RION

Reverberation Time Program NX-43RV

Instruction Manual

Organization of This Manual

This manual describes the functions and operating procedures of the Reverberation Time Program NX-43RV. It consists of the following chapters:

- Overview of This Product
  Describes the main functions of the NX-43RV.
- Reference Instruction Manuals
  Describes the reference instruction manuals for the sound level meter and optional programs.
- Preparation Before Use
  Describes the installation procedure for the NX-43RV and the function switching settings.
- Reading the Display
  Describes the basic information about the text and display items shown on the measurement screen during measurement.
- Setting Menu
  Describes the configuration methods for the various settings of this program.
- Reverberation Time Measurement
  Describes the measurement procedures and operating methods for reverberation time.
- Data Recall
  Describes the method for recalling recorded data.
- Waveform Recording
  Describes the setup procedure for the Waveform Recording Program.
- Store Data Format and File Structure
  Describes the folder structure of stored data and the relationship between available recording time and SD card capacity.
- Communication Commands
  Describes the communication commands related to the functions of the NX-43RV.
- Technical Reference
  Describes technical information related to reverberation time measurement.
- Specifications
  Describes the specifications of the NX-43RV.

Safety Precautions / Precautions for Use

Safety precautions

The precautions shown here are provided to ensure the safe and correct use of this product and to prevent injury or damage to the user and others. Possible incidents resulting from incorrect handling are classified into two categories: “WARNING” and “CAUTION”. Be sure to follow all of these precautions, as they are important matters related to safety. For any questions concerning this product, please contact the dealer.

Examples of pictorial indications

Specific prohibitions may be displayed in the illustrations.

	Prohibitions		Instructions

Display	Meaning
WARNING	Indicates a possibility of death or serious injury due to incorrect handling.
CAUTION	Indicates a possibility of personal injury or property damage due to incorrect handling.
Important	Failure to observe the precautions indicated by this may result in damage to the unit.
Note	Denotes special information that is helpful in utilizing the capabilities of the unit but that is not directly related to safety.

Usage License Agreement

Important

- Please read the following Usage License Agreement carefully before using this software product.

This Software Usage License Agreement (hereinafter referred to as the "Agreement") sets forth the terms and conditions governing the use of the software (including upgraded and customized versions) for the Class 2 Sound Level Meter NL-43, Class 1 Sound Level Meter NL-53, and Class 1 Sound Level Meter (with low-frequency sound measurement function) NL-63, provided by RION CO., LTD. (hereinafter referred to as "RION").
Consent to this Agreement is a condition for use of the Software. Any customer who uses the Software (hereinafter referred to as "You") must agree to this Agreement in advance before using the Software.

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5. This Agreement does not grant you any rights to transfer the rights specified in this Agreement to any third parties.
6. RION shall not be liable for any consequences of your actions as set forth in this Article.

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1. The License of the Software does not implicitly or explicitly guarantee that the Software will continue to operate without problems under any circumstances. If a problem occurs while the Software is being used under normal conditions, you should contact RION using the information provided in the Instruction Manual. RION will, to the extent possible, provide you with the necessary information regarding the content of your inquiry, including the cause of the problem and ways in which you can use the Software better.
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4. RION (hereinafter in this Article, including RION's affiliates and subsidiaries) shall not be liable for any change or loss of stored data due to a problem occurring with the Software.
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6. In no event does RION assume liability for any problem caused by an alteration or modification of the Software by you. RION also does not assume liability for any damage caused to yourself by such an alteration or modification.
7. Except as explicitly provided in this Agreement, RION shall not be liable to you or a third party for damages of any kind arising out of, or in connection with, the Software.

Article 5 Software Updates

1. RION may update the Software upon prior notice to you.
2. RION may temporarily suspend the provision of the Software to you due to updates, maintenance, etc. of the Software as set forth in the preceding paragraph. However, RION shall not be liable for any damages incurred by you as a result of such temporary suspension.

Article 6 Termination of Use

1. You can terminate the use of the Software at any time by destroying the Software and all associated documentation.
2. RION may terminate the provision of Software to you without prior notice if you breach any of the terms of this Agreement. In such a case, you are obligated to immediately destroy the Software and all associated documentation (including any unauthorized copies).
3. RION may terminate the provision of Software to you with at least three (3) months' notice.
4. RION shall not be liable for any damages incurred by you due to your inability to use the Software in accordance with the preceding two paragraphs.
5. This Agreement shall be effective as long as you continue to use the Software.

Article 7 Other Items

1. If the Software and the Product are taken from Japan to any other country, the Foreign Exchange and Foreign Trade Law, the United States Export Administration Act, and all other applicable laws and regulations of the country must be strictly observed.
2. This Agreement shall be exclusively governed by the laws of Japan.
3. In the event of any dispute arising in connection with this Agreement, the court with jurisdiction over the location of RION's head office shall be the exclusive court of first instance.

Article 8 Changes to this Agreement

RION reserves the right to change this Agreement at any time without notice. In this case, you will be deemed to have agreed to the revised Agreement at the time you use the Software after the change is made to the Agreement.

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1 Overview of This Product

The Reverberation Time Program NX-43RV is an optional program that adds a reverberation time measurement function by installing it in a sound level meter equipped with octave and 1/3 octave real-time analysis.
By using this program, reverberation time can be measured quickly and easily with a single sound level meter, in addition to its standard functions.
Measurement complies with ISO 3382. Reverberation time indices such as T_{20}, T_{30}, T_{15}, and EDT (Early Decay Time) can be easily calculated using two estimation methods: the integrated impulse response method and the interrupted noise method.
Furthermore, by installing the optional Waveform Recording Program NX-43WR, the real-time sound pressure waveform can be recorded simultaneously.

- Compatible models
  - Class 2 Sound Level Meter NL-43
    With Extended Function Program NX-43EX and Octave·1/3 Octave Real-time Analysis Program NX-43RT installed
  - Class 1 Sound Level Meter NL-53
    With Extended Function Program NX-43EX and Octave·1/3 Octave Real-time Analysis Program NX-43RT installed
  - Class 1 Sound Level Meter (with low-frequency sound measurement function) NL-63
    With Octave·1/3 Octave Real-time Analysis Program NX-63RT installed

- Reverberation time measurement methods
  - Integrated impulse response method
  - Interrupted noise method

- Reverberation time measurement data
  - Auto L_p store data
    Stores the sound levels (up to four conditions) and the results of octave or 1/3-octave-band analysis
  - Decay curve data
    Calculated based on Auto L_p store data
  - Reverberation time data
    Calculated based on decay curve data

2 Reference Instruction Manuals

For details on the operation of the sound level meters and various optional programs, refer to the relevant instruction manuals listed below.

[Related Instruction Manuals]

- Class 1 Sound Level Meter NL-53 / Class 2 Sound Level Meter NL-43 (Common)
  - Class 1 Sound Level Meter NL-53 / Class 2 Sound Level Meter NL-43 with Extended Function Program NX-43EX — Instruction Manual - Operation Guide
  - Octave·1/3 Octave Real-time Analysis Program NX-43RT — Instruction Manual
  - Waveform Recording Program NX-43WR — Instruction Manual

- Class 1 Sound Level Meter (with low-frequency sound measurement function) NL-63
  - Class 1 Sound Level Meter (with low-frequency sound measurement function) NL-63 — Instruction Manual - Operation Guide
  - Octave·1/3 Octave Real-time Analysis Program NX-63RT — Instruction Manual
  - Waveform Recording Program NX-43WR — Instruction Manual

You can download the instruction manuals from our website:

https://rion-sv.com/nl-43_53_63/manual/

3 Preparation Before Use

3.1 Installing

Important

- Make sure that the sound level meter is turned off before inserting the program card.
- When installing the program, make sure that sufficient battery charge remains, or connect the unit to a USB power supply or AC adapter.
- Never remove the program card during installation. There is a risk of malfunction.
- Never format the program card using SD card formatting software (such as SD Formatter). If the card is formatted, the optional program stored on the card will be erased and can no longer be used. Restoration of erased programs is not covered by the warranty.
- Before installation, update the sound level meter to the latest firmware version. For the latest firmware, check [Support Room] » [Download] » [Software] on our website (https://rion-sv.com/).

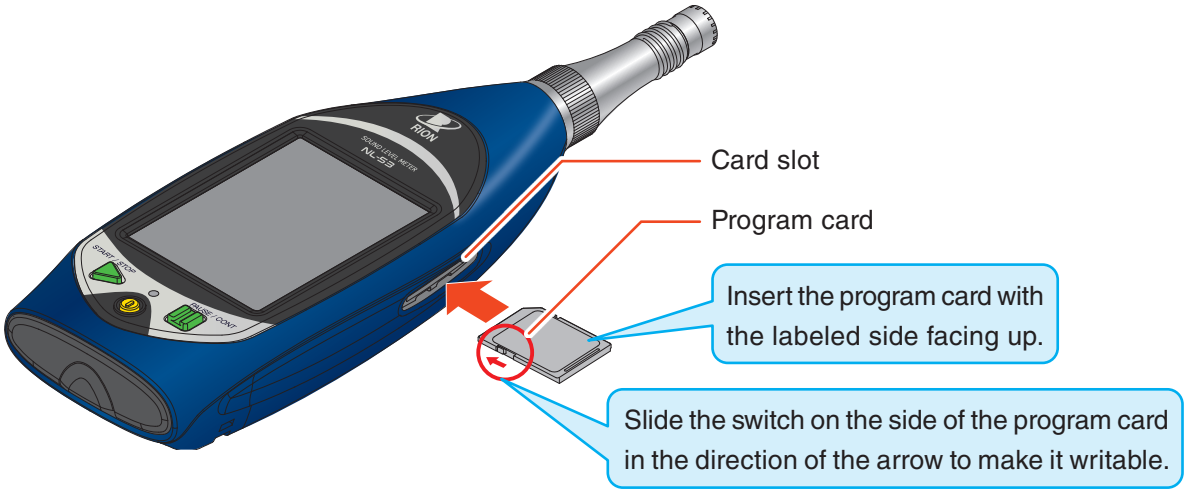
Note

- When installing the NX-43RV on the NL-43/53, first install the Function Extension Program NX-43EX and the Octave·1/3 Octave Real-time Analysis Program NX-43RT.
- When installing the NX-43RV on the NL-63, first install the Octave·1/3 Octave Real-time Analysis Program NX-63RT.
- The optional program can be installed on only one sound level meter. To install the optional program on another sound level meter, uninstall it from the currently installed sound level meter first.
- After installation is complete, the program card used for installation 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.

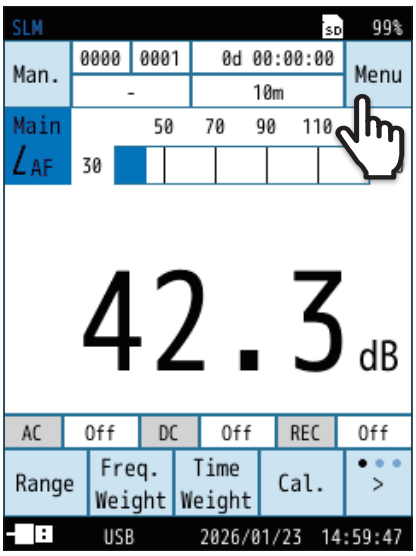


Note

- If the program card is write-protected, installation cannot be performed. Before starting the installation, make sure that the card is set to the write-enabled position.

3 Touch [Menu] on the measurement screen.

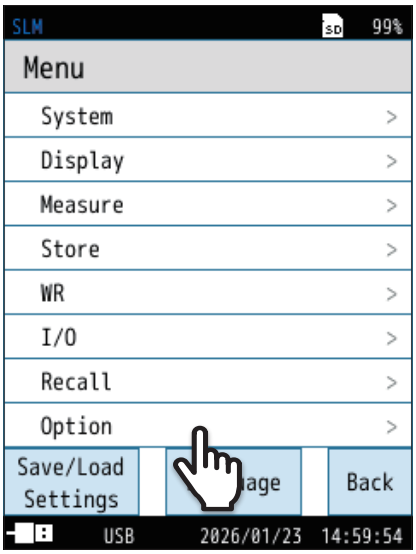
The [Menu] screen appears.



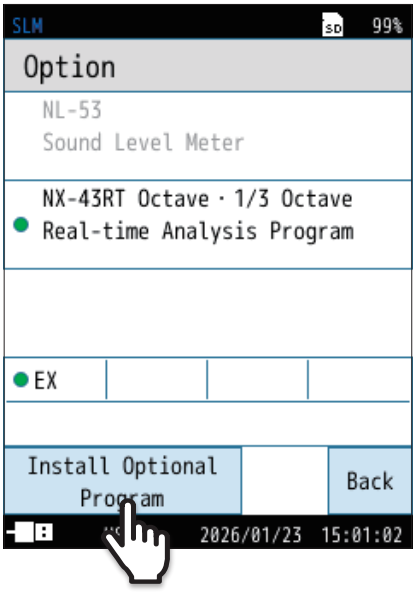
> **Note**
>
> - The program installation must be performed when the measurement mode is on [SLM]. Confirm that [SLM] is displayed in the upper left corner of the screen before operation.
> - If other than [SLM] is displayed, select [NL-53 Sound Level Meter (depending on the model)] on the [Menu] » [Option]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

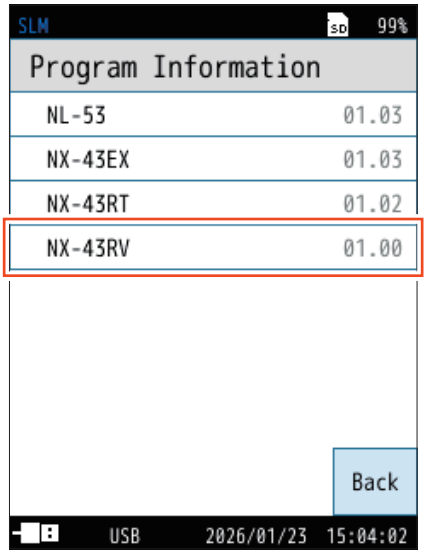


6 Touch [Install].

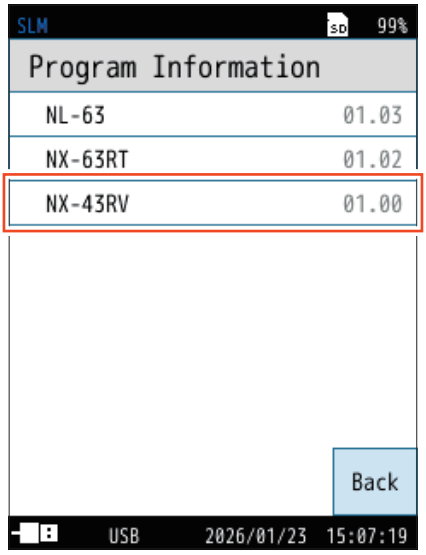
The program will now be installed.



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



NL-43 / NL-53



NL-63

3.2 Uninstalling

Important

- Make sure that the sound level meter is turned off before inserting the program card.
- When uninstalling the program, make sure that sufficient battery charge remains, or connect the unit to a USB power supply or AC adapter.
- Never remove the program card during uninstallation. There is a risk of 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 (page 9).

Note

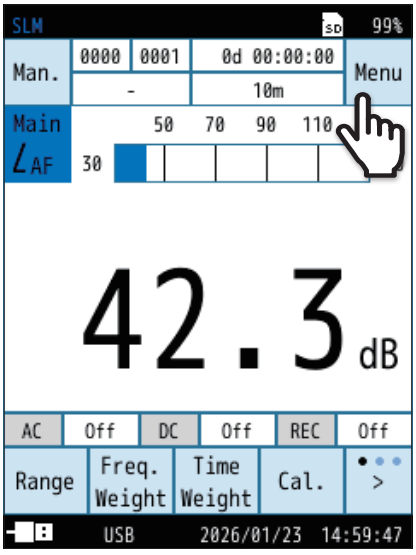
- If the program card is write-protected, uninstallation cannot be performed. Before starting the uninstallation, make sure that the card is set to the write-enabled position.

3 Touch [Menu] on the measurement screen.

The [Menu] screen appears.

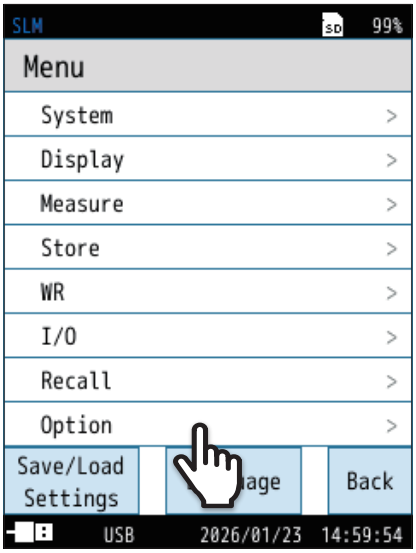
Note

- 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 before operation.
- If other than [SLM] is displayed, select [NL-53 Sound Level Meter (depending on the model)] on the [Menu] » [Option] screen and switch to [SLM].

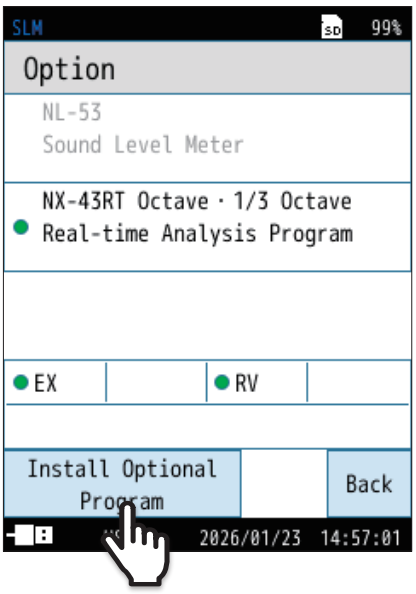


4 Touch [Option] on the [Menu] screen.

The [Option] screen appears.



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



6 **Touch [Uninstall].**

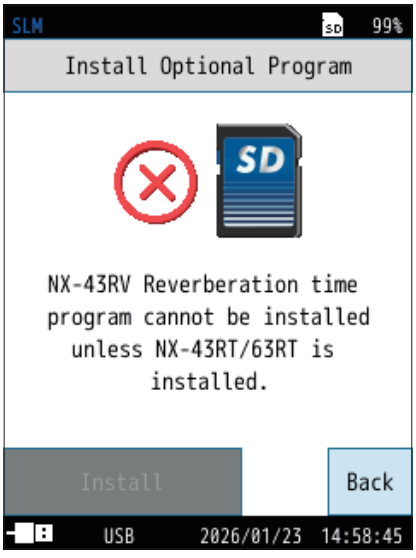
The program will now be uninstalled.



3.3 If you cannot install

- NL-43 / NL-53
  To install the NX-43RV, install the Octave·1/3 Octave Real-time Analysis Program NX-43RT and the Extended Function Program NX-43EX in advance.
- NL-63
  To install the NX-43RV, install the Octave·1/3 Octave Real-time Analysis Program NX-63RT in advance.

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

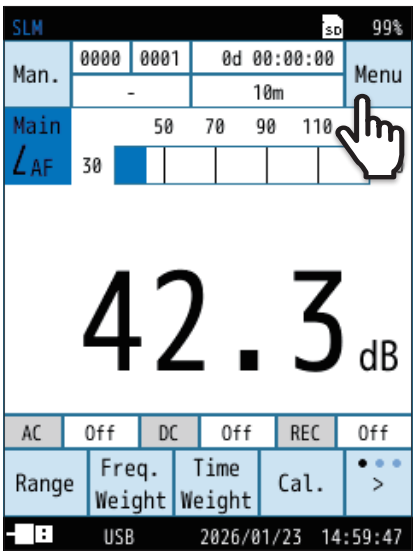


3.4 Switching the function to this program

The NX-43RV operates on the NX-43RT or NX-63RT.

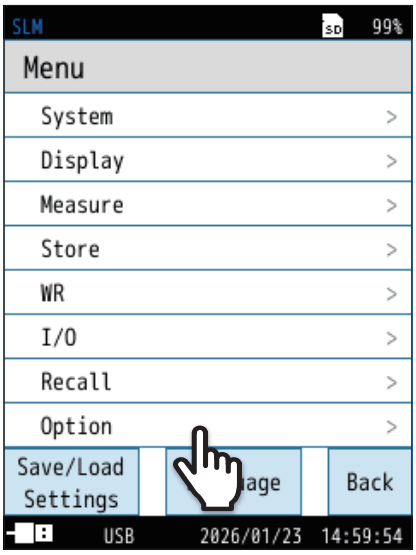
1 **Touch [Menu] on the measurement screen.**

The [Menu] screen appears.



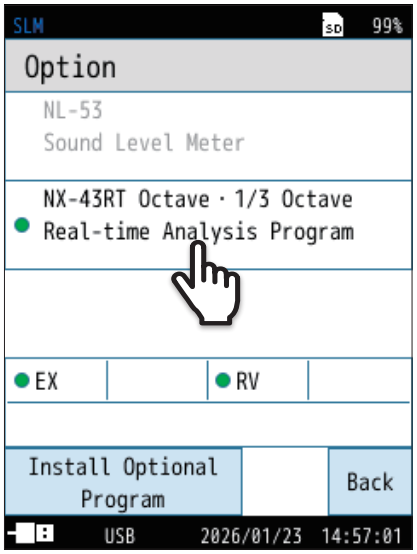
2 **Touch [Option] on the [Menu] screen.**

The [Option] screen appears.

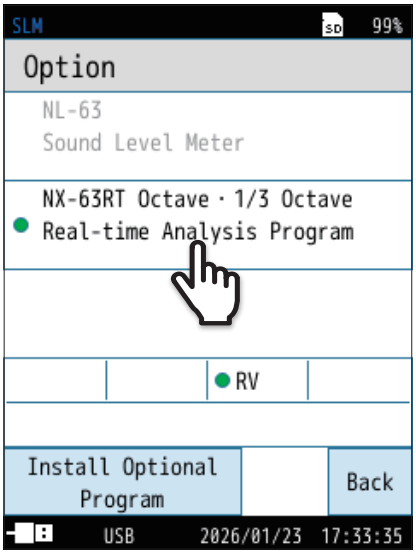


3 On the [Option] screen, touch [NX-43RT Octave · 1/3 Octave Real-time Analysis Program] ([NX-63RT] when using the NL-63).

The unit will restart immediately, the function will switch, and the NX-43RT / NX-63RT measurement screen will appear.

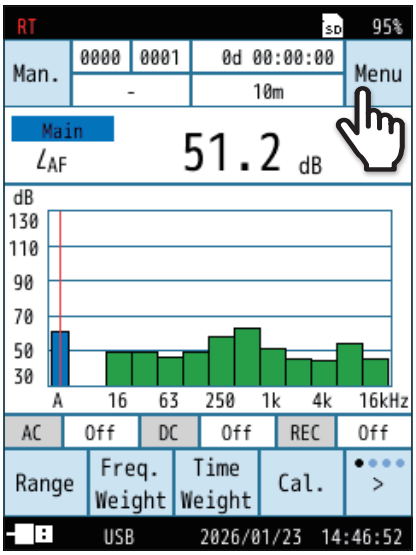


NL-43 / NL-53

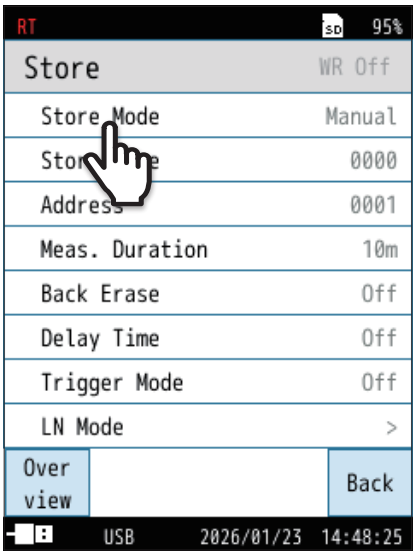


NL-63

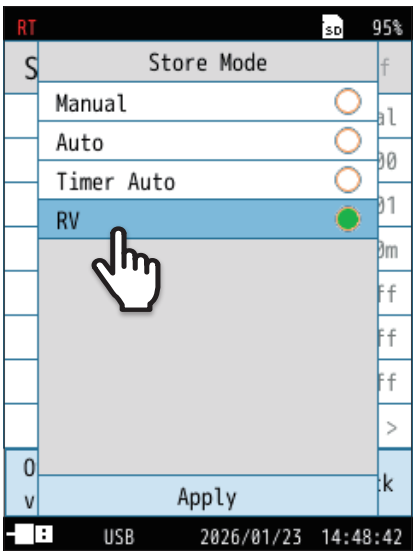
4 On the measurement screen, touch [Menu] - [Store].



5 On the [Store] screen, touch [Store Mode].

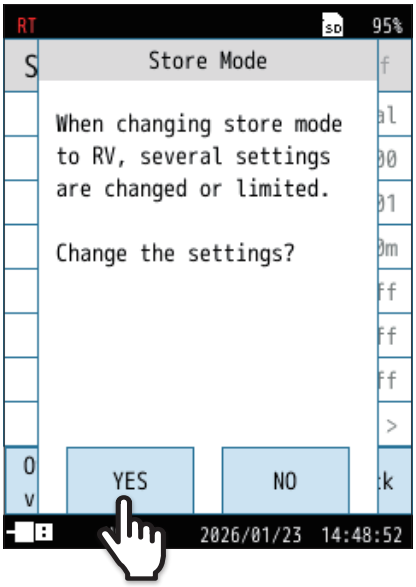


6 On the [Store Mode] screen, touch [RV].



7 On the confirmation screen, select [Yes].

When the measurement screen reappears, [RV] is displayed in the upper left corner of the screen.



4

Reading the Display

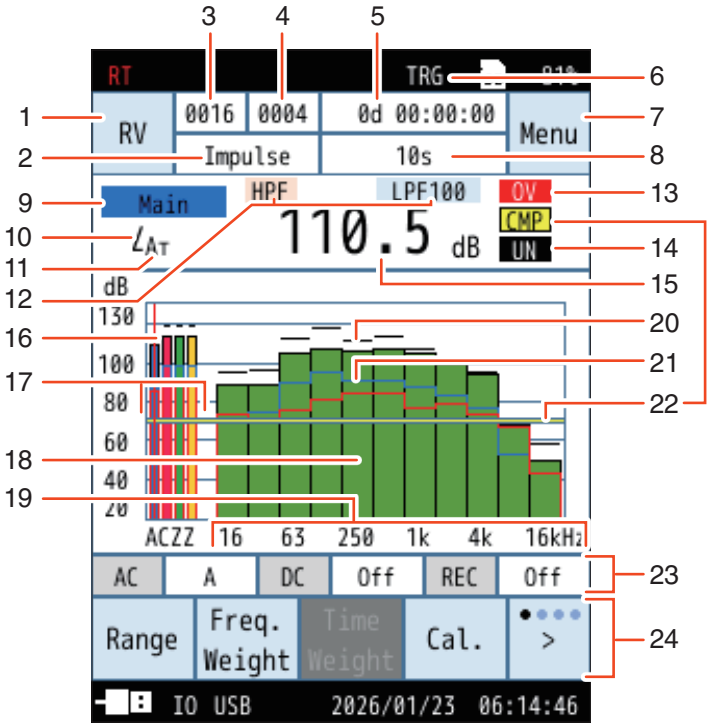
The measurement screen is displayed in the graph format or the numerical value list format.
To switch the display format, touch [List View] on the menu ring, or select from [Menu] » [Display] » [Display Analysis] (page 29).

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.

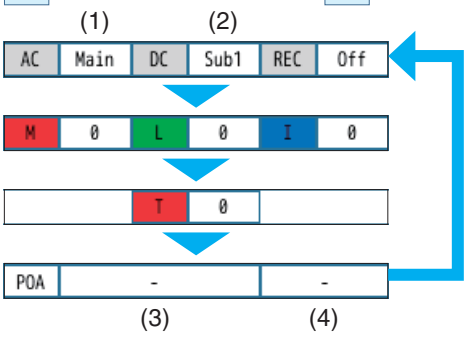
4.1 Measurement screen

4.1.1 Graph screen

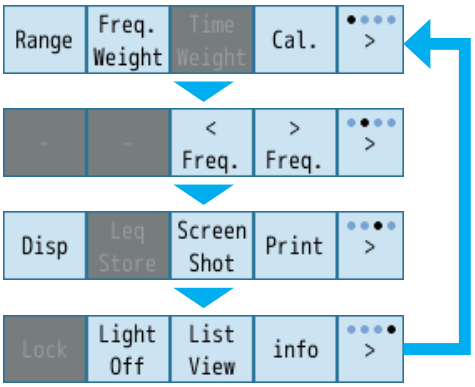


No.	Name	Description
1	Store mode	Displays the store mode when saving to memory. Touch to go directly to the store settings screen. There are four store modes: Manual, Auto, Timer Auto, and RV (page 35).
2	Reverberation time measurement method	Displays the measurement method selected for the reverberation time measurement. There are two measurement methods: Impulse and Noise (page 36).
3	Store name	Displays the store name (page 35).
4	Store address	Displays the memory address. When the store address reaches “0040,” it is displayed in red (page 35).
5	Elapsed measurement time	Displays the elapsed time since the start of measurement in hours, minutes, and seconds .

<table>
<tr><th>No.</th><th>Name</th><th>Description</th></tr>
<tr><td>6</td><td>Measurement start trigger</td><td>Displayed automatically when the store mode is set to RV.
The measurement start trigger is fixed to [Level].</td></tr>
<tr><td>7</td><td>Menu / Pause / Standby / Measuring 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>Rec.</td><td>Displayed during measurement when waveform recording is enabled (the recording function is available for Total only).
While recording in the measuring state, ▶ and Rec. are displayed alternately.
* Optional program NX-43WR is required.</td></tr>
<tr><td>■</td><td>Flashes while waiting for the level trigger.
In addition, the indicator LED flashes blue.</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>
</table></td></tr>
<tr><td>8</td><td>Total measurement time</td><td>Displays the set total measurement time (page 36).</td></tr>
<tr><td>9</td><td>Channel name and center frequency</td><td>Shows the channel (Main, Sub1 to Sub3) or the center frequency of the band of the graph selected with the cursor.</td></tr>
<tr><td>10</td><td>Measured quantity</td><td>Displays the measured quantity of the graph selected by the cursor.</td></tr>
<tr><td>11</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>
<tr><td>G*</td><td>G-weighting</td></tr>
</table>
* Available only for NL-63.</td></tr>
<tr><td>12</td><td>Filter</td><td>Low-pass and high-pass filters can be set in Frequency Weighting (page 33).
The settings can be configured independently for sound level and Band.
<table>
<tr><td>Z(HPF)*</td><td>High-pass filter with Z-weighting</td></tr>
<tr><td>Z(LPF100Hz)*</td><td>Low-pass filter with Z-weighting (cutoff frequency 100 Hz)</td></tr>
<tr><td>Z(LPF500Hz)*</td><td>Low-pass filter with Z-weighting (cutoff frequency 500 Hz)</td></tr>
</table>
* Available only for NL-63.</td></tr>
<tr><td>13</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>14</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>15</td><td>Level indication</td><td>Shows the level of the graph selected with the cursor.</td></tr>
<tr><td>16</td><td>Cursor</td><td>Used to select one channel or one frequency band from the displayed graph.
To move the cursor, touch the bar graph, or touch < Freq. | > Freq. on the menu ring.</td></tr>
</table>

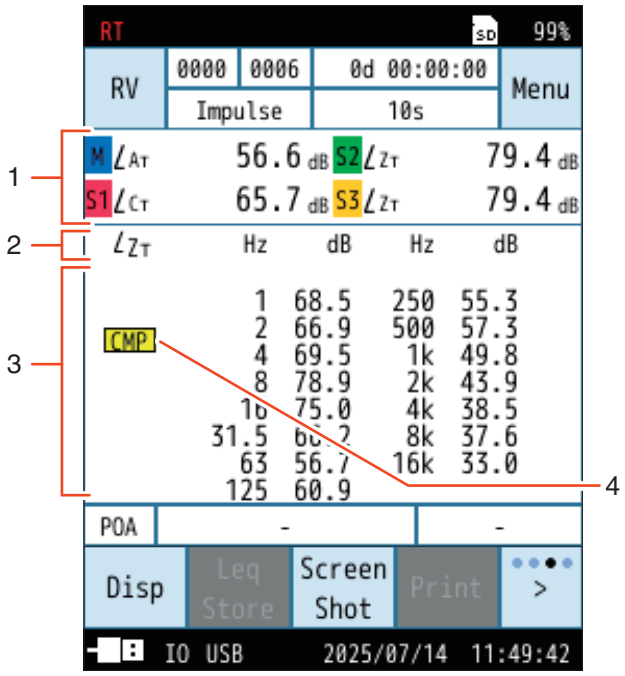
<table>
<tr><th>No.</th><th>Name</th><th>Description</th></tr>
<tr><td>17</td><td>Level bar</td><td>
<table>
<tr><td>
A
Main</td><td>Sound level bar for the Main. This is always displayed.
The set frequency weighting is displayed below the bar.</td></tr>
<tr><td>
CZA
Sub1 to Sub3</td><td>Sound level bars for the Sub1 to Sub3 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>
</table>
</td></tr>
<tr><td>18</td><td>Frequency band level bar</td><td>Displays the level value for each frequency band as a bar graph.
Octave band analysis: 16 Hz to 16 kHz (11 bands)
1/3 octave band analysis: 12.5 Hz to 20 kHz (33 bands)
* The following settings are available only for NL-63.
When the frequency weighting for Band is set to Z, G, Z (LPF100Hz), or Z (LPF500Hz):
Octave band analysis: 1 Hz to 16 kHz (15 bands)
1/3 octave band analysis: 1 Hz to 20 kHz (44 bands)</td></tr>
<tr><td>19</td><td>Frequency display</td><td>The center frequencies of the frequency bands are displayed as a reference: 16 Hz, 63 Hz, 250 Hz, 1 kHz, 4 kHz, and 16 kHz
* The following settings are available only for NL-63.
When the frequency weighting for Band is set to Z, G, Z (LPF100Hz), or Z (LPF500Hz), the center frequencies of the frequency bands are displayed as a reference: 1 Hz, 4 Hz, 16 Hz, 63 Hz, 250 Hz, and 1 kHz</td></tr>
<tr><td>20</td><td>Maximum Hold</td><td>When the Maximum Hold is set to [On], the previous maximum value of each frequency band is displayed.</td></tr>
<tr><td>21</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 (page 31).</td></tr>
<tr><td>22</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 43) and the following two conditions are met.
• When the specified channel (selected from Main, Sub1 to Sub3, 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>23</td><td>Information display bar</td><td>Each time you touch info on the menu ring, the displayed information will switch.
info is displayed by touching > on the far right of the menu ring.


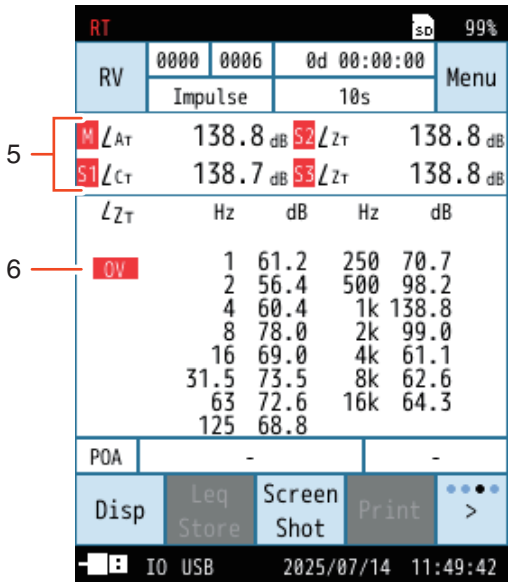
(1) For AC OUT under Signal Output, either the channels (Main, Sub1 to Sub3) or Band can be selected. When Band is selected, its center frequency is displayed.
(2) For DC OUT under Signal Output, either the channels (Main, Sub1 to Sub3) or Band can be selected. When Band is selected, its center frequency is displayed.
(3) Not displayed when the store mode is set to RV. When set to a mode other than RV, the upper and lower frequencies of the Partial Overall (POA) band are displayed.
(4) Not displayed when the store mode is set to RV. When set to a mode other than RV, the NC/NR/Cz curve evaluation result is displayed at the end of the measurement.</td></tr>
</table>

<table>
<tr><th>No.</th><th>Name</th><th>Description</th></tr>
<tr><td>24</td><td>Menu ring</td><td>
Each time you touch [>] on the far right of the menu ring, the displayed menu switches.


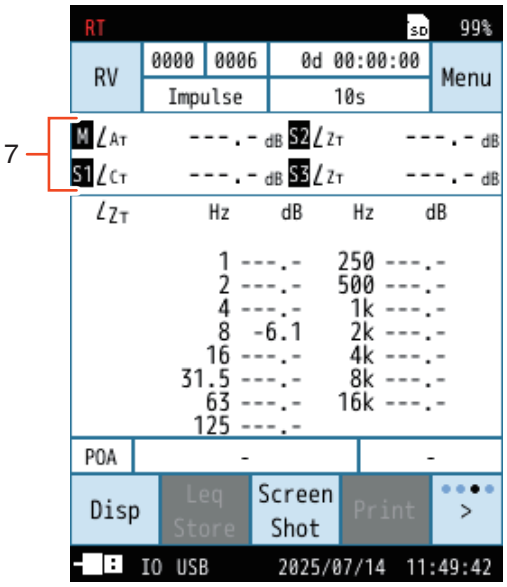
<table>
<tr><td>Range</td><td>Sets the upper and lower limits of the bar graph.</td></tr>
<tr><td>Freq. Weight</td><td>Sets the frequency weighting for each channel (page 33).</td></tr>
<tr><td>Time Weight</td><td>When the store mode is set to RV, “Time Weighting” cannot be set.
This button is displayed when the store mode is set to Manual, Auto, or Timer Auto, and is used to set the time weighting for each channel (see the “Operation Guide” of the sound level meter).</td></tr>
<tr><td>Cal.</td><td>Displays the [Calibration] screen (see the “Operation Guide” of the sound level meter).</td></tr>
<tr><td>< Freq. | > Freq.</td><td>Switch the channel and frequency band to display. Move the cursor.</td></tr>
<tr><td>Disp</td><td>Switches the screen display.</td></tr>
<tr><td>Leq Store</td><td>When the store mode is set to RV, “Leq Store” cannot be set.
Displayed in Manual mode (see the “Operation Guide” of the sound level meter).</td></tr>
<tr><td>Screen Shot</td><td>Saves a screenshot of the displayed screen (see the “Operation Guide” of the sound level meter).</td></tr>
<tr><td>Print</td><td>Prints a screenshot of the displayed screen (see the “Operation Guide” of the sound level meter).</td></tr>
<tr><td>Lock</td><td>When the store mode is set to RV, “Lock” cannot be set.
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 the “Operation Guide” of the sound level meter).</td></tr>
<tr><td>Light Off</td><td>Turns off the backlight (see the “Operation Guide” of the sound level meter).</td></tr>
<tr><td>Graph View
List View</td><td>Switches the analysis result display.
It is labeled as [Graph View] while a list is displayed, and [List View] while a graph is displayed.</td></tr>
<tr><td>info</td><td>Switches the display of the information display bar.</td></tr>
</table>
</td></tr>
</table>

4.1.2 Numeric list screen





Overload indication



Under-range indication

No.	Name	Description
1	Sound level	Displays the icon, measured quantity, and sound level values for Main and Sub1 to Sub3 (only the sub channels that are set to [On]).
2	RV measured quantity	Displays the measured quantity of the reverberation time.
3	Frequency band levels	Show the level value in each frequency band and the measured quantity. With 1/3 octave analysis, touching < Page > Page on the menu ring switches the displayed frequency band. ◀ and ▶ are displayed when there is another page, ◁ and ▷ are displayed when there is no other page.
4	Comparator	Select [Comparator] on the [Menu] » [I/O] » [IO Port] screen. When the comparator channel is set to [Band], CMP is displayed in the frequency-band level area. 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 Sub3.

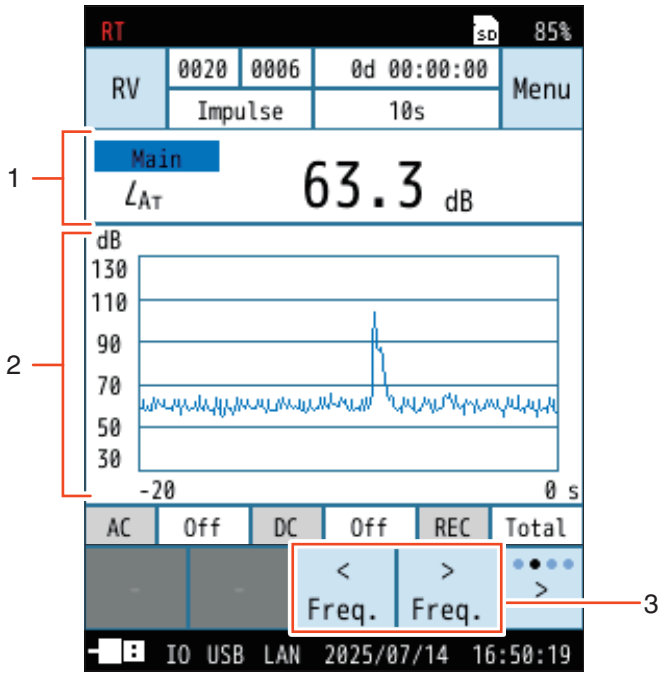
No.	Name	Description	
5 6	Overload indication		When a signal overload condition is detected in the sound level, the corresponding Main and/or Sub1 to Sub3 icons will change from the default color to red for at least one second (e.g.: Main, M ⇒ M).
			When a signal overload condition is detected during calculation measurement, the corresponding Main and/or Sub1 to Sub3 icons will change from the default color to red. This indication remains until the next calculation measurement is started (e.g.: Main, M ⇒ M).
			When an overload condition is detected for the octave band, this indication is shown for at least one second.
			Displayed when signal overload is detected during octave-band calculation. This indication remains on the calculation result screen until the next calculation measurement is started.
7	Under-range indication		When an under-range condition is detected for the sound level, Main and Sub1 to Sub3 icons will change from the default color to black (e.g.: Main, M ⇒ M).
			If the calculation contains signal under-range data, Main and Sub1 to Sub3 icons will change from the default color to black. This indication remains until the next calculation measurement is started (e.g.: Main, M ⇒ M).

Note

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

4.1.3 Time-Level screen

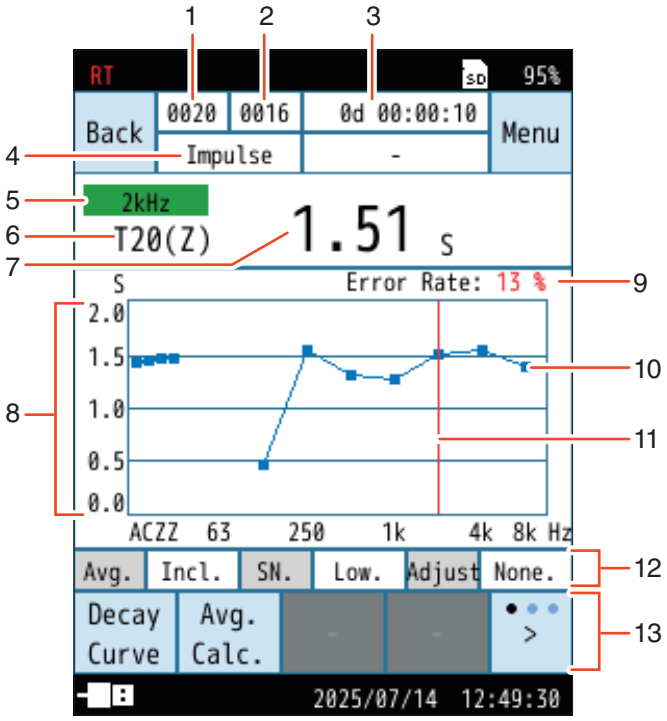
The Time-Level screen can be displayed when a setting other than [Off] is selected from [Menu] » [Display] » [Time-Level] (page 30).
Touching Disp on the menu ring switches the display in the following order:
Measurement screen → Time-Level screen → Measurement screen … (page 20)



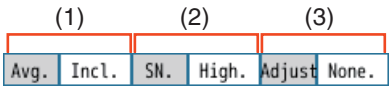
No.	Name	Description
1	Channel name / frequency band / measured quantity / sound level value	Displays the channel name (Main or Sub1 to Sub3) / frequency band, measured quantity, and sound level value of the selected channel or frequency band.
2	Time-Level waveform	Displays the level fluctuation of the sound level and frequency band levels. The time scale of the X-axis can be set from [Menu] » [Display] » [Time-Level]. The level scale of the Y-axis can be set from [Menu] » [Display] » [Bar Graph].
3	Menu ring < Freq. > Freq.	Touching > on the far right of the menu ring switches the displayed menu. Touching < Freq. > Freq. on the menu ring switches the channel (Main or Sub1 to Sub3) or each frequency band.

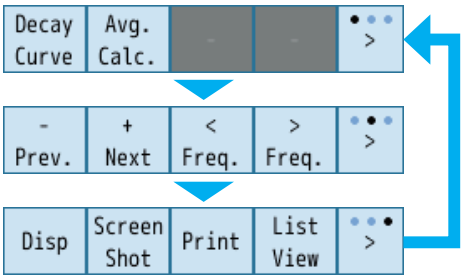
4.2 Recall screen

4.2.1 Reverberation Time Recall screen



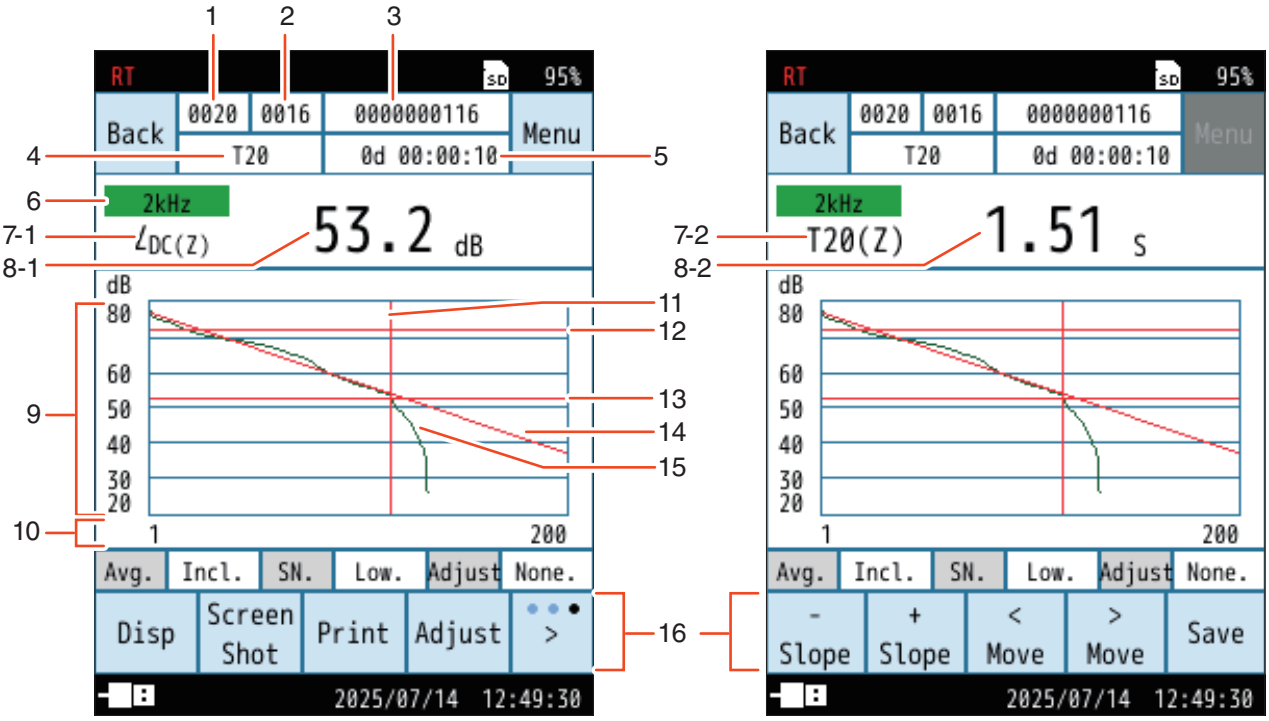
No.	Name	Description
1	Store name	Displays the store name of the recalled data.
2	Store address	Displays the store address of the recalled data.
3	Measurement time	Displays the measurement time for the selected store address (0d 00:00:00 to 0d 00:00:30). If an address with no stored or averaged result is specified, an invalid value (-d: --:--:--) is displayed.
4	Reverberation time measurement method	Displays the reverberation time measurement method used for the measurement (Impulse or Noise).
5	Channel name / center frequency of frequency band	Displays the channel name (Main or Sub1 to Sub3) or the center frequency of the frequency band selected by the cursor.
6	Reverberation time type and frequency weighting	Displays the reverberation time type (T20, T30, T15, or EDT) for the channel (Main or Sub1 to Sub3) or each frequency band selected by the cursor. The measured frequency weighting is shown in parentheses (not displayed on the “Reverberation average” screen).
7	Reverberation time	Displays the reverberation time for the channel (Main or Sub1 to Sub3) or each frequency band selected by the cursor.
8	Reverberation time graph range	Displays the time display range of the reverberation time. To change the setting, select from [Menu] » [Display] » [RVT Display] » [Graph] » [Graph Upper Range].
9	Error rate	Displays the error rate calculated from T20 and T30. This is not displayed when the graph for T15 or EDT is shown. When [Display Error] is set to [On], the [Error Rate] setting item is displayed. If the result is within the range set for [Error Rate], it is displayed in black; if it exceeds the set value, it is displayed in red. [Display Error] can be set from [Menu] » [Display] » [RVT Display] » [Display Error].
10	Reverberation time graph	Displays a graph with the channel (Main, Sub1 to Sub3) and each frequency band on the horizontal axis, and the reverberation time on the vertical axis.

<table>
<tr><th>No.</th><th>Name</th><th>Description</th></tr>
<tr><td>11</td><td>Cursor</td><td>In the graph display, use the cursor to select either a channel (Main or Sub1 to Sub3) or a frequency band. The cursor moves when you touch the graph or touch [< Freq.] [> Freq.] on the menu ring.
Displays information of the channel (Main, Sub1 to Sub3) or each frequency band selected by the cursor at positions 5, 6, 7, 9, and 12 on the screen.</td></tr>
<tr><td>12</td><td>Information display bar during recall</td><td>

(1) [Avg.]
Displays whether the currently displayed result is used in calculating the Reverberation average (page 59).
[Incl.]: Used in calculating the Reverberation average
[Excl.]: Not used in calculating the Reverberation average
[–]: Displayed when the Reverberation average (store address 0000) is shown,or when no store address data exist
(2) [SN.]
Displays whether the signal-to-noise (S/N) ratio between the signal and background noise is sufficient (page 59).
[High.]: S/N ratio is sufficient
[Low.]: S/N ratio is insufficient
(3) [Adjust]
Displays whether adjustment of the slope of the approximation line created from the reverberation decay curve has been performed (page 61).
[None.]: The approximation line has not been adjusted
[Adj.]: The approximation line has been adjusted</td></tr>
<tr><td>13</td><td>Menu ring during recall</td><td>Touching [> ...] on the far right of the menu ring switches the displayed menu.


<table>
<tr><td>Decay curve</td><td>Switches the display from the Reverberation time screen to the Decay curve screen (page 61).
This is not displayed when the Reverberation average screen is shown.</td></tr>
<tr><td>Avg. Calc.</td><td>Sets whether the currently displayed result is included in the calculation of the Reverberation average (page 59).
This is not displayed when the Reverberation average screen is shown.</td></tr>
<tr><td>- Prev. / + Next</td><td>Switches between the Reverberation average and store address data (page 56).</td></tr>
<tr><td>< Freq. / > Freq.</td><td>Switches the channel (Main, Sub1 to Sub3) or each frequency band to be displayed, and moves the cursor (page 63).</td></tr>
<tr><td>Disp</td><td>Switches the type of Reverberation time (T20, T30, T15, EDT) (page 63).</td></tr>
<tr><td>List View</td><td>Switches the display between the graph view and the numeric list view. While the numeric list is displayed, [Graph View] is shown; while the graph is displayed, [List View] is shown (page 60).</td></tr>
</table></td></tr>
</table>

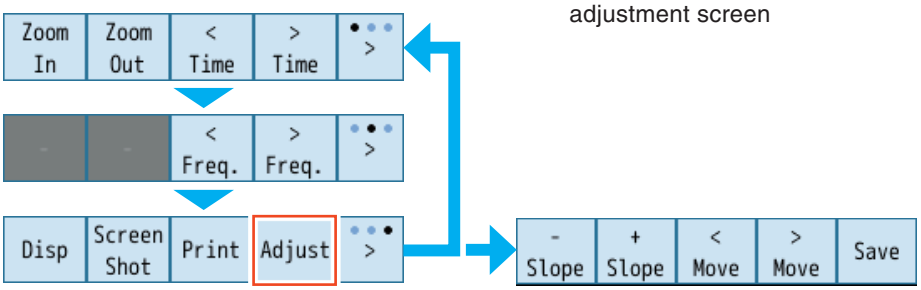
4.2.2 Decay curve screen



Decay curve screen

Approximation line adjustment screen

No.	Name	Description
1	Store name	Displays the store name of the data selected on the Reverberation time recall screen.
2	Store address	Displays the store address of the data selected on the Reverberation time recall screen.
3	Cursor address	Displays the level of the decay curve at the cursor position.
4	Reverberation time type	Displays the reverberation time type (T20, T30, T15, EDT) (page 63).
5	Measurement time	Displays the measurement time for the selected store address (0d 00:00:00 to 0d 00:00:30).
6	Channel name / center frequency of frequency band	Displays the channel name (Main or Sub1 to Sub3) or the center frequency of the frequency band selected by the cursor on the Reverberation time recall screen.
7-1	Decay curve measured quantity / frequency weighting	Displays the measured quantity "L_{DC}" of the decay curve. The frequency weighting used for the measurement is shown in parentheses.
8-1	Decay curve level	Displays the level of the decay curve at the cursor position.
7-2	Reverberation time type / frequency weighting	Displays the reverberation time type (T20, T30, T15, EDT) of the data selected on the reverberation time recall screen. The frequency weighting used for the measurement is shown in parentheses.
8-2	Reverberation time	Displays the reverberation time. The value increases or decreases according to the adjustment of the approximation line.
9	Level range	The level range (vertical axis) is determined as follows. Impulse: The upper and lower limits of the graph are automatically determined from the maximum and minimum values recorded in the reverberation decay curve file. Noise: Determined in conjunction with the bar graph range setting.
10	Address range	Displays the address range (horizontal axis). Touch Zoom In Zoom Out to switch between 100, 200, 400, 800, 1600, 3200, and 6400.

<table>
<tr><th>No.</th><th>Name</th><th>Description</th></tr>
<tr><td>11</td><td>Cursor</td><td>Touch the graph or touch [< Time][> Time] on the menu ring to move the cursor.
On the Decay curve screen, the address information at the cursor position is displayed at position 3, and the decay curve level at the cursor position is displayed at position 8-1.
On the approximation line adjustment screen, the cursor position is fixed, and the reverberation time is displayed at position 8-2.</td></tr>
<tr><td>12</td><td>Reverberation time calculation start level</td><td>Displays the start level for reverberation time calculation based on the values recorded in the reverberation time store file.</td></tr>
<tr><td>13</td><td>Reverberation time calculation end level</td><td>Displays the end level for reverberation time calculation based on the values recorded in the reverberation time store file.</td></tr>
<tr><td>14</td><td>Approximation line</td><td>Displays the approximation line calculated from the decay curve on the graph.</td></tr>
<tr><td>15</td><td>Decay curve</td><td>Displays the decay curve.</td></tr>
<tr><td>16</td><td>Menu ring on the Decay curve screen</td><td>Touching [• • •
>] on the far right of the menu ring switches the displayed menu.
(1) Decay curve screen
(2) Approximation line adjustment screen


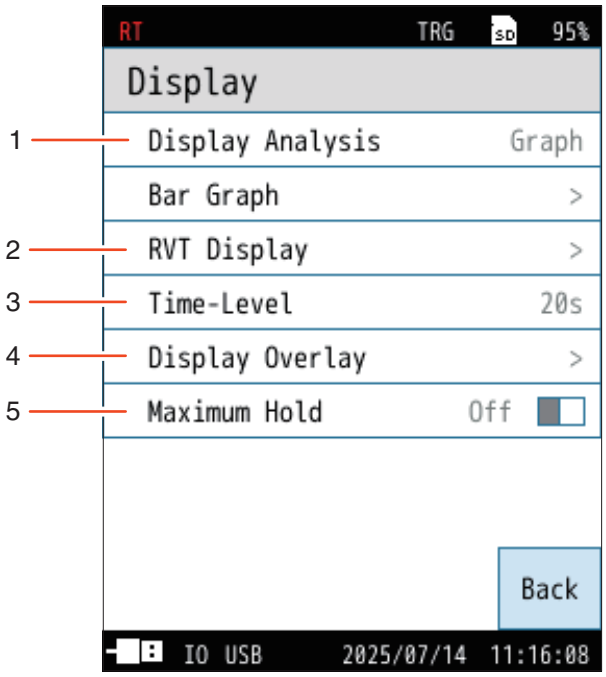
(1) Decay curve screen (page 61)
<table>
<tr><td>Zoom In | Zoom Out</td><td>Switches the address range (horizontal axis) on the Decay curve screen.</td></tr>
<tr><td>< Time | > Time</td><td>Moves the cursor and switches the address at the cursor position.</td></tr>
<tr><td>< Freq. | > Freq.</td><td>Switches the channel (Main, Sub1 to Sub3) or each frequency band to be displayed. Touching it moves the cursor.</td></tr>
<tr><td>Disp</td><td>Switches the reverberation time type.</td></tr>
<tr><td>Adjust</td><td>Transitions to the approximation line adjustment screen.</td></tr>
</table>
(2) Approximation line adjustment screen
<table>
<tr><td>- Slope | + Slope</td><td>Adjusts the slope of the approximation line.</td></tr>
<tr><td>< Move | > Move</td><td>Moves the approximation line to the left or right.</td></tr>
<tr><td>Save</td><td>Saves the adjustment result of the approximation line.</td></tr>
</table></td></tr>
</table>

5 Setting Menu

This section mainly describes the menus related to the NX-43RV.
For details on how to use the sound level meter and other information, refer to each instruction manual listed in “2. Reference Instruction Manuals” (page 8).

5.1 Display

Sets the items displayed on the measurement screen.

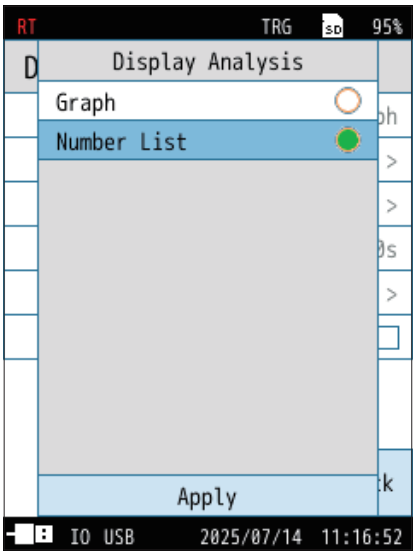


No.	Name	Description
1	Display Analysis	Switches the display of the measurement screen (page 29).
2	RVT Display	Sets items related to reverberation time measurement (page 29).
3	Time-Level	Sets whether to display the time-level screen (page 30).
4	Display Overlay	Selects whether to overlay graphs of measurement data measured in Manual, Auto, or Timer Auto mode (page 31).
5	Maximum Hold	Selects whether to temporarily hold and display the previous maximum value of the band.

5.1.1 Display Analysis

Switches the display of the measurement screen.

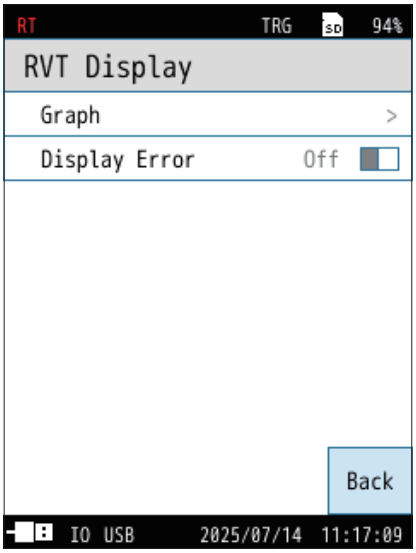
Item	Description
Graph	Displays a graph on the measurement screen.
Number List	Displays a list of numbers on the measurement screen.



5.1.2 RVT Display

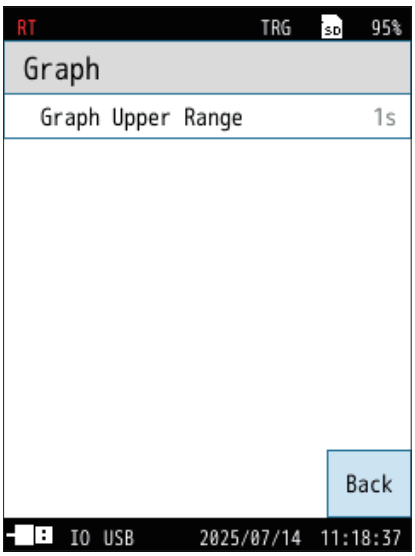
Sets items related to reverberation time measurement.

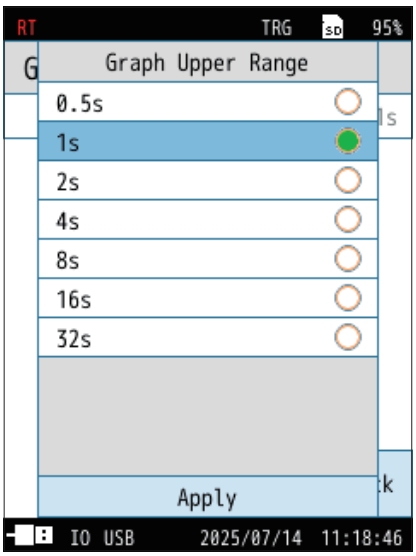
Item	Description
Graph	Sets the vertical axis scale of the reverberation time result graph.
Display Error	When set to On, the error rate threshold can be set.



Graph

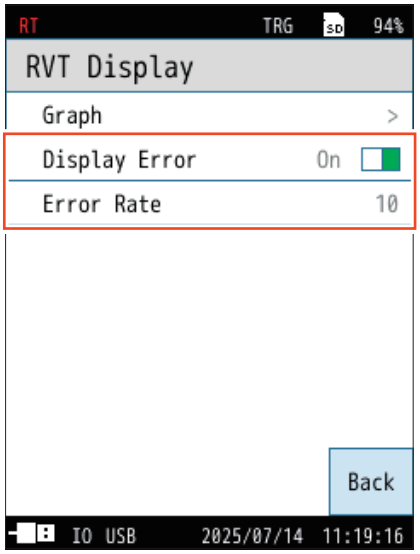
Sets the upper limit of the vertical axis of the reverberation time measurement result graph displayed on the Recall screen.

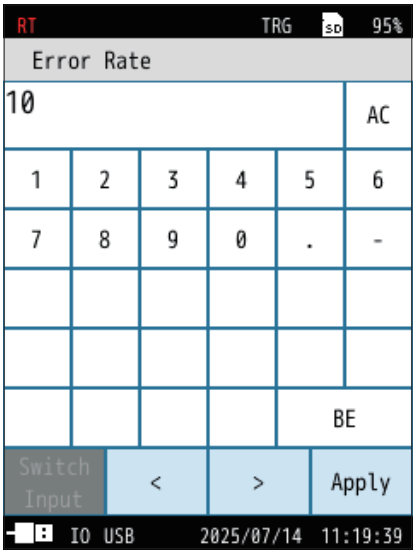




Display Error

When [Display Error] is turned On, the [Error Rate] setting is added.
On the recall screen, if the error rate exceeds the set threshold, the error rate value is displayed in red.

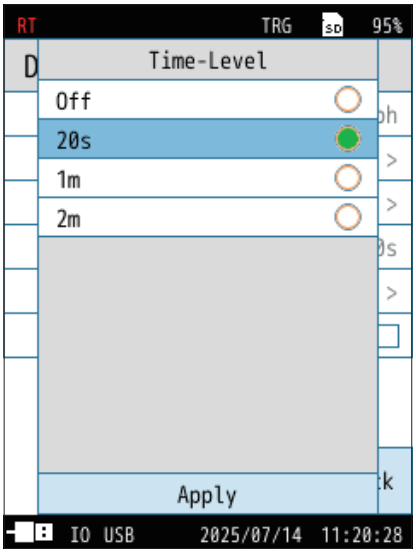




5.1.3 Time-Level

Sets whether to display Time-Level.
When set to anything other than [Off], the time-level screen (page 23) is displayed.

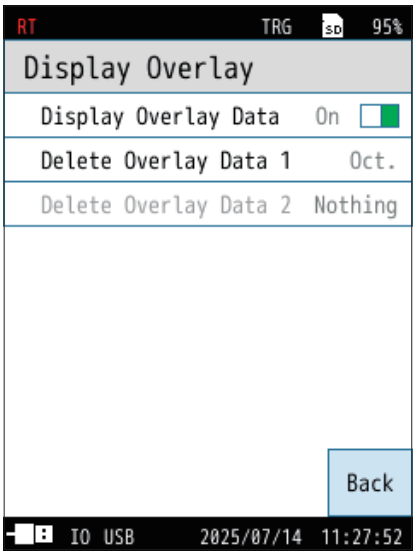
Item	Description
Off	Does not display the [Time-Level] screen.
20s	Displays the [Time-Level] screen. Select the screen horizontal axis (time).
1m	
2m	



5.1.4 Display Overlay

Select whether to overlay graphs of measurement data measured in Manual, Auto, or Timer Auto store mode.
Overlay data can be registered from the [Recall] screen (page 64)

Registered overlay data can be deleted.

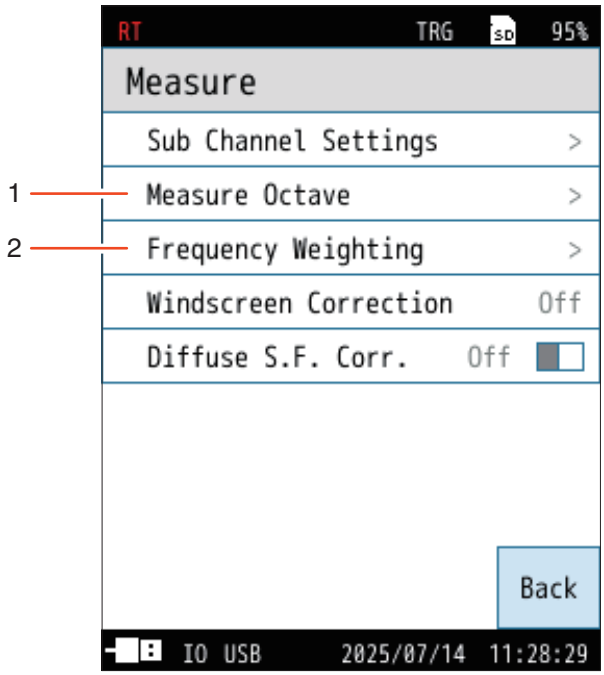


Note

- [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.

5.2 Measure

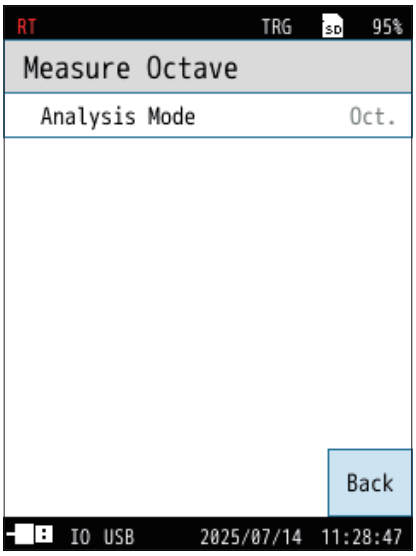
Sets the number of measurement channels, correction and other items.



No.	Name	Description
1	Measure Octave	Switches the mode of octave analysis (page 33).
2	Frequency Weighting	Sets the frequency weighting for each channel (page 33).

5.2.1 Measure Octave

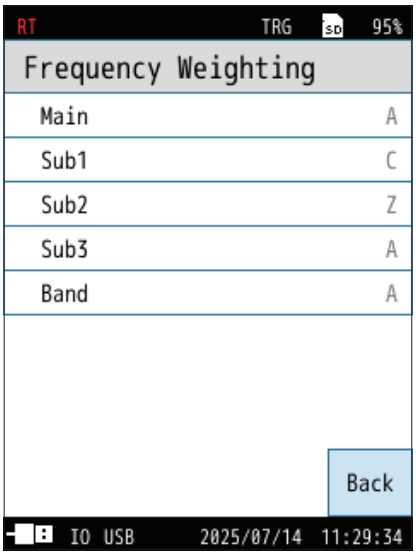
Selects the octave analysis mode from [Oct.] or [1/3 Oct.].

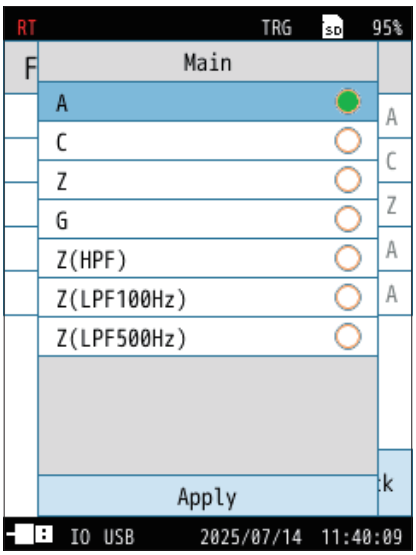


5.2.2 Frequency Weighting

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

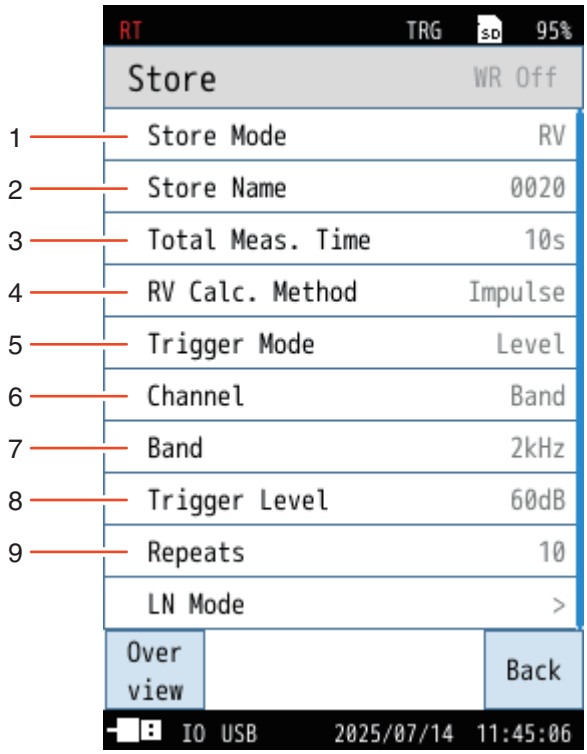
Item	Description
A	Sets A-weighting. A frequency filter is applied that accounts for the relative loudness perceived by the human ear, and is selected when measuring general environmental noise.
C	Sets C-weighting. A frequency filter is applied that attenuates the low-frequency range equal to or below 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 this 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.
G*	Sets G-weighting. A frequency filter is applied that accounts for the relative loudness perceived by the human ear by infrasound. Select this when evaluating the psychological and physiological effects of infrasound from 1 Hz to 20 Hz.
Z (HPF)*	Sets Z-weighting and a high-pass filter, limiting the lower bound of the measurement frequency range to 10 Hz.
Z (LPF100Hz)*	Sets Z-weighting and a low-pass filter (cutoff frequency: 100 Hz), limiting the upper bound of the measurement frequency range to 100 Hz.
Z (LPF500Hz)*	Sets Z-weighting and a low-pass filter (cutoff frequency: 500 Hz), limiting the upper bound of the measurement frequency range to 500 Hz.





* Available only for NL-63.

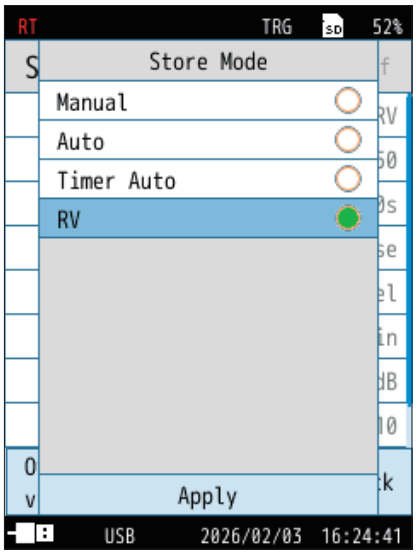
5.3 Store



No.	Name	Description
1	Store Mode	Select [RV] when measuring reverberation time (page 35). The store mode can be selected from [Manual], [Auto], [Timer Auto], or [RV].
2	Store Name	Sets the store data identification number (0000 to 9999) (page 35).
3	Total Meas. Time	Sets the measurement time for one reverberation time measurement in RV store (page 36).
4	RV Calc. Method	Sets the method for calculating the reverberation time (page 36).
5	Trigger Mode	In RV store, the trigger mode is fixed to [Level] (level trigger). When the store mode is other than [RV], [Level] or [External] can be selected.
6	Channel	Selects the channel for the measurement start trigger (page 37).
7	Band	Displayed when the channel is set to [Band] (page 37).
8	Trigger Level	Sets the trigger level for starting measurement (page 37).
9	Repeats	Sets the number of measurement repetitions (1 to 10) (page 38).

5.3.1 Store Mode

Sets the store mode.
Select [RV] when measuring reverberation time.



5.3.2 Store Name

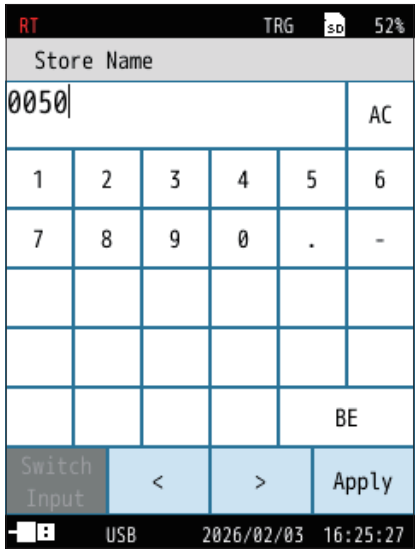
Sets the identification number for RV store data.

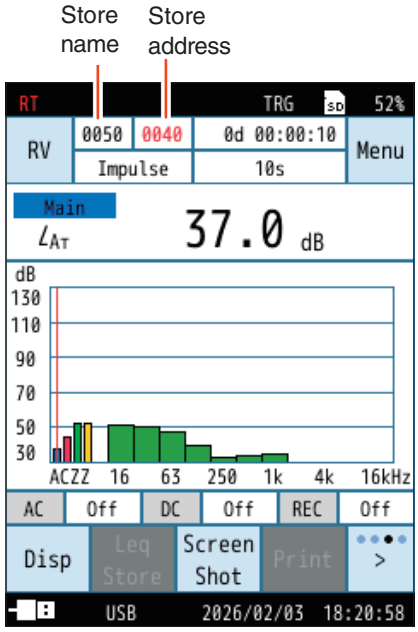
Relationship between store name and store address

- The Store Name can be set from 0000 to 9999.
- For each Store Name, store addresses from 0001 to 0040 can be saved. Measurement data are saved sequentially to the store addresses.
- When the store address reaches 0040, no further measurement data can be saved under the same Store Name.
  In this case, the store address “0040” is displayed in red on the screen.

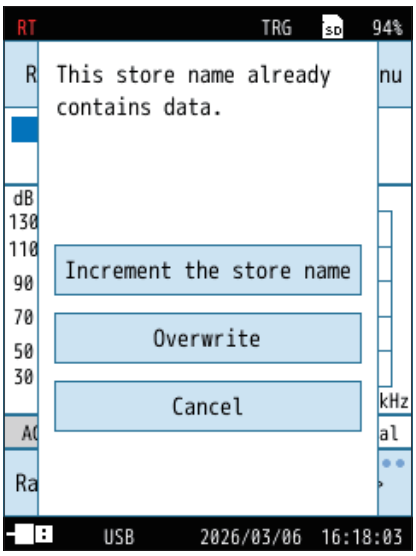
Store name	Store address
0000	0001 0002 ・ ・ ・ 00*n* (Number of data items: maximum 40)
0001 ・ ・ ・ ・ ・	0001 0002 ・ ・ ・ 00*n* (Number of data items: maximum 40)
9999	0001 0002 ・ ・ ・ 00*n* (Number of data items: maximum 40)

n: Number of store addresses saved for one store name





- The maximum number of measurements per store name is 40.

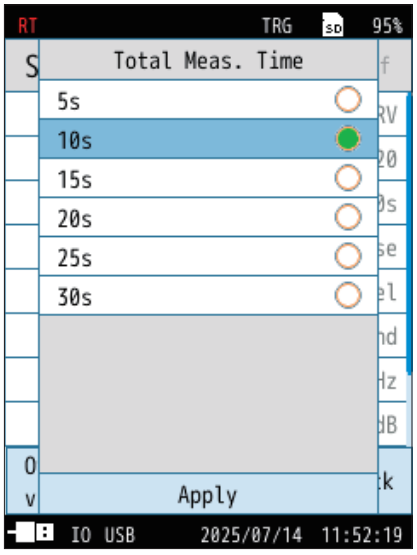


Note

- When measurement is started with a store name for which 40 measurements have already been performed, a confirmation screen is displayed. If [Overwrite] is selected on the confirmation screen, the existing data are deleted, the store address returns to 0001, and measurement starts.

5.3.3 Total Meas. Time

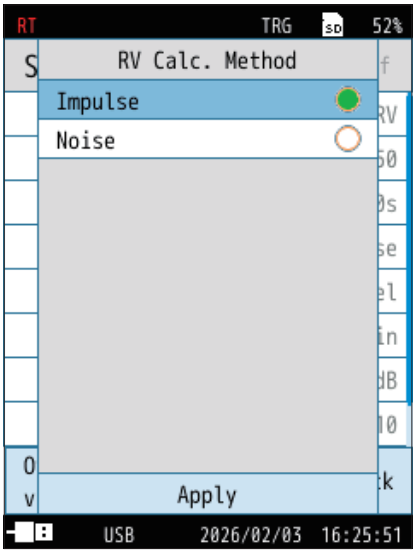
Sets the measurement time for one reverberation time measurement in RV store.



5.3.4 RV Calc. Method

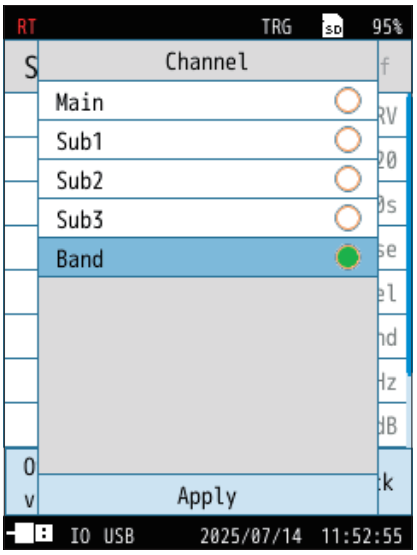
Selects the reverberation time measurement method.

Item	Description
Impulse	Integrated impulse response method
Noise	Interrupted noise method



5.3.5 Channel

Select the channel to trigger the measurement start.

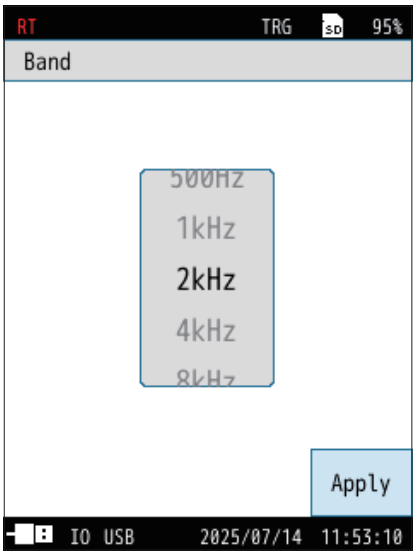


Note

- Main and Band are always displayed.
- Sub1 to Sub3 are displayed only for channels set to [On] from [Menu] » [Measurement] » [Sub Channel].

5.3.6 Band

Displayed when [Band] is selected in “5.3.5 Channel”.
The available frequency bands vary depending on the sound level meter and the analysis mode.



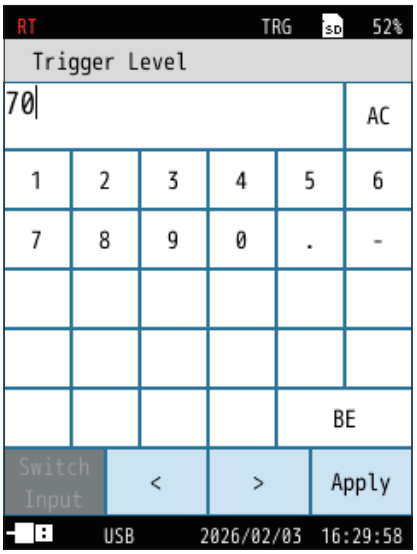
- NL-43 / NL-53
  - Octave band analysis: 16 Hz to 16 kHz (11 bands)
  - 1/3 octave band analysis: 12.5 Hz to 20 kHz (33 bands)
- NL-63

  When the BAND frequency weighting is set to A, C, or Z (HPF):
  - Octave band analysis: 16 Hz to 16 kHz (11 bands)
  - 1/3 octave band analysis: 12.5 Hz to 20 kHz (33 bands)

  When the BAND frequency weighting is set to Z, G, Z (LPF100Hz), or Z (LPF500Hz):
  - Octave band analysis: 1 Hz to 16 kHz (15 bands)
  - 1/3 octave band analysis: 1 Hz to 20 kHz (44 bands)

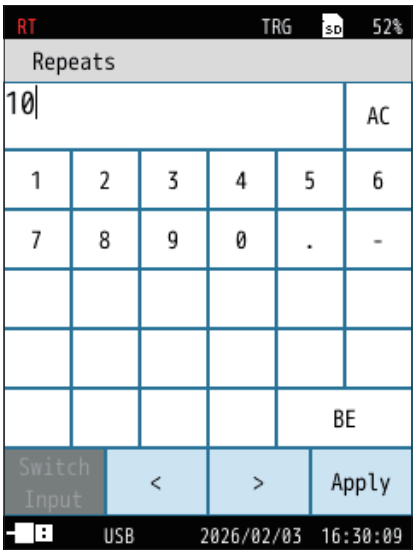
5.3.7 Trigger Level

Sets the trigger level for starting measurement.
The level can be set from 30 dB to 130 dB in 1 dB steps.



5.3.8 Repeats

Sets the number of measurement repetitions (1 to 10).

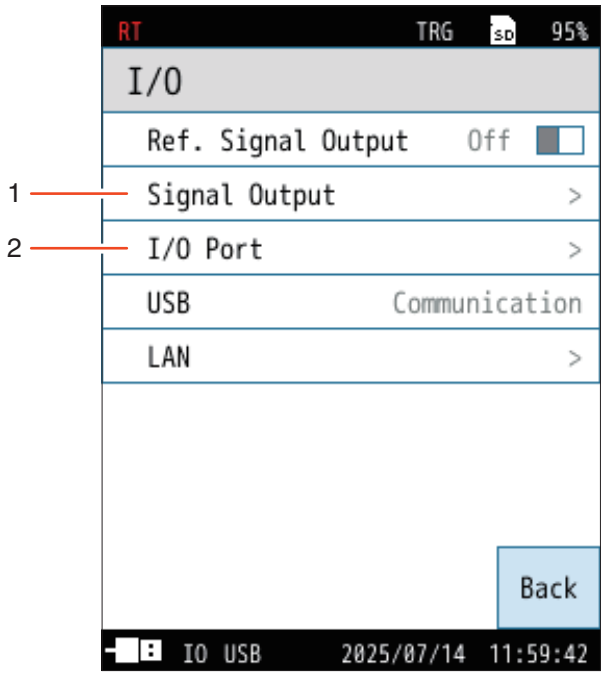


Note

- The selectable number of repetitions ranges from 1 to 10; however, when measurement is started using [Increment the store name], up to 40 addresses of reverberation time measurement results can be stored for a single Store Name (page 52).

5.4 I/O

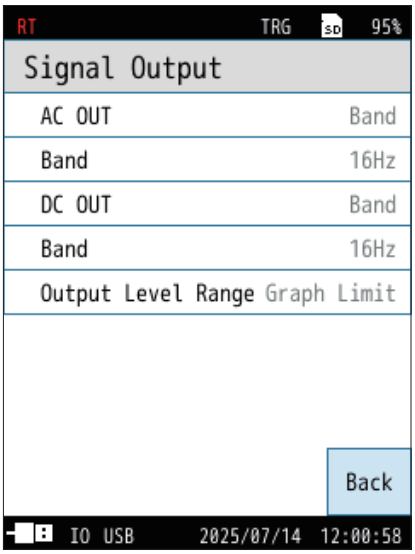
Sets the types of signals used for external input and output.



No.	Name	Description
1	Signal Output	Sets the AC output and DC output (page 40).
2	I/O Port	Sets the I/O port on the bottom of the device (page 43).

5.4.1 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 on how to use the sound level meter and other information, refer to each instruction manual listed in “2. Reference Instruction Manuals” (page 8).

Important

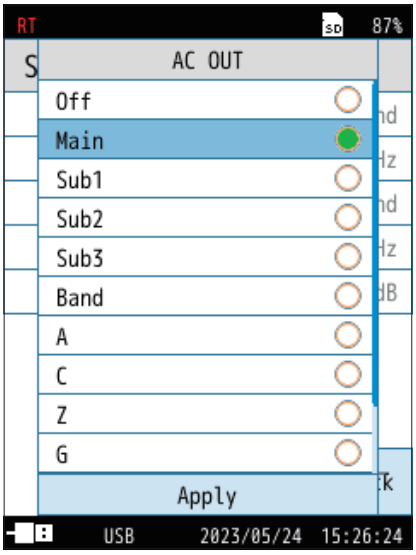
- Make sure that the dedicated accessories, such as the optional BNC-pin output cable CC-24/CC-24S or the AC/DC Output Splitter Cable CC-43S, are connected. Connecting the wrong cable or adapter may damage the device.

Note

- Simultaneous output of AC output and DC output is possible. To output either AC output or DC output, use CC-24/CC-24S. To output them simultaneously, use CC-43S.
- When the AC/DC Output Splitter Cable CC-43S is connected and either the AC or DC is turned on, the output will always be from Channel 1. If both are turned on, the AC output will be from Channel 1 and the DC output will be from Channel 2.

AC OUT

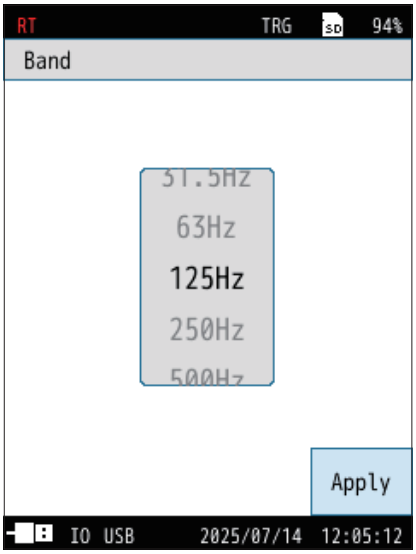
Item	Description
Off	No AC signal is output.
Main	Outputs an AC signal corresponding to the sound pressure waveform after frequency weighting. Applies the frequency weighting set in the selected channel.
Sub1	
Sub2	
Sub3	
Band	Outputs an AC signal corresponding to the Band after frequency weighting. 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	
G*	
Z (HPF)*	
Z (LPF100Hz)*	
Z (LPF500Hz)*	



* Available only for NL-63.

- **Band**

  Displayed when the [AC output] is set to [Band].
  The available frequency bands vary depending on the sound level meter and the analysis mode.



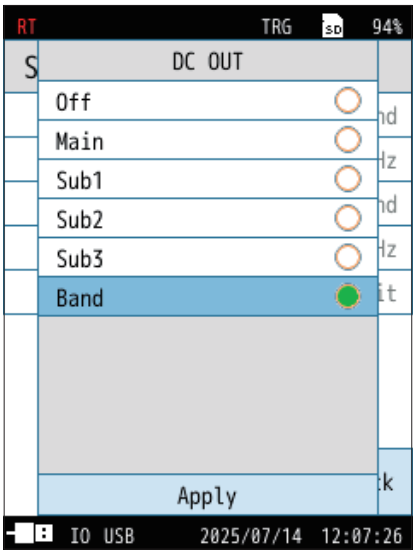
- NL-43 / NL-53
  - Octave band analysis: 16 Hz to 16 kHz (11 bands)
  - 1/3 octave band analysis: 12.5 Hz to 20 kHz (33 bands)
- NL-63

  When the BAND frequency weighting is set to A, C, or Z (HPF):
  - Octave band analysis: 16 Hz to 16 kHz (11 bands)
  - 1/3 octave band analysis: 12.5 Hz to 20 kHz (33 bands)

  When the BAND frequency weighting is set to Z, G, Z (LPF100Hz), or Z (LPF500 Hz):
  - Octave band analysis: 1 Hz to 16 kHz (15 bands)
  - 1/3 octave band analysis: 1 Hz to 20 kHz (44 bands)

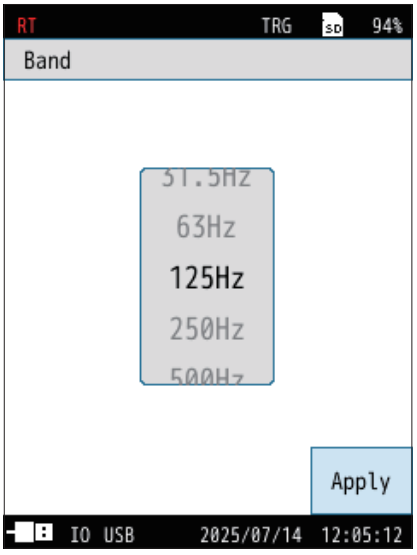
DC OUT

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**

  Displayed when the [DC output] is set to [Band].
  The available frequency bands vary depending on the sound level meter and the analysis mode.



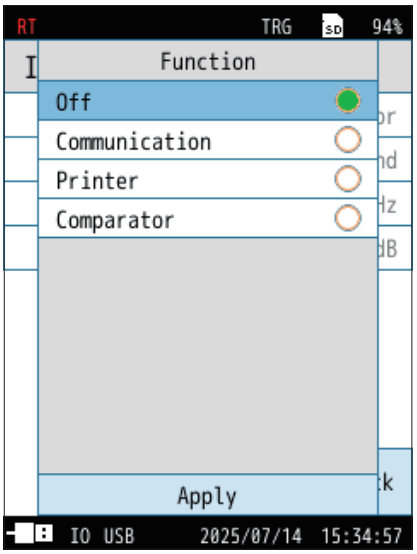
- NL-43 / NL-53
  - Octave band analysis: 16 Hz to 16 kHz (11 bands)
  - 1/3 octave band analysis: 12.5 Hz to 20 kHz (33 bands)
- NL-63

  When the BAND frequency weighting is set to A, C, or Z (HPF):
  - Octave band analysis: 16 Hz to 16 kHz (11 bands)
  - 1/3 octave band analysis: 12.5 Hz to 20 kHz (33 bands)

  When the BAND frequency weighting is set to Z, G, Z (LPF100Hz), or Z (LPF500 Hz):
  - Octave band analysis: 1 Hz to 16 kHz (15 bands)
  - 1/3 octave band analysis: 1 Hz to 20 kHz (44 bands)

5.4.2 I/O Port

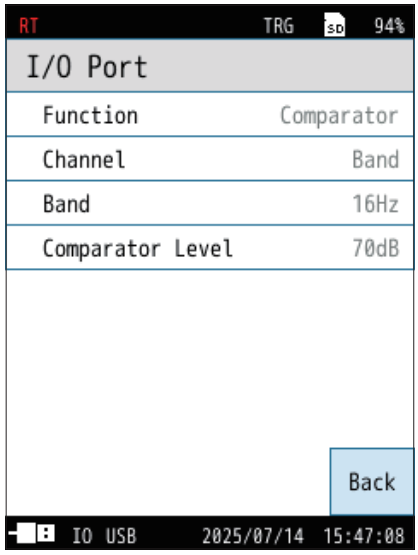
Sets the I/O port on the bottom of the device.



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 displayed on the screen can be printed using the dedicated printer DPU-414 or BL2-58. * The DPU-414 and BL2-58 are no longer manufactured or sold.
Comparator	Sets the comparator signal (open-collector signal for external device control). Select the channel for comparator evaluation (Main, Sub1 to Sub3, or Band), and set the level (30 dB to 130 dB). Set the frequency when selecting the band.

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

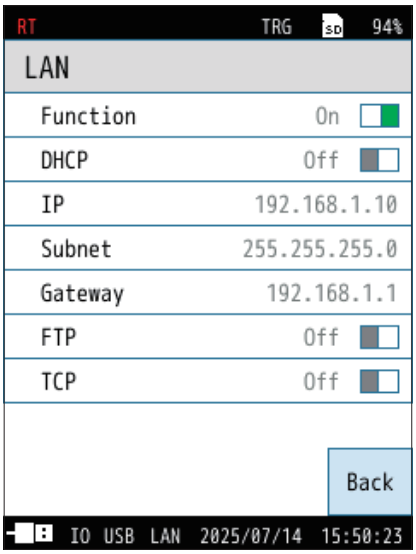
The comparator output turns on when the specified channel exceeds the set level.



Item	Description
Channel	Select the channel for comparator judgment from [Main], [Sub1], [Sub2], [Sub3], and [Band].
Band	The available frequency bands vary depending on the sound level meter and the analysis mode. NL-43 / NL-53 Octave band analysis: 16 Hz to 16 kHz 1/3 octave band analysis: 12.5 Hz to 20 kHz NL-63 Octave band analysis: 1 Hz to 16 kHz 1/3 octave band analysis: 1 Hz to 20 kHz.
Comparator Level	Sets the level for which the comparator output is turned on.

5.4.3 LAN

The Web App function cannot be used when RV store is selected.



Default settings for RV store mode

The following items are set when the store mode is set to [RV].

Item			Default settings
Display	RVT Display	Graph » Graph Upper Range	1s
		Display Error	Off
Measure	Time Weighting		τ(10ms)
Store	Total Meas. Time		10s
	RV Calc. Method		Impulse
	Trigger Mode		Level
	Repeats		1

Note

- When the store mode is changed from [RV] to [Manual], [Auto], or [Timer Auto], the previous settings are not retained, and the following settings are applied.
  - Sub band, POA, Differential Operation, Back Erase, Delay Time: Off
  - Calculation value for Differential Operation: Leq
  - Trigger Mode: Level
  - Time Weighting for Main, Sub channels, and Band: F

6 Reverberation Time Measurement

6.1 Preparation

- Prepare an impulse sound source or a noise generator (e.g., SF-06 / Nor282), and set the measurement parameters.
- Determine the position of the sound source and the measurement points in the receiving room.

  * The SF-06 is no longer manufactured and sold.

⚠ CAUTION

- When performing measurements at high sound pressure levels, be sure to wear appropriate hearing protection.

Important

- An SD card is required for reverberation time measurement. Measurement data cannot be saved to the internal memory. Make sure to insert an SD card with sufficient free capacity.
- Use a genuine SD card provided by our company. If a non-genuine SD card is used, there is a risk that the instrument may not operate correctly, and such use is not covered by the operation guarantee.
- Before starting measurement, format the SD card using the sound level meter.
- Never turn off the power or remove the SD card while data are being saved (during storing). There is a risk of data corruption.

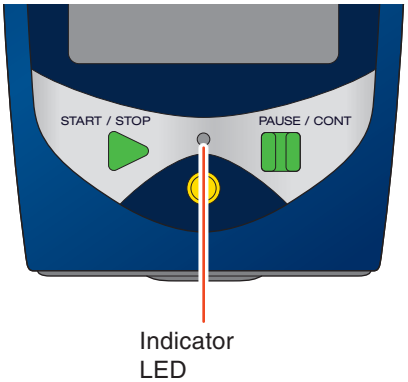
6.2 Reading the LED Indications

During measurement, the measurement status can be checked even from a distance by the flashing color of the indicator LED.

Flashes blue: Level trigger standby
The unit is waiting for a sound that will trigger the start of measurement.

Flashes red: Measuring
Reverberation time measurement is in progress.

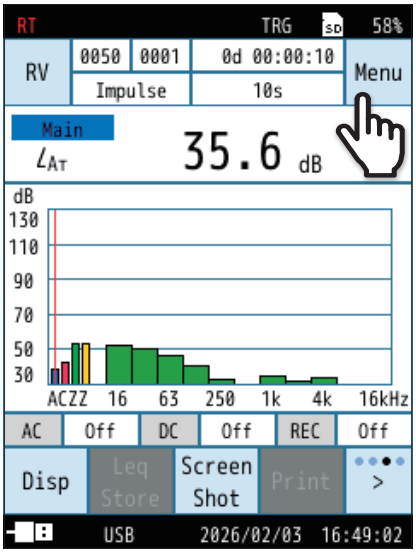
Flashes purple: Calculating
Post-analysis (Decay Curve and Reverberation Time analysis) is being performed after measurement is completed.



6.3 Measurement

1 Touch [Menu] on the measurement screen.

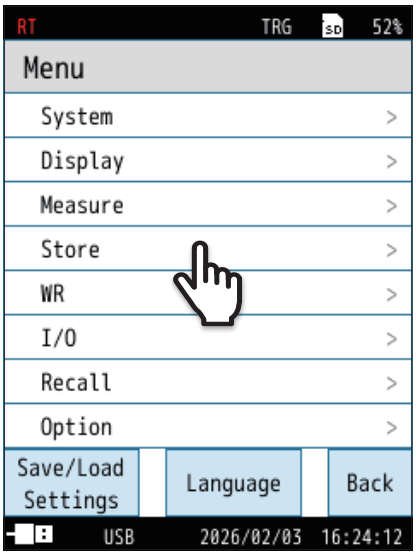
The [Menu] screen appears.



> **Note**
>
> - The operation must be performed when the measurement mode is set to [RT]. Confirm that [RT] is displayed in the upper left corner of the screen.
> - If a mode other than [RT] is displayed, select the NX-43RT Octave·1/3 Octave Real-time Analysis Program (depending on the instrument model) on the [Menu] » [Option] screen, and switch the mode to [RT].

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

The [Store] screen appears.



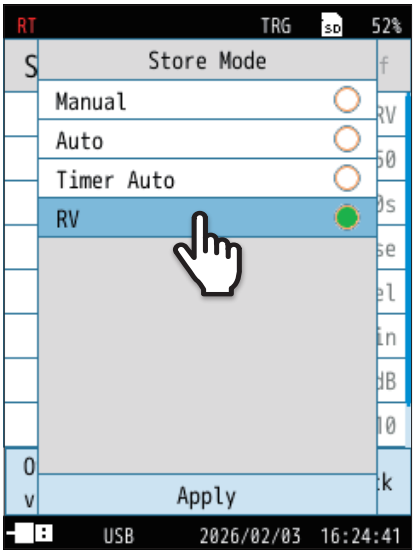
Menu screen

3 Touch [Store Mode] on the [Store] screen.



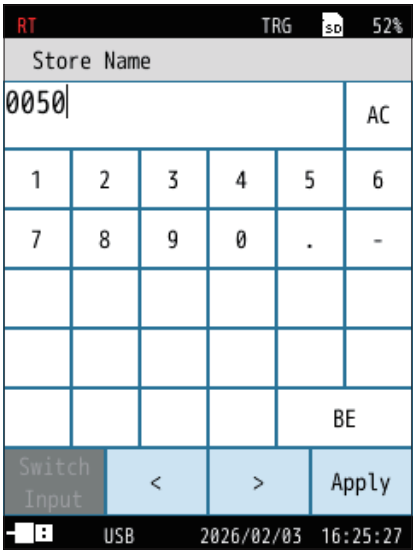
Store screen

4 Set the store mode to [RV] (page 35).



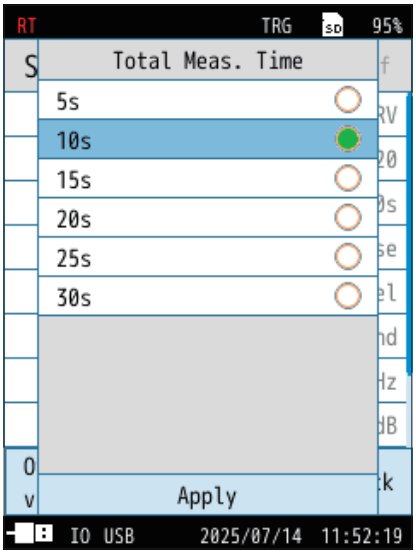
5 Return to the [Store] screen and touch [Store Name].

Set the store name (page 35).



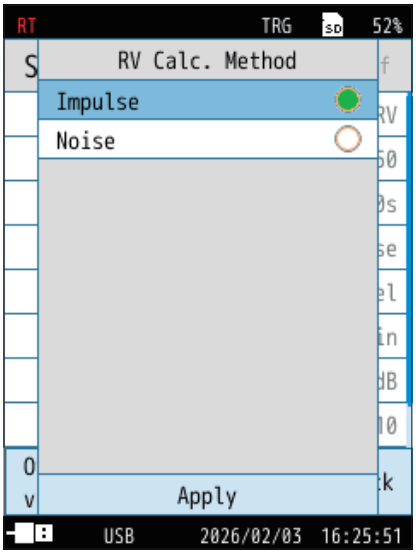
6 Return to the [Store] screen and touch [Total Meas. Time].

Set the measurement time for one reverberation time measurement (page 36).



7 Return to the [Store] screen and touch [RV Calc.Method].

Set the reverberation time calculation method to [Impulse] or [Noise] (page 36).

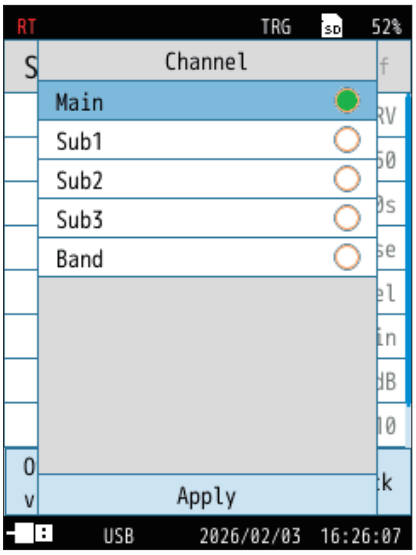


8 Return to the [Store] screen and touch [Channel].

Set the channel for the level trigger (page 37).

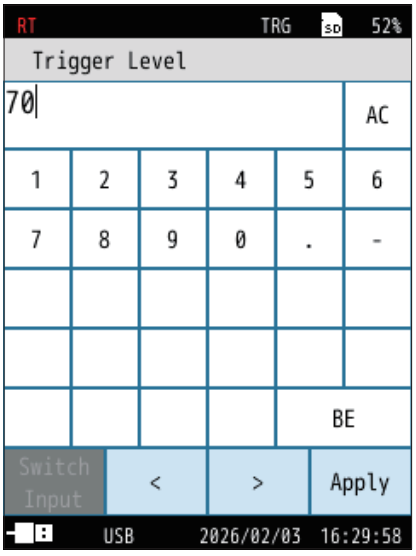
Note

- To apply the level trigger to a specific frequency band, select [Band]. When [Band] is selected, [Band] is displayed on the [Menu] » [Store] screen (page 37). Touch [Band] and select the frequency band for the level trigger.



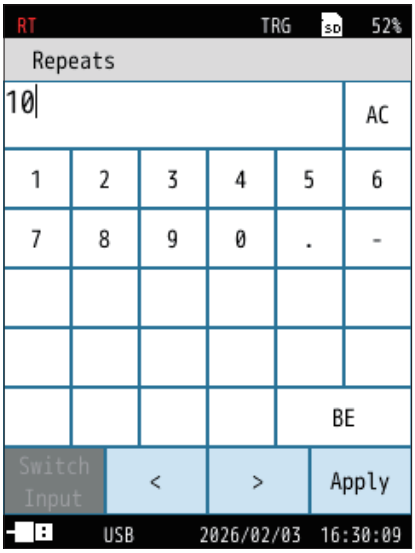
9 Return to the [Store] screen and touch [Trigger Level].

Set the trigger level for starting measurement (page 37).



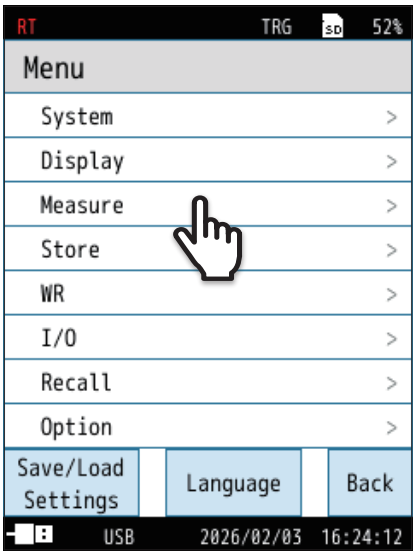
10 Return to the [Store] screen and touch [Repeats].

Set the number of measurement repetitions (page 38).



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

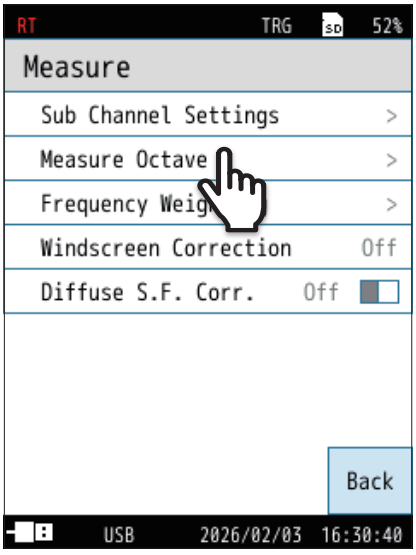
The [Measure] screen appears.



Menu screen

12 Touch [Measure Octave] on the [Measure] screen.

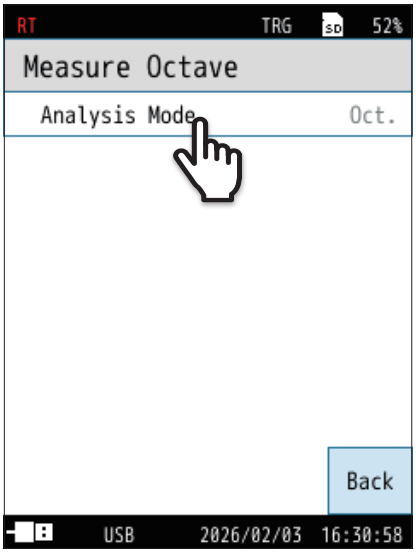
The [Measure Octave] screen appears (page 29).



Measure screen

13 Touch [Analysis Mode].

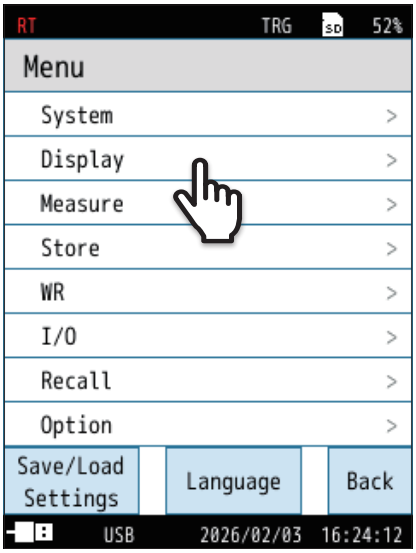
Select the analysis mode from [Oct.] or [1/3 Oct.].



14 Return to the [Measure] screen and set the required items such as [Frequency Weighting].

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

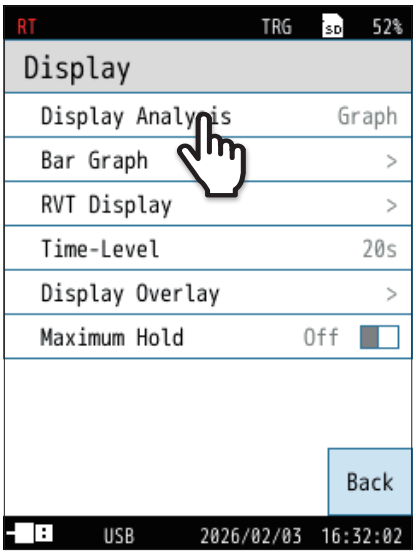
The [Display] screen appears.



Menu screen

16 Touch [Display Analysis] on the [Display] screen.

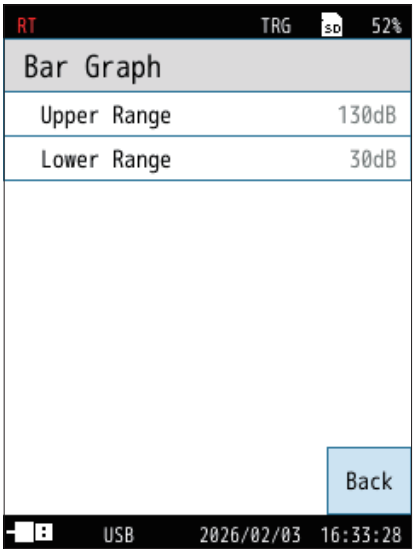
Select [Graph] or [Number List] (page 29).



Display screen

17 Return to the [Display] screen and touch [Bar Graph].

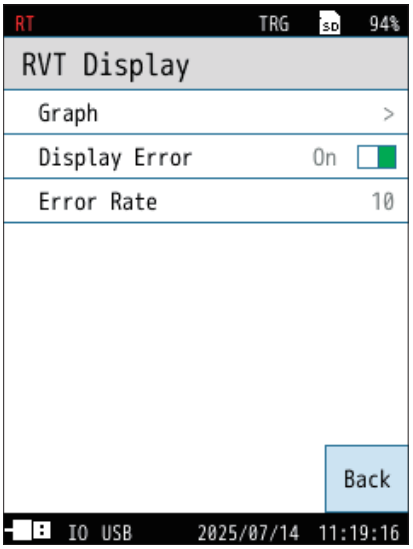
When [Graph] is selected, set the upper and lower limits of the bar graph.



18 Return to the [Display] screen and touch [RVT Display].

Set the items related to reverberation time measurement (page 29).

Item	Description
Graph	Set the vertical axis display scale of the reverberation time measurement result graph.
Display Error	When set to On, the error rate threshold can be set.



19 Return to the [Display] screen and set other required items such as [Time-Level].

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

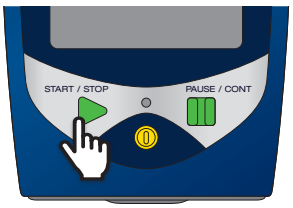
21 Set up the sound level meter at the measurement point.

22 Set up the sound source.

Note

- When using a sound source with the automatic interval output function enabled, set the ON time and OFF time to suitable values, taking the measurement time and processing time into consideration.

23 Press the START/STOP key to start measurement.



(1) The unit enters the level trigger standby state.

(2) Play the sound source.

(3) The trigger activates when the output sound pressure level of the sound source exceeds the set trigger level.

(4) During measurement, ▶ flashes in the upper right of the screen and the elapsed time is displayed. At the same time, the LED flashes red.

(5) When the measurement time (including the 1-second pre-trigger) has elapsed, measurement stops automatically. The data are then saved to the store address.

(6) When [Repeats] (page 49) is set to more than one, the store address increments by one and the unit returns to the level trigger standby state. Steps (2) to (6) are repeated for the specified number of times.

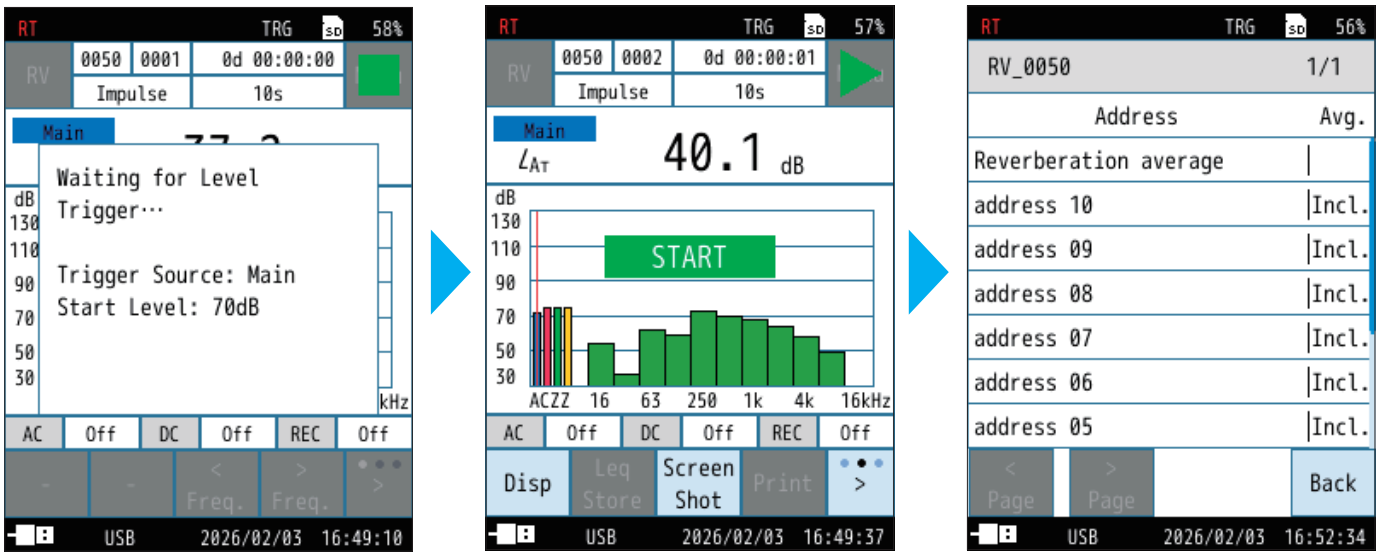
(7) After measurements for the specified repeat count are completed, post-analysis* is performed on the reverberation time data obtained from each measurement, and the data are saved. During calculation, the LED flashes purple.

* Post-analysis: Decay Curve and Reverberation Time analysis.

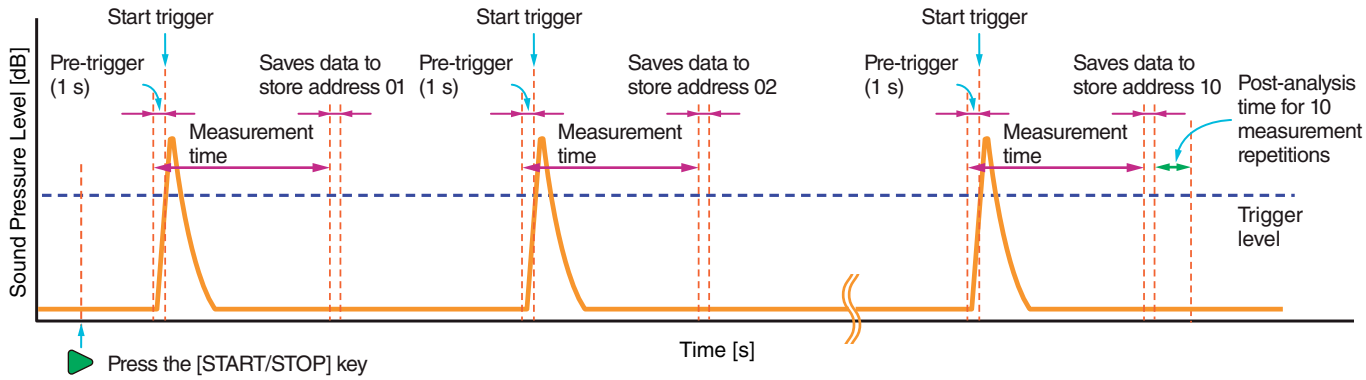
(8) After step (7) is completed, the screen automatically switches to the store address data list screen (page 55).

Note

- Press the START/STOP key to stop measurement during measurement.
- If measurement stops due to insufficient remaining capacity on the SD card, the data for each store address cannot be used for post-analysis.
- The maximum value for [Repeats] is 10; however, for each Store Name, reverberation time measurement results can be saved for up to 40 store addresses. To perform additional measurements, refer to step 24.
- The post-analysis time varies depending on the repeat count.



Level trigger standby | Measurement screen | Store address data list screen

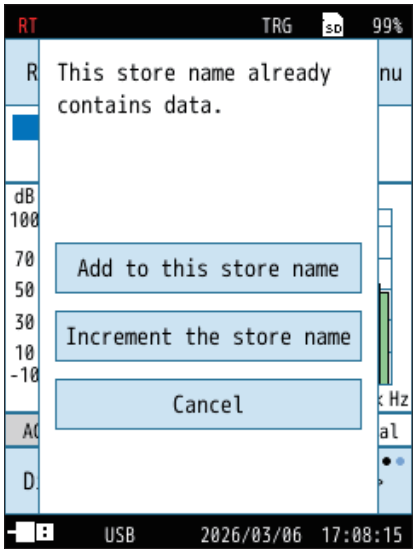


Example of measurement operation when the repeat count is set to 10

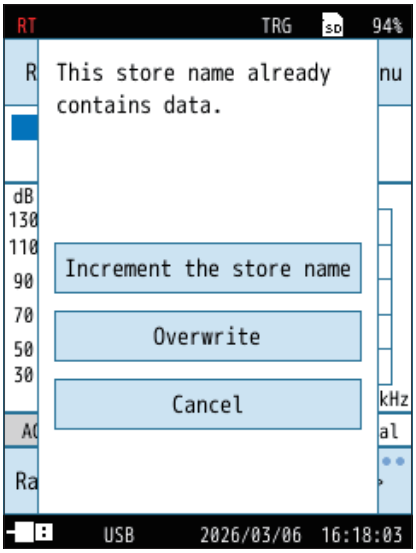
24 Touch [Back] or press the START/STOP key to return to the measurement screen.

25 To perform additional measurements, press the START/STOP key to start measurement.

If measurement data have already been saved, one of the screens shown below appears.



When the store address is less than 40



When the store address is 40 or when the settings have been changed

- When [Add to this store name] is selected
  The store address increments by one.
  Step 23 is executed.

Note

- For one store name, store addresses from 0001 to 0040 can be saved (maximum of 40 store addresses).

- When [Increment the store name] is selected
  The store name increments by one, the store address starts from 0001, and step 23 is executed.

- When [Overwrite] is selected
  The store name remains unchanged, and all data saved under that store name are deleted.
  The store address starts from 0001.
  Step 23 is executed.

- When [Cancel] is selected
  Measurement is not performed, and the screen returns to the measurement screen.

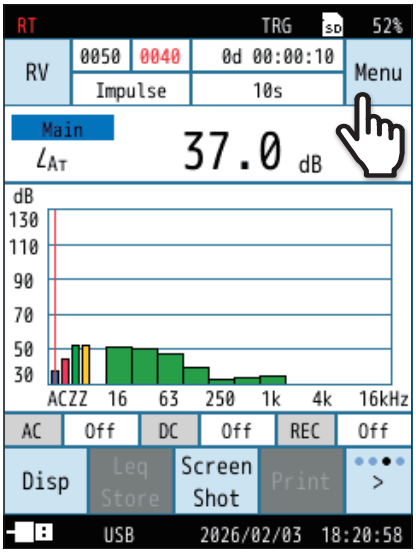
7 Data Recall

On the [Menu] » [Recall] screen, stored reverberation time data can be recalled and displayed on the screen.
For details on how to use the sound level meter and other information, refer to each instruction manual listed in “2. Reference Instruction Manuals” (page 8).

7.1 Data recall list screen

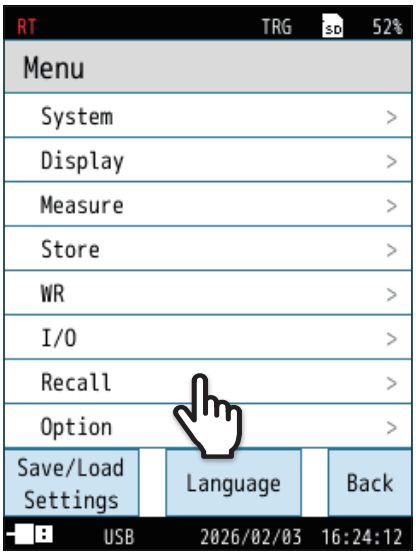
1 **Touch [Menu] on the measurement screen.**

The [Menu] screen appears.



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

The [Recall] screen appears.



[Menu] screen

3 Select and display stored data on the [Recall] screen.

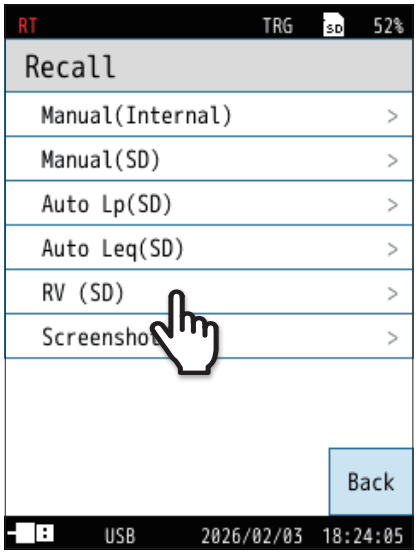
(1) On the [Recall] screen, touch [RV (SD)].

(2) On the [RV (SD)] screen, touch the store name of the desired data.

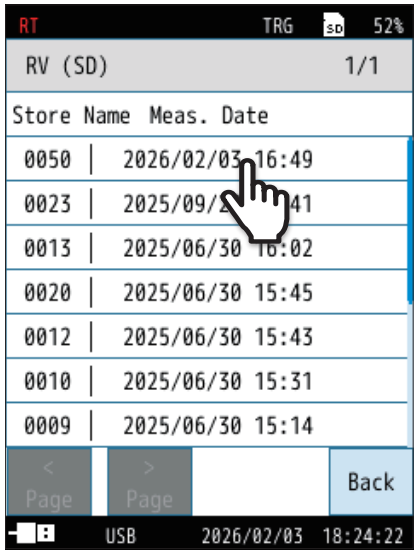
(3) On the confirmation screen, touch [View the data]. The store address data list screen appears.

Note

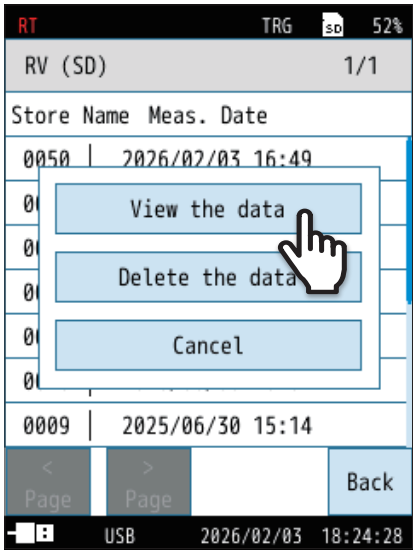
- When [Delete the data] is selected, the store data are deleted.
- When [Cancel] is selected, the screen returns to the [RV (SD)] screen.



[Recall] screen



[RV (SD)] screen



Confirmation screen

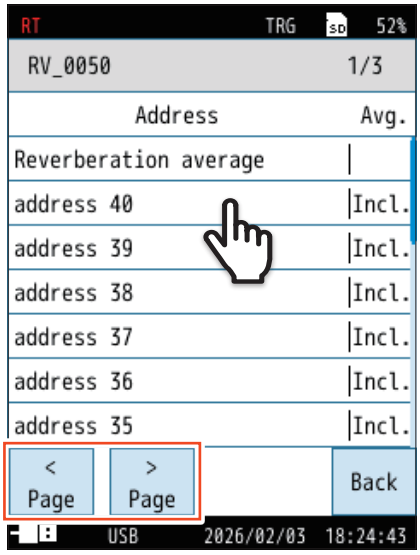
(4) On the store address data list screen, touch [Reverberation average] or [Address 01] to [Address 40].

If there are six or more data items, the display can be changed by scrolling the screen or by using < Page > Page.

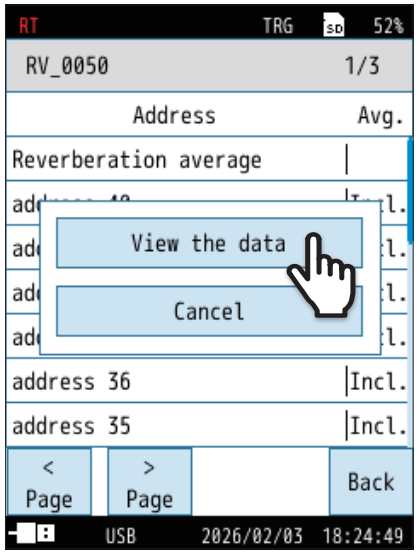
(5) Touching [View the data] displays the reverberation time recall screen.

Note

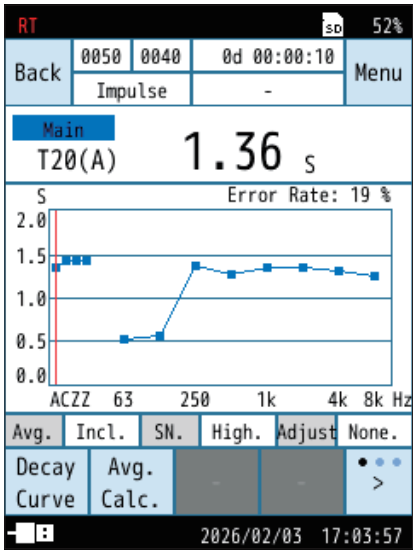
- When [Cancel] is selected, the screen returns to the store address data list screen.



Store address data list screen



Confirmation screen



Reverberation time recall screen

7.2 Graph display on the reverberation time recall screen

Displays data for either the Reverberation average (store address 0000) or each store address from *n* to 01 (00*n* to 0001) in graph format. *n*: Number of store addresses saved for one store name (page 35).

- Switching store address data

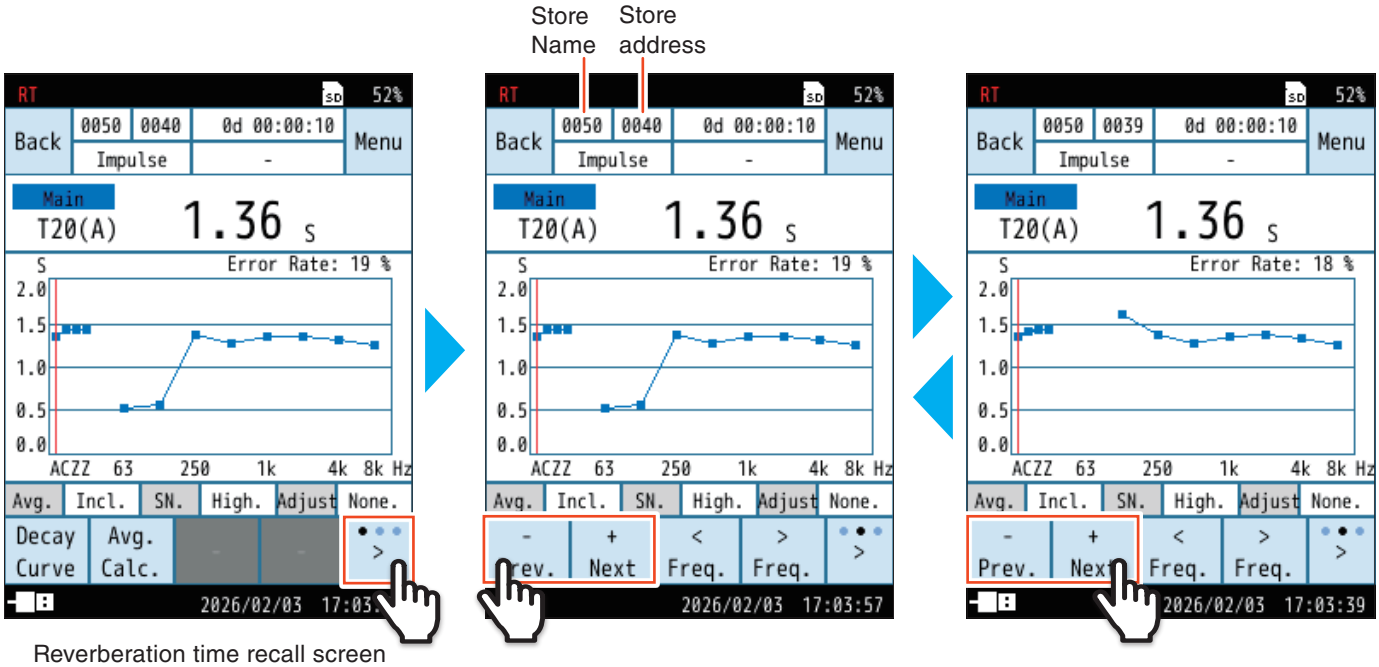
(1) Touching [>] on the far right of the menu ring switches the displayed menu.

(2) Each time [- Prev.] [+ Next] is touched, the store address data are switched in the following order.

Reverberation average (0000) ↔ address *n* (00*n*) • • • ↔ address 02 (0002) ↔ address 01 (0001)

Note

- "Reverberation average" is data obtained by averaging, and is displayed with store address 0000.

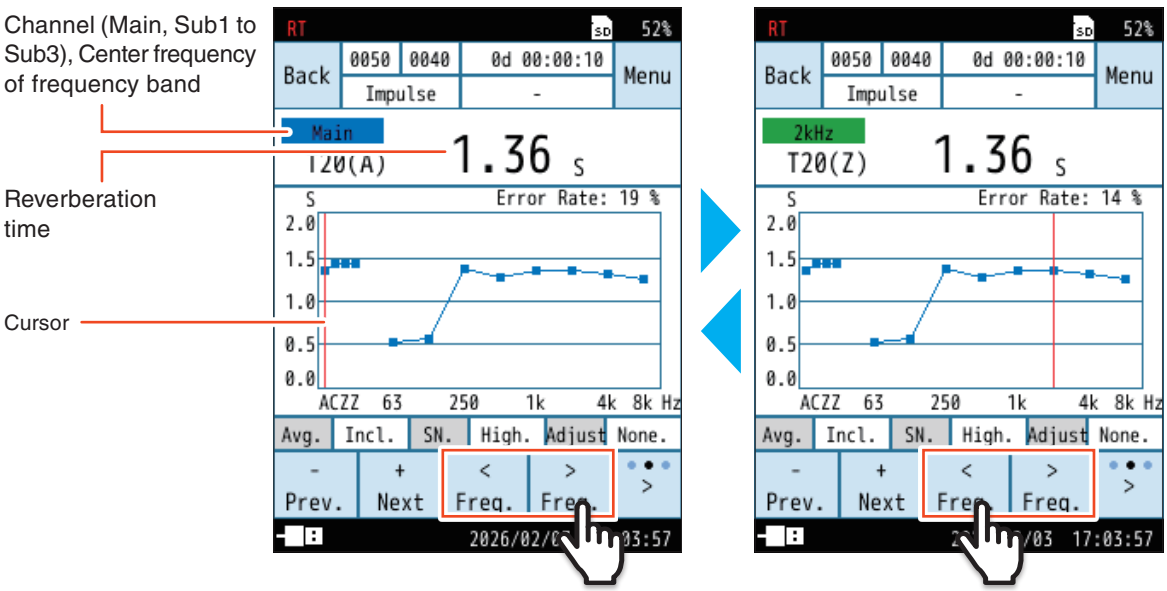


Reverberation time recall screen

- Reverberation time at the cursor position

(1) Displays the reverberation time of the channel (Main, Sub1 to Sub3) or the frequency band at the cursor position.

(2) Touching the screen or [< Freq.] [> Freq.] on the menu ring switches the cursor position.

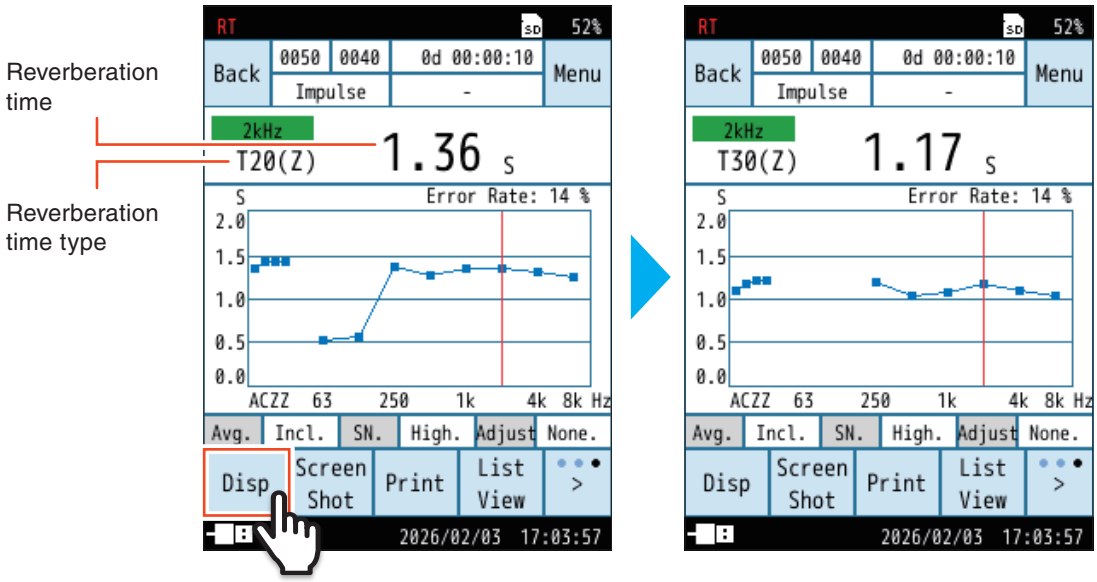


- Switching the reverberation time type

(1) Touching [>] on the far right of the menu ring switches the displayed menu.

(2) Each time [Disp] is touched, the reverberation time type switches in the following order (page 63).

T20 → T30 → T15 → EDT

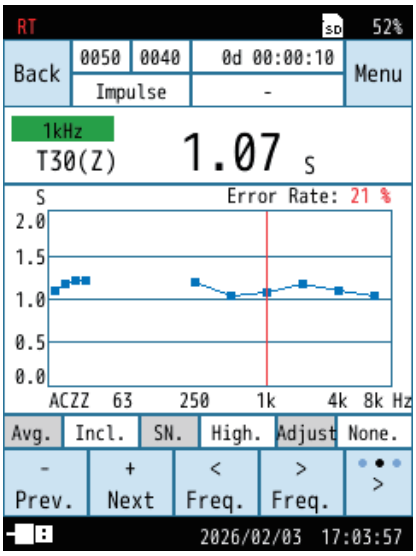


- Error rate

  [Display Error] is set to [On], displays the error rate calculated for T20 and T30.

  When the error rate exceeds the threshold, it is displayed in red.

  If either T20 or T30 used for calculating the error rate cannot be obtained, or if the calculated error rate is outside the range of 0 to 100, “– %” is displayed.



Note

- The error rate is not displayed when the T15 or EDT graph is shown.
- The error rate is displayed for each channel (Main, Sub1 to Sub3) or each frequency band.

7.3 Average Calculation of Reverberation Time

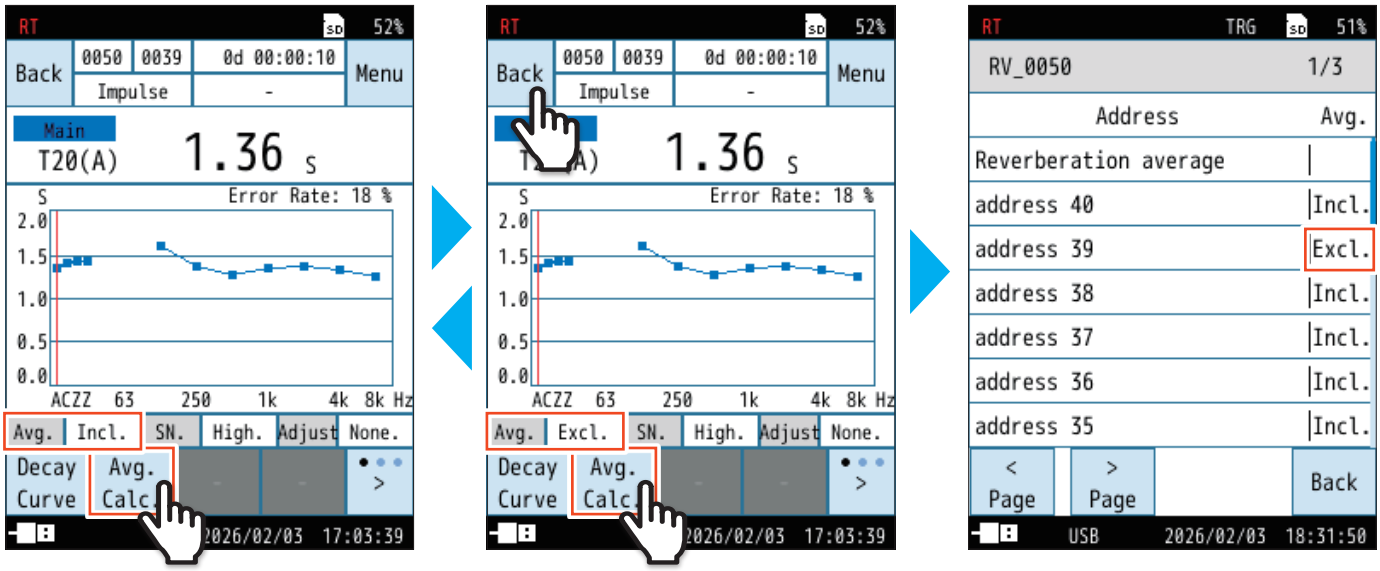
Reverberation average (store address 0000) is calculated by averaging the reverberation time data obtained at each store address data 01 to *n* (0001 to 00*n*). *n*: Number of store addresses saved under one store name (page 35).
Store address data cannot be deleted individually.
Store address data can be excluded from the average calculation by touching Avg. Calc. (page 25).

(1) On the Reverberation time recall screen, touching Avg. Calc. switches the "Avg." indication to "Incl." or "Excl." When "Excl." is displayed, the corresponding data is excluded from the average calculation.

(2) Touch [Back] to display the store address data list screen. On the store address data list screen, data included in the average calculation are indicated as "Incl." and data excluded from the average calculation as "Excl.", allowing you to confirm their status in a list.

Note

- When Reverberation average (store address 0000) or a store address with no data is selected, Avg. Calc. is disabled. In this case, the "Avg." indication shows "–".

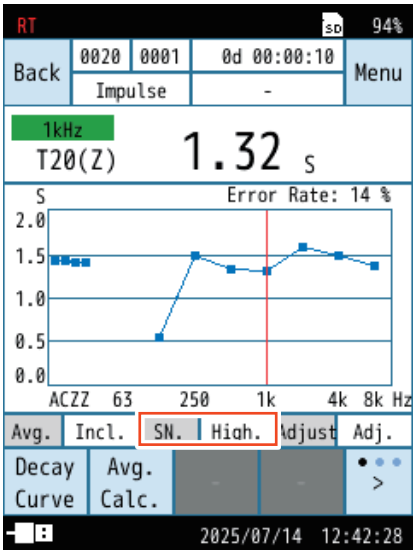


Reverberation time recall screen

Store address data list screen

7.4 S/N ratio for reverberation time measurement

To measure the reverberation time accurately, a sufficient signal-to-noise ratio (S/N) between the measurement signal and the background noise is required. When the "SN." indication on the screen shows "High.", the S/N ratio is sufficient. When it shows "Low.", the S/N ratio is insufficient (page 25).



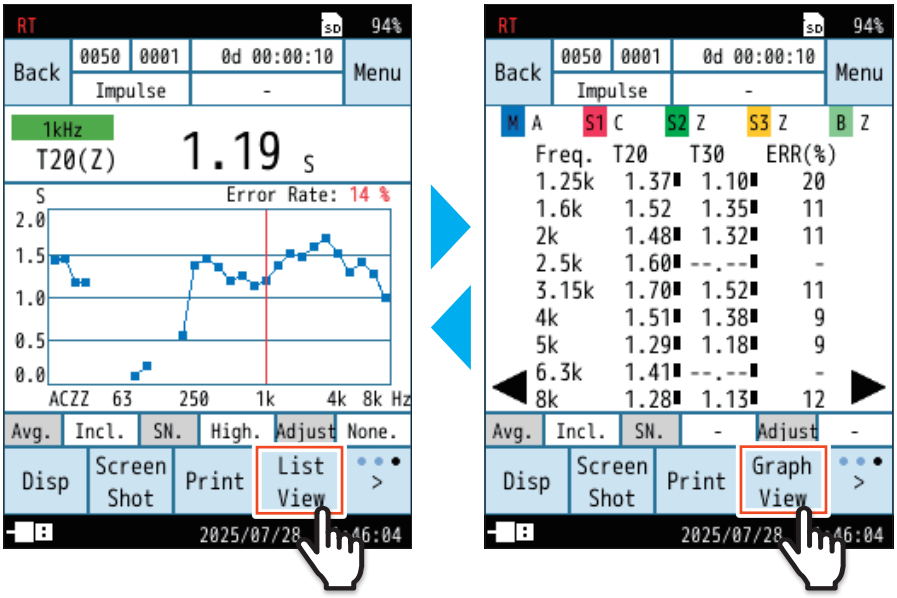
Note

- The S/N ratio is displayed for each channel (Main, Sub1 to Sub3) or each frequency band.

7.5 List view of the reverberation time recall screen

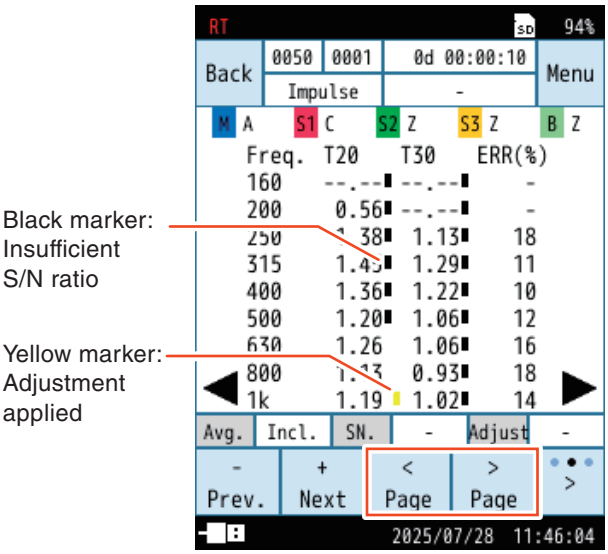
Displays the reverberation average (store address 0000) or the data of each store address 01 to *n* (0001 to 00*n*) in list format. *n*: Number of store addresses saved under one store name (page 35).

- Switching between graph and list view
  Touch List View on the menu ring to switch to the numeric list view. Touch Graph View to switch to the graph view.



- Display data
  Reverberation time T20, T30, and the error rate are displayed in list format for each frequency band.
  If an error is determined based on the S/N ratio, a black marker is displayed (page 25).
  If the approximation line of the reverberation time has been adjusted, a yellow marker is displayed (page 25).

- Page switching
  When multiple pages are available in the frequency band list, ◀ and ▶ are displayed.
  When no additional page is available, ◁ and ▷ are displayed.
  To switch pages, touch < Page > Page on the menu ring.



7.6 Decay curve screen

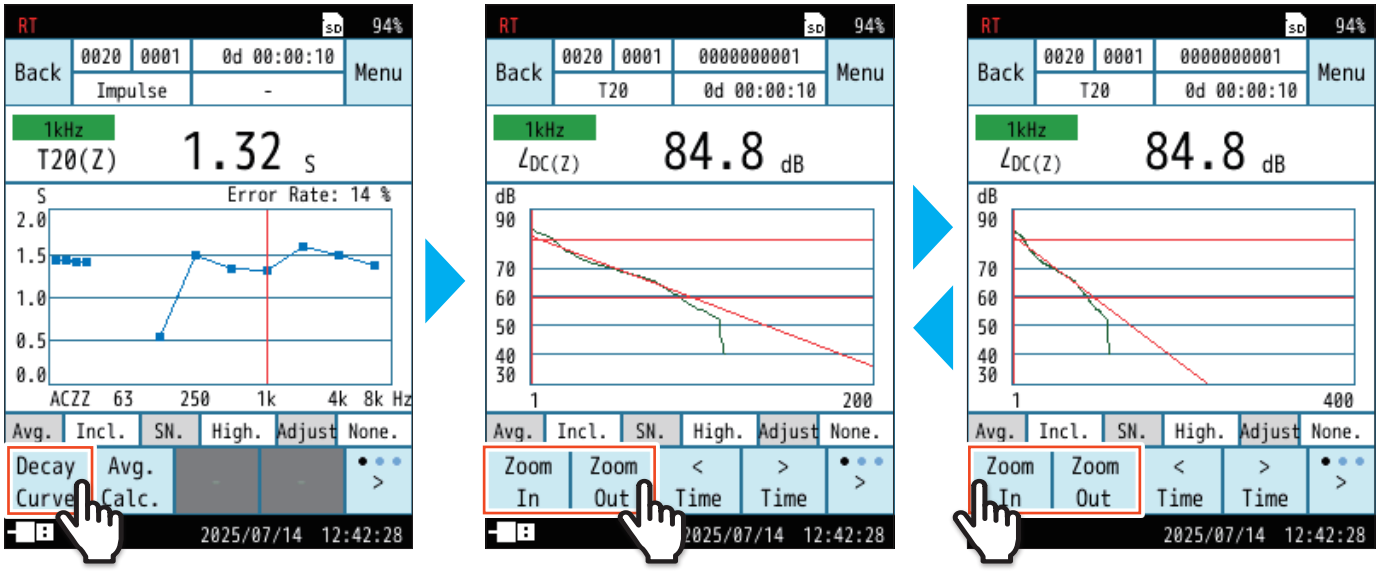
Displays the decay curve (T-L graph). The approximation line can be shifted and its slope adjusted (page 25).

(1) On the Reverberation time recall screen, touch Decay curve to display the decay curve (T-L graph) for the channel (Main, Sub1 to Sub3) or the frequency band at which the cursor is positioned.

(2) Each time Zoom In / Zoom Out is touched, the address range (horizontal axis) switches between 100, 200, 400, 800, 1600, 3200, and 6400, in ascending or descending order respectively.

Note

- The level range (vertical axis) is determined as follows.
  Impulse: The upper and lower limits of the graph are automatically determined from the maximum and minimum values recorded in the reverberation decay curve file.
  Noise: Determined in conjunction with the bar graph range setting.
- When Reverberation average (store address 0000) or a store address with no data is selected, Decay curve is disabled and cannot be selected.

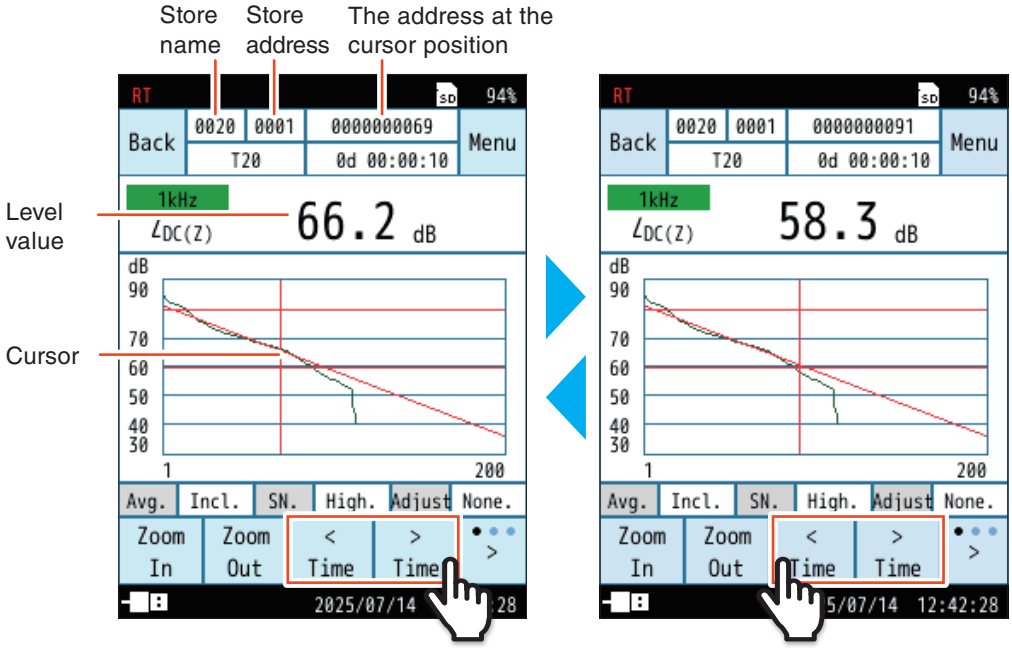


Reverberation time recall screen

Decay curve screen

(3) The cursor moves to the touched position or when < Time / > Time on the menu ring is touched.

Displays the level value at the cursor position and the address at the cursor position.



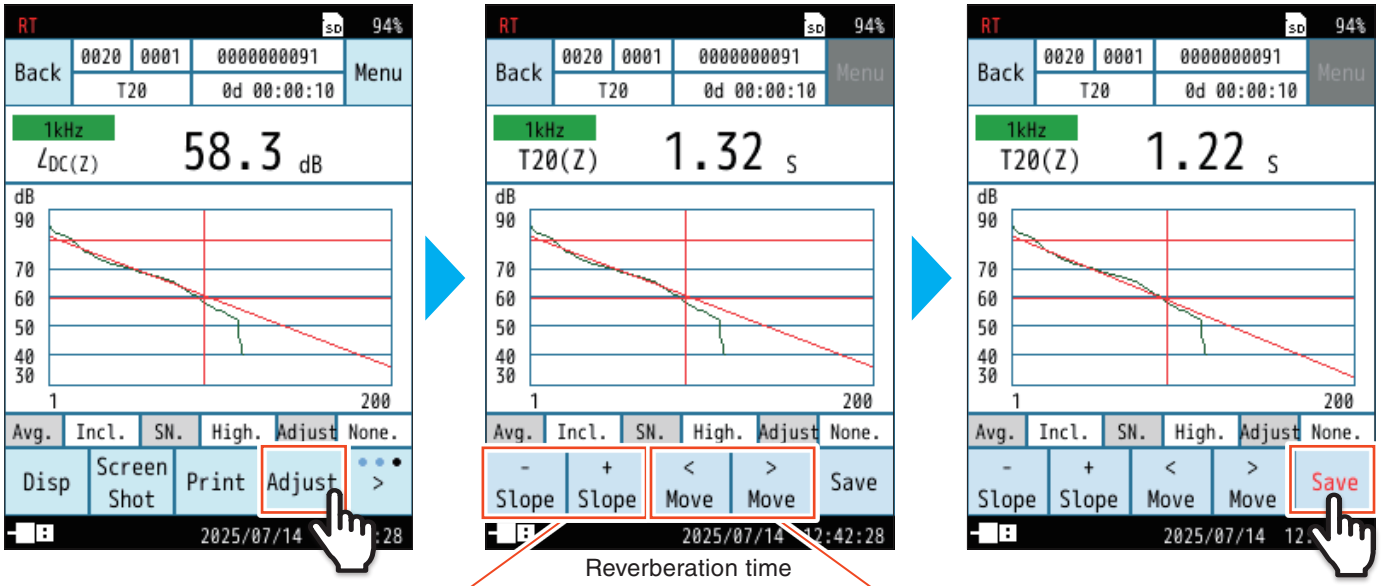
(4) Touching [>] on the far right of the menu ring switches the displayed menu.

(5) Touching [Adjust] switches to the Reverberation time adjustment screen, where the following adjustments are available.

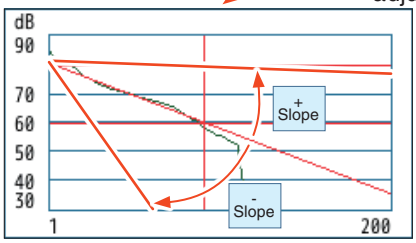
Each time [-Slope] [+Slope] is touched, the slope of the approximation line changes.

Each time [<Move] [>Move] is touched, the approximation line shifts horizontally.

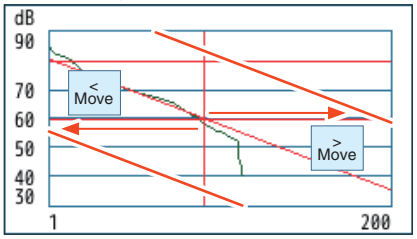
(6) Touching [Save] saves the adjustment results.



Reverberation time adjustment screen



Adjusts the slope of the approximation line using [Slope]



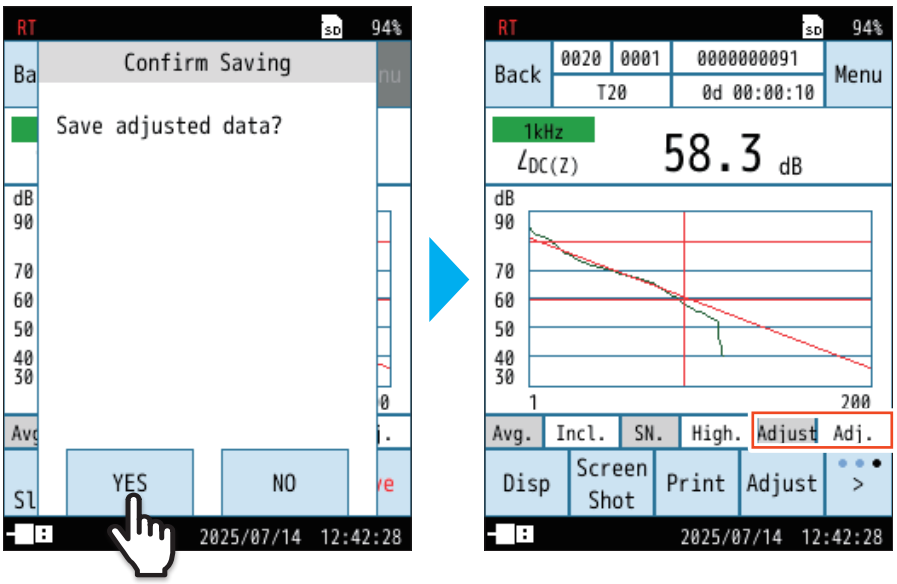
Moves the approximation line using [Move]

(7) On the confirmation screen, touch [Yes] to return to the decay curve screen.

(8) For an adjusted decay curve, the [Adjust] indication changes from [None.] to [Adj.].

Note

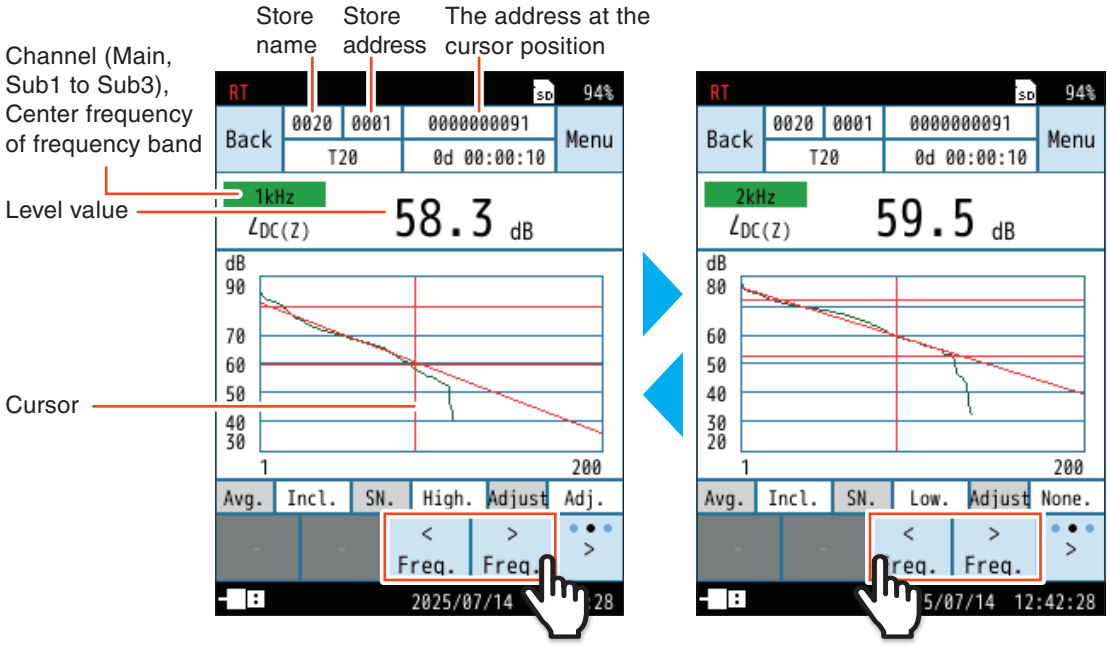
- Once an adjustment has been made, the parameter indication remains [Adj.] even if the Reverberation time is returned to its pre-adjustment value.



- Switching channels (Main, Sub1 to Sub3) or frequency bands

  (1) Touching [...>] on the far right of the menu ring switches the displayed menu.

  (2) Each time [<Freq.] [>Freq.] on the menu ring is touched, the display switches between channels (Main, Sub1 to Sub3) or frequency bands.



- Switching the Reverberation time type

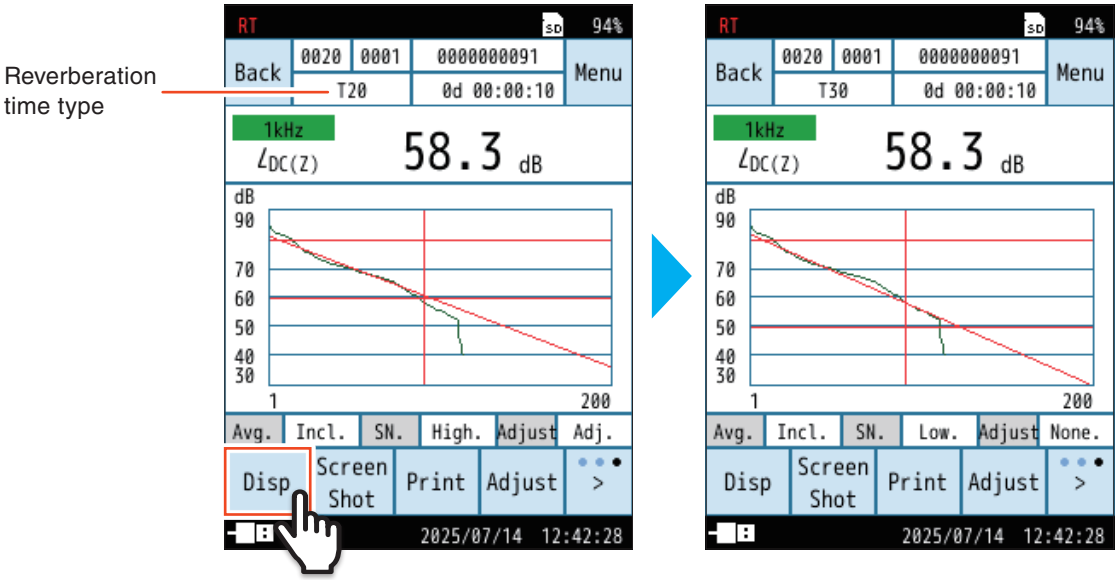
  (1) Touching [...>] on the far right of the menu ring switches the displayed menu.

  (2) Each time [Disp] is touched, the Reverberation time type switches in the following order.

T20 → T30 → T15 → EDT

Note

- For data measured by the interrupted noise method, the EDT approximation line is not displayed.



7.7 Display of overlay data

Recall data (except data stored in RV store mode) can be registered as overlay data and displayed overlaid with the current measurement on the measurement screen (page 25).

Note

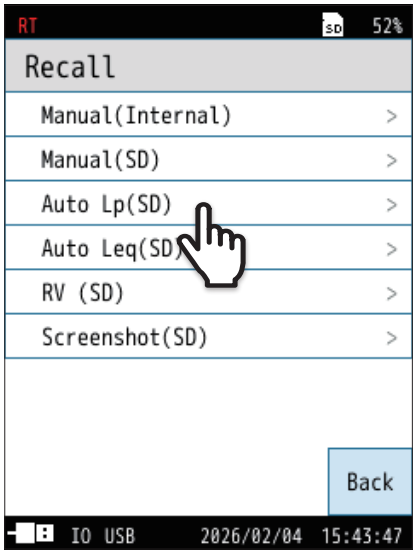
- Cannot be overlaid with Reverberation time measurement results obtained in RV store mode.

1 Register overlay data on the recall screen.

(1) On the [Menu] » [Recall] screen, touch [Manual(Internal)], [Manual (SD)], [Auto Lp (SD)], or [Auto Leq (SD)].

(2) On the recall data list screen, select the desired data.

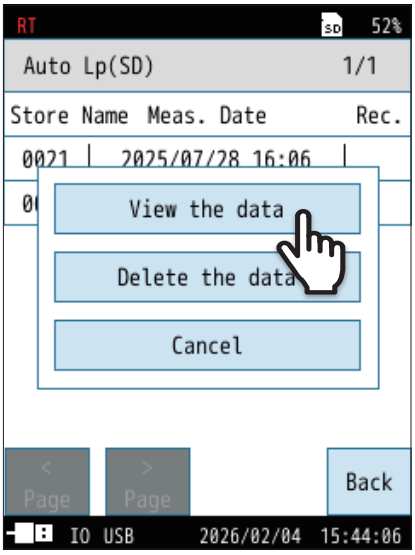
(3) Select [View the data] to display the recall data screen.



Recall screen

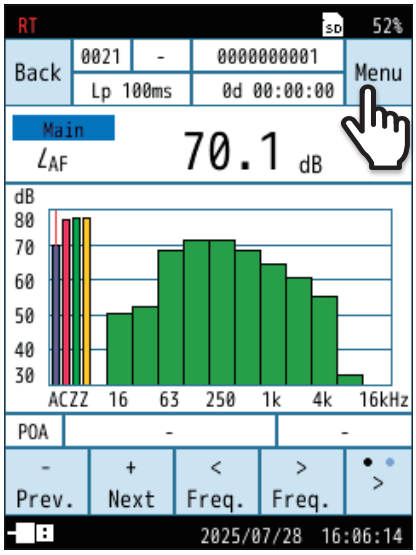


Recall data list screen

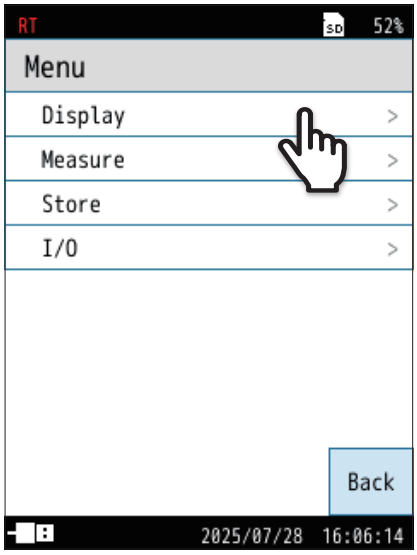


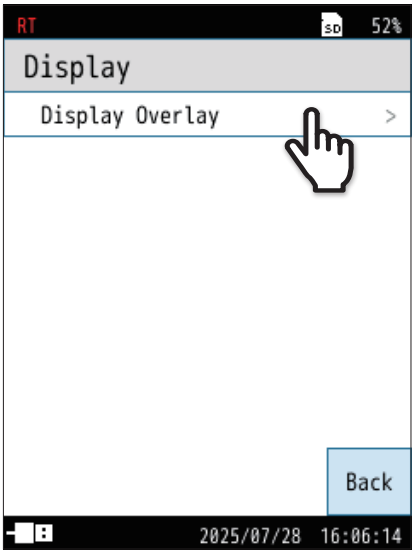
Confirmation screen

(4) On the recall data screen, touch [Menu] » [Display] » [Display Overlay].

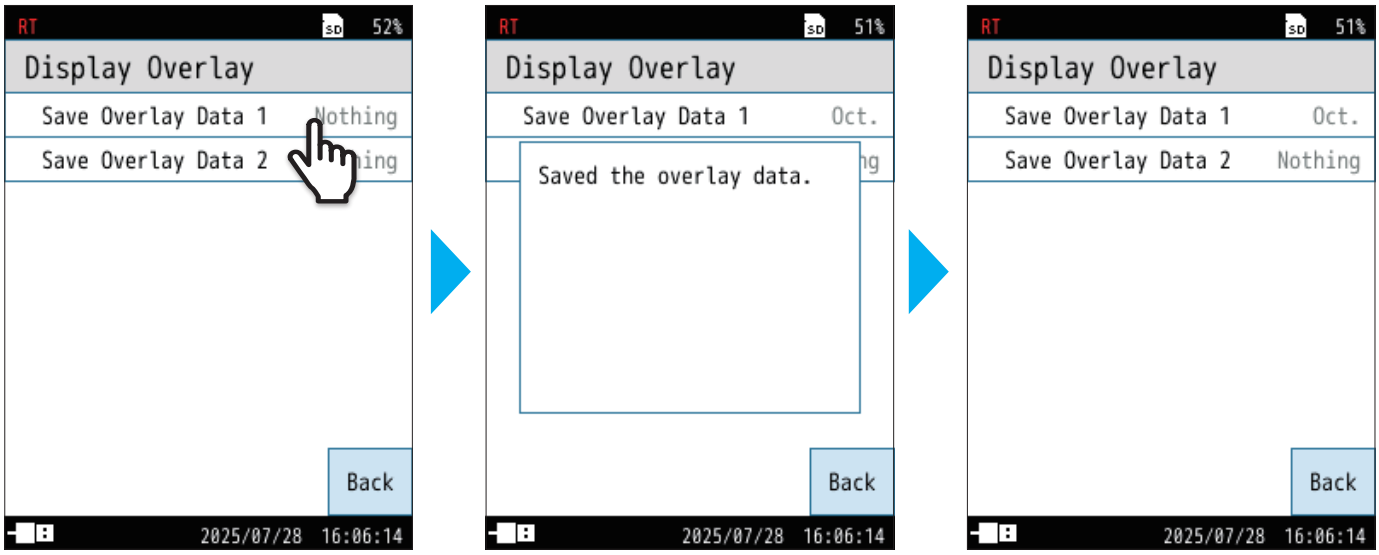


Recall data screen



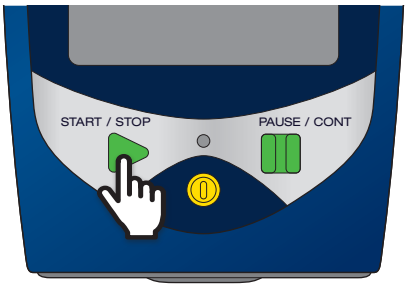


(5) Touch [Save Overlay Data 1] or [Save Overlay Data 2] to save the data to be registered.



Overlay screen

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

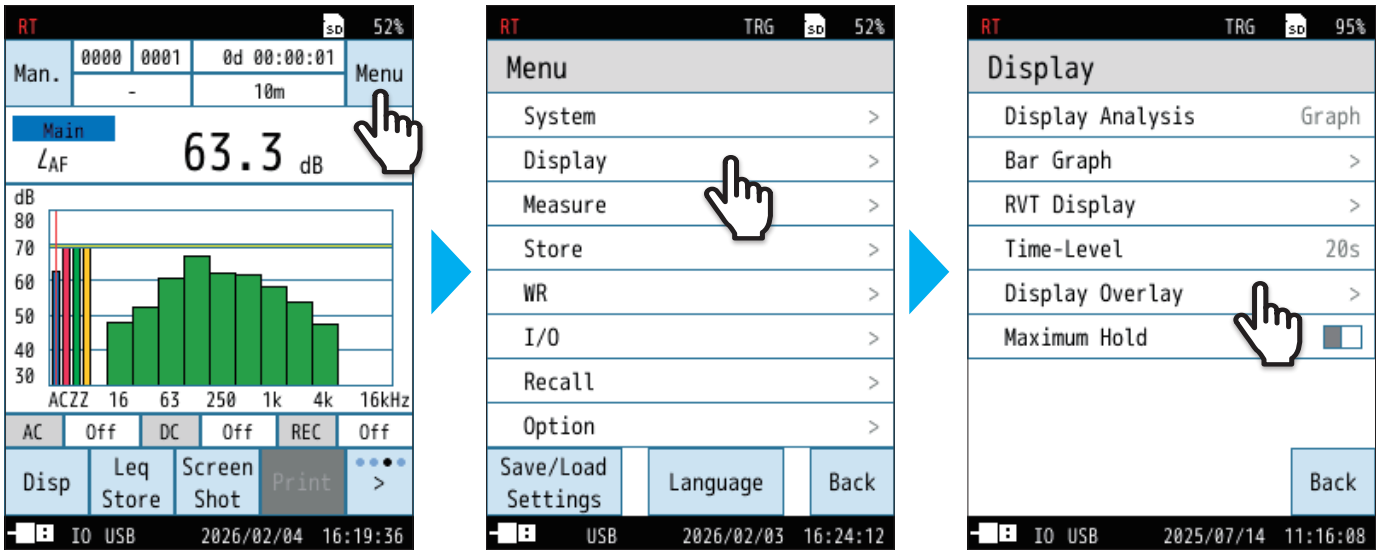


Note

- Up to two overlay data sets can be registered. Repeat steps (1) to (6).

2 Display the overlay data on the measurement screen.

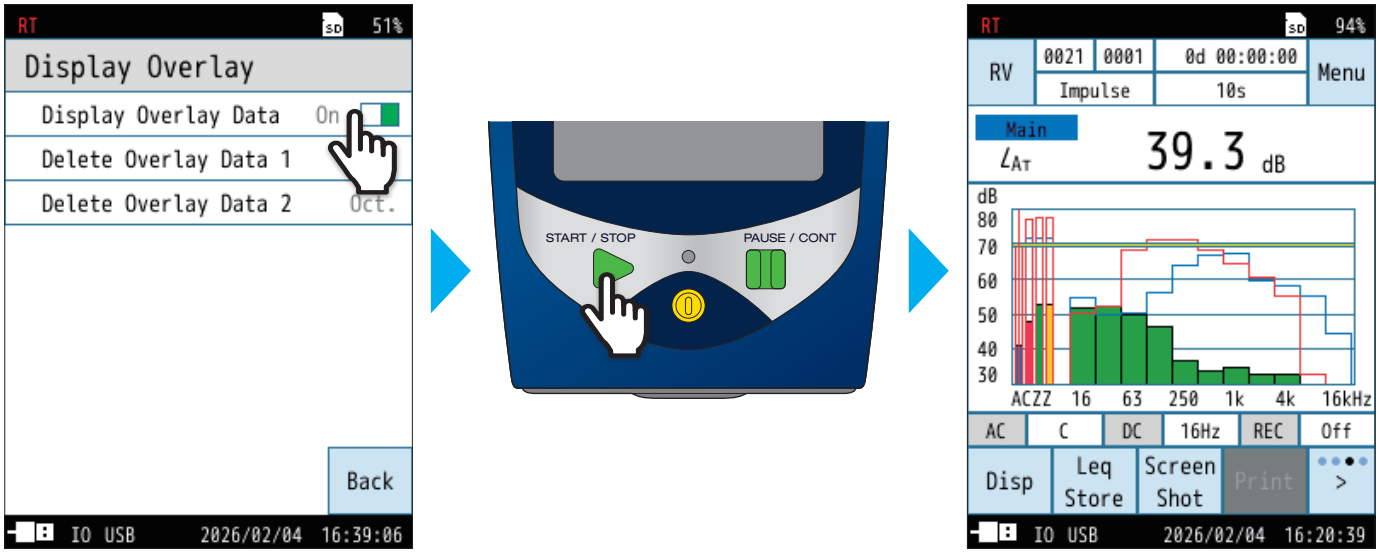
(1) On the measurement screen, touch [Menu] » [Display] » [Display Overlay].



Measurement screen

(2) Set [Display Overlay Data] to [On].

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



Note

- Overlay display is available only when the analysis mode matches that used for the measurement.
- If the analysis mode does not match, the message “Cannot be displayed because the store conditions are different.” appears.

8 Waveform Recording

By using the optional Waveform Recording Program NX-43WR in combination, the sound pressure waveform of the actual sound can be recorded.
* For details, refer to the Waveform Recording Program NX-43WR Instruction Manual.

8.1 Preparation

⚠ CAUTION

- When performing measurements at high sound pressure levels, be sure to wear appropriate hearing protection.

Important

- The optional Waveform Recording Program NX-43WR must be installed.
- An SD card is required for reverberation time measurement and actual sound recording. Measurement data cannot be saved to the internal memory. Always insert an SD card with sufficient available capacity.
- Use only SD cards supplied by RION. If an SD card other than a genuine RION product is used, the unit may not operate properly and will not be covered by the warranty.
- Before starting measurement, format the SD card using the sound level meter.
- While data is being saved (during store), do not turn off the power or remove the SD card. There is a risk of data corruption.

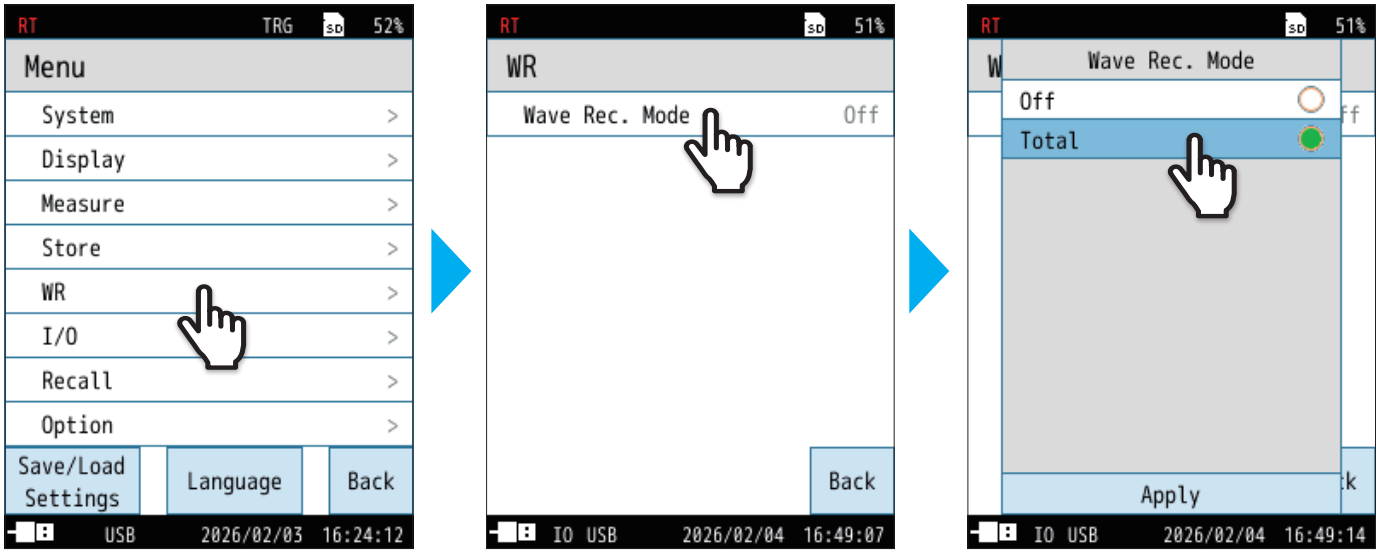
Note

- When the store mode is set to [RV], the only selectable recording function is [Total].

8.2 Measurement

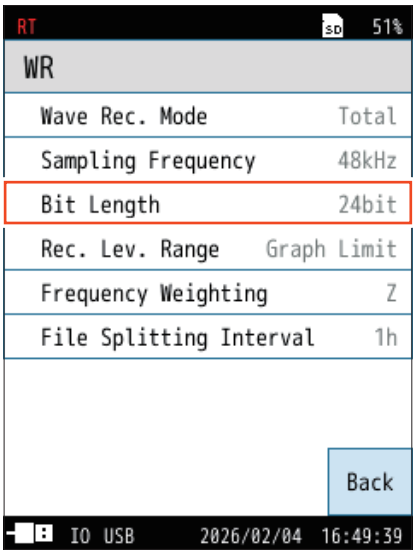
1 Sets the recording function.

(1) Touch [Menu] » [WR] » [Wave Rec. Mode] » [Total].



Menu screen　　Waveform recording screen

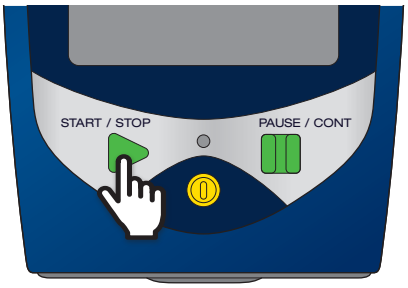
(2) Before starting recording, check that the waveform recording settings are appropriate, and configure them as necessary.



Note

- For high-precision analysis, set [Bit Length] to [24bit].
  Note that increasing the data size reduces the available recording time.
- Setting [Rec. Lev. Range] to a lower value enables even higher-precision analysis. If the input level becomes excessive (overload), recording (Rec.) may not be possible. Set this appropriately to avoid overload.
- When [Bit Length] is set to [16bit], a dynamic range of approximately 80 dB from the recording range (upper recording limit) is available.
- When [Bit Length] is set to [24bit], a dynamic range of approximately 130 dB from the recording range (upper recording limit) is available.
- For details, refer to the Instruction Manual for the Waveform Recording Program NX-43WR.

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



2 Measurement procedure

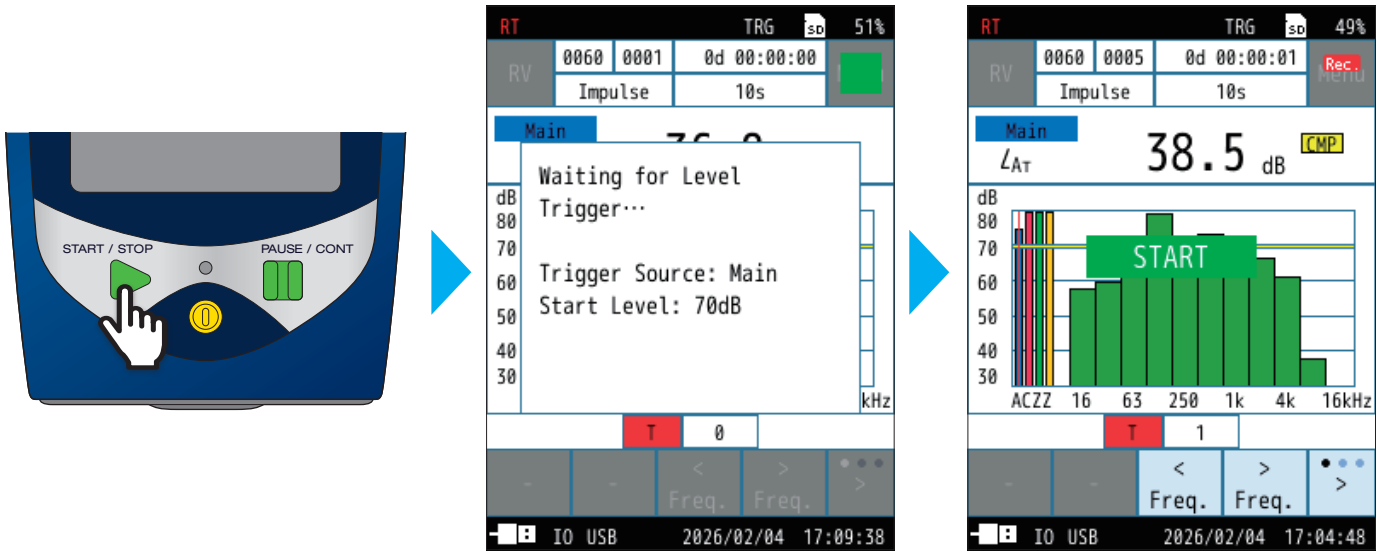
(1) Press the START/STOP key to start measurement.

(2) The unit enters the level trigger standby state.

(3) The trigger activates when the output sound pressure level of the sound source exceeds the set trigger level.

(4) During measurement, ▶ or Rec. are displayed alternately in the upper right of the screen, and the elapsed time is shown. The LED flashes red.

(5) When the measurement time (including 1 second of pre-trigger) has elapsed, the measurement stops automatically. The data is then saved to the store address.



8.3 Playback and analysis of recorded files

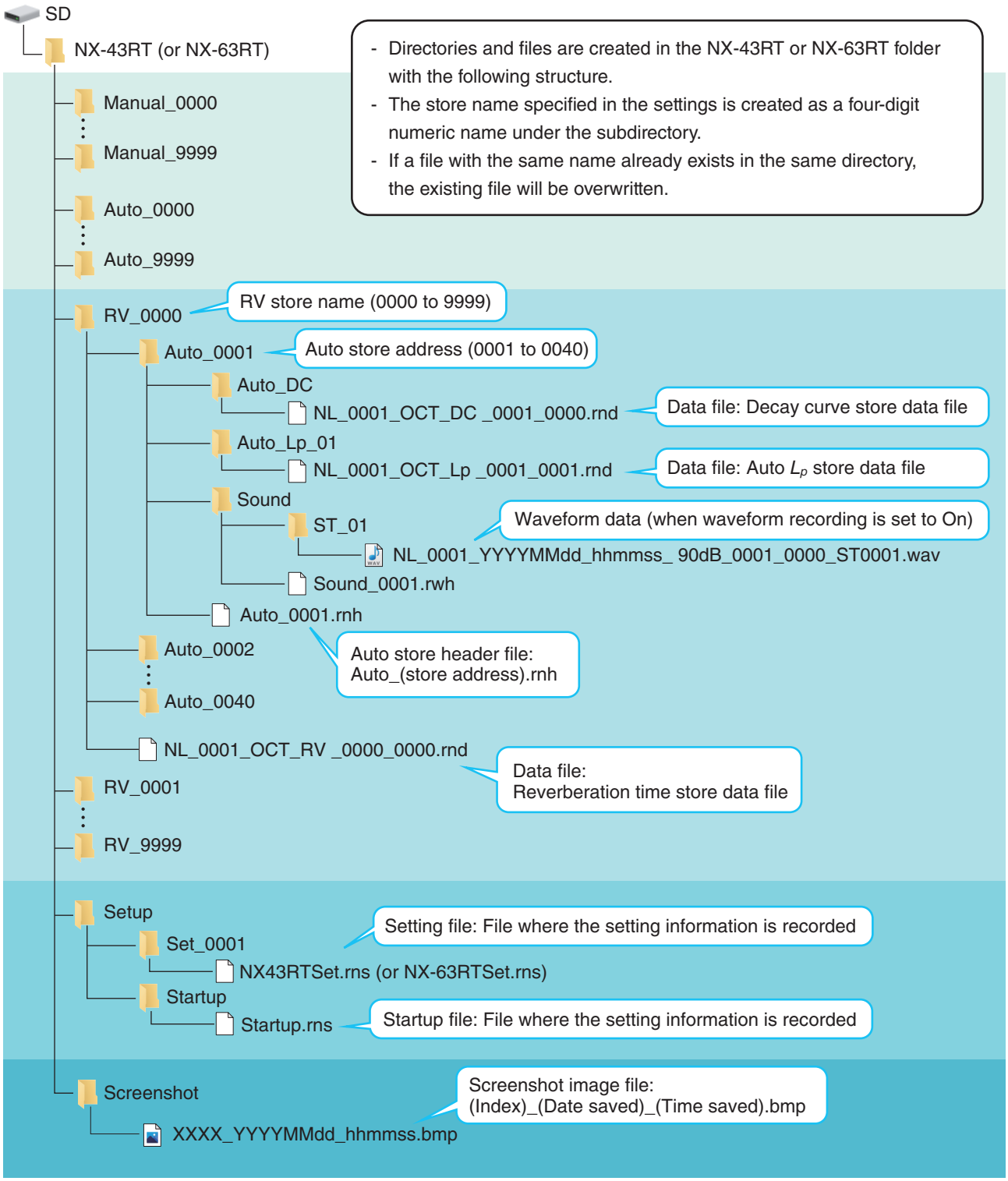
- Recorded files can be played back using commercially available WAVE playback software or the Waveform Analysis Software AS-70. However, they cannot be played back on the NL-43 / NL-53 / NL-63 main unit.
- Recorded files can be analyzed using the Waveform Analysis Software AS-70.
- WAVE data are stored in accordance with the standard WAVE file format.
  Bit length: 16 bit / 24 bit
  Endianness: Little-endian
  Full-scale +13 dB value: 32767 for 16 bit, 8388607 for 24 bit

9

Store Data Format and File Structure

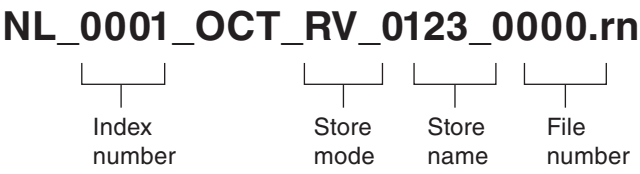
9.1 Folder structure

The folder structure of the data stored on the SD card is shown below.



Data file name

Data files are named as shown below.



- Index number
  The number can be set from [Menu] » [System] » [System Information] » [Index].
- Store mode
  The file name varies depending on the store mode.
  Reverberation time: RV
  Decay curve: DC
  Auto L_p store: Lp␣(space)
- Store name
  Reverberation time : RV store name (0000 to 9999)
  Decay curve screen, Auto L_p store: Reverberation time store address (0001 to 0040)
- File number
  Reverberation time, Decay curve: 0000
  Auto L_p store: 0001

Waveform recording data file name

When the recording function of NX-43WR is available, a [Sound] folder is created within the Auto store data folder, and the recorded data are saved in this folder.
For details, refer to the Instruction Manual for the NX-43WR.

Important

- When using the NX-43RV, the data format of files saved on the NL-43 / NL-53 differs from the data format of files saved on the NL-63. Therefore, recorded files are not compatible between different sound level meter models.

9.2 Available recording time and SD card capacity

The amount of measurement data that can be saved to an SD card depends on the capacity of the inserted card. The number of data sets that can be saved to the SD card varies depending on the reverberation time measurement settings.

Reverberation time measurement setting example

Analysis Mode: 1/3 Oct.
Total Meas. Time: 10 s
Number of data sets: 40 addresses
Sub channels: All On

	SD card capacity	
	512 MB	2 GB
Data sets of a store	Approx. 9 sets	Approx. 36 sets

- **When performing waveform recording**

Reverberation time measurement setting example

Analysis Mode: 1/3 Oct.
Total Meas. Time: 10 s
Number of data sets: 40 addresses
Sub channels: All On

Waveform recording setting example

Sampling Frequency: 48 kHz
Bit Length : 24 bit

	SD card capacity	
	512 MB	2 GB
Data sets of a store	Approx. 4 sets	Approx. 17 sets

Note

- An SD card is required for reverberation time measurement. Measurement data cannot be saved to the internal memory.

10 Communication Commands

For a list of additional commands, refer to the respective Communication Guide for the following meters:

- Class 2 Sound Level Meter NL-43
- Class 1 Sound Level Meter NL-53
- Class 1 Sound Level Meter (with low-frequency sound measurement function) NL-63

11 Technical Reference

Reverberation time

Reverberation time is defined as “the time required for the sound pressure level to decay by 60 dB after a steady state has been reached in a room and the sound source is stopped.”

In typical measurement environments, it is difficult to ensure an S/N ratio (difference between the signal level and background noise level) of 60 dB or more. Therefore, the reverberation time is calculated from a decay range smaller than 60 dB (such as 20 dB or 30 dB).

- T_{20}: reverberation time
  The reverberation time calculated from the slope of the decay curve over the range in which the sound pressure level decreases by 20 dB, starting from the point 5 dB below the maximum sound pressure level or the steady-state level.
- T_{30}: reverberation time
  The reverberation time calculated from the slope of the decay curve over the range in which the sound pressure level decreases by 30 dB, starting from the point 5 dB below the maximum sound pressure level or the steady-state level.
- T_{15}: reverberation time
  The reverberation time calculated from the slope of the decay curve over the range in which the sound pressure level decreases by 15 dB, starting from the point 5 dB below the maximum sound pressure level or the steady-state level.
- EDT: Early Decay Time
  The reverberation time calculated from the slope of the decay curve over the range in which the sound pressure level decreases by 10 dB from the maximum sound pressure level.
  Calculated only by the integrated impulse response method.

Note

- The reverberation time is automatically estimated based on the reverberation decay curve. Because the shape of the curve and the calculated result may vary depending on the measurement environment and the reverberation time measurement method, check the approximation line on the Recall screen and use the adjustment function as necessary.

Reverberation time calculation method using the integrated impulse response method

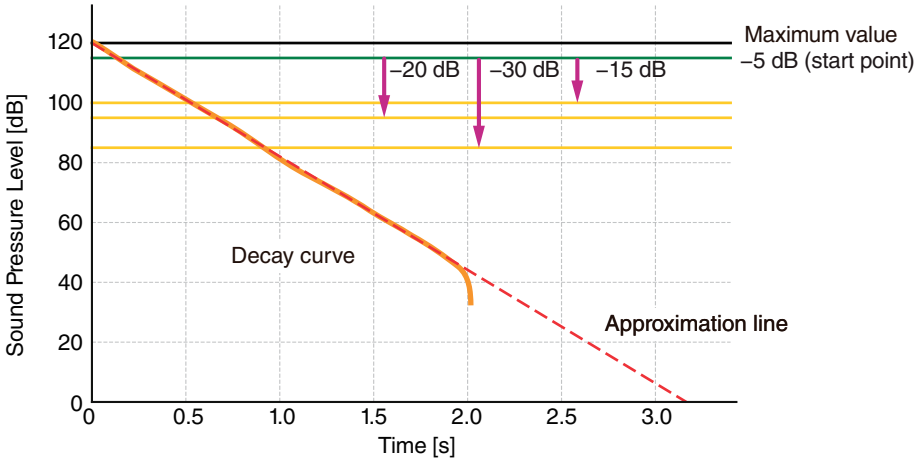
1. Calculate the maximum value of the Auto L_p store data.
2. Determine the L_{eq} of the last 1 second of the Auto L_p store data as the background noise level.
3. Derive the decay curve from the data between the maximum value obtained in step 1 and the point where the level reaches the background noise level obtained in step 2.
4. Set the level 5 dB below the maximum sound pressure level of the decay curve as the starting point for reverberation time calculation.
5. Calculation of T_{20} / T_{30} / T_{15} / EDT

   T_{20}: Multiply by 3 the time required for the level to decrease by 20 dB from the starting point.

   T_{30}: Multiply by 2 the time required for the level to decrease by 30 dB from the starting point.

   T_{15}: Multiply by 4 the time required for the level to decrease by 15 dB from the starting point.

   EDT: Multiply by 6 the time required for the level to decrease by 10 dB from the maximum level.

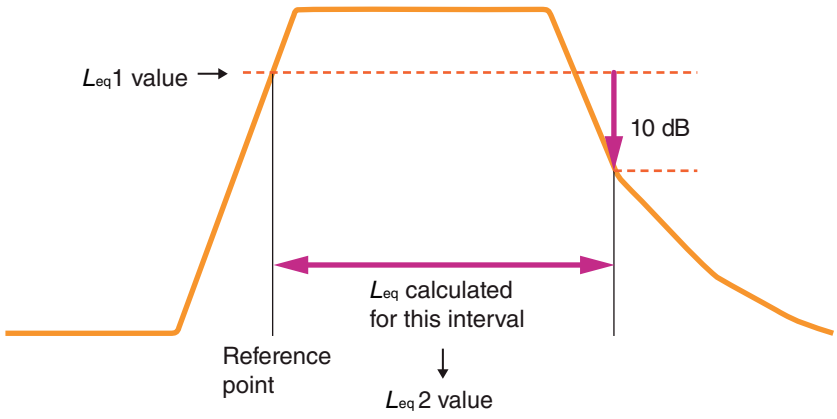


Reverberation time calculation method using the interrupted noise method

1. Calculate the L_{eq} for a 1-second interval starting 1.3 seconds after the beginning of the decay curve (hereinafter referred to as $L_{eq}1$).
2. Using the entire measurement data, calculate the L_{eq} for the interval from the point where the level first exceeds $L_{eq}1$ to the point where the level subsequently decreases by 10 dB from $L_{eq}1$ (hereinafter referred to as $L_{eq}2$).
3. The higher of $L_{eq}1$ and $L_{eq}2$ is taken as the steady-state level of the noise source.
4. The level 5 dB below the steady-state level is defined as the starting point for reverberation time calculation.
5. Calculate T_{20}, T_{30}, and T_{15} as follows:
   T_{20} is obtained by multiplying by 3 the time required for the level to decrease by 20 dB from the starting point.
   T_{30} is obtained by multiplying by 2 the time required for the level to decrease by 30 dB from the starting point.
   T_{15} is obtained by multiplying by 4 the time required for the level to decrease by 15 dB from the starting point.

Note

- EDT is not calculated when using the interrupted noise method.
- If the background noise level fluctuates excessively, the steady-state level may be calculated lower than the actual level.



L_{eq} 2 calculation method

S/N ratio

The S/N ratio is evaluated as High (sufficient) or Low (insufficient) based on the level of the input sound source relative to the background noise. The quality of the S/N ratio serves as an indicator of the reliability of the reverberation time and does not affect whether the reverberation time can be calculated.
The S/N ratio for T_{xx} and EDT is calculated as follows:

- Integrated impulse response method
  The energy average value of the last 1 second of the Auto L_p store data is used as the background noise level.
  (Auto L_p store data maximum value) – (5 + xx) – (background noise level) = Judgment value
  If the judgment value is 10 or greater: High (sufficient)
  If the judgment value is less than 10: Low (insufficient)
- Interrupted noise method
  The energy average value of the last 1 second of the decay curve is used as the background noise level.
  (Steady-state level of the decay curve) – (5 + xx) – (background noise level) = Judgment value
  If the judgment value is 10 or greater: High (sufficient)
  If the judgment value is less than 10: Low (insufficient)

Note

- xx indicates the numerical value corresponding to xx in T_{xx}.

Error rate

During reverberation time measurement, if the T_{20} and T_{30} values calculated for a certain frequency band differ significantly, there may be a problem with the measurement data.

For NX-43RV, the difference between T_{20} and T_{30} is calculated and displayed as the error rate.
The error rate is calculated as $\left|1 - T_{30} / T_{20}\right| \times 100$. The result is rounded to the nearest integer [%].

Before starting the measurement, set the error rate threshold from [Menu] » [Display] » [RVT Display] » [Display Error].

On the recall screen, if the error rate exceeds the set threshold, the error rate value is displayed in red.

ISO 3382-2:2008 Acoustics — Measurement of room acoustic parameters — Part 2: Reverberation time in ordinary rooms states as follows:
“Typical values of C are 0 % to 5 %. Values higher than 10 % indicate a decay curve which is far from being a straight line and the value of the reverberation time estimated from the decay curve may be suspicious.”

12 Specifications

<table>
<tr><td>Compatible model</td><td>Class 2 Sound Level Meter NL-43
Class 1 Sound Level Meter NL-53
Class 1 Sound Level Meter (with low-frequency sound measurement function) NL-63</td></tr>
<tr><td>Media</td><td>512 MB SD card</td></tr>
<tr><td>Standards applied</td><td>IEC 61260-1:2014 class 1
ANSI/ASA S1.11-2014/Part 1 class 1
ISO 3382-2:2008
JIS C 1513-1:2020 class 1</td></tr>
<tr><td>Measurement function</td><td>Performs octave and 1/3 octave real-time analysis processing to obtain up to four sound pressure level conditions and the sound level of each octave band, and calculates the decay curve and reverberation time for each.
Reverberation time measurement can be performed using the integrated impulse response method with an impulse sound source, or the interrupted noise method with a broadband noise sound source. For the decay curve, the approximation line can be adjusted after measurement, the reverberation time can be recalculated, and multiple calculated reverberation time values can be selected to calculate an arithmetic mean.
<table>
<tr><td>Instantaneous value</td><td>Time-weighted sound level L_p (excl. Octave band analysis)</td></tr>
<tr><td>Calculated values</td><td>Time-weighted sound level L_{eq}
Sound exposure level L_E (excl. Octave band analysis)
Maximum time-weighted sound level L_{max} (excl. Octave band analysis)
Minimum time-weighted sound level L_{min} (excl. Octave band analysis)
Peak sound level L_{peak} (excl. Octave band analysis)
* All calculated values are obtained at 5 ms intervals.</td></tr>
<tr><td>Decay curve</td><td>Decay curve(Integrated impulse response method) $L_{DC,\ Impulse}$
Decay curve(Interrupted noise method) $L_{DC,\ Noise}$
* Calculated using L_{eq} calculated values at 5 ms intervals.</td></tr>
<tr><td>Reverberation time</td><td>Reverberation time calculated from the –5 dB to –25 dB range of the decay curve: T_{20}
Reverberation time calculated from the –5 dB to –35 dB range of the decay curve: T_{30}
Reverberation time calculated from the –5 dB to –20 dB range of the decay curve: T_{15}
Early decay time calculated from the 0 dB to –10 dB range of the decay curve: EDT (Integrated impulse response method only)</td></tr>
</table>
</td></tr>
<tr><td>Linear operating range</td><td>113 dB (A-weighting, 1 kHz)</td></tr>
</table>

Frequency analysis

NL-43 / NL-53

Octave band analysis	Octave band-pass filter: 16 Hz to 16 kHz Configuration: 12th-order Butterworth band-pass digital filter Center frequency: Base-10
1/3 octave band analysis	1/3 octave band-pass filter: 12.5 Hz to 20 kHz Configuration: 6th-order Butterworth band-pass digital filter Center frequency: Base-10

NL-63 (*The items in parentheses indicate the frequency weighting of Band.)

Octave band analysis	Octave band-pass filter: 16 Hz to 16 kHz (A, C, Z (HPF)) 1 Hz to 16 kHz (Z, G, Z (LPF100Hz), Z (LPF500Hz)) Configuration: 12th-order Butterworth band-pass digital filter Center frequency: Base-10
1/3 octave band analysis	1/3 octave band-pass filter: 12.5 Hz to 20 kHz (A, C, Z (HPF)) 1 Hz to 20 kHz (Z, G, Z (LPF100Hz), Z (LPF500Hz)) Configuration: 6th-order Butterworth band-pass digital filter Center frequency: Base-10

Frequency weighting

A-weighting, C-weighting, Z-weighting, and G-weighting (Available only for NL-63)

Time weighting

10 ms (fixed)

* Used for screen display, trigger level, instantaneous value L_p, and calculated values L_{max} / L_{min}.

Level range switching

Level range	One range
Bar graph display	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
Signal output range	Can be linked to the bar graph upper limit, or set from 70 dB to 130 dB in 10 dB increments.
Recording range	Can be linked to the bar graph upper limit, or set from 70 dB to 130 dB in 10 dB increments.

Sampling interval

L_p, L_{eq}	20.8 µs (sampling frequency 48 kHz)

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) Pre-time: 1 s (fixed) Number of repetitions: 10 (Up to 40 store addresses can be recorded per one RV store name.)

Overload / under-range indication

The following indications are displayed for sound level and octave band analysis under the respective conditions below.

- OVER is displayed when the input signal exceeds the upper measurement limit.
- UNDER is displayed when the input signal is below the lower measurement limit (excluding octave band analysis).
- OUTPUT OVER is displayed when the output signal exceeds 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 Numeric list

Reverberation time calculation result graph

Display range (vertical axis)	Upper limit: 0.5 s, 1 s, 2 s, 4 s, 8 s, 16 s, 32 s Lower limit: 0 s (fixed)
Frequency band display range (horizontal axis)	63 Hz to 8 kHz (Octave) 50 Hz to 10 kHz (1/3 Octave)

Decay curve time graph

Level range (vertical axis)	Impulse: The upper and lower limits of the graph are automatically determined from the maximum and minimum values recorded in the reverberation decay curve file. Noise: Determined in conjunction with the bar graph range setting.
Time range (horizontal axis)	Zoom in/out: 0.5 s, 1 s, 2 s, 4 s, 8 s, 16 s, 32 s

Waveform recording

The waveform recording function* can be used in parallel with store function.
* 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.

Output

AC output	Output characteristics: Sound level link (channel can be selected) Band link (frequency can be selected) A-weighting, C-weighting, Z-weighting, G-weighting*, Z (LPF100Hz, LPF500Hz, HPF)* (*Available only for NL-63) 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

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. * DPU-414 and BL2-58 are no longer manufactured and sold.
Baud rate	9600 bps, 19200 bps, 38400 bps, 57600 bps, 115200 bps

<table>
<tr><td>USB</td><td><table>
<tr><td>Communication</td><td>Measurement values can be acquired and settings can be changed by using communication commands.</td></tr>
<tr><td>Data transfer</td><td>Enables the transferring of data by making the computer recognize the SD card as a removable disk.</td></tr>
</table></td></tr>
<tr><td>LAN</td><td><table>
<tr><td>Communication</td><td>Measurement values can be acquired and settings can be changed by using communication commands.</td></tr>
<tr><td>Data transfer</td><td>Data on an SD card can be transferred to a computer.</td></tr>
</table></td></tr>
<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. 8 hours
Ni-MH rechargeable battery HR6: Approx. 8 hours
* 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 and Inspection Certificate</td></tr>
</table>

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RION CO., LTD.

https://www.rion.co.jp/english/

3-20-41 Higashimotomachi, Kokubunji, Tokyo 185-8533, Japan

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