

# KEW SNAP Series

**MODEL 2417** 

# ALL WEATHER DIGITAL AC LEAKAGE CURRENT TESTER



INSTRUCTION MANUAL

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# 1. SAFETY WARNINGS

Make sure to read through this instruction manual before using this instrument.

This instruction manual contains warnings and safety rules which must be observed by the use to ensure safe operation of the instrument and to retain it in safe condition.

•The symbol  $\triangle$  indicated on the instrument means that the user must refer to related parts in the manual for safe operation of the instrument. Be sure to carefully read the instruction following each  $\triangle$  symbol in this manual.

		is reserved for conditions and actions that are likely	
		to cause serious or fatal injury.	
$\triangle$ <b>WARNING</b> is reserved for conditions and actions that can cause			
		serious or fatal injury.	

▲**CAUTION** is reserved for conditions and actions that can cause bodily injury or instrument damage.

#### 

- Read through and understand instructions contained in this manual before starting using the instrument.
- Save and keep the manual handy to enable quick reference whenever necessary.
- In order to avoid injury, or damage to the instrument or the circuit under test, be sure to understand and follow all safety instructions contained in the manual.
- Be sure to use the instrument only in its intended applications and to follow measurement procedures described in the manual.

Following symbols are used on the instrument and in the instruction manual. Attention should be paid to each symbol to ensure your safety.

Refer to the instructions in the manual.

This symbol is marked where the user must refer to the instruction manual so as not to cause personal injury or instrument damage.

Indicates an instrument with double or reinforced insulation.

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•Never make measurement on a circuit above 600V AC.

- Do not attempt to make measurement in the presence of flammable gasses, fumes, vapor or dust. 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 open the battery compartment cover when making measurement.
- •Never try to make measurement if any abnormal conditions, such as broken Transformer jaws or case is noted.
- •The instrument is 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.

#### 

- Never attempt to make any measurement if any abnormal conditions are noted, such as broken case, cracked test leads and exposed metal parts.
- Do not install substitute parts or make any modification to the instrument. Return the instrument to Kyoritsu or your distributor for repair or re-calibration.

•Do not try to replace the battery if the surface of the instrument is wet.

### 

- •Make sure that the function selector switch is set to an appropriate position before making measurement.
- Be sure to set the function selector switch to the "OFF" position after use. When the instrument will not be use for a long period of time, place it in storage after removing the battery.

This is to avoid damage to the instrument by possible leakage from the battery.

Do not expose the instrument to the direct sun, extreme temperatures or dew fall.

Placing the instrument in temperatures of 60°C or higher can cause the instrument's case to deform and result in operation failures.

# 2. FEATURES

- O Model 2417 offers True RMS measurement capability.
- O Designed for measurements of AC Leakage and AC current with five ranges from 200 mA to 500 A. AC 200 mA range provides a high resolution of 0.1 mA.
- Least affected by external magnetic field.
- O Provides dual frequency responses of fundamental 50/60Hz only or up to 1kHz. The frequency response of up to 1kHz permits measurements of current with harmonics superimposed on the fundamental frequency. High frequency current from appliances such as inverters, switching regulators etc. can therefore be measured.
- O Data hold function to allow for easy readings in dimly lit or hardto-reach locations.
- Large easy-to-read LCD display.
- $\bigcirc$  Automatic power off within 30 minutes to conserve battery life.

# **3. SPECIFICATIONS**

### •AC current ranges

at 23±10  $^\circ\!\mathrm{C}$  , 85% relative humidity

		Accuracy			
Ra	inges	Frequency Selector Switch			
		WIDE (40Hz-1kHz) position	50/60 Hz position		
200mA	0-199.9mA	±1.0% rdg±4 dgt (50/60 Hz)	±1 .5% rdg±6 dgt		
2000mA	0-1999mA	±3.0% rdg±4 dgt (40Hz-1kHz)	±1.5% lug±6 ugi		
20A	0-19.99A	±1.5% rdg±4 dgt (50/60 Hz)	10.00/ relation date		
200A	0-199.9A	±3.5% rdg±4 dgt (40 Hz-1kHz)	±2.0% rdg±6 dgt		
5004		±2.0% rdg±4 dgt (50/60 Hz)	10 E0/ ada 10 dat		
500A		±4.0% rdg±4 dgt (40Hz-1kHz)	±2.5% rdg±6 dgt		

Operating System: Sensing: Digital Display:	Dual Integration True RMS sensing 3-1/2 digit liquid crystal display with maximum reading of 1999
Overrange Indication:	Numeral "1" on the highest digit flashes
Response Time:	Approx. 2 second
Sample Rate:	Approx. three times per second
Data Hold:	For all ranges. In Data Hold mode, "H"
Low Battery Indicator:	symbol is displayed on the digital display "B" symbol is displayed on the digital display.
Storage Temperature	-10°C~50°C at 75% max, relative
and Humidity:	humidity without condensing
<b>Operating Temperature:</b>	0~40°C
Power Source:	one 6F22 (DC9 V) battery or equivalent
Current Consumption:	Approx. 4 mA

Auto Power Off:	Automatically turns power off in approx. 30 minutes after the instrument is powered
Insulation Resistance:	$10M\Omega$ min. at 1000 V between electrical circuit and housing case, and electrical circuit and transformer jaws
Withstand Voltage:	3700 V AC for 1 minute between electrical circuit and housing case as well as electrical circuit and transformer jaws
Conductor Size:	Approx. 40 mm diameter max.
Dimensions:	209 (L) x 96 (W) x 45 (D) mm
Weight:	450 g approx. (battery included)
Accessories:	6F22 battery
	Carrying Case
	Instruction manual
<b>Optional Accessories:</b>	Multi-Tran Model 8004 and 8008

## 4. INSTRUMENT LAYOUT





### 1) Transformer Jaws

Pick up current flowing through the conductor.

### 2 Jaw Trigger

Operates the transformer jaws. Press to open them.

### ③ Power/Range Switch

Selects ranges. Also, turns power on. Always turn the switch to off after use.

### ④ Data Hold Push Button

Push to freeze a reading and push again to release it. In Data Hold mode, "H" is displayed on the digital display.

### **(5) Frequency Selector Switch**

Selects frequency response of 50/60 Hz or up to 1 kHz WIDE.

### 6 Digital Display

Function symbols and decimal point are displayed according to the Range Switch position.



**⑦** Safety Hand Strap

# **5. PREPARATIONS FOR TESTS**

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Always inspect your instrument and accessories for any sign of damage or abnormality before every use. If any abnormal conditions exist (eg. cracked cases, display not reading, etc.), do not attempt to conduct any tests.

#### 5-1 Battery Check

To check the battery voltage set the Power/Range Selector Switch to OFF position. If the display is clear without symbol "B" showing, battery voltage is OK. If the display blanks or "B" is indicated, replace the battery according to section 7 for Battery replacement.

#### NOTE

The instrument automatically turns power off approximately 30 minutes after it is turned on. Therefore the display may be blank with the Power/Range Selector Switch set to On position. To operate the instrument, set the switch back to OFF position and then ON position.

#### 5-2 Data Hold Switch

If the Data Hold Switch is pressed in (DATA HOLD mode), press to release it.

Otherwise, the display remains frozen. When the instrument is in DATA HOLD mode, "H" symbol is indicated on the display.

# 6. OPERATING INSTRUCTIONS

#### 6-1 Current Measurements

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- Do not make measurements where the potential is greater than 600 V AC. This may cause shock hazard and damage to the instrument or equipment under test.
- The Transformer Jaws are made of metal and their tips are not insulated. Be especially careful about the hazard of possible shorting where the equipment under test has exposed metal parts.
- Do not open the battery compartment cover when making measurements.

### 

- Take sufficient care to avoid shock, vibration or excessive force when handling the instrument. Otherwise, precisely adjusted Transformer Jaws will be damaged.
- When Transformer Jaws do not fully close, never try to close them by force, but make them free to move and try again. If a foreign substance is stuck in the jaw tips, remove it. If the jaw tips have been deformed, correct so that each tip is properly aligned. Otherwise, the jaws will be damaged and warranty may not cover the repair cost.

#### NOTE

When making current measurements, keep the Transformer Jaws fully closed. Otherwise, accurate measurements cannot be taken.

Maximum conductor size is 40 mm in diameter.

- When measuring larger current, the Transformer Jaws may buzz. This is not a fault and does not affect the accuracy either.
  - (1) Set the Range Switch to the desired "A" or " mA" position.
  - (2) Select the desired frequency response. WIDE or 50/60 Hz, with the Frequency Selector Switch. (see section 6-2 for Frequency Selector Switch)
  - (3) Press the Trigger to open the Transformer Jaws and clamp onto a conductor or conductors as shown in Fig. 3. Take the reading on the display. (This method also permits measurements of leakage current flowing through earthing conductors and very small current.)



Fig. 3

### 

Do not exceed maximum allowable current on each current range. (see section 3 for Specifications)

- For more accurate measurements, place the conductor at the center of the closed jaws.
- When measuring current on a line or a grounded wire, clamp onto one conductor only.
  - (4) When measuring out of balance leakage current, clamp onto all conductors except a grounded wire as shown in Fig. 4.





Fig. 4

#### 6-2. Frequency Selector Switch

Model 2417 measures AC currents of:

- (1) 50/60 Hz fundamental frequency only with the Frequency Selector Switch set to the 50/60 Hz position ("50/60 Hz" is indicated on the display), or
- (2) 40 Hz to 1 kHz with the Frequency Selector Switch set to the WIDE position ("WIDE" is indicated on the display)

Frequency response of 40 Hz to 1 kHz permits measurements of current with harmonics superimposed on the fundamental frequency. High frequency current from appliances such as inverters, switching regulators etc. can therefore be measured.

#### NOTE

 Model 2417 hasa very good frequency response due to the electrical property of the transformer jaws used for the instruments.

Therefore, it measures AC current of not only 50 Hz or 60 Hz fundamental wave form but also of higher frequencies and harmonics superimposed on the fundamental frequency when present in the circuit under test. To eliminate the effect of noise from the high frequency and measure AC current of 50 Hz or 60 Hz fundamental frequency, a filter circuit is incorporated into the Model 2417 which works when the frequency selector switch is set to the 50/60 Hz position.

It is designed to attenuate frequencies starting from around 100 Hz with an attenuation characteristic of approx. -24 dB/octave (signal strength declines to one sixteenth of that at the initial frequency when it doubled). Recently there has been increased usage of power through inverters, switching regulators, etc. When the high frequency noise from such appliances leaks or flows into the ground through capacitors not filtering completely, the earth leakage breaker may not trip. In such a case the instruments may not give current readings with the frequency selector switch at the 50/60 Hz position. Therefore, it is necessary to make current measurements with the switch at the "WIDE" position. When in doubt as to the presence of high frequencies and harmonics that affect AC current measurements, take current readings with the switch at the 50/60 Hz and "WIDE" positions respectively and then compare the results obtained.

### 6-3 Date Hold

Push the Data Hold Switch Button to freeze the reading. "H" symbol is displayed on the digital display to indicate that the instrument is in Data Hold mode.

Push the button again to exit from Data Hold mode.

### 6-4 Automatic Power Off

Model 2417 automatically turns power off In approx. 30 minutes after it is turned on. To operate the instrument, set the Frequency Selector Switch back to OFF position and then ON position.

# 7. BATTERY REPLACEMENT

### 7-1 When to replace the battery

- (1) When "B" symbol is displayed on the digital display.
- (2) When the digital display does not read with the Power/Range Selector Switch set to ON position.

#### 7-2 Battery replacement

- (1) Set the Power/Range Selector Switch to OFF position.
- (2) Unscrew and remove the battery compartment cover as shown in Fig. 5.
- (3) Replace the battery with a new 9 V battery type 6F22 or equivalent, observing correct polarity.
- (4) Screw the battery compartment cover.



Fig.5

### 

Never replace the battery during measurement.

# 8. OPTIONAL ACCESSORIES

### 8-1 Model 8004 and 8008 (Multi-Tran)

Model 8008 is a clamp-on current transformer designed to measure AC current up to 3000 A in conjunction with a clamp meter. It clamps on large bus-bars (up to 150 X 100 mm) and conductors (up to 100 mm diameter). Model 8004 is also available for AC current measurements up to1000A on a conductor of max 60 mm diameter. As shown. clamp on a conductor with Model 8008 or 8004, their pickup coil also clamped with Model 2417. Then take the reading and multiply it by 10.

#### NOTE

These Multi-Tran's cannot be used for leakage current measurement.



### MEMO

### DISTRIBUTOR



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