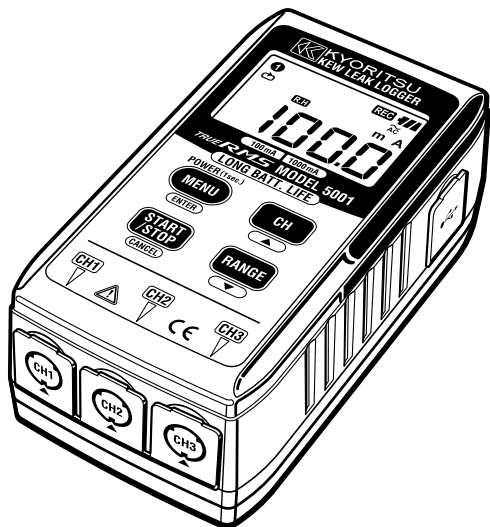


INSTRUCTION MANUAL



Leak Logger for Measuring & Recording leakage current

KEW LEAK LOGGER

MODEL 5000/5001



**KYORITSU ELECTRICAL INSTRUMENTS
WORKS, LTD.**

Contents

1. Safety Warnings	1
2. Features	3
3. Specification	4
4. Features	6
4-1 Panel	6
4-2 LCD display	6
4-3 Message to be displayed on LCD	7
5. Before starting measurement & record	8
5-1 Power on/off the instrument	8
5-2 Battery voltage check	8
5-3 Auto power off	8
5-4 Sensor connection	8
5-5 How to fix the instrument	9
5-6 Max. recording time and Max. number of recording data	10
6. How to use	11
6-1 Continuous recording mode	12
6-2 Event recording mode	15
6-3 Max value recording mode	18
6-4 Capture recording mode	22
7. Measurement	26
7-1 Current measurement	26
7-2 Measuring and recording method	28
8. Recording	30
9. Menu operation	31
9-1 Menu operation	31
9-2 Change of set value	31
9-3 Menu flow chart	32
10. Data transfer to PC	37
11. Battery Replacement	40



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 instructions contained in this manual before starting to use the instrument.
- Save and keep the manual at hand to enable quick reference whenever necessary.
- Be sure to use the instrument only in its intended applications.
- Be sure to understand and follow all safety instructions contained in the manual.

Be sure to observe the above instructions. 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 related parts in the manual for safe operation of the instrument. Be sure to carefully read the instructions following each  symbol 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 a minor injury or instrument damage.

 **DANGER**

- Never make measurement on the circuit in which electrical potential to ground over AC300V 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 and the instrument case when making measurement.
- Verify proper operation on a known source before use or taking action as a result of the indication of the instrument.


 **WARNING**

- Never attempt to make any measurement if any abnormal conditions are noted, such as broken case 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 batteries if the surface of the instrument is wet.
- Make sure to power off the instrument when opening the Battery cover for battery replacement.

 **CAUTION**

- Do not expose the instrument to the direct sun, high temperature and humidity or dewfall.
- Be sure to set the range selector switch to "OFF" position 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.

2. Features

- This instrument is a leak logger for measuring and recording leakage current.
- Capable of recording leakage current from CH1 to 3 with leakage clamp sensor.
- Can measure and record max. AC1000mA(50/60Hz) with RMS.
- Recording modes are as follows:
 - (1) Continuous recording mode
Record the data continuously at set interval.
 - (2) Event recording mode
Can record total 8 data (for about 0.8sec.): prior to and subsequent to when exceeding set current value. LED will blink when recording starts.
 - (3) Max. value recording mode
When exceeding set current value, record the max. value every 10sec. Record the value until it drops to 50% of set value or for 10min.
 - (4) Capture recording mode
When exceeding set current value, record the instantaneous value in 200ms (10 to 12 waveforms) including 50ms prior to and subsequent to when exceeding the set value.
- Can store 60,000 data when using 1ch, and when using all 3ch, can store 20,000data at each channel.
(Continuous recording mode)
- Data will not be lost at battery replacement or at lower battery voltage as it is stored in nonvolatile memory.
- Capable of recording for long period due to power saving function.
- Can transfer the recorded data to PC via USB cable.
- Protected throughout by double or reinforced insulation “” .

3. Specification

- Continuous recording mode [RMS] (50/60Hz, Sine Wave) :

Range	Measuring range	Accuracy of the instrument	Accuracy when combining with sensor
100mA	0~100.0mA	$\pm 1.0\%rdg \pm 5dgt$	$\pm 2.0\%rdg \pm 10dgt$
1000mA	0~1000mA		$\pm 2.0\%rdg \pm 6dgt$

Crest Factor ≤ 2.5 : Sine Wave accuracy $+2\%+5dgt$

- Event/Max. value/ Capture recording mode [RMS] (50/60Hz, Sine Wave) :

Range	Measuring range	Accuracy of the instrument	Accuracy when combining with sensor
100mA	0~100.0mA	$\pm 1.5\%rdg \pm 7dgt$	$\pm 2.5\%rdg \pm 12dgt$
1000mA	0~1000mA		$\pm 2.5\%rdg \pm 8dgt$

- Current detection (Event/Max. value/ Capture recording mode):

- Capture recording mode [instantaneous value]:

Range	Measuring range	Accuracy of the instrument	Accuracy when combining with sensor
100mA	0~100.0mA	$\pm 3\%rdg \pm 2\%fs$	$\pm 4\%rdg \pm 2.5\%fs$
1000mA	0~1000mA		$\pm 4\%rdg \pm 2\%fs$

- Operating system : Successive Approximation
- Input : AC voltage (AC100mV/A)
- Rated max. working voltage : AC170mVrms, 250mV peak value
- Number of input channel : 3
- Measuring method : True RMS
- RMS Measuring interval :

Continuous recording mode:

approx. 1sec. to 60 min. depending on recording interval

Max. value, Event mode :

approx. 100ms. Normally, sampling at 3.3ms intervals.

(Sampling for current detection: at the interval of about 1.6ms.)

Capture recording mode :

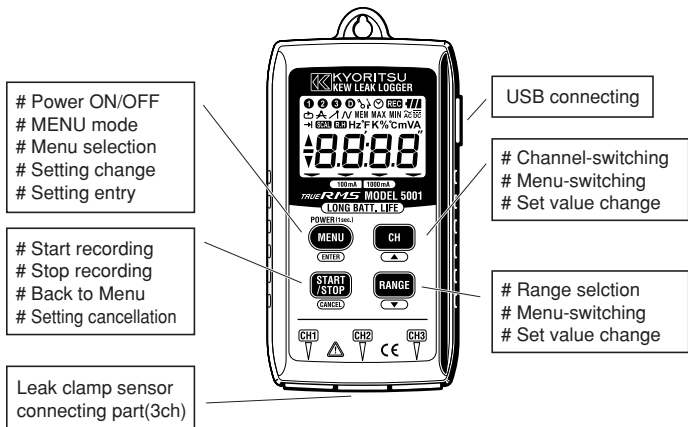
approx. 100ms. Consistently, sampling at 1ms intervals.

(Sampling for current detection: at the interval of about 0.5ms.)

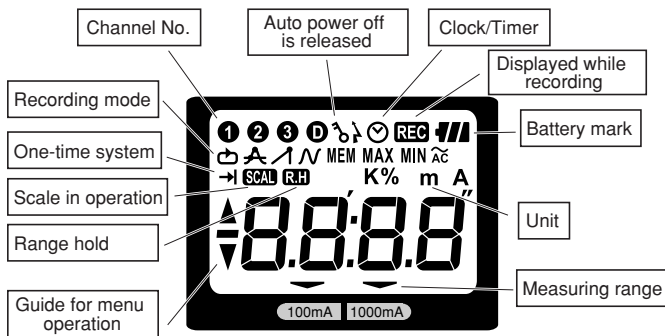
- Display : Liquid crystal display
- Low battery warning : Battery mark display(in 4 levels)
- Overrange indication : "OL" mark appears when exceeding measuring range. (Max. indication 1049counts.)
- Auto power off : Power off function operates automatically after a switch remains for 3min. (when recording is stopped)
- Temperature & humidity range(guaranteed accuracy) :
23°C ±5°C/Relative humidity 85% or less (no condensation)
- Operating temperature & humidity range :
0°C ~50°C/Relative humidity 85% or less (no condensation)
- Storage temperature & humidity range :
-20°C ~+60°C/Relative humidity 85% or less (no condensation)
- Battery : DC6V: Alkaline battery(LR6) x 4pcs (M5000)
DC9V: Alkaline battery(LR6) x 6pcs (M5001)
- Current consumption : approx. 5mA
- Possible measurement time:
Approx.25days(M5000)/40days(M5001)
(Until the instrument cannot be powered on)
Under normal temperature
- Applicable standards : IEC 61010-1:2001
CATIII 300V Pollution degree2
IEC 61326 (EMC standard)
- Overload protection : AC 1500A MAX/ for 10sec.
(when sensor M8143 is used.)
- Withstand voltage : AC3536V (RMS 50/60Hz)/ for 5sec.
- Insulation resistance : 50Mohm or more / 1000V
- Dimension : 111(H) x 60(W) x 36(D)mm (M5000)
111(H) x 60(W) x 42(D)mm (M5001)
- Weight : Approx.255g(M5000)/ 315g(M5001)
- Accessories : Alkaline battery LR6 x 4pcs (M5000)
Alkaline battery LR6 x 6pcs (M5001)
PC software for data display CD : 1pce
USB cable : 1pce.
Carrying case
Instruction manual
- Applicable clamp sensor : Leak clamp sensor (M8141/8142/8143)
- Option : Carrying Case (M9119)
Extension cord for sensor(M-7147)

4. Features

4-1 Panel



4-2 LCD display



4-3 Message to be displayed on LCD

Message	Meaning
NC	Sensor is not connected.
OL	Over-range
SET.1	Menu: Setting1 (SET.1)
SET.2	Menu: Setting2 (SET.2)
STS.1	Menu: Status1 (STS.1)
STS.2	Menu: Status2 (STS.2)
End	Menu: End
LOG	Continuous recording mode (LOGging)
dtc	Event recording mode(detect)
-	Max. value recording mode (Max)
CAP	Capture recording mode (CAPture)
-PC-	PC data in transit
CLR	Warning of memory clear

5. Before starting measurement & record


5-1 Power on/off the instrument

Instrument can be powered on by pressing "MENU/ENTER" button **1sec. or more** when it is in OFF status.

When all indications are displayed on the LCD, release the button.

To power off the instrument, press "MENU/ENTER" button **1sec. or more** while making normal measurement. (Instrument cannot be powered off while recording data. Stop the recording, and power off the instrument.) Then "OFF" will be displayed on the LCD and instrument is powered off when releasing then button.

5-2 Battery voltage check

Power on the instrument. When the battery mark displayed on the LCD is last 1level () or no indication on the LCD, replace batteries. When no indications displayed on the LCD, battery is exhausted. Replace it new one.

5-3 Auto-power off

When turning on Auto-power off function in Menu: "Setting2 (SEt.2)", automatically switches the instrument off approx. in 3 minutes after the last operation of switch.

While recording, instrument will not be switched off but indicate battery mark and recording mark, etc instead of the measured value.

Measured values can be displayed again by operating any button.

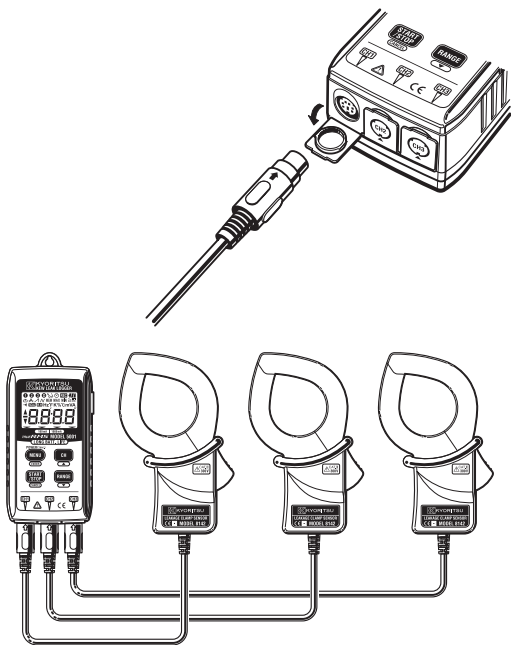
When turning off Auto-power off function, instrument will not be switched off automatically. Be sure to switch off the instrument after use.

(Please refer to the instruction manual, page 31 "9.Menu operation" for further details.)

5-4 Sensor connection

This instrument, Leak logger, can perform measurement and record by using sensors via 3ch. Pay attention to the direction of the connector of sensor cable and firmly connected it. Press "CH" button on the instrument and display the channel in use.

When the sensor is not connected correctly, "nc" is displayed on the LCD. If this message is displayed, confirm that no dust on the connector terminal and connect the sensor again.



5-5 How to fix the instrument

Instrument can be fixed as below. With either method, be sure to check the instrument is not easily dropped. If the instrument is not firmly fastened, it will drop and may be destroyed or damaged.

- 1) Hang the instrument on hook
Capable of fixing the instrument with a hook or screw by using the hooking hole on the top.
- 2) Fix the instrument with magnet on its back.
Can fix the instrument to metallic plate with the magnet on its backside.

5-6 Max. recording time and Max. number of recording data

Max. recording time for Continuous measurement mode

Recording interval	When using 3CH 20,000data/1CH	When using 2CH 30,000data/1CH	When using 1CH 60,000data
1sec.	5:33:20	8:20:00	16:40:00
2sec.	11:06:40	16:40:00	1day/9:20:00
5sec.	1day/3:46:40	1day/17:40:00	3days/11:20:00
10sec.	2days/7:33:20	3days/11:20:00	6days/22:40:00
15sec.	3days/11:20:00	5days/5:00:00	10days/10:00:00
20sec.	4days/15:06:40	6days/22:40:00	13days/21:20:00
30sec.	6days/22:40:00	10days/10:00:00	20days/20:00:00
1min.	13days/21:20:00	20days/20:00:00	41days/16:00:00
2min.	27days/18:40:00	41days/16:00:00	83days/8:00:00
5min.	69days/10:40:00	104days/4:00:00	208days/8:00:00
10min.	138days/21:20:00	208days/8:00:00	416days/16:00:00
15min.	208days/8:00:00	260days/10:00:00	625days/0:00:00
20min.	277days/18:40:00	416days/16:00:00	833days/8:00:00
30min.	416days/16:00:00	625days/0:00:00	1250days/0:00:00
60min.	833days/8:00:00	1250days/0:00:00	2500days/0:00:00


Note)Max. recoding time is limited by battery life.


Max. number of recording data


Recording mode	When using 3CH	When using 2CH	When using 1CH
Continuous rec.	20,000data	30,000data	60,000data
Event rec.	1,600data	2,400data	4,800data
Max. value rec.	330data	495data	990data
Capture rec.			345data


6. How to use

Select one of the four recording modes, and start recording.

- (1)  Record at regular interval in Continuous recording mode
→ P.12
Record the data at the selected intervals. (Interval: 1sec. ~ 60min)
Best suited for checking Leakage varies with time as recording is performed at regular interval.

- (2)  Detect leakage current in Event recording mode
(LED blinks) → P.15
To check the cause of leakage: current value, time and frequency when exceeding the set current value can be checked. On each channel, LED blinks when exceeding set value, and can check time and current value of the last 10data with the instrument. It is helpful to check the cause of leakage on site.

- (3)  Record the max. value in Max. value recording mode.
→ P.18
Best suited for checking the recording time and number of times from the occurrence to the end of leakage. Record starts when exceeding the set current value, and record the max value every 10sec.
When exceeding set current value, record the max. value every 10sec.
As recording the value until it drops to 50% of set value or for 10min, can check when intermittent leakage occurs.

- (4)  Catch waveform in capture recording mode. → P.22
Record waveforms at sampling frequency approx. 900Hz by using CH1 only. Best suited for waveform observation. When exceeding set current value, record the instantaneous value in 200ms (10 to 12 waveforms) including 50ms prior to and subsequent to when exceeding the set value. (* Waveform cannot be displayed on the LCD of the instrument. Transfer the data to PC by using PC software of accessory, and check the graphic display.)

6-1 Continuous recording mode: Record at 1min. interval

Step1 : Power on

- (1) Press "MENU/ENTER" button for 1sec. or more and power on the instrument.
- (2) Release the button when all indications are displayed on the LCD.
- (3) When instrument is powered on, it becomes measurement mode.

Step2 : Check and change of set value

- (4) Press "MENU/ENTER" button and make the instrument to menu mode.
- (5) Check Setting1:"SEt.1" is displayed on the LCD, and press "MENU/ENTER" button.
- (6) Present recording mode is displayed on the LCD. Confirm "LOG" is displayed on the LCD, and press "RANGE/▼"button.
(When "dtc", " _ _ " and "CAP" is displayed on the LCD, change the recording mode according to the procedure described in clause 9-2.Change of set value.

Recording mode can be selected from:

- LOG : Continuous recording mode
- dtc : Event recording mode
- _ _ : Max.value recording mode
- CAP : Capture recording mode

- (7) Present recording interval is displayed on the LCD. Check the interval of "1'00" (1min.) is selected, and press "RANGE/▼"button.

In case of change, follow the procedure described in clause 9-2.Change of set value.

Recording interval can be selected from:

- 1,2,5,10,15,20,30sec
- 1,2,5,10,15,20,30,60min.

- (8) Then, present status of one-time system is displayed. In case of change, follow the procedure described in clause 9-2. Change of set value.

One-time system can be selected either:

On : Recording will stop when memory is full.

Off : Overwrite the old data, and store the latest data

- (9) By pressing "RANGE/▼" button, setting 1 is complete and "End" message is displayed. Can back to "SEt.1" at first setting by pressing "MENU/ENTER" or "START/STOP, CANCEL" button.
- (10) Can back to initial measurement mode by pressing "START/STOP, CANCEL" button.

Step3 : Clamp sensor connection, Preparation for measurement

- (11) Connect the instrument and clamp sensor without clamping on anything. Pay attention to the direction of connector and firmly connected to the instrument.
- (12) Clamp the measured object on clamp sensor.
- (13) Every time when pressing "CH/▲" button, display of measured value on CH1 to 3 can be switched. Confirm that a sensor is connected to the instrument. When a sensor is not connected, "nc"(non-connect) is displayed on the LCD.
(The measured value will not be recorded when sensor is not connected at starting to record.)

Step4 : Start recording

- (14) Press "START/STOP" button for 4sec. or more and start to record. While the button is being pressed, "Clr" blinks on the LCD. Keep the button pressed, then measured value and "REC" mark are displayed on the LCD and recording starts.
When release the button, recording will stop.
(In this recording mode, recorded data will be deleted at starting a measurement. So transfer the important data to PC in advance.)

(15) Following operations are available while recording.

- Display the measured value on each channel -> "CH/▲"button
- Recording condition : Display recorded max. value -> Menu "StS.1"
- Recording condition : RECALL -> Menu "StS.2"
- Check the set value at "SEt.1" and "SEt.2"
Following things cannot be operated while recording, so check them carefully before starting to record.
- Power OFF
- Set value change at "SEt.1" and "SEt.2"
- Change of measurement range
- Data communication with PC

When operation above things, recording shall be suspended.

Step5 : Stop recording

- (16) Press "START/STOP" button 1sec or more to stop recording.
- (17) Recording will stop, and "REC" mark disappears.

Step6 : Check the recorded data

- (18) Can check the recorded data while or after recording.
 - Recorded qty. in percentage -> Menu "StS.1"
 - Max, recorded value and when it is recorded (date and hour) on each channel -> Menu "StS.1"
 - Number of recorded data -> Menu "StS.2"
 - RECALL(Display the latest 10data, date, hour and recorded value)-> Menu "StS.2"

Step7 : Graphic display on PC

- (19) Can check the change of leakage current by transferring the data to PC and display it in graphic. Refer to the instruction manual for PC software of "KEW LOG Soft" which shows how to transfer the data PC.

6-2 Event recording mode: Record with the set current of 15mA

Step1 : Power on

- (1) Press "MENU/ENTER" button for 1sec. or more and power on the instrument.
- (2) Release the button when all indications are displayed on the LCD.
- (3) When instrument is powered on, it becomes measurement mode.

Step2 : Check and change of set value

- (4) Press "MENU/ENTER" button and make the instrument to menu mode.
- (5) Check Setting1:"SEt.1" is displayed on the LCD, and press "MENU/ENTER" button.
- (6) Present recording mode is displayed on the LCD. Check "dtc" is displayed on the LCD, and press "RANGE/▼"button.
(When "LOG", " _ _ " and "CAP" is displayed on the LCD, change the recording mode according to the procedure described in clause 9-2.Change of set value.

Recording mode can be selected from:
LOG : Continuous recording mode
dtc : Event recording mode
 _ _ : Max.value recording mode
CAP : Capture recording mode

- (7) Present current set value on CH1 is displayed on the LCD. Confirm that the set current is 15mA, and press "RANGE/▼"button.
In case of change, follow the procedure described in clause 9-2.Change of set value.

The current value can be set at every 1mA from 0 to 1000mA. When the first current is detected, next detection will not start until the detected value drops to 50% or less of set value. So set the value that is more appropriate than that of measured before stating to record.

- (8) Check/change the current set value on CH2 and CH3 as well.

- (9) Then, present status of one-time system is displayed. In case of change, follow the procedure described in clause 9-2.Change of set value.

One-time system can be selected either:

On : Recording will stop when memory is full.

Off : Overwrite the old data,and store the latest data

- (10)By pressing "RANGE/▼"button, setting 1 is complete and "End" message is displayed. Can back to "SEt.1" at first setting by pressing "MENU/ENTER" or "START/STOP, CANCEL" button.
- (11)Can back to initial measurement mode by pressing "START/STOP, CANCEL" button.

Step3 : Clamp sensor connection, Preparation for measurement

- (12) Connect the instrument and clamp sensor without clamping on anything. Pay attention to the direction of connector and firmly connected to the instrument.
- (13) Clamp the measured object on clamp sensor.
- (14) Every time when pressing "CH/▲"button, display of measured value on CH1 to 3 can be switched. Confirm that a sensor is connected to the instrument. When a sensor is not connected, "nc"(non-connect) is displayed on the LCD.
(The measured value will not be recorded when sensor is not connected at starting to record.)

Step4 : Start recording

- (15) Press "START/STOP" button for 3sec. or more and start to record. While the button is being pressed, "REC" mark blinks on the LCD. Keep the button pressed, then measured value and "REC" mark are displayed on the LCD and recording starts. When the button is released, recording will stop. (In this recording mode, recorded data will not be deleted when a record is performed continuously. The recorded data will be deleted when changing recording mode or sensor connecting channel. So transfer the important data to PC in advance.)

(16) Following operations are available while recording.

- Display the measured value on each channel -> "CH/▲" button
- Recording condition : Display recorded max. value -> Menu "StS.1"
- Recording condition : RECALL -> Menu "StS.2"
- Check the set value at "SEt.1" and "SEt.2"
Following things cannot be operated while recording, so check them carefully before starting to record.
- Power OFF
- Set value change at "SEt.1" and "SEt.2"
- Change of measurement range
- Data communication with PC

When operating above things, recording shall be suspended.

Step5 : Stop recording

(17) Press "START/STOP" button 1sec or more to stop the recording.

(18) Recording will stop, and "REC" mark disappears.

Step6 : Check the recorded data

(19) Can check the recorded data while or after recording.

- Recorded qty. in percentage -> Menu "StS.1"
- Max, recorded value and when it is recorded (date and hour) on each channel -> Menu "StS.1"
- Number of detected data -> Menu "StS.2"
- RECALL (Display the latest 10 data, date, hour and recorded value) -> Menu "StS.2"

Step7 : Graphic display on PC

(20) Can check the change of leakage current by transferring the data to PC and display it in graphic. Refer to the instruction manual for PC software of "KEW LOG Soft" which shows how to transfer the data to PC.

6-3 Max value recording mode: Record with the set current of 15mA

Step1 : Power on

- (1) Press "MENU/ENTER" button for 1sec. or more and power on the instrument.
- (2) Release the button when all indications are displayed on the LCD.
- (3) When instrument is powered on, it becomes measurement mode.

Step2 : Check and change of set value

- (4) Press "MENU/ENTER" button and make the instrument to menu mode.
- (5) Check Setting1:"SEt.1" is displayed on the LCD, and press "MENU/ENTER" button.
- (6) Present recording mode is displayed on the LCD. Check " _ _ " is displayed on the LCD, and press "RANGE/▼"button.
(When "LOG", "drc" and "CAP" is displayed on the LCD, change the recording mode according to the procedure described in clause 9-2.Change of set value.

Recording mode can be selected from:

LOG : Continuous recording mode

drc : Event recording mode

_ _ : Max.value recording mode

CAP : Capture recording mode

- (7) Present current set value on CH1 is displayed on the LCD. Confirm that it is set to 15mA, and press "RANGE/▼"button.
In case of change, follow the procedure described at cause 9-2.Change of set value.

The current value can be set at every 1mA from 0 to 1000mA. When the first current is detected,nextdetection will not start until the detected value drops to 50% orless of set value. So set the value that is more appropriate than that of measured before stating to record.

- (8) Check/change the current set value on CH2 and CH3 as well.
- (9) Then, present status of one-time system is displayed. In case of change, follow the procedure described in clause 9-2. Change of set value.

One-time system can be selected either:

On : Recording will stop when memory is full.

Off : Overwrite the old data, and store the latest data

- (10) By pressing "RANGE/▼" button, setting 1 is complete and "End" message is displayed. Can back to "SEt.1" at first setting by pressing "MENU/ENTER" or "START/STOP, CANCEL" button.
- (11) Can back to initial measurement mode by pressing "START/STOP, CANCEL" button.

Step3 : Clamp sensor connection, Preparation for measurement

- (12) Connect the instrument and clamp sensor without clamping on anything. Pay attention to the direction of connector and firmly connected to the instrument.
- (13) Clamp the measured object on clamp sensor.
- (14) Every time when pressing "CH/▲" button, display of measured value on CH1 to 3 can be switched. Confirm that a sensor is connected to the instrument. When a sensor is not connected, "nc"(non-connect) is displayed on the LCD.
(The measured value will not be recorded when sensor is not connected at starting to record.)

Step4 : Start recording

(15) Press "START/STOP" button for 3sec. or more and start to record. While the button is being pressed, "REC" mark blinks on the LCD. Keep the button pressed, then measured value and "REC" mark are displayed on the LCD and recording starts. When the button is released, recording will stop. (In this recording mode, recorded data will not be deleted when a record is performed continuously. The recorded data will be deleted when changing recording mode or sensor connecting channel. So transfer the important data to PC in advance.)

(16) Following operations are available while recording.

- Display the measured value on each channel -> "CH/▲" button
- Recording condition : Display recorded max. value -> Menu "StS.1"
- Recording condition : RECALL -> Menu "StS.2"
- Check the set value at "SEt.1" and "SEt.2"
Following things cannot be operated while recording, so check them carefully before starting to recording.
- Power OFF
- Set value change at "SEt.1" and "SEt.2"
- Change of measurement range
- Data communication with PC

When operating above things, recording shall be suspended.

Step5 : Recording stop

(17) Press "START/STOP" button 1sec or more to stop recording.

(18) Recording will stop, and "REC" mark disappears.

Step6 : Check the recorded data

(19)Can check the recorded data while or after recording.

- Recorded qty. in percentage -> Menu "StS.1"
- Max, recorded value and when it is recorded (date and hour) on each channel -> Menu "StS.1"
- Number of detected current -> Menu "StS.2"
- RECALL(Display the latest 10data, date, hour and recorded data)-> Menu "StS.2"

Step7 : Graphic display on PC

(20)Can check the change of leakage current by transferring the data to PC and display it in graphic. Refer to the instruction manual for PC software of "KEW LOG Soft" which shows how to transfer the data to PC.

6-4 Capture recording mode: Record with the set current of 15mA

Step1 : Power on

- (1) Press "MENU/ENTER" button for 1sec. or more and power on the instrument.
- (2) Release the button when all indications are displayed on the LCD.
- (3) When instrument is powered on, it becomes measurement mode.

Step2 : Check and change of set value

- (4) Press "MENU/ENTER" button and make the instrument to menu mode.
- (5) Check Setting1:"SEt.1" is displayed on the LCD, and press "MENU/ENTER" button.
- (6) Present recording mode is displayed on the LCD. Check "CAP" is displayed on the LCD, and press "RANGE/▼"button.
(When "LOG", "drc" and "___" is displayed on the LCD, change the recording mode according to the procedure described in clause 9-2. Set value change.

Recording mode can be selected from:

LOG : Continuous recording mode

drc : Event recording mode

___ : Max.value recording mode

CAP : Capture recording mode

- (7) Present current set value on CH1 is displayed on the LCD. Confirm that it is set to 15mA, and press "RANGE/▼"button.
In case of change, follow the procedure described in clause 9-2.Change of set value.

The current value can be set at every 1mA from 0 to 1000mA. When the first current is detected,next detection will not start until the detected value drops to 50% or less of set value. So set the value that is more appropriate than that of measured before stating to record.

- (8) Then, present status of one-time system is displayed. In case of change, follow the procedure described in clause 9-2. Change of set value.

One-time system can be selected either:

On : Recording will stop when memory is full.

Off : Overwrite the old data, and store the latest data

- (9) By pressing "RANGE/▼" button, setting 1 is complete and "End" message is displayed. Can back to "SEt.1" at first setting by pressing "MENU/ENTER" or "START/STOP, CANCEL" button.
- (10) Can back to initial measurement mode by pressing "START/STOP, CANCEL" button.

Step3 : Clamp sensor connection, Preparation for measurement

- (11) Connect the instrument and clamp sensor without clamping on anything. Pay attention to the direction of connector and firmly connected to the instrument. In capture recording mode, only Ch1 is used.
- (12) Clamp the measured object on clamp sensor.
- (13) Confirm that a sensor is connected to the instrument. When a sensor is not connected, "nc"(non-connect) is displayed on the LCD. (The measured value will not be recorded when sensor is not connected at starting to record.)

Step4 : Start recording

(14) Press "START/STOP" button for 3sec. or more and start to record. While the button is being pressed, "REC" mark blinks on the LCD. Keep the button pressed, then measured value and "REC" mark are displayed on the LCD and recording starts. When the button is released, recording will stop.

(In this recording mode, recorded data will not be deleted when a record is performed continuously. The recorded data will be deleted when changing recording mode or sensor connecting channel. So transfer the important data to PC in advance.)

(15) Following operations are available while recording.

- Recording condition : Display recorded max. value -> Menu "StS.1"
- Recording condition : RECALL -> Menu "StS.2"
- Check the set value at "SEt.1" and "SEt.2"
Following things cannot be operated while recording, so check them carefully before starting to recording.
- Power OFF
- Set value change at "SEt.1" and "SEt.2"
- Change of measurement range
- Data communication with PC

When operating above things, recording shall be suspended.

Step5 : Recording stop

(16) Press "START/STOP" button 1sec or more to stop recording.

(17) Recording will stop, and "REC" mark disappears.

Step6 : Check the recorded data

(18)Can check the recorded data while or after recording.

- Recorded qty. in percentage -> Menu "StS.1"
- Max, recorded value and when it is recorded (date and hour) on each channel -> Menu "StS.1"

Number of detected current -> Menu "StS.2"

- RECALL(Display the latest 10data, date, hour and recorded value)-> Menu "StS.2"

Step7 : Graphic display on PC

(19)Can check the waveform of leakage current by transferring the data to PC and display it in graphic. Refer to the instruction manual for PC software of "KEW LOG Soft" which shows how to transfer the data to PC.

7. Measurement

7-1 Current measurement

 **DANGER**

- Never make measurement on the circuit in which electrical potential to ground over AC300V exists.
- 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.
- Do not make measurement with the battery compartment cover removed from the instrument.

 **CAUTION**

- 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 it 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.
- Refer to the specification of clamp sensor for the max. measurable conductor size. During current measurement, keep the transformer jaws fully closed. Otherwise, accurate measurement cannot be made.
- When measuring a large current, the transformer jaws may buzz.
This is not a fault and does not affect the accuracy.

- (1) By pressing " CH " button, the measured value at each channel to which the sensor connected will be displayed.

① → ② → ③

When no clamp sensor is connected to the instrument, "nc" will be displayed on the LCD.

- (2) In continuous recording mode, by pressing " RANGE " button, range is changed in following sequence. Select any range from below ranges.

Auto-range → 1000mA range → 100mA range → Auto-range

In Event/Max. value/Capture recording mode, Auto-range is not available. Select the range before starting to record.

- (3) Measurement on Zero-phase system (see Fig.1)

When measuring out of balance leakage current, clamp onto all conductors except a ground wire. Take the readings on the LCD.

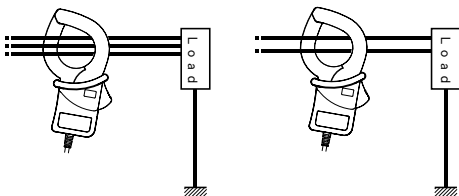


Fig.1 Measurement of leakage current on Zero-phase system

- (4) Measurement on ground wire (see Fig.2)

Clamp onto a ground wire.

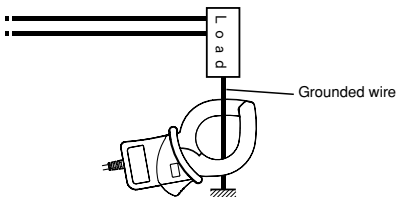


Fig.2 Measurement of leakage current on ground wire

7-2 Measuring and recording method

1) Continuous recording mode

Switch the channel to which the sensor is connected every at recording intervals. After recording, stand-by until next recording interval comes. Import 180data of input signal by sampling during 2cycles from the connected sensor, and calculate true RMS. Measurement result will be displayed at every 1sec.

2) Event recording mode

Do sampling consistently at 1.6ms intervals, and compare and judge the peak value of sine wave that is converted into RMS and current set value. At the same time, calculate RMS every at 100ms from the sampling value at every 3.3ms. When the event which exceeding detected current value happens, total 8data(for about 0.8sec.): 3RMS prior to when exceeding the value and 4data subsequent to it is recorded. In addition, the peak value and time when detecting the exceeding current will be recorded.

After recording, current will not be detected until current drops to 50% or less of set current value as the last detected leakage current is remaining. On the selected channel, measured max. values during measurements at every 100ms will be displayed at every 1sec.

3) Max. value recording mode

Sampling continuously at 1.6ms intervals, and compare and judge the peak value of sine wave that is converted into RMS and current set value.

At the same time, calculate RMS every at 100ms from the sampling value at every 3.3ms.

When the event which exceeding detected current value happens, record will start and end when the value drops to 50% or less of set current value or for 10min with information of max value recorded at every 10sec and time.

After recoding, current will not be detected until current drops to 50% or less of set current value as the last detected leakage current is remaining. On the selected channel, measured max. values during measurements at every 100ms will be displayed at every 1sec. While recording, max. value will be displayed at every 10sec.

4) Capture recording mode

Sampling continuously at 1ms intervals, and compare and judge the peak value of sine wave that is converted into RMS and current set value.

When the event which exceeding detected current value happens, instantaneous value with time information for 200ms(10 to 12 waveforms) including 50ms prior to and subsequent to when exceeding the set value.

After recording, current will not be detected until current drops to 50% or less of set current value as the last detected leakage current is remaining. On the selected channel, measured max. values uring measurements at every 100ms will be displayed at every 1sec.

8. Recording

- (1) Recording starts by pressing "START/STOP" button 3sec or more, and **REC** mark is displayed on the LCD.

Note:

- The channel on which the data is subject to record automatically recognize the clamp sensor, which is connected to a channel of the instrument, and record the data measured on the channel to which the sensor is connected. Do not connect a sensor to a channel on which no recording will perform.
- In capture recording mode, the measured value on CH1 only can be recorded.
- In capture recording mode, when starting to record by pressing this button, all the data recorded in the past will be deleted.
- In event recording, Max value recording and capture recording mode, when changing the recording mode of the channel to which a sensor is connected, the data recorded in the past will be deleted as well.

Transfer the important data to PC in advance.

- (2) To end the recording, press "START/STOP" button again for 1sec or more. Then " **REC** " mark disappears from the LCD. For the general of recorded data, it can be checked by "recorded qty %", "recorded max value" in menu "StS.1" and "number of recorded data/number of detected current" in menu "StS.2" or "RECALL".

9. Menu operation

9-1 Menu operation

Menu mode can be operated with following buttons to switch the indication, change or register the set value.

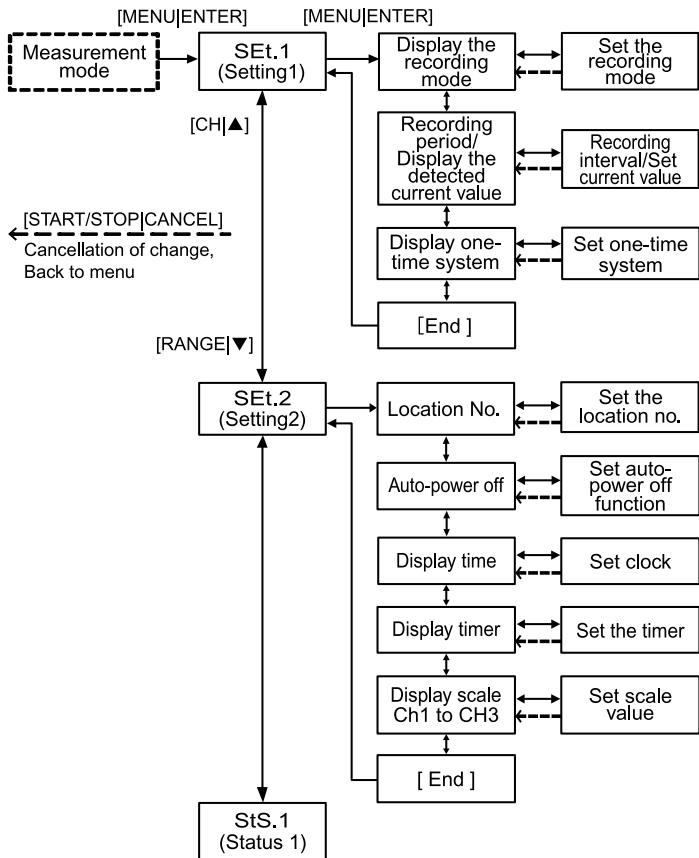
<p><small>POWER (1sec.)</small></p> <p>MENU</p> <p>ENTER</p> <p><Select item> <Change, register></p>	<p>CH</p> <p>▲</p> <p><Switch item> <Change the set value></p>
<p>START /STOP</p> <p>CANCEL</p> <p><Back to menu> <Cancellation of change></p>	<p>RANGE</p> <p>▼</p> <p><Switch item> <Change the set value></p>

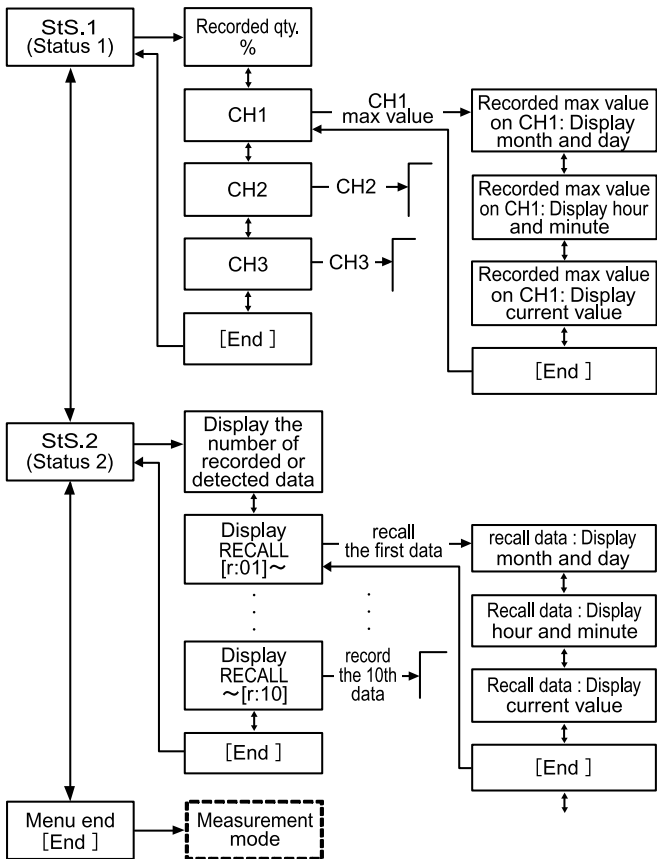
Memo: When "▲" or "▼" mark is displayed at the left side on the LCD, the indicated direction of "CH/▲" and "RANGE/▼" button are available.

9-2. Change of set value

- (1) Press "MENU/ENTER" button while present setting is displayed on the LCD.
- (2) All indication on LCD will blink and be ready for changing the set value.
- (3) Set value can be changed with "CH/▲" or "RANGE/▼" button.
- (4) When the set value is being displayed, press "MENU/ENTER" button to ascertain it. In case of cancel the change, press "START/STOP, CANCEL" button. Then can be back to previous set value.
- (5) The indications on LCD will stop, and the set value is ascertained.

9-3 Menu flow chart





<Menu setting 1: SEt.1 item>

1) "Recording mode"


Select one of the four recording mode.

 [LOG] : Continuous recording mode

Make measurements and record the data at the selected intervals.

 [dtc] : Event recording mode

Can record total 8data(approx. for 0.8sec.): prior to and subsequent to when exceeding the set current value. The LED for the CH on which the exceeding value is detected will blink.

 [] : Max. value recording mode

When exceeding the set value, record the measured current value at every 10sec. The recording will be continued until the measured value drops to 50% or less of the set value or for 10min. LED for the detected channel will blink.

 [CAP] Capture recording mode

Can record the instantaneous value when exceeding set current value. Capable of observing waveform by transferring the data to PC.

2-1) "Recording interval"

Recording interval can be selected in Continuous recording mode.

Recording interval can be selected from:

1, 2, 5, 10, 15, 20, 30sec.

1, 2, 5, 10, 15, 20, 30, 60min.

2-2) "Current value for detection"

In Event, Max value and Capture recording mode, set the current value for detection for each channel. When detecting the current which exceeds this set value, record will start. Also, LED blinks.

3) "One-time switch"

On : Recording will stop when memory is full.

Off : Overwrite the old data, and store the latest data (Endless)


<Menu setting 2: [SEt. 2] item>

1) Location information

Set the location no. to identify the measuring and recording place. Location no. is linked to the location list in PC software and allows to display the location name, which corresponding the location no., when displaying data on PC software.
Can recognize the place where the data is recorded.

2) Auto-power off

Turn on/off Auto-power off function.

When Auto-power off function is turned off,  mark is displayed on the LCD and the function will not operate. Be sure to power off the instrument after use. Auto-power off function will not operate while recording.

3) Time

Capable of adjusting the time within 00:00 to 23:59.

Connect the instrument to PC and set clock and date on PC software.

4) Timer (Reservation of starting time)

Display and set the timer. Capable of setting the timer within 00:00 to 23:59.

Recording will start at the time set with the timer.

Press "START/STOP" button 3sec. or more after setting the timer to get the instrument to recording mode. Instrument stands by until the set time. At the set time, recording will start.

5) Scale **SCAL**

The value: measured value times scale value, is displayed on the LCD. (It will not reflect on the recorded data.)

When measuring one-tenth signal via Multi-tran or something, measured value can be directly read from the LCD as it is displayed : Measured value x 10.0 = Indicated value, if setting the scale value to 10.0.

<Menu recording status :

"StS.1(status1) item> (just for reference)

- 1) Recorded qty.:
Display the rate of recorded data against the amount of memory is indicated in percentage(%). In case of 100%, old data will be overwritten by new data.
- 2) "CH1 MAX"
Display the recorded max. value of CH1 from the beginning of recording.
Can check: "Month, day", "Hour, minute" and "max value".
- 3) "CH2 MAX"
Display the recorded max. value of CH2 from the beginning of recording.
Can check: "Month, day", "Hour, minute" and "max value".
- 4) "CH3 MAX"
Display the recorded max. value of CH3 from the beginning of recording.
Can check: "Month, day", "Hour, minute" and "max value".

<Menu recording status :

"StS.2(status2) item> (just for reference)

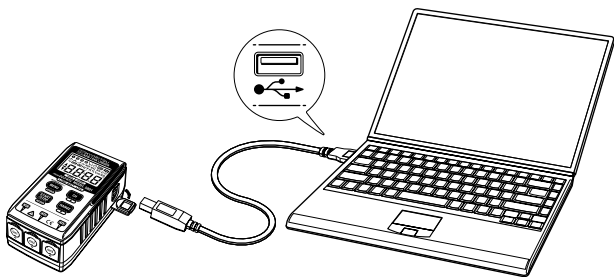
- 1-1) Number of recorded data
In continuous recording mode, display the number of recorded data.
- 1-2) Number of detected current
In event, max value and capture recording mode, display the number of detected current on each channel respectively.
- 2) RECALL (r:01 ~ r:10)
Can check the latest 10data.
Display "Month, day", "Hour, minute", "recorded value on CH1", "recorded value on CH2" and "recorded value on CH3".
(In case of no data, display "-----".)

10. Data transfer to PC

- Install PC software “KEW LOG Soft” on your PC before using the instrument. Please refer to the instruction manual for “KEW LOG Software” which shows how to install the software.
- When connecting the logger to PC for the first time, your PC will find this new hardware and install the USB driver.
Follow the instructions described in the instruction manual for “KEW LOG Soft” and install it on your PC.

10-1 Connection of USB cable

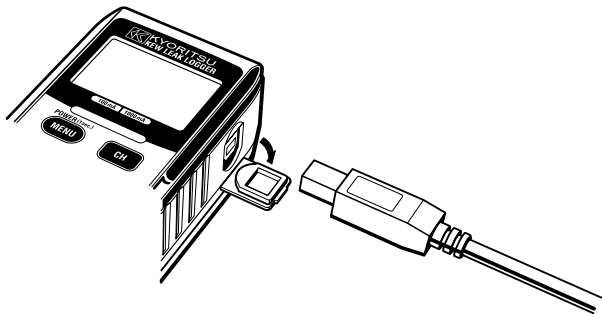
- (1) Connect the USB cable to the available USB port of PC.



- (2) Connect the other end of USB cable to the USB terminal on the right side of this instrument.

Note:

Remove the protective cover of USB terminal carefully, and connect a cable to it. When the cover is damaged, it may cause poor contact due to dust, etc.



10-2 Preparation for data transmission

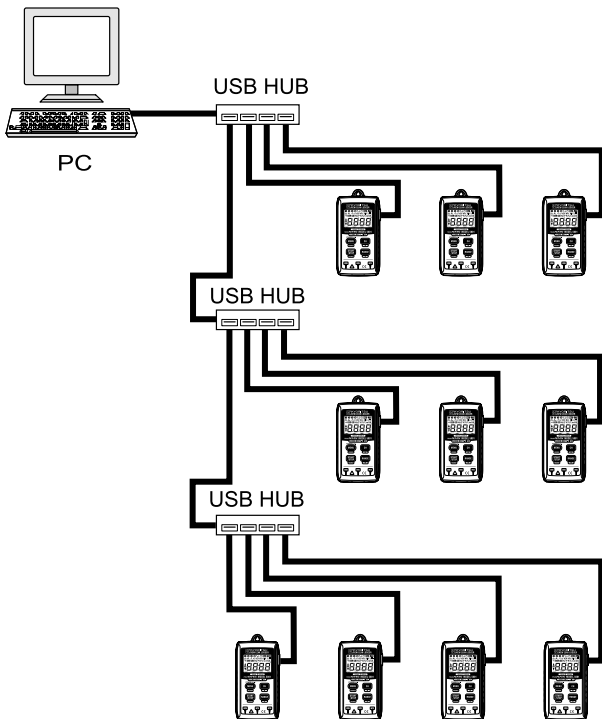
- (1) Power on the instrument, and get ready for measurement.
(Note: Data cannot be transferred during menu mode or in recording.)
- (2) Start up PC software: KEW LOG Soft.

10-3 Operation of PC software

Refer to the enclosed instruction manual for "KEW LOG Soft".

10-4 Multiple connections

By using commercially available USB hub, multiple Leak Loggers can be connected to your PC. With PC software "KEW LOG Soft", you can select one Logger from the list of detected Logger and can do data transfer. You need not connect and disconnect USB cable one by one.





11. Battery Replacement

WARNING

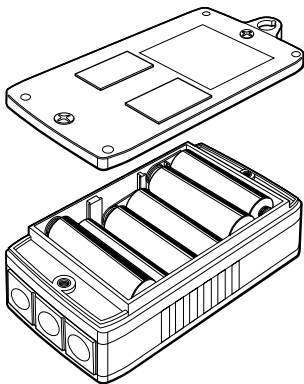
- In order to avoid electrical shock, remove sensors from the instrument when replacing batteries.

CAUTION

- Do not mix new and old batteries.
- Install batteries in the orientation as shown inside the battery compartment, observing correct polarity.

When the warning mark for low battery voltage "  " is blinking on the LCD, it means battery voltage is low. To continue measuring/recording, replace the batteries. If this warning mark is blinking, it will not affect on the measurement accuracy. Note that the display is blank and "  " mark is not shown when batteries are completely exhausted.

- (1) Loosen two battery compartment cover-fixing screws on the back side of the instrument and remove the cover.
- (2) Replace the batteries with new.
(Battery : Alkaline, LR6, 1.5V)
- (3) Install the battery compartment cover, and tighten up the screws.



MEMO

DISTRIBUTOR

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



KYORITSU ELECTRICAL INSTRUMENTS WORKS, LTD.

No.5-20, Nakane 2-chome, Meguro-ku,
Tokyo, 152-0031 Japan

Phone : 81-3-3723-0131 Fax : 81-3-3723-0152

URL : <http://www.kew-ltd.co.jp>

E-mail : info@kew-ltd.co.jp

Factories : Uwajima & Ehime