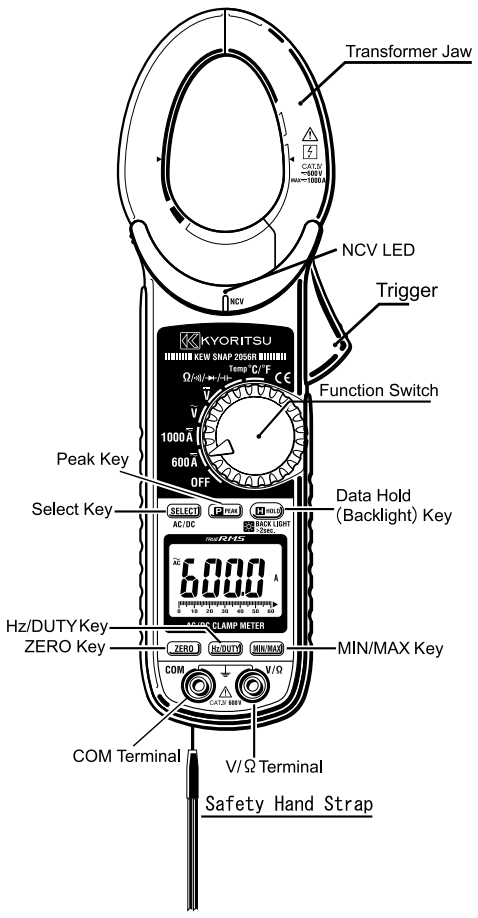
INSTRUCTION MANUAL

DIGITAL CLAMP METER

KEW SNAP SERIES

KEW2046R 600A TRMS Type
KEW2056R 1000A TRMS Type



KYORITSU ELECTRICAL INSTRUMENTS WORKS, LTD.

1. Features

- Designed to meet international safety standards.
  IEC61010-1.IEC61010-031:2002 & IEC61010-2-032
  Measurement Category (CAT.) IV 600V
  Pollution Degree 2
- Double molded main body provides comfortable single handed grip
- Data Hold Function
- LCD Backlight function to facilitate working at dimly lit situations.
- REL function to indicate measurement variation (Current, voltage, Resistance measurement)
- MIN/MAX function enables easy reading of min & max value during measurement.
- PEAK Hold Function enables Peak value measurement of starting current. (only at ACA Range)
- With Continuity & Diode Check Function
- Capacity measurement of capacitors
- Temperature measurement, switchable between ˚C and ˚F
- NCV (Non Contact Voltage) Function for wiring check
- 600V input protection
- Sleep Function to extend battery life
- With Bar Graph, 6039 count display

2. 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 cause injury, instrument damage and/or damage to equipment under test.

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 in the table 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
≂	AC & DC

⚠ DANGER

- Never make measurement on a circuit in which voltage over AC600V exists.
- 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.
- Transformer jaw tips are designed not to short the circuit under test. If equipment under test has exposed conductive parts, however, extra precaution should be taken to minimize the possibility of shorting.
- 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.
- The instrument is to be used only in its intended applications or conditions. Otherwise, safety functions equipped with the instrument doesn't work, and instrument damage or serious personal injury may be caused.

⚠ WARNING

- Never attempt to make measurement if any abnormal conditions, such as broken case and exposed metal parts are found on the instrument.
- 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.
- Do not try to replace the batteries if the surface of the instrument is wet.
- Disconnect all the cords and cables from the object under test and power off the instrument before opening the Battery Cover for Battery replacement.
- Verify proper operation on a known source before use or taking action as a result of the indication of the instrument.

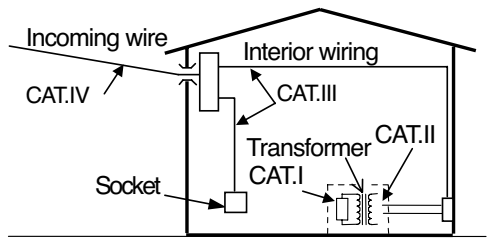
⚠ CAUTION

- Set the Function Switch to an appropriate position before starting measurement.
- Firmly insert the test leads.
- Disconnect the test leads from the instrument for current measurement.
- Do not expose the instrument to the direct sun, high temperature and humidity or dewfall.
- Altitude 2000m or less. Appropriate operating temperature is within 0℃ and 40℃.
- 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.
- Use a cloth dipped in water or neutral detergent for cleaning the instrument. Do not use abrasives or solvents.

Measurement categories (Over-voltage categories)

To ensure safe operation of measuring instruments, IEC61010 establishes safety standards for various electrical environments, categorized as CAT. Ⅰ to CAT.Ⅳ, and called measurement categories.
Higher-numbered categories correspond to electrical environments with greater momentary energy, so a measuring instrument designed for CAT.Ⅲ environments can endure greater momentary energy than one designed for CAT.Ⅱ.

- **CAT.Ⅰ**: Secondary electrical circuits connected to an AC electrical outlet through a transformer or similar device.
- **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).



3. Specification

3-1. Measuring range & accuracy

(accuracy guaranteed at 23℃±5℃, humidity 45~85%) AC Current 600A, 1000A Function

Function	Measuring Range	Accuracy KEW2046R	Accuracy KEW2056R
600A	0-600.0A Peak 1500A CF=2.5@600A CF=3.0@500A	±2.0%rdg±5dgt(50/60Hz) ±3.5%rdg±5dgt(40~500Hz) ±5.5%rdg±5dgt(500~1kHz) * Add 2% at CF>2	
1000A	0-1000A Peak 1500A CF=2.5@600A CF=3.0@500A	N/A	

DC Current 600A, 1000A Function

Function	Measuring Range	Accuracy KEW2046R	Accuracy KEW2056R
600A	0-600.0A	±1.5%rdg±5dgt	±1.5%rdg±5dgt
1000A	0-1000A	N/A	

AC Voltage Function
(Auto-ranging, Input impedance: approx. 10MΩ)

Range	Measuring Range	Accuracy KEW2046R	Accuracy KEW2056R
6/60/600V	0-600.0V	±1.5%rdg±4dgt (50/60Hz) ±3.5%rdg±5dgt (40~400Hz)	

DC Voltage Function
(Auto-ranging, Input impedance: approx. 10MΩ)

Range	Measuring Range	Accuracy KEW2046R	Accuracy KEW2056R
600mV/6/60/600V	0-600.0V	±1.0%rdg±3dgt	

Resistance (Diode Check/ Continuity/ Capacity)

Range	Measuring Range	Accuracy KEW2046R	Accuracy KEW2056R
600Ω/6k/60k/600kΩ	0-600.0V	±1.0%rdg±5dgt	
6M/60MΩ	0.600-60.00MΩ	±5%rdg±8dgt	
Cont Buzzer	0-600.0Ω	Buzzer sounds at 100Ω or less	
Diode	Test voltage: 0-2V		

Capacity Function

Range	Measuring Range	Accuracy KEW2046R	Accuracy KEW2056R
40nF	0.01nF -4000μF Auto-ranging	NA	
400nF		±2.5%rdg±20dgt	
4μF			
40μF			
400μF		NA	
4000μF		NA	

Frequency/DUTY Function(Auto-ranging for Frequency)

Range	Measuring Range	Accuracy KEW2046R	Accuracy KEW2056R
ACA	40Hz-400Hz	±0.5%rdg±5dgt	
ACV	1Hz～10kHz		
0.1-99.9% (Pulse width/Pulse period)		±2.5%rdg±5dgt	

Note: Measurable inputs are: 40Vrms@ACV or 50Arms@AC600A, 350A@AC1000A Range

Temperature Function

Range	Measuring Range	Accuracy KEW2046R	Accuracy KEW2056R
˚C	-50℃～ 0℃	±5℃±3dgt	
	0℃～ 150℃	±3℃±2dgt	
	150℃～ 700℃	±2℃±2dgt	
˚F	-58˚F～ 32˚F	±9˚F±3dgt	
	32˚F～ 302˚F	±5˚F±2dgt	
	302˚F~1292˚F	±2%±2dgt	

Above specified accuracy is applied to Clamp meter itself. Accuracy of Temperature probe is excluded.

3-2. General Specification

- Mode of operation : △Σ mode
- Display : max. 6039 counts
  (Frequency: 9999, Capacity &Temperature:4039)
  & Bar graph
- Over-range indication : "OL" displayed when exceeding the measuring range.
  (except for AC/DCV and 1000A Function)
- Range switching :
  Auto-ranging/Voltage, Resistance, Capacity Range Single range / Continuity, Diode check, DUTY and Temperature
- Sample rate : three times per second
- Functional construction:
  OFF/ ACA/ ACV/ DCA/ DCV/Ω/ ˚C / ˚F
- Keys :
  SELECT(AC/DC switching &/Ω/ ⊣◀ / ·)) / ⊣⊢),
  PEAK HOLD/ Back Light, REL△,Hz/DUTY, MIN/MAX
- Power source : DC3V/ R03(UM-4) x 2pcs
- Low battery warning : "BATT" mark is displayed at 2.4V±0.15V or less.
- Temperature & humidity accuracy guaranteed: 23℃±5℃, relative humidity 85% or less (no condensation)
- Operating temperature & humidity range : 0~40℃, relative humidity 85% or less (no condensation)
- Storage temperature & humidity range : -20~60℃, relative humidity 85% or less (no condensation)
- Current consumption : approx. 25 mA
- Sleep Function : Automatically powered off in about 15 min after the last Function switch operation. Rotate the Function Switch from OFF to any position to exit from the Sleep state.
- Applicable Standards
  IEC 61010-1 : 2001
  Measurement CAT. IV 600V Pollution degree 2
  IEC 61010-031:2002, IEC 61010-2-032
  EMC：EN 61326
  - EN 55022
  - EN 61000-4-2 (performance criterion B)
  - EN 61000-4-3 (performance criterion B)
- Overload Protection
  Current Range : 720A AC/ 10 sec@KEW2046R
  1200A AC/DC/ 10 sec@KEW2056R
  Voltage Range : 720V AC/DC/ 10sec
  Resistance Range : 600V AC/DC/ 10sec
- Withstand Voltage
  6880V AC （TRMS 50/60Hz）/ 5 sec
  (between Jaws and electrical circuit/ between internal circuit and enclosure)
- Insulation Resistance: 10MΩ or more/ 1000V
  （between electrical circuit and enclosure）
- Conductor size
  KEW2046R: approx. 33mm
  KEW2056R: approx. 40mm
- Dimension
  approx. 254(L)×82(W)×36(D)mm / KEW2056R
  approx. 243(L)×77(W)×36(D)mm / KEW2046R
- Weight : approx 300g @ KEW2046R
  310g @ KEW2056R
- Accessories
  Test Leads Model 7066 / 1 set
  Battery R03（UM-4）/ 2pcs
  Instruction manual English, Japanese / 1pce
  Carrying Case Model 9094 / 1pcs
- Optional Accessories
  K-type Temperature Probe Model 8216
  Multi-Tran M-8008

- **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)** 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, t, D=t/T	$A\sqrt{D}$	$A\frac{t}{T}=A\cdot D$	$\frac{A\sqrt{D}}{AD}=\frac{1}{\sqrt{D}}$	$(1.111\sqrt{D}-1)\times100\%$	$\frac{A}{A\sqrt{D}}=\frac{1}{\sqrt{D}}$

3-3. Function Keys

The "●" mark shows available function at each Range.

	HOLD	PEAK	SELECT	ZERO	Hz/ DUTY	MAX/ MIN
ACA	●	●	●	●	●	●
ACV	●	-	-	●	●	●
DCA	●	-	●	●	-	●
DCV	●	-	-	●	-	●
Ω	●	-	●	●	-	●
⊣◀	-	-	●	-	-	-
·))	-	-	●	-	-	-
⊣⊢	●	-	●	●	-	-
TEMP	●	-	●	●	-	●

4. Preparation for measurement

4-1. Checking Battery Voltage

Set the Function Switch to any position other than "**OFF**".When the display is clear without "**BATT**" mark, showing battery voltage is enough. When the display is blank or "**BATT**" mark is indicated, replace the batteries according to Section 7, Battery Replacement.

⚠ CAUTION

The Sleep feature automatically powers the instrument off in about 15 min after the last switch or key operation. Therefore, the display may be blank even with the Function Switch set to a position other than "OFF". To operate the instrument in this case, turn the switch back to the "OFF" position, then to any other position. Replace the batteries if nothing was displayed after above operations.

4-2. Checking Switch Setting & Operation

Confirm the Function Switch is set to the correct position,the instrument is set to the correct