indicates that this instrument can clamp on bare conductors when measuring a voltage corresponding to the applicable measurement category, which is marked next to this symbol.
~ AC ⎓ DC ⏚ Ground (Earth)
This instrument is subject to WEEE Directive (2002/96/EC). Please contact our dealer near you at disposal.

Measurement Category

O Circuits which are not directly connected to the mains power supply.
CAT II Primary electrical circuits of equipment connected to an AC electrical outlet by a power cord.
CAT III Primary electrical circuits of the equipment connected directly to the distribution panel, and feeders from the distribution panel to outlets.
CAT IV The circuit from the service drop to the service entrance, and to the power meter and primary over current protection device(distribution panel).

Current measurement section of this instrument is designed for CAT IV 300V / CAT III 600V and Voltage measurement section is for CAT III 300V / CAT II 600V respectively.

Test leads 7107A with the Cap is designed for CAT IV 600V / CAT III 1000V and without the Cap is for CAT II 1000V.
When the instrument and the test lead are combined and used together, whichever lower category either of them belongs to will be applied.



⚠ DANGER

- Never make measurements under the circumstances exceed the designed measurement category and the rated voltage of the instrument and the test leads.
- Do not attempt to make measurement in the presence of flammable gasses. Otherwise, the use of the instrument may cause sparking, which can lead to an explosion.
- Never attempt to use the instrument if its surface or your hand is wet.
- Do not exceed the maximum allowable input of any measuring range.
- Never open the Battery cover during a measurement.
- To avoid electrical shock by touching the equipment under test or its surroundings, be sure to wear insulated protective gear.
- Never measure current while the test leads are inserted into the input terminals.
- Test leads to be used for voltage measurements shall be rated as appropriate for Measurement Category III or IV according to IEC 61010-031 and shall have a voltage rating of 600V or higher.
- Barriers on the instrument body and the test leads provide protection to keep your fingers and hands from touching an object under test. Keep your fingers and hands behind the barrier and protective fingerguard during measurement.

⚠ WARNING

- Never attempt to make measurement if any abnormal conditions, such as broken case and exposed metal parts are found on the instrument or test leads.
- Verify proper operation on a known source before use or taking action as a result of the indication of the instrument.
- **Firmly attach the Caps to the test leads when performing measurements at CAT III or higher test environment.**
  When KEW2200R and the test leads are combined and used together, whichever is lower category & voltage to earth either of them belong to is applied.
- Do not rotate the Function Switch while the test leads are being connected.
- Do not install substitute parts or make any modification to the instrument. For repair or re-calibration, return the instrument to your local distributor from where it was purchased.
  Stop using the test lead if the outer jacket is damaged and the inner metal or color jacket is exposed.

⚠ CAUTION

- Use of this instrument is limited to domestic, commercial and light industry applications. If equipments generating strong electromagnetic interference or strong magnetic fields due to large currents exist nearly, malfunctions of the instrument may be caused.
- Set the Function Switch to an appropriate position before starting measurement.
- Firmly insert the test leads.
- The LCD shows some readings at the ACV and the DCV ranges even while the test leads are open. And, it may show some digits instead of 0 when short-circuiting the test leads. However, these phenomena don't affect measurement results.
- This instrument isn't dust & water proofed. Keep away from dust and water.
- Be sure to power off the instrument after use. When the instrument will not be in use for a long period, place it in storage after removing the batteries.
- Do not expose the instrument to the direct sun, high temperature and humidity or dewfall.
- Use a cloth dipped in water or neutral detergent for cleaning the instrument. Do not use abrasives or solvents.

2. Specification

Accuracy guaranteed
100% or less of each range (AC0.1A/0.01V or more)
Temperature: 23 ± 5°C, Humidity: 45 - 75%

ACA (Auto Range)

Range	Display Range	Accuracy
40A	0.00, 0.06-41.99A	±1.5 %rdg±5dgt (45-65Hz) ±2.0 %rdg±5dgt (40-1kHz)
400A	32.0-419.9A	
1000A	320-1049A	

Input protective current : AC1200A
CF<2.5 (less than 1500A Peak)
For non-sinusoidal waveforms, add ± 1.5 %rdg ± 5dgt(45-65Hz), ±3.0 %rdg±5dgt(40-1kHz) ,

ACV (Auto Range)

Range	Display Range	Accuracy
4V	0.000, 0.006-4.199V	±1.8 %rdg±7dgt (45-65Hz) ±2.3 %rdg±8dgt (65-500Hz)
40V	3.20-41.99V	
400V	32.0-419.9V	
600V	320-629V	

CF<2.5. For non-sinusoidal waveforms, add ±1.5 %rdg ±5dgt(45-65Hz), ±3.0 %rdg±5dgt(40-500Hz)

DCV (Auto Range)

Range	Display Range	Accuracy
400mV	±0.0-±419.9mV	Accuracy is not guaranteed
4V	±0.320-±4.199V	±1.0%rdg±3dgt
40V	±3.20-±41.99V	
400V	±32.0-±419.9V	
600V	±320-±629V	

ACV/DCV input impedance :
>100MΩ (400mV Range), 11MΩ (4V Range), 10MΩ (40/400/600V Range)

Resistance / Continuity (Auto Range)

Range	Display Range	Accuracy
400Ω	0.0-419.9Ω	±2.0%rdg±4dgt
4kΩ	0.320-4.199 kΩ	
40kΩ	3.20-41.99 kΩ	
400kΩ	32.0-419.9 kΩ	
4MΩ	0.320-4.199 MΩ	±4.0%rdg±4dgt
40MΩ	3.20-41.99 MΩ	±8.0%rdg±4dgt
Cont.	0.0-419.9Ω	Bz threshold value 50±30Ω

Open-loop voltage :
<3.3V typ (400Ω / Cont Range), 0.7V typ (4kΩ Range)
0.47V typ (40k - 40MΩ Range)
Input protective voltage : AC/DC600V 10 sec

●Measuring method : Dual integration
●Over-range indication : OL
●Measurement cycle : 2.5 times per second
●Applicable Standards :
IEC/EN 61010-1/ 61010-2-032/ 61010-2-033 (instrument)
Pollution degree 2, Indoor use, Altitude up to 2000m
Current measurement section
CAT III 600V / CAT IV 300V
Voltage measurement section
CAT II 600V / CAT III 300V
IEC/EN 61010-031(Test leads Model 7107A)
w/ caps CAT IV 600V / CAT III 1000V
w/o caps CAT II 1000V
EN61326 (EMC)
In the radio-frequency electromagnetic field of 3V/m,accuracy is within five times the rated accuracy.
●Environmental standards : EU RoHS directive compliant
●Withstand voltage :
AC5160Vrms 5sec between Current sensor and enclosure
AC3470Vrms 5sec between circuit and enclosure
●Insulation resistance :
>100MΩ /1000V between enclosure and electrical circuit
●Operating Temperature and humidity range :
0 to 40°C 85%RH or less (no condensation)
●Storage Temperature and humidity range :
-20 to 60°C 85%RH or less (no condensation)
●Power source : DC3V R03/LR03 (AAA) ×2
●Current consumption : < 5mA
●Battery life (ACA, continuous, no load, with R03) :
Approx. 120 hours
●Dimension, Weight :
190(L)×68(W)×20(D)mm,
approx. 120g (including batteries)
●Accessories :

Test leads Model 7107A	1set
Battery R03(AAA)	2pcs
Instruction manual	1pce
Carrying case Model 9160	1pce

[Effective Value (RMS)]
Most alternating currents and voltages are expressed in effective values, which are also referred to as RMS(Root-Mean-Square) values.
The effective value is the square root of the average of square of alternating current or voltage values. Many clamp meters using a conventional rectifying circuit have "RMS" scales for AC measurement. The scales are, however, actually calibrated in terms of the effective value of a sine wave though the clamp meter is responding to the average value. The calibration is done with a conversion factor of 1.111 for sine wave, which is found by dividing the effective value by the average value. These instruments are therefore in error if the input voltage or current has some other shape than sine wave.

[CF (Crest Factor)]
CF (Crest Factor) is found by dividing the peak value by the effective value.
Examples: Sine wave: CF=1.414
Square wave with a 1: 9 duty ratio: CF=3

Waveform	Effective value Vrms	Average value Vavg	Conversion factor Vrms/ Vavg	Reading errors for average sensing instrument	Crest factor CF
A 0	$\frac{1}{\sqrt{2}}A$ ≒0.707	$\frac{2}{\pi}A$ ≒0.637	$\frac{\pi}{2\sqrt{2}}$ ≒1.111	0%	$\sqrt{2}$ ≒1.414
A 0	A	A	1	$\frac{A\times1.111-A}{A}\times100$ =11.1%	1
A 0	$\frac{1}{\sqrt{3}}A$	0.5A	$\frac{2}{\sqrt{3}}$ ≒1.155	$\frac{0.5A\times1.111-\frac{A}{\sqrt{3}}}{\frac{A}{\sqrt{3}}}\times100$ =-3.8%	$\sqrt{3}$ ≒1.732
A 0 T f D=f/T	$A\sqrt{D}$	$A\frac{f}{1}=A\cdot D$	$\frac{A\sqrt{D}}{AD}=\frac{1}{\sqrt{D}}$	$(1.111\sqrt{D}-1)\times100\%$	$\frac{A}{A\sqrt{D}}=\frac{1}{\sqrt{D}}$

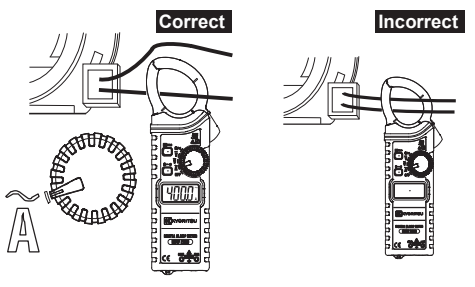
3. Other Function

●Data Hold
Press the Data Hold Key to freeze the reading.
Press the Data Hold Key again to release the freezing display.
indicated "H" on LCD
●Low battery indication
indicated "B" on LCD at 2.3±0.15V or less
●Sleep Function
Automatically powered off in about 10min after.
To disable the sleep function, power the instrument on with the Data Hold Key pressed.
(indicated "POFF" for about 2 seconds on LCD)

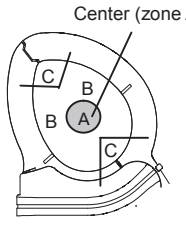
4. ACA Measurement

⚠ DANGER
Never measure current while the test leads are inserted into the V/Ω and/or COM Terminals.
Keep your fingers and hands behind the barrier during measurement.

Press the trigger to open the Current Sensor and clamp the one conductor (Dia. 33mm max.) under test.

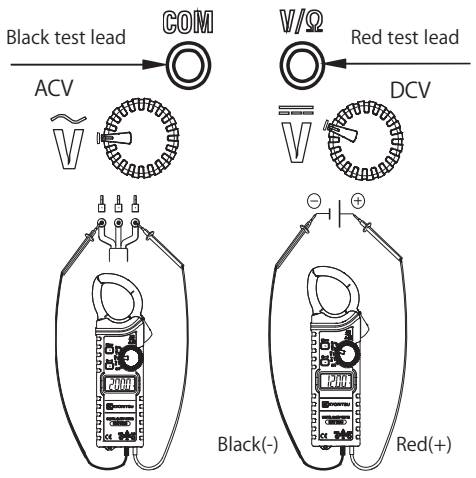


NOTE
Measurement accuracy is guaranteed when the measured object is placed at the center (zone A) of the Current Sensor.
In zone B, 4% of tolerance should be added to the specified accuracy. In zone C, measured values should be considered as reference values (Accuracy is not guaranteed).



5. ACV/DCV Measurement

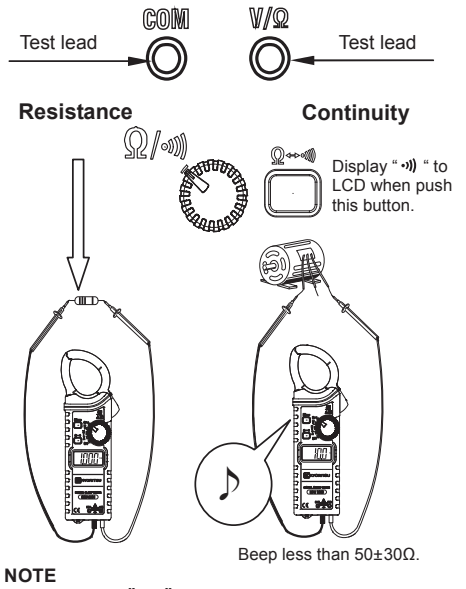
⚠ DANGER
Never make measurement on a circuit in which voltage over 600V exists.
Keep your fingers and hands behind the protective fingerguard during measurement.



NOTE
If the connection is reversed, the LCD indicates the " — " mark (DCV measurement).

6.Resistance(Continuity)Measurement

⚠ WARNING
Never use the instrument on an energized circuit.
NOTE Beep less than 50±30Ω.
LCD indicates" OL" when the test leads are open.



NOTE
LCD indicates " OL" when the test leads

7. Battery Replacement

⚠ WARNING

- Replace the batteries when a Low Battery Voltage warning "B" mark(< 2.3±0.15V) is indicated on the LCD. Otherwise, precise measurement cannot be made.
  Note that when the battery is completely exhausted, the LCD goes blank without showing "B" mark.
- Do not try to replace the batteries if the surface of the instrument is wet.
- Disconnect the test leads from the object under test andpower off the instrument before opening the BatteryCompartment Cover for Battery replacement.

⚠ CAUTION

- Do not mix old and new batteries.
- Install batteries in correct polarity as indicated in the Battery Compartment.

(1) Set the Function Switch to "OFF" position.
(2) Unscrew and remove the Battery Compartment Cover on the bottom of the instrument.
(3) Replace the batteries observing correct polarity.
Use new two R03/LR03 (AAA) 1.5V batteries.
(4) Install the Battery Compartment Cover and tighten the screws.

DISTRIBUTOR

Kyoritsu reserves the rights to change specifications or designs described in this manual without notice and without obligations.

KYORITSU ELECTRICAL INSTRUMENTS WORKS, LTD.
2-5-20,Nakane, Meguro-ku,
Tokyo, 152-0031 Japan
Phone: +81-3-3723-0131
Fax: +81-3-3723-0152
Factory: Ehime,Japan
www.kew-ltd.co.jp