

kaise


AC/DC DIGITAL MINI-CLAMP METER

INSTRUCTION MANUAL




SK-7660/7661

KAISE CORPORATION

FOR SAFETY MEASUREMENTS!!

To prevent an electrical shock hazard to the operator and/or damage to the instruments, read this instruction manual carefully before using the Clamp Meter. WARNINGS with the symbol  on the Clamp Meter and this instruction manual are highly important.

Important Symbols

-  The symbol listed in IEC 61010-1 and ISO 3864 means "Caution (refer to instruction manual)".
-  **WARNING** : The symbol in this manual advises the user of an electrical shock hazard that could result in serious injury or even death.
-  **CAUTION** : The symbol in this manual advises the user of an electrical shock hazard that could cause injury or material damages.

WARNING

Measurement on High Power Line is very dangerous. It sometimes includes High Surge Voltage that could cause dangerous arcs of explosive short in the instrument and could result in serious injury to the operator. For dangerous voltage measurement on High Power Line or High Voltage Circuit, always keep the instrument away from your body without holding it in your hands. Do not touch the Clamp Meter, its Test Leads, and any part of the circuit.

INTRODUCTION

Thank you for purchasing KAISE "MODEL SK-7660/7661 AC/DC DIGITAL MINI-CLAMP METER". To obtain the maximum performance of this instrument, read this Instruction Manual carefully, and take safe measurement.

1. UNPACKING AND INSPECTIONS

Inspect the instrument and accessories for transport damage. If any damage or missing items are found, ask your local dealer for replacement.

Confirm that the following items are contained in the package.

- Digital Clamp Meter
- 1 set of Test Lead (100-63)
- Instruction Manual

2. SPECIFICATIONS

2-1. GENERAL SPECIFICATIONS

- DISPLAY (LCD)**
 - Numerical Display** : 4000 count, Maximum reading 4050, 12mm high.
 - Units and Symbols** : $\bar{\bar{=}}$, $\bar{-}$, \sim , A, mV, V, Ω , k Ω , M Ω , Hz, kHz, %, nF, μ F, \leftarrow , \rightarrow , DH, DIFF, PH(SK-7660), MAX-MIN(SK-7661), APO, BAT, AUTO and decimal point.
- OPERATING PRINCIPLE** : Σ Δ conversion
- AC MEASUREMENT** : SK-7660 : True RMS
SK-7661 : Average Rectification
- SAMPLING RATE** : 3 times / second
- RANGE SELECTION** : Auto-Ranging
- POLARITY** : Auto-Polarity ("—" symbol appears in minus)
- OVERLOAD INDICATION** : "OL" symbol appears.
- BATTERY WARNING** : "BAT" symbol appears when battery voltage goes down to approx. 2.4V or less.
- DISPLAY HOLD** : Enables to hold indicating values by DH Key
- PEAK HOLD (SK-7660 only)** : Peak value is measurable by pressing PH key for one second or more.
- MAX/MIN MEASUREMENT (SK-7661 only)** : MAX/MIN values are measurable by pressing MAX/MIN key for one second or more.

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- DIFFERENCE MEASUREMENT** : Difference value is measurable by pressing DIFF key for one second or more.
- CONTINUITY TEST** : Buzzer sounds and \rightarrow symbol appears on LCD.
 - Buzzer Sounds : at approx. 50 Ω or less
 - Open Circuit Voltage : approx. 0.44V
- OVERLOAD PROTECTION** :
 - Current** : 600A rms for 1 minute (600V line)
 - Voltage** : 1000V rms for 1 minute.
 - Resistance** : 300V rms for 1 minute
- DIELECTRIC STRENGTH** : 3.52kV AC (50Hz) for 1 minute (between input terminal and case)
- OPERATABLE TEMPERATURE & HUMIDITY** : 0°C to 40°C, 80%RH or lower in non-condensing.
- STORAGE TEMPERATURE & HUMIDITY** : -20°C to 60°C, 70%RH or lower in non-condensing.
- TEMPERATURE COEFFICIENT** : Accuracy in 23°C \pm 5°C \times 0.1 / °C
- SAFETY LEVEL** : CE Marking approved (IEC-61010-1, CAT III 300V, CAT II 600V and EMC Test passed.)
- POWER SUPPLY** : 1.5V R03 (AAA) batteries \times 2 (not attached)
- POWER CONSUMPTION** : SK-7660 : Approx. 15mA, SK-7661 : Approx. 13mA
- CONTINUOUS OPERATING TIME** : SK-7660 : Approx. 25 hours (Manganese cell), Approx. 50 hours (Alkaline cell) / SK-7661 : Approx. 30 hours (Manganese cell), Approx. 60 hours (Alkaline cell) (in DC Current range, 0A input)
- AUTO POWER OFF** : Power turns off automatically after 12 minutes of any switch operation. (releasable)
- CONDUCTOR DIAMETER** : 27mm ϕ
- DIMENSIONS & WEIGHT** : 170(H) \times 58(W) \times 27(D)mm, 160g (Battery Included)
- ACCESSORIES** : 100-63 Test Lead \times 1 set, Instruction Manual
- OPTIONAL ACCESSORIES** : 1015 Carrying Case, 880 Line Separator, 940 Alligator Clips

2-2. MEASUREMENT SPECIFICATIONS

(23°C \pm 5°C, < 80%RH in non-condensing)

1. CURRENT MEASUREMENTS ($\bar{\bar{=}}$ A / \sim A / Hz)

1-1. DC CURRENT ($\bar{\bar{=}}$ A)

Range	Accuracy	Resolution	Max. Input Current	Overload Protection
40.00A	$\pm 1.5\%rdg \pm 3dgt$	10mA	400A DC	600A rms (for 1 minute)
400.0A	$\pm 1.5\%rdg \pm 5dgt$ (40~200A) $\pm 3.0\%rdg \pm 3dgt$ (201~300A) $\pm 4.0\%rdg \pm 3dgt$ (301~400A)	100mA		

1-2. AC CURRENT (\sim A) SK-7660 : True RMS / SK-7661 : Average Rectification

Range	Accuracy ($\geq 0.5A$)	Resolution	Max. Input Current
40.00A	$\pm 1.5\%rdg \pm 5dgt$ (50/60Hz)	10mA	400A rms
400.0A	40~200A / $\pm 2.0\%rdg \pm 3dgt$ (50/60Hz) 201~300A / $\pm 4.0\%rdg \pm 5dgt$ (50/60Hz) 301~400A / $\pm 5.0\%rdg \pm 5dgt$ (50/60Hz)	100mA	

Frequency Characteristic : 40A Range : (0.5~9A) add 1.5% / (10~40A) : add 0.5% (40~400Hz) 400A Range : add 1.0%

Overload Protection : 600A rms (for 1 minute)

Crest Factor : 0.5~200A : 3 or less / 300A : 2 or less / 400A : 1.5 or less

> 2 : add 2% to Accuracy (SK-7660 only)

1-3. FREQUENCY (Hz)

Range	Accuracy	Resolution	Input Sensitivity	Max. Input Current
5.00Hz~49.99Hz	$\pm 0.2\%rdg \pm 2dgt$	0.01Hz	5A (sine wave)	400A rms
50.0Hz~499.9Hz		0.1Hz		
0.500kHz~1.000kHz		1Hz		

1-4. PEAK CURRENT (\approx 400A) ※SK-7660 only

Range	Accuracy (Pulse Width : 10ms)	Resolution	Max. Input Current
400A	$\pm 5.0\%rdg \pm 5dgt$	100mA	400A peak

2. VOLTAGE MEASUREMENTS ($\bar{\bar{=}}$ V / \sim V / Hz / %)

2-1. DC VOLTAGE ($\bar{\bar{=}}$ V)

Range	Accuracy	Resolution	Input Resistance	Max. Input Voltage	Overload Protection
400.0mV	$\pm 1.0\%rdg \pm 3dgt$	0.1mV	$\geq 100M\Omega$	600V DC	1000V rms (for 1 minute)
4.000V		1mV	$\approx 11M\Omega$		
40.00V	$\pm 1.0\%rdg \pm 2dgt$	10mV	$\approx 10M\Omega$	600V rms	1000V rms (for 1 minute)
400.0V		100mV			
600V		1V			

2-2. AC VOLTAGE (\sim V) SK-7660 : True RMS / SK-7661 : Average Rectification

Range	Accuracy	Resolution	Input Resistance	Max. Input Voltage	Overload Protection
4.000V	$\pm 1.5\%rdg \pm 5dgt$	1mV	$\approx 11M\Omega$	600V rms	1000V rms (for 1 minute)
40.00V		10mV			
400.0V	$\pm 1.0\%rdg \pm 2dgt$	100mV	$\approx 10M\Omega$	600V rms	1000V rms (for 1 minute)
600V		1V			

Crest Factor : \sim 400V : 3 or less / 401~600V : 2 or less (SK-7660 only)

2-3. FREQUENCY (Hz)

Range	Accuracy	Resolution	Input Sensitivity	Max. Input Voltage
5.00Hz~49.99Hz	$\pm 0.2\%rdg \pm 2dgt$	0.01Hz	5V (sine wave)	600V rms
50.0Hz~499.9Hz		0.1Hz		
0.500kHz~4.999kHz		1Hz		
5.00kHz~49.99kHz		10Hz		

2-4. DUTY CYCLE (%)

Range	Accuracy	Resolution	Input Sensitivity	Max. Input Voltage
5.0%~95.0%	$\pm 1.0\%rdg \pm 3dgt$	0.1%	5V (square wave)	600V rms

Frequency Range : 40~400Hz

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3. RESISTANCE (Ω)

Range	Accuracy	Resolution	Test Current	Open Circuit Voltage
400.0 Ω	$\pm 1.5\%rdg \pm 5dgt$	0.1 Ω	$\leq 0.4mA$	$\approx 0.44V$
4.00k Ω		1 Ω		
40.00k Ω	$\pm 0.7\%rdg \pm 3dgt$	10 Ω	$\leq 50\mu A$	$\approx 0.44V$
400.0k Ω		100 Ω		
4.000M Ω		1k Ω		
40.00M Ω	$\pm 3.0\%rdg \pm 5dgt$	10k Ω	$\leq 50nA$	$\approx 0.44V$
400.0M Ω				

Overload Protection : 300V rms (for 1 minute)

4. CONTINUITY TEST (\rightarrow)

Range	Accuracy	Resolution	Test Current	Open Circuit Voltage
400.0 Ω	$\pm 1.5\%rdg \pm 5dgt$	0.1 Ω	$\leq 0.4mA$	$\approx 0.44V$

Overload Protection : 300V rms (for 1 minute)

Buzzer Sound : Approx. 50 Ω or less

5. DIODE TEST (\leftarrow)

Range	Accuracy	Resolution	Open Circuit Voltage	Overload Protection
0~1.5V	$\pm 5.0\%rdg \pm 5dgt$	1mV	$\leq 1.7V$	300V rms (for 1 minute)

6. CAPACITANCE ($\left|$)

Range	Accuracy	Resolution	Open Circuit Voltage	Overload Protection
50.00 nF	$\pm 5.0\%rdg \pm 10dgt$	10pF	$\approx 1.25V$	300V rms (for 1 minute)
500.0 nF		100pF		
5.000 μ F		1nF		
50.00 μ F	$\pm 5.0\%rdg \pm 10dgt$	10nF	$\approx 0.44V$	300V rms (for 1 minute)
100.0 μ F		100nF		

3. SAFETY PRECAUTIONS

Correct knowledge of electric measurements is essential to avoid unexpected danger such as operator's injury or damage to the instrument. Read carefully and observe the following precautions for safety measurements.

3-1. WARNINGS

WARNING 1. Checks of Body and Test Lead

Before measurement, confirm the body of this instrument and handle insulators of the Test Leads have no cracks or any other damages. Dust, grease and moisture must be removed.

WARNING 2. Warning for High Power Line Measurements

High Power Line (High Energy Circuits) such as Distribution Transformers, Bus Bars and Large Motors are very dangerous. High Power Line sometimes includes High Surge Voltage that could cause explosive short in the instrument and could result in shock hazard. For voltage measurement of High Power Line, do not touch Clamp Meter, its Test Leads, and any part of the circuit.

WARNING 3. Warning for High Voltage Measurements

Even for Low Energy Circuits of electric/electronic appliances, such as heating elements, small motors, line cords and plugs, High Voltage Measurements are very dangerous. Do not touch Clamp Meter, Test Leads, and any part of the circuit. Generally, shock hazard could occur when the current between the circuit, that involves more than 33V rms or 46.7V DC or peak, and ground goes up to 0.5mA or more.

WARNING 4. Dangerous Voltage Measurement Procedure

For dangerous voltage measurement, strictly observe the following procedure.

- Before measurement, turn off the power of the circuit to be measured.
- Plug test lead connector into input terminals matching "+" and "-".
- Attach Black and Red Alligator Clips (optional) to Test Lead pins.
- Set FUNCTION Switch to " \approx V / Hz / %".
- Select " $\bar{\bar{=}}$ (DC)" or " \sim (AC)" by SHIFT key.
- Confirm the power of the circuit to be measured is turned off. Connect Black Alligator Clip to - (earth) side and Red Alligator Clip to + (positive) side.
- Place the Clamp Meter away from your body not holding it in your hands. Take safety distance from power source or circuit to be measured not to touch the dangerous voltage.
- Turn on the power of the circuit to be measured. Read the measurement value on LCD.

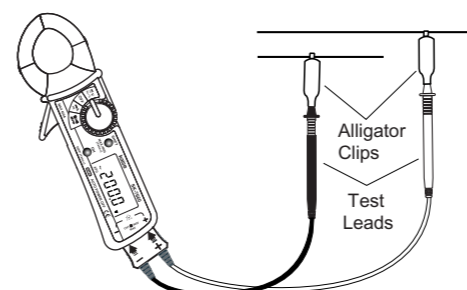


fig. 1

- After measurement, turn off the power of the measuring circuit and discharge the all capacitors.
- Disconnect Alligator Clips (with Test Leads) from the circuit.

In case of live-line measurement, observe the following procedure.

- Place the Clamp Meter away from your body not holding it in your hands.
- Set FUNCTION Switch to " \approx V / Hz / %".
- Select " $\bar{\bar{=}}$ (DC)" or " \sim (AC)" by SHIFT key.

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- Attach Black Alligator Clip to Black Test Lead pin. Connect it to - (earth) side of the circuit to be measured.
- Take safety distance from power source or circuit to be measured not to touch the dangerous voltage.
- Hold Red Test Lead with one hand and connect it to + (positive) side of the circuit to be measured.
- Read the measurement value on LCD.
- After measurement, disconnect Red Test Lead and Black Alligator Clip from the circuit.

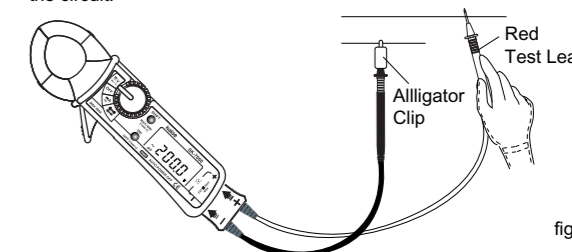


fig. 2

WARNING 5. Correct Selection of FUNCTION Switch

Always confirm that FUNCTION Switch is set to the correct position. Do not measure voltage at Ω / \rightarrow / \leftarrow / $\left|$ position.

WARNING 6. Maximum Input Observance

Do not measure voltage or current that might exceed the specified maximum input values.







WARNING 7. Test Lead Disconnection

Disconnect Test Leads from the measuring circuit before changing the measurement functions or removing Battery Cover for battery replacement.

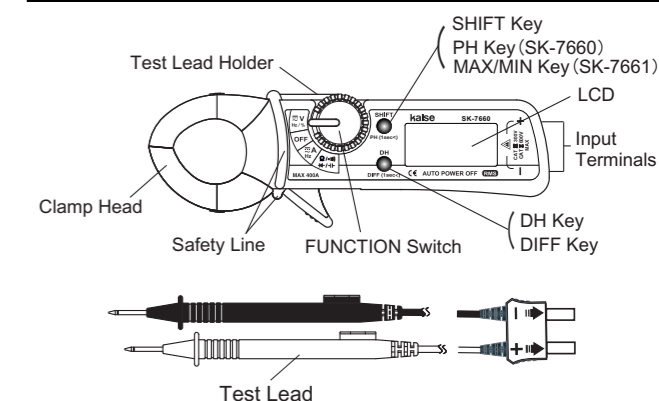
WARNING 8. Safety Line

Do not put your fingers over the Safety Line while current measurement.

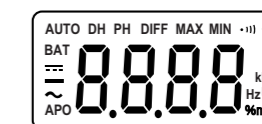
3-2. GENERAL WARNINGS AND CAUTIONS

-  **WARNING 1.** Children and the persons who do not have enough knowledge about electric measurements must not use this instrument.
-  **WARNING 2.** Do not measure the electricity naked or barefooted to protect yourself from electrical shock hazard.
-  **WARNING 3.** Be careful not to get hurt with the sharp Test Lead pins.
-  **CAUTION 1.** Do not polish the case or attempt to clean it with any cleaning fluid like gasoline or benzine. If necessary, use silicon oil or antistatic fluid.
-  **CAUTION 2.** Avoid the clamp meter from hard mechanical shock or vibration, high temperature and strong magnetic field.
-  **CAUTION 3.** Remove the batteries when the clamp meter is out of use for a long time. The exhausted batteries might leak electrolyte and corrode the inside.

4. NAME ILLUSTRATION



4-1. LCD



- | | | | |
|-----------------|----------------------------|------------------------------------|---------------------------|
| AUTO | : Auto-Ranging | MAX | : Maximum Value (SK-7661) |
| BAT | : Battery Warning | MIN | : Minimum Value (SK-7661) |
| $\bar{\bar{=}}$ | : Direct Current (DC) | \rightarrow | : Continuity Test |
| - | : Minus Symbol | \leftarrow | : Diode Test |
| \sim | : Alternating Current (AC) | mV, V | : Units of Voltage |
| APO | : Auto Power Off | M Ω , k Ω , Ω | : Units of Resistance |
| DH | : Display Hold | A | : Unit of Current |
| PH | : Peak Hold (SK-7660) | Hz, kHz | : Unit of Frequency |
| DIFF | : Difference Measurement | % | : Unit of Duty Cycle |
| MAX/MIN | : Max/Min Measurement | nF, μ F | : Units of Capacitance |

(SK-7661)

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