Clean and simple design, intuitive operation, wide range of applications

The **NL** Series Lineup

**Sound Level Meter <Class 1>**

**NL-32/31**

**Sound Level Meter <Class 2>**

**NL-22/21/20**
**Sound level meter characteristics and sound level measurement**

### AC Output
Supplies an AC signal after frequency weighting. When a filter card (NX-21SA, NX-21VA) is inserted, the AC signal is output after filter processing.

**Output voltage**: 1 Vrms ±50 mVrms (scale upper limit)
**Output impedance**: approx. 600 Ω
**Load impedance**: 10 kΩ or more
**Suitable cable**: BNC - RCA cable CC-24 (option)

Output signal in calibration mode (scale upper limit –6 dB, 1000 Hz sine wave) is 0.5 Vrms.

### DC Output
Supplies a level-converted DC signal after frequency weighting, rms detection, and logarithmic compression. The selected frequency weighting and time weighting characteristics are active.

**Output voltage**: 2.5 V ±50 mV (scale upper limit), 0.25 V/10 dB
**Output impedance**: approx. 50 Ω
**Load impedance**: 10 kΩ or more
**Suitable cable**: BNC - RCA cable CC-24 (option)

Output signal in calibration mode (scale upper limit –6 dB) is 2.35 V.

## Frequency weighting characteristics

The major types of frequency weighting used by sound level meters are A, C, and Flat. The respective weighting curves are shown below. The subjective impression of how loud a sound is depends not only on the sound level. Low-frequency sounds and high-frequency sounds are perceived differently, even if they have the same level. Using the A-weighting curve when measuring sound produces results that are fairly similar to the subjective impression gained by the human hearing. Therefore A-weighting is normally used, both in Japan and internationally, for noise evaluation and similar tasks.

### Influence of microphone extension cable

When the output of the microphone/preamplifier is routed through an extension cable, certain limitations regarding measurable sound level and frequency range will apply. This is due to the influence of the cable capacitance. The longer the cable, the lower the measurable sound level and the lower the frequency limit. The diagram below shows the relationship between cable length, measurable sound level, and frequency. If for example a sound level of 123 dB is to be measured up to 8 kHz, an extension cable length of up to about 100 meters is possible.

### Effect of windscreen

When making outdoor measurements in windy weather or when measuring air conditioning equipment or similar, wind noise at the microphone can cause measurement errors. To prevent this, the supplied windscreen WS-10 can be attached to the microphone. The windscreen characteristics are shown below. The windscreen will reduce wind noise by about 25 dB during noise level measurement (with A-weighting), and by about 15 dB during sound level measurement.

### All-weather windscreen WS-03

This sturdy, durable product is designed for prolonged outdoor use. It not only reduces wind noise but also provides protection against rain and dew. The product consists of a 20-cm diameter open cell type polyurethane foam structure for reducing wind noise and a ball-shaped nylon non-woven cloth for water proofing.

**Specifications:**
- Wind noise reduction: approx. 28 dB (A-weighting), approx. 19 dB (C-weighting)
- Effect on frequency response: 20 Hz to 8 kHz +0.8, −1.5 dB (with water droplets)
- Compatible microphones: 1/2 inch, 1 inch diameter
- Shape and weight: 200 mm dia. ball shape, approx. 2.5 kg

**Material:**
- Open cell type polyurethane foam and nylon non-woven cloth
Wide 100 dB dynamic range eliminates need for level range switching

NL series is compliant with the current Measurement Law, JIS and IEC regulations. An attractive lineup of optional program cards is provided. These CompactFlash (CF) cards contain programs for adding useful functions such as sound monitoring, 1/1 and 1/3 octave real-time analysis, and FFT analysis. (Depending on the sound level meter model, some restrictions may exist as to which program cards can be used.)

Automated measurements for environmental evaluation and noise control purposes are made easy by various convenient features of these sound level meters, such as power-saving design, and optional real sound monitoring capability. Results of automatic measurement can be stored directly on CF card, making it easy to transfer such data to a computer for further processing.


Real sound monitor function
The real sound monitor card NX-22J integrates a sound monitor function in the sound level meter. This allows event recording (above a certain threshold) or interval recording (at preset intervals) during sound level measurement. By using the NL-22PB1 management software, you can perform various data processing functions while listening to the actual recorded sound.

Compatible with CompactFlash cards
Data can be recorded directly on high-capacity memory cards. 64 MB CF card can be supplied as option. This will hold 99,999 sets of processed values such as Leq, or 5.2 days worth of continuous data with sound level measurement performed every 100 ms. By selecting a suitable card, you can easily match the storage capacity to the intended measurement.

Comparator function
An open collector output linked to the comparator function can be used for various purposes. The comparator level can be set from 30 to 130 dB in 1-dB steps. (Maximum applied voltage: 24 V DC, maximum current: 60 mA DC)

Power backup capability
When the unit is powered from an external source (AC adapter), the inserted batteries will automatically take over if the external power is interrupted for any reason.
Card slot: A CompactFlash card slot is integrated in the unit. Inserting a card here enables auto store operation. Optional program cards can also be inserted to load various expansion functions.

I/O connectors (RS-232C/USB): The I/O connector allows sound level measurement control from a computer, data output to a computer, data output to a printer (optional DPU-414/CP-11/CP-10), and comparator output (dedicated cable required). In addition, an AC/DC output connector and AC adapter connection jack are also provided.

System diagram: (Equipment other than sound level meter is optional)
Management software

**NL-22PB1**
(with real sound playback function)

**Management software NL-32/22**
- Supported OS: Windows 98/98SE/ME/2000/XP
- Not compatible with manually stored data

**Daily report display screen**
By reading in auto store data from memory card, processing functions such as measurement data display, editing, creation of daily and weekly reports, text file export, and printing become possible.

**Edit display screen**
When using the real sound monitor card NX-22J, recorded live sound can be played back. Data erase and recalculation are also possible.

**Memory card recording times**

<table>
<thead>
<tr>
<th>Memory card capacity</th>
<th>Recording time</th>
</tr>
</thead>
<tbody>
<tr>
<td>64 MB</td>
<td>Approx. 2 hours 10 minutes</td>
</tr>
<tr>
<td>128 MB</td>
<td>Approx. 5 hours</td>
</tr>
<tr>
<td>256 MB</td>
<td>Approx. 11 hours</td>
</tr>
</tbody>
</table>

**Program cards NL-32/22/31/21**

- **Real sound monitor card NX-22J**
  Adds sound monitor function to sound level meter.
  This allows event recording (above a certain threshold) or interval recording (at preset intervals) during sound level measurement. By using the NL-22PB1 management software, you can perform various data processing functions while listening to the recorded sound.
  *The recorded sounds are not useful for the aim of frequency analysis.*

- **1/1, 1/3 Octave real-time analyzer card NX-22RT**
  Adds 1/1, 1/3 octave real-time analyzer function to sound level meter.
  Supported standards:
  - IEC 61260: 1995 Class 1
  - JIS C 1514: 2002 Class 1
  Measurement modes:
  - Lp, Leq, Lmax (select one processing function)
  Frequency analyzer bands:
  - 1/1 octave filter: 16 Hz to 8 kHz
  - 1/3 octave filter: 12.5 Hz to 16 kHz
  Memory:
  - Max. 100 data per file
  - Number of files: max. 100
  AC/DC output:
  - Voltage always corresponds to Lp value, regardless of selected measurement type (full-scale: 2.5 V, 0.25 V/10 dB)

- **FFT Analyzer card NX-22FT**
  Adds FFT analyzer function to sound level meter.
  Frequency span:
  - 2 kHz, 5 kHz, 10 kHz, 20 kHz
  Window types:
  - Regular, Hanning
  Number of analysis lines: 400
  Zoom ratio:
  - 1, 2, 4
  Processing:
  - Instantaneous, linear average, maximum value
  Memory:
  - Max. 100 data per file
  - Number of files: max. 50

- **1/1, 1/3 Octave filter card NX-21SA**
  Adds frequency band switching analyzer function to sound level meter.
  Supported standards:
  - IEC 61260: 1995 Class 1
  - JIS C 1514: 2002 Class 1
  Frequency analyzer bands:
  - 1/1 octave filter: 16 Hz to 8 kHz
  - 1/3 octave filter: 12.5 Hz to 16 kHz (NL-21 to 10 kHz)
  AC/DC output:
  - For selected frequency band

**Universal filter card NX-21VA**
(1/3 octave steps)

- Adds high-pass filter and low-pass filter function to sound level meter.
  - 3rd order high-pass filter: 10 Hz to 12.5 kHz (NL-21 to 8 kHz)
  - 3rd order low-pass filter: 10 Hz to 12.5 kHz (NL-21 to 8 kHz)
  AC/DC output:
  - For selected frequency band

**Sound calibrator NC-74**
Ideal for calibration of high-precision sound level meters
This device conforms to IEC 60942: 1997 Class 1 and JIS C 1515: 1991.
Its performance and functions are suitable for high-precision sound level meters. Sound level: 94 dB, Frequency: 1 kHz
### Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>NL-32</th>
<th>NL-31</th>
<th>NL-22</th>
<th>NL-21</th>
<th>NL-20</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Applicable standards</strong></td>
<td>IEC 61672-1:2002 Class 1, JIS C 1509-1 Class 1</td>
<td>IEC 61672-1:2002 Class 1, JIS C 1509-1 Class 2</td>
<td></td>
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</tr>
<tr>
<td><strong>Measurement functions (main processing)</strong></td>
<td>Simultaneous measurement of all items, with selected time weighting and frequency weighting:</td>
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<tr>
<td></td>
<td>Sound level Lp, equivalent continuous sound level L_{Aeq}, sound exposure level L_{E}, maximum sound level L_{max}, minimum sound level L_{min}, percentile sound level L_{x%} (5 freely selectable values)</td>
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<tr>
<td><strong>Measurement functions (sub processing)</strong></td>
<td>In addition to main processing items, one of the following can be selected for simultaneous processing:</td>
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<tr>
<td></td>
<td>Peak sound level L_{max}, C-weighted peak sound level L_{peak}, C-weighted equivalent continuous sound level L_{Ceq}, power average of maximum sound level in a given interval L_{Aeq}(t), impulse sound level L_{i}, impulse equivalent continuous sound level L_{Ieq}</td>
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<tr>
<td><strong>Measurement time</strong></td>
<td>10 seconds, 1, 5, 10, 15, 30 minutes, 1, 8, 24 hours, and manual (maximum 200 hours)</td>
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<tr>
<td><strong>Measurement level range</strong></td>
<td>A-weighting: 28 to 138 dB, C-weighting: 33 to 138 dB, FLAT: 38 to 138 dB</td>
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<tr>
<td><strong>Inherent noise</strong></td>
<td>A-weighting: 20 dB or less (Typ.17 dB), C-weighting: 25 dB or less, FLAT: 30 dB or less</td>
<td>A-weighting: 22 dB or less (Typ.19 dB), C-weighting: 27 dB or less, FLAT: 32 dB or less</td>
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<tr>
<td><strong>Linear range</strong></td>
<td>100 dB</td>
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<tr>
<td><strong>Level range selection</strong></td>
<td>20 to 80 dB, 20 to 90 dB, 20 to 100 dB, 20 to 110 dB, 20 to 120 dB, 40 to 130 dB (6 ranges in 10-dB steps)</td>
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<tr>
<td><strong>Frequency range (including microphone)</strong></td>
<td>20 Hz to 20 kHz, 20 Hz to 8 kHz</td>
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<tr>
<td><strong>Frequency weighting characteristics</strong></td>
<td>10 Hz to 20 kHz, 10 Hz to 14 kHz</td>
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<tr>
<td><strong>rms detection</strong></td>
<td>A-weighting, C-weighting, Flat</td>
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<tr>
<td><strong>Acoustic calibration</strong></td>
<td>Fast, Slow, Impulse, Using sound level calibrator NC-74</td>
<td>Fast, Slow, Impulse ( selectable only as auxiliary processing function)</td>
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</tr>
<tr>
<td><strong>Back-erase function</strong></td>
<td>Data for 5-second interval before pressing Pause button can be excluded</td>
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<tr>
<td><strong>Processing</strong></td>
<td>Digital</td>
<td></td>
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<tr>
<td><strong>Sampling frequency</strong></td>
<td>20.8kHz (L_{Aeq},L_{max},L_{i}), 100 ms (L_{i})</td>
<td>30.3kHz (L_{Aeq},L_{max},L_{i}), 100ms (L_{i})</td>
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</tr>
<tr>
<td><strong>Data store functions</strong></td>
<td>Manual store in internal memory or on memory card (selectable), auto store when memory card is inserted</td>
<td>Store in internal memory only</td>
<td>Manual store only</td>
<td></td>
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</tr>
<tr>
<td><strong>Manual store</strong></td>
<td>Store sound level, processed values, store time, processing start time in internal memory or on memory card (max. 100 data sets)</td>
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</tr>
<tr>
<td><strong>Auto store 1</strong></td>
<td>Continuously store sound level (every 100 ms, 200 ms, 1 sec) or L_{Aeq} (every 1 sec) on memory card, with timer function</td>
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<tr>
<td><strong>Auto store 2</strong></td>
<td>Continuously store main and sub processing values and processing start time information at preset measurement intervals on memory card, with timer function</td>
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</tr>
<tr>
<td><strong>Microphone</strong></td>
<td>1/2 inch electret condenser microphone</td>
<td>UC-53A (~28dB)</td>
<td>UC-52 (~33dB)</td>
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<tr>
<td><strong>Preampifier</strong></td>
<td></td>
<td>NH-21</td>
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<tr>
<td><strong>Display</strong></td>
<td>LCD with LED backlight (128 x 64 dots + 121 icons), display contents: numeric and bar graph indication of sound level</td>
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<tr>
<td><strong>Outputs</strong></td>
<td>Menu screen display for operation</td>
<td></td>
<td></td>
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<tr>
<td><strong>I/O connector</strong></td>
<td>AC/DC jack (menu selectable), AC output: 1 Vrms (full scale), DC output: 2.5 V (full scale), 0.25 V/10 dB</td>
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<tr>
<td><strong>Comparator output</strong></td>
<td>Sound level measurement control from a computer, output of data to computer or printer (optional DPU-414/CP-11/CP-10)</td>
<td>Activated when preset threshold level (30 to 130 dB in 1-dB steps) is exceeded ( comparator output)</td>
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</tr>
<tr>
<td><strong>Power requirements</strong></td>
<td>Four IEC R6P (size AA) batteries (LR6 or R6PU), AC adapter (Option: NC-34, NC-98)</td>
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</tr>
<tr>
<td><strong>Battery life</strong></td>
<td>Backlight off (battery life is reduced to about 1/2 when backlight is off), main processing on, sub processing off, options not used</td>
<td>Approx. 24 hours</td>
<td>Approx. 29 hours</td>
<td>Approx. 30 hours</td>
<td>Approx. 32 hours</td>
</tr>
<tr>
<td><strong>Ambient temperature for use</strong></td>
<td>−10 to +50°C, 10 to 90% RH (no condensation)</td>
<td></td>
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<tr>
<td><strong>Dimensions, weight</strong></td>
<td>Approx. 260 × 76 × 33 mm, approx. 400 g (including batteries)</td>
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</tr>
<tr>
<td><strong>Supplied accessories</strong></td>
<td>Windscreen WS-10 × 1, carrying case, IEC R6P (size AA) R6PU battery (manganese) × 4, hand strap, connector cover</td>
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</tr>
</tbody>
</table>

### Options

<table>
<thead>
<tr>
<th>Name</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real sound monitor card</td>
<td>NX-22J</td>
</tr>
<tr>
<td>1/1, 1/3 Octave real-time analyzer card</td>
<td>NX-22RT</td>
</tr>
<tr>
<td>FFT Analyzer card</td>
<td>NX-22FT</td>
</tr>
<tr>
<td>1/1, 1/3 Octave filter card</td>
<td>NX-21SA</td>
</tr>
<tr>
<td>Universal filter card</td>
<td>NX-21VA</td>
</tr>
<tr>
<td>Management software</td>
<td>NL-22PB1</td>
</tr>
<tr>
<td>64 MB CompactFlash memory card</td>
<td>MC-64CF</td>
</tr>
<tr>
<td>128 MB CompactFlash memory card</td>
<td>MC-12CF1</td>
</tr>
</tbody>
</table>

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* Specifications subject to change without notice.

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