

Clean and simple design, intuitive operation,
wide range of applications
The NL Series Lineup



NL-32 NL-22 NL-31 NL-21 NL-20

Sound Level Meter < Class 1 >

NL-32/31

Sound Level Meter < Class 2 >

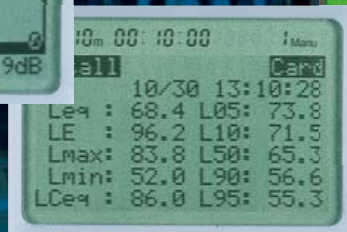
NL-22/21/20

Wide 100 dB dynamic range eliminates need for level range switching

Powerful functions for diverse measurements.
Easy-to-read display and stable long-term operation.
A new generation of sound level meters.



Level/time measurement screen



Simultaneous processing result display screen



Sound level display screen (with backlight)



Real sound monitor function

NL-32/22

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.



Real sound monitor display



Compatible with CompactFlash cards

NL-32/22/31/21

Data can be recorded directly on high-capacity memory cards. 128 MB CF card can be supplied as option. This will hold 99,999 sets of processed values such as L_{eq} , or 10 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.



Timer function

NL-32/22/31/21

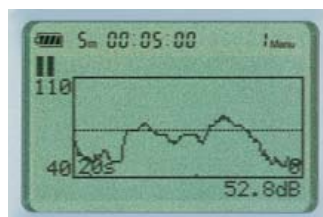
The unit can be set to start and stop measurement at specified times. In the standby condition, the unit consumes only a small amount of power. In combination with the interval function, this enables problem-free long-term measurement.



Comparator function

NL-32/22/31/21

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)



Comparator level display



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.

- Simultaneous measurement of equivalent continuous sound level, percentile sound level, and maximum level
- Graphic indication of sound level fluctuations, back-erase function for excluding recent data
- Easy-to-read backlit LCD display
- Filter cards provide expanded settings for various filter functions **NL-32/22/31/21**
- USB interface (with optional connection cable) **NL-32/22**

Main unit functions (data recording/output)

Card slot

NL-32/22/31/21

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.



Card slot

I/O connectors (RS-232C/USB) USB compatible

NL-32/22

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.



Connectors on bottom of unit



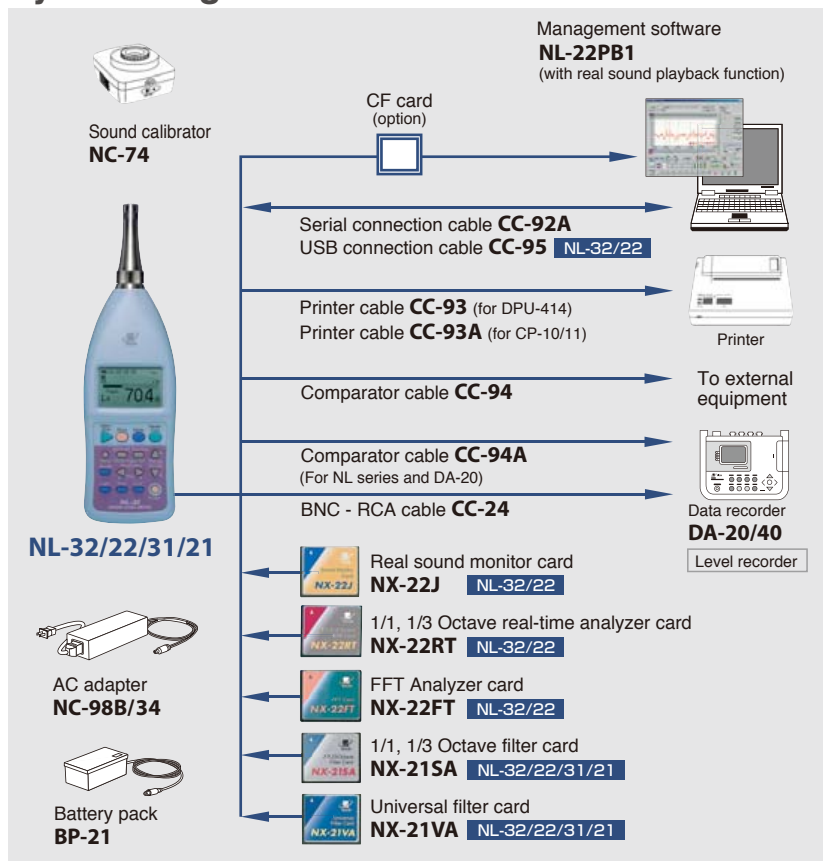
NL series is compliant with the current Measurement Law, JIS and IEC regulations. An attractive lineup of optional program cards is provided. These CompactFlash (CF) cards contain programs for adding useful functions such as sound monitoring, 1/1 and 1/3 octave real-time analysis, and FFT analysis.

(Depending on the sound level meter model, some restrictions may exist as to which program cards can be used.)

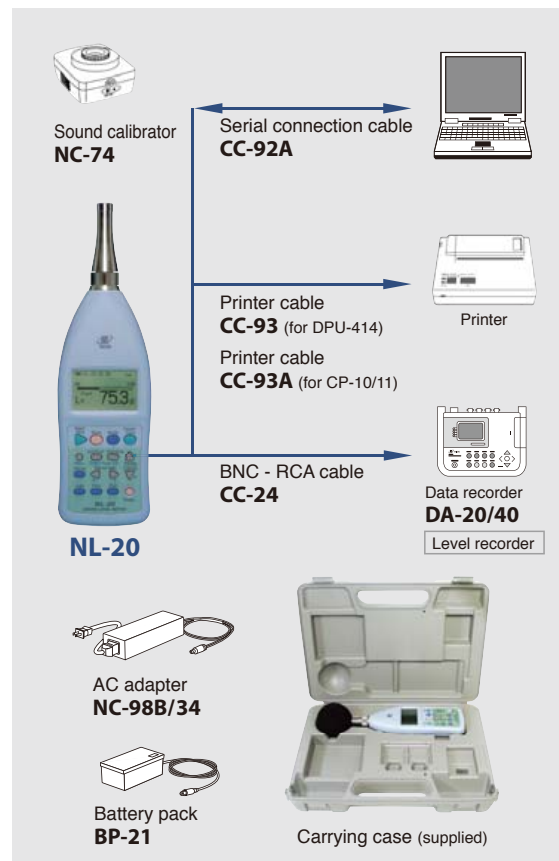
Automated measurements for environmental evaluation and noise control purposes are made easy by various convenient features of these sound level meters, such as power-saving design, and optional real sound monitoring capability. Results of automatic measurement can be stored directly on CF card, making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



System diagram NL-32/22/31/21 (Equipment other than sound level meter is optional)



NL-20 (Equipment other than sound level meter is optional)



Management software

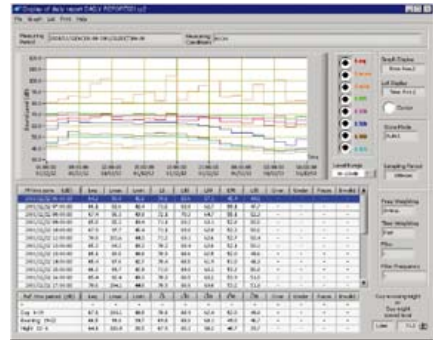
NL-32/22

● Supported OS: Windows 2000/XP ● Not compatible with manually stored data

Management software

NL-22PB1

(with real sound playback function)



Memory card recording times

| Memory card capacity | Recording time |
|----------------------|------------------|
| 128 MB | Approx. 5 hours |
| 256 MB | Approx. 11 hours |

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.

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.

Program cards (CF card)

NL-32/22/31/21

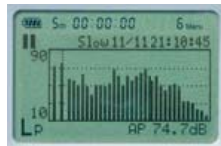
Program card compatibility chart



| | | NL-32/22 | NL-31/21 | NL-20 |
|---|---------|----------|----------|-------|
| Real sound monitor card | NX-22J | YES | NO | NO |
| 1/1, 1/3 Octave real-time analyzer card | NX-22RT | YES | NO | NO |
| FFT Analyzer card | NX-22FT | YES | NO | NO |
| 1/1, 1/3 Octave filter card | NX-21SA | YES | YES | NO |
| Universal filter card | NX-21VA | YES | YES | NO |

1/1, 1/3 Octave real-time analyzer card

NX-22RT

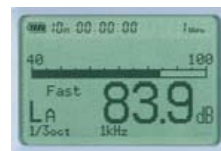


Adds 1/1, 1/3 octave real-time analyzer function to sound level meter.

- Supported standards: IEC 61260: 1995 Class 1, JIS C 1514: 2002 Class 1
- Measurement modes: L_p , L_{eq} , L_E , L_{max} (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 L_p value, regardless of selected measurement type (full-scale -10 dB: 2.5 V, 0.25 V/10 dB)

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

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.

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: Rectangular, Hanning
- Number of analysis lines: 400
- Zoom ratio: x1, x2, x4
- Processing: Instantaneous, linear average, maximum value
- Memory: Max. 100 data per file, Number of files: max. 50

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 eminently suitable for high-precision sound level meters.

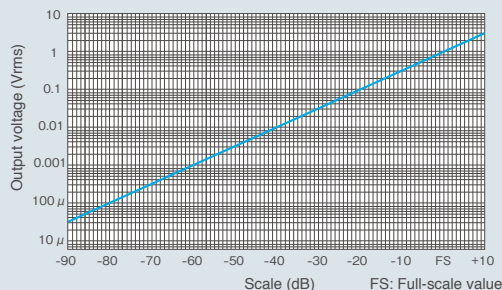
- Sound level: 94 dB
- Frequency: 1 kHz

Sound level meter characteristics and sound level measurement

Output connector

■ 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. The relationship between display reading and output voltage is as shown below.

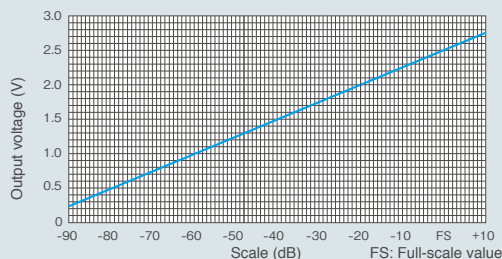


- Output voltage: 1 Vrms \pm 50 mVrms (scale upper limit)
- Output impedance: approx. 600 Ω
- Load impedance: 10 k Ω or more
- Suitable cable: BNC - RCA cable CC-24 (option)

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. The relationship between display reading and output voltage is as shown below.



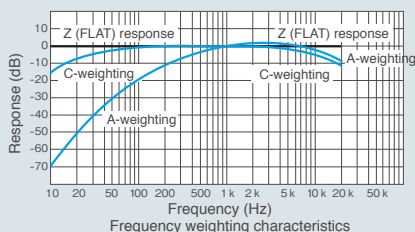
- Output voltage: 2.5 V \pm 50 mV (scale upper limit), 0.25 V/10 dB
- Output impedance: approx. 50 Ω
- Load impedance: 10 k Ω or more
- Suitable cable: BNC - RCA cable CC-24 (option)

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

Frequency weighting characteristics

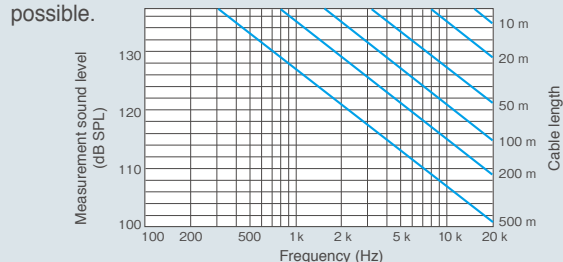
The major types of frequency weighting used by sound level meters are A, C, and Flat. The respective weighting curves are shown below. The subjective impression of how loud a sound is depends not only on the sound level. Low-frequency sounds and high-frequency sounds are perceived differently, even if 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. Flat characteristics are suitable for example when the actual sound level is to be measured or when the output of the sound level meter will be used for frequency analysis. C-weighting produces results that are close to flat response characteristics, but the influence of sounds below 31.5 Hz and above 8 kHz is reduced. This setting is useful for sound pressure measurements where unwanted

low-frequency components are to be excluded or where a high degree of high-frequency components exist.



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.

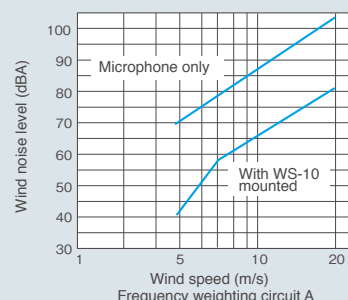


Effect of windscreen

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.



WS-10



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.



WS-03 (option)

- Specifications:
 - Wind noise reduction: approx. 28 dB (A-weighting), approx. 19 dB (C-weighting)
 - Effect on frequency response: 20 Hz to 8 kHz \pm 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

Specifications

| | NL-32 | NL-31 | NL-22 | NL-21 | NL-20 | |
|---|--|---|---|---|-------------------------------|------------------|
| Applicable standards | High-Precision Sound Level Meter according to the following standards | | General-Purpose Sound Level Meter according to the following standards | | | |
| | IEC 61672-1 : 2002 Class 1 | | IEC 61672-1 : 2002 Class 2 | | | |
| | JIS C 1509-1 Class 1 | | JIS C 1509-1 Class 2 | | | |
| Measurement functions (main processing) | Simultaneous measurement of all items, with 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 freely selectable values) | | | | | |
| Measurement functions (sub processing) | In addition to main processing items, one of the following can be selected for simultaneous processing: Peak sound level 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_{Atms} , impulse sound level L_{AI} , impulse equivalent continuous sound level L_{AIeq} <small>*L_{Atms}, 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 and flat characteristics are selected for main processing.</small> | | | | | |
| Measurement time | 10 seconds, 1, 5, 10, 15, 30 minutes, 1, 8, 24 hours, and manual (maximum 200 hours) | | | | | |
| Measurement level range | A-weighting: 28 to 138 dB, C-weighting: 33 to 138 dB, FLAT: 38 to 138 dB | | | | | |
| | C-weighted peak sound level: 55 to 141 dB, FLAT characteristics peak sound level: 60 to 141 dB | | | | | |
| Inherent noise | A-weighting: 20 dB or less (Typ. 17 dB), C-weighting: 25 dB or less, FLAT: 30 dB or less | | A-weighting: 22 dB or less (Typ. 19 dB), C-weighting: 27 dB or less, FLAT: 32 dB or less | | | |
| Linearity range | 100 dB | | | | | |
| Level range selection | 20 to 80 dB, 20 to 90 dB, 20 to 100 dB, 20 to 110 dB, 30 to 120 dB, 40 to 130 dB (6 ranges in 10-dB steps) | | | | | |
| Frequency range (including microphone) | 20 Hz to 20 kHz | | 20 Hz to 8 kHz | | | |
| | Electrical circuit (AC output) | 10 Hz to 20 kHz | | | | |
| | Electrical circuit characteristics (detector) | 10 Hz to 20 kHz | | 10 Hz to 14 kHz | | |
| Frequency weighting characteristics | A-weighting, C-weighting, Flat | | | | | |
| rms detection | Performed with digital processing | | | | | |
| | Time weighting characteristics (dynamic characteristics) | Fast, Slow, Impulse (Impulse selectable only as auxiliary processing function) | | | Fast, Slow | |
| Acoustic calibration | Using sound level calibrator NC-74 | | | | | |
| Back-erase function | Data for 5-second interval before pressing Pause button can be excluded | | | | | |
| Processing | Digital | | | | | |
| | Sampling frequency | 20.8 μ s (L_{eq} , L_{max} , L_{min} , L_E), 100 ms (L_N) | | 30.3 μ s (L_{eq} , L_{max} , L_{min} , L_E), 100 ms (L_N) | | |
| Data store functions | Manual store in internal memory or on memory card (selectable), auto store when memory card is inserted | | | | Store in internal memory only | |
| | Manual store | Store sound level, processed values, store time, processing start time in internal memory or on memory card (max. 100 data sets) | | | Manual store only | |
| | Auto store 1 | Continuously store sound level (every 100 msec, 200 msec, 1 sec) or L_{Aeq} (every 1 sec) on memory card, with timer function | | | | |
| | Auto store 2 | Continuously store main and sub processing values and processing start time information at preset measurement intervals on memory card, with timer function | | | | |
| Microphone | 1/2 inch electret condenser microphone | | | | | |
| | Model (sensitivity level) | UC-53A (-28 dB) | | UC-52 (-33 dB) | | |
| | Preamplifier | NH-21 | | | | |
| Display | LCD with LED backlight (128 × 64 dots + 121 icons), display contents: numeric and bar graph indication of sound level Combined display of all processed values, L-T screen (real-time level recording with 20-second horizontal axis) Menu screen display for operation | | | | | |
| Outputs | AC/DC jack (menu selectable), AC output: 1 Vrms (full scale), DC output: 2.5 V (full scale), 0.25 V/10 dB | | | | | |
| I/O connector | RS-232C, USB | | RS-232C | | RS-232C | |
| | Sound level measurement control from a computer, output of data to computer or printer (optional DPU-414/CP-11/CP-10) | | | | | |
| Comparator output | Activated when preset threshold level (30 to 130 dB in 1-dB steps) is exceeded (comparator output) | | | | — | |
| Power requirements | Four IEC R6P (size AA) batteries (LR6 or R6PU), AC adapter (Option: NC-34, NC-98B) | | | | | |
| | Battery life | Backlight off (battery life is reduced to about 1/2 when backlight is on), main processing on, sub processing off, options not used | | | | |
| | LR6 (alkaline batteries) | Approx. 24 hours | Approx. 29 hours | Approx. 30 hours | Approx. 32 hours | Approx. 34 hours |
| R6PU (manganese batteries) | Approx. 10 hours | Approx. 10 hours | Approx. 11 hours | Approx. 12 hours | Approx. 14 hours | |
| Ambient temperature for use | -10 to +50 °C, 10 to 90 % RH (no condensation) | | | | | |
| Dimensions, weight | Approx. 260 × 76 × 33 mm, approx. 400 g (including batteries) | | | | | |
| Supplied accessories | Windscreen WS-10 × 1, carrying case, IEC R6P (size AA) R6PU battery (manganese) × 4, hand strap, connector cover | | | | | |

Options

| Name | Model | Name | Model | Name | Model |
|---|----------|---------------------------------|-----------------------|------------------------------|--------------|
| Real sound monitor card | NX-22J | Microphone extension cable | EC-04 (2 m and up) | USB connection cable | CC-95 |
| 1/1, 1/3 Octave real-time analyzer card | NX-22RT | BNC - RCA cable | CC-24 | Sound calibrator | NC-74 |
| FFT Analyzer card | NX-22FT | Serial connection cable | CC-92A | Pistonphone | NC-72A |
| 1/1, 1/3 Octave filter card | NX-21SA | Printer cable | CC-93 (for DPU-414) | All-Weather windscreen set | WS-03E |
| Universal filter card | NX-21VA | Printer cable | CC-93A (for CP-10/11) | Printer | DPU-414 |
| Management software | NL-22PB1 | Comparator cable | CC-94 | AC adapter | NC-34 series |
| 128 MB CompactFlash memory card | MC-12CF1 | Comparator cable(for NL series) | CC-94A | AC adapter (100 to 240 V AC) | NC-98B |
| 256 MB CompactFlash memory card | MC-25CF1 | | | | |

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* Specification subject to change without notice.

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