

# **SPECIFICATIONS**

Sound Level Meter

**NL-31**



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## Outline

The Sound Level Meter NL-31 is designed for sound level measurements according to the IEC standard. The following measurements can be made:

● Equivalent continuous sound level	$L_{eq}$
● Sound exposure level	$L_E$
● Maximum sound level	$L_{max}$
● Minimum sound level	$L_{min}$
● Percentile sound level	$L_N$ (five selectable settings)
● Sound level	$L_p$
● C-weighted peak sound level	$L_{Cpeak}$
● FLAT peak sound level	$L_{peak}$
● Impulse sound level	$L_{AI}$
● Impulse equivalent continuous sound level	$L_{AIeq}$
● Takt-max sound level	$L_{Atm5}$

Measurement settings and results (level values and bar graph) are shown on the backlit LCD panel.

Measurement data (sound level, processed data, measurement parameters) can be stored in the internal memory of the unit or on a memory card (CompactFlash card optional). The serial interface allows sending measurement data to a printer or computer.

By loading optional filter program, the unit can be used for 1/1 octave or 1/3 octave analysis with a 3rd-order Butterworth high-pass and low-pass filter.

Recorded data can be further processed on a computer.

The following accessories are available, to cover a wide range of application requirements.

- Printer                   DPU-414  
Serves to produce hard copy of measurement data (including data stored in memory).
- Level recorder       LR-07/LR-20A  
Serves to record sound level changes over time.

# Specifications

## Applicable standards

IEC 61672-1:2002 class 1

JIS C 1509-1:2005 class 1

IEC 60651 and IEC 60804 was withdrawn and replaced by IEC 61672-1.

JIS C 1505 was withdrawn and replaced by JIS C 1509-1.

## Measurement functions

### Main processing functions

Simultaneous measurement of all items according to selected time weighting and frequency weighting

Sound level  $L_p$

Equivalent continuous sound level  $L_{eq}$

Sound exposure level  $L_E$

Maximum sound level  $L_{max}$

Minimum sound level  $L_{min}$

Percentile sound level  $L_N$  (5 selectable settings)

### Auxiliary processing functions

One selectable for simultaneous processing with main measurement processing functions

Peak sound level (FLAT)  $L_{peak}$

C-weighted peak sound level  $L_{Cpeak}$

C-weighted equivalent continuous sound level  $L_{Ceq}$

Power average of maximum sound level in a given interval  $L_{Atm5}$

Impulse sound level  $L_{AI}$

Impulse equivalent continuous sound level  $L_{AIeq}$

$L_{Atm5}$ ,  $L_{AI}$ , and  $L_{AIeq}$  can only be chosen when A weighting is selected for main processing.

$L_{Ceq}$  can only be chosen when A weighting or FLAT is selected for main processing.

### Measurement time

10 seconds, 1, 5, 10, 15, 30 minutes, 1, 8, 24 hours, and manual (maximum 200 hours)

### Measurement range

A weighting: 28 dB to 138 dB

C weighting: 33 dB to 138 dB

FLAT: 38 dB to 138 dB

C-weighted peak sound level: 55 dB to 141 dB

Peak sound level (FLAT): 60 dB to 141 dB

Inherent Noise	A weighting: 20 dB or less (17 dB Typ.) C weighting: 25 dB or less FLAT: 30 dB or less
Linearity range	100 dB
Reference sound pressure level	94 dB
Reference level range	30 to 120 dB
Level range selection	
	6 ranges in 10-dB steps
	20 to 80 dB
	20 to 90 dB
	20 to 100 dB
	20 to 110 dB
	30 to 120 dB
	40 to 130 dB
	7 ranges when optional 1/1, 1/3 Octave Filter Card NX-21SA or optional Universal Filter Card NX-21VA is ON
	10 to 70 dB (selectable only when NX-21SA or NX-21VA is ON)
	20 to 80 dB
	30 to 90 dB
	40 to 100 dB
	50 to 110 dB
	60 to 120 dB
	70 to 130 dB
Frequency range	
	Overall characteristics including microphone: 20 to 20000 Hz
	Electrical circuit characteristics (AC output): 10 to 20000 Hz
	Electrical circuit characteristics (detector): 10 to 20000 Hz
Frequency weighting	A, C, FLAT
RMS detection	Digital processor Characteristics: Fast, Slow, Impulse * Impulse is selectable only for auxiliary processing functions
Calibration	Electrical calibration with 1-kHz sine wave signal from built-in oscillator Calibration using sound calibrator or pistonphone
Back-erase function	Pause key can be set to erase data from preceding 5 seconds
Processing functions	Digital processing Sampling interval 20.8 $\mu$ s ( $L_{eq}$ , $L_{max}$ , $L_{min}$ , $L_E$ ) 100 ms ( $L_N$ )

## Data store functions

For manual store, data can be stored either in the internal memory or on the optional CompactFlash card. Auto store is possible only when the CompactFlash card is inserted, because data are stored directly on the card. Multiple data files can be created on the CompactFlash card.

**Manual store** Up to 100 data sets (sound level, store time and date, main and auxiliary processing results, processing start time) can be stored manually. Maximum expands to 100 data sets per one file when storing directly to CompactFlash card.

**Auto store 1** Sound level or  $L_{Aeq,1\text{ sec}}$  can be stored automatically on CompactFlash card every 100 ms, 200 ms, or 1 s. The maximum store time is 200 hours.

### Auto store 1 timer function

Serves to set start and end time for auto store 1 measurement. Until the measurement start time, the unit operates in power save mode (power consumption approx. 1/3).

**Auto store 2** Main and auxiliary processing results and processing start time are stored on CompactFlash card for each measurement, performed at preset intervals. Max. 99999 data sets can be stored.

### Auto store 2 timer function

Serves to set start and end time for auto store 2 measurement. Pause interval between measurements can also be set. During the pause interval, the unit operates in power save mode (power consumption approx. 1/3).

**Microphone** 1/2-inch prepolarized condenser type  
Model: UC-53A  
Sensitivity: -28 dB

**Preamplifier** NH-21

**Display** Backlit LCD (128 × 64 dots + 121 icons)

### Display screens

Numeric and bar graph indication of sound level

Processing results screen

Level-time graph (real-time level recording with 20-second horizontal axis)

Menu screens for operation settings

### Warning indications

Over-range indication: full-scale +8.5 dB

Under-range indication: full-scale -2.6 dB

## Outputs

AC/DC output

Key-selectable AC or DC output

AC output (using selected frequency weighting and filter settings)

Output voltage: 1 Vrms (at full-scale)

Output impedance: 600  $\Omega$

Load impedance: 10 k $\Omega$  or more

DC output

Output voltage: 2.5 V (at full-scale), 0.25 V/10 dB

Output impedance: 50  $\Omega$

Load impedance: 10 k $\Omega$  or more

## I/O connector

Sound level meter control from and data output to a computer via the RS-232-C interface

Data output to printer DPU-414/CP-11/CP-10

RS-232-C

Transfer principle: asynchronous

Data word length: 8 bit

Stop bits: 1 bit

Parity check: none

Baud rate: 4800, 9600 or 19200 bps

Flow control: yes

Select X parameter control or RTS/CTS control

## Comparator output

Open collector output: goes ON when set level is exceeded

Maximum voltage: DC 24 V

Maximum current: DC 60 mA

Level setting range: 30 to 130 dB, 1-dB steps

## Power requirements

Four IEC R6P (size "AA") batteries

Battery life (23°C) Approx. 27 h (alkaline batteries),

Approx. 10 h (manganese batteries)

With backlighting, battery life is reduced to about half.

When auxiliary processing functions are enabled, battery life is reduced by about 20%.

When the optional filter is enabled, battery life is reduced by about 20%.

AC adapter (option)

NC-34: 100 V AC

NC-34A: 120 V AC

NC-34B: 220 V AC

NC-98A: 100 to 240 V AC (CE-marked)

Current rating Approx. 65 mA

Current consumption in standby mode is reduced to about one third.

Operating input voltage: 4.2 V to 6.5 V

Internal backup battery retains clock for about 1.5 months without external power.

Ambient conditions

-10°C to +50°C, 10% to 90% RH (no condensation)

Dimensions

Approx. 260 × 76 × 33 mm

Weight (including batteries)

Approx. 400 g

Supplied accessories	Windscreen	WS-10	1
	Carrying case	NL-21-031	1
	Connector cover	NL-21-005	1
	Hand strap	VM-63-017	1
	Batteries	IEC R6P	4
	Inspection Certificate		1
	Instruction manuals		1 set
		(Instruction Manual, Technical Notes, Serial Interface Manual, 1 each)	
Optional equipment	1/1, 1/3 Octave Filter Card	NX-21SA	
	Universal Filter Card	NX-21VA	
	CompactFlash card	MC-16CF	
	CF card adapter	MC-CFADP	
	AC adapter	NC-34 series	
	AC adapter with CE mark	NC-98A	
		(100 to 240 V, 50/60 Hz)	
	BNC-to-RCA cable	CC-24	
	Microphone extension cable	EC-04 series	
	Serial I/O cable	CC-92	
	Printer cable	CC-93 (9 pins, for DPU-414)	
		CC-93A (25 pins, for CP-10, CP-11)	
	Printer	DPU-414	
	Sound calibrator	NC-74	
	Pistonphone	NC-72	
	Level recorder	LR-07/LR-20A	
	Comparator output cable	CC-94	
	Windscreen	WS-03E	
Battery pack	BP-21		
	Dry-cell batteries (IEC-R20, size "D") × 4		

## Optional program card specifications

The program card is a CompactFlash card which contains program data. After these program data have been read off the card by the sound level meter during the software installation process, the new function can be used.

1/1, 1/3 Octave Filter Card      NX-21SA

Linearity range during filter operation is 65 dB.

Supported standard: IEC 61260 : 1995 Class 1

1/1 octave filters (IEC compatible)

16 Hz to 8 kHz

1/3 octave filters (IEC compatible)

12.5 Hz to 16 kHz

Universal Filter Card              NX-21VA

3rd-order Butterworth high-pass filter and 3rd-order Butterworth low-pass filter with freely selectable frequency in 1/3 octave steps

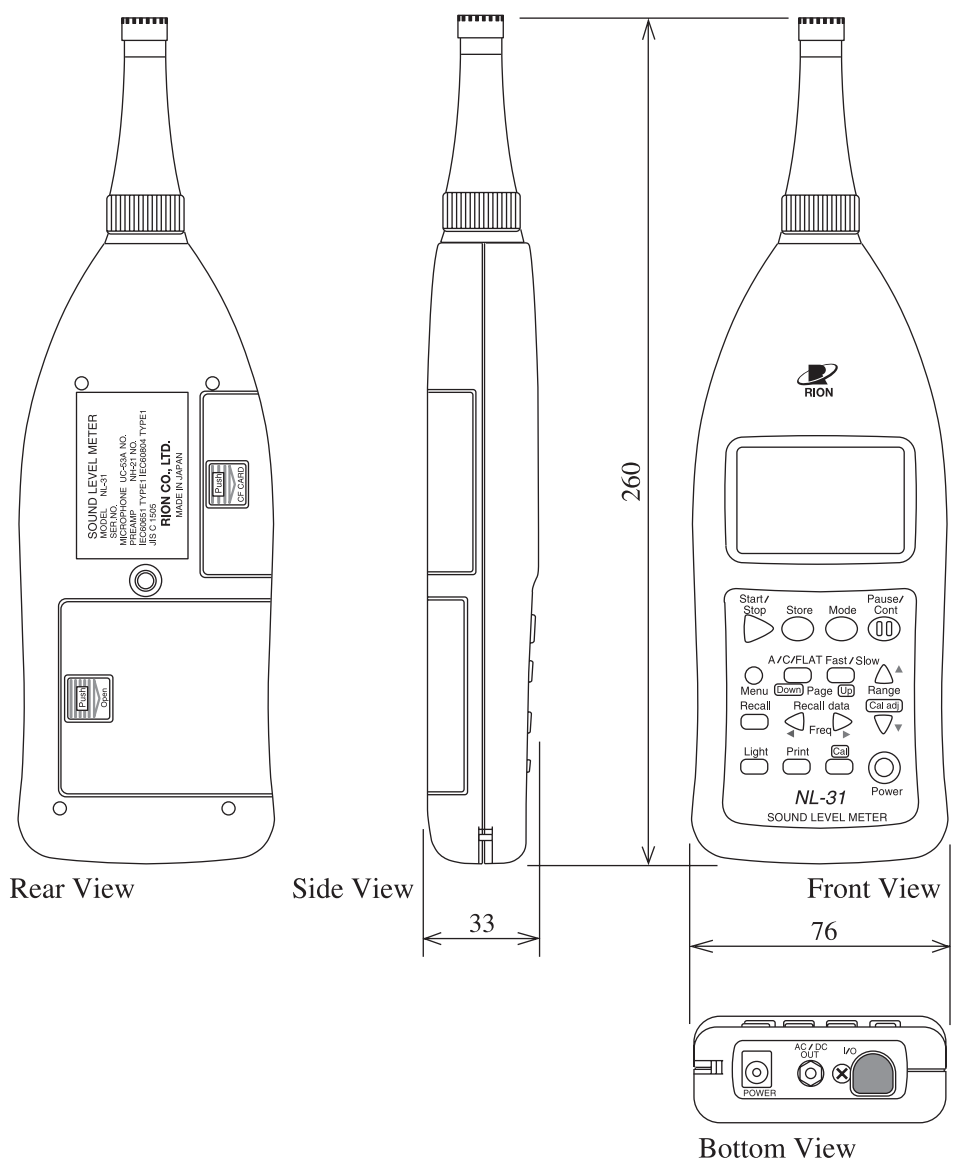
Linearity range during filter operation is 65 dB.

HPF cutoff frequencies (-3 dB)

10 Hz to 12.5 kHz

LPF cutoff frequencies (-3 dB)

10 Hz to 12.5 kHz



Unit: mm

Dimensional Drawings

Specifications subject to change without notice