LUMITESTER C-110

OPERATION MANUAL

Thank you for purchasing the LUMITESTER C-110.
To use your LUMITESTER C-110 safely and correctly,
read this operation manual carefully and follows the instructions.

Kikkoman Corporation

To ensure safe use

Safety precautions

WARNING	"WARNING" indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	"CAUTION" indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury or damage to the equipment.

In addition to the above alert symbols and signal words, the following warning symbols are used in this manual to designate the degree of hazard and damage that might occur if this product is used incorrectly.

	**Mandatory** This symbol indicates a mandatory action.
	**Prohibited** This symbol indicates a prohibited action.
	**Electrical shock hazard** This symbol indicates a risk of electrical shock.
	**Fire hazard** This symbol indicates a risk of smoke emission or fire.
	**Explosive hazard** This symbol indicates a risk of explosion.
	**Toxic hazard** This symbol indicates a toxic substance risk.
	**Corrosion hazard** This symbol indicates a risk of corrosion.

Handling precautions

If an abnormal condition is found…

WARNING
If an abnormal condition is found, immediately turn off the power. If operating the unit on battery power at that time, then remove the battery. If operating it from an AC adapter, then turn off the power and unplug the AC adapter from the power socket. If you notice abnormal operation, or burning odor or smoke being emitted from this unit, then there is a risk of potential fire or internal explosion. After checking that the smoke has dissipated, please contact us or our local dealer. Never attempt to repair the problem yourself since this could be dangerous. Continuous operation under abnormal conditions may lead to fire or electrical shock.

Precautions during use

WARNING
Do not use chemicals that may generate flammable gases and do not use in an atmosphere containing flammable gases. Doing so may cause gas explosion in this unit.
Never attempt to remove any cover of this unit, or disassemble or repair any part of this product. Only our qualified service personnel are allowed to service this unit. This unit contains high internal voltages, so improper handling may cause electrical shock, fire or abnormal operation.
Do not plug or unplug the AC adapter with wet or moist hands. Doing so may cause electrical shock, fire or malfunction.
When using the AC adapter, always connect it to a power source ranging from AC 100V to 240V (50/60Hz). Failure to follow this instruction may cause electrical shock or fire, or damage this unit.
Use the specified AC adapter or battery that comes with this unit. Using a different AC adapter or battery may cause electrical shock or fire, or damage this unit.
Never connect an AC power source to the AC adapter input and RS-232C terminal. Doing so may cause electrical shock, fire or malfunction.
Do not expose this unit to water and do not handle it with wet hands. This unit is not water-proof, so water or moisture may cause electrical shock, fire or malfunction.

Other precautions during use

Take the following precautions when using this unit.

- Do not move this unit during measurement. This may cause fluctuations in the measurement data.
- Do not tilt this unit during measurement. This may cause fluctuations in the measurement data.
- Use this unit while placed on a level surface.
- After measurement, always take the measurement container out of this unit. If this unit is moved or inverted after measurement while the measurement container is left inside, then the remaining reagent may contaminate the measurement section, possibly causing malfunction.
- Keep this unit at least 10 cm away from stirrers, mixers or any device that may generate electromagnetic noise.
- Do not expose this unit to liquids, reagents or organic solvents. Doing so may cause malfunction, discoloration or deformation. If the unit was exposed to such liquids, reagents or solvents, then wipe them away immediately.
- Do not press or rub the display panel or key operation section with hard or pointed objects. Doing so may cause scratches or damages.
- Before connecting to the RS-232C terminal on this unit, make sure the power is off.
- Before using this unit, wash your hands thoroughly or wear sterilized gloves. This unit is extremely sensitive, so the ATP (Adenosine Tri-Phosphate) may become contaminated through contamination from hands.
- Avoid conversation with others when you are using this unit. This unit is extremely sensitive, so the ATP may become contaminated through mouth saliva.
- Always use the specified instruments and tools.
- Use this unit at temperatures from 5 to 40ºC and a humidity from 20 to 85%.
- Do not use this unit in locations where the temperature fluctuates rapidly.
- Do not use this unit in locations directly exposed to steam or in locations where condensation occurs.
- Do not use this unit in locations where corrosive gases are generated.
- Do not use this unit in locations subject to vibration.
- Do not use this unit in locations exposed to excessive dust or debris.
- Do not leave this unit in unstable place or hazardous locations. Do not apply excessive shock to this unit and do not drop it.
- Do not place this unit in locations where the temperature is extremely low or near heaters.
- Avoid using this unit in locations directly exposed to air flow from an air conditioner or fan.
- Do not place any object on this unit.
- Be careful to prevent electrostatic charge buildup on the sample tube. Static electricity may cause an increase the measurement data.

Precautions when using reagents

CAUTION

Wear gloves and protective glasses and mask as needed, and provide sufficient ventilation when handling the reagent.

Flying droplets from reagents or samples may cause skin or eye irritation or injury. If an irritant reagent comes in contact with the skin or eyes, wash thoroughly with tap water and consult a physician or pharmacist.

Precaution during installation or storage

WARNING

Do not use chemicals that may generate flammable gases and do not store this unit in an atmosphere containing flammable gases.

Doing so may cause this unit to explode internally.

Do not store this unit in locations where water or chemicals may penetrate inside this unit.
A short-circuit may occur if water or chemicals penetrate inside this unit, causing fire or electrical shock.

Other precautions during storage

When storing this unit, take the following precautions:

- Store this unit at temperatures from -10 to +50ºC and a humidity from 20 to 95%.
- Do not store this unit in locations directly exposed to steam and in locations where condensation occurs.
- Do not store this unit in locations where corrosive gases are generated.
- Do not use this unit in locations subject to vibration.
- Do not use this unit in locations exposed to excessive dust or debris.
- Do not leave this unit in unstable or hazardous locations. Do not apply excessive shock to this unit and do not drop it.
- Do not place this unit in locations where the temperature is extremely low or near heaters.
- Avoid using this unit in locations directly exposed to air flow from an air conditioner or fan.
- Do not place any object on this unit.

When moving or transporting this unit

When moving or transporting this unit, take the following precautions:

Always use the original carton and packing materials when transporting this unit. Our warranty does not cover any damage or breakdown caused during transportation due to use of non-specified cartons and packing materials.

When moving this unit, always first turn off the power and unplug the AC adapter from the power socket.

Disposal of this unit and reagents

When disposing of this unit and reagents be sure to comply with local regulations regarding industrial waste disposal. Consult the local regulations in your area for detailed information.

WARNING

Do not place this unit in fire or attempt to burn it.
Doing so may cause the unit to explode internally.

Table of Contents

1. Overview

The LUMITESTER C-110 is a portable luminometer designed for simple and quick measurement of light emission by ATP. Using a compact photomultiplier tube as the light detector, the LUMITESTER C-110 measures low-level light by photon counting method that ensures high sensitivity and low noise.
The LUMITESTER C-110 operates with either a rechargeable battery or AC adapter, allowing wide flexibility with regard to measurement locations.
Operation is very simple. All you need to begin measurement is just insert a sample tube and press the start key.
Measurement units are selectable from among RLU (relative light units), M, pg and CELL.
The dedicated utility software allows easy creation and registration of a calibration curve, data transfer, etc.

2. Features

- **High sensitivity**
  Using a special reagent enables ATP measurement at 4×10^{-12}M (0.2 pg / assay). (Note 1)

- **Wide measurement range**
  ATP amounts can be measured over a wide range of 4×10^{-12} to 1×10^{-6}M. (Note 1)

- **Quick and simple measurement**
  Just pressing one key starts measurement and the result is displayed in 10 seconds (when in STANDARD mode).

- **Data memory**
  Up to 1000 data can be stored.

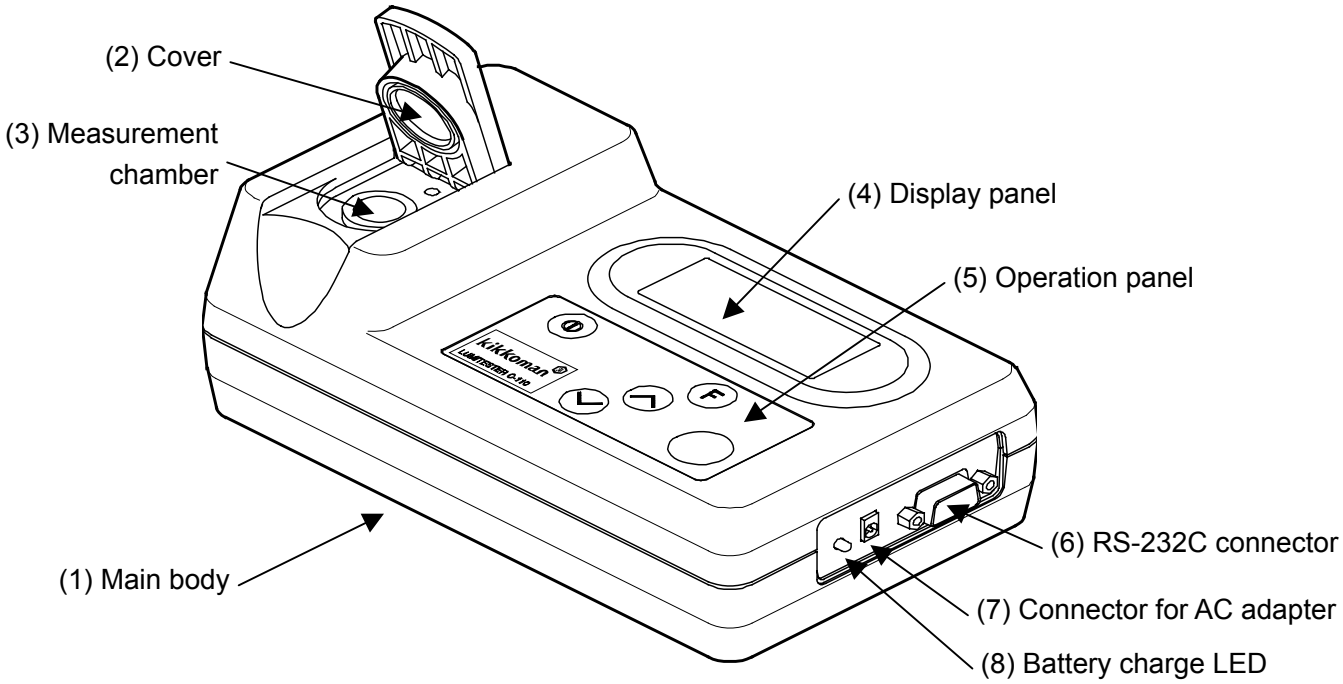
- **ATP amount display**
  ATP amounts (M or pg) can be displayed by pre-registering a calibration curve. The number of cells can also be displayed by registering the APT amount per cell.

- **Calibration curve input**
  The dedicated utility software allows creating and registering a calibration curve.

- **ADVANCED mode**
  ADVANCED mode sets the measurement time and displays count values in real-time.

Note 1: Sensitivity and measurement range might differ depending on the reagent being used.

3. Part Names and Functions

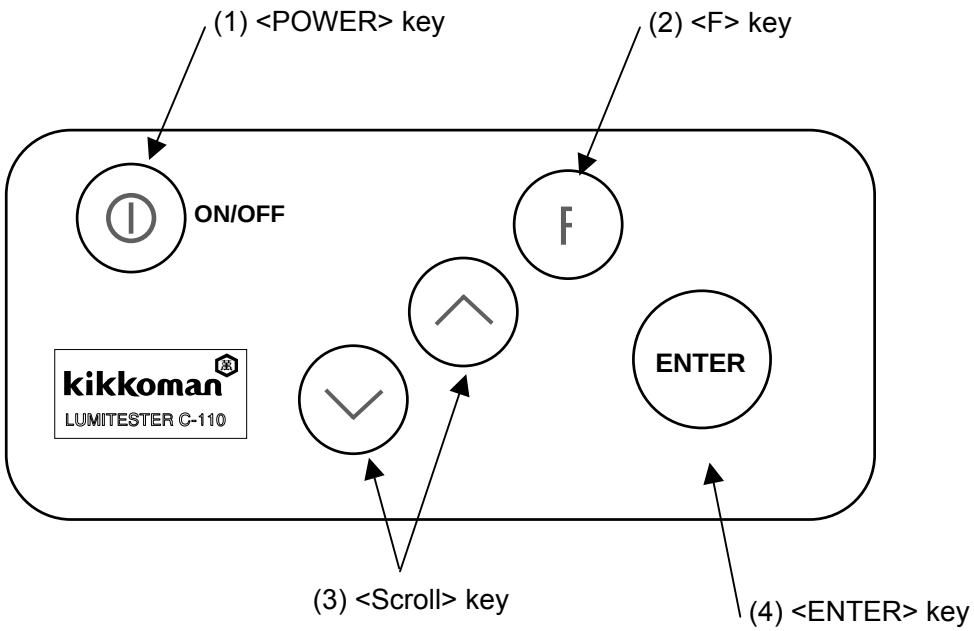


(1) Main body	The LUMITESTER main body containing the detector and drive circuits.
(2) Cover	The cover on the measurement chamber. It can be opened and closed with the touch of a finger.
(3) Measurement chamber	A sample tube is installed in this chamber.
(4) Display panel	Displays measurement results and instructions.
(5) Operation panel	See description on the next page.
(6) RS-232C connector	Connects to a printer or computer.
(7) Connector for AC adapter	Connects to the AC adapter.
(8) Battery charge LED	This LED lamp is lit in red during charging of the battery and turns green when charging is complete.

Accessories

AC adapter	Use this AC adapter when operating the LUMITESTER from the AC line.
RS-232C cable	Use this cable to connect to a printer or computer.
CD	Contains utility software.

Operation Panel



(1) <POWER> key	Press this key to turn power on or off.
(2) <F> key	Press this key to enter the function routine mode.
(3) <Scroll> key	Use this key to scroll the measurement data or select test conditions.
(4) <ENTER> key	Press this key to begin measurement or enable data entry.

4. Power

<LUMITESTER operation>
The LUMITESTER can operate either from the rechargeable battery or AC adapter.

<When the AC adapter is not connected>
The LUMITESTER operates from the battery.

<When the AC adapter is connected>
The LUMITESTER operates from the AC adapter.

<Battery charge condition>
The battery is charged by the AC adapter, and the LED indicator changes during charging as follows:

Red during charging → Green when fully charged → Charging stops

<Charging time> The charging time is about 4 hours.

<To connect the AC adapter>
Just plug the AC adapter into the connector marked "DC IN" located on the side of the case.

<Precautions when not using this unit>
Even when the battery charge LED lamp is lit in green, a small amount of current flows into the battery from the AC adapter. This will affect the battery service life, so unplug the AC adapter from the AC outlet when not using the LUMITESTER.

<When a battery mark appears on the display panel>
The remaining battery power is low, so recharge the battery.

<CAUTION !! Always use the AC adapter supplied with the LUMITESTER.>
If an AC adapter other than supplied is used, the LUMITESTER may malfunction.

5. Operating Procedure

5-1 Basic operation

This section explains basic operations of the LUMITESTER C-110.
The LUMITESTER C-110 can be operated in the following two modes for making measurements.

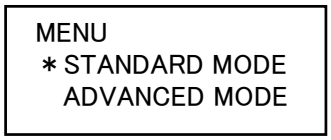
- **STANDARD mode**
  Measurement results are displayed in units of RLU (relative light unit), M, pg or CELL which are selectable.
  Measurement time is fixed to 10 seconds.

- **ADVANCED mode**
  This mode allows start delay time setting, measurement time setting, and ON/OFF switching of real-time count value display.
  Measurement results are displayed only in RLU units.

5-1-1 STANDARD mode measurement

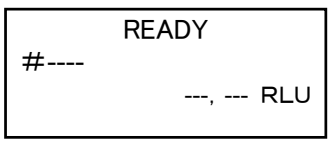
1) Turn the power on.

- Hold down the <POWER> key until the message at the right appears.
- After 2 seconds, the current date, time, and remaining battery level are displayed.
  The remaining battery level is shown in 1 to 5 steps, with step 5 indicating fully charged.
  (The remaining battery level is not shown when the AC adapter is connected.)
- The MAIN MENU screen then appears.
- Check that STANDARD mode shows an asterisk (*) and press the <ENTER> key.



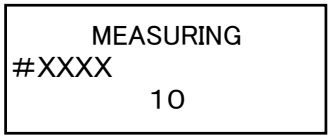
2) Prepare a tube containing the sample fluid.

- Open the measurement chamber cover with your finger.
- Put the sample tube into the measurement chamber.
- Press down the cover to close it.



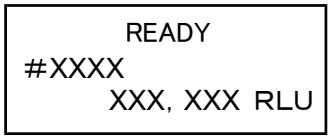
3) Start measurement.

- Press the <ENTER> key.
- The message shown at the right appears and measurement will start.



- Wait until measurement is over (until the center digit counts down to “0”).
  CAUTION ! Do not open the cover during measurement.

- After 10 seconds, the measurement results are displayed as shown at the right.
- When a printer is connected, the measurement results are also printed out.



- In units other than "RLU", the measurement results below the BLANK value are displayed as ND (Not Detected).
  (The BLANK value is the amount of light emission obtained when a sample with zero concentrations was measured.)
- If the message "Scale Over" appears, this means the light level emitted from the sample is too high, exceeding the upper limit of the LUMITESTER measurement range.

  << Scale Over >>
  The upper limit of LUMITESTER measurement range is 999,999 RLU (approximately 100,000 pg).

4) Take the sample tube out of the chamber.

- To prevent carrying the LUMITESTER with a tube containing a sample fluid still installed in the measurement chamber, make it a habit to remove the sample tube after measurement.
- To continue measurement, repeat steps 2) to 4).

5) Turn the power off.

- Press the <POWER> key to turn the power off.
  * If you attempt to turn off the power while a sample tube is still in the LUMITESTER, a beep sounds, so open the cover and remove the sample tube.

Data Memory

Measurement data is sequentially stored in memory as sample No. 0001 to No. 1000. When data for sample No. 1000 is stored, the next data is stored in memory as sample No. 0001. All data stored in memory is backed up by battery, and will not be lost even when the power is turned off.

* When measurement is started with MONITOR mode turned on, the data previously stored in memory will be erased and the measurement data written in memory from No. 0001, so use caution.

To see the data previously measured, use the <SCROLL> keys.

<< Data Scroll >>

When scrolling with the < ∨ > key, the display stops at the latest data.

When scrolling with the < ∧ > key, the display does not stop but continues scrolling until the < ∧ > key is released.

When any sample number is displayed, pressing the <ENTER> key starts measurement and the measurement data is stored in memory as the next sample number for the latest data.

5-1-2 ADVANCED mode measurement

1) On the MAIN MENU screen, use the scroll keys to select the ADVANCED mode and press the <ENTER> key.

*To set the measurement conditions, refer to "(10) Measurement time setting" and "(11) MONITOR mode" in section 5-2, "Function Routines".

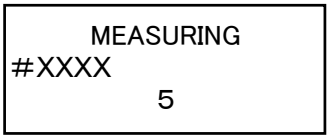
2) Prepare a tube containing the sample fluid.

- Open the measurement chamber cover with your finger.
- Put the sample tube into the measurement chamber.
- Press down the cover to close it

3) Start measurement.

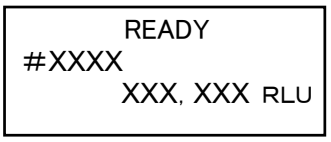
- Press the <ENTER> key.
  Measurement starts under the start delay and measurement time conditions which are set by "MEASURING TIME" function routine.

- Wait until measurement is over (until the center digit counts down to “0”).



When MONITOR mode is ON, the count value is displayed at specified time intervals (GATE TIME).

- Measurement results are then displayed as shown at the right.
  In ADVANCED mode, the measurement data is always displayed in RLU units regardless of which measurement unit is selected.



4) Take the sample tube out of the chamber.

- To continue measurement, repeat steps 2) to 4).

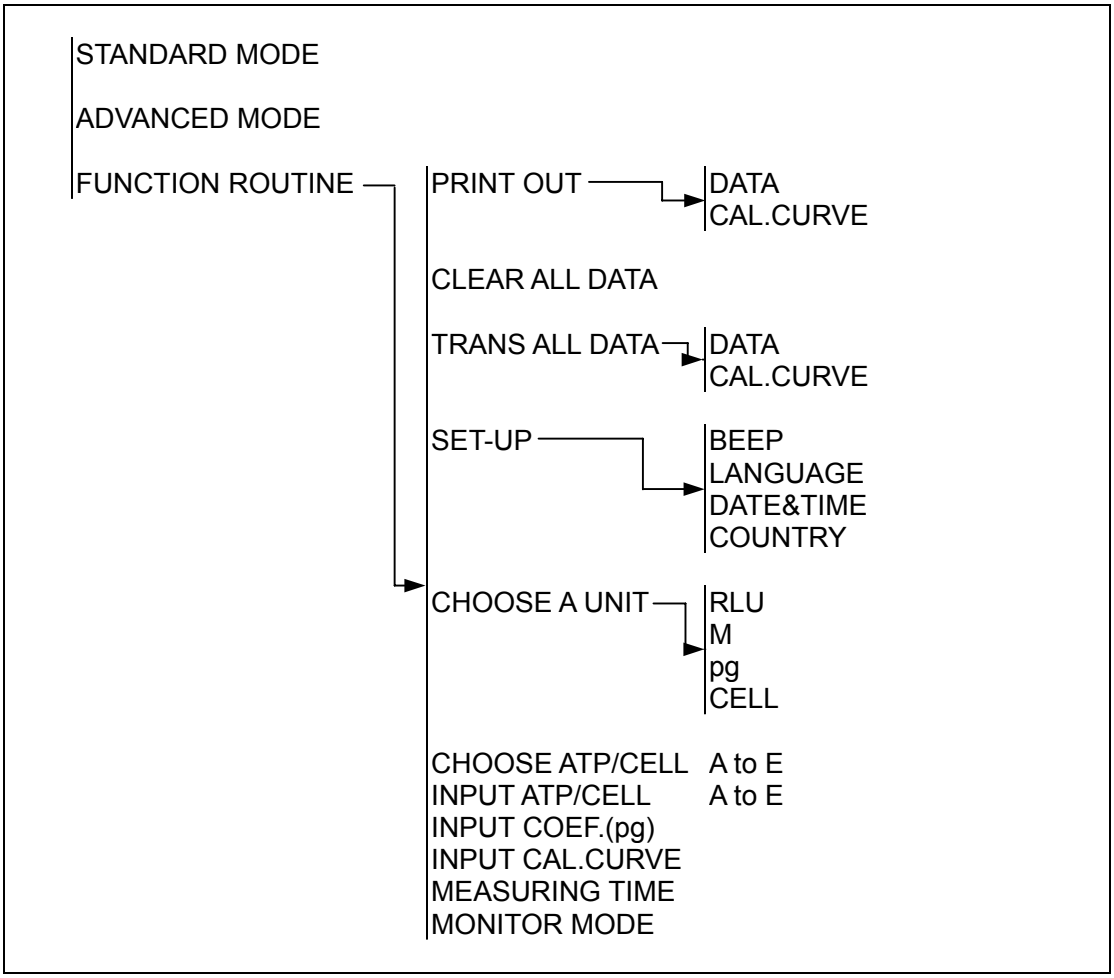
5) Turn the power off.

- Press the <POWER> key to turn the power off.
  * If you attempt to turn off the power while a sample tube is still in the LUMITESTER, a beep sounds, so open the cover and remove the sample tube.

5-2 Function routines

The LUMITESTER uses function routines to clear data or make various settings.
First of all, familiarize yourself with the basic operation flow for making condition settings and selections.

LUMITESTER C-110 Menu List



Press the <F> key to enter the function routine mode.
From the FUNCTION menu, select the desired function and press the <ENTER> key.
When the selection and setting are complete, the display returns to the MAIN MENU.
Pressing the <F> key on any screen returns to the MAIN MENU.
(In some functions, pressing the <ENTER> after pressing the <F> key determines the setting and then returns to the MAIN MENU.)

Each function is described below.

(1) Print [PRINT OUT]

Use this function to print out the stored measurement data or calibration curve.

Procedure

- In the PRINT OUT function, select the item you want to print.

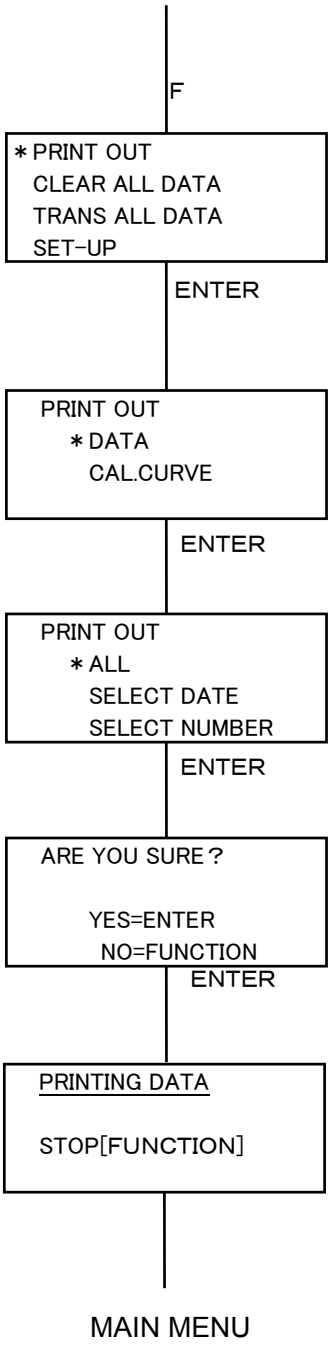
  "DATA"
  Select this item to print measurement data.

  "CAL.CURVE"
  Select this item to print the currently set calibration curve.

- After selecting the item to print, press the <ENTER> key.
- When you selected "DATA", further select the data to print from the following submenus.

  "ALL"
  Prints all data stored in memory.
  ・ To abort printing, press the <F> key.

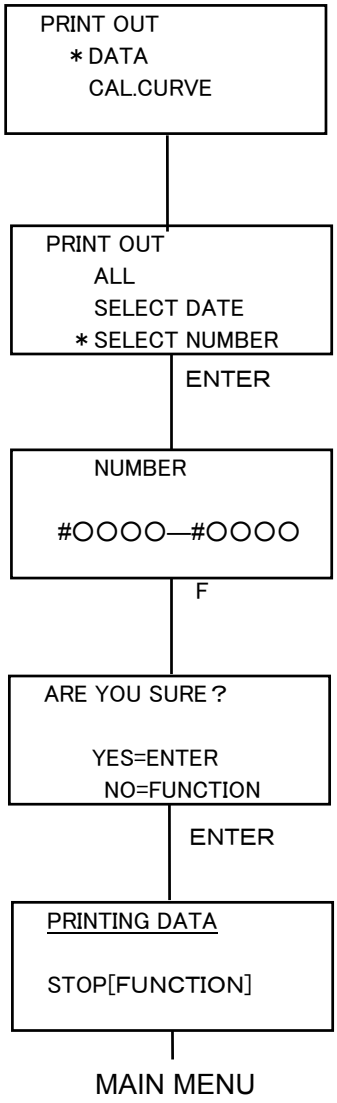
  "SELECT DATE"
  Prints all data of the specified measurement date.
  ・ Press the <ENTER> key, and the cursor moves to the edit position.
  ・ Select the date using the scroll keys.
  ・ After selecting the date, press the <F> key.
  ・ When a conformation screen appears, press the <ENTER> key to start printing.
  ・ To abort printing, press the <F> key.



"SELECT NUMBER"

Prints the data that is stored between the specified two data numbers.

- Press the <ENTER> key, and the cursor moves to the edit position.
- Select the numbers using the scroll keys.
- After selecting the numbers, press the <F> key.
- When a conformation screen appears, press the <ENTER> key to start printing.
- To abort printing, press the <F> key.



*** Input range**

The right-hand data number must be equal to or larger than the left-hand data number.

If the entry does not meet the above conditions or a data number where no data is stored is entered, the cursor moves back to that position.

CAUTION !

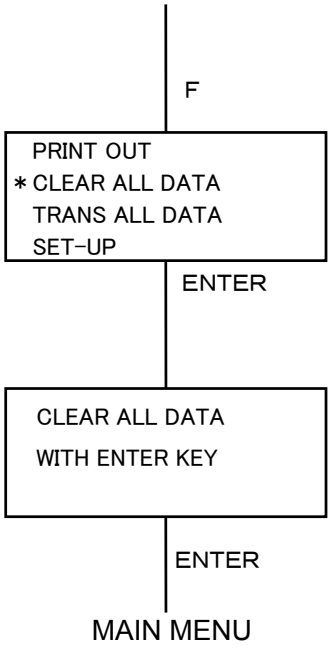
Be sure to turn off the power when connecting or disconnecting a printer from the LIMITESTER.

(2) Data clear [CLEAR ALL DATA]

Use this function to clear all data stored in memory.

Procedure

- In the CLEAR ALL DATA function, press the <ENTER> key to clear the data.
- To cancel data clear, press the <F> key.



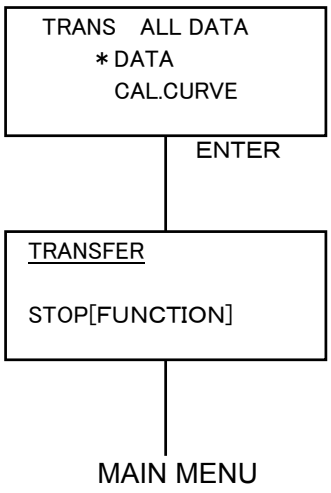
(3) RS-232C transmission [TRANS ALL DATA]

Use this function to transmit all data stored in memory through the RS-232C port.

Procedure

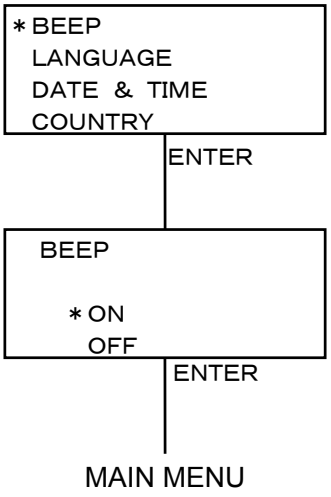
- In the TRANS ALL DATA function, select the data you want to transmit and press the <ENTER> key.
- To stop transmission, press the <F> key.

* For details on RS-232C, refer to Chapter 7, Computer Interface".



(4) Various settings [SET-UP]

In the SET-UP function, you can make the following settings.



BEEP

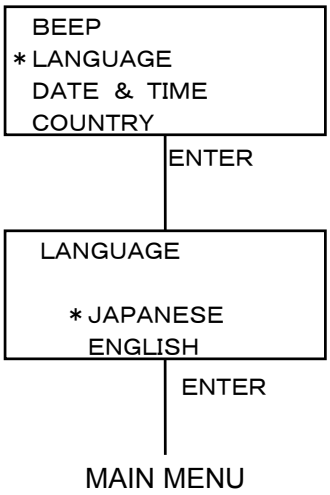
This selects whether the BEEP sound is to be ON or OFF.

Procedure

- Select ON or OFF using the scroll keys.
- Press the <ENTER> key.

LANGUAGE

This selects the display language, Japanese or English.



Procedure

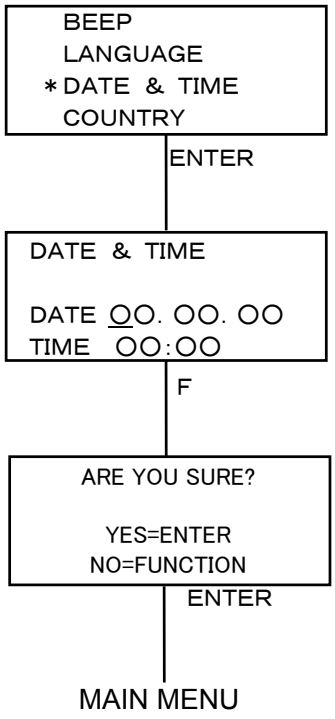
- Select the language using the scroll keys.
- Press the <ENTER> key.

DATE & TIME

This allows you to change the current date settings.

Procedure

- Press the <ENTER> key to move the cursor to where you want to make settings.
- Change the date and/or time using the scroll keys.
- Press the <F> key.
- When a confirmation message appears, press the <ENTER> key to enable the change and return to the MAIN MENU.



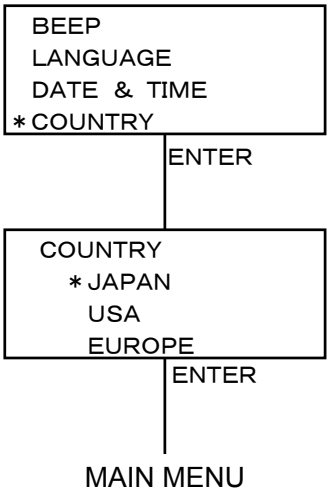
COUNTRY

This allows you to select the date display format from the following three styles.

JAPAN	yy.mm.dd
USA	mm.dd.yy
EUROPE	dd.mm.yy

Operation

- Select the country using the scroll keys.
- Press the <ENTER> key.



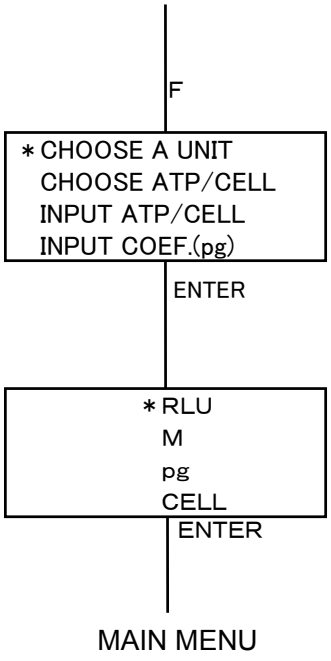
(5) Display unit selection [CHOOSE A UNIT]

Use this function to select measurement units.

RLU (Relative Light Unit)	Displays the relative amount of light that was measured.
M (mol/l)	Displays ATP concentrations that were calibrated using a calibration curve.
pg (picogram)	Displays values that were converted to weight.
CELL	Displays values that were converted to the number of cells.

Procedure

- Select the desired unit and press the <ENTER> key.



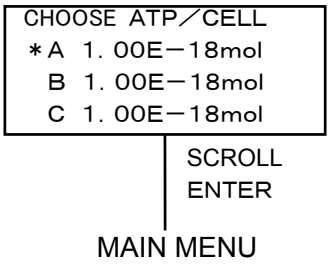
(6) ATP/CELL coefficient selection [CHOOSE ATP/CELL]

Use this function to select the coefficient for converting the "M" (mol per liter) unit to the "CELL" (number of cells) unit.
Conversion coefficient (type of cell) can be selected from among 5 types (A to E).

Procedure

- Select the type of cell using the scroll keys
- Press the <ENTER> key.

* The calculation formula for finding the number of cells is shown in Chapter 6, "Relation between Each Unit".

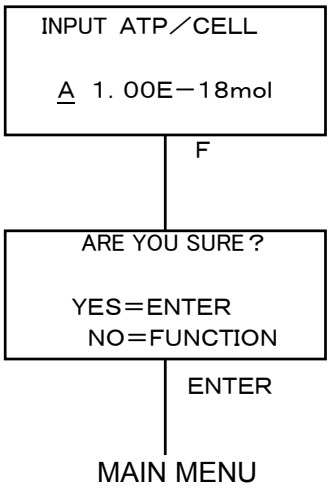


(7) ATP/CELL coefficient input [INPUT ATP/CELL]

Use this function to enter the coefficient for converting the "M" (mol per liter) unit to the "CELL" (number of cells) unit.

Procedure

- Use the scroll keys to select the type of cell from among A to E.
- Press the <ENTER> key, and the cursor moves to the edit position.
- Change the value using the scroll keys.
- Press the <F> key, and a confirmation message appears.
- Press the <ENTER> key to enable the change and return to the MAIN MENU.



Input range

1.00E-20 mol to 1.00E-12 mol

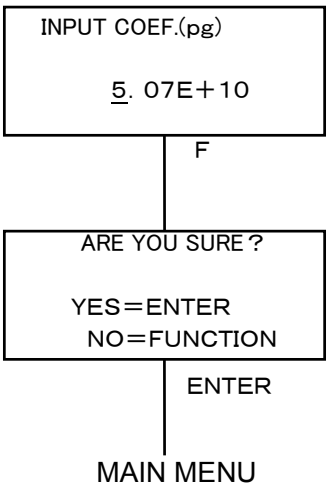
* If the value you have entered is outside the input range, the cursor moves back to that position, so re-enter the correct value.

(8) "pg" conversion coefficient input [INPUT COEF.(pg)]

Use this function to set the coefficient for converting the "M" (mol per liter) unit to the "pg" (picogram) unit.

Procedure

- Press the <ENTER> key, and the cursor moves to the edit position.
- Change the value using the scroll keys.
- Press the<F> key, and a confirmation message appears.
- Press the ENTER key to enable the change and return to the MAIN MENU.



Input range

1.00E+05 to 1.00E+20

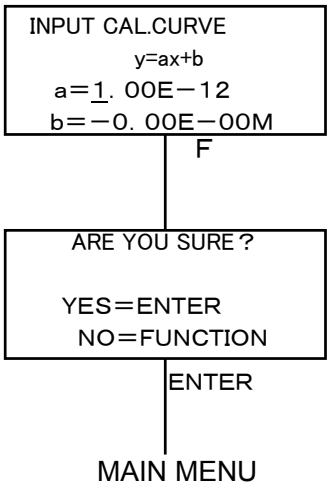
* If the value you have entered is outside the input range, the cursor moves back to that position, so re-enter the correct value

(9) Calibration curve input [INPUT CAL.CURVE]

Use this command to set a calibration curve.

Procedure

- Change the values using the scroll keys.
- Press the <ENTER> key, and the cursor moves to the next edit position.
- After making the changes, press the <F> key.
- When a confirmation message appears, press the <ENTER> key to enable the changes.



Input range

a	1.00E-17 to 1.00E-10
b	-1.00E-08M to -0.00E-00M

* If the value you have entered is outside the input range, the cursor moves back to that position, so re-enter the correct value.

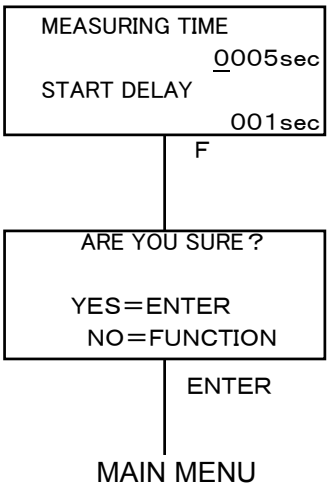
(10) Measurement time setting [MEASURING TIME]

Set the measurement time and start delay time to make measurements in ADVANCED mode.

* These settings will not be reflected in STANDARD mode.
* The start delay time is the time until the measurement actually starts after the <ENTER> key is pressed.

Procedure

- Press the <ENTER> key, and the cursor moves to the edit position.
- Change the values using the scroll keys.
- After making the changes, press the <F> key.
- When a confirmation message appears, press the <ENTER> key to enable the changes.



Input range

Measurement time	1 to 1000 seconds
Start delay	1 to 100 seconds (0 seconds cannot be set.)

* If the value you have entered is outside the input range, the cursor moves back to that position, so re-enter the correct value.

* About measurement data display
  Values displayed in RLU (relative light unit) at the end of measurement are the average of the count rate measured during the measurement time.

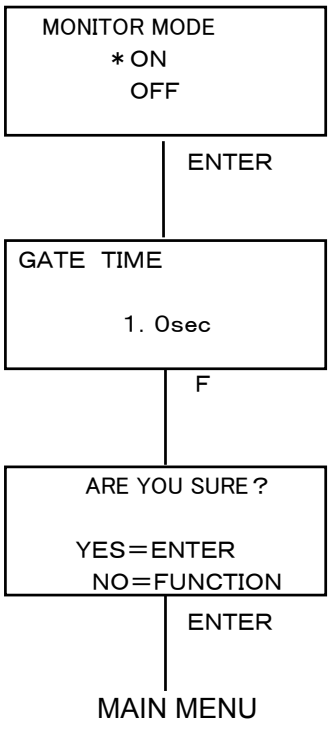
(11) Monitor mode [MONITOR MODE]

This mode displays the count value at specified time intervals (GATE TIME) during measurement.
The count value is displayed only in RLU units.
The count value is transferred to the PC if connected to the LUMITESTER.

* When measurement is started with MONITOR mode set to ON, the data previously stored in memory will be erased and the measurement data written in memory from No. 0001.
* Measurement ends when the "Measurement Time" has elapsed or the data count has reached 1000.
* MONITOR mode is enabled only during ADVANCED mode measurement.

Procedure

- Select "ON" and press the <ENTER> key.
- Set the GATE TIME using the scroll keys.
- After making the change, press the <F> key.
- When a confirmation message appears, press the <ENTER> key.



GATE TIME input range
0.5 to 10 seconds
(From 1 to 10 seconds, the time is set in 1 second steps.)

*** Measurement data display when MONITOR mode is ON:**
When MONITOR mode is ON, the accumulated count value within the GATE TIME is displayed. This is not the count rate.

6. Relation between Each Unit

6-1 ATP concentrations

Relative light unit (RLU) —Conversion Formula (calibration curve)→ ATP concentration (M)

Calibration curve $y = ax + b$

x : Relative light unit (RLU)

y : ATP concentration (M)

Relative light unit (RLU) can be converted to ATP concentration by entering "a" and "b" beforehand.
The default values for "a" and "b" and their input ranges are as follows.

Default value

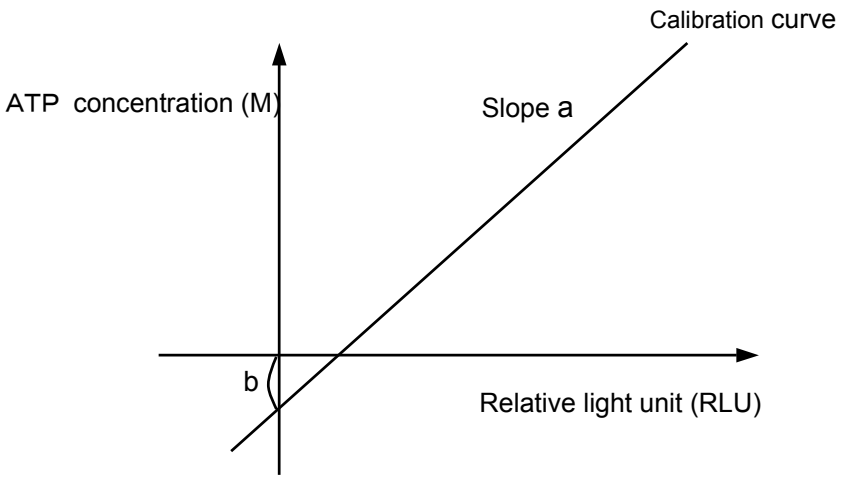
$a=2\times10^{-13}$

b=0

The relation between RLU (relative light unit) and ATP concentration is as follows:

Slope "a" is obtained by measuring standard ATP solution.

"b" is the "blank" light level represented in ATP concentration.



6-2 ATP amount (pg)

ATP concentration (M) $\xrightarrow{\text{Conversion Coefficient}}$ ATP amount (pg)

ATP amount (pg) = ATP concentration (M) × conversion coefficient (pg coefficient)

The conversion coefficient default value is 5.07×10^{10} ($507\times10^{-4}\times10^{12}$).

507 : ATP molecular weight

10^{-4} : 100 microliter/liter

When the sample liquid amount is 100 microliters, the default value can be used as is.

6-3 Number of cells (CELL)

ATP concentration (M) $\xrightarrow{\text{Conversion Coefficient}}$ Number of cells (CELL)

$$\text{Number of cells (per milliliter)} = \frac{\text{ATP concentration (M)}}{\text{ATP (mol) / CELL}} \times 10^{-3}$$

7. Computer Interface

The LUMITESTER C-110 is supplied with computer software "LUMITESTER C-110 Utility Software". This software allows you to easily create and register a calibration curve and to perform data transfer. See "Utility Software Operation Manual" for detailed information.

This section explains how to transfer data to the computer without using the utility software.
Measurement data and registered calibration curve data can be transferred.
Remote control and data transfer cannot be performed from the computer.

To connect the LUMITESTER to the computer, use the RS-232C cable supplied with the LUMITESTER.
Set the computer protocol so that it matches the LUMITESTER communicating conditions listed below.

RS-232C Communication Conditions

Baud rate (bit/sec.)	19200 bps
Data bit	8 bits
Parity check	Yes, Even parity
Stop bit	1
Flow control	Hardware

Data format used is a CSV format.
Refer to the computer operation manual for related computer cable connections and operation.
After cable connections and computer settings are complete, execute the "TRANS ALL DATA" function available in the Function Routine menu from the LUMITESTER.
By connecting the computer to the LUMITESTER before starting measurement, the data will be transferred to the computer when the measurement is complete.

If your PC does not have a serial connector, then use a USB-serial conversion cable (USB-RS232C conversion cable) to connect to the USB port on your PC.
A conversion cable using the FTDI chipset or the Prolific chipset is recommended.

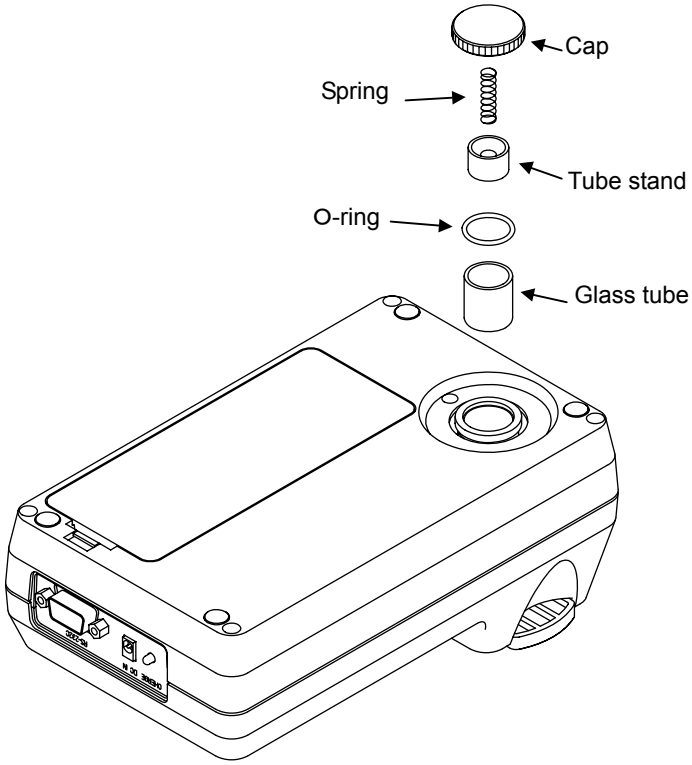
8. Maintenance

WARNING	Never wipe or wash the LUMITESTER with water. Water may cause electrical shock, fire or malfunction.

8-1 Cleaning the measurement chamber

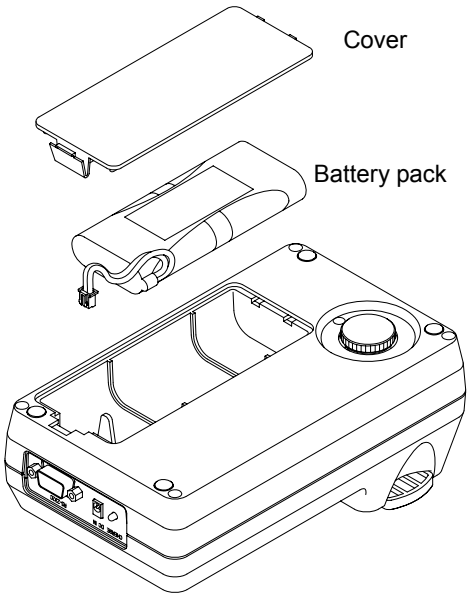
If liquid spills in the measurement chamber, clean as described below.

- Turn the power off.
- Remove the cap on the bottom of the measurement chamber and take out the inside parts as shown.
- Wipe the spilled area with a cloth moistened with alcohol.
- Put the parts you removed back into the measurement chamber in the reverse order and put the cap back on.



8-2 Replacing the rechargeable battery pack

If the battery power quickly runs out even after being fully charged, it is a time to replace the battery pack.



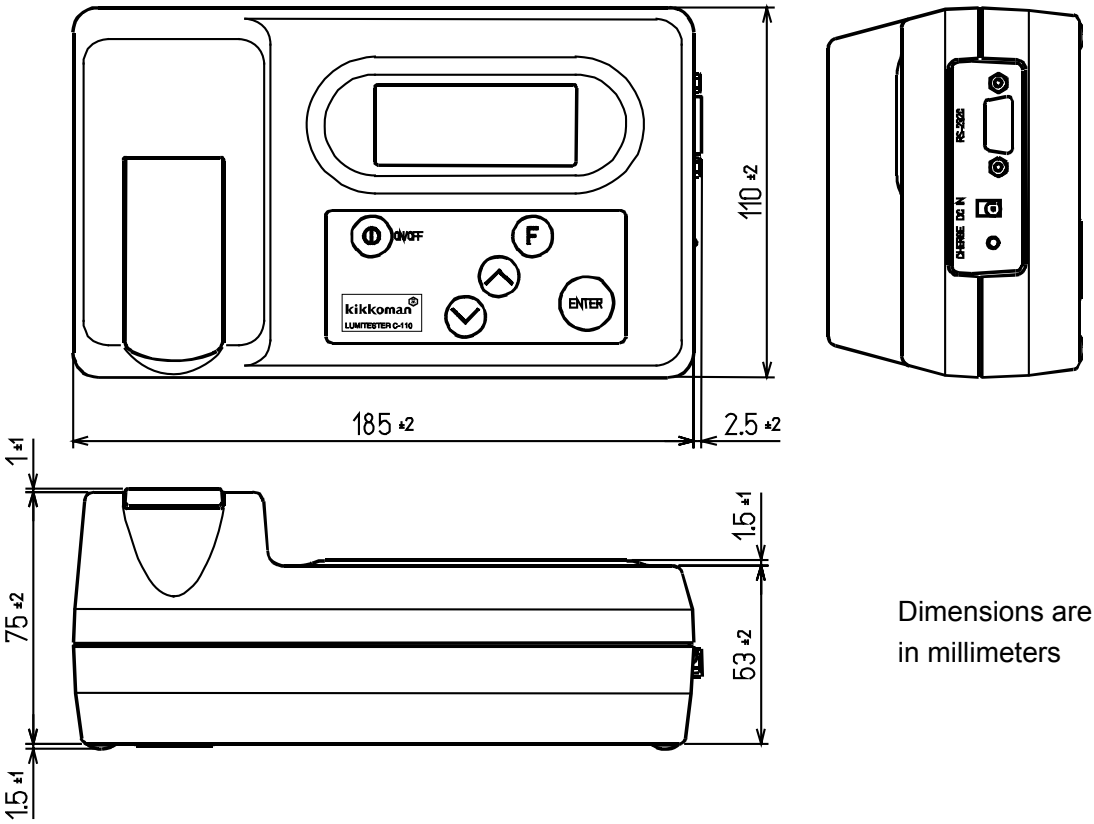
- Turn the power off.
- Remove the cover on the battery compartment and take out the battery pack.
- Unplug the battery connector, then replace the battery pack with a new one.
- Check with your dealer to make sure you buy the correct battery pack.

CAUTION! Always use the specified battery pack. If other types of battery packs are used, this may cause malfunction or may damage the unit.

9. Specifications

Detection method	Photon counting mode using photomultiplier tube
Detection range	4 x 10^{-12} to 1 x 10^{-6}M ATP
Dark noise	10 RLU or less
Measurement time	10 seconds (1 to 1000 seconds in ADVANCED mode)
Sample tube	ϕ12 x 55mm
Luminescent regent amount	100 μl
Dispensing and mixing	External
Measurement units	RLU, M, pg, CELL
Measurement mode	STANDARD mode, ADVANCED mode
Calibration curve	1 type
Data memory	1000 pieces of data
Display	LCD (liquid crystal display) panel
Printer	Data can be printed out to an optional external printer
Interface	RS-232C
Software	Software is supplied for data transfer and calibration curve creation/registration.
Power	Rechargeable battery or AC adapter
Dimensions	185W x 110D x 75H mm (excluding projecting parts)
Weight	Approx. 700g
Temperature	Storage -10 to +50°C Operating +5 to +40°C
Humidity	No condensation

10. Dimensions



Dimensions are
in millimeters

11. After Sales Service

Warranty

The LUMITESTER is guaranteed for a period of one year from the date of delivery. If any failure is found in the workmanship or materials within this warranty period, we will repair or replace the defective parts without charge.

However, the warranty does not cover any of the following cases even if within the warranty period.

- The product has been misused or modified.
- Failure was caused by accidents such as natural or man-made disasters.
- The product has been dropped.
- The failure was caused by the use of an incorrect adapter or battery.

This warranty is limited to repair or replacement.

Repair

After the warranty period has expired, the repair and replacement costs required to recover the original functions will be charged to the user.

If you suspect a failure which may require repair, contact our sales dealer providing the production serial number and a detailed description of the problem.

While every effort will be made to repair the returned product in as short a time as possible, the repair in the following cases may require additional time, unusual cost, or may be refused.

1. The product was purchased long time ago.
2. The product uses maintenance parts which are not in current production.
3. The product was severely damaged.
4. The product was modified.
5. Problems cannot be observed by us.
6. Other similar cases