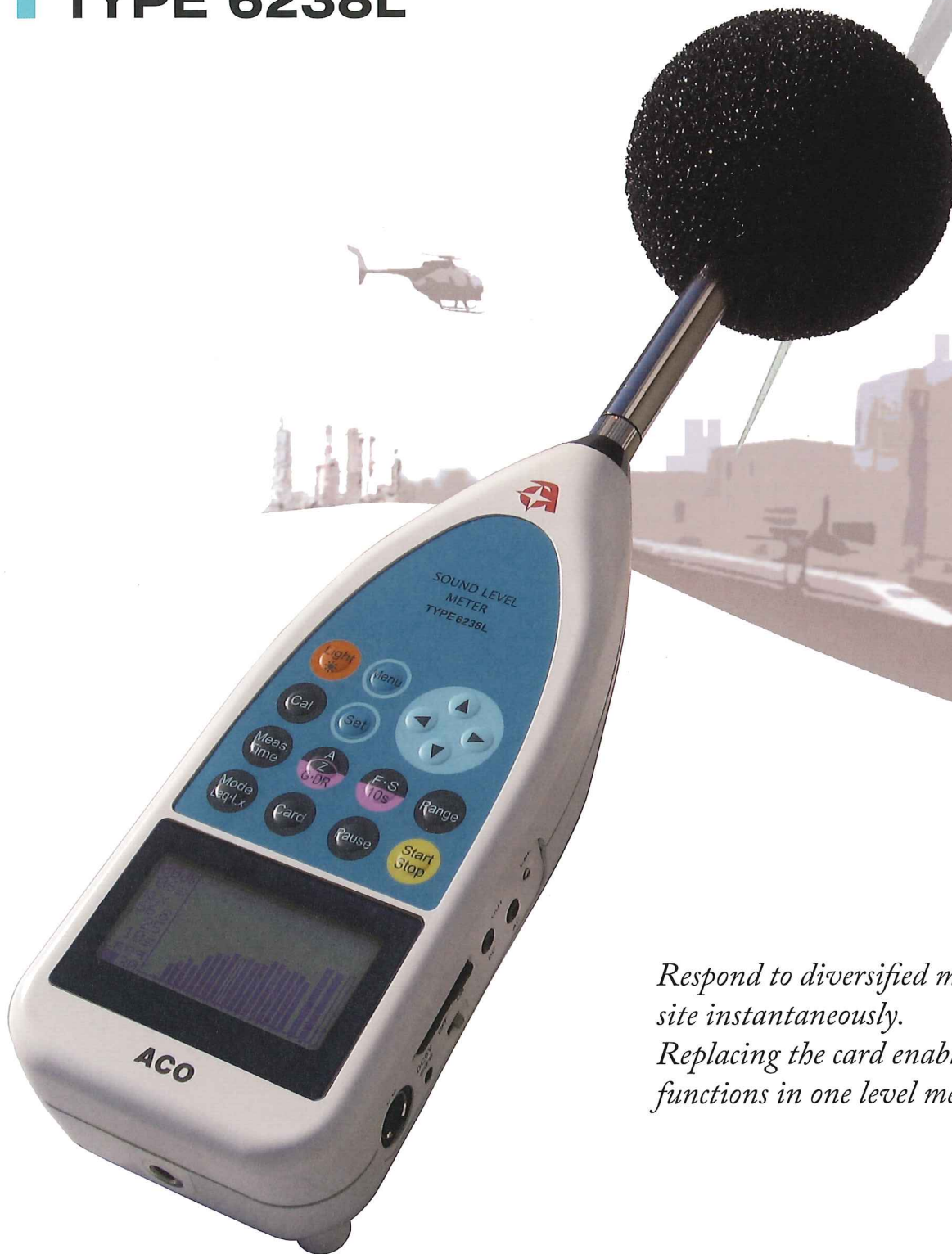


Low frequency sound pressure level meter

Precision Sound level meter

TYPE 6238L



*Respond to diversified measurement site instantaneously.
Replacing the card enables 2 measuring functions in one level meter.*

 **ACO CO.,LTD.**

Only replacing the card enables to measure A-weighted sound pressure level, G-weighted sound pressure level and 1/3-octave real-time analysis.

This independently enables to measure both sound pressure level and ultralow-frequency sound pressure level

As ecological assessment went into effect, the evaluation of environmental noise such as traffic noise or industrial equipment noise, or deeper understanding of the labor health environment and knowledge of environment conservation at offices, factories, etc. are getting more needed.

Also in accordance with growing environment problems, low and low-frequency noise (infrasound) has been a big problem, presenting slightly different perspective from those as usual.

For example, it is the case people claim various medical problems due to the low-frequency noise of neighbor's water heater operated at midnight or vanes of wind power generation system rapidly increasing recently.

G-weighted sound pressure level for estimation of ultralow-frequency was established in ISO, and collection and analysis of highly-detailed data are strongly desired to study the influence of low-frequency sound on human body of as well as the solution to the related problems.

Low-frequency sound pressure level meter / Precision Sound level meter TYPE 3238L is extremely high resolution and reliability sound level meter that meets the above-stated needs providing a possibility of real-time on-site analysis.

Measuring functions:

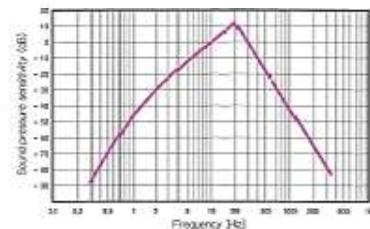
Most evaluation indexes are available such as Equivalent continuous A-weighted sound pressure level LAeq, Single event sound exposure level LAE, etc., of course including A-weighted sound pressure level LA best suited for environmental noise assessment.

Equipped with a card slot:

It enables to add the specified analyzing function by inserting the option program card (SD Card). Various program cards (Option) are available, such as 1/1 and 1/3-octave analysis card, FFT analysis Card etc.

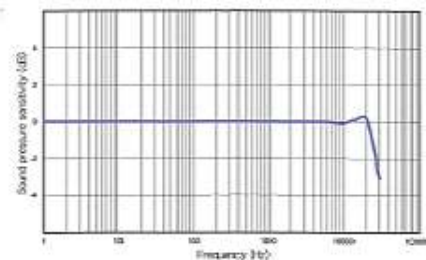
G-weighted:

Replacing the card with G-card enables to measure G-weighted sound pressure level and 1/3-octave real-time analysis.



G-weighted sound pressure level is the frequency weighting characteristic standardized in ISO 7196 to evaluate psychological or physiological effect of ultralow-frequency sound ranging 1-20Hz. It corresponds to A-weighted sound pressure level LA in audifrequency range. The feature is characterized by sharp inclined curve, at lower frequencies than 1Hz and higher than 20Hz, both based on 0dB at 10Hz, in comparison with A-weighting curve at 1-20Hz. This is based on the result of the experiment on the interval threshold in ultralow-frequency sound.

Frequency characteristics of microphone (TYPE 7146NL)



TYPE 7146NL is the field type electret condenser microphone which complies with IEC61672-1 Class 1. It has also wide dynamic range and frequency range, as well as high sensitivity and easy to operate, free from need of supplying DC bias voltage.

Sample of the G-weighted sound pressure level



Sample of the display for 1/3 octave filter



Low-frequency noise

The audible frequency range is assumed to be 20Hz-20000Hz. This is the audifrequency range where our auditory sensation can perceive acoustic noise.

Sound ranging 1Hz-20Hz is termed ultralow-frequency sound or infrasound, which we can not hear actually.

Ultralow-frequency sound and those we can hardly hear at lower than 100 Hz are both termed low-frequency sound.

The low-frequency sound exists as ambient noise in daily life and sometimes happens to be reflected or emphasized under some specified conditions. It is thus said the low-frequency sound affects person physically (rattling door or window, micronotion of various articles etc.), psychologically (aggravate distraction, feeling of pressure, etc.), or physiologically (headache, buzzing, nauseaing, etc.). Unlike the usual acoustic noise, the sound source can hardly be identified, sometimes influencing larger area of the site.

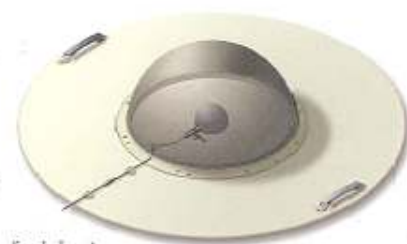
Requirement for highly-detailed outdoor measurements

Wind screen for wind power system measurement

We have pursued wind noise reduction capability, waterproof property and acoustic transparency, each of the screen.

The exceptional and non-conventional capability of waterproof and almost 100% acoustic transparency was realized by the newly developed specified sheet.

*This dedicated windscreen has been developed through the business-academic collaboration of Shizuoka University, Tomozona Co., Ltd. and Aco Co., Ltd.



Equipped with a memory function

The measured data is stored by built-in memory card (SD card).



G-card

G-weighted sound pressure level measuring 1/3-octave band Real-time Analysis. Real-time recording of the data is possible by using RSR (Real-time Sound Recording) Card.

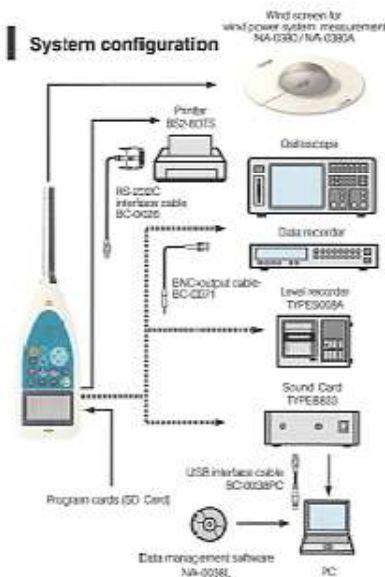


Abundant program cards (Option)

1/1, 1/3-octave Real-time Analysis Card
FFT Analysis Card
ESR Card (Real-time sound recording Card)



System configuration



Configuration

1. Main body
2. Memory Card (SD Card)
3. G Card
4. BNC Pin Code
5. Windscreen (φ90)
6. Carrying case
7. Four 1.5V Alkaline cells EC type LR6
8. Hand strap
9. Instruction manual

SPECIFICATIONS

Type	TYPE6238L
Microphone Type(Sensitivity)	TYPE 7146NL(-28dB, Stand-alone -26dB)
Name	Low frequency sound pressure level meter
Applicable Standards	JIS C 1514:2002 Class1 ISO 7196:1995
Frequency Range	FLAT(DR:1-500Hz) FLAT(FLAT:1-100Hz) G-weighted sound pressure level:LG(G ISO 7196 Reference) 1/3-octave(FLAT:1-80Hz)
Level Range Control	FLAT,G-weighted sound pressure level 20-80dB, 20-90dB,30-100dB 40-110dB,50-120dB, 60-130dB
Frequency analysis band	1/3-octave 1Hz,1.25Hz,1.6Hz,2Hz,2.5Hz,3.15Hz,4Hz,5Hz 6.3Hz,8Hz,10Hz,12.5Hz,16Hz,20Hz,25Hz,31.5Hz 40Hz,50Hz,63Hz,80Hz,OA,AP,G
Measurement Level	G:40dB-130dB FLAT:50dB-130dB 1/3-octave:30dB-130dB
Overload characteristic	+3dB from upper limited scale
Self-noise level	The lower limit of the measurement range in dB lies 8dB higher than self-noise level.
Time weighting	Fast,Slow,10sec
Frequency weighti	G(Digital),FLAT
Measurement items	Low frequency sound pressure level(L _{DR}) Low frequency sound pressure level(L _F) G-weighted sound pressure level(L _G) Equivalent continuous sound pressure level(L _{eq}) Maximum sound pressure level(L _{max})
Measurement time	1s, 3s, 5s, 10s, 1mim, 5mim, 10mim, 15mim, 30mim, 1h, 8h, 12h, 24h, Manual (Max. 199h59m59s)
Sampling Time	20.8 μs (L _{eq} , L _{max} , L _{min} , L _{DR} , L _{DRmax} , L _{Peq} , L _{Pmax}) 666 μs (L _G , L _{Gmax}), 64ms (L _N)
Data clear function	Pause, and a function that deletes preceding 3 or 5 sec. data Memory start ; Selectable Auto or Manual
Timer function	A marker can be set to start and stop the measurement at any specified moments.
Display	Liquid crystal and Backlight (128×64 points) Display range : 4digits display Display cycle : display Period : 1s Bar display : display Period : 0.1s Warning : Over ; +3dB from upper limited scale Under ; -0.6dB from lower limited scale Battery display : 5 steps display Date : year / month / day / hour : minute : second
Calibration signal	Electric calibration with internal oscillator (1kHz,20Hz sine wave)
Outputs	AC output : φ 2.5 Jack Output : 1Vrms (FS) Output impedance : 600 Ω Load impedance : more than 10k Ω DC output : φ 2.5 Jack Output : 2.5V (FS), 0.25V/10dB, Output impedance : 50 Ω Load impedance : more than 10k Ω
RMS detection circuit	True RMS detection circuit (computing type)
Processing	Digital
Pause	Normal temporary pause function, as well as the function of canceling the data before pausing the measurement, are available.
Data Storage Functions	Sound pressure level or Processed values stored in built-in Memory or Memory card Manual Storage:Sound level, Calculation value, Memory time, Store the Sampling to Built-in memory or on Memory card, Auto Storage : Sampling interval 100ms, 200ms, sound level,Leq etc. Processing Card : Storage of calculation results
I / O	Direct output to printer, control and output data to computer Digital output of real-time noise waveform with USB interface.
Comparator Output	Comparator Function with threshold level.
Battery Type	Four 1.5V Alkaline cells IEC type LR6, Optional AC adapter Battery life : Alkaline dry cell ; Approx.9 hours when Switch on a back light ; Approx.1/3 Consumption current : Approx.150mA (When input 6V) at Calculation OFF.
Operating temperature	-10~50°C 30%-90%RH (no condensation)
Size	85(W) x 328(H) x 48(D)
Weight	Less than Approx.450g (Including batteries)

Name	Precision Sound level meter
Applicable Standards	JIS C1509-1:2005 Class I IEC 61672-1:2002 Class I
Frequency Range	20Hz-12.5kHz(Conforms with measurement law) 1Hz-20kHz(Z) 20Hz-20kHz(A)
Level Range Control	10dB step 6step 20-80dB, 20-90dB 30-100dB, 40-110dB 50-120dB, 60-130dB
Measurement Level	A:28-130dB Z:39-130dB
Overload characteristic	+3dB from upper limited scale
Self-noise level	The lower limit of the measurement range in dB lies 8dB higher than self-noise level.
Linearity Range	75dB
Time weighting	Fast,Slow
Frequency weighting	A,Z
Measurement items	Sound pressure level(L _p) A-weighted sound pressure level(L _A) Equivalent continuous A-weighted sound pressure level(L _{Aeq}) Sound Exposure level(L _{AE}) Maximum sound pressure level(L _{Amax}) Minimum sound pressure level(L _{Amin}) Percentile sound pressure level(5 freely selectable values,L _{AN}) Peak Sound Pressure level(L _{peak}) Power average of maximum sound pressure level in a given interval(L _{ATms})

Option	<ul style="list-style-type: none"> 1/1 and 1/3-octave Real-time Analysis Card Applicable standards : JIS C1514(IEC61260) : Class1 Measurement mode : Sound pressure level (L_p) , Equivalent continuous Sound pressure level (L_{eq}) , Sound exposure level(L_E) , Maximum sound pressure level (L_{max}) (One of the measurement modes selected as above is displayed.) Frequency analysis band : 1/1- octave filter ; 16Hz, 31.5 Hz, 63 Hz, 125 Hz, 250 Hz, 500Hz,1kHz, 2kHz,4kHz, 8kHz, OA, AP 1/3- octave filter ; 12.5Hz, 16Hz, 20 Hz,25 Hz,31.5Hz,40Hz, 50Hz, 63Hz, 80Hz, 100Hz, 125Hz,160Hz, 200Hz, 250Hz, 315Hz, 400Hz, 500Hz, 630Hz, 800Hz, 1kHz, 1.25kHz, 1.6kHz, 2kHz, 2.5kHz, 3.15kHz, 4kHz, 5kHz, 6.3kHz,8kHz,10kHz, 12.5kHz, 16kHz, OA, AP Level Range Control: 10-80dB, 20-90dB, 30-100dB, 50-120dB, 60-130dB FFT Analysis Card Frequency span : 2kHz, 5kHz, 10kHz, 20kHz Time window : Rectangular, Hanning Analysis line : 400 Zoom : ×1, ×2, ×4 Processing : Sound pressure level, Linear average value, Max, RSR card (Real sound recording card) This card enables automatic recording with specified level and time, namely adding the function of recording real wave data. The data is recorded in WAVE file format (48kHz 16bit Mono), easily corresponding to most common application software of acoustic analysis, as well as displaying its greatest force in all kinds of acoustic analysis.
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Option



1. Piston phone	TYPE 2124A
2. Sound calibrator	TYPE2127
3. Tripod exclusively for sound level	NA-0333
4. Extension cable	BC-0046L
5. AC adapter	AC-1026
6. 1/1 and 1/3-octave Real-time Anal	NA-0038
7. FFT Analysis Card	NA-0038F
8. RSR Card (Real Sound Recording Card)	NA-0038R
9. USB interface cable	BC-0038PC
10. Data management software	NA-0038L
11. Windscreen for wind power system measurement	NA-0380
Fold-down type Windscreen for wind power system measurement	NA-0380A
12. Carrying case(NA-0380A)	NA-0080
13. Windscreen (φ 175)	NA-0305A

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