

Integrating Sound Level Meter
TYPE 6226

Instruction Manual
(Version 1.5Pc)

ACO Co.,Ltd.

Safety precautions


To prevent bodily injury or damage to property, the following safety precautions must be observed.


This manual contains important safety and operating instructions for Integrating Sound Level Meter TYPE 6226.

Read all instructions, before using the instrument.


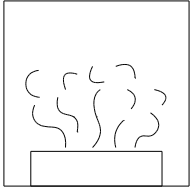
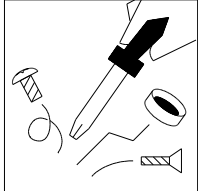
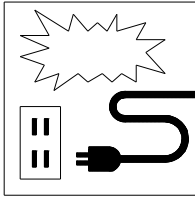
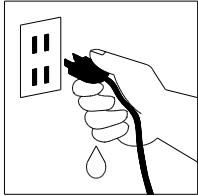
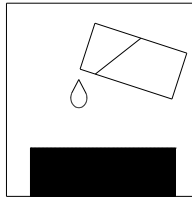
After reading all instructions, keep this manual for quick reference

1. Expressions of safety instructions

 WARNING
<i>Calls attention to a procedure, practice, or condition that could possibly cause death or bodily injury.</i>


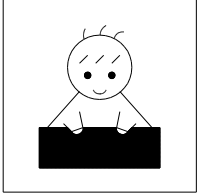
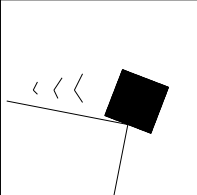
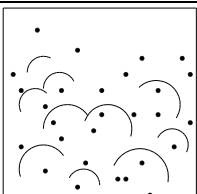
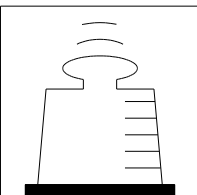
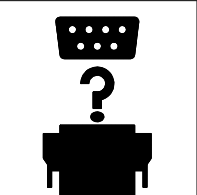
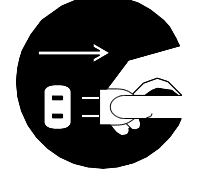
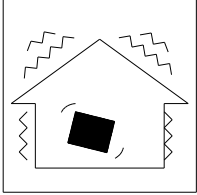
 CAUTION
<i>Calls attention to a procedure, practice, or condition that could possibly cause bodily injury or damage to instrument.</i>

2. Important safety instructions

 WARNING	
<p>Stop using the instrument, when producing smoke, bad smell or noise. It causes fire or shock hazard. Turn off the POWER switch and unplug the AC adaptor (optional) from outlet as soon as possible. To reduce risk of injury, take it to a qualified serviceman when service or repair is required. Please contact ACO co. or the dealer when service or repair is required.</p>	
<p>Do not substitute parts or modify instrument. It causes bodily injury, fire or shock hazard.</p>	
<p>Do not use the AC power adaptor except the optional AC-1026. Other type of adaptor may cause damage to the instrument.</p>	
<p>Do not touch the plug of AC adaptor (AC-1026) with wet hands. It causes shock hazard.</p>	
<p>Stop using the instrument, when an object or liquid falls/spills into the instrument. It causes fire or shock hazard. Turn off the POWER switch and unplug AC adaptor (optional) from outlet as soon as possible. To reduce risk of injury, take it to a qualified serviceman when service or repair is required. Please contact ACO co. or the dealer when service or repair is required.</p>	

3. Cautions for usage

Integrating Sound Level Meter TYPE 6226 is assembled with precision parts. To prevent bodily injury or damage to the instrument, the following cautions must be observed.

 CAUTION	
<p>Keep the instrument away from the children. If the instrument falls down, it is very dangerous.</p>	
<p>Do not place it on an unstable place (shaky table or sloping place). If the instrument falls down, it is very dangerous.</p>	
<p>Do not expose the instrument to moisture or dust. It causes fire or shock hazard.</p>	
<p>Do not put heavy objects on the instrument. It causes damage to the instrument.</p>	
<p>Connect cable properly, it is instructed in this manual. Wrong connection causes fire hazard.</p>	
<p>Before you move the instrument to other place, turn off the POWER switch and remove all wiring.</p>	
<p>Do not put the instrument on the vibrating place. If the instrument falls down, it is very dangerous.</p>	
<p>For avoiding liquid spill, remove alkaline dry batteries when you don't use for long period of time. It is recommended to remove alkaline dry batteries after each use.</p>	

Introduction

1. Overview

Integrating Sound Level Meter TYPE 6226 has been designed for environmental noise measurement. TYPE 6226 can measure Equivalent continuous A-weighted sound pressure level (LAeq), Single event sound exposure level (LAE), Percentile level (Lx) and Wave form peak hold (Lpeak).

Applications include automobile, airplane and factory noise, quality control or some other tests.

TYPE 6226 has a RS-232C interface to connect with a printer or a personal computer. (To connect to a personal computer, an optional firmware version-up is needed.)

Results of measurements are displayed on a LCD screen as a bar graph and numerical values. TYPE 6226 can display wide dynamic range of 100dB, so that you don't need to change ranges. It is easy to use.

2. Features

1. Percentile level (Lx: L5, L10, L50, L90, L95), Lmax and Lmin can be measured at the same time.
2. Equivalent continuous A-weighted sound pressure level (LAeq) can be measured.
Environmental noise important to industrial health can be measured.
3. Wave form peak hold (Lpeak) can be measured (LCpeak included).
4. Wide linearity range of 100dB
5. Built-in RS-232C interface:
Data processing with a personal computer is available (optional).
6. Built-in memory: Approximately 10,000 samples : 1000 sets of results
7. Large LCD screen with back-light. The display is clear to see and easy to understand.

3. Configuration

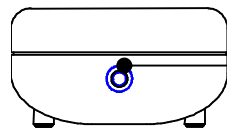
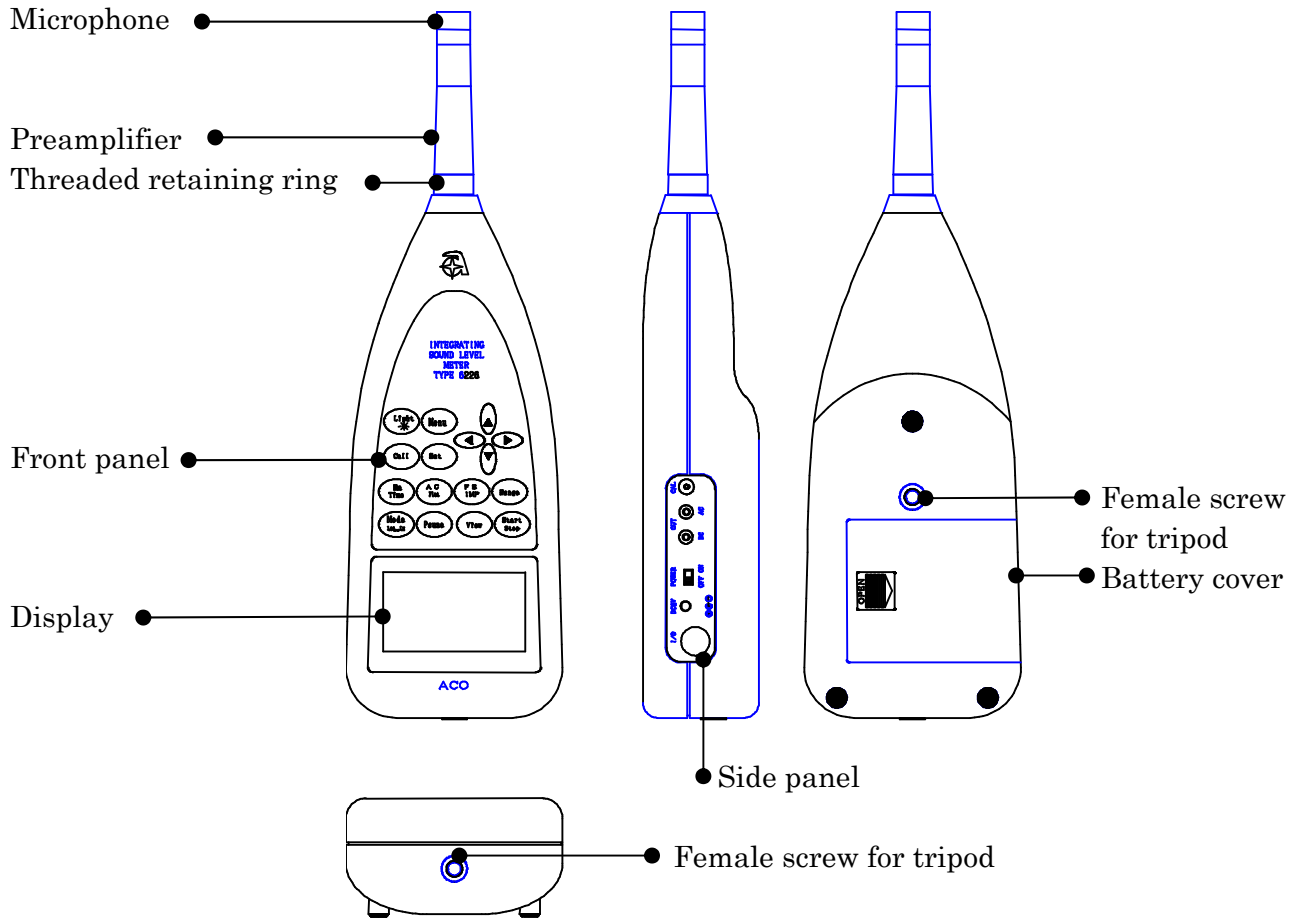
(1) Integrating Sound Level Meter	TYPE 6226	1
(2) 1/2" electret condenser microphone	TYPE 7052N	1
(3) Wind breaking screen (φ 50)	NA-0304	1
(4) Hand strap		1
(5) Carrying case		1
(6) Instruction manual		1
(7) Option		
• AC adaptor	AC-1026	
• Tripod exclusively for sound level meter	NA-0333	
• Extension cable(2m~30m)	BC-0046-2~30	
• Output cable(BNC pin cord)	BC-0071	
• Interface cable	BC-0026PC	
• Data management software (with Instruction manual)	NA-0226-4	

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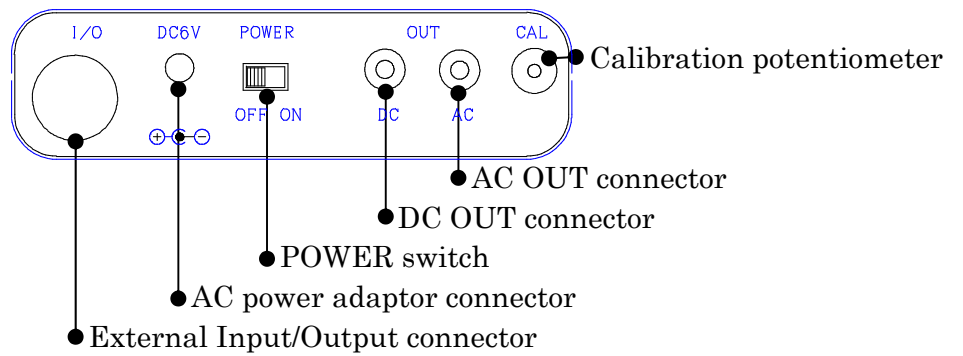
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Section 1 Setting up

1. Locations and their functions



Side panel

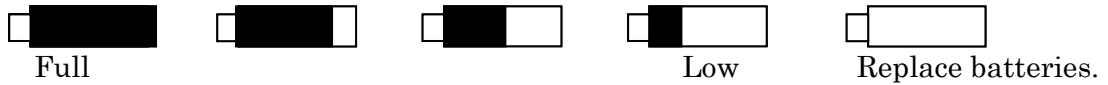


2. Battery installation

When LCD display tells low battery, install new batteries.

For long-term measurement, install new batteries in advance.

The following displays tell you the condition of the batteries.

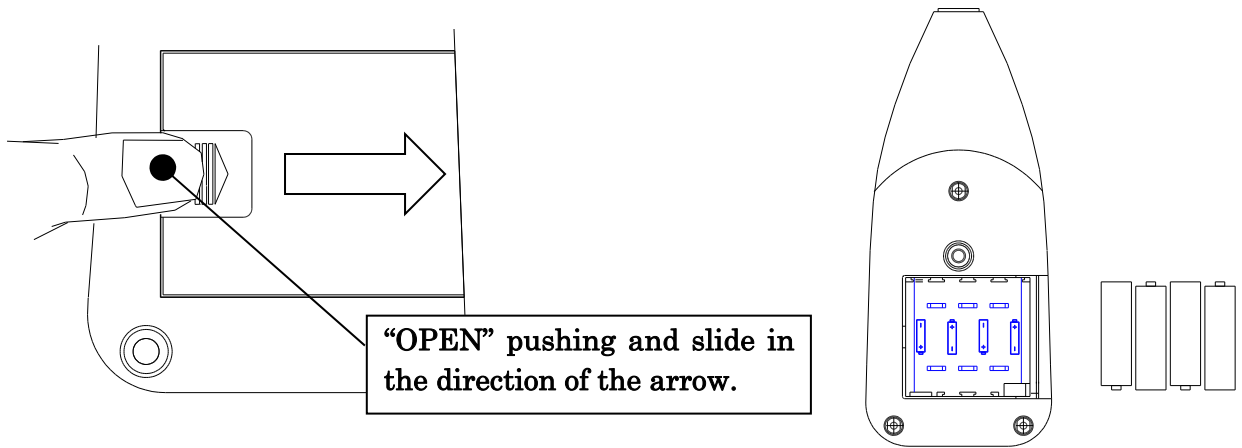


To install new batteries:

- 1) Turn off the POWER switch.
- 2) The slide is done while pushing the battery lid by the thumb.(Refer to the figure below)
- 3) Put the new batteries in the case, then shut the cover. The inside of the case shows you the direction of the batteries.

CAUTION

Do not put the batteries in the wrong direction. These four batteries should be replaced at the same time.



- Battery life is approximately:
 20 hours (Alkaline batteries, continuous operation)
 10 hours (Manganese batteries, continuous operation)
- Use of LCD back-light shortens the life of the batteries (approximately 1/3).

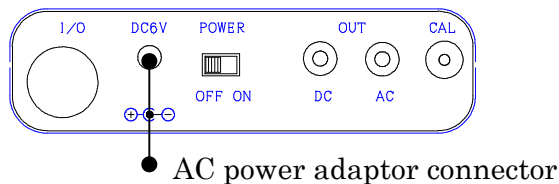
3. AC power adaptor

- 1) Turn off the POWER switch.
- 2) Connect the optional AC power adaptor to the AC power adaptor connector.
- 3) Put the AC plug in the AC 100V outlet.

Power consumption Approx.2.1VA

CAUTION

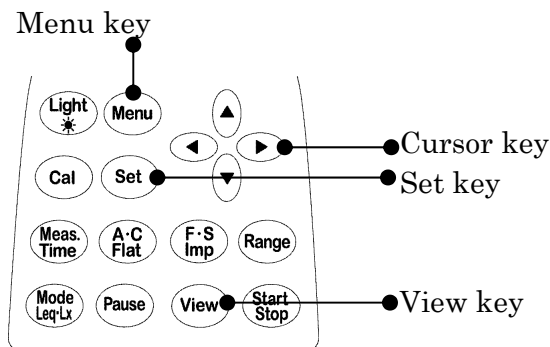
Do not use the AC power adaptor other than the one recommended. Other type of adaptor may cause damage to the instrument.



4. LCD adjustment





You can adjust LCD contrast, when the batteries were low, or when the new batteries were installed.

The procedure is as follows.



1) When you press the **Menu** key, the following screen appears.

<menu>	1/2
Meas Mode	: Manu
Interval	: Single
I/O	: OFF
Data delet	: OFF
LCD cont	: *****
date y/m/d	: 00/01/01
time	: 00:00:00

- 2) Select **LCD cont** with **Cursor** key , then move the cursor rightward with  key.
- 3) Adjust the LCD contrast with   key, then press **Set** key to save the setting.
After pressing **Set** key, the cursor moves to leftward.
- 4) If you want to go back to measurement mode, press **View** key.

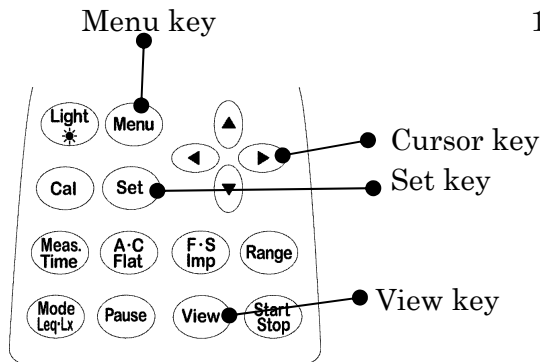
CAUTION

There can be a temporary appearance of a line on the LCD when the Power switch is turned OFF. It is a normal phenomenon and not a problem or failure.

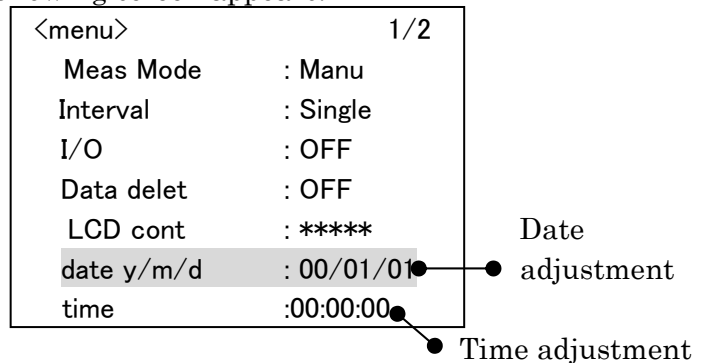
5. Calendar adjustment

To adjust the calendar (time), operate as follows.

You can adjust calendar in the Menu mode in the same way as LCD adjustment.



- 1) When you press the **Menu** key, the following screen appears.



【Calendar adjustment】

- 1) Select **date y/m/d** with **Cursor** key ▼, then move the cursor rightward with ► key.
- 2) Set the year/month/day with ▲▼ key, then press **Set** key to save the setting.
After pressing **Set** key, the cursor moves to leftward.
- 3) If you want to go back to the measurement mode, press **View** key.

【Time adjustment】

- 1) Select **time** with **Cursor** key ▼, then move the cursor rightward with ► key.
- 2) Set the hour:minute:second with ▲▼ key, then press **Set** key to save the setting.
After pressing **Set** key, the cursor moves leftward.
- 3) If you want to go back to the measurement mode, press **View** key.

【Caution】

Be sure to enter the date (date y/m/d) in the order of “year → month → day.”

Input any figure of; y(year): 00 – 99, m(month):01 – 12, and d(day): 01 – 31.

Ex.) For November 30, 2003

Correct) 03/11/30

Incorrect) 11/30/03 30 has been entered for m(month). Input any figure of 01 through 12.

Be sure to enter the time in the order of “hour → minute → second.”

Input any figure of; h(hour): 00 – 24, m(minute): 00 – 59, s (second) 00 – 59.

Ex.) For 23:58:32

Correct) 23/58/32

Incorrect) 32/58/23 32 has been entered for h(hour). Input any figure of 00 through 24.

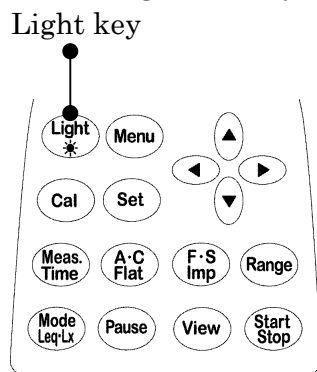
<Entry of incorrect date and time>

The instrument has a function for outputting data that was measured or is being measured to a personal computer.

During recovery of data, if an incorrect date and time are entered, an error message “Econver Error” is displayed on the screen and data recovery cannot be carried out.

6. LCD back-light

You can use LCD back-light, when your measurement is carried out in the dark situations.



(ア) Press **Light** key, LCD back-light goes on.

(イ) If you press **Light** key again, LCD back-light goes out.

The light automatically goes out in about 30 seconds after the light goes on.

(ウ) When the batteries is low, LCD back-light dims.

CAUTION

Use of LCD back-light shortens the life of the batteries.

Section 2 Basic Operation

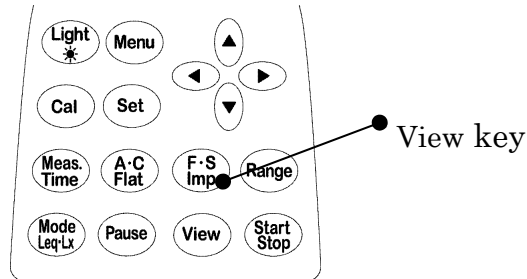
1. Changing Display mode

1-1 How to change the display mode

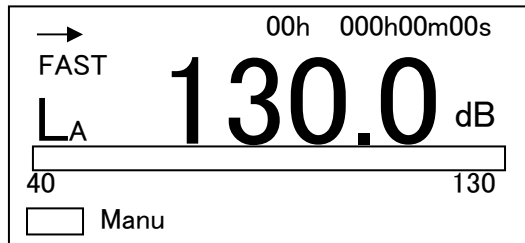
Display has three modes (normal, magnified and list mode).

You can change them with **View** key.

You can use **View** key to go back to this display mode from any other menu screen.

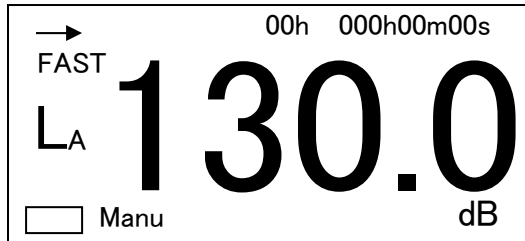


Normal display mode

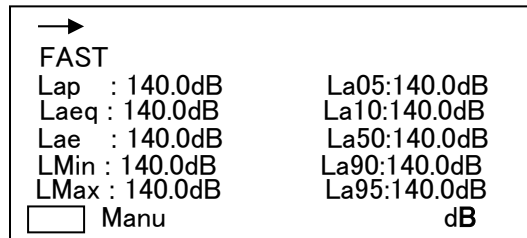


Only normal display can show when “Peak measurement” is selected.

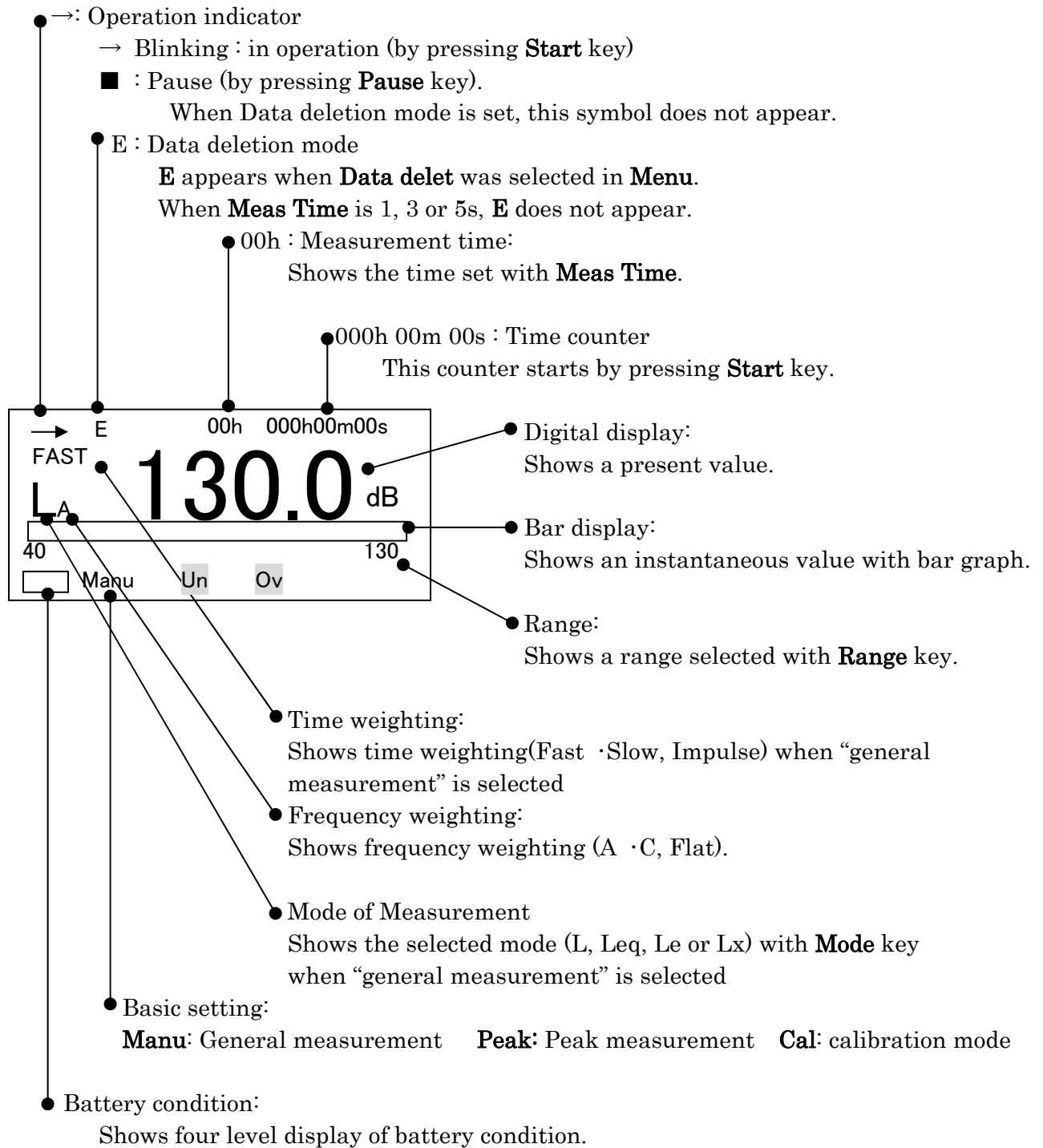
Magnified display mode



List display mode



1-2 Normal display mode



- When the input signal level is lower -0.6dB than the limited scale of selected range, **Un** appears.
- When the input signal level is higher $+3\text{dB}$ than the limited scale of selected range, **Ov** appears.
- Digital display shows the time-weighted or frequency-weighted value.
- Digital display is updated once per second.
- Bar display is updated 10 times per second.

1-3 Magnified display mode

In magnified display mode, bar graph does not appear. And the numerical characters are magnified in the digital display.

After you have changed to the magnified display mode, you can change measurement mode (A-weighted sound pressure level [or sound pressure level] measurement or the equivalent continuous A-weighted sound pressure level measurement) with **Mode** key.

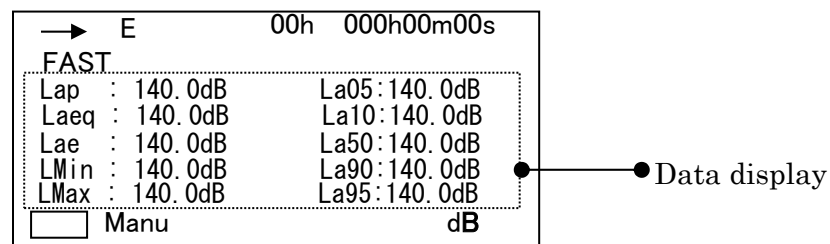
The other contents in this mode are the same as in normal display mode. This mode is disabled when “Peak measurement” is selected.



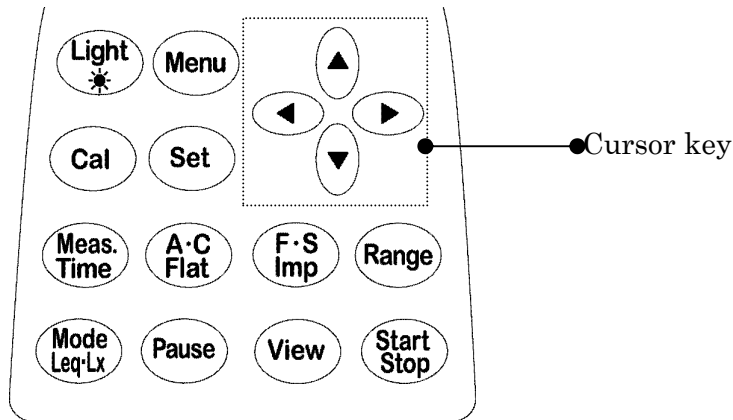
1-4 List display mode

All the measured data are shown in list mode.

Ten items (including Leq) are shown in this mode. This mode is disabled when “Peak measurement” is selected.



2. Operation of panel switches and their function



- **Light :** LCD back-light key
See “LCD adjustment” on Page 11.
 - **Menu :** Menu key
 - **Set :** Set key
 - **Cursor key :** is used to move a cursor to select a item. } See “Section 4 Menu” on Page **.
 - **Cal :** Calibration key
See “Calibration“ on Page 16.
 - **Meas. Time :** Measurement time selection key
 - **A ·C , Flat :** Frequency weighting key
 - **F ·S , Impulse :** Time weighting key
 - **Range :** Range selection key
 - **Mode :** Mode selection key
 - **Pause :** Pause key
 - **View :** Display mode key
 - **Start Stop :** Start and Stop key
- } See “Section 3 Measuring procedure” on Page **.

View key is used to switch displays or return to normal display from Menu screen.
See “Section 2, 1-1 How to change the display mode” for detail.

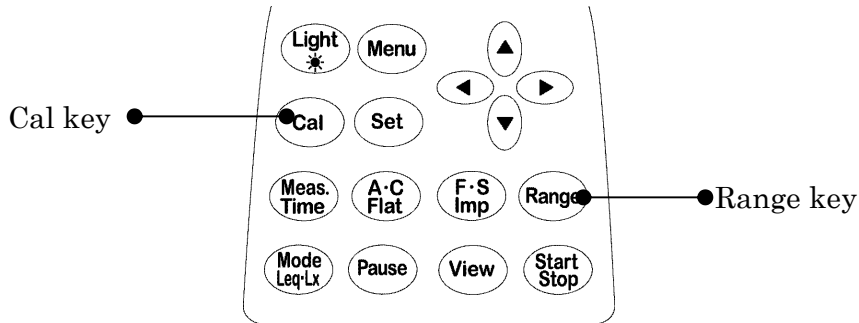
3. Calibration

You need to calibrate the instrument regularly before you start taking measurements.

There are two types of calibration. One is the way using the internal generator, the other is the way using the pistonphone. Note that calibration is disabled when “Peak measurement” is selected.

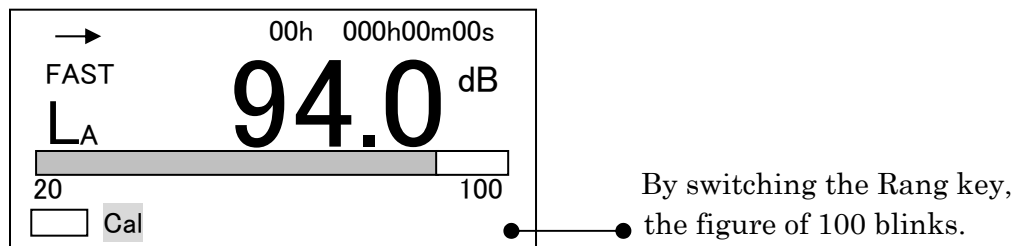
3-1 Calibration using internal generator

You can calibrate the instrument using the internal generator (1kHz, sine wave)

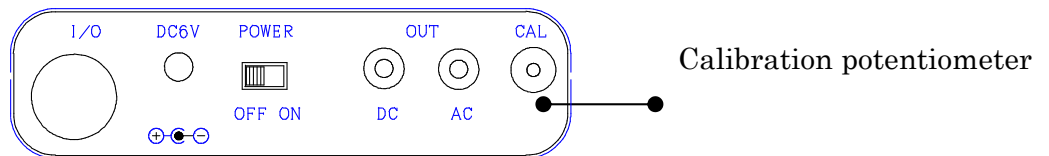


- 1) Turn on the POWER switch and check basic setting is **Manu**. When peak is on display, change it to **Manu** mode (to change the setting ,see page P.23 〈Display〉).
- 2) Press **Cal** key.
- 3) Press Range key, and choose '100dB' by cursor keys ▲▼, and press Range key again to register.
- 4) Adjust the calibration potentiometer on the side panel until the display shows 94.0dB.
- 5) If **Cal** key is pressed once again, the calibration is completed.

< Calibration display >



< Side panel >



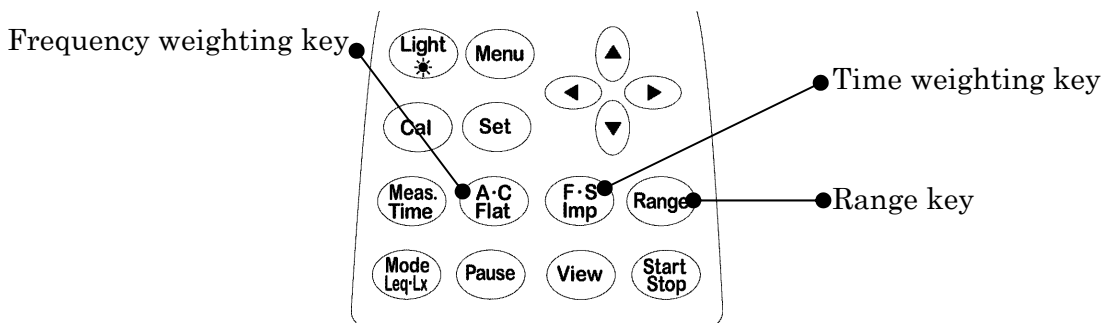
< Reference > Full scale range and Cal(the display shows)

Full scale Range (dB)	CAL (dB)
80	74.0
90	84.0
100	94.0
110	104.0
120	114.0
130	124.0

<Reference> Relation between the display value of each range, and output voltage

DISPLAY VALUE (dB)						OUTPUT VOLTAGE (V)	
RANGE						AC OUT	DC OUT
40~130	30~120	20~110	20~100	20~90	20~80		
130	120	110	100	90	80	1.00000	2.50000
120	110	100	90	80	70	0.31623	2.25000
110	100	90	80	70	60	0.10000	2.00000
100	90	80	70	60	50	0.03162	1.75000
90	80	70	60	50	40	0.01000	1.50000
80	70	60	50	40	30	0.00316	1.25000
70	60	50	40	30	20	0.00100	1.00000
60	50	40	30	20	—	0.00032	0.75000
50	40	30	20	—	—	0.00010	0.50000
40	30	20	—	—	—	0.00003	0.25000

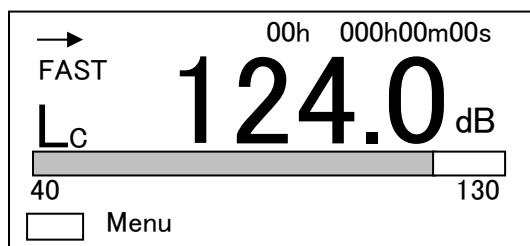
3-2 Calibration using pistonphone



- 1) Turn on the POWER switch and check basic setting is **Manu**. When peak is on display, change it to **Manu** mode (to change the setting ,see page P.23 <Display>).
- 2) Set the frequency weighting to **C** with **Frequency weighting** key.
- 3) Set the time weighting to **Fast** with **Time weighting** key.
- 4) Set the range to **40~130dB** with **Range** key.
- 5) Switch on the pistonphone.
- 6) Adjust the calibration potentiometer on the side panel until the display shows a output level of the pistonphone (standard value is 124.0dB).

For the detail of pistonphone output level, please see shipping inspection data sheet of the pistonphone.

< Calibration display >



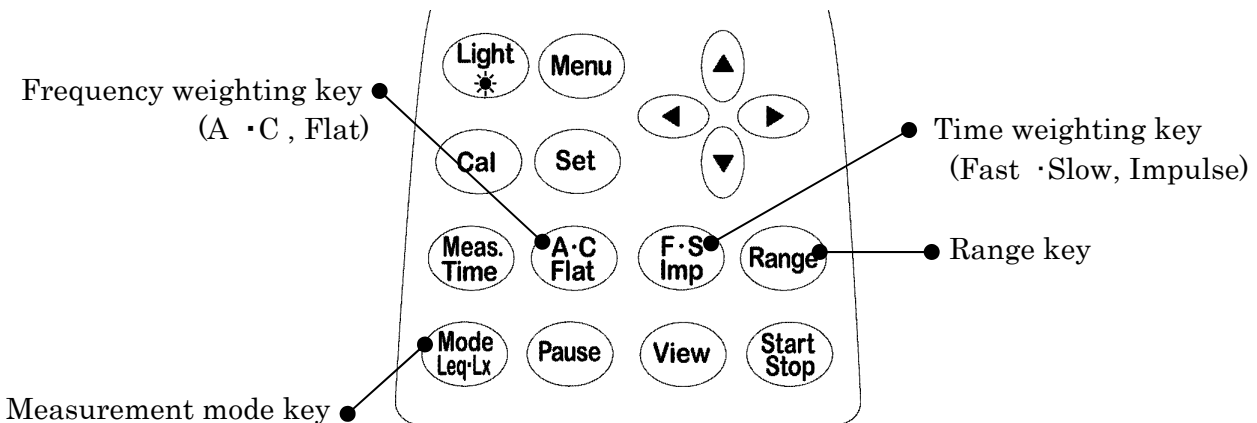
※ After the calibration of the pistonphone, perform calibration per 3.1 “Calibration using internal generator” in Page 15. If there is a difference of more than ± 0.5 dB for 94.0 dB, the instrument shall be checked. Please contact ACO or authorized dealer.

Section 3 Measuring Procedure

This meter has two major basic settings. One is “General measurement” which is for general environmental noise measurement; the other is “Peak measurement” which indicates waveform peak hold. The 1st to 5th section of following measurements is on “General measurement” setting. Only 6th section is measured on “Peak measurement” setting.

Factory default is “General measurement” and the screen shows **Manu** under the level figures. It shows **Peak** when “Peak measurement” is selected. For changing the basic setting, see “6. C-weighted waveform peak hold measurement.”

1. A-weighted sound pressure level (LA) measurement



< Parameter setting >

Turn on the POWER switch and check basic setting is **Manu**. When peak is on display, change it to **Manu** mode (to change the setting ,see page P.23 <Display>).

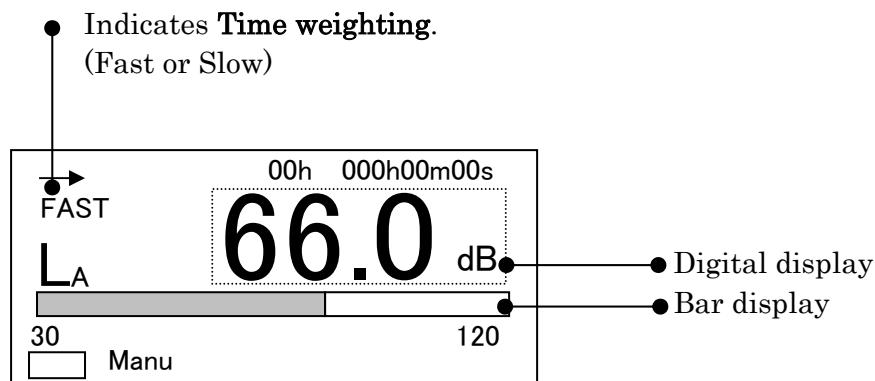
Range key: Select a range that Bar display indicates approximately 2/3 of the full scale.

Time weighting key: Fast or Slow

Frequency weighting key: A

Measurement mode key: LA

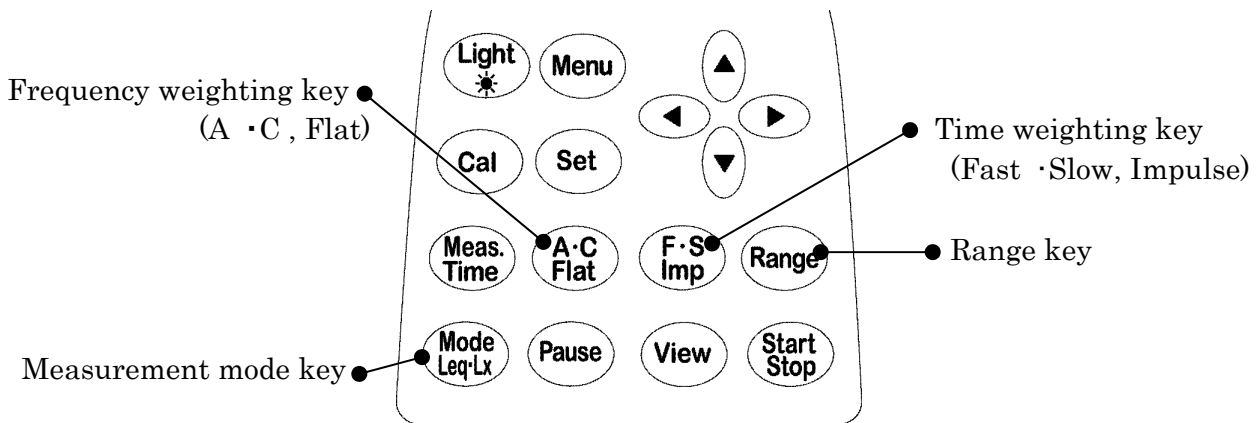
< Display >



- 1) Displayed LA level is updated once per second.
- 2) Bar display is updated 10 times per second.
- 3) You don't need to press **Start** key.

2. Sound pressure level (Lc/Lf) measurement

(Sound pressure level measurements except A-weighted sound pressure level.)



< Parameter setting >

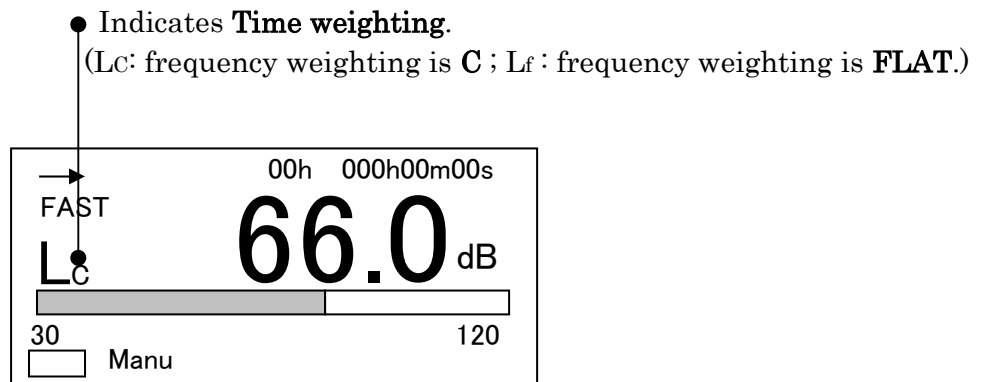
Range key: Select a range that Bar display indicates approximately 2/3 of the full scale.

Time weighting key: Fast or Slow

Frequency weighting key: C or F

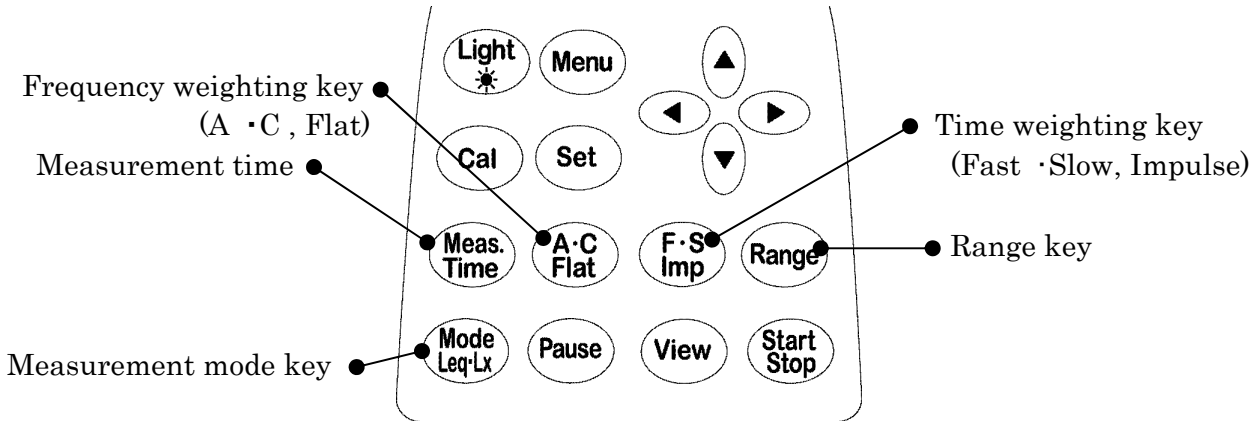
Measurement mode key: Lc or Lf

< Display >



- Displayed level is updated once per second.
- Bar display is updated 10 times per second.
- You don't need to press **Start** key.

3. Equivalent continuous A-weighted sound pressure level (L_{Aeq}) measurement



< Parameter setting >

Range key: Select a range that Bar display indicates approximately 2/3 of the full scale.

Time weighting key: Fast or Slow

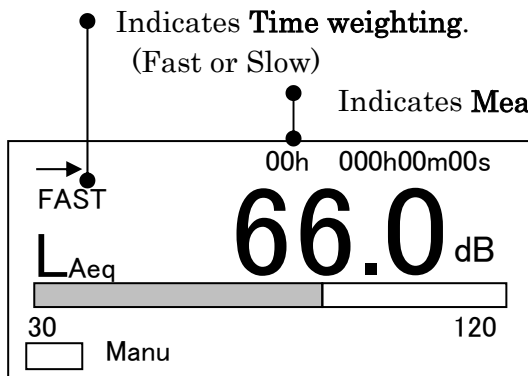
Frequency weighting key: A(C,F)

Measurement time key: 1s, 3s, 5s, 10s, 1m, 5m, 10m, 15m, 30m, 1h, 8h, 24h, and ***.

(***: Measurement continues until **Stop** key is pressed.)

Measurement mode key: LAeq

< Display >



Indicates **Time weighting**.
(Fast or Slow)

Indicates **Measurement time**.

In this sound level meter, L_{Aeq} computation is made at high sampling rate (20.8 μs) for input pressure waveform, which then offers high precision short-term measurement with least influence of dynamic response.

- Measurement starts by pressing **Start** key, and automatically stops in the measurement time. Digital display indicates a calculated data at that time
- If you press **Stop** key in measurement, the digital display indicates the calculated data at that time.
- When **Interval** is set to **Repeat** in <Menu> display, the measurement is repeated in every measurement time. (This function is useful for printings and data transfer to computer.)
- If you press **Pause** key in measurement, the digital display indicates the calculated data from start to 3 or 5 seconds before that time. This function deletes preceding 3 or 5 sec. Data when **Pause** key is pressed.
- To set this function, See the description of **data delete** in “Section 4 Menu 2.Menu(1/2)” on Page **.
- When *** is selected, the digital display indicates the calculated data at the time when **Stop** key is pressed. If **Stop** key is not pressed, the measurement continues in 199 hours 59 minutes 59 second.

4. Single event sound exposure level (L_{ae}) and Percentile level (L_x) measurement

In the measurement of LA_{eq} or LA, the following nine values of the measurement time are automatically calculated from the point of pressing **Start** key. So you can acquire the L_{ae} and L_x without another operations.

- Equivalent continuous A-weighted sound pressure level: LA_{eq}
- Single event sound exposure level: L_{ae}
- Percentile level: L₀₅ , L₁₀ , L₅₀ , L₉₀ , L₉₅ , L_{min} or L_{max}

By pressing the **Measurement mode** key, you can select the value (LA_{eq} , L_{ae} or L_x) shown on the **Normal display mode** screen.

Note that in **View** line of **Mode Set** screen you must select which data of L_x (including L_{max}, L_{min}) is displayed before you can monitor on the display.

You can also look through all of 10 data in the **List display mode** as follows.

→	00h	000h00m00s
FAST		
Lap : 140.0dB	La05:140.0dB	
Laeq : 140.0dB	La10:140.0dB	
Lae : 140.0dB	La50:140.0dB	
LMin : 140.0dB	La90:140.0dB	
LMax : 140.0dB	La95:140.0dB	
<input type="checkbox"/> Manu		dB

In this sound level meter, L_{ae} and L_x computation is made at high sampling rate (20.8μs) for input pressure waveform, which then offers high precision short-term measurement with least influence of dynamic response.

The L_x computation is made at sampling rate 100msec, which tends to influence the accuracy in the condition of measuring time less than 10sec.

5. Maximum A-weighted Sound pressure Level (L_{max}) Measurement

In the measurement of LA_{eq} or LA_e, the following measurements automatically start by pressing **Start** key.

- Equivalent continuous A-weighted sound pressure level: LA_{eq}
- Single event sound exposure level: LA_e
- Percentile level: L₀₅ , L₁₀ , L₅₀ , L₉₀ , L₉₅ , L_{min} or L_{max}

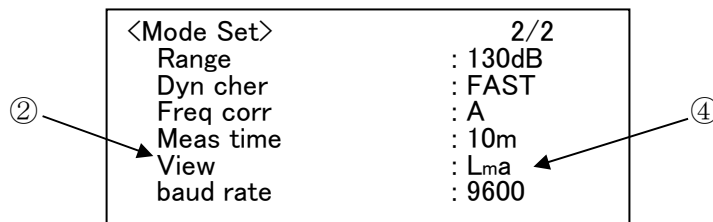
So the operation is same as LA_{eq} measurement.

The following is how to select L_{max} value displayed on the screen.

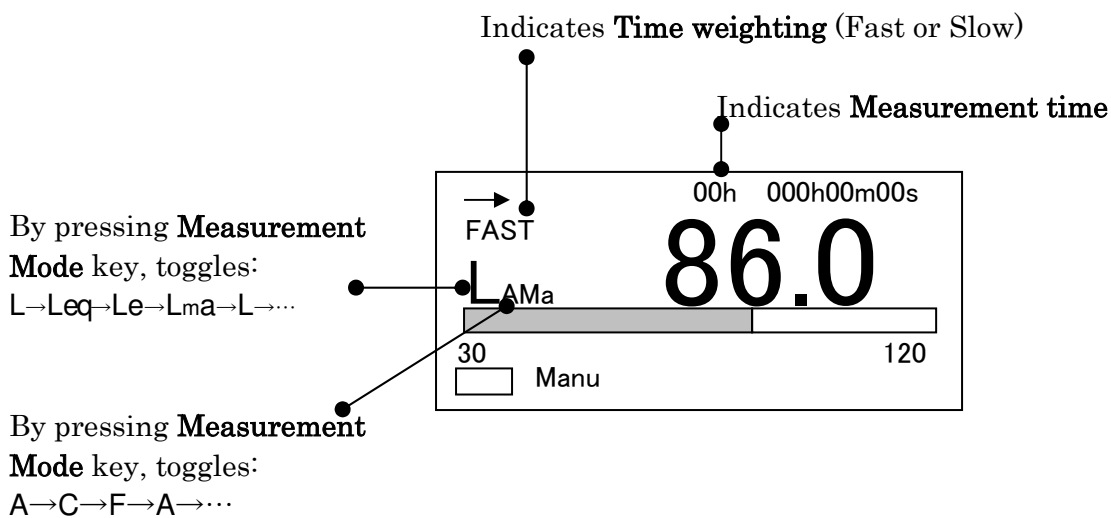
1. Press **Menu** key twice to call <Mode Set> screen.
2. Move to "View" line with ▲ or ▼ key.
3. Move to the right column with ► key.
4. Select "Lma" (indicates L_{max}) with ▲ or ▼ key and press **SET** key to enter.
5. Return to the normal display from <Menu> screen by pressing **View** key.
6. Select L_x with **Measurement mode** key, if necessary.

< Display >

<Mode Set> screen (for example)





Normal display mode screen



6. C-weighted waveform peak hold measurement (LC_{Peak})

Lc_{peak} is measured on “Peak measurement” setting.

At first, change the basic setting from Manu (default) to Peak.

1. Press Menu key once to call <Menu>1/2 screen and check the cursor is on the top line of “Meas Mode”.
2. Move to the right column with  key.
3. Change “Manu” to “Peak” with  key and press **SET** key to enter.
4. Return to the normal display from <Menu> screen by pressing **View** key and check the display shows Peak under the figures.

< Parameter setting >

Range key: Select a range that Bar display indicates approximately 2/3 of the full scale.

Time weighting key: N/A

Frequency weighting key: C

Measurement time key: 1s, 3s, 5s, 10s, 1m, 5m, 10m, 15m, 30m, 1h, 8h, 24h, and ***.

(***: Measurement continues until **Stop** key is pressed.)

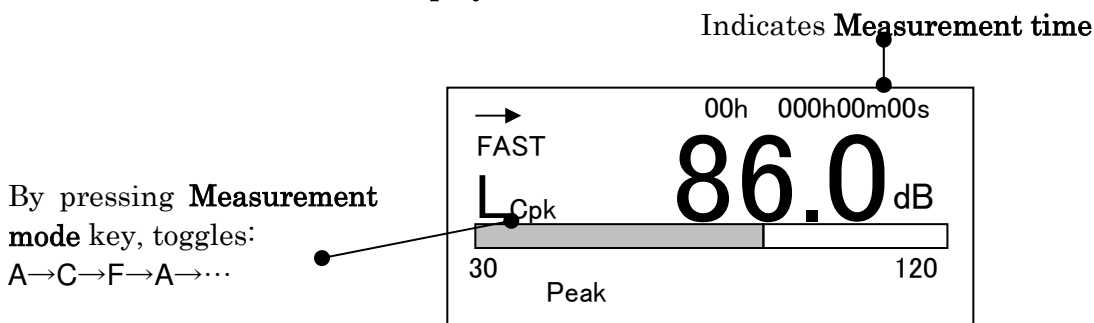
Measurement mode key: N/A (fixed to LC_{pk})

< Display >

<Mode Set> screen (for example)

<menu>	1/2	③
Meas Mode	: Peak	
Interval	: Single	
I/O	: Off	
Data delet	: Off	
LCD cont	: ****	
date y/m/d	: 02/04/19	
time	: 11: 16: 58	

Normal display mode screen



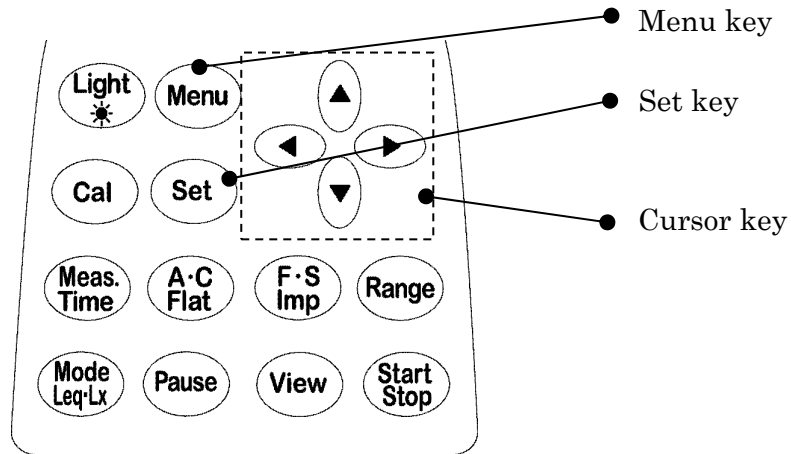
- Measurement starts by pressing **Start** key, and automatically stops in the measurement time (→ is displayed during measurement). Digital display indicates a calculated data at that time.
- If you press **Stop** key in measurement, the digital display indicates the calculated data at that time.
- When *** is selected, the digital display indicates the calculated data at the time when Stop key is pressed. If Stop key is not pressed, the measurement continues in 199 hours 59 minutes 59 second.

Section 4 Menu

1. How to use Menu

You can change to Menu display by pressing **Menu** key.

You can return to the measurement display by pressing **View** key.



Every time you press **Menu** key, <menu> and <Mode Set> pages are alternated.

Select an item with ▲▼ key and complete the selection with ► key, then change the parameters with ▲ key.

<menu>	1/2
Meas Mode	: Manu
Interval	: Single
I/O	: OFF
Data delet	: OFF
LCD cont	: *****
date y/m/d	: 00/01/01
time	: 00:00:00

Basic setting for Meas Mode, Calendar, LCD contrast etc.

<Mode Set>	2/2
Range	: 130dB
Dyn cher	: FAST
Freq corr	: A
Meas time	: 1s
View	: L05
baud rate	: 9600

Detailed settings for measurement

2. Menu (1/2)

<menu>	1/2	● Page of Menu
Meas Mode	: Manu	
Interval	: Single	
I/O	: OFF	
Data delet	: OFF	
LCD cont	: *****	
date y/m/d	: 00/01/01	
time	: 00:00:00	

<u>Items</u>	<u>Initial value</u>	<u>Explanation</u>
● Meas Mode	: Manu	: Basic setting Manu : General measurement Remote : Communicate mode Peak : Peak measurement
● Interval	: Single	: Measuring interval OFF : Continuous data output mode. Single : Completes one measurement in Meas Time by pressing Start key. Fixed value in Peak measurement Repeat : Repeats measurement in every Meas Time by pressing Start key. Measurement is repeated until Stop key is pressed.
● I/O	: OFF	: External equipment connection setting OFF : No external equipment. Fixed value in Peak measurement Print : Enables you to use a external printer. PC : Enables you to use a personal computer.
● Data delet	: OFF	: Data deletion mode setting OFF : No Data deletion mode Fixed value in Peak measurement 3sec : deletes preceding 3 sec data when Pause key is pressed. 5sec : deletes preceding 5 sec data when Pause key is pressed. When Meas Time is 1, 3 or 5s, this function is disabled.
● LCD cont	: *****	: LCD contrast adjustment. See "LCD adjustment".
● date y/m/d	: 00/01/01	: Calendar setting (date : 2000/01/01) See "Calendar adjustment".
● time	: 00:00:00	: Time setting See "Calendar adjustment".

3. Mode Set (2/2)

<Mode Set>	2/2
Range	: 130dB
Dyn cher	: FAST
Freq corr	: A
Meas time	: 1s
View	: L05
baud rate	: 9600

- Range : 130dB : Shows a range value set with **Range** key.
- Dyn cher : FAST : FAST , SLOW or Imp. In general measurement Shows Time weighting set with **F · S · Imp** key. PEAK is displayed and fixed in peak measurement.
- Freq corr : A : Shows Frequency weighting set with **A · C · Flat** key.
- Meas time : 1s : Shows Measurement time set with **Meas time** key.
- View : L05 : Mode setting in Normal and Magnified display mode.
- baud rate : 9600 : Baud rate setting
4800, 9600 or 19200.

- Contents are updated every time you change the settings.
- You can change Range etc. in this menu.

Section5 AC、DC Output

1. AC Output

The AC Output is the frequency-weighted signal.

Output: 1Vrms (FS), Output impedance: 600 Ω , Load impedance > 10k Ω

2. DC Output

The DC Output is the frequency-weighted, root-mean-square-detected, and then logarithmic converted signal.

Output: 2.5V (FS), 0.25V/10dB, Output impedance: 50 Ω , Load impedance > 10k Ω

Section 6 Data Transfer to a Personal Computer

After or during measurement, you can transfer the data to a personal computer.

- Operating system software: Microsoft Windows 98SE/2000/XP/Vista/7
* Windows 7 supports 32bit, 64bit.

1) Data transfer after measurement

You can transfer the data to a personal computer with an optional cable and a software.
You can open the data directly with spreadsheet software.

<Data>

Date	Time	Time weight	Range	Measurement	Laeq	Lae	Lmin	Lmax	La05	La10	La50	La90	La95
2000/4/14	21:09:00	F	110dB	000h00m03	59.9	66	45.3	72.2	72.2	71.4	48.1	45.4	45.3
2000/4/14	21:09:03	F	110dB	000h00m03	48	54	45.7	51.6	51.4	50.7	47.9	46	45.9
2000/4/14	21:09:07	F	110dB	000h00m03	48.8	55	44.4	52.5	52.5	52	48.2	44.5	44.4
2000/4/14	21:09:11	F	110dB	000h00m03	51.6	58	44	62.8	61.4	58.5	46.5	44.5	44
2000/4/14	21:09:16	F	110dB	000h00m01	48.5	52	43.7	50.8	50.8	50.8	48.6	43.7	43.7

2) Data transfer during measurement

If you set the parameter in the following display, you can transfer the data to a personal computer in every **Meas Time** by pressing **Start** key.

(You cannot save the data to built-in memory.)

<menu>	1/2
****	: **
Interval	: OFF
I/O	: OFF
****	: **

<Output form>

	Explanation
00/01/05_02:15:16_F_130dB <input type="checkbox"/>	Starting date and time, Time weighting and Range
(+ <input type="checkbox"/>)	: Starting point of the first measurement.
000h00m10s <input type="checkbox"/>	Measurement time (+ <input type="checkbox"/>)
Laeq : _130.0__La05 : _130.0 <input type="checkbox"/>	data
Lae_ : _130.0__La10 : _130.0 <input type="checkbox"/>	"
_____La50 : _130.0 <input type="checkbox"/>	"
Lmin : _130.0__La90 : _130.0 <input type="checkbox"/>	"
Lmax : _130.0__La95 : _130.0 <input type="checkbox"/> <input type="checkbox"/>	"
00/01/05_02:15:27_F_130dB <input type="checkbox"/>	Starting date and time, Time weighting and Range
(+ <input type="checkbox"/>)	: Starting point of the second measurement.

The results of every **MeasTime** are transferred to a computer in the above form.

In the first line, Starting date and time, Time weighting and Range are transferred.

In the second line, Measurement time is transferred.

In the third to seventh line, the calculated data are transferred.

You can stop measurement by pressing **Stop** key.

If you press **Stop** key in measurement, Measurement time shows the elapsed time.

Imperfect results are shown as ***.

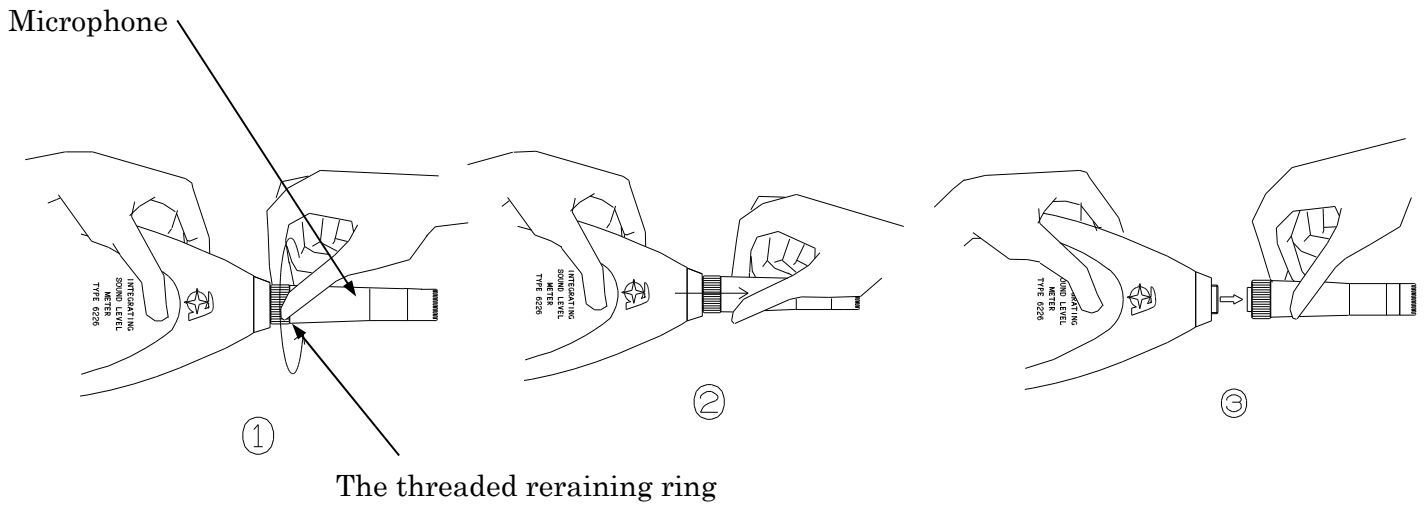
_ : Space : Line feed character

Section 7 Specifications

1) Model	TYPE 6226
2) Description	Integrating Sound Level Meter
3) Standards	conforms with JIS C 1502, IEC 60651 Type 2, IEC 60804 Type 2
4) Accuracy	± 1 dB
5) Measuring ranges(JIS)	28 – 130dB(A), 33 – 130dB(C), 38 – 130dB(F)
6) Peak level:	38 – 138dB(A), 55 – 138dB(C), 60 – 138dB(F)
7) Frequency range	20Hz – 8kHz
8) Microphone	7052N 1/2" electret condenser microphone
9) Level range	10dB step, Six stages 20~80dB, 20~90dB, 20~100dB, 20~110dB, 30~120dB, 40~130dB
10) Linearity range	100dB
11) Time weighting	FAST, SLOW, IMPULSE
12) Frequency weighting	A, C, FLAT
13) Measurement items	Lp, Leq, Lae, Lmax, Lmin, Lx(L5, L10, L50, L90, L95), L _{peak}
14) Measurement time	1s,3s,5s,10s,1min,5min,10min,15min,30min,1h,8h,24h manual (max.199h 59m 59s)
15) Sampling interval	20.8 μ s (Leq), 10ms (Lmax, Lmin)
16) Lx Sampling interval	100ms
17) Display	LCD with back-light (128×64 dots)
18) Digital display	four line, display update: 1s, resolution 0.1dB
19) Warning	: Over ; +3dB from upper limited scale Under ; –0.6dB from lower limited scale
20) Bar display	display update: 0.1s
21) Battery display	four level display of battery condition
22) Built-in memory	approximately 10,000 samples. : 1,000 sets of results
23) Built-in calendar	year/month/day/ hour:minute:second Equivalent to +/- 1 minute monthly difference
24) Pause	pause, and a function that deletes preceding 3 or 5 sec. Data
25) Calibration signal	internal generator (1kHz sine wave)
26) AC output	output: 1Vrms (FS), output impedance: 600 Ω , load impedance > 10k Ω
27) DC output	output: 2.5V (FS), 0.25V/10dB, output impedance: 50 Ω , load impedance > 10k Ω
28) Input/Output	for printing, computer control and data transfer. Interface:RS-232C (asynchronous) data bits 8 bits stop bit 1 bit parity none baud rate 4800, 9600, 19200 bps
29) Power supply	Four 1.5V size-AA batteries or AC adaptor Consumption current; When AC adaptor is used ; Approx.2.1VA
30) Battery life (continuous operation)	Alkaline batteries:20 hours, Manganese batteries: 10 hours. Use of LCD back-light shortens the life of the batteries (approximately 1/3). Built-in backup cell ; Life Approx.4-5 year
31) Operating temperature and humidity	– 10~+50°C 30%~90% (without condensation)
32) Size	85(W)×284(H)×46(D) mm
33) Weight	370g (including batteries)

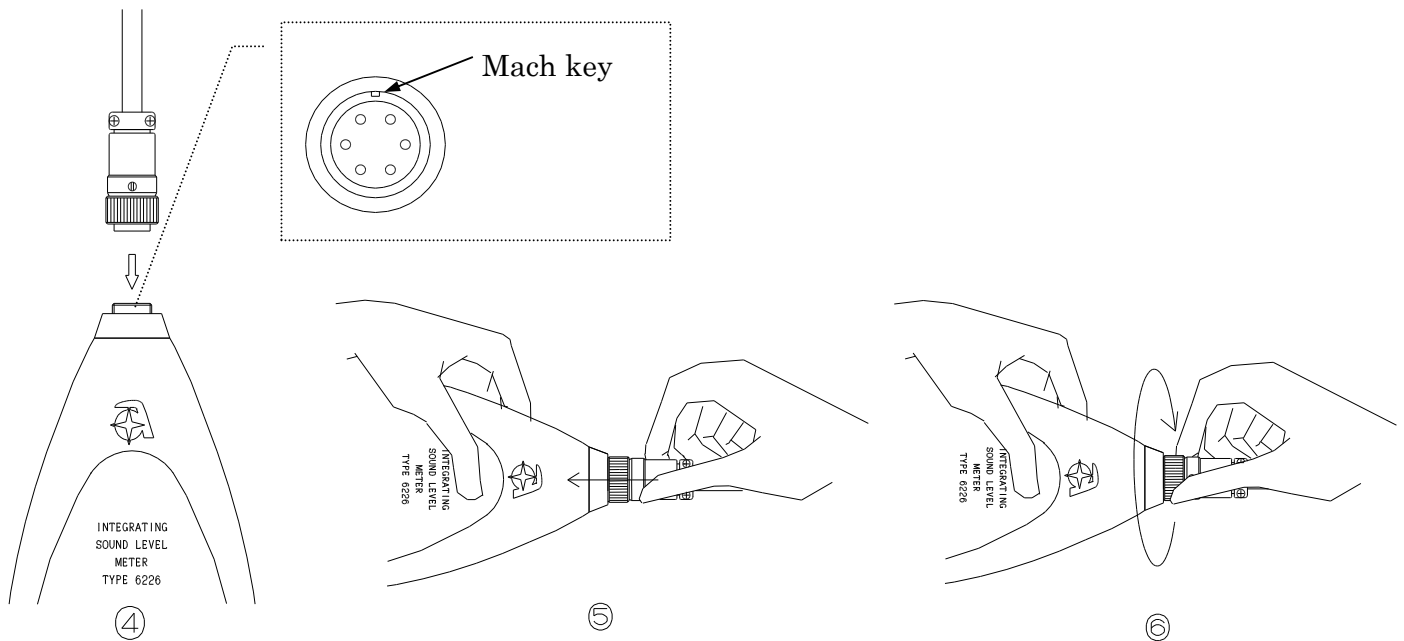
Pin Connections and How to Connect the Extension cable

1) Detach microphone from the body of the meter.



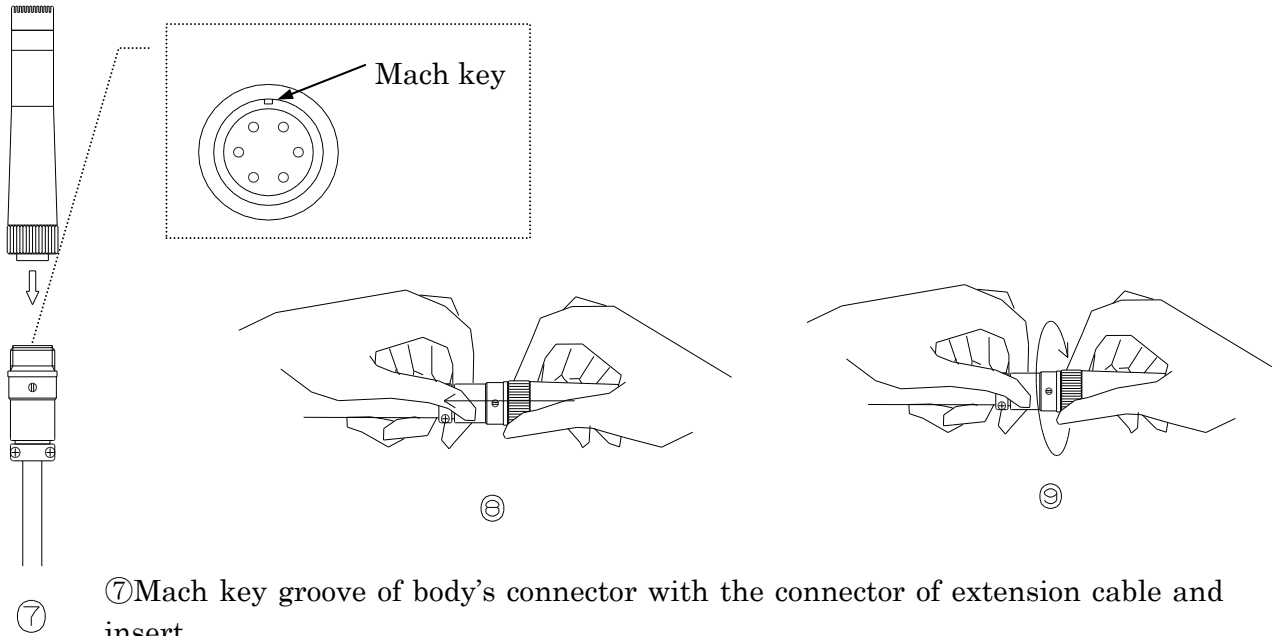
- ① Turn the threaded retaining ring a little to the left.
- ② Pull out microphone as shown.
- ③ Repeat ① turn a left and ② pull out a little 5-8 times and you can separate.

2) Then plug the male connector of extension cable into the connector of the body.



- ④ Mach key groove of body's connector with the connector of extension cable and insert.
- ⑤ Push the connector of extension cable.
- ⑥ Turn the threaded retaining ring a little as shown repeat ⑤ and ⑥ 5-8 times and you can connect.

3) Attach microphone to the female connector of extension cable.



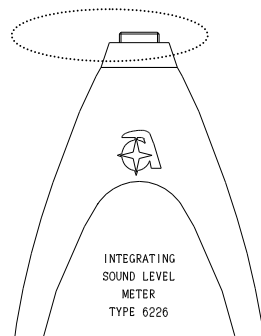
⑦Mach key groove of body's connector with the connector of extension cable and insert.

⑧Push the connector of extension cable.

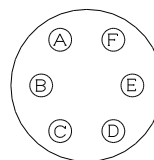
⑨Turn the threaded retaining ring a little as shown repeat ⑧ and ⑨ 5-8 times and you can connect.

※ **Note; Do not turn only the threaded retaining ring connecting. It causes damage to the connector.**

【Wiring diagram of Main body side connector】

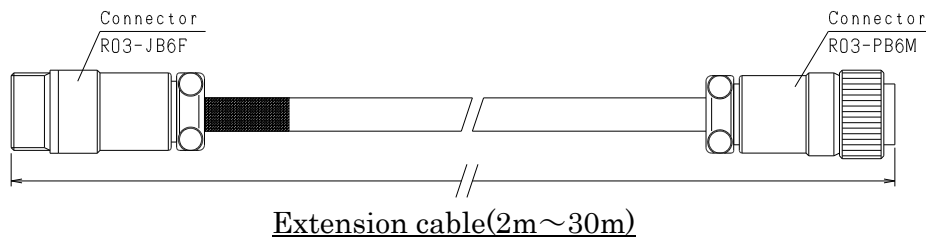


Connector (Soket;Type R03-R6F)

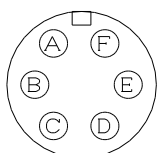


A ; +7V E ; NC
 B ; NC F ; SIG
 C ; -6.4V
 D ; GND

【Wiring diagram of Extension cable】

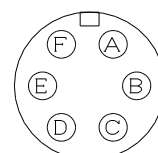


Connector (Pin;R03-JB6F)



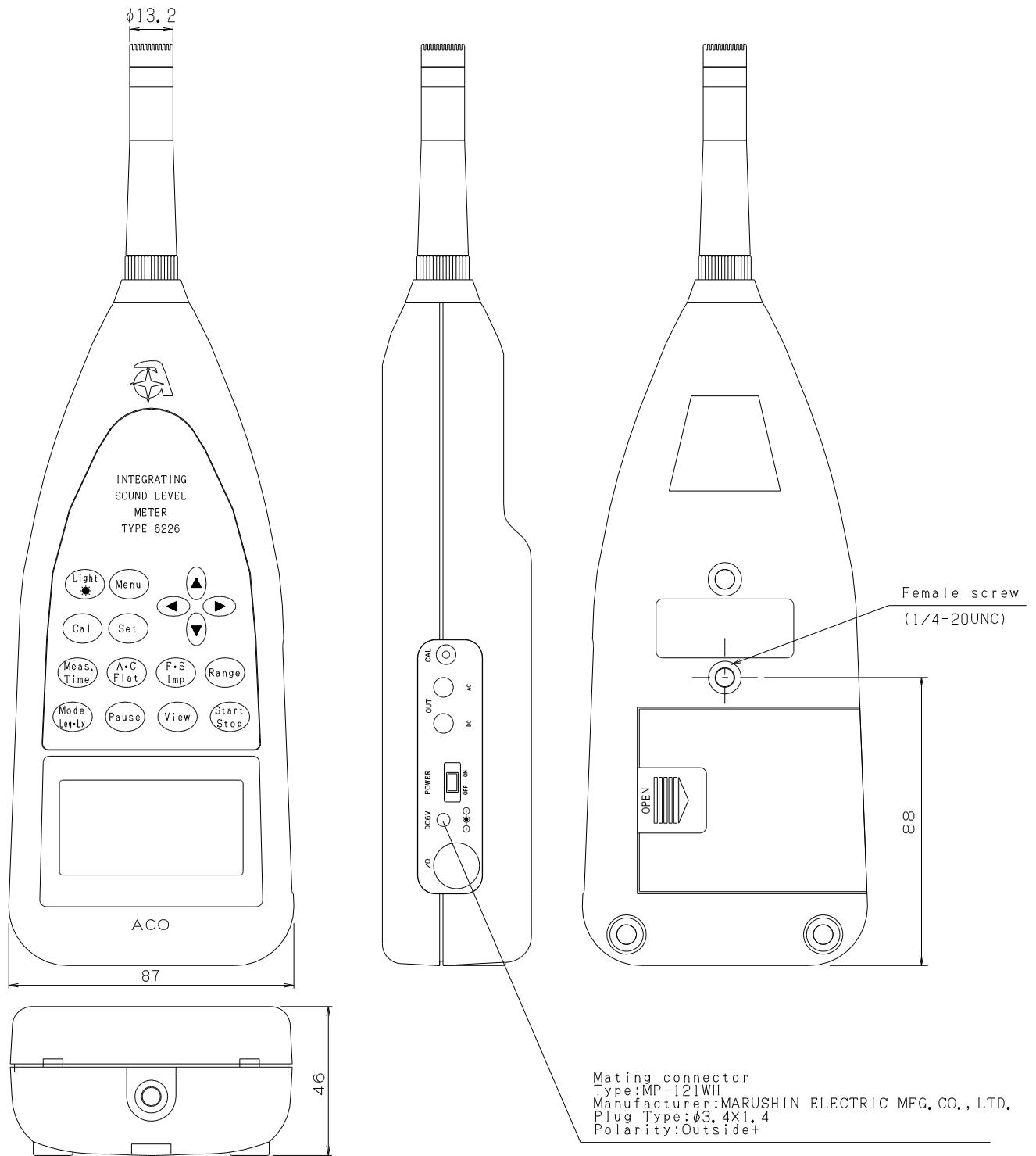
A ; +V D ; COM
 B ; NC E ; NC
 C ; -V F ; SIG

Connector (Soket;R03-PB6M)



A ; +V E ; NC
 B ; NC F ; SIG
 C ; -V
 D ; COM, Shield

< Appendix >



Appearance diagram of Sound Level Meter TYPE 6226

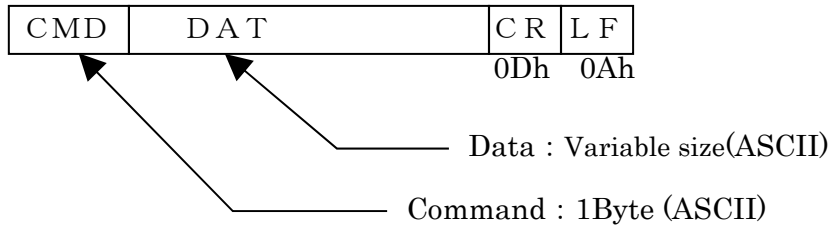
Communication Command

1. Interface

RS-232C

Transfer Speed : 4800, 9600, 19200bps
 Data size : 8bit
 Stop bit : 1bit
 Parity check : non

2. Format



3. Command table (CMD)

Capital letters pertain to PC command

Small letters pertain to 6226 command

No	Function Item	6226 ↑ PC	PC ↑ 6226	Function Outline
1	Time and date setting request	T		
	Time and date setting completed		t	
2	Configuration file transfer	F		
	Configuration file transfer		f	
3	Start measurement	S		
	Start measurement		s	
4	Stop measurement	E		
	Stop measurement		e	
5	Data acquisition completed		r	
6	Data request	D		
	Data transfer			
7	Calibration	C		Cal mode
			c	Only display
8	Back light	L		Lights up LED
			l	
9	Independent range setting	R		
10	Filter setting	A		
			a	
11	Lp-value acquisition	P		Data transfer

4. Detail of Command

CMD	Function Item	Type of data	Outline of Functions
	Time and date setting request	ASCII(13)	YYMMDDHHMMSS
t	Time and date setting completed		Without data part
F	Transfer Configuration file	ASCII(6)	<u>A B C D E F</u> A : Meas Time Setting (1) 0 ; * * * 1 ; 1 s 2 ; 3 s 3 ; 5 s 4 ; 1 0 s 5 ; 1 m 6 ; 5 m 7 ; 1 0 m 8 ; 1 5 m 9 ; 3 0 m A ; 1 h B ; 8 h C ; 2 4 h B : Range Setting (1) 0 ; 1 3 0 d B 1 ; 1 2 0 d B 2 ; 1 1 0 d B 3 ; 1 0 0 d B 4 ; 9 0 d B 5 ; 8 0 d B C : Filter Setting (1) 0 ; A 1 ; C 2 ; F D : Time constant 0 ; Fast 1 ; Slow 2 ; Imp E : Interval 0 : Single 1 : Repeat
f	Transfer Configuration file		Without data part
S	Start measurement	ASCII(1)	Without data part
s	Start measurement		"
E	Stop measurement	ASCII(1)	Without data part
e	Stop measurement		"
r	Data acquisition		Without data part
D	Data request	ASCII(1)	Without data part
	Data transfer		Reference to 6-4
C	Data request	ASCII(1)	Without data part
	Data transfer	ASCII(1)	
L	Data request	ASCII(2)	0 : lights out 1 : Lights up
	Data transfer	ASCII(1)	
R	Independent range setting	ASCII(2)	0 : 130 1 : 120 2 : 110 3 : 100 4 : 90 5 : 80
r	Answer	ASCII(1)	Without data part
A	Filter setting	ASCII(2)	0 : A 1 : C 2 : F
a	Answer	ASCII(1)	Without data part
P	Lp-value acquisition	ASCII(1)	Without data part
	Data transfer	ASCII(5)	Reference to 6-5

5. Preparation (To Remote mode)

Select Remote Mode manually

<Menu>	1/2
Meas mode	: Remote
Interval	: Single
I/O	: OFF
Date delet	: OFF
LCD cont	: *****
Date y/m/d	: 00/01/01
Time	: 00:00:00

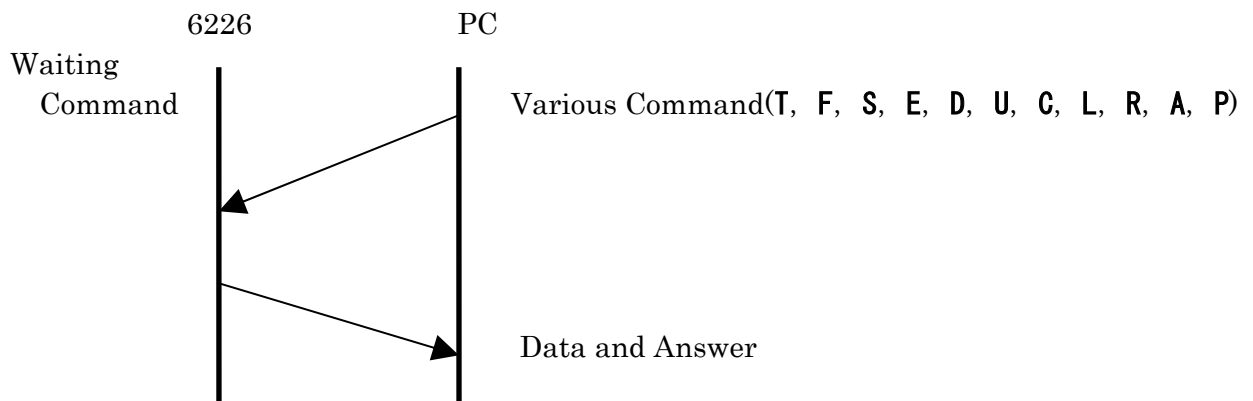
Display changes into [Remote] inhibiting any other key access than Menu.

→	00h 000h00m00s
FAST	
LA	130.0
<input type="checkbox"/> Remote	dB

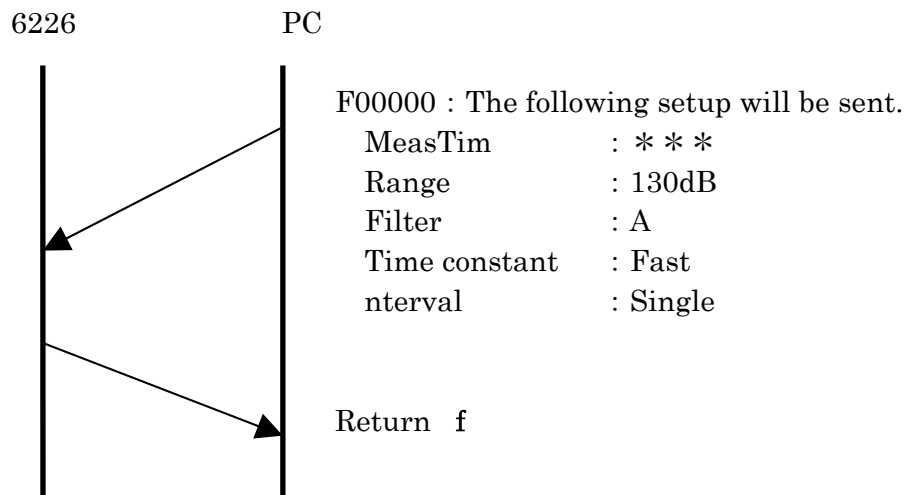
Next time you power on, it starts with [Remote].
To cancel it, select [Manu] in Menu.

6. Communication timing

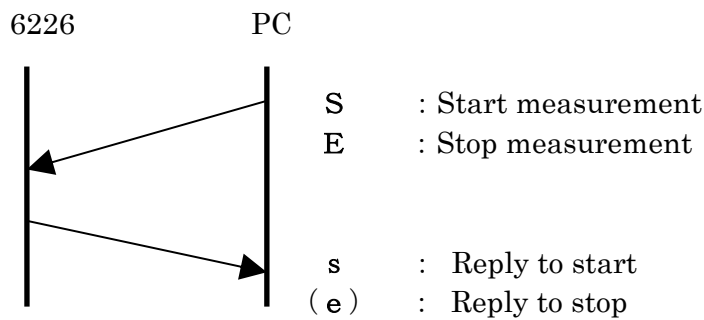
6-1 After Power On



6-2 Transfer Configuration file



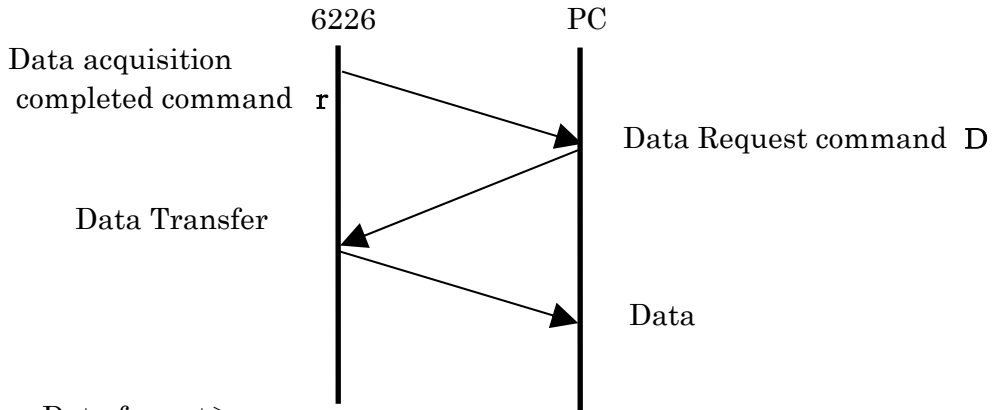
6-3 Start measurement / Stop measurement



On receiving **S** command, it starts with set-up condition
 (Measuring Time : When * * * selected, it measures up to **E** Command.)
 On receiving **E** command, the measurement is terminated.

6-4 After Data acquisition (Data acquisition)

- When [Meas Time] is other than *** not receiving the E command : Data acquisition completed command r is issued to CPU.
- In Interval/Repeat mode, r is issued every time of the measurement
- On E command issued, the measurement is terminated even in the Repeat mode.

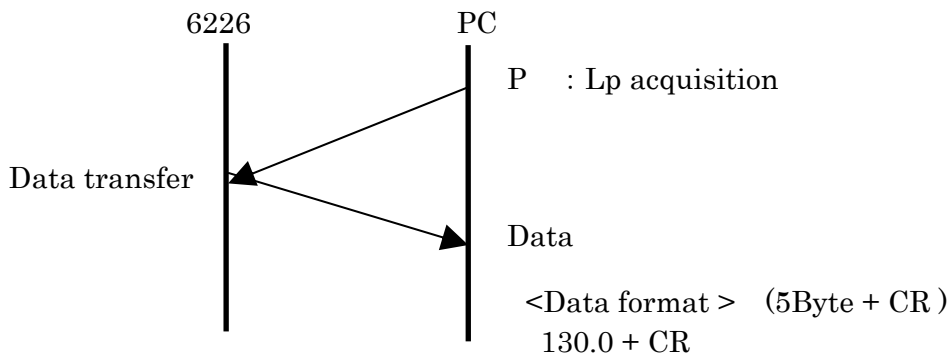


< Data format >

```

0 0 / 0 1 / 0 5 □ 0 2 : 1 5 : 1 6 □ F □ 1 3 0 d B + L F
0 0 h 0 0 m 0 0 s + L F
L a e q : □ 1 3 0 . 0 □ □ □ L a 0 5 : □ 1 3 0 . 0 + L F
L a e □ : □ 1 3 0 . 0 □ □ □ L a 1 0 : □ 1 3 0 . 0 + L F
□ □ □ □ □ □ □ □ □ □ □ □ □ □ L a 5 0 : □ 1 3 0 . 0 + L F
L M i n : □ 1 3 0 . 0 □ □ □ L a 9 0 : □ 1 3 0 . 0 + L F
L M a x : □ 1 3 0 . 0 □ □ □ L a 1 0 : □ 1 3 0 . 0 L F + L F
□ : Space (20)
+ L F : Code linefeed (0 A)
    
```

6-5 Lp-value acquisition



6-6 Notes

- Flow control is not available in 6226.
- For communication command error, the ? mark is returned.
- To return to Calibration, Stop measurement command E is used.

This software collects data measured with an Aco sound-level meter in a PC for processing. The data can be collected after or during measurements. Please choose the method that best suits your needs.

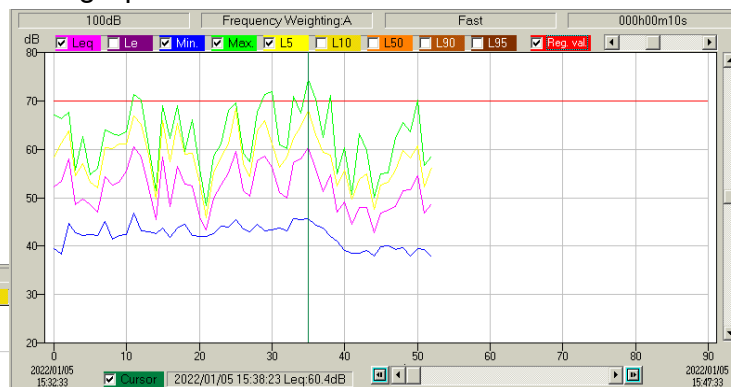
Operating environment

- Required CPU : MMX(R) Pentium(R) 120MHz or more
- Required OS : Windows(R)95/98/98SE/Me/XP/Vista/7
- Memory : 32MB or more
- HDD free space available : 1MB or more
- Required interface : Serial port

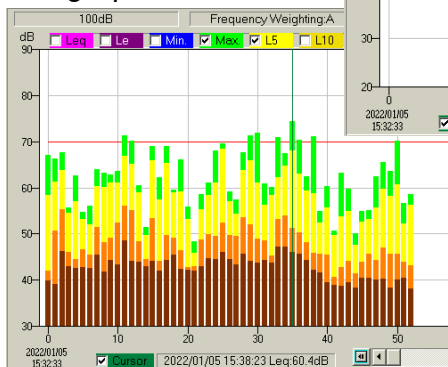
Software features

1. The collected data is stored in a text format file so the data can be processed in whatever software you have.
2. If connected to a PC during measurements, the data is transmitted to the PC. Regardless of memory limitations on the Aco sound-level meter, large quantities of data can be stored and managed.
3. By simply selecting the necessary data, graphs and reports like those below can be created and used.

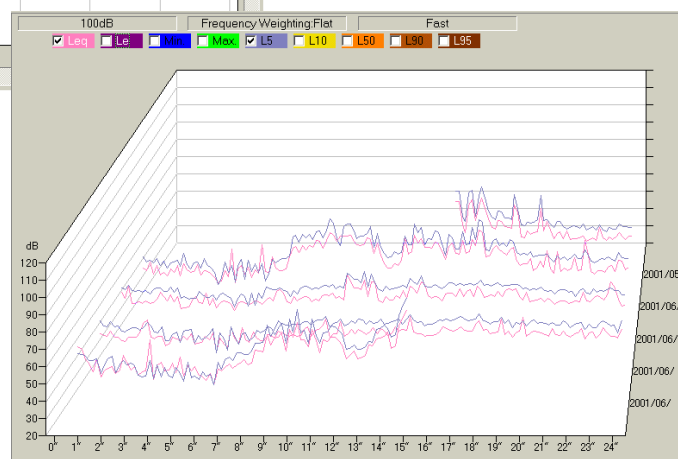
Line graph



Bar graph



Daily data comparative display



In addition, you can print out the following style list on A4 size paper.

ACO sound level meter / Data management software

100dB Frequency Weighting characteristic: Frequency Weighting: A Time weighting : Fast

No.	Meas. time	Leq	Le	Min.	Max.	L05	L10	L50	L90	L95
1	2001/05/31 14:54:30	062.6	090.3	032.7	080.0	068.8	066.6	054.7	038.9	037.1
2	2001/05/31 15:04:29	062.7	090.4	034.0	082.1	068.6	066.1	056.0	039.5	037.3
3	2001/05/31 15:14:29	049.1	077.0	033.3	071.1	054.2	050.5	039.2	034.8	034.4
4	2001/05/31 15:24:29	044.5	072.4	032.8	064.8	051.0	048.1	037.1	034.2	033.8
5	2001/05/31 15:34:29	060.5	088.3	033.9	079.8	067.6	064.2	044.6	035.9	035.5
6	2001/05/31 15:44:29	063.6	091.4	034.1	086.6	069.2	059.1	045.2	036.0	035.4
7	2001/05/31 15:54:29	051.5	079.4	036.4	082.5	054.1	051.7	041.7	038.2	037.8
8	2001/05/31 16:04:29	060.0	087.7	036.0	080.4	066.2	059.2	044.5	037.2	036.9
9	2001/05/31 16:14:29	064.7	092.4	034.1	089.9	071.1	067.8	051.5	038.3	037.7
10	2001/05/31 16:24:29	058.8	086.5	032.9	080.6	064.4	059.9	049.0	038.5	036.3
11	2001/05/31 16:34:29	052.8	080.5	033.7	072.5	057.2	053.4	041.8	035.6	035.1
12	2001/05/31 16:44:29	047.8	075.7	032.7	068.6	053.5	051.3	040.6	034.7	034.0

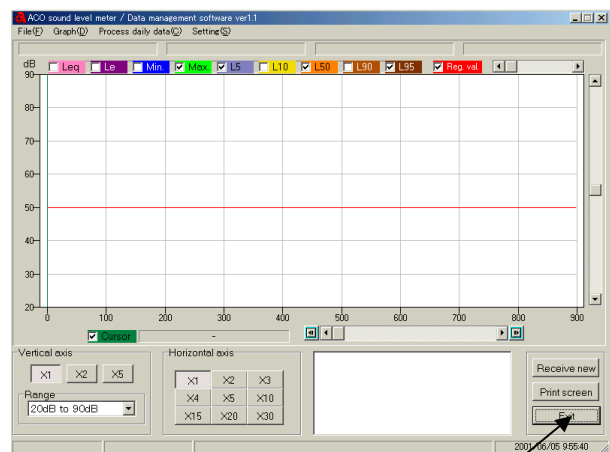
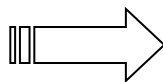
Installation

Copy the *ACO sound-level meter* folder to the directory you want to use on the hard disk.

Start up and Shut down

When you double click the *Type6224&6* icon in the folder, the working screen below appears.

Double click



Press this button to exit

PC operation

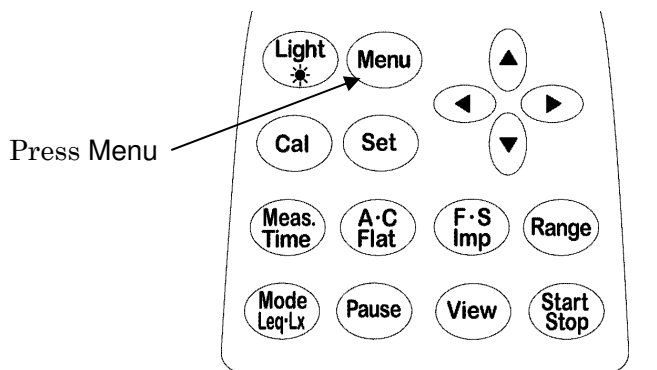
If you move the cursor to an item on the screen an explanation will be displayed.

Data processing and PC operation will become obvious if you click on the different menu items.

This guide explains only data transmission from the sound-level meter to the PC.

Transmitting data after measurement

1. Settings for data measurements



```

<menu> Screen settings
Meas Mode      Manu
Interval       Repeat or Single
I/O            Off
baud rate      9600
    
```

```

<menu>                               1/2
Meas Mode      :Manu
Interval       :Repeat
I/O            :Off
Data delet     :Off
LCD cont       :****
date y/m/d     :00/11/20
Time           :11:30:26
    
```

```

<Mode Set>                             2/2
Range          :100dB
Dyn charF      :FAST
Freq corr      :A
Meas time      :***
View           :L50
baud rate      :9600
    
```

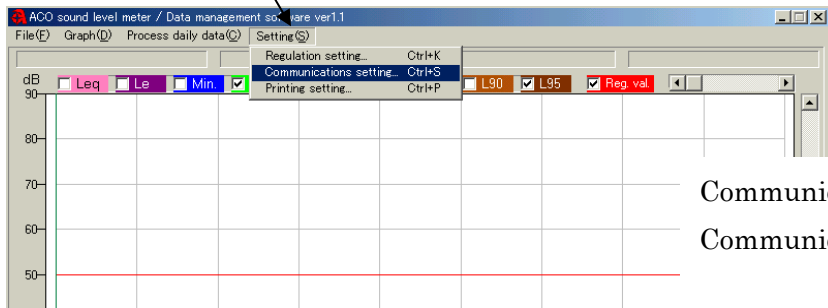
Note: Make settings for other items as needed to suit your purpose in making measurements.

2. Settings when transmitting data to the PC

After making measurements, connect the sound-level meter to the PC.

Note: Make sure that you are using a transmitting Interface cable.

>>Settings on the PC side



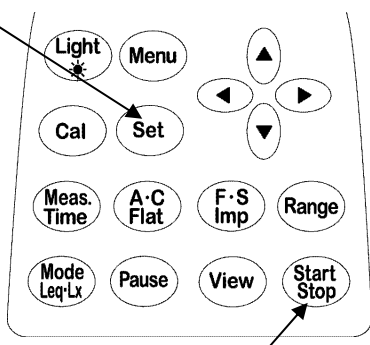
Communication speed 9600 BPS (normal)
 Communications port Select between
 COM1 and COM8

>>Settings for and operation of the sound-level meter

1) <menu> Screen settings

I/O Change to PC

2) Press Set to confirm, then press Start/Stop.



The screen below appears,
 and data transmission begins.

```

<PC>
List ->
    
```

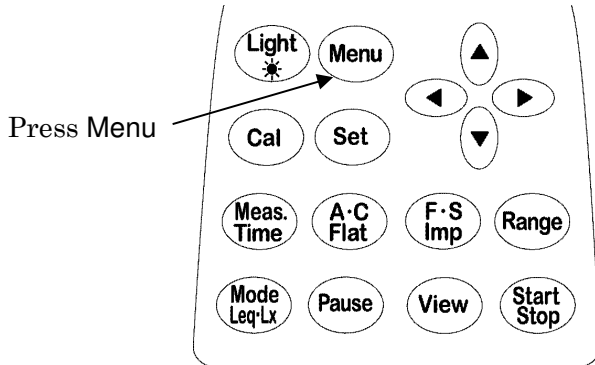

Transmitting data while making measurements

Connect the sound-level meter and the PC

>>Settings on the PC side

(The settings are the same as when transmitting data after measurements)

>>Settings for and operation of the sound-level meter.



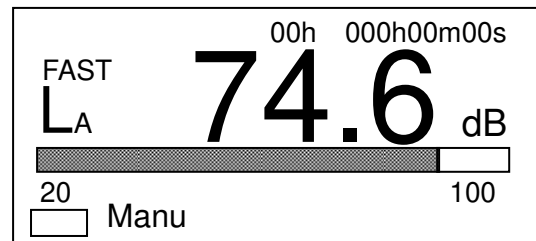
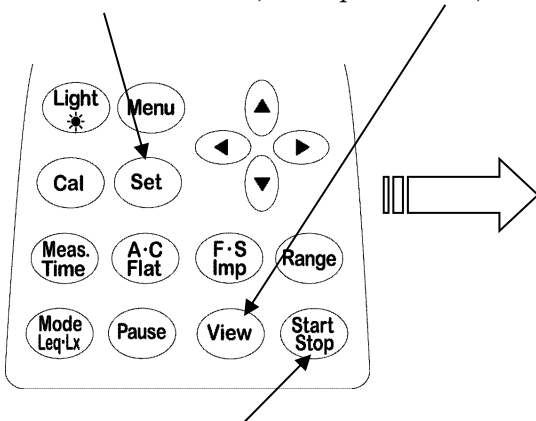
<menu>	1/2
Meas Mode	:Manu
Interval	:Off
I/O	:Off
Data delet	:Off
LCD cont	:****
date y/m/d	:00/11/20
Time	:11:30:26

<Mode Set>	2/2
Range	:100dB
Dyn charF	:FAST
Freq corr	:A
Meas time	:***
View	:L50
baud rate	:9600

- 1) <menu> Screen settings
Interval Off
I/O Off
baud rate 9600

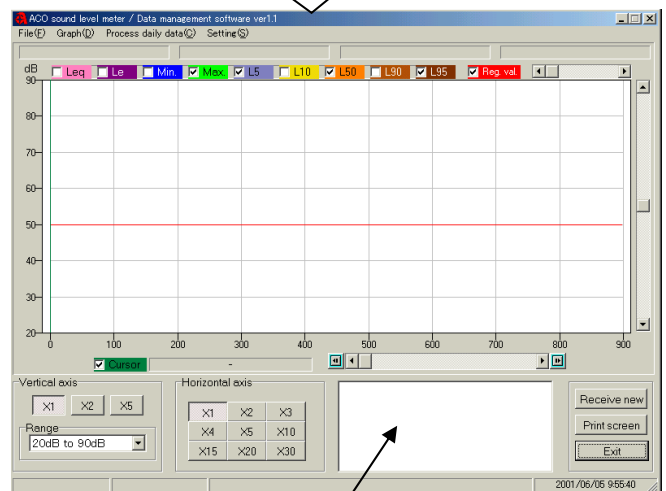
Note: Make settings for other items as needed to suit your purpose in making measurements.

- 2) Press Set to confirm, then press View, and the measurements screen appears.



- 3) If Start/Stop is pressed, at the same time measurements begin and data is transmitted for each measurement interval. The data is appended to data displayed on the PC screen.
- 4) If Start/Stop is pressed during measurements, both measurements and transmission stop.

Note: Transmitted data is not stored in the memory of the sound-level meter. After transmission be sure to save it on the PC.



Latest numerical data received is displayed here.