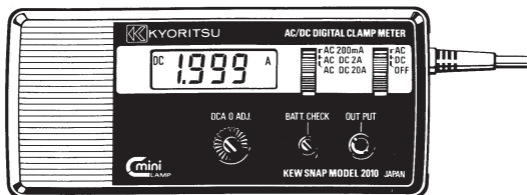


# INSTRUCTION MANUAL



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## MINIATURE DIGITAL AC/DC CLAMP METER

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KEW SNAP SERIES  
**MODEL 2010**

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# 1. Safety Warning

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- 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 these operating instructions thoroughly and completely before using the instrument.
- The symbol  means that the user must read the instructions in this manual for safe operation of the instrument.

## WARNING

This is a warning for the user to avoid electric shock hazard.

## CAUTION

This is a caution for the user to avoid damage to the instrument.

- To avoid electric shock hazard do not use the instrument if it is in the following conditions:
  - a. Shows visible damage.
  - b. Fails to perform intended operation.
  - c. Has been subjected to prolonged storage under unfavorable conditions.
  - d. Has been subjected to severe transport stress.

To ensure the safe operation of the instrument observe the following safety warnings and cautions.

- (1) Never open the battery compartment cover when making measurements.
- (2) Make sure to turn the power switch off before battery replacement. Also, keep the instrument away from the circuit under test.
- (3) Never make current measurements on a circuit above 60 V AC/DC as the instrument is designed for use on low voltage circuits only.

- (4) The metal tips of transformer jaws are not insulated. Be especially careful to avoid a shorting to the conductor under test if it has a bare metal section.**
- (5) Never apply voltage to the output terminal.**
- (6) Never exceed the limit of current input when making measurements.**
- (7) Always turn the power switch off after every use.**
- (8) Do not expose the instrument to the direct sun, extreme temperature or dew fall.**
- (9) The transformer jaws open to a maximum of 7.5mm-dia conductor. An accurate measurement cannot be made when the transformer jaws are not fully closed on a conductor larger than 7.5mm.**
- (10) The transformer jaws, especially their tips, have been precisely adjusted to obtain maximum accuracy. Take sufficient care to avoid shock, vibration or excessive force when handling the instrument.**
- (11) The instrument is designed to have 2A and 20A ranges only for DC current measurements. Be careful that it gives "1" overrange indication only when the range selector switch is set to the DC 200mA position.**

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## 2. Features

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The instrument is a miniature digital AC/DC Clamp meter.

- Clamp-on sensor is separated from the display unit, allowing the user to take easy measurements and readings at cramped quarters and crowded wiring.
- Minimum resolution is 0.1mA for AC current and 1mA for DC current, one of the most valuable features of this instrument.
- Low battery warning symbol “**B**” plus battery check switch to indicate battery voltage.
- External power supply jack permits the use of an optional AC adaptor. Convenient for continuous operation by connecting a recorder, for example.

### 3. Specifications

● Rating & Accuracy. (at 23°C, 75% max. relative humidity)

Function	Ranges	Input Current	Accuracy
DC Current	2A	(0~1.999A)	$\pm(1.0\%rdg+2dgt)$
	20A	(0~19.99A)	$\pm(1.5\%rdg+4dgt)$
AC Current	200mA	(0~199.9mA)	$\pm(1.0\%rdg+2dgt)(50/60Hz)$ $\pm(1.5\%rdg+8dgt)(40\sim 2kHz)$
	2A	(0~1.999A)	$\pm(1.0\%rdg+2dgt)(50/60Hz)$ $\pm(2.5\%rdg+10dgt)(40\sim 2kHz)$
	20A	(0~19.99A)	$\pm(2.5\%rdg+10dgt)(40\sim 2kHz)$

Note: Accuracy for DC current applies where a DC current with "less than 80% ripple content" is measured. Accuracy for both 2A DC and 20A DC ranges is  $\pm(2.5\%rdg+5dgt)$  where a DC current with 121% ripple content (50Hz or 60Hz, single phase, half-wave rectified current) is measured.

● Output (Impedance: 200  $\Omega$  approx.)

Function	Ranges	Input Current	DC Output Voltage	Accuracy
DC Current	2A	0~2.000A	(0~200.0mV)	$\pm(1.5\%rdg+0.4mV)$
	20A	0~20.00A	(0~200.0mV)	$\pm(2.0\%rdg+0.5mV)$
AC Current	200mA	0~200.0mA	(0~200.0mV)	$\pm(1.5\%rdg+0.4mV)(50/60Hz)$ $\pm(2.0\%rdg+1.0mV)(40\sim 2kHz)$
	2A	0~2.000A	(0~200.0mV)	$\pm(1.5\%rdg+0.4mV)(50/60Hz)$ $\pm(3.0\%rdg+1.0mV)(40\sim 2kHz)$
	20A	0~20.00A	(0~200.0mV)	$\pm(3.0\%rdg+1.0mV)(40\sim 2kHz)$

Note.1: Delivers 100.0mV DC output against 1000 count display. Be careful that when BATT. check switch is pressed an output voltage proportional to the power supply voltage will be delivered from output terminal.

Note.2: Accuracy for DC current applies where a DC current with less than 80% ripple content is measured. Accuracy for both 2A and 20A ranges is  $\pm(3.0\%rdg+0.5mV)$  where a DC current with 121% ripple content (50Hz or 60Hz single phase, half-wave rectified current) is measured.

Even when the instrument gives an overrange indication, voltage will be delivered from output terminal linearly.

Function	Ranges	Input Current	DC Output Voltage
DC Current	2A	0~30A	0~3V (100mV/A)
	20A	0~30A	0~300mV (10mV/A)
AC Current	200mA	0~800mA	0~800mV (1000mV/A)
	2A	0~8A	0~800mV (100mV/A)
	20A	0~30A	0~300mV (100mV/A)

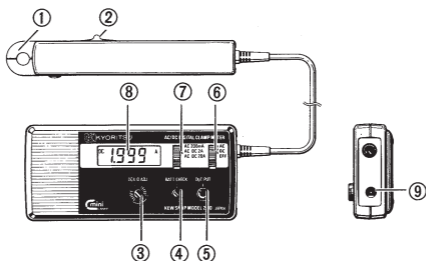
Note: DC current with less than 40% ripple content shall apply. Be careful that single phase, full-wave rectified DC current (with 48% ripple content) and single phase, half-wave rectified DC current (with 121% ripple content) will not be delivered linearly.

- **Operating System:** DC: Flux gate method. Average sensing.  
AC: Current transformer principle. Average sensing, calibrated in rms of a sine wave.
- **Display:** Field effect 3-1/2 digit liquid crystal display with maximum indication of 1999.
- **Low Battery Indication:** “**B**” symbol appears on the display.
- **Battery Check:** when Battery Check button is pressed, power supply voltage level is displayed at any range.
- **Overrange Indication:** “1” is displayed on the most significant digit.
- **Response Time:** 2 seconds approx.
- **Sample Rate:** 3 times per second approx.
- **Operating Temperature & Humidity:** 0~+50°C at 85% max. relative humidity.  
(there shall be no condensation)
- **Storage Temperature & Humidity:** -10°C~+50°C, at 75% max. relative humidity.
- **Current Consumption:** 15mA approx. at DC current measurements. (approx. 20 hours of continuous use on alkaline battery.)  
7mA approx. at AC current measurements. (approx. 40 hours of continuous use on alkaline battery)
- **Overload Protection:** Up to 100AC, DC for 1 minute.
- **Operating Frequency Range:** 40Hz~2kHz.
- **Insulation Resistance:** 10MΩ min. at 1000V between housing case and metal section of transformer jaws.
- **Withstand Voltage:** 750VAC for 1 minute between housing case and metal section of transformer jaws; between external power supply plus output terminal and metal section of transformer jaws.

- **Conductor Size:** 7.5mm outside diameter.
- **Dimensions:** Sensor:  
152.5 (L) × 23 (W) × 18 (D) mm  
Display unit:  
142 (L) × 64 (W) × 26 (D) mm
- **Weight:** 220g approx. (battery included)
- **Power Source:** 1 × 6LF22 (9V Alkaline Battery) or equivalent & AC adaptor (9VDC)
- **Accessories:** Included—Carrying case (model 9071),  
Instruction manual,  
1 × Alkaline Battery  
Optional—AC Adaptor  
Model 8022 AC100V~120V  
Model 8023 AC200V~240V  
Output cord (Model 7014)



## 4. Instrument Layout



① **Transformer Jaws**

② **Jaw Trigger**

③ **DC Current Zero Adjust Knob**

④ **Battery Check Switch (does not lock)**

When this switch is pressed, the level of power supply voltage will be displayed on all ranges. The measurement unit, function symbol and decimal point for the measuring range selected will be displayed on the LCD.

⑤ **Output Terminal**

Current measured will be converted into DC voltage and output through this terminal.

⑥ **Power ON-OFF and AC/DC Selector Switch**

⑦ **Range Selector Switch**

⑧ **3-1/2 digit LCD with maximum reading of 1999.**

In addition to the measurement unit, symbol and decimal point, low battery warning symbol "**B**" will be automatically indicated on the LCD. Overrange warning "1" on the most significant digit will also be displayed.

⑨ **External Power Supply Input Jack**

When AC adaptor available as an optional accessory is inserted into this jack, power from internal battery will be disconnected, thus permitting the use of external power supply.

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## 5. Preparation for Tests

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Battery voltage is OK where the display is clear without indication of “**B**” symbol when the battery check switch is pressed. Battery voltage is insufficient when the “**B**” symbol is displayed.

Replace the battery with a new one in accordance with the instructions for battery replacement in section 7.

“**B**” symbol is designed to appear at 6.80V. But since a slight variation is expected, check battery voltage with the BATT. check button pressed. While the BATT. check button is pressed, the battery voltage in use on all ranges will be displayed. Replace the battery with a new one when its voltage is below 6.8V. Refer to section 6-4 for battery check and how to take the reading.

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## 6. Operating Instructions

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### WARNING

Never open the battery compartment cover while taking measurements. Make sure that voltage above 6V is not present on the circuit under test. The metal tips of the transformer jaws are not insulated. Be especially careful that the transformer jaws do not touch the conductor under test to avoid a shorting.

### CAUTION

Take care not to input excessive current when taking measurements. The transformer jaws open to a maximum of 7.5mm dia conductor. No accurate measurements can be made when the transformer jaws are not closed fully on a conductor larger than 7.5mm. The transformer jaws have been precisely adjusted to obtain maximum accuracy. Take sufficient care to avoid shock, vibration and excessive force when handling the instrument.

#### **6-1. DC Current Measurements (2A and 20A ranges)**

- (1) With the power switch at the DC position, set the range selector switch to the desired range position.
- (2) Before taking measurements, zero adjust the display by turning the DC 0 ADJ knob. To obtain an accurate reading make it a practice to zero adjust before every use. The instrument may go off zero after the range is changed. Also, zero adjust after every change of the range.
- (3) Pull down the jaw trigger to open the transformer jaws and clamp on one conductor only. The current measured will be displayed on the LDC.
- (4) The polarity of DC current is positive (+) when it flows through the transformer jaws in the arrow direction as shown in Fig. 2.

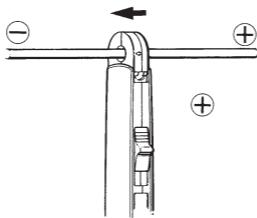


Fig.2

**⚠ CAUTION**

(1) The instrument has only two DC current ranges of 2A and 20A. When it is set to the 200mA range position with the function switch at the DC position, the display reads “1” only for overrange and no measurements can be made.

(2) The flux gate method is used for this instrument to permit the measurements of very small DC current. (1mA minimum resolution).

This method is designed to measure DC current by running a square wave current through the transformer jaws. Therefore, the instrument can measure full or half wave rectified DC current of 50Hz or 60Hz sinusoidal AC current only. It cannot measure full or half wave rectified DC current of square wave AC current.

The instrument cannot measure DC current having a waveform of sharp rise to result from the phase angle control by thyristors, on-off control by switching elements, etc.

- (3) Bringing the transformer jaws close to a metal sheet or magnetic substance will affect the display reading by several counts (for DC current measurements only).

Make sure to adjust the display to zero by turning the DC A 0 ADJ knob after the transformers are brought close to the conductor to be tested where a metal sheet or magnetic substance is located near by as shown in Fig. 3.

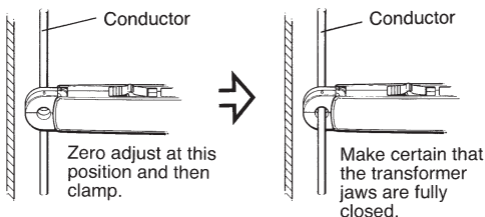


Fig. 3

- (4) Since the 2A DC tange is designed with very high sensitivity, earth magnetism affects the display reading by several counts (for DC currents only). When checking to see if the display reads zero near the conductor under test, hold the instrument in the same posture as where it is used to clamp on the conductor. Refer to Fig. 4.

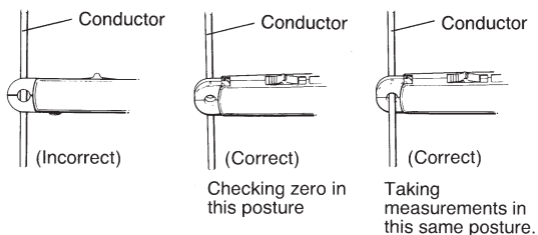


Fig. 4.

## **6-2. AC Current Measurements** (200mA, 2A & 20A ranges)

- (1) with the power switch at the “AC” range position, set the range selector switch at the desired position.
- (2) Pull down the jaw trigger to open the transformer jaws and clamp on one conductor only under test. The AC current measured will be displayed on the LCD.

## **6-3. Output Terminal**

By connecting an optional output cord Model 7014, DC voltage will be output through this terminal after it is converted from AC or DC input current. DC output voltage can be monitored by connecting output terminal to a DMM. Many hours of current recorder.

### **WARNING**

**Never apply voltage to the output terminal.**

#### 6-4. Battery Check

When the battery check button is pressed, the battery voltage in use will be displayed on every range. When the battery voltage is below 6.80V, replace the battery. The measurement unit, function symbol and decimal point displayed are those for the measuring range selected. For example, you will obtain a reading as shown in Fig. 5 when the battery check button is pressed at the 200mA AC range.

The display indicated that the battery voltage is 7.50V.

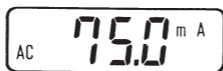


Fig. 5

The test can be resumed when the battery check button is released (it has no lock down feature).

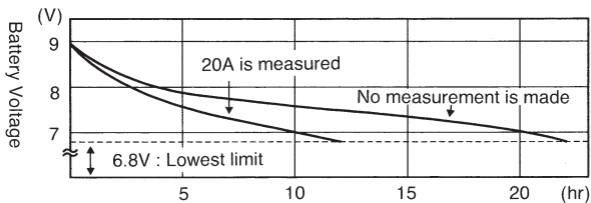
Battery voltage drain is faster on the DC range than on the AC range. The amount of current consumption also varies with the value of current to be measured.

Refer to the table below:

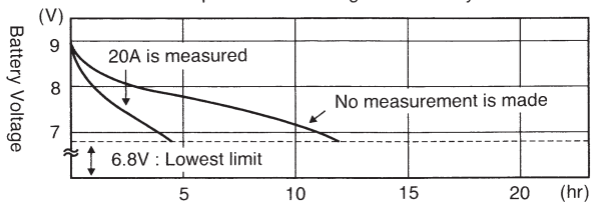
DC current to be measured	0A	6A	10A	14A
Current Consumption	16mA	18mA	20mA	22mA

DC current to be measured	18A	20A	25A	30A
Current Consumption	24mA	26mA	30mA	32mA

○ Continuous Operation with Alkaline Battery



○ Continuous Operation with Manganese Battery





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## 7. Battery Replacement

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“**B**” symbol for low battery indication appears next to “AC” (Fig.6) on the display.

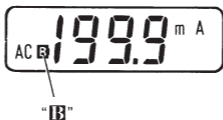


Fig. 6.

- (1) Set the power switch to the OFF position.
- (2) Remove the battery compartment cover by unscrewing it as shown in Fig. 7.

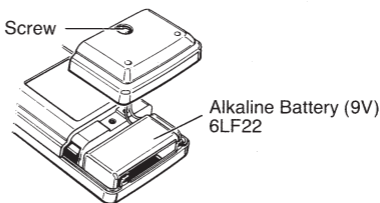


Fig. 7

**⚠ WARNING**

Before replacing the battery, make sure to turn the power switch to the OFF position. Also, keep the instrument away from the conductor under test.

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## 8. How to Use AC Adaptor

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With the power switch of the 2010 set to the OFF position, connect AC adaptor to the instrument as shown in Fig. 8.

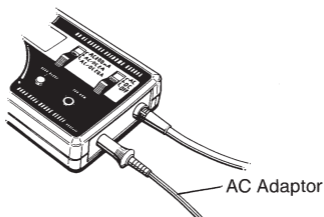


Fig. 8.

Then, plug the AC adaptor into the power source outlet.



### CAUTION

Connecting the AC adaptor to the instrument will automatically disconnect power from internal battery power source.

The instrument does not operate if the AC adaptor is not in working condition.

Always use the AC adaptor specified in this manual.

If an adaptor having a higher open circuit voltage or much of ripple voltage generally available from the market is used as a substitute it will damage the instrument or cause the display reading to be unstable.

# MEMO

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