RION

Octave · 1/3 Octave Real-time Analysis Program NX-43RT

Instruction Manual

Organization of This Manual

This manual describes functions and operation methods of Octave · 1/3 Octave Real-time Analysis Program NX-43RT. The manual consists of the chapters listed below. You should also consult the Instruction Manuals of Class 2 Sound Level Meter NL-43, and those of Class 1 Sound Level Meter NL-53.

- Overview of This Product
  Explains the functions of the NX-43RT.
- Preparation Before Use
  Explains how to install the NX-43RT and the settings before using it.
- Reading the Display
  Provides a basic explanation about the text displayed on the measurement screen when taking measurements.
- Setting Menu
  Describes how to configure the settings of the device.
- Measurement
  Explains the basic procedures for measurement.
- Communication Commands
  Explains communication commands about functions of the NX-43RT.
- Octave and 1/3 Octave Band Filters
  Lists the characteristics of the octave and 1/3 octave band filters.
- Noise Floor
  Lists the noise floor (representative value) of Class 2 Sound Level Meter NL-43, and Class 1 Sound Level Meter NL-53.
- Descriptions for IEC 61260-1 (JIS C 1513-1)
  Lists the information materials corresponding to IEC 61260-1 (JIS C 1513-1).
- Specifications
  Lists the technical specifications of the NX-43RT.

Display	Meaning
Important	Failure to observe the precautions indicated by this may result in damage to the device.
Note	Denotes special information that is helpful in utilizing the capabilities of the device but that is not directly related to safety.

You can download the Instruction Manuals from our website:

https://svmeas.rion.co.jp/nl-43_53_63/manual/

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1 Overview of This Product

This program is designed to be installed on Class 2 Sound Level Meter NL-43 and Class 1 Sound Level Meter NL-53, allowing the unit to function as an octave and 1/3 octave real-time analyzer.
In addition to sound level (up to 4 conditions), octave or 1/3 octave band analysis and calculation of the partial overall (POA) value of the specified band are possible.

Measurement data can be displayed as a graph or in numerical format.
Sub Band settings allow octave band analysis with different time weightings.
The difference between arbitrary sound level calculation results can be calculated.
The graph display also allows overlaying with previous measurement data.
The indoor noise rating (NC/NR/Cz value) can also be displayed.
Data are stored in CSV format, which allows processing on a computer, using general software.

Octave and 1/3 octave band analysis can be carried out for the following items.

- Time-weighted sound level L_p
- Time-weighted sound level* L_{eq}
- Sound exposure level* L_E
- Maximum time-weighted sound level L_{max}
- Minimum time-weighted sound level L_{min}
- Percentile sound level $L_{N\,(5,\,10,\,50,\,90,\,95)}$ up to five values
- Moving L_{eq} $L_{eq,mov}$

* Not included in the calculation for the sub band.

In addition, it is possible to measure the following items in the POA of the selected frequency band.

- Time-weighted sound level L_p
- Time-weighted sound level L_{eq}
- Sound exposure level L_E
- Maximum time-weighted sound level L_{max}
- Moving L_{eq} $L_{eq,mov}$

For details on the NL-43/NL-53 including information on how to use the operation keys, refer to the Instruction Manual of the NL-43/NL-53.

2 Preparation Before Use

2.1 Installing

Important

- Check that the power of the sound level meter is turned off before installing the program card.
- When installing, do so with sufficient battery power remaining, while charging via the USB cable, or with the AC adapter connected.
- Never remove the program card while installing the optional program. Doing so may result in a malfunction.
- Never format the program card with SD card formatting software (such as SD Formatter etc.). Otherwise, the program data on the card will be erased and can no longer be used. Restoration of the erased program is not guaranteed.
- Upgrade the firmware of the sound level meter to the latest version before installing the optional program. For the latest firmware version, check the download software section of the Support Room on the RION website (https://www.rion.co.jp/).

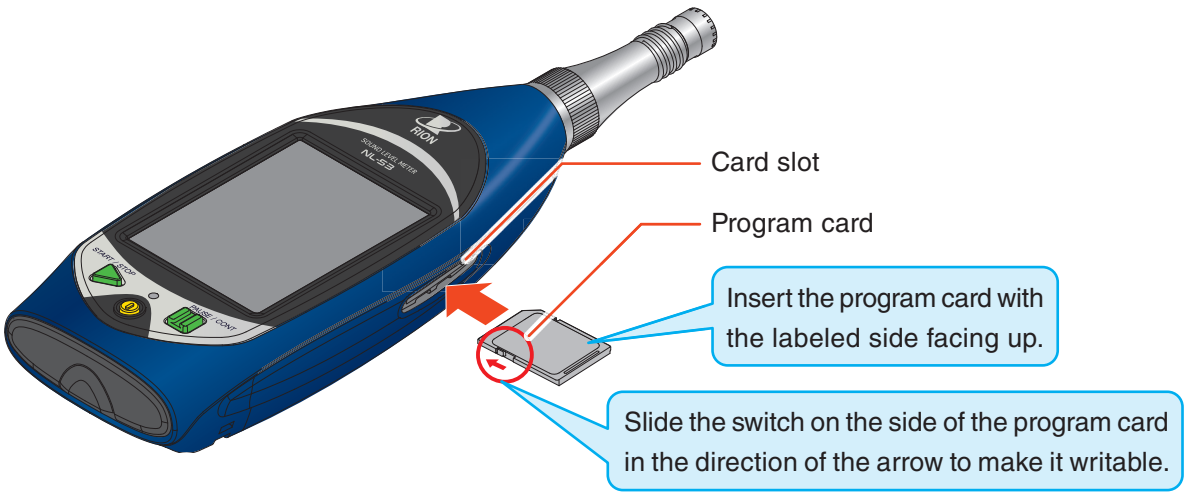
Note

- When installing the NX-43RT on the NL-43/53, function extension program NX-43EX must be installed first.
- If you install the optional program on one sound level meter, you will not be able to install it on other sound level meters. To install the optional program for the other sound level meters, you will need to uninstall the optional program from the sound level meter where it is installed.
- After installation is complete, the program card from which the program was installed can be used as an SD card for storing data.

1 **Open the card slot cover on the right side of the sound level meter.**

2 **Insert the program card into the card slot.**

With the labeled side of the program card facing up, insert it into the card slot until a clicking sound is made.

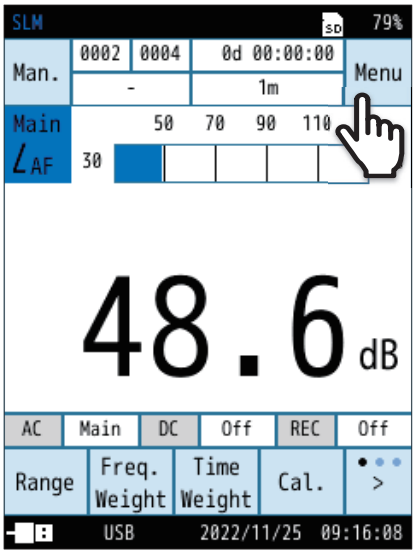


Note

- You will not be able to install the optional program if the write protection (read-only) of the program card is enabled. Make the program card writable.

3 Touch [Menu] on the measurement screen.

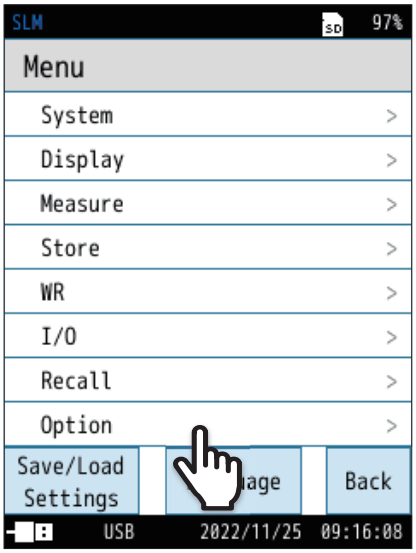
The [Menu] screen appears.



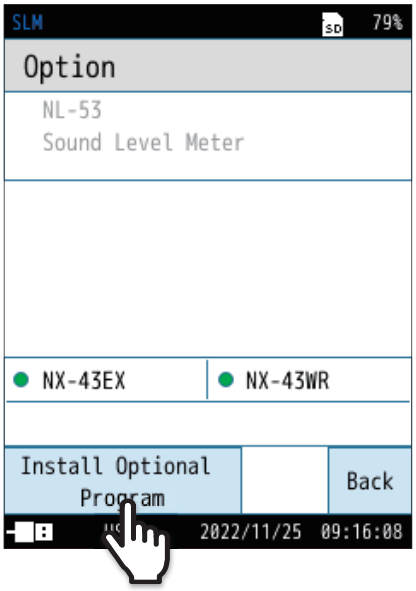
> **Note**
> - The program installation must be performed when the measurement mode is on [SLM]. Confirm that [SLM] is displayed in the upper left corner of the screen.
> - If other than [SLM], select [NL-53 Sound Level Meter (or NL-43 Sound Level Meter)] on the [Menu] - [Option] screen and switch to [SLM].

4 Touch [Option] on the [Menu] screen.

The [Option] screen appears.



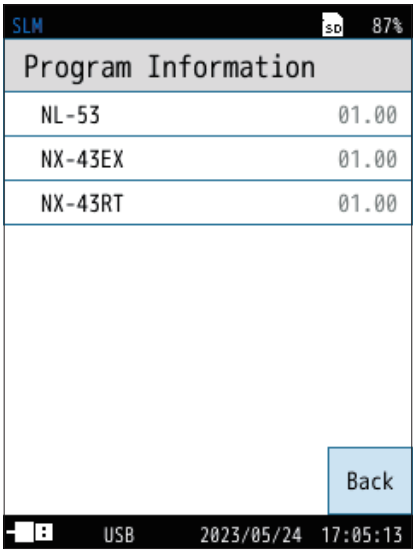
5 Touch [Install Optional Program] on the [Option] screen.



6 Touch [Install].

The program will now be installed.

- You can check the installed programs from [Menu] - [System] - [System Information] - [Program Information].



2.2 Uninstalling

Important

- Check that the power of the sound level meter is turned off before installing the program card.
- When uninstalling, do so with sufficient battery power remaining, while charging via the USB cable, or with the AC adapter connected.
- Never remove the program card while uninstalling. Doing so may result in a malfunction.

1 Open the card slot cover on the right side of the sound level meter.

2 Insert the program card used for installation into the card slot.

With the labeled side of the program card facing up, insert it into the card slot until a clicking sound is made (refer to Page 7).

Note

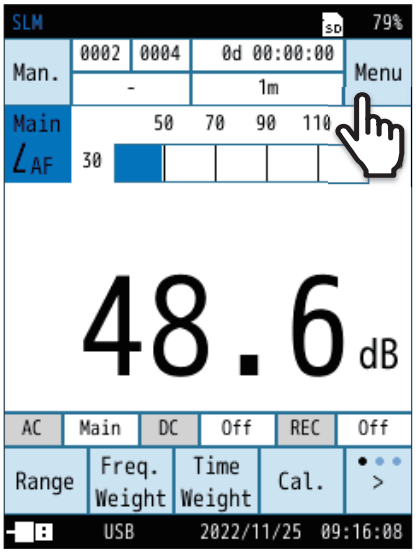
- You will not be able to uninstall the optional program if the write protection (read-only) of the program card is enabled. Make the program card writable.

3 Touch [Menu] on the measurement screen.

The [Menu] screen appears.

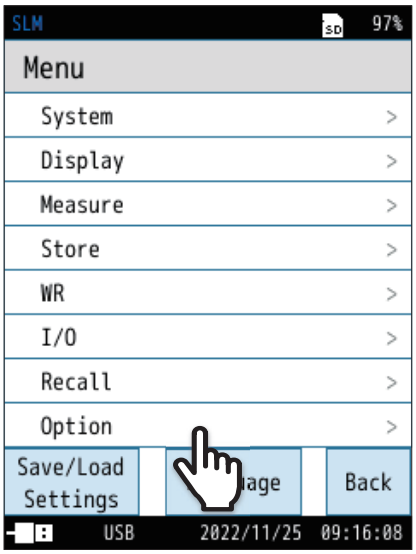
Note

- The program uninstallation must be performed when the measurement mode is on [SLM]. Confirm that [SLM] is displayed in the upper left corner of the screen.
- If other than [SLM], select [NL-53 Sound Level Meter (or NL-43 Sound Level Meter)] on the [Menu] - [Option] screen and switch to [SLM].

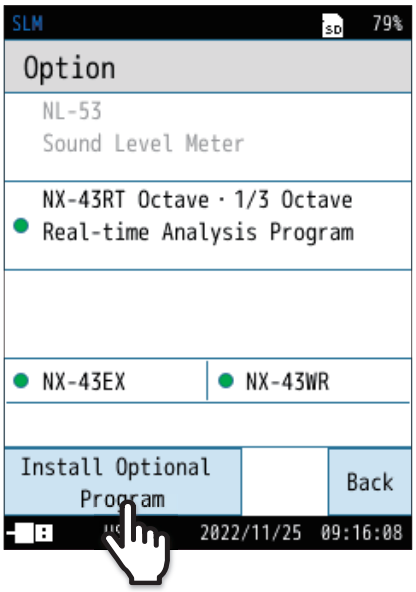


4 Touch [Option] on the [Menu] screen.

The [Option] screen appears.

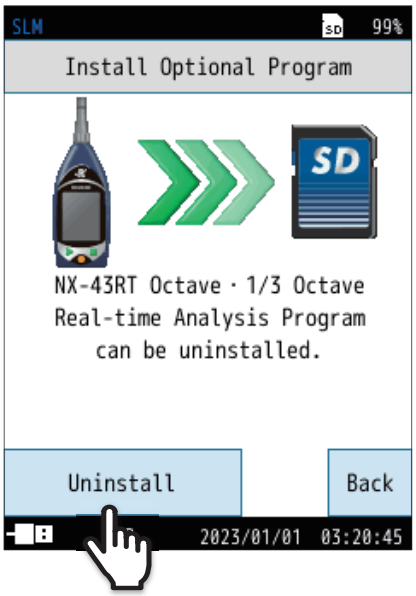


5 Touch [Install Optional Program] on the [Option] screen.



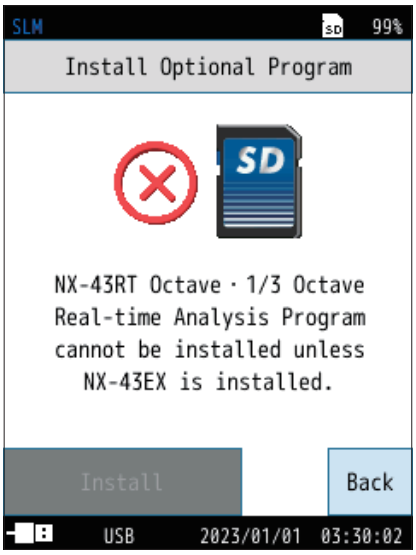
6 Touch [Uninstall].

The program will now be uninstalled.

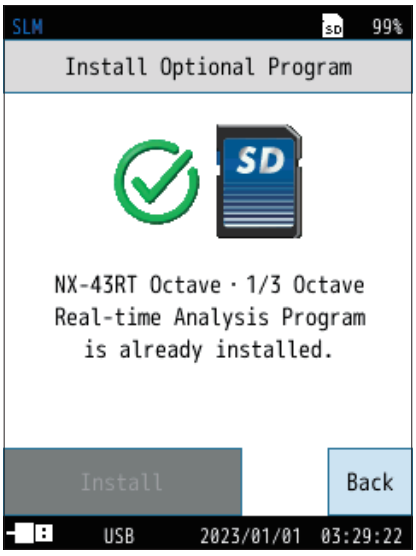


2.3 If you cannot install

- You will not be able to install the NX-43RT if function extension program NX-43EX is not installed on the NL-43/NL-53.
  Touch [Back] or press the START/STOP key to return to the measurement screen.



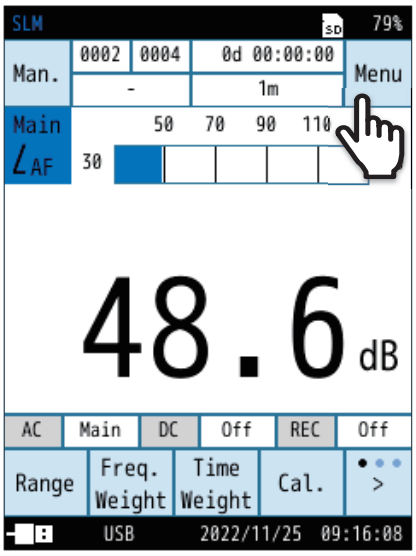
- If the NX-43RT is already installed on the main unit, it cannot be installed again.



2.4 Switching the function to this program

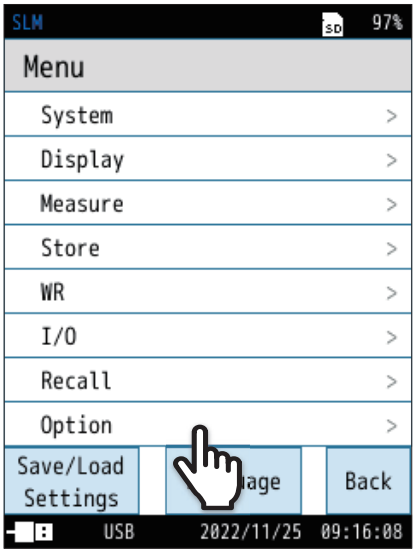
1 **Touch [Menu] on the measurement screen.**

The [Menu] screen appears.



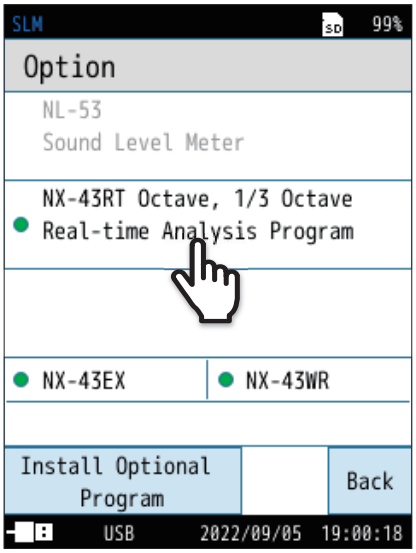
2 **Touch [Option] on the [Menu] screen.**

The [Option] screen appears.



3 **On the [Option] screen, touch [NX-43RT Octave · 1/3 Octave Real-time Analysis Program].**

The unit will be restarted immediately, the function will switch, and the NX-43RT measurement screen will appear.



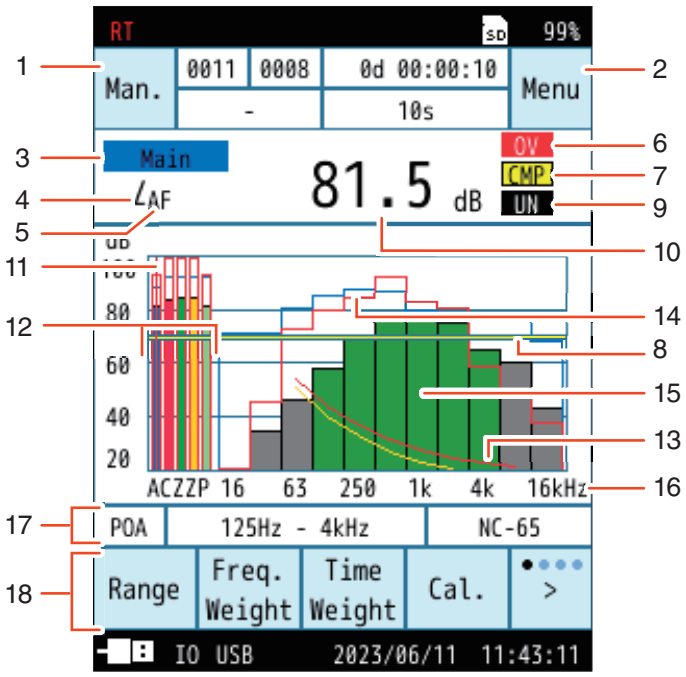
3 Reading the Display

The measurement screen is displayed in the graph format or the numerical value list format.
To switch the display format, touch [List View] on the menu ring, or select [Menu] - [Display] - [Display Analysis] (Page 22).

Note

- While the actual display will not look like the one shown in the figures below, the explanation is based on the assumption that all the text are displayed.

3.1 Graph screen



<table>
<tr><th>No.</th><th>Name</th><th>Description</th></tr>
<tr><td>1</td><td>Store mode</td><td>Displays the store mode when saving to memory. Touch to go directly to the store settings screen.
There are three store modes: Manual, Auto, and Timer Auto.</td></tr>
<tr><td>2</td><td>Menu / measurement status</td><td>Touch to display the [Menu] screen.
The following icons appear when measuring.
<table>
<tr><td>▶</td><td>Flashes during measurement.
In addition, the indicator LED flashes red.</td></tr>
<tr><td>■</td><td>Flashes during measurement standby in Timer Auto mode.
In addition, the indicator LED flashes blue.</td></tr>
<tr><td>II</td><td>When set to Manual store mode, if the PAUSE/CONT key is pressed while measuring, measurement will pause and this will flash.
In addition, the indicator LED flashes blue.
* This function cannot be used when the waveform recording function (optional) is set.</td></tr>
<tr><td>II</td><td>If the PAUSE/CONT key is pressed in the current state, measurement will pause and this will appear.</td></tr>
<tr><td>Lock</td><td>Flashes when the operation is locked.
Touching the key lock on the menu ring locks all settings. Operations other than turning off the screen and unlocking the key lock will not provoke a response.
To turn off the power, disable the operation lock and then press the POWER key.</td></tr>
</table></td></tr>
<tr><td>3</td><td>Channel name and center frequency</td><td>Shows the channel name (Main, Sub1 to 3), frequency band POA, or frequency band center frequency of the graph selected with the cursor.</td></tr>
<tr><td>4</td><td>Measurement amount</td><td>Shows the measurement amount of the graph selected with the cursor.</td></tr>
<tr><td>5</td><td>Frequency weighting</td><td>Displays the frequency weighting set for each channel.
<table>
<tr><td>A</td><td>A-weighting</td></tr>
<tr><td>C</td><td>C-weighting</td></tr>
<tr><td>Z</td><td>Z-weighting</td></tr>
</table></td></tr>
<tr><td>6</td><td>Overload indication</td><td>
<table>
<tr><td>OV
(White on red)</td><td>When an overload condition is detected for the sound level or octave band analysis, this indication is shown for at least one second.</td></tr>
<tr><td>OV</td><td>If the calculation contains signal overload data, this indication is shown. This indication remains on the calculation result screen until the next calculation measurement is started.</td></tr>
</table></td></tr>
<tr><td>7
8</td><td>Comparator
Comparator level line</td><td>
<table>
<tr><td>CMP</td><td>Displayed when the comparator (open collector signal for external device control) is selected for the I/O (Page 35) and the following two conditions are met.
• When the specified channel (selected from Main, Sub1 to 3, Band) exceeds the set level (30dB to 130dB)
• When the cursor is placed on the specified channel or frequency band
The comparator level line is displayed on the graph screen.</td></tr>
</table></td></tr>
<tr><td>9</td><td>Under-range indication</td><td>
<table>
<tr><td>UN
(White on black)</td><td>When a sound level under-range condition is detected, this indication is shown for at least one second. No display for octave band analysis.</td></tr>
<tr><td>UN</td><td>If the calculation contains signal under-range data, this indication is shown. This indication remains on the calculation result screen until the next calculation measurement is started.</td></tr>
</table></td></tr>
<tr><td>10</td><td>Level indication</td><td>Shows the level of the graph selected with the cursor.</td></tr>
<tr><td>11</td><td>Cursor</td><td>Used to select a channel, frequency band POA, and frequency band in the currently displayed graph.
To move the cursor, touch the bar graph, or touch

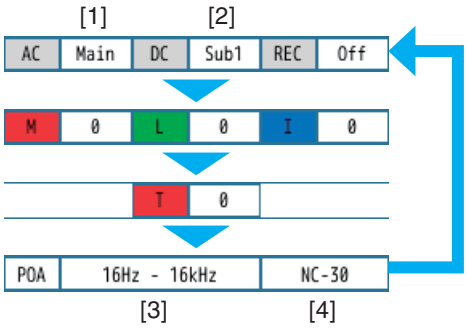
,

on the menu ring.</td></tr>
</table>

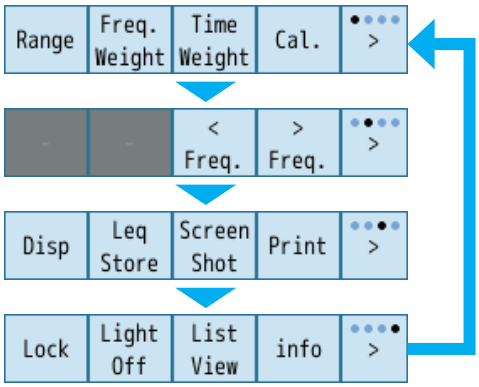
<table>
<tr><th>No.</th><th>Name</th><th>Description</th></tr>
<tr><td>12</td><td>Level bar</td><td>
<table>
<tr><td>

Main</td><td>Sound level bar for the Main. This is always displayed.
The set frequency weighting is displayed below the bar.</td></tr>
<tr><td>

Sub1 to 3</td><td>Sound level bars for the Sub1 to 3 channels can be displayed.
The set frequency weighting is displayed below each bar.
These bars are displayed for any sub channel set to [On] on the [Menu] - [Measurement] - [Sub Channel Settings] screen.</td></tr>
<tr><td>

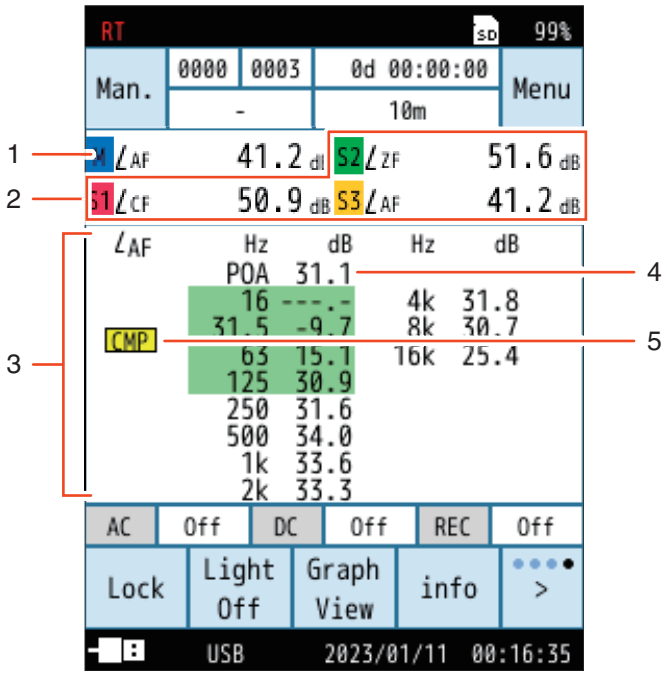
Partial Overall (POA)</td><td>A level bar for Partial Overall (POA) for the frequency band range selected on the [Menu] - [Measure] - [Measure Octave] screen can be displayed.
The indication “P” is displayed below the bar.
This bar is displayed if [Partial Overall (POA)] is set to [On] on the [Menu] - [Measure] - [Measure Octave] screen.</td></tr>
</table>
</td></tr>
<tr><td>13</td><td>NC/NR/Cz Curve</td><td>Shows the curve selected in [Indoor Noise] on the [Display] screen (see Page 23).</td></tr>
<tr><td>14</td><td>Overlay graph</td><td>When the [Display Overlay] setting is set to [On], the graphs of the saved data graph will be shown overlaid (see Page 22).</td></tr>
<tr><td>15</td><td>Frequency band level bar</td><td>Shows the level value in each frequency band as a bar graph. When octave band analysis is selected, 11 bands from 16 Hz to 16 kHz are shown. When 1/3 octave band analysis is selected, 33 bands from 12.5 Hz to 20 kHz are shown. The frequency bands selected for partial overall (POA) are shown in green and light green in the graph.
Display color
<table>
<tr><th rowspan="2">Analysis Mode</th><th colspan="2">Color</th></tr>
<tr><th>Partial Overall (POA): Off</th><th>Partial Overall (POA): On</th></tr>
<tr><td>Oct.</td><td>Dark green</td><td>Dark green
Outside the selection range of POA: Gray</td></tr>
<tr><td>1/3 Oct.</td><td>Octave band center frequency: Green
1/3 octave band center frequency band: Light green</td><td>Octave band center frequency: Green
1/3 octave band center frequency band: Light green
Outside the selection range of POA: Gray</td></tr>
<tr><td>Sub Band (Oct.)</td><td>Yellow</td><td>Yellow</td></tr>
<tr><td>Sub Band (1/3 Oct.)</td><td>Octave band center frequency: Yellow
1/3 octave band center frequency band: Beige</td><td>Octave band center frequency: Yellow
1/3 octave band center frequency band: Beige</td></tr>
</table>
</td></tr>
<tr><td>16</td><td>Frequency display</td><td>Indicators for 16 Hz, 63 Hz, 250 Hz, 1 kHz, 4 kHz, and 16 kHz are shown here on a horizontal axis, as a guide to the frequencies of the level bar display.</td></tr>
<tr><td>17</td><td>Information display bar</td><td>Each time you touch [info]* on the menu ring, the displayed information will switch.
[1] As an alternating current (AC) output, not only the sound level (Main, Sub1 to 3) but also the Band can be selected. When the Band is selected, frequency information is displayed.
[2] As an alternating current (DC) output, not only the sound level (Main, Sub1 to 3) but also the Band (POA or frequency) can be selected. When the Band is selected, POA or frequency information is displayed.
[3] Displays the upper and lower frequencies of partial overall (POA).
[4] Displays the evaluation result of the NC/NR/Cz Curve at the end of the measurement.
* [info] is displayed by touching on the far right of the menu ring.
 
</td></tr>
</table>

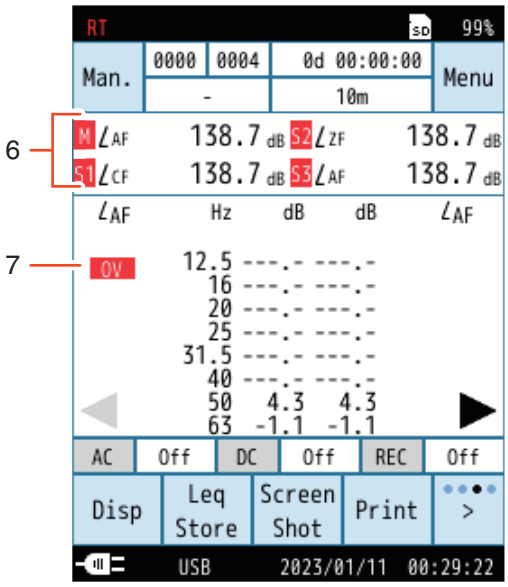
No.	Name	Description
18	Menu ring	Each time you touch [>] on the far right of the menu ring, the displayed menu switches.



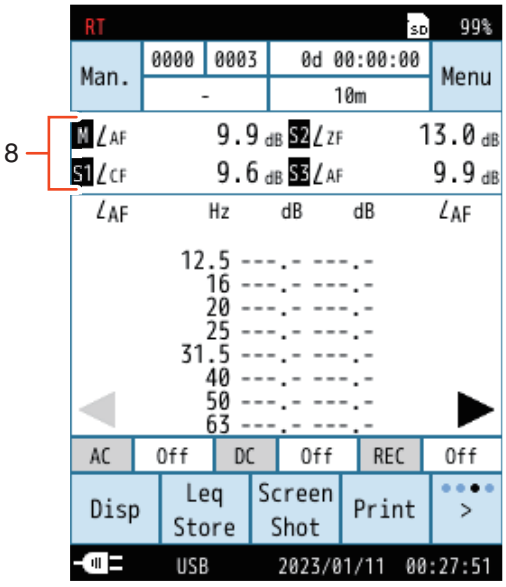
Range	Sets the upper and lower limits of the bar graph.
Freq. Weight	Sets the frequency weighting for each channel (Page 27).
Time Weight	Sets the time weighting for each channel (Page 27).
Cal.	Displays the [Calibration] screen (see “Operation Guide”).
< Freq. > Freq.	Switch the channel, Partial Overall (POA), and frequency band to display. Move the cursor.
Disp	Switches the screen display.
Leq Store Lp Store (Manual)	Displayed in Manual mode (see “Operation Guide”). Even if you select [Cancel] when saving the data after measurement, you can save the data again. “Leq Store” appears in the menu ring. Touch it to save the L_{eq} store data (L_{eq}, L_E, L_{max}, etc.). When paused, [Lp Store] appears. Touch it to save the L_p store data.
Screen Shot	Saves a screenshot of the displayed screen (see “Operation Guide”).
Print	Prints a screenshot of the displayed screen (see “Operation Guide”).
Lock	Turns on/off the key lock function. Operations other than turning off the screen and unlocking the key lock will not provoke a response. To turn the power off, disable the key lock and then press the POWER key (see “Operation Guide”).
Light Off	Turns off the backlight (see “Operation Guide”).
Graph View List View	Switches the analysis result display. It is labeled as [Graph View] while a list is displayed, and [List View] while a graph is displayed.
info	Switches the display of the information display bar.

3.2 Numeric list screen





Overload indication



Under-range indication

No.	Name	Description
1	Main channel level	Shows the level value and the measurement amount of the main channel.
2	Sub channel level	Shows the level value and the measurement amount of the sub channel.
3	Frequency band levels	Show the level value in each frequency band and the measurement amount. With 1/3 octave analysis, touching [> Page] on the menu ring switches the displayed frequency band. ◀ and ▶ are displayed when there is another page, and ◁ and ▷ are displayed when there is no other page. The frequency bands selected for partial overall (POA) are highlighted in green.

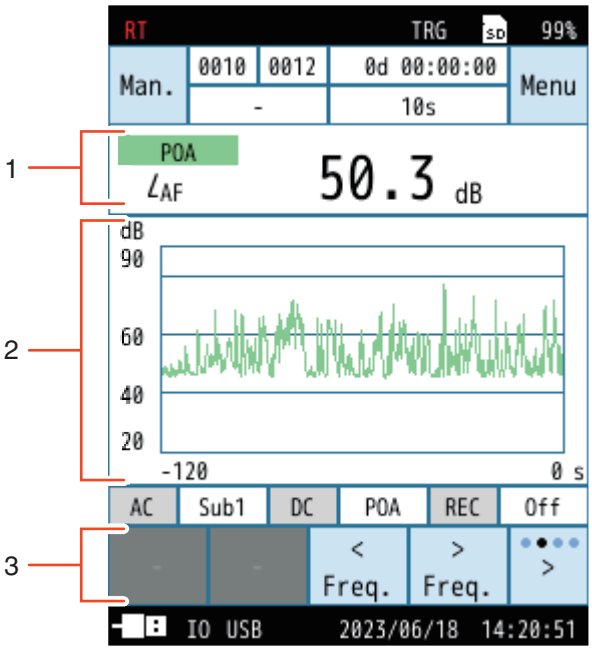
<table>
<tr><th>No.</th><th>Name</th><th>Description</th></tr>
<tr><td>4</td><td>POA</td><td>Shows the level of partial overall (POA) when it is set to [On] in the [Menu]-[Measure]-[Measure Octave] screen. Displays the total power value in the frequency range set by the upper and lower frequency of POA (Page 26).</td></tr>
<tr><td>5</td><td>Comparator</td><td>Select [Comparator] on the [Menu]-[I/O]-[IO Port] screen.
When the channel to be judged by the comparator is set to [Band], CMP.
The sound level icon will change from the default color to yellow (e.g.: Main, M ⇒ M) when the channel is set to Main, Sub1 to 3.</td></tr>
<tr><td>6
7</td><td>Overload indication</td><td>
<table>
<tr><td>M
S1
S2
S3</td><td>When a signal overload condition is detected in the sound level, the corresponding Main or/and Sub1 to 3 icons will change from the default color to red for at least one second (e.g.: Main, M ⇒ M).</td></tr>
<tr><td>M
S1
S2
S3</td><td>When a signal overload condition is detected during calculation measurement, the corresponding Main or/and Sub1 to 3 icons will change from the default color to red.
This indication remains until the next calculation measurement is started (e.g.: Main, M ⇒ M).</td></tr>
<tr><td>OV</td><td>When an overload condition is detected for the octave band, this indication is shown for at least one second.</td></tr>
<tr><td>OV</td><td>Displayed when there is a signal overload data during the octave band calculation.
This indication remains on the calculation result screen until the next calculation measurement is started.</td></tr>
</table>
</td></tr>
<tr><td>8</td><td>Under-range indication</td><td>
<table>
<tr><td>M
S1
S2
S3</td><td>When an under-range condition is detected for the sound level, Main and Sub1 to 3 icons will change from the default color to black (e.g.: Main, M ⇒ M).</td></tr>
<tr><td>M
S1
S2
S3</td><td>If the calculation contains signal under-range data, Main and Sub1 to 3 icons will change from the default color to black.
This indication remains until the next calculation measurement is started (e.g.: Main, M ⇒ M).</td></tr>
</table>
</td></tr>
</table>

Note

- “--.-” is shown when the level value is -10 dB or lower.

3.3 Time-Level screen

The time-level screen can be displayed by setting [Time-Level] on the [Display] screen to a setting other than [Off] (Page 22).
Each time you touch Disp on the menu ring, the display switch (Page 17).



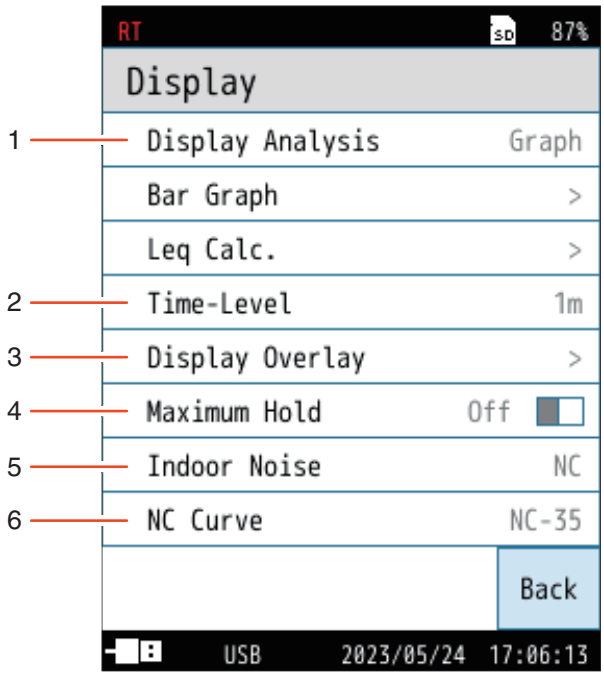
No.	Name	Description
1	Sound level / POA level / Frequency band level	Displays the level value and the measurement amount of Main and selected Sub1 to 3. The POA displays partial overall measurements and level values. When the Sub Band is set to [On], level value and the measurement amount of the two bands are displayed.
2	Time-Level Waveform	Displays the level fluctuation of the sound level and Frequency band levels. The time scale of the X-axis is set in the [Menu] - [Display] - [Time-Level]. The level scale of the Y-axis is set in the [Menu] - [Display] - [Bar Graph].
3	Menu ring < Freq. > Freq.	< Freq. and > Freq. in the menu ring are displayed when the time-level screen is displayed. Each time you touch > on the far right of the menu ring, the displayed menu switches. Touch < Freq. and > Freq. to switch the channel (Main, Sub1 to 3, POA and each frequency band).

4 Setting Menu

This chapter describes only the menus related to the NX-43RT.
For the setting menus of the sound level meter unit, refer to “Operation Guide”.

4.1 Display

Sets the measurement amount and other items displayed on the measurement screen.

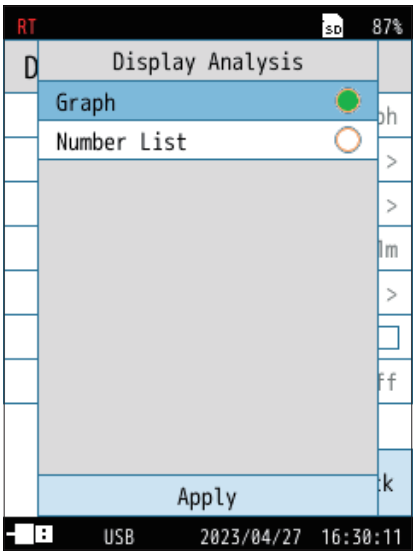


No.	Name	Description
1	Display Analysis	Switches the display of the measurement screen (Page 22).
2	Time-Level	Sets whether to display Time-Level screen (Page 22).
3	Display Overlay	Select whether to overlay graphs of previous measurement data (Page 22).
4	Maximum Hold	Select whether to temporarily hold the previous maximum value of the band to be displayed. When [Sub band] is set to [On], this is not displayed.
5	Indoor Noise	Evaluates the indoor noise using the measurement results of Manual store (Page 23).
6	NC/NR/Cz Curve	Select the evaluation value of the NC/NR/Cz Curve to be displayed on the measurement screen (Page 23).

4.1.1 Display Analysis

Switches the display of the measurement screen.

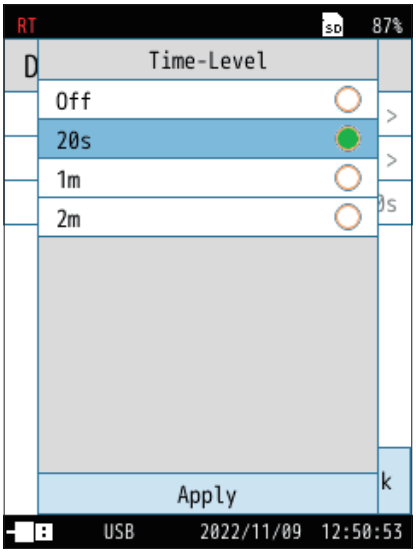
Item	Description
Graph	Displays a graph on the measurement screen.
Number List	Displays a list of numbers on the measurement screen.



4.1.2 Time-Level

Sets whether to display Time-Level.
When set to anything other than [Off], the time-level screen (Page 20) is displayed.

Item	Description
Off	Does not display the [Time-Level] screen.
20s	Displays the [Time-Level] screen. Select the screen horizontal axis (time).
1m	
2m	



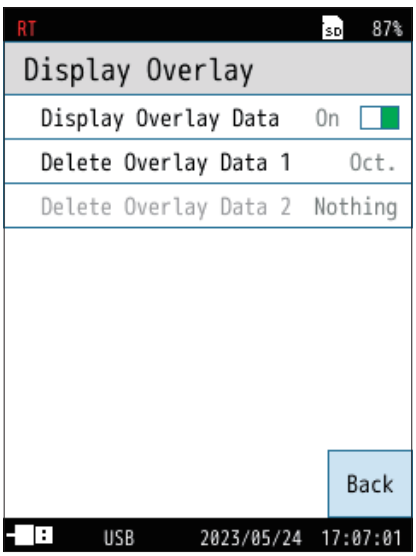
4.1.3 Display Overlay

Select whether to overlay graphs of previous measurement data.
Overlay data is registered from the [Recall] screen (Page 42).

Registered overlay data can be deleted.

Note

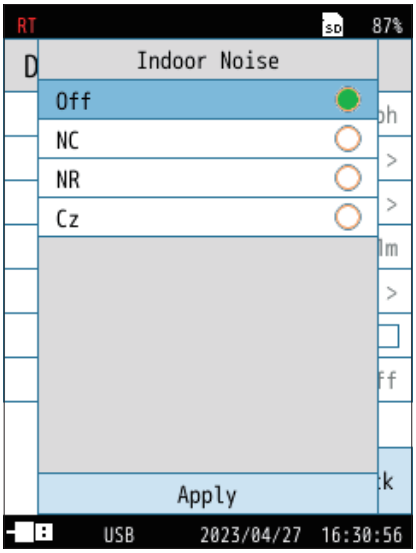
- [Display Overlay] is displayed on the measurement screen only if the analysis mode matches the one in which the measurement is to be performed.
- If the analysis mode does not match, the message “Cannot be displayed because the store conditions are different” is displayed.



4.1.4 Indoor Noise

Evaluates the indoor noise using the measured Leq value of Manual store.

Item	Description
Off	Disables [Indoor Noise].
NC	Shows the NC curve.
NR	Shows the NR curve.
Cz	Shows the Cz curve.



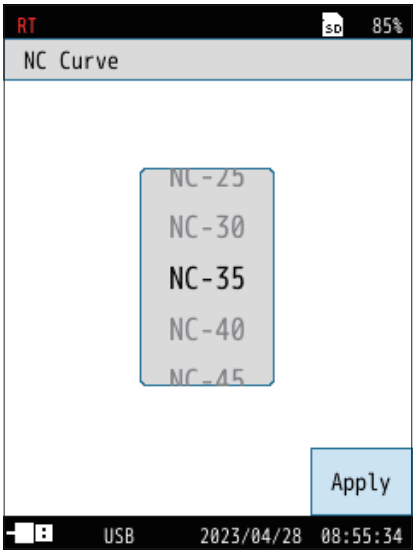
Note

- [Indoor Noise] is displayed only with the following settings:
  Store Mode: Manual
  Sub Band: Off
  Analysis Mode: Octave

4.1.5 NC Curve

When [NC] is selected for [Indoor Noise], the [NC Curve] menu will appear on the screen.
Select the NC curve to be displayed on the graph screen.

The NC curve is shown for two values: the selected value and the one below that.
(When [NC-50] is selected, the NC-50 curve and the NC-45 curve are shown. If [NC-15] is selected, only the NC-15 curve is shown because there are no curves below it.)

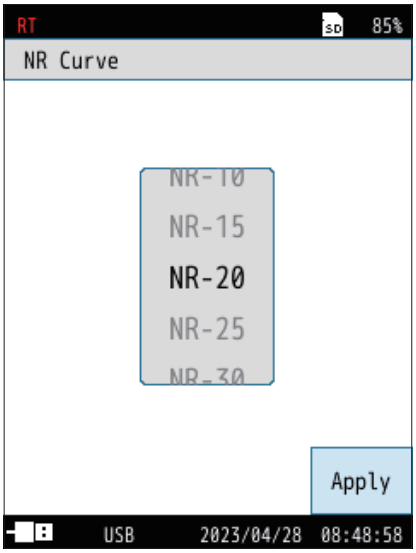


Note

- In general, the frequency weighting C or Z of the measurement frequency band is recommended for evaluation with the NC curve.
- The NC curves are always displayed as a guide. The NC values are automatically calculated at the end of measurement or upon recall. None of these are saved in the store data, but they are displayed when the data is read on the [Recall] screen.

4.1.6 NR Curve

When [NR] is selected for [Indoor Noise], the [NR Curve] menu will appear on the screen.
Select the NR curve to be displayed on the graph screen.

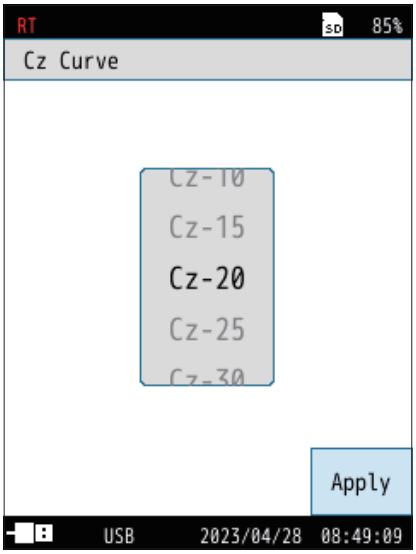


Note

- In general, the frequency weighting C or Z of the measurement frequency band is recommended for evaluation with NR curve.
- The NR curves are always displayed as a guide. The NR values are automatically calculated at the end of measurement or recall. None of these are saved in the store data, but they are displayed when the data is read on the [Recall] screen.

4.1.7 Cz Curve

When [Cz] is selected for [Indoor Noise], the [Cz Curve] menu will appear on the screen.
Select the Cz curve to be displayed on the graph screen.

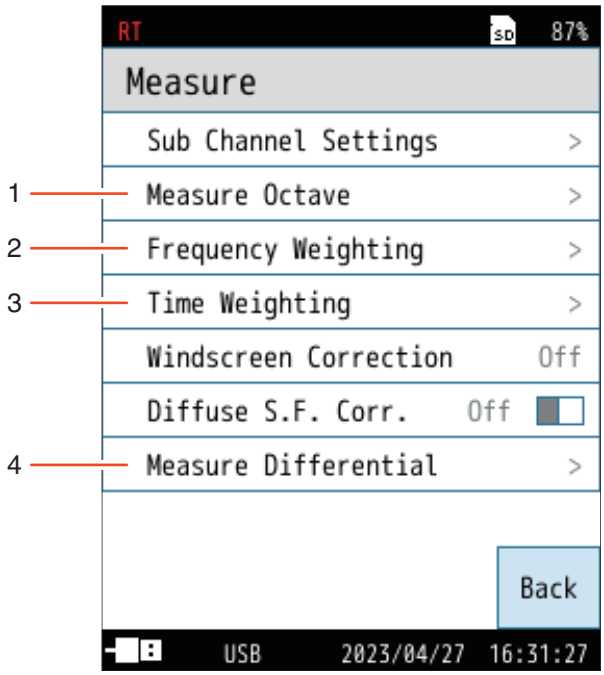


Note

- Evaluation with the Cz curve can be measured only when the frequency weighting Z of the frequency band is set.
- The Cz value or the Cz curve will not be saved in the store data.

4.2 Measure

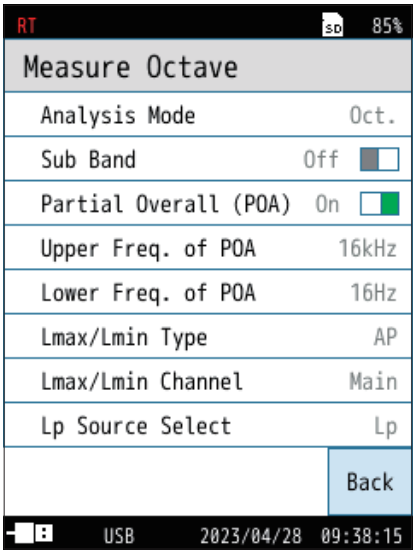
Sets the number of measurement channels, correction and other items.



No.	Name	Description
1	Measure Octave	Switches the mode of octave analysis (Page 26).
2	Frequency Weighting	Sets the frequency weighting for each channel (Page 27).
3	Time Weighting	Sets the time weighting for each channel (Page 27).
4	Measure Differential	Sets the differential operation (Page 28).

4.2.1 Measure Octave

Switches the mode of octave analysis.



Item	Description
Analysis Mode	Select Oct. or 1/3 Oct.
Sub Band	Turns on/off the sub band analysis. When [Sub Band] is set to [On], the Sub Band channel is added, and two types of time weighting can be measured simultaneously.
Partial Overall (POA)	Turns On/Off the Partial Overall (POA).
Upper Freq. of POA	This item is shown when [Partial Overall (POA)] is set to [On]. Set the upper and lower frequency of POA (Page 16).
Lower Freq. of POA	
Lmax/Lmin Type	Select [AP] or [Band] as the display type for the analysis results of the maximum and minimum values. When [AP] is selected, the analysis results when the sound level (all-pass level) of the main channel became maximum and minimum within the calculation time will be displayed. When [Band] is selected, the maximum and minimum analysis results within the calculation time for each frequency band will be displayed.
Lmax/Lmin Channel	This item is shown when [AP] is selected for [Lmax/Lmin Type]. The channel can be selected from Main, Sub1, Sub2, and Sub3.
Lp Source Select	Select [Lp] or [Leq] as the Lp source. When [Leq] is selected, the Leq value is stored in the Lp store data file instead of the Lp value. This item is shown when [Store Mode] is set to [Auto] and [Lp Store Interval] is set to [100ms].

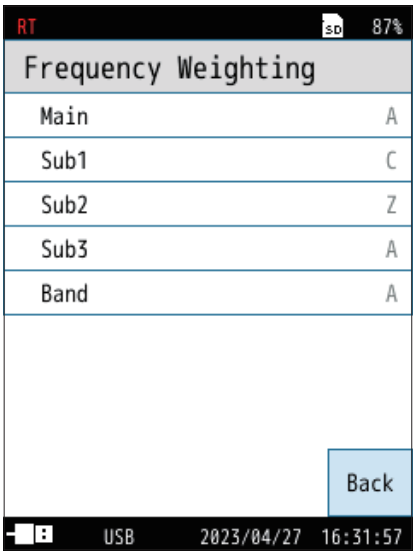
Note

- POA is not performed to the Sub band.
- POA can be selected from Lp, Leq, LE, Lmax, and Leq,mov for measurement.

4.2.2 Frequency Weighting

Sets the frequency weighting for each channel and octave band analysis.

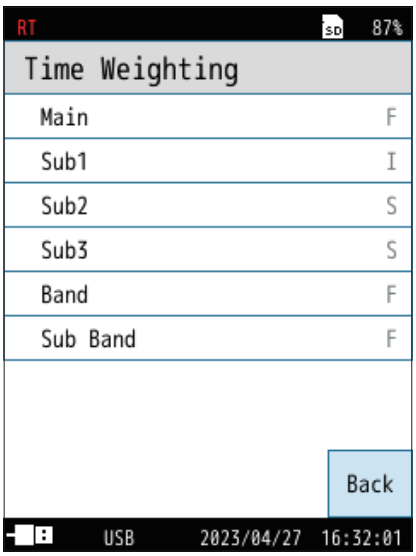
Item	Description
A	Sets A-weighting. A frequency filter is applied that accounts for the relative loudness perceived by the human ear, and is selected when measuring general environmental noise.
C	Sets C-weighting. A frequency filter is applied that attenuates the low-frequency range equal to or below 31.5 Hz and the high-frequency range equal to or above 8 kHz. In general, C-weighting may be used to reduce background noise such as wind noise for frequency analysis, or to measure loud sounds.
Z	Sets Z-weighting. A flat frequency filter is applied over the specified measurement frequency range. Select when measuring the sound levels (physical quantity) over a wide band, or when performing a frequency analysis of the measured sound that is not weighted by frequency.



4.2.3 Time Weighting

Sets the time weightings for each channel and octave band analysis.

Item	Description
F	Sets F (Fast). Select this when measuring general noise, especially fluctuating sound. This is usually used for measuring noise levels and sound levels.
S	Sets S (Slow). Select this to pick up sounds with little fluctuation or the average values of fluctuating sounds. This is used for measuring noise such as express trains and regular railway sounds, etc. It is also commonly used to measure low-frequency sounds.
I	Sets I (Impulse) (except for octave band analysis. This cannot be set for Band or Sub Band). This responds to short, continuous sounds more quickly than F (Fast) at the onset.

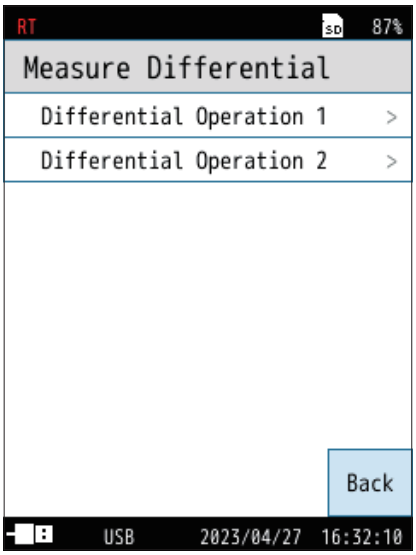


Note

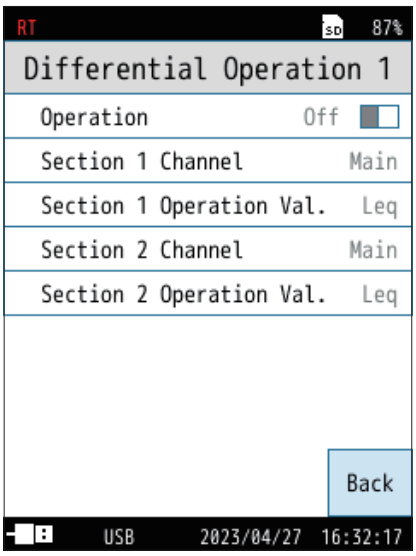
- The device uses high-speed sampling (20.8 µs) data for the sound pressure waveforms for L_{eq}, L_E and L_{Peak} (sound level only) calculation, and so it is not affected by time weighting.
- [Sub Band] is displayed when [Sub Band] is set to [On] and can be set to F or S.

4.2.4 Measure Differential

Sets the differential operation. Used to select two types of sound level calculation values and calculate the difference.

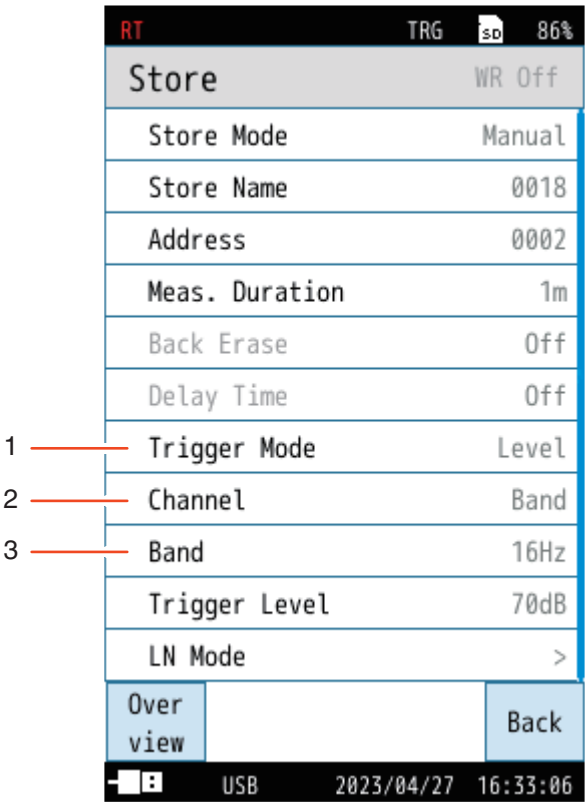


Item	Description
Differential Operation 1	Sets Differential Operation 1.
Differential Operation 2	Sets Differential Operation 2.



Item	Description
Operation	Turns On/Off the differential operation display.
Section 1 Channel	Select from Main, Sub1, Sub2, and Sub3. Channels that are set to [On] for [Sub Channel] on the [Measure] screen are displayed.
Section 1 Operation Val.	Select from Leq, LE, Lmax, Lmin, Lpeak, L5, L10, L50, L90, and L95. LIeq can be selected when time weighting is set to I (Impulse).
Section 2 Channel	Select from Main, Sub1, Sub2, and Sub3. Channels that are set to [On] for [Sub Channel] on the [Measure] screen are displayed.
Section 2 Operation Val.	Select from Leq, LE, Lmax, Lmin, Lpeak, L5, L10, L50, L90, and L95. LIeq can be selected when time weighting is set to I (Impulse).

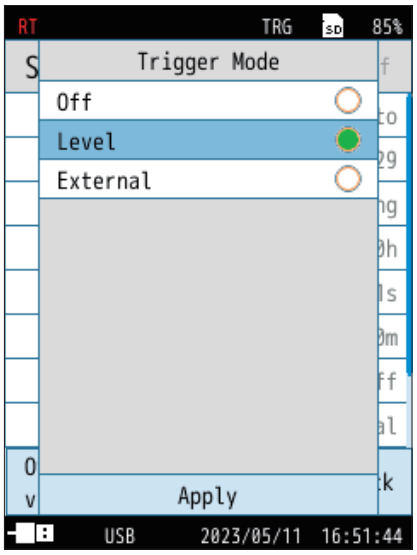
4.3 Store



No.	Name	Description
1	Trigger Mode (Manual, Auto)	Select the trigger for starting measurement from [Level] or [External] (Page 30).
2	Channel	Displayed when the [Trigger Mode] is set to [Level]. Select the channel to trigger the measurement start (Page 30).
3	Band (Manual, Auto)	Displayed when [Trigger Mode] is set to [Level] and [Channel] is set to [Band] (Page 30).

4.3.1 Trigger Mode (Manual mode, Auto mode)

Select [Level] or [External] for the trigger for starting measurement in Manual mode and Auto mode.
For details about level and external triggers, refer to “When [Band] is selected for the channel with [Comparator]” (Page 35) and “When [Comparator] is selected” of the “Operation Guide”.

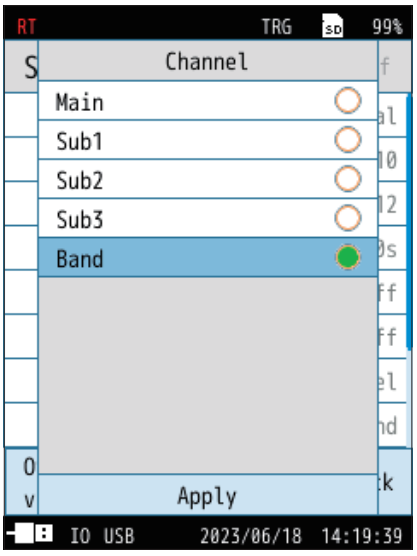


Note

- Level trigger starts measurement when the specified channel exceeds the specified level.
- External trigger starts measurement when the BNC terminals of the comparator output / trigger input cable CC-43CT connected to the I/O port are shorted.
- [Trigger Mode] cannot be used together with the following functions:
  - Delay Time
  - Web App
  - Level recording (NX-43WR function)
  - I/O port (when external trigger is set)

4.3.2 Channel

Displayed when the [Trigger Mode] is set to [level] on the [Store] screen.
Select the channel to trigger the measurement start.

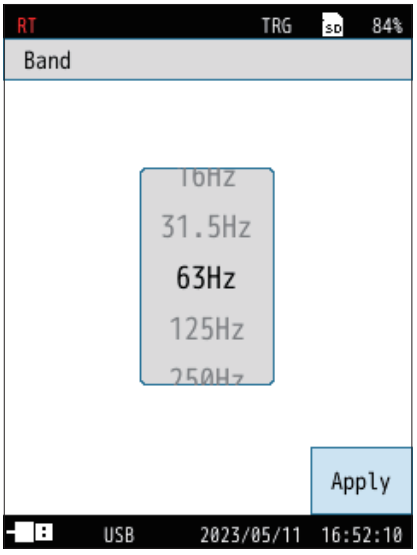


Note

- Sub1 to 3 is displayed and can be selected when is set to on in the [Menu]-[Measure]-[Sub Channel Settings].

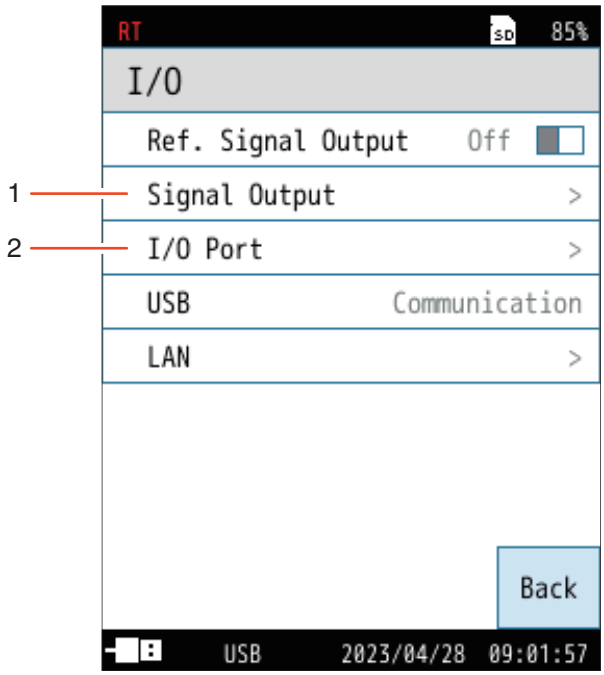
4.3.3 Band (Manual mode, Auto mode)

Displayed when [Trigger Mode] is set to [Level], and [Channel] is set to [Band] on the [Store] screen.
Select from 16Hz to 16kHz for octave band analysis, and 12.5Hz to 20kHz for 1/3 octave band analysis (Page 35).



4.4 I/O

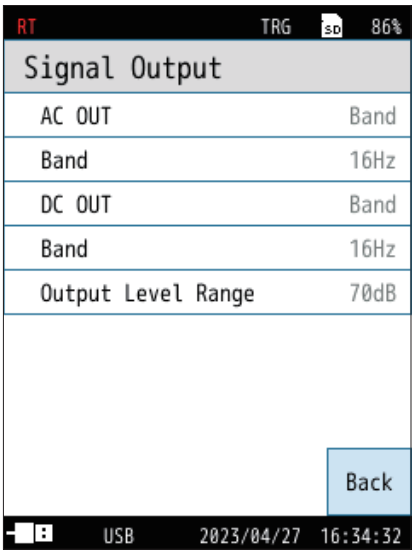
Sets the number of measurement channels, correction and other items.



No.	Name	Description
1	Signal Output	Sets the AC output and DC output (Page 32).
2	I/O Port	Sets the I/O port on the bottom of the device (Page 35).

4.4.1 Signal Output

Sets the AC output and DC output.



Item	Description
AC OUT*	Sets the AC signal output from the AC/DC terminal on the bottom of the device.
DC OUT*	Sets the DC signal output from the AC/DC terminal on the bottom of the device.
Output Level Range	Sets the upper limit of the output level range.

* For details, refer to the NL-43/NL-53 (with NX-43EX) Instruction Manual "Operation Guide".

Important

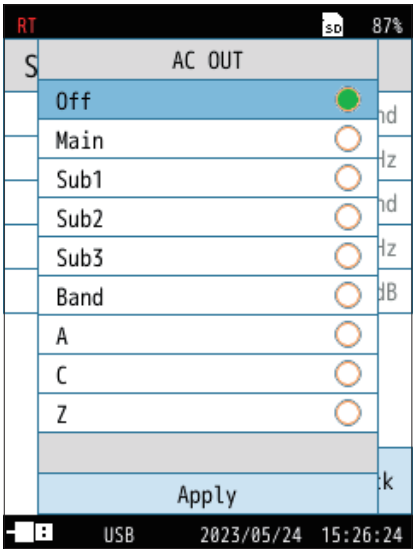
- Make sure that the dedicated cable and stereo output adapter CC-43S are properly connected. Connecting them in an incorrect combination may damage the main unit.

Note

- Simultaneous output of AC output and DC output is possible. To output either AC output or DC output, use CC-24. To output them simultaneously, use CC-43S.
- If either [AC OUT] or [DC OUT] is set to [On] with stereo output cable CC-43S connected, the output will be made from channel 1. If both are set to [On], the AC output will be made from channel 1. If either [AC OUT] or [DC OUT] is set to [On] with the stereo output cable connected, the output will always be made from channel 1. If both are set to [On], the AC output will be made from channel 1 and the DC output from channel 2.

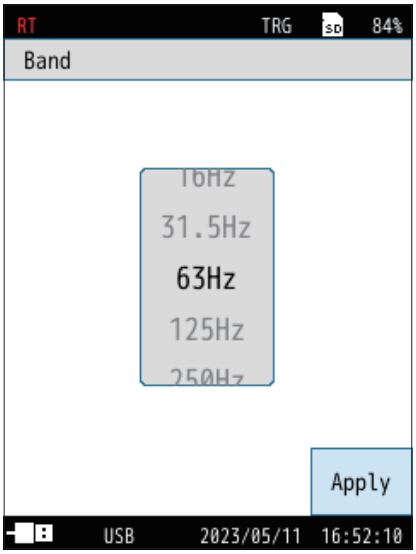
AC OUT

Item	Description
Off	No AC signal is output.
Main	Outputs an AC signal corresponding to the sound pressure waveform after frequency weighting. Applies the frequency weighting set in the selected channel.
Sub1	
Sub2	
Sub3	
Band	Outputs an AC signal corresponding to the Band after frequency weighting. Applies the frequency weighting set in the Band.
A	Outputs an AC signal corresponding to the sound pressure waveform after frequency weighting. Applies the selected frequency weighting.
C	
Z	



• Band

Select from 16Hz to 16kHz for octave band analysis, and 12.5Hz to 20kHz for 1/3 octave band analysis (Page 16).

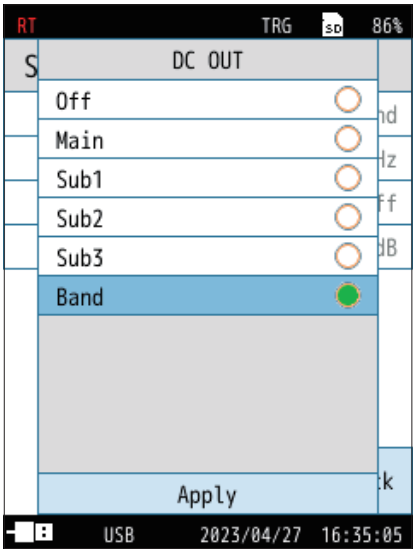


Note

- [POA] is not available for AC output.

DC OUT

Item	Description
Off	No DC signal is output.
Main	Outputs a DC signal corresponding to the sound level (L_p) after frequency weighting and time weighting. Applies the frequency and time weighting set in the selected channel.
Sub1	
Sub2	
Sub3	
Band	Outputs a DC signal corresponding to the sound level (L_p) after frequency weighting and time weighting. Applies the frequency and time weighting set in the Band.



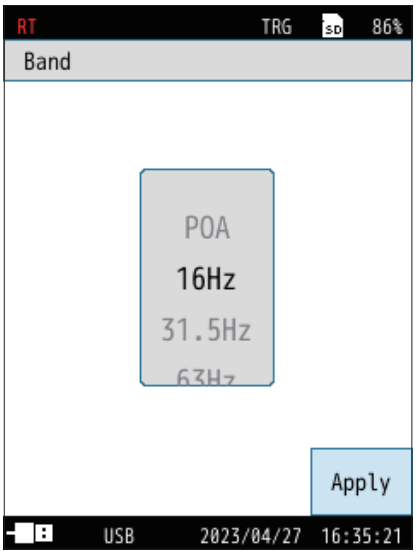
- **Band**

Select from 16Hz to 16kHz for POA and octave band analysis, and 12.5Hz to 20kHz for 1/3 octave band analysis (Page 16).

Note

[POA] is displayed and can be selected only with the following settings:

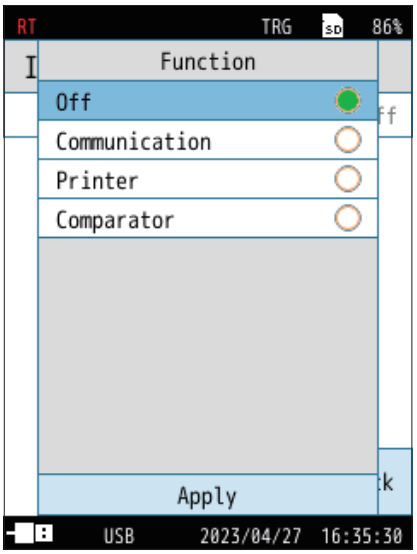
- Partial Overall (POA): On
- Signal Output - DC OUT: Band



4.4.2 I/O Port

Sets the I/O port on the bottom of the device.

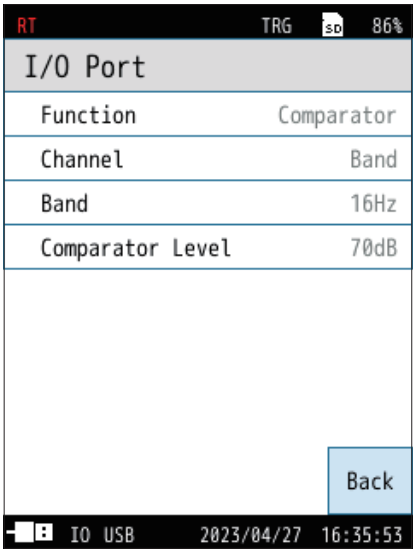
Item	Description
Off	Turns off the I/O setting of the I/O port.
Communication	Measurement values can be acquired and settings can be changed by using communication commands.
Printer	The contents on the screen can be printed using the dedicated printer DPU-414 or BL2-58. * DPU-414 and BL2-58 are no longer manufactured and sold.
Comparator	Outputs the comparator signal (open collector signal for external device control). Select the channel for comparator judgment(select from Main, Sub1 to 3, Band) and level (30dB to 130dB) can be set. Set the frequency when selecting the band.



When [Band] is selected for the channel with [Comparator]

The comparator output turns on when the specified channel exceeds the set level.

Item	Description
Channel	Select the channel for comparator judgment from [Main], [Sub1], [Sub2], [Sub3], and [Band].
Band	Select the frequency from 16Hz to 16kHz for octave band analysis, and 12.5Hz to 20kHz for 1/3 octave band analysis (Page 16).
Comparator Level	Sets the level for which the comparator output is turned on.



Note

- [POA] is not available for [Comparator].

Factory default settings

The factory default settings for the main setting items are listed below.

Item			Default settings
Display	Display Analysis		Graph
	Display Overlay		Off
	Maximum Hold		Off
	Indoor Noise		Off
	NC Curve		NC-15
	NR Curve		NR-10
	Cz Curve		Cz-10
Measure	Measure Octave	Analysis Mode	Oct.
		Sub Band	Off
		Partial Overall (POA)	Off
		Upper Freq. of POA	16kHz
		Lower Freq. of POA	16Hz
		Lmax/Lmin Type	Band
		Lmax/Lmin Channel	Main
		Lp Source Select	Lp
	Frequency Weighting	Band	Z
	Time Weighting	Band	F
		Sub Band	S
	Differential Operation	Operation	Off
		Section 1/2 Channel	Main
		Section 1/2 Operation Val.	Leq
Store	Trigger Band	Trigger Channel / Channel	Main

5 Measurement

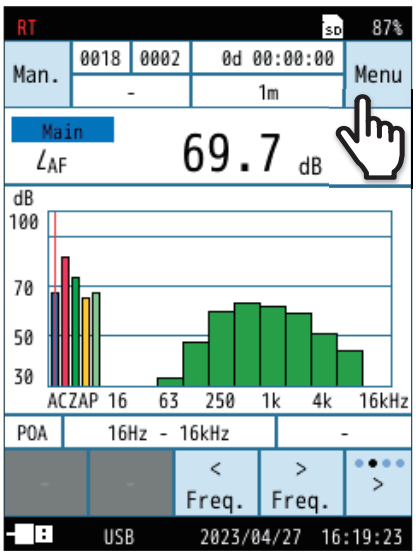
5.1 Measurement

Note

- After installation is complete, the program card for this program can be used as an SD card for storing data.
- Prior to measurement, first format the SD card for storing data with the device.

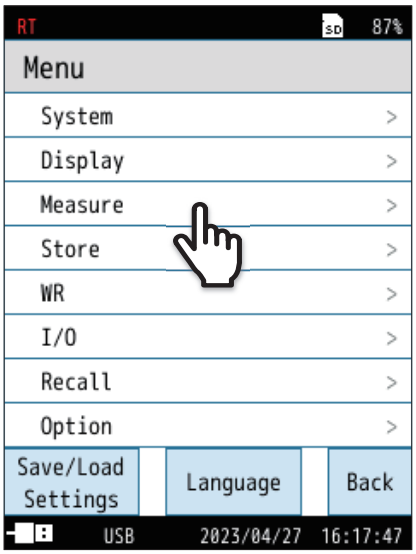
1 Touch [Menu] on the measurement screen.

The [Menu] screen appears.



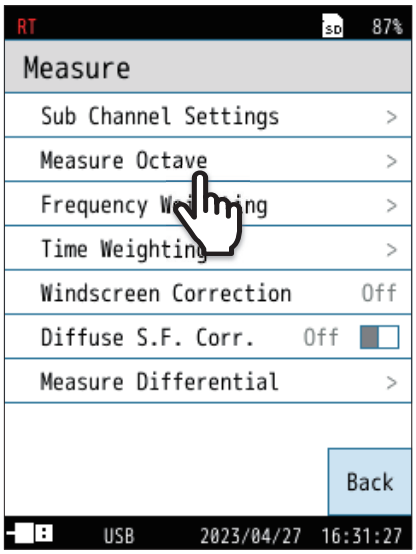
2 Touch [Measure] on the [Menu] screen.

The [Measure] screen appears.

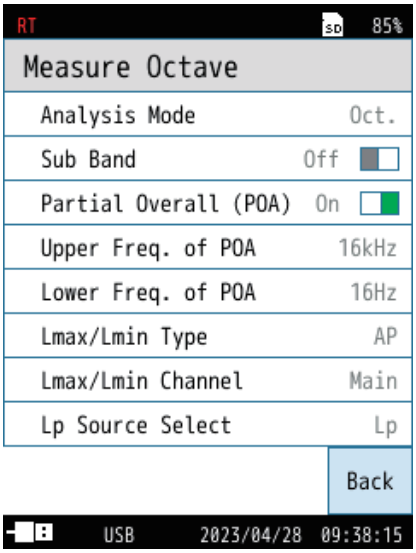


3 Touch [Measure Octave].

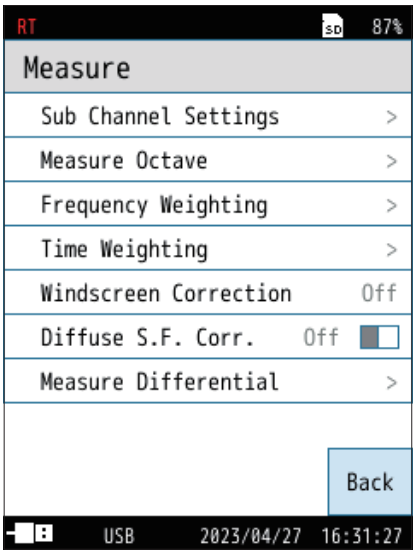
Select the analysis mode from [Oct.] and [1/3 Oct.].



4 Set [Sub Band] and [Partial Overall (POA)] as needed.

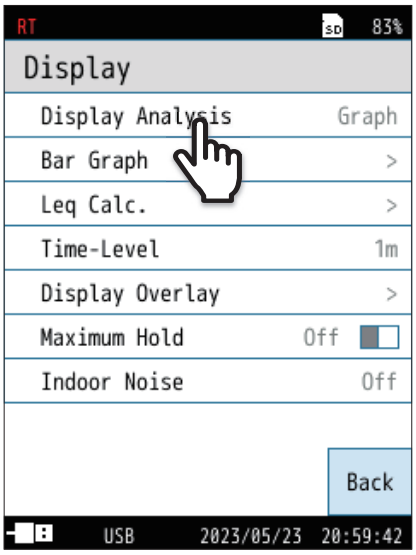


5 Return to the [Measurement] screen and set the needed items such as [Frequency Weighting] and [Time Weighting].

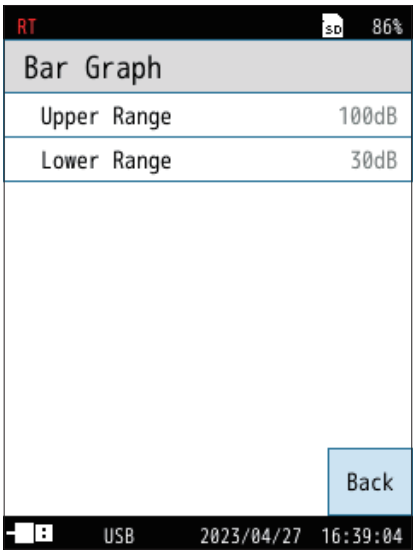


6 Return to the [Menu] screen, and touch [Display] - [Display Analysis].

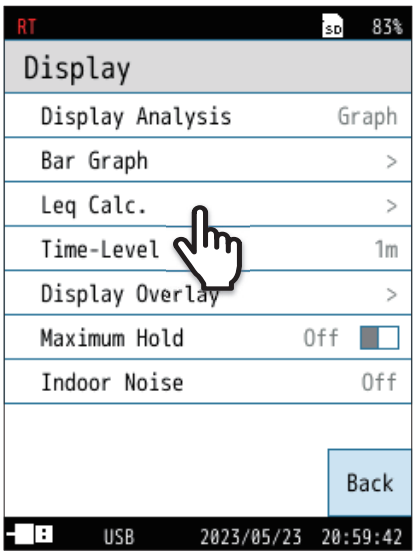
Select [Graph] or [Number List].



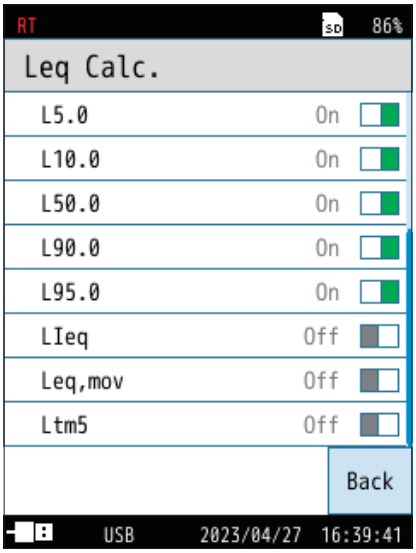
7 When [Graph] is selected, set the upper and lower limits of the bar graph.



8 Return to the [Menu] screen, and touch [Display] - [Leq Calc.].



9 On the [Leq Calc.] screen, set the calculated values to be displayed on the measurement screen to [On].



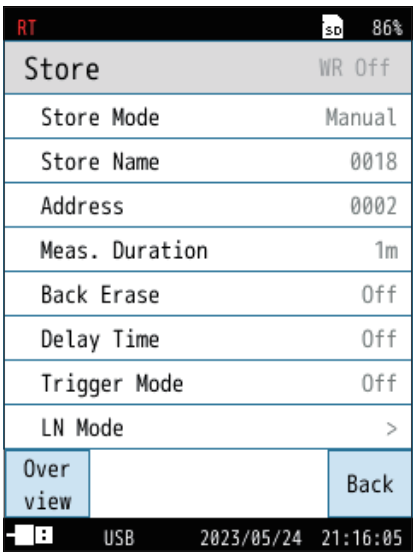
The setting switches between On and Off each time you touch.

Item	Description
On	Displays the calculated value of the target on the measurement screen.
Off	Does not display the calculated value of the target on the measurement screen.

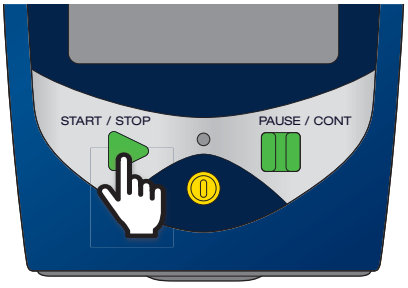
Note

- L_{eq} calculation (L_{eq}, L_E, L_{max}, L_{min}, statistical calculation for a certain interval, etc.) is measured at the same time. This setting sets the calculated values you want to display.

10 Return to the [Menu] screen, and touch [Store] to set [Store Mode] and the measurement conditions.



11 Touch [Back] or press the START/STOP key to return to the measurement screen.



12 Press the START/STOP key to start measuring.

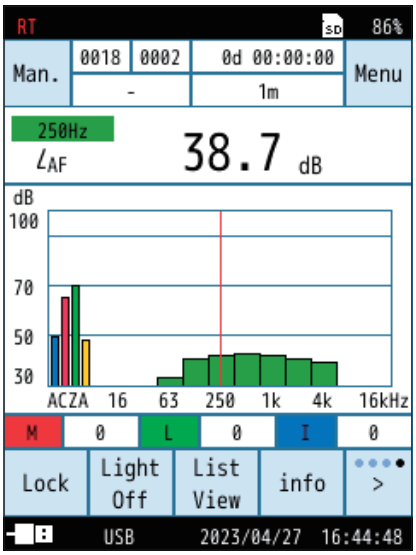
During measurement, the PAUSE/CONT key can be used to pause and resume the measurement (only when the store mode is set to Manual, and waveform recording is off). When paused, “PAUSE” and “II” are displayed flashing on the screen.

- On the measurement screen, touch [Disp] to switch the displayed measurement value in the following order:

  L_{AF} » L_{Aeq} » L_{AE} » L_{AFmax} » L_{AFmin} » L_{AF05} » L_{AF10} » L_{AF50} » L_{AF90} » L_{AF95} » $L_{eq,mov}$ » Other calculation » Time-Level

  * The measurement values that are set to [Off] in the [Menu] - [Display] screen are skipped (except for L_{AF}).

- On the graph screen, the cursor indicating the center frequency can be switched by touching the bar graph or touching [< Freq.] [> Freq.] on the menu ring. Channels with a cursor (Main, Sub1, Sub2, Sub3), POA, frequency bands and their readings are displayed numerically at the top of the screen.
  For the center frequency indicated by the band level bar graph, refer to Page 16.
- The graph display and the numeric list display can be switched from the menu ring.
- While no measurement is in progress, pressing the PAUSE/CONT key will pause the sound level displayed at that point. Press the PAUSE/CONT key again to cancel the pause.

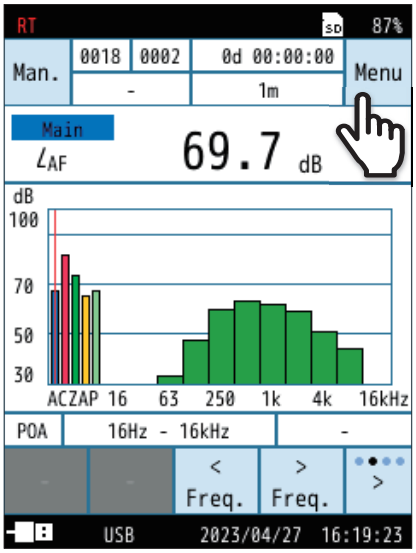


5.2 Registering the Overlay data

Register the recall data as overlay data, and display it overlaid on the current measurement on the measurement screen.

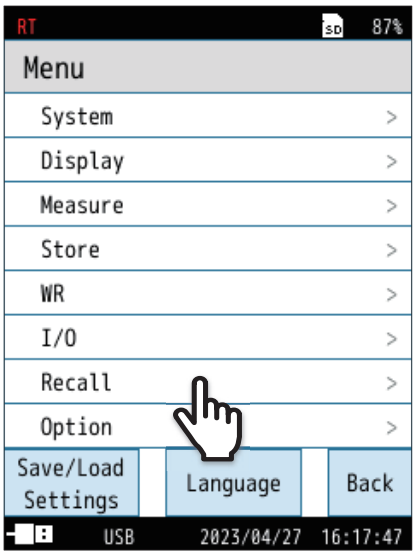
1 **Touch [Menu] on the measurement screen.**

The [Menu] screen appears.

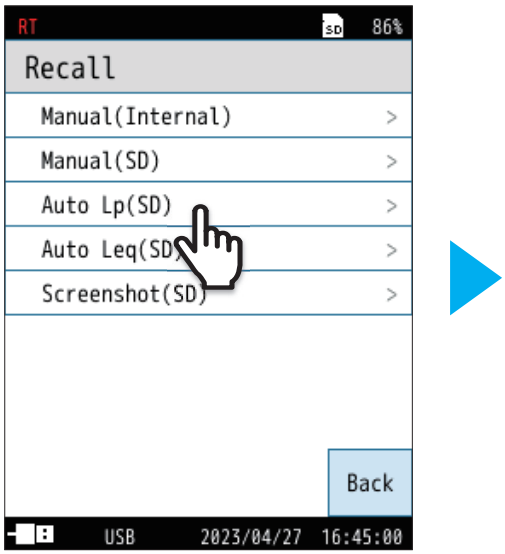


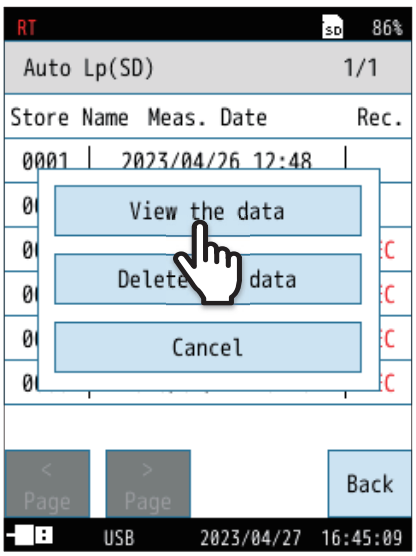
2 **Touch [Recall] on the [Menu] screen.**

The [Recall] screen appears.



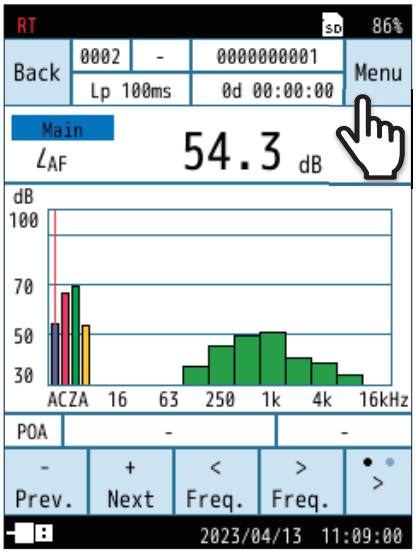
3 **Read the recall data from the [Recall] screen.**





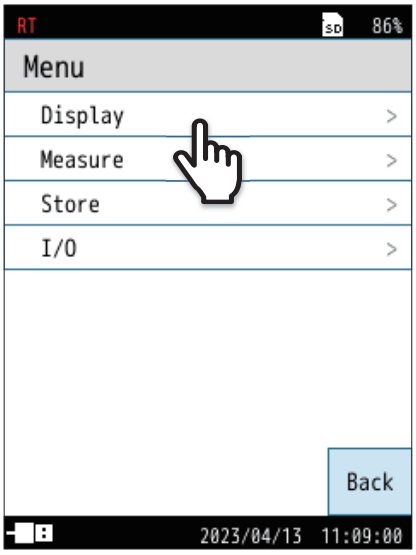
4 Touch [Menu].

The [Menu] screen appears.



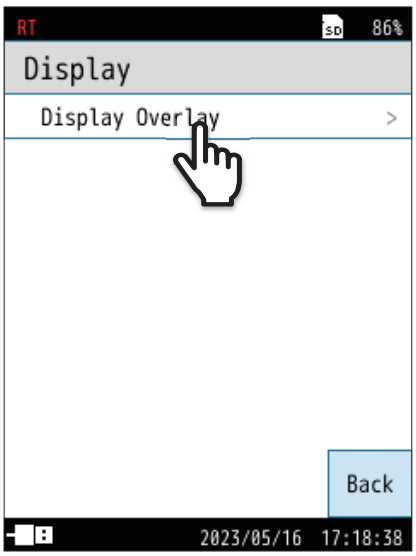
5 Touch [Display] on the [Menu] screen.

The [Display] screen appears.



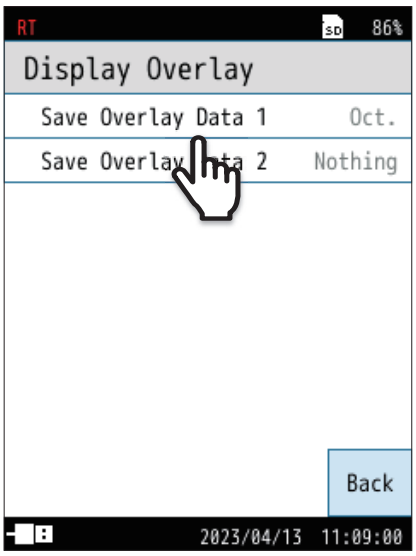
6 Touch [Display Overlay].

The [Display Overlay] screen appears.



7 Touch [Save Overlay Data 1] or [Save Overlay Data 2].

The overlay data will be saved.
Up to two overlay data can be registered.



Note

The following items can be registered as overlay data but cannot be displayed.

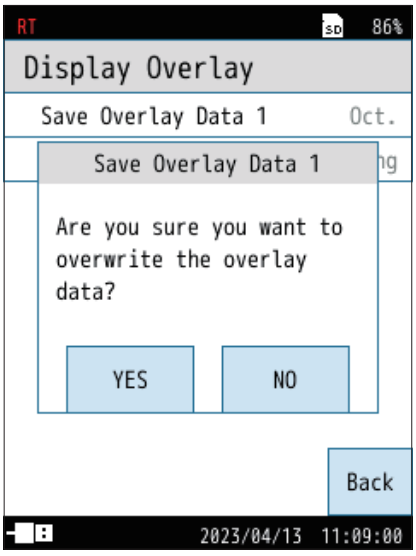
- Data with different octave bandwidths for Overlay data 1 and Overlay data 2
- Data with different octave bandwidths between measurement screen and Overlay data

The following items cannot be registered as overlay data.

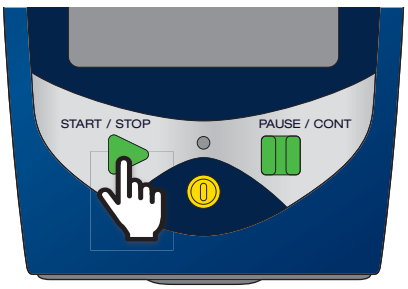
- Data with Sub Band on

If saved data already exists, the screen shown to the right appears.

For details on how to delete the registered overlay data, refer to Page 22.

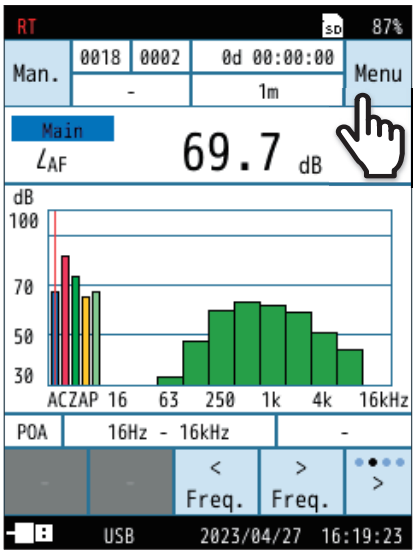


8 Touch [Back] or press the START/STOP key to return to the measurement screen.



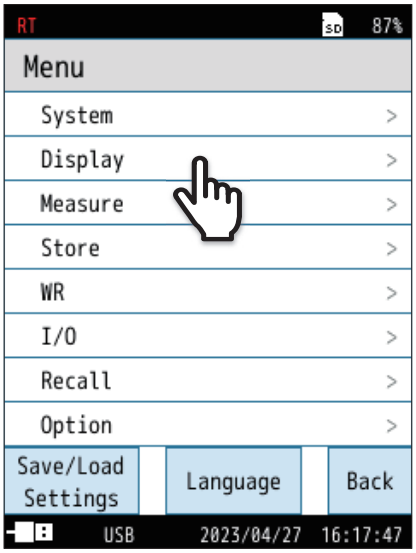
9 Touch [Menu] on the measurement screen.

The [Menu] screen appears.



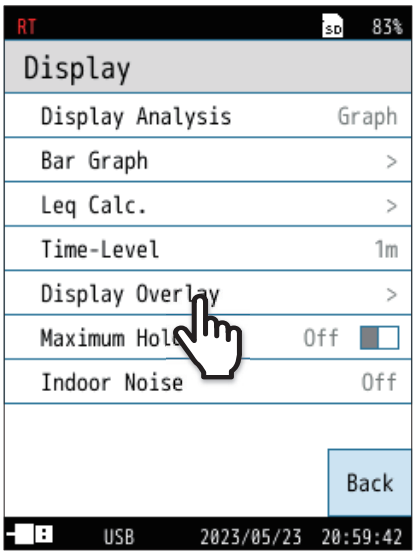
10 Touch [Display] on the [Menu] screen.

The [Display] screen appears.



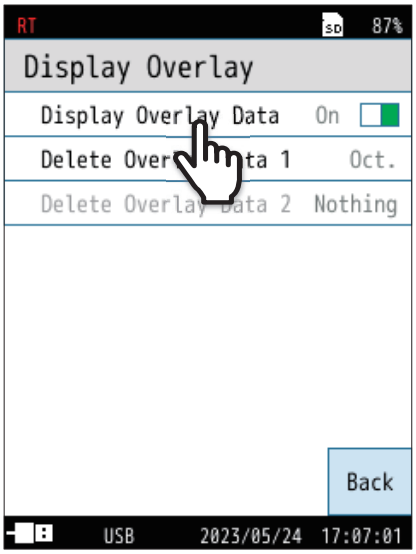
11 Touch [Display Overlay].

The [Display Overlay] screen appears.

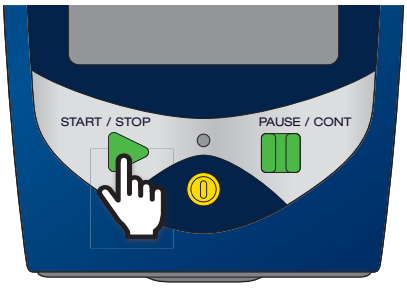


12 Turn On [Display Overlay Data].

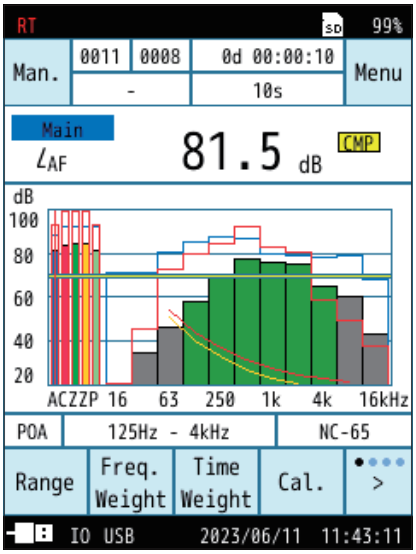
For details on how to delete the registered overlay data, refer to Page 22.



13 Touch [Back] or press the START/STOP key to return to the measurement screen.



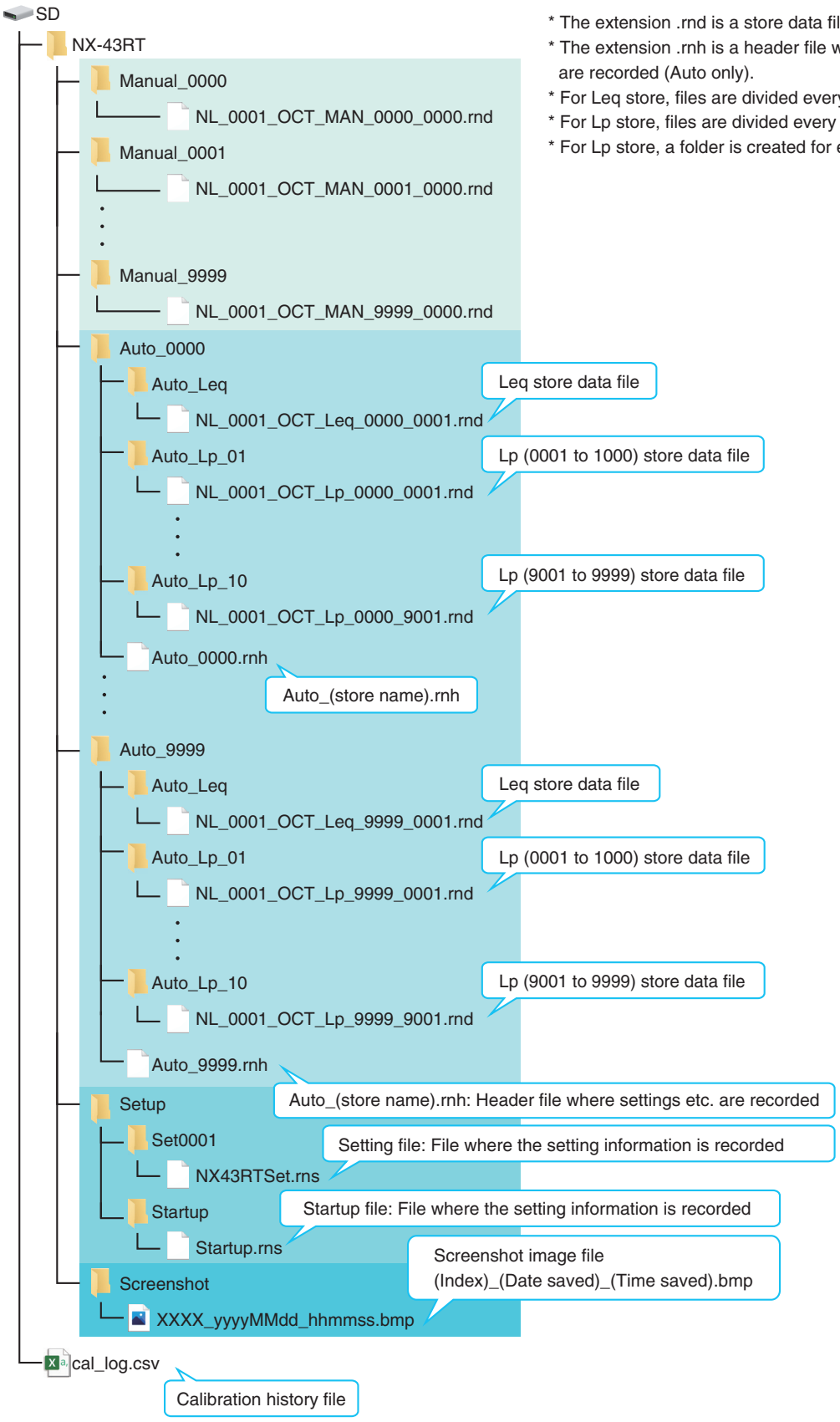
The registered overlay data is displayed on the measurement screen. Overlay data 1 is displayed with red lines and overlay data 2 with blue lines.



5.3 Store data format and file structure

Folder and file names that are used for saving data differ, depending on the selected store mode.

File organization

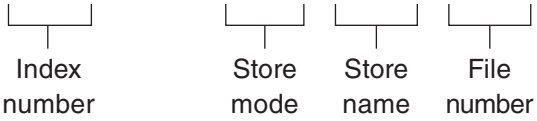


* The extension .rnd is a store data file.
* The extension .rnh is a header file where settings etc. are recorded (Auto only).
* For Leq store, files are divided every 3,600 sets.
* For Lp store, files are divided every hour.
* For Lp store, a folder is created for every 1,000 data.

Data file name

Data files are named as shown below.

NL_0001_OCT_MAN_0123_0000.rnd



- Index number
  Number set in [Menu] - [System] - [System Information] - [Index].
- Store mode
  The file name varies depending on the store mode.
  Manual store:MAN
  Auto store: Leq or Lp␣(space)
- Store name
  0000 to 9999
- File number
  Manual store is fixed to 0000.

5.4 SD card

Important

- Use SD cards provided by Rion. The performance of other cards is not guaranteed.
- Note that we assume no responsibility for any damage or loss of stored measurement data.

Measurable time

The measurable time depends on the SD card capacity.
The measurable time to an SD card is as follows:

L_p store interval	SD card capacity		
	512 MB	2 GB	32 GB
100 ms	31 h	130 h	2,094 h
200 ms	63 h	259 h	4,188 h
1 s	315 h	1,297 h	20,938 h

* Based on the condition with sound level (4 channels), 1/3 Oct, and no sub bands.
* SD card capacity may be less than indicated, depending on the type of SD card.

Note

- When [Analysis Mode] is set from [1/3 Oct.] to [Oct.], the measurable becomes approx. 1.5 times.
- When [Sub Band] is set to [On], the measurable time becomes approx. 0.6 times.
- When the number of sound level channels is set to 1, the measurable time becomes approx. 1.3 times.

When performing Auto store

L_{eq} store is divided into files every 3,600 sets (maximum 9,999 files).
When one of the following conditions occurs, the store is stopped and data is saved.

- When the total measurement time reached the set value
- When the L_p and L_{eq} store reached 9,999 data
- When the remaining capacity of the SD card became 1 MB or less
  (Waveform recording stops when the remaining capacity of the SD card becomes 10 MB or less.)

6

Communication Commands

For a list of additional commands for Class 1 Sound Level Meter NL-53 and Class 2 Sound Level Meter NL-43 with the NX-43RT installed, refer to “Communication Guide”.

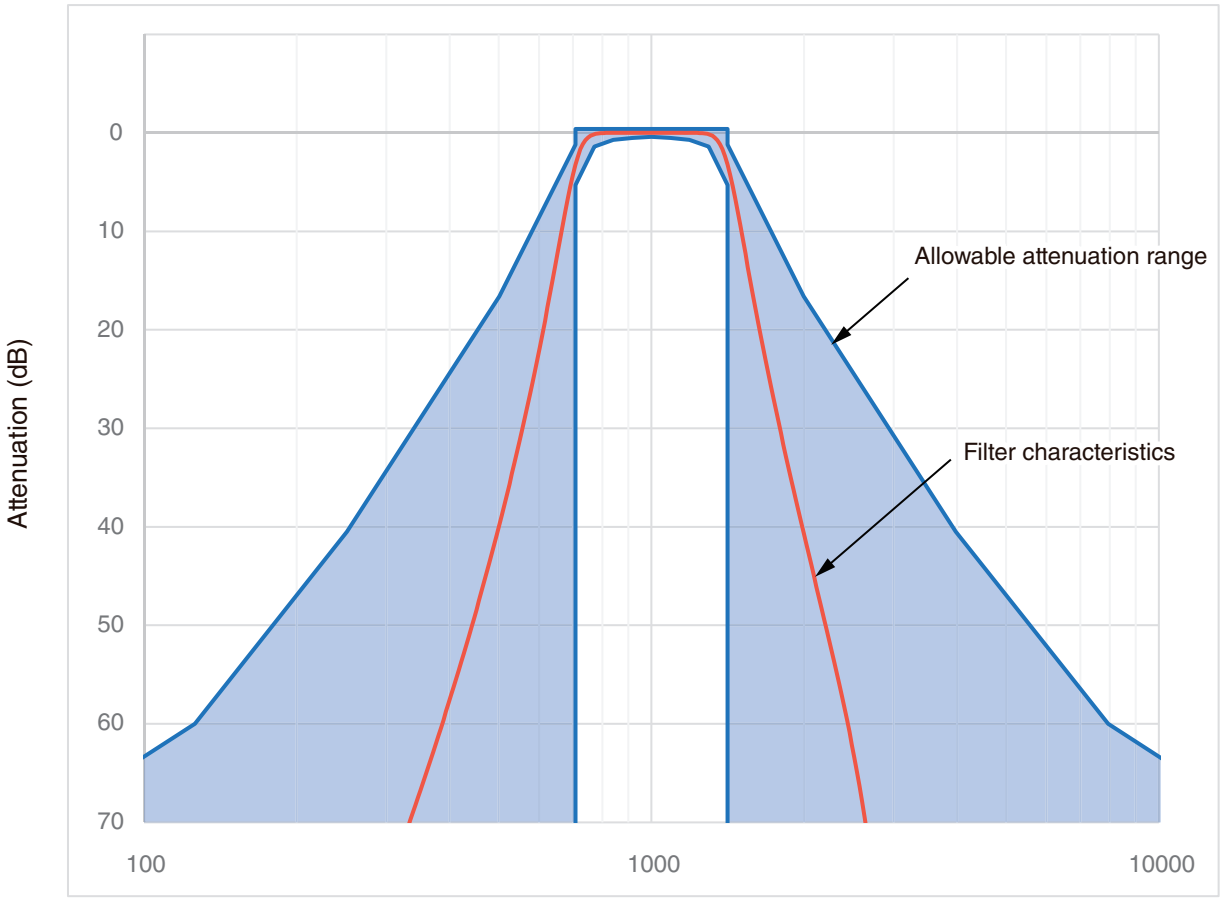
7

Octave and 1/3 Octave Band Filters

The characteristics of the octave and 1/3 octave band filters in the NL-43/NL-53 meet the IEC 61260-1:2014 class 1, JIS C 1513-1:2020 class 1, and ANSI/ASA S1.11-2014/Part 1 class 1 standards.

Octave band filter characteristics

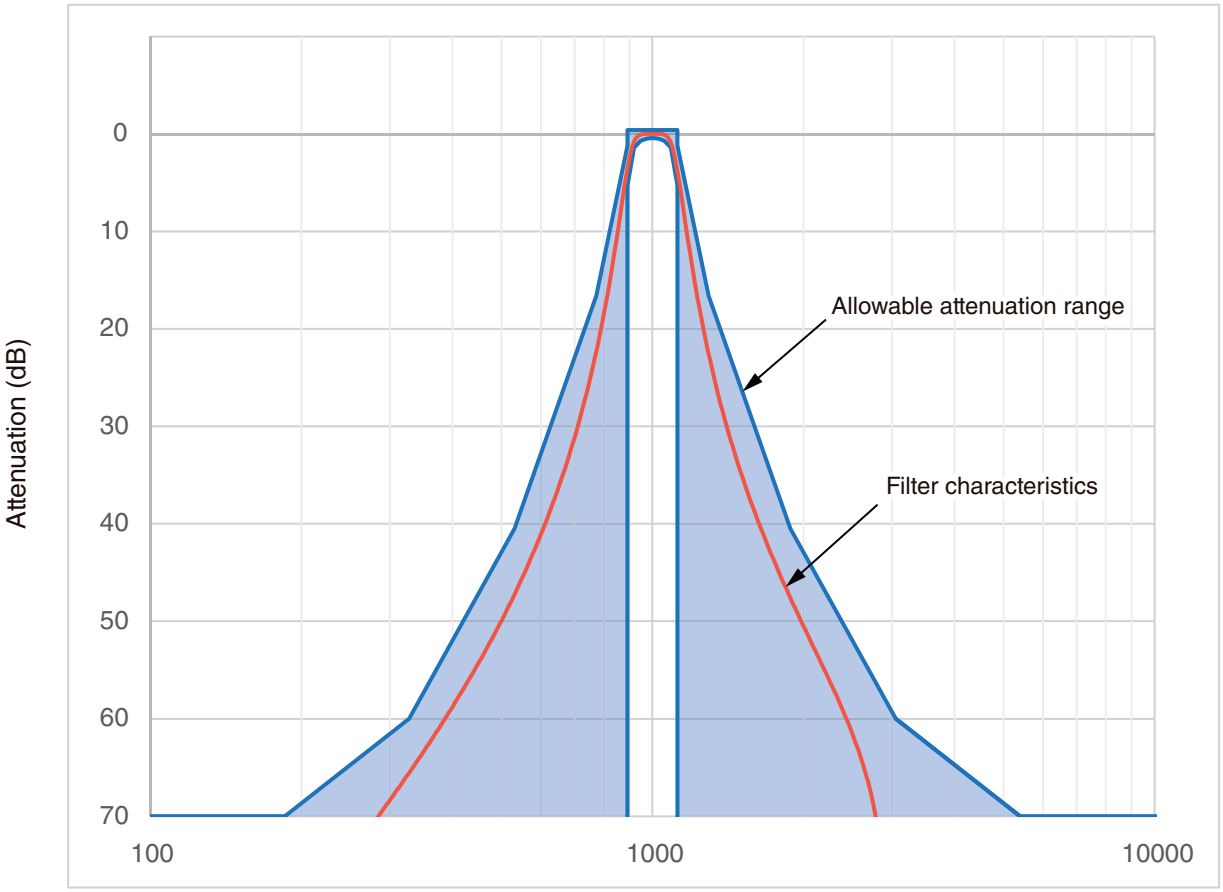
The graph below shows the allowable attenuation tolerance according to the IEC and JIS standards, and the actual characteristics of the octave band filter in the device.



Frequency ratio f/fc (f: Frequency, fc: Center frequency at 1 kHz)
Attenuation tolerance according to JIS C 1513-1:2020 class 1 and octave band filter characteristics of NX-43RT

1/3 octave band filter characteristics

The graph below shows the allowable attenuation tolerance according to the IEC and JIS standards, and the actual characteristics of the 1/3 octave band filter in the device.

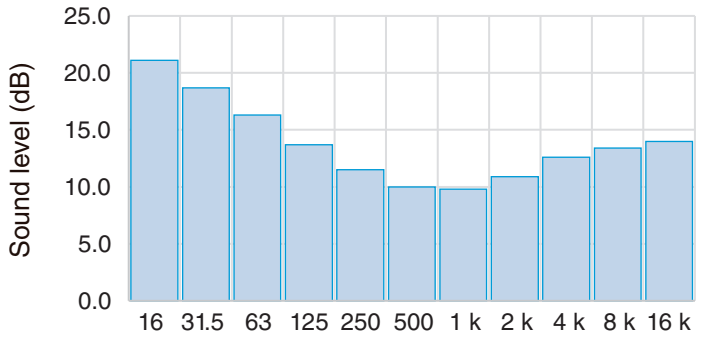


Frequency ratio f/fc (f: Frequency, fc: Center frequency at 1 kHz)
Attenuation tolerance according to JIS C 1513-1:2020 class 1 and 1/3 octave band filter characteristics of NX-43RT

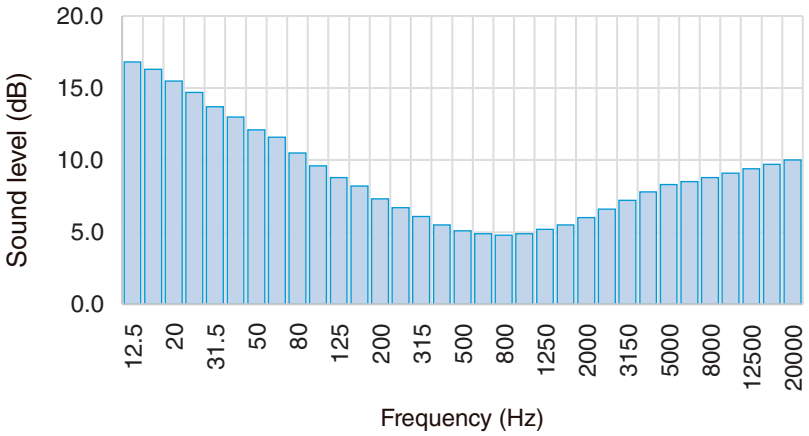
8 Noise Floor

With the NL-43

The diagrams below show the noise floor (representative value) of Class 2 Sound Level Meter NL-43 in the frequency weighting “Z” positions.
The measurement was made with octave and 1/3 octave band filter and a frequency analyzer.



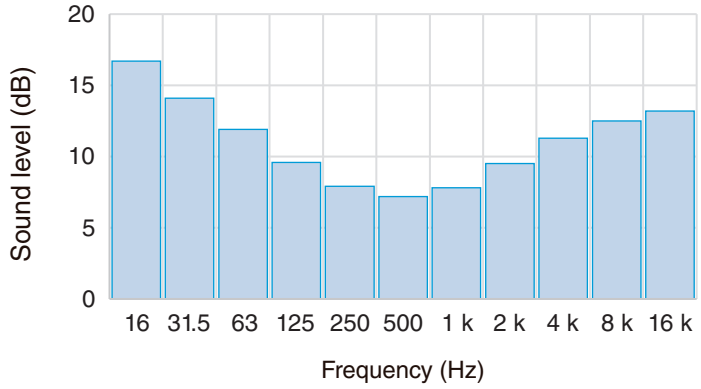
NL-43 Oct.



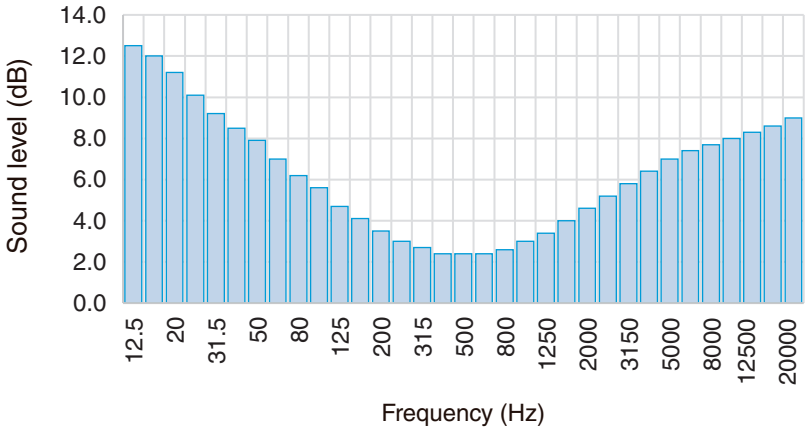
NL-43 1/3 Oct.

With the NL-53

The diagrams below show the noise floor (representative value) of Class 1 Sound Level Meter NL-53, in the frequency weighting “Z” positions.
The measurement was made with octave and 1/3 octave band filter and a frequency analyzer.



NL-53 Oct.



NL-53 1/3 Oct.

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Descriptions for IEC 61260-1 (JIS C 1513-1)

Standard paragraph No.	Description	See also No.	Explanation
5	**Required Specifications**		
5.1	**General**		
5.1.4	Filter configuration (description is of one of the normal operating modes, including essential accessories)		For hardware connections, refer to “Turning on the Power” in “Operation Guide”. Device settings are as follows: Frequency weighting (Band): Z-weighting Windscreen Correction: OFF Diffuse S.F. Corr.: OFF Delay Time: OFF Back Erase: OFF When checking the operation, attach a 19 pF dummy microphone to the NL-43 instead of the UC-52, and attach a 13 pF dummy microphone to the NL-53 instead of the UC-59.
5.9	**Reference attenuation**		
5.9.1	Reference attenuation in pass band	7.1 c)	0 dB (Z-weighting with 1 kHz sinusoidal input)
5.9.2	Filter adjustment to verify reference attenuation	7.3 c)	Not necessary due to digital filter
5.13	**Linear operating range**		
5.13.1	Linear operating range in each level range	7.2 a), 7.3 a)	It is as follows with Z-weighting: 38 dB to 138 dB
5.13.6	Level range with the narrowest linear operating range		Not applicable as there is only one level range
5.13.8	Linearity tolerance maintained outside the linear operating range	7.2 b)	Not applicable
5.14	**Time-invariant operation**		
5.14.4	Bandwidth fractions and their corresponding center frequencies	7.2 e)	Bandwidth fraction: 1 Center frequency: 16 Hz to 16 kHz (With octave band-pass filter) Bandwidth fraction: 3 Center frequency: 12.5 Hz to 20 kHz (With 1/3 octave band-pass filter)
5.17	**Overload indication**		
5.17.1	Behavior of overload indication	7.2 f)	Refer to “Reading the Display”
5.18	**Filter attenuation time for devices measuring reverberation time**		
5.18.1	Maximum attenuation time of each filter		No reverberation time measurement function is available Reference values are as follows Condition: Time weighting F Approx. 2 s with 16 Hz octave band-pass filter Approx. 3 s with 10 Hz 1/3 octave band-pass filter

Standard paragraph No.	Description	See also No.	Explanation
5.19	**Maximum effective voltage of the sinusoidal input signal in each level range for which each filter meets this standard**	7.2 c)	NL-43: Attach a 19 pF dummy microphone instead of the UC-52 and input a 1 kHz sine wave about 4.5 Vrms NL-53: Attach a 13 pF dummy microphone instead of the UC-59 and input a 1 kHz sine wave about 9.0 Vrms
5.20	**Input and output impedance**		
5.20.1	Output and input impedances for proper device operation (as appropriate)	7.3 d)	Not applicable
5.22	Sensitivity in various environments		
5.22.2	Ambient temperature and humidity		
5.22.2.1	Operating temperature and relative humidity ranges	7.2 g)	Refer to “Specifications” in “Operation Guide”
5.22.2.5	Whether the use in an environmentally controlled location is intended		Not applicable
5.23	**Requirements for electrostatic discharge and electromagnetic compatibility**		
5.23.3	Immunity to radio frequency electromagnetic fields		
5.23.3.11	Operating mode and connected device that result in the weakest immunity	7.3 i)	Refer to 6.6.10 of “Descriptions for IEC 61672-1” in “Technical Guide”
5.23.4	Emission limits		
5.23.4.3	Operation mode and connected device that generate the maximum emissions	7.3 j)	Refer to 5.21.2 of “Descriptions for IEC 61672-1” in “Technical Guide”
7	**Instruction Manual**		
7.1	**General**		
7.1 a)	Description indicating that all filters of all nominal filter bandwidths available on the analysis channel meet all performance requirements of this standard		IEC 61260-1 class 1 Group X
7.1 b)	Nominal center frequencies of filters		Refer to Tables 1 and 2
7.1 c)	Reference attenuation	5.9.1	Refer to 5.9.1
7.2	**Operation**		
7.2 a)	Linear operating ranges for each nominal center frequency of each filter bandwidth	5.13.1, 7.3 a)	Refer to 5.13.1, 7.3 a)
7.2 b)	If it is possible to display an output signal level outside the linear operating range, then the acceptance limit of the output signal level outside the linear operating range	5.13.8	Refer to 5.13.8
7.2 c)	Maximum effective voltage of the sinusoidal input signal at any frequency	5.19	Refer to 5.19
7.2 d)	Recommendation for ensuring measurements are within the linear operating range		Overload indicator should not be displayed.
7.2 e)	Information related to the range of time-invariant nominal center frequencies and spectral analysis of transient and unsteady signals		16 Hz to 16 kHz (With octave band-pass filter) 12.5 Hz to 20 kHz (With 1/3 octave band-pass filter) The response to sudden signal input depends on the center frequency and time weighting of the band-pass filter.

Standard paragraph No.	Description	See also No.	Explanation
7.2 f)	Overload indicator and their meanings	5.17.1	Refer to 5.17.1
7.2 g)	Temperature and relative humidity ranges at which band-pass filters operate without exceeding applicable requirements	5.22.2.1	Refer to 5.22.2.1
7.2 h)	If battery-powered, the recommended means to make sure there is enough power to drive the device without exceeding any of the applicable acceptance limits during inspection		Refer to “Reading the Display” in “Operation Guide”
7.2 i)	If a filter is connected to a sound level meter or equivalent device with the intent of operating it, identification of such a device		Not applicable
7.2 j)	For equipment with built-in band-pass filters for measuring reverberation time, the maximum decay time of each filter		Refer to 5.18.1
7.2 k)	The maximum time required to power up the device until it is possible to measure the output signal level of the device to meet requirements at all applicable ambient temperatures		Refer to 5.1.19 of “Descriptions for IEC 61672-1” in “Technical Guide”
7.3	**Testing**		
7.3 a)	Reference level range	5.13.1, 7.2 a)	Not applicable
7.3 b)	Reference input signal level and corresponding reference value		94 dB at 1 kHz
7.3 c)	Means of adjustment necessary to verifying the reference amount of attenuation	5.9.2	Refer to 5.9.2
7.3 d)	Real and imaginary parts of terminal impedance that should result when connecting to device inputs and outputs	5.20.1	Refer to 5.20.1
7.3 e)	Short circuit effect when connected to the analog output of a band-pass filter		Not applicable
7.3 f)	Device configuration when in normal operating mode	5.1.4	Refer to 5.1.4
7.3 g)	Allowable degradation of performance or loss of function due to exposure to electrostatic discharge		Refer to 6.5.2 of “Descriptions for IEC 61672-1” in “Technical Guide”
7.3 h)	Reference direction for immunity tests to power frequency magnetic field and radio frequency electromagnetic field		Refer to “Power frequency magnetic fields and radio frequency electromagnetic fields” in “Technical Guide”
7.3 i)	Operating mode and connected devices that provide minimum immunity to power supply frequency magnetic fields and radio frequency fields	5.23.3.11	Refer to 5.23.3.11
7.3 j)	Settings and configuration that produce maximum radio frequency emissions	5.23.4.3	Refer to 5.23.4.3
7.3 k)	Additional information needed to test and verify that band-pass filters and filter sets meet the requirements of this standard	5.1.4	Refer to 5.1.4

IEC 61260-1 (JIS C 1513-1) center frequency

Table 1. Octave band-pass filter

Nominal center frequency (Hz)	Exact center frequency (Hz)
16	15.849
31.5	31.623
63	63.096
125	125.89
250	251.19
500	501.19
1000	1000.0
2000	1995.3
4000	3981.1
8000	7943.3
16000	15849

Table 2. 1/3 octave band-pass filter

Nominal center frequency (Hz)	Exact center frequency (Hz)
12.5	12.589
16	15.849
20	19.953
25	25.119
31.5	31.623
40	39.811
50	50.119
63	63.096
80	79.433
100	100.00
125	125.89
160	158.49
200	199.53
250	251.19
315	316.23
400	398.11
500	501.19
630	630.96
800	794.33
1000	1000.0
1250	1258.9
1600	1584.9
2000	1995.3
2500	2511.9
3150	3162.3
4000	3981.1
5000	5011.9
6300	6309.6
8000	7943.3
10000	10000
12500	12589
16000	15849
20000	19953

10 Specifications

<table>
<tr><td>Compatible models</td><td>Class 1 Sound Level Meter NL-53 / Class 2 Sound Level Meter NL-43</td></tr>
<tr><td>Media</td><td>512 MB SD card</td></tr>
<tr><td>Applicable standards</td><td>IEC 61260-1:2014 class 1
ANSI/ASA S1.11-2014/Part 1 class 1
JIS C 1513-1:2020 class 1</td></tr>
<tr><td>Measurement function</td><td>Simultaneous measurement of sound level (up to 4 conditions), octave or 1/3 octave band analysis, and calculation of the partial overall (POA).
When [Measure differential] is set to [On], the difference between arbitrary sound level calculation results can be calculated.
<table>
<tr><td>Instantaneous value</td><td>Time-weighted sound level</td><td>L_p</td><td></td></tr>
<tr><td rowspan="10">Calculated values</td><td>Time-weighted sound level</td><td>L_{eq}</td><td></td></tr>
<tr><td>Sound exposure level</td><td>L_E</td><td></td></tr>
<tr><td>Maximum time-weighted sound level</td><td>L_{max}</td><td></td></tr>
<tr><td>Minimum time-weighted sound level</td><td>L_{min}</td><td>(excluding POA)</td></tr>
<tr><td>Percentile sound level</td><td>L_N</td><td>(excluding POA)</td></tr>
<tr><td>Moving Leq</td><td>$L_{eq,mov}$</td><td></td></tr>
<tr><td>Peak sound level</td><td>L_{peak}</td><td>(excluding Band and POA)</td></tr>
<tr><td colspan="3">I-time-weighted equivalent continuous sound level</td></tr>
<tr><td></td><td>L_{Ieq}</td><td>(excluding Band and POA)</td></tr>
<tr><td>Takt-max sound level</td><td>L_{tm5}</td><td>(excluding Band and POA)</td></tr>
</table></td></tr>
<tr><td>Linear operating range</td><td>113 dB (A-weighting, 1 kHz)</td></tr>
<tr><td>Frequency analysis</td><td>
<table>
<tr><td>Octave band analysis</td><td>Octave band-pass filter: 16 Hz to 16 kHz
Configuration: 12th-order Butterworth band-pass digital filter
Center frequency: Base-10</td></tr>
<tr><td>1/3 octave band analysis</td><td>1/3 octave band-pass filter: 12.5 Hz to 20 kHz
Configuration: Sixth-order Butterworth band-pass digital filter
Center frequency: Base-10</td></tr>
</table></td></tr>
<tr><td>Frequency weighting</td><td>A-weighting, C-weighting, Z-weighting</td></tr>
<tr><td>Time weighting</td><td>F (Fast), S (Slow), I (Impulse)*
When the additional band is set to [On] in octave analysis, two types of time weighting can be measured simultaneously.
* Except for octave band analysis</td></tr>
<tr><td>Level range switching</td><td>
<table>
<tr><td>Level range</td><td>One range</td></tr>
<tr><td>Bar graph display</td><td>Upper limit: 70 dB to 130 dB can be set in 10 dB increments
Lower limit: -10 dB to 60 dB can be set in 10 dB increments</td></tr>
<tr><td>Signal output range</td><td>Can be linked to the bar graph upper limit, or set from 70 dB to 130 dB in 10 dB increments.</td></tr>
</table></td></tr>
</table>

Sampling interval

L_p, L_{eq}, L_E, L_{max}, L_{min}, L_{peak}, L_{leq}	20.8 µs (sampling frequency 48 kHz)
L_N	L_p: 100 ms L_{eq}: 1 s
$L_{eq,mov}$	L_{eq}: 1 s
L_{tm5}	L_{max}: 5 s

Reference signal output to external devices

Frequency	1 kHz
Output level	Bar graph upper limit – 6 dB

Trigger mode

Starts measurement upon the following trigger.

Level trigger	Starts measurement when the specified channel exceeds the specified level. Channel: Sound level (channel can be selected) Band (frequency band can be selected)
External trigger	Starts measurement when the BNC terminals of the comparator output / trigger input cable CC-43CT connected to the I/O port are shorted.

Overload/ under-range indication

The following notifications are sent for Sound level and octave band analysis respectively.

- OVER is displayed for a signal input that is larger than the upper measurement limit
- UNDER is displayed for a signal input that is smaller than the lower measurement limit (excluding octave band analysis)
- OUTPUT OVER is displayed for a signal output that is larger than the output level range

Display

Bar graphs and time-level graphs that correspond to various measurement values can be displayed.

Graph update cycle	100 ms
Numeric value update cycle	1 s
Measurement value display method	Graph or Number List

Manual store

Records instantaneous values or calculated values throughout a measurement to a file for one address at a time.

Measurement time	1 s to 24 h, or user setting (1 s to 24 h)
Data storage capacity	Internal memory: Data of up to 1,000 addresses can be stored. SD card: Data can be saved with store names from 0000 to 9999 (up to 1,000 addresses for each store).

Auto store

Repeatedly records instantaneous values (Auto L_p store) and calculated values (Auto L_{eq} store) throughout a measurement to a file.

Total Meas. Time	10 s, 1 m, 5 m, 10 m, 15 m, 30 m, 1 h, 8 h, 24 h, or user setting (1 s to 1000 h, no limit)
L_p Store Interval	10 ms, 25 ms, 100 ms*, 200 ms, 1 s
L_{eq} Calc.Interval	10 s, 1 m, 5 m, 10 m, 15 m, 30 m, 1 h, 8 h, 24 h, user setting (1 s to 24 h)
Data storage capacity	SD card: Data can be saved with store names from 0000 to 9999.

* When L_p Store Interval is set to 100 ms, L_p Source Select will be displayed in the Measure Octave menu and can be selected from L_p or L_{eq} as the L_p source.

Timer Auto store

Auto store is performed between the specified measurement start time and measurement stop time. In the measurement stop state, the device enters the sleep state, which reduces power consumption.

Measurement time	Auto store start interval can be selected from the following: 5 m, 10 m, 15 m, 30 m, 1 h, 8 h, 24 h

Waveform recording

The waveform recording function* can be used in parallel with store.
* Waveform Recording Program NX-43WR (optional) function

Overlay of measurement values

Select up to two recall data measurement results and display them overlaid on the measurement screen.

Maximum value hold

Temporarily holds and displays the maximum value immediately before octave band analysis.

Indoor noise evaluation

In the octave band measurement, select the NC/NR/Cz Curve and display it overlaid to obtain the evaluation result for the measured L_{eq} value.

Output

AC output	Output characteristics: Sound level link (channel can be selected) Band link (frequency can be selected) A-weighting, C-weighting, Z-weighting Output voltage: 1 Vrms at the output level range Output resistance: 50 Ω Load impedance: 10 kΩ or more
DC output	Channel: Sound level (channel can be selected) Band (frequency can be selected) POA Output voltage: 2.5 V, 25 mV/dB at the output level range upper limit Output resistance: 50 Ω Load impedance: 10 kΩ or more
DC/AC simultaneous output	Enables simultaneous output of DC output and AC output.

Comparator

The comparator output turns on when the specified channel exceeds the set level.

Channel	Sound level (Channel can be selected), band (frequency can be selected)
Level	30 dB to 130 dB can be set in 1 dB increments

Recording mode

Event recording (Level Rec.)	Channel: Main, Sub1, Sub2, Sub3, Band Band: 16 Hz to 16 kHz (POA and octave band analysis) 12.5 Hz to 20 kHz (1/3 octave band analysis) Trigger level: 30 dB to 130 dB (1 dB increments) Pre-time (level recording): Off, 1 s, 5 s, 10 s, 30 s, 1 min Maximum recording time: Off, 10 min Number of recordable data items: 9999 items for 1 store name

* Waveform Recording Program NX-43WR (optional) function

Communication/ RS-232C

Communication	Measurement values can be acquired and settings can be changed by using communication commands.
Print	Printing is possible using the dedicated printer DPU-414 or BL2-58. Prints the measurement screen or saved data screen.
Baud rate	9600 bps, 19200 bps, 38400 bps, 57600 bps, 115200 bps

USB

Communication	Measurement values can be acquired and settings can be changed by using communication commands.
Data transfer	Enables the transferring of data by making the computer recognize the SD card as a removable disk.

LAN

Communication	Measurement values can be acquired and settings can be changed by using communication commands.
Data transfer	Data on an SD card can be transferred to a computer.
Web app	Via a web browser, settings can be changed and measured values displayed. Via Google Chrome on PC only, audio can be played.

<table>
<tr><td>Power supply</td><td>4 × AA batteries, power supply to DC jack and USB port<table>
<tr><td>Operating time
(at 23°C with ECO setting)</td><td>Alkaline battery LR6: Approx. 10 hours
Ni-MH rechargeable battery HR6: Approx. 10 hours
Mobile battery: Approx. 18 hours at 5000 mAh
* The operating time varies depending on the device settings and the battery manufacturer.</td></tr>
<tr><td>AC adapter</td><td>NE-21P
(Input: 100 V to 240 V AC, 50/60 Hz, Output: 12 V DC)</td></tr>
<tr><td>External power supply voltage</td><td>5.7 V to 15 V (rated voltage 12 V)
USB port: 5 V</td></tr>
<tr><td>Primary side
(100 V side)
Power consumption</td><td>Approx. 4 W</td></tr>
</table></td></tr>
<tr><td>Dimensions</td><td>32 mm (H) × 24 mm (W) × 2.1 mm (D)</td></tr>
<tr><td>Weight</td><td>Approx. 5 g</td></tr>
<tr><td>Accessories</td><td>Supplied Accessories & Inspection Certificate</td></tr>
</table>

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