Green power, Hybrid power
Auto range, A/C weighting

SOUND LEVEL METER

Model : SL-4113G

Your purchase of this SOUND LEVEL METER marks a step forward for you into the field of precision measurement.

Although this METER is a complex and delicate instrument, its durable structure will allow many years of use if proper operating techniques are developed. Please read the following instructions carefully and always keep this manual within easy reach.

OPERATION MANUAL

TABLE OF CONTENTS

1. FEATURES

* Hybrid power, power supply from green power (handy generator) or battery. If power source come from " Green power ", battery is no need. Operate the generator 30 seconds will offer several minutes energy typically.
* Main functions are designed to meet IEC 61672 class 2.
* A & C weighting networks comply with standards.
* 0.5" standard microphone head.
* Time weighting (Fast & Slow) dynamic characteristic modes.
* RS232/USB computer interface.
* Auto range & Manual range selection.
* Available for external calibration adjustment.
* Condenser microphone for high accuracy & long-term stability.
* Memory function to store the Max. & Min. value.
* Hold and Peak Hold functions.
* Operation key used push button.
* LCD display for low power consumption & clear read-out even in bright ambient light condition.
* Using the durable, long-lasting components, including a strong, light weight ABS-plastic housing case.
* Small and light weight design allow one hand operation.

2. SPECIFICATIONS

Display	40 mm x 32 mm LCD (Liquid crystal display).
Function	dB (A & C frequency weighting), Time weighting (Fast, Slow), Hold, Memory (Max. & Min.), Peak hold, RS232 output.

Measurement Range	30 - 130 dB.
Resolution	0.1 dB.
Accuracy (23± 5 ℃)	* Meet IEC 61672 class 2, tested under Input signal level on 94 dB & frequency range from 31.5 Hz to 8 k Hz, refer to page 12.
Range selector	*Auto range :* 30 to 130 dB.
	Manual range : 3 range, 30 to 80 dB, 50 to 100 dB, 80 to 130 dB, 50 dB on each step, with over & under range indicating.
Frequency	31.5 to 8,000 Hz.
Microphone type	Electric condenser microphone.
Microphone size	Out size, 12.7 mm DIA. (0.5 inch).
Weighting Network	Characteristics of A & C.
Time weighting (Fast & Slow)	Fast - t= 200 ms, Slow - t = 500 ms, * "Fast" range is simulated the human ear response time. * "Slow" range is easy to get the avg. values of vibration sound level. * The "Fast" & "Slow" response range are designed to meet IEC 61672 class 2 requirement.
Calibrator	B & K (Bruel & kjaer), MULTIFUCTION ACOUSTIC CALIBRATOR 4226.
Output Signal	Serial data interface.
Output terminal	* Connect the optional RS232 cable UPCB-02 will get the RS232 plug (D9 plug).. * Connect the optional USB cable USB-01 will get the USB plug.
	Terminal socket size : 3.5 mm dia. phone socket.

Calibration VR	Build in external calibration VR, easy to calibrate on 94 dB level by screw driver.
Operating Temp.	0 to 50 ℃ (32 to 122 ℉).
Operating Humidity	Less than 80% RH.
Power Supply * Hybrid power	**Green power :** Power from the handy generator, battery is no need.
	Battery power : DC 9V battery, 006P, MN1604(PP3) or equivalent. * Alkaline or heavy duty type.
Power Consumption	Battery power : Approx. DC 10 mA.
Dimension	240 x 69 x 38 mm (9.4 x 2.7 x 1.1.5 inch).
Weight	320 g/0.7 LB (including battery).
Accessory Included	Instruction Manual .... 1 PC.

Optional Accessories	94 dB Sound Calibrator :
	    Model : SC-941.
	94 dB/114 dB Sound Calibrator :
	    Model : SC-942.
	Sound wind shield ball
	    Model : SB-01
	RS232 cable (isolated RS232 cable) :
	    Model : UPCB-02.
	USB cable
	    Model : USB-01
	Application windows software :
	    Model : SW-U801-WIN.

3. FRONT PANEL DESCRIPTION
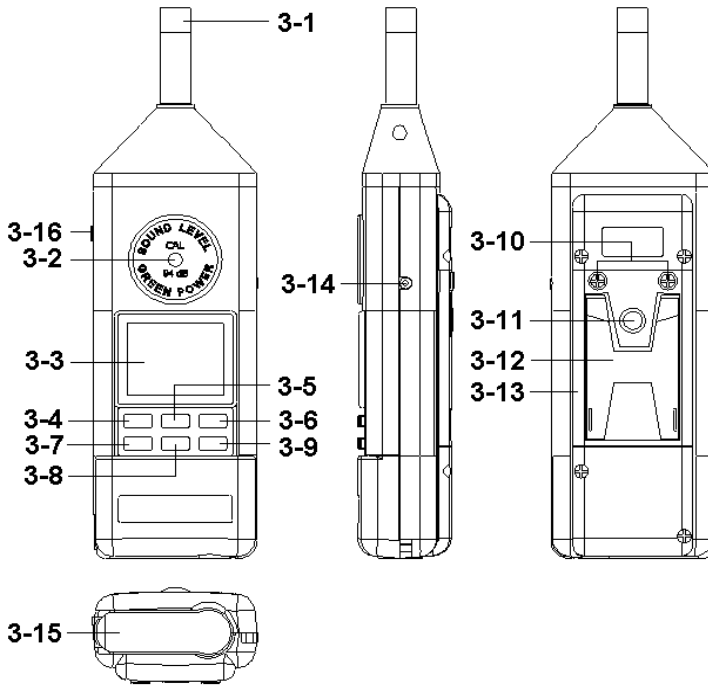
Fig. 1

3-1 Microphone
3-2 Calibration VR
3-3 Display
3-4 Power On/Off Button
3-5 Hold Button
3-6 REC./Max. Min. Button
3-7 F/S/P.H. Button
3-8 A/C Weighting Button
3-9 Range Button

3-10 Screws for battery cover
3-11 Tripod Fix Nut
3-12 Stand
3-13 Battery compartment / Cover
3-14 RS232 Computer Interface
     Socket
3-15 Power generator's handle
3-16 Power type switch.

4. MEASURING PROCEDURE

Green power (No battery) supply

If power supply will come from green power (handy generator), the procedures are following :

Slide the " Power type switch " (3-16, Fig. 1) to the " G " position, the meter will offer the power source from the Handy generator (Green power), battery is no need.
Operate the generator 30 seconds will offer several minutes energy typically.

1) There is a " Power generator's handle " (3-15, Fig. 1) on the bottom of the housing case.

Power generator's handle
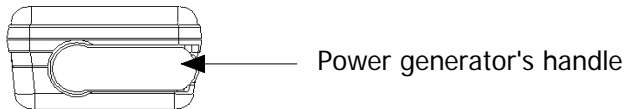
2) a. Power off the meter.
   b. Lift and extend the " Power generator's handle " and rotate the handle in clockwise direction will generate the power energy into the meter, refer Fig. a, b, c

lift

Fig. a

extend

rotate

Fig. b   Fig. c

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c. Operate the generator 30 seconds will offer several minutes power supply for the meter typically. If operate the generator more time, the meter will save more power to the meter for a certain period.

Battery supply

If intend use the battery power, the procedures are following :

<u>Install the DC 9V battery into the " Battery compartment " (3-13, Fig. 1)</u>

Slide the " Power type switch " to the " B " position, the meter will offer the power source from the battery.

1) Power on by pressing the " Power On/Off Button " (3-4, Fig. 1) , the meter's default function is " Auto range ", " A frequency weighting " & " Fast time weighting ". The lower LCD display will show the unit " A. Fast Auto ".
2) Select " A " or " C " frequency weighting by pressing the " A/C Button " (3-8, Fig. 1) .
   The characteristic table of A, C weighting, please refer to page 12.

   Note :
   a. The characteristic of A weighting is simulated as the " Human Ear Listening " response.
   b. Typically always select the A weighting when makes environmental sound level measurement.
   c. The C weighting characteristic is near the " FLAT " response. Typically it is suitable for checking the noise of machinery (Q.C. check) & knowing the real sound level of the tested equipment.

3) Determine proper measuring range by pressing the
   " Range Button " (3-9, Fig. 1).
   After power on the default range is " Auto range ".
   In the same time the lower right display will show the text
   of " Auto ".
   Under the auto range, press the " Range Button " once
   will enter to the manual range 1, range 2, rang 3. There
   are still 3 manual ranges for your choice :

   * *Manual range 1 , 30 - 80 dB range :*
     Display will show the unit of " 30 - 80 ".
   * *Manual range 2 , 50 - 100 dB range :*
     Display will show the unit of " 50 - 100 ".
   * *Manual range 3 , 80 - 130 dB range :*
     Display will show the unit of " 80 - 130 ".

4) According to various measuring sound source, select the
   Time Weighting (Fast or Slow) by pressing the " Time
   Weighting Button " (3-7, Fig. 1).

   Note :
   a. If select the function of " Fast " time weighting, the
       display will show the unit of " Fast ".
   b. If select the function of " Slow " time weighting, the
       display will show the unit of " Slow ".

5) Hold the instrument in hand and point the microphone at
   measured noise source, the sound level value (dB) will be
   displayed on LCD.
6) Peak Hold
   If intend to maintain the peak value, press the " F/S/P.H.
   Button " (3-7, Fig. 1) once in sequence until a " P.H "
   symbol will show on the top LCD display.
   Press " F/S/P.H. Button again to exit the function.

   Note :
   When make the Peak Hold measurement , the Time
   weighting will set to " Fast " automatically.

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7) Data Hold

   During the measurement, pushing the " Hold Button "
   (3-5, Fig. 1) will hold the measured value & the LCD
   will indicate " H " symbol.
   * Push the " Hold Button " again to release the data hold
      function.
8) Data Record (Max., Min. reading)
   * The data record function displays the maximum and
      minimum readings. To start the DATA RECORD
      function, press the " REC. Button " (3-6, Fig. 1) once.
      " REC " symbol will appear on the LCD display.
   * With the " REC " symbol on the display :

   a) Push the " REC. Button " (3-6, Fig. 1) once, the
      " REC Max " symbol along with the maximum value
      will appear on the display.

      *If intend to delete the maximum value, just press
      the " Hold Button " (3-5, Fig. 1) once a while, then
      the display will show the " REC " symbol only &
      execute the memory function continuously.*

   b) Push the " REC. Button " (3-6, Fig. 1) again, the
      " REC Min " symbol along with the minimum value
      will appear on the display.

      *If intend to delete the minimum value, just press
      the " Hold Button " (3-5, Fig. 1) once a while, then
      the display will show the " REC " symbol only &
      execute the memory function continuously.*

   c) To exit the memory record function, push the
      " REC " button at least 2 seconds continuously. The
      display will revert back to the current reading.

5. AUTO POWER DISABLE

The instrument has built-in " Auto Power Shut-off "
in order to prolong battery life. The meter will switch
off automatically if none of the buttons are pressed
within approx. 10 min.

To de-activate this feature, Select the memory record
function during measurement, by pressing the
" REC. Button " (3-6, Fig. 1).

6. MEASURING CONSIDERATION

1) Please should select the proper time weighting (A
   weighting or C weighting). Typically the A weighting
   selector will be engaged.
2) Please don't keep or operate the instrument at high
   temperature & humidity environment for a long period.
3) Keep microphone dry & avoid serious vibration.

7. RS232 PC SERIAL OUTPUT

 The instrument is provided an 3.5 mm dia. phone socket
(3-14, Fig. 1) for RS232 computer interface socket.

The connector output is a 16 digits data stream which
can be utilized to the user's specific application.

**A RS232 lead with the following connection will
be required to link the instrument with the PC
serial input.**

```
┌─────────────────────────────────────────────────────────────┐
│   Meter                           PC                          │
│   (3.5 mm jack plug)              (9W 'D" Connector)          │
│                                                               │
│   Center Pin.....................................Pin 4        │
│                                                               │
│   Ground/shield.............................Pin 2 ┐           │
│                                                   │  2.2 K    │
│                                   Pin 5 ┘         │  resister │
└─────────────────────────────────────────────────────────────┘
```
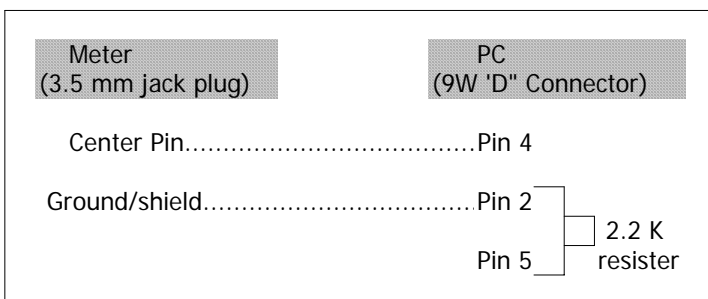
The 16 digits data stream will be displayed in the following format :

D15 D14 D13 D12 D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 D1 D0

Each digit indicate the following status :

D15	Start Word		
D14	4		
D13	1		
D12 & D11	Annunciator for Display		
	dB = 17		
D10	Polarity		
	0 = Positive 1 = Negative		
D9	Decimal Point(DP), position from right to the left		
	0 = No DP, 1= 1 DP, 2 = 2 DP, 3 = 3 DP		
D8 to D1	Display reading, D1 = LSD, D8 = MSD		
	For example :		
	If the display reading is 1234, then D8 to D1 is :		
	00001234		
D0	End Word		

RS232 setting

Baud rate	9600
Parity	No parity
Data bit no.	8 Data bits
Stop bit	1 Stop bit

8. REPLACEMENT of BATTERY

When the left top corner of LCD display show " ⊏⧅⊐ ",
it indicate the power supply is under low power condition.

If the meter is used the " Battery power supply " , it is
necessary to replace the battery. However within
specification measurement may still be made for several
hours after low battery indicator appears before the
instrument become inaccurate.
Loose the " Screws for battery cover " (3-10, Fig. 1) and
open the " Battery Cover " (3-13, Fig. 1) away from the
instrument and remove the battery.
Install a 9 V battery (Alkaline or Heavy duty type) and
replace the cover.

9. CALIBRATION

1) Prepare the optional " SOUND CALIBRATOR ", such
   as " SC-941 " or " SC-942 ". Power on the Sound
   Calibrator & plug calibrator output socket into the
   " Microphone " head (3-1, Fig. 1) of the Sound Level meter.
2) Select manual range to " 50 - 100 dB ".
3) Select " Time Weighting " at " Fast " position.
4) Select " A " weighting.
5) Adjust the " Calibration VR " (3-2) carefully with a
   " - " screw driver until the display reading value within
   " 94± 0.2 " dB.

10. FREQUENCY WEIGHTING CHARACTERISTICS OF A and C NETWORKS

Frequency Hz	A Weighting Charac.	C Weighting Charac.	Tolerance (IEC 61672 class 2)
31.5	-39.4 dB	-3 dB	± 3.5 dB
63	-26.2 dB	-0.8 dB	± 2.5 dB
125	-16.1 dB	-0.2 dB	± 2.0 dB
250	-8.6 dB	0 dB	± 1.9 dB
500	-3.2 dB	0 dB	± 1.9 dB
1 K	0 dB	0 dB	± 1.4 dB
2 K	+1.2 dB	-0.2 dB	± 2.6 dB
4 K	+1 dB	-0.8 dB	± 3.6 dB
8 K	-1.1 dB	-3 dB	± 5.6 dB

11. TIME WEIGHTING (FAST and SLOW) CHARACTERISTICS

Time Weighting Charac.	Max. response ref. continuous signal	Tolerance (IEC 61672 class 2)
F (Fast)	- 1.0 dB	+ 1 dB
		- 2 dB
S (Slow)	- 4.1 dB	± 2 dB

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