SOUND LEVEL METER

Model : SL-4012

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.

QUALITY ASSURED FIRM ISO 9001 SGS

UKAS QUALITY MANAGEMENT 005

OPERATION MANUAL

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1. FEATURES

* Large LCD display, easy to read.
* 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.
* AC output for system expansion.
* 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 MAX. 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	52 mm x 32 mm LCD (Liquid crystal display), 5 digits with annunciator.
Function	dB (A & C frequency weighting), Time weighting(Fast, Slow), Hold, Memory (Max. & Min.), Max. hold, AC output, 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 11.
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.
Range selector	Manual range: 3 ranges (30 to 80 dB, 50 to 100 dB, 80 to 130 dB). Auto range: 30 - 130 dB.
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	** AC output :* AC 0.5 Vrms corresponding to each range step. Out put impedance - 600 ohm.
	** RS232 output.*

Output terminal	*Terminal 1 :* RS 232/USB PC serial interface. * Connect the optional RS232 cable UPCB-02 will get the RS232 plug. * Connect the optional USB cable USB-01 will get the USB plug.
	Terminal 2 : AC output terminal.
	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	DC 9V battery, 006P, MN1604(PP3) or equivalent. ** Alkaline or heavy duty type.*
Power Consumption	Approx. DC 6 mA.
Dimension	268 x 68 x 29 mm (10.6 x 2.7 x 1.1 inch).
Weight	285 g/0.63 LB (including battery).
Accessory Included	Instruction Manual ..... 1 PC.
Optional Accessories	*94 dB Sound Calibrator :* Model : SC-941. 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

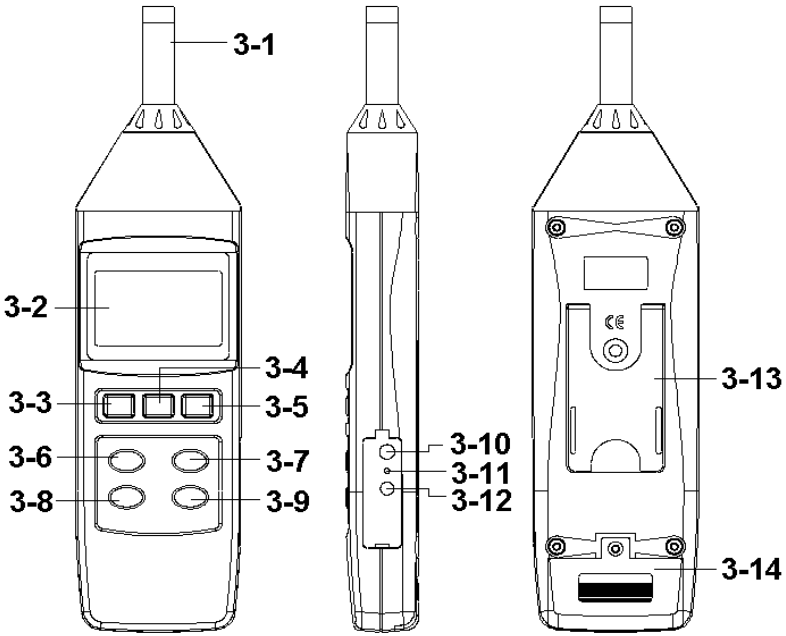


Fig. 1

3-1 Microphone
3-2 Display
3-3 Power On/Off Button
3-4 Hold Button
3-5 REC./Max. Min. Button
3-6 Max. Hold Button
3-7 A/C Weighting Button
3-8 Time Weighting (Fast / Slow) Button
3-9 Range Button
3-10 AC Output Socket
3-11 Calibration VR
3-12 RS232 Computer Interface Socket
3-13 Battery compartment / Cover
3-14 Stand

4. MEASURING PROCEDURE

1) Power on by pressing the " Power On/Off Button " (3-3, 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 " (3-7, Fig. 1) .

Note :

a. The characteristic table of A, C weighting, please ref. page 11.

b. The characteristic of A weighting is simulated as the " Human Ear Listening " response. 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 " (3-8, 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) Max. Hold
   If intend to maintain the maximum value, press the " Max. Hold Button " (3-6, Fig. 1) and a " P.H " symbol will show on the top LCD display. Press the " Max. Hold Button again to exit the function.

   Note :
   a. When make the Max. Hold measurement under slow varying noise environment, please select the " Auto range "
   b. When make the Max. Hold measurement under pulse noise environment, it should select to the convenient " manual range "

7) Data Hold

During the measurement, pushing the " Hold Button " (3-4, Fig. 1) will hold the measured value & the LCD will indicate " HOLD " 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 " (3-5, Fig. 1) once. " REC " symbol will appear on the LCD display.
* With the " REC " symbol on the display :
  a) Push the " REC. Button " (3-5, 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 " (3-4, Fig. 1) once a while, then the display will show the " REC " symbol only & execute the memory function continuously.

  b) Push the " REC. Button " (3-5, 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 " (3-4, 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 " (3-5, 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. SIGNAL OUTPUT

7-1 AC output

The instrument is provided an 3.5 mm dia. phone socket (3-10, Fig. 1) for AC output, it is used to connect with analyzer, level recorder, tape recorder, controller...etc.

Note :

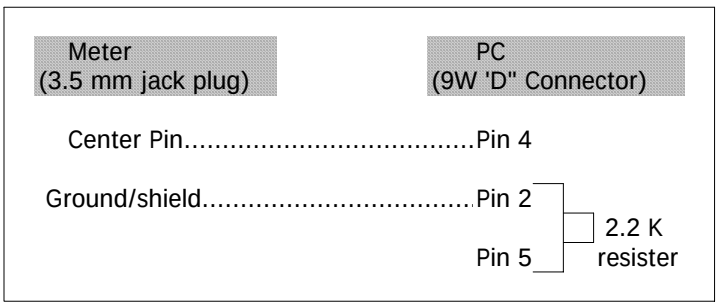
AC 0.5 Vrms corresponding to each range step.
Output impedance - 600 ohm.

7-2 RS232 computer interface

The instrument is provided an 3.5 mm dia. phone socket (3-12, 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.



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

1) When the left top corner of LCD display show "  ", 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.
2) Open the " Battery Cover " (3-13, Fig. 1) away from the instrument and remove the battery.
3) 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 " (3-11) 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