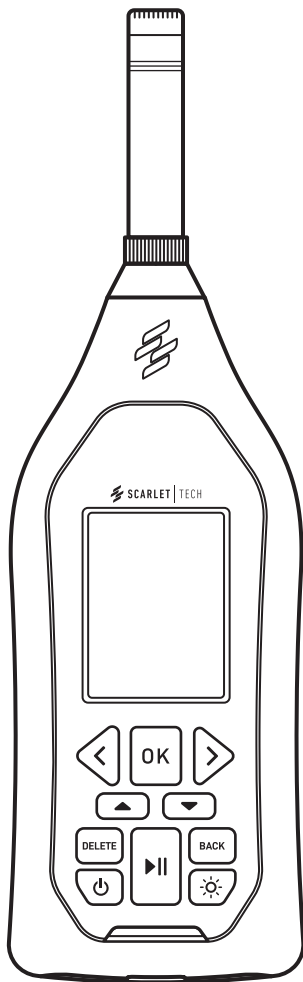




SCARLET | TECH



ST-12D

Sound Level Meter

User Guide

Precaution

- Use the sound level meter gently, especially the microphone, which is a sensitive sensor. Avoid crashing, knocking, or hitting the device, and prevent water or oil from entering.
- When using alkaline batteries, choose high-capacity options. Remember to remove the batteries if the sound level meter will not be used for more than one week to prevent potential issues.
- Perform calibration before and after measurements if necessary to ensure accurate readings.
- Keep the sound level meter powered on for at least 8 hours each month to charge the internal clock battery.

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1. Introduction

ST-12D is the Class 1 sound level meter that complies with IEC 61672:2013 standard. It has the capability to conduct precise noise measurements with its comprehensive sound analyzers, which calculate all the crucial parameters, such as Leq, Lpeak, Lmax, Lmin, and the optional of 1/1 or 1/3 octave band filters.

2. Packing Content

- 1. ST-12D Class 1 sound level meter
- 2. Windscreen
- 3. USB-C to USB cable
- 4. USB power adapter
- 5. Serial to RS232 cable
- 6. Serial to USB cable
- 7. AA batteries
- 8. Calibration certificate
- 9. User guide
- 10. Waterproof carrying case

(1)



(2)



(3)



(4)



(5)



(6)



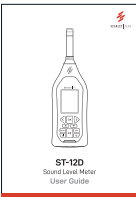
(7)



(8)



(9)



(10)



3. Technical Specifications

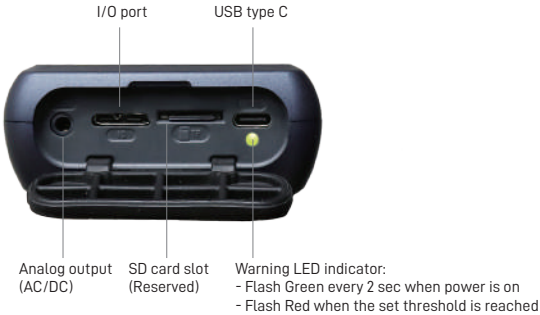
Item	Description
Fulfils Standard	IEC 61672-1: 2013 Class 1
Measurement Range	25 ~ 140 dB (143 dB C Peak)
Time Weightings (γ)	Fast, Slow, Impulse, I10
Frequency Weightings (γ_x)	A, C, Z
Integrating Analysis	$L_{xy}p$, $L_{xy}max$, $L_{xy}min$, $L_{xeq,T}$, $L_{xeq,t}$, L_{xpeak} , L_xE , E
Statistic Analysis	$L_{xy}p$, $L_{xy}max$, $L_{xy}min$, $L_{xeq,T}$, L_xE LN (N=1~99) : L5, L10, L50, L90, L95, SD Ldn, Ld, Ln
Exposure Analysis	E, TWA, Lex, 8h, LAVG, DOSE
Octave Band Analysis (Optional)	1/1 and 1/3 octave bands
Measurement Run Time	1s ~ 99 h 59 m 59 s
Display	2.4-inch 240 × 320 pixel full-color display Adjustable brightness & backlight can be turned off
Display Resolution	0.1 dB
Refresh Rate	0.5 s
Accuracy	± 0.5 dB
Frequency Range	10 Hz ~ 20 kHz
Audio Recording	Record noise data in MP3/WAV format Synchronize/Trigger mode Sampling rate: 12 kHz, 24 kHz, 48 kHz / 16 bit, 24 bit
Storage Capacity	4 GB internal memory MicroSD card
Output Interface	USB type-C, Bluetooth, AC/DC signal, Serial
Power Supply	4 x AA alkaline batteries External power supply (USB type-C adapter): 5V, 1A
Operation Time	Max 24hrs by 4 x AA alkaline batteries (The operation time varies depending on the device settings and battery type)
Dimensions	250 × 76 × 33 mm
Weight	340 g
Operation Environment	Working temperature: -20 ~ 60 °C Relative humidity: 20% ~ 90%

4. Overview

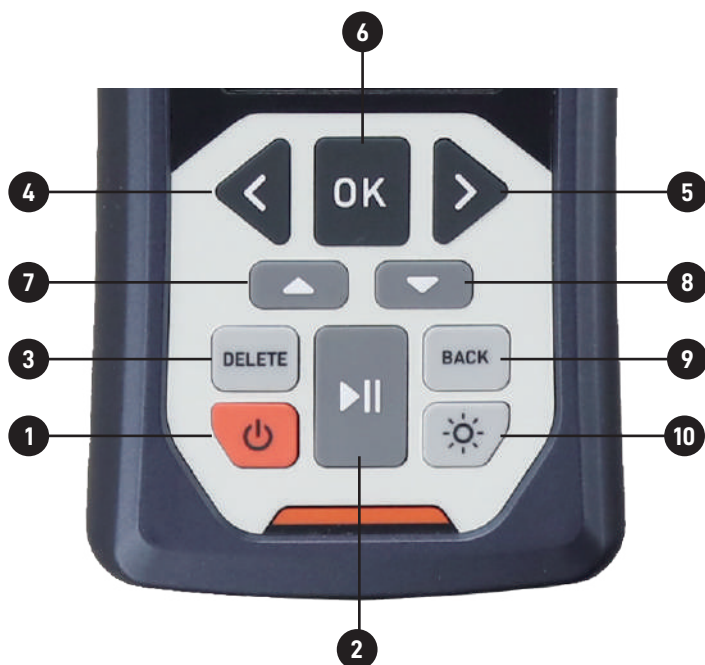
4.1 Front View













4.2 Bottom View



4.3 Keypad



No	Button	Definition
1	 Power	Power ON/OFF
2	 Play (Pause)	Start, pause or continue the measurement
3	 Delete	Terminate measurement; Delete measurement record
4	 Left	Navigate to the left
5	 Right	Navigate to the right
6	 OK	Select; Confirm
7	 Previous	Change to the previous option
8	 Next	Change to the next option
9	 Back	Cancel; Go back to the previous page
10	 Backlight	Turn off backlight manually

5. Installation & Setup

5.1 Preparation

■ Preparation Before Use

1. Check if the microphone has been installed correctly.
2. Check if the battery is inserted.
3. If necessary, calibrate the device with a sound calibrator. The standard method is described in *Calibration section* of this user guide.
4. The device should be tested by the relevant department regularly (e.g., annually) to ensure its accuracy.

■ Use of Windscreen

In windy conditions, use a windscreen to reduce the influence of wind noise. Various models are available, and windscreens can reduce noise by about 10-15 dB. Refer to *Appendix C* for the effects on free-field responses of a sound level meter with a windscreen when there is no wind.

5.2 Power Supply

■ External Power Supply

ST-12D can be connected with external power through the USB-C socket (5V, 1A) at the lower right of the device. When connected, the internal battery will automatically be cut-off. The shell of the plug as the cathode and the core of the plug as the anode. For continuous long-term use of the device, it is recommended to use an external power supply.



■ Checking & Changing the Battery

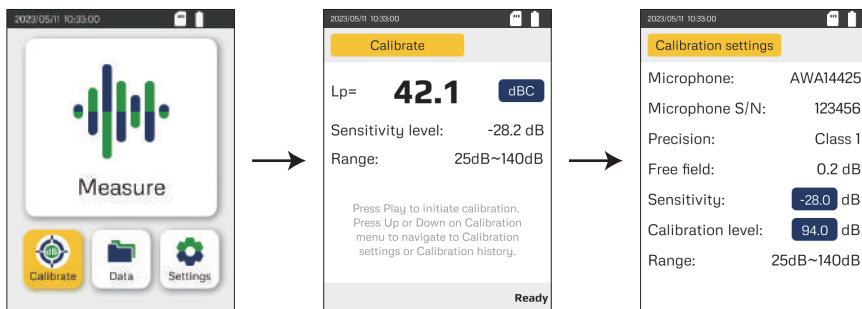
When the battery is low, the device will display a low battery warning. Please replace the battery. After replacing, the device will resume normal operation.

5.3 Calibration

Calibrate the ST-12D with a 1 kHz Class 1 certified sound calibrator. Scarlet also offers a Class 1 sound calibrator called the ST-120. Detailed instructions for using the ST-120 are provided separately in the ST-120 user guide.




Before Calibration: Check Calibration Settings

1. On **Main Menu**, navigate the cursor to **Calibrate** by pressing Left ◀ or Right ▶, then press OK . After entering **Calibrate**, navigate to **Calibration settings** by pressing Previous ◀ or Next ▶ on the calibration menu.
2. The default microphone sensitivity is configured during manufacturing.
3. If your Class 1 calibrator outputs 94 dB, set **Calibration level** to 94.0 dB. (Calibration level ranges from 70.0 to 130.0 dB.)
4. Press OK  to save the settings.



Start Calibration

Navigate to **Calibrate** by pressing Previous ◀ or Next ▶ on **Calibration**. Follow the below steps:

1. For field calibration with the 1 kHz Class 1 sound calibrator, set the parameter to either dBC or dBA. (For lab calibration, dBC is recommended)
2. Gently insert the microphone into the Class 1 sound calibrator. Once the microphone is properly covered, turn on the calibrator and wait a few seconds for the sound pressure level to stabilize.
3. Press Play  to initiate the calibration and wait for 10 seconds. The calibration status will be displayed in the bottom right corner of the screen.
4. After the calibration is completed, press OK  to save the calibration record, or press Back  if you don't want to save the record; this will return you to the **Ready** status.

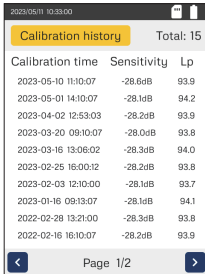


Calibration Status Definitions

Status	Definition
Ready	The status before initiating calibration
Calibrating	Calibration is in progress. A 10-second countdown timer is displayed alongside
Finish	Calibration is complete if the current sensitivity level is within or equal to 3 dB of the previous record
Fail	Calibration fails if the current sensitivity level exceeds the previous record by more than 3 dB

Calibration History

1. Navigate to **Calibrate history** by pressing Previous ◀ or Next ▶ on the calibration menu.
2. The calibration records are displayed in a list by date, with the most recent record at the top.





2023/05/11 10:33:00

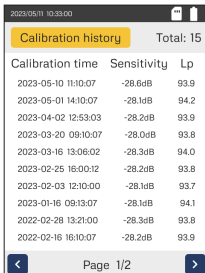
Calibration history Total: 15

Calibration time	Sensitivity	Lp
2023-05-10 11:10:07	-28.6dB	93.9
2023-05-01 14:10:07	-28.1dB	94.2
2023-04-02 12:53:03	-28.2dB	93.9
2023-03-20 09:10:07	-28.0dB	93.8
2023-03-16 13:06:02	-28.3dB	94.0
2023-02-25 16:00:12	-28.2dB	93.8
2023-02-03 12:10:00	-28.1dB	93.7
2023-01-16 09:13:07	-28.1dB	94.1
2022-02-28 13:21:00	-28.3dB	93.8
2022-02-16 16:10:07	-28.2dB	93.9

Page 1/2

Delete a Specific Calibration Record

1. Navigate to one of the records and press OK  to view the calibration details.
2. Press Delete  to remove this specific record; a pop-up will appear to confirm the deletion.

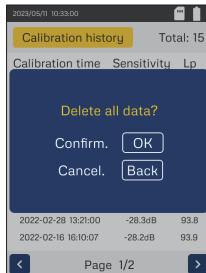


2023/05/11 10:33:00

Calibration history Total: 15

Calibration time	Sensitivity	Lp
2023-05-10 11:10:07	-28.6dB	93.9
2023-05-01 14:10:07	-28.1dB	94.2
2023-04-02 12:53:03	-28.2dB	93.9
2023-03-20 09:10:07	-28.0dB	93.8
2023-03-16 13:06:02	-28.3dB	94.0
2023-02-25 16:00:12	-28.2dB	93.8
2023-02-03 12:10:00	-28.1dB	93.7
2023-01-16 09:13:07	-28.1dB	94.1
2022-02-28 13:21:00	-28.3dB	93.8
2022-02-16 16:10:07	-28.2dB	93.9

Page 1/2



2023/05/11 10:33:00

Calibration history Total: 15

Delete all data?


Confirm.

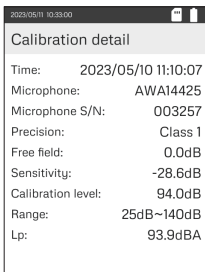
Cancel.

2022-02-28 13:21:00	-28.3dB	93.8
2022-02-16 16:10:07	-28.2dB	93.9

Page 1/2

Delete all calibration records

1. Return to **Calibration history** and press Delete .
2. A pop-up will appear to confirm the deletion.



2023/05/11 10:33:00

Calibration detail

Time: 2023/05/10 11:10:07

Microphone: AWA14425

Microphone S/N: 003257

Precision: Class 1

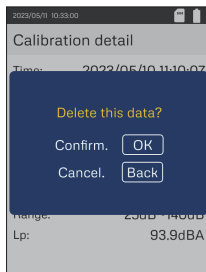
Free field: 0.0dB

Sensitivity: -28.6dB

Calibration level: 94.0dB

Range: 25dB~140dB

Lp: 93.9dBA



2023/05/11 10:33:00

Calibration detail

Delete this data?

Confirm.


Cancel.

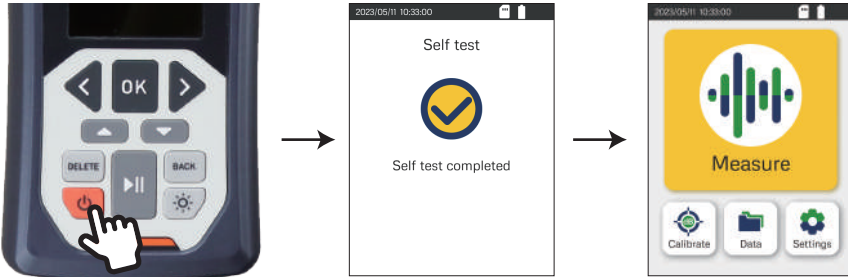
Time: 2023/05/10 11:10:07		
Range: 25dB~140dB		
Lp: 93.9dBA		

5.4 Basic Operation



Power the ST-12D On & Off

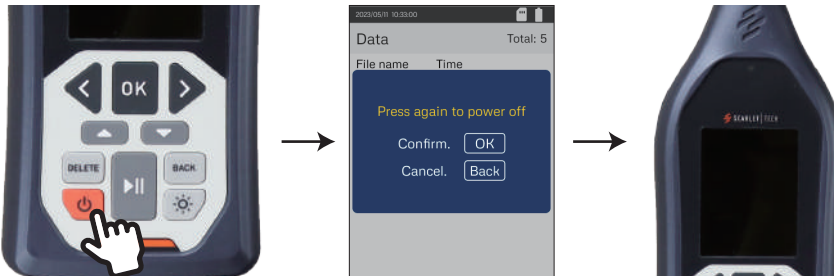
Power On the ST-12D

1. Press and hold Power  for 3 sec to turn on the ST-12D.
2. The device will take a self check while booting and then enter **Main Menu** after ready for operation.





Power Off the ST-12D

1. Press Power  while ST-12D is operating.
2. A popup will appear for confirmation, press OK  to switch off the ST-12D.




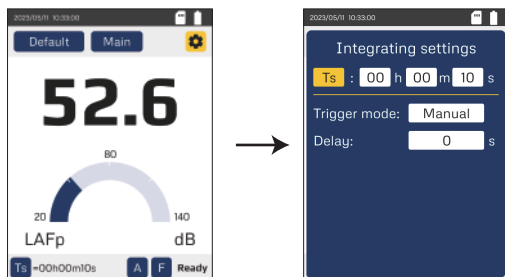
5.5 Select Measurement Function

1. Press Left ◀ or Right ▶ to navigate to the **Measure**, then press OK .
2. Press Left ◀ or Right ▶ to navigate to the **Integral**, then press OK  to enter **Integral analyzer**. (See *Operation Interface* section for more details)




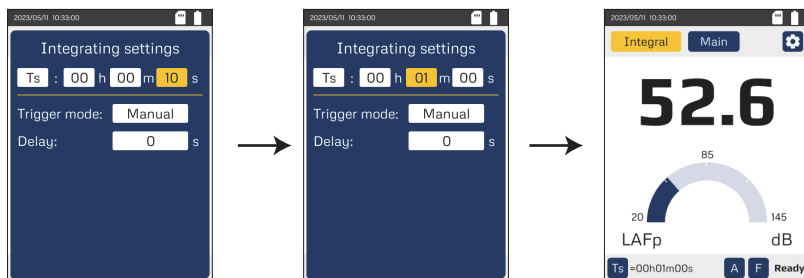
5.6 Setting the Parameters of the Analyzer

1. Press Left ◀ or Right ▶ to navigate to **Settings** icon.
2. Confirm with OK  to enter the **Analyzer settings**. (Integrating settings as an example)



5.7 Preset Measurement Time

1. Navigate the cursor to the Ts.
2. Press Previous ◀ or Next ▶ to select measurement time. (See *Operation Interface* section for more details)
3. Press OK  to save the settings and return to **Analyzer**. (Integral as an example)



Select Weightings

1. On **Analyzer**, navigate to the bottom right corner.
2. Press Previous ◀ or Next ▶ to select **Frequency Weighting** or **Time Weighting**.

Frequency Weighting



Time Weighting





Start Measurement

1. On **Analyzer**, press Play ▶ to start the measurement.
2. In the bottom status bar, **Ts** label will switch to **Tm** (indicating the measurement time) and display the elapsed measurement time in hr:min:sec. The analyzer status will be shown as **Run** in the bottom right corner. (See *Operation interface* for more details)
3. The measurement ends when the time reaches Ts. All measurement results will be automatically saved (by default, to the internal memory). To change the storage location, see *Settings section* for more details.





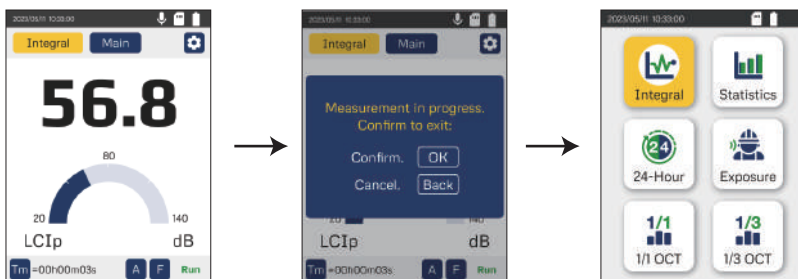
Pause a Measurement

1. Press Play (Pause)  to pause while measurement is running.
2. The measurement will stop and can be resumed by pressing Play  again.

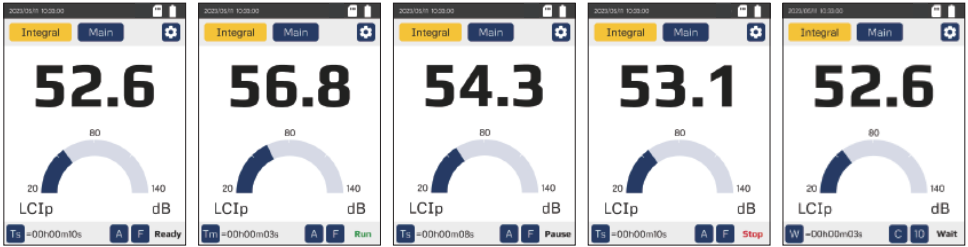


Terminate Measurement

1. Press Back  while measurement is running.
2. A confirmation popup will appear; press OK  to exit the analyzer and stop the measurement manually.



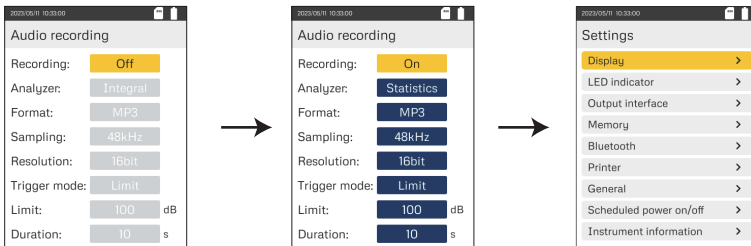
5.8 Measurement Status



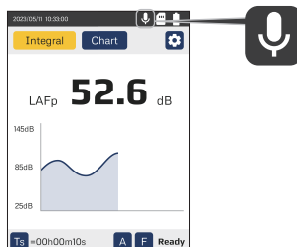
Status	Definition
Ready	The status before initiating measurement
Run	Measurement is in progress. The current or remaining measurement time is displayed in hr:min:sec at the bottom left corner
Pause	Measurement is paused. Press Play to resume
Stop	Measurement has ended. The results are automatically stored
Wait	Measurement has been initiated but has not yet reached the trigger point

5.9 Enable Audio Recording

1. On **Settings**, navigate to **Audio recording** settings.
2. Navigate to **Recording** by pressing Left or Right .
3. Press Previous or Next to switch the option to **On** to enable **Audio recording** function.
4. Press OK to save the settings and return to previous settings page.

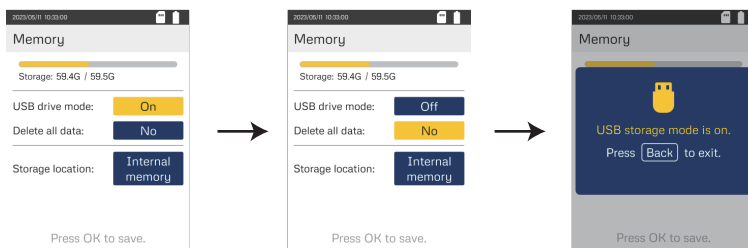


5. When audio recording is active, **Audio recording icon** will appear on the top status bar.

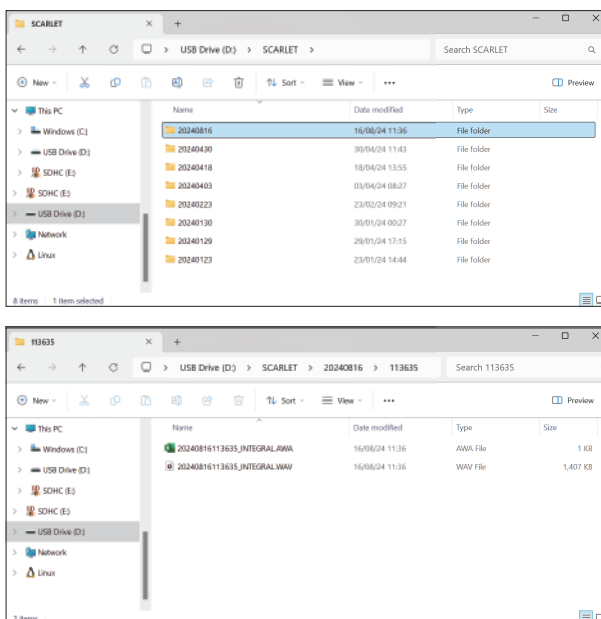


5.10 Export Data through USB Drive Mode


1. Connect the ST-12D with your PC using the USB-C cable.
2. Navigate to **Memory** settings.
3. Navigate to **USB drive mode** by pressing Left ◀ or Right ▶.
4. Press Previous ◀ or Next ▶ to switch the option to **On** to enable **USB drive mode** function.
5. A pop-up will appear indicating that **USB storage mode** is on.

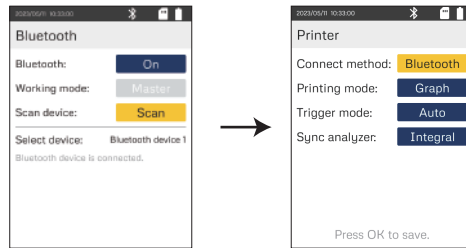



6. Based on the chosen storage location in **Memory** settings, the historical records stored at the selected location will appear in your PC's file explorer under USB Drive folder.
7. Records are organized into folders by measurement date (yyyymmdd), and the reports can be opened in Excel format.

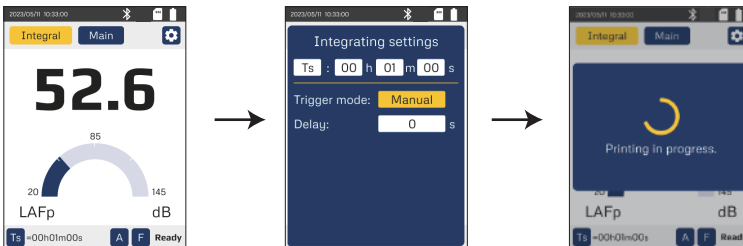


5.11 Automatically Print Data After Measurement in Bluetooth Mode

1. Ensure Bluetooth printer is successfully connected. (See *Settings-Bluetooth* section for more details)
2. Navigate to **Printer** settings and configure the following options, then press OK  to save:
 - **Connect method:** Bluetooth
 - **Printing mode:** Graph or Text only
 - **Trigger mode:** Auto
 - **Sync analyzer:** Integral (or select preferred analyzer to enable auto printing)

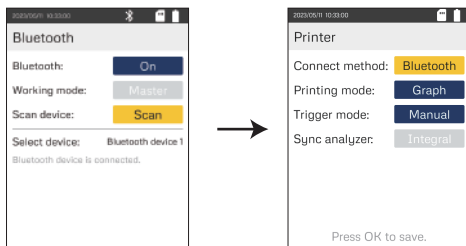


3. Go to **Measure**, navigate to **Integral** (or the analyzer selected in Printer settings), and navigate to **Settings icon**.
4. Ensure the **Trigger mode** is **Manual**.
5. On the **Integral** page, press Play  to initiate the measurement. The printer will automatically print the report once the measurement is complete.

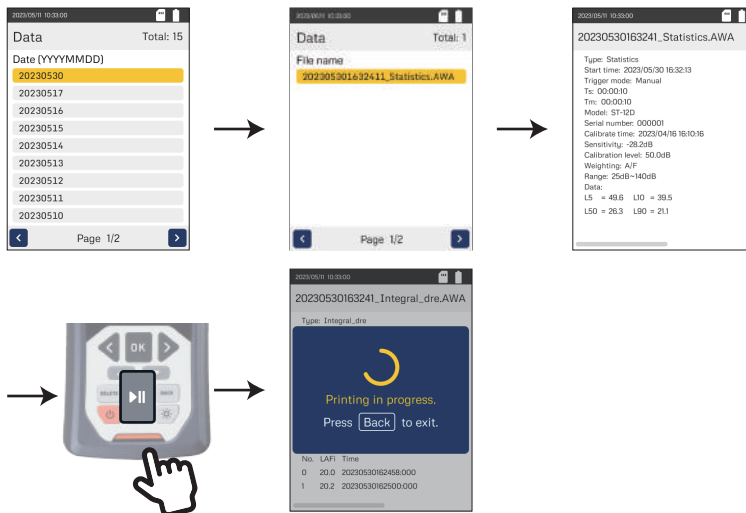


5.12 Print Historical Data via Bluetooth Mode

1. Ensure Bluetooth printer is successfully connected. (See *Settings-Bluetooth* section for more details).
2. Navigate to **Printer** settings page and configure the following options, then press **OK** to save:
 - **Connect method:** Bluetooth
 - **Printing mode:** Graph or Text only
 - **Trigger mode:** Manual





3. Navigate to **Data** and choose the specific data page you want to print.
4. Press Play **▶** to start printing the report.
5. A pop-up will appear indicating that printing is in progress.

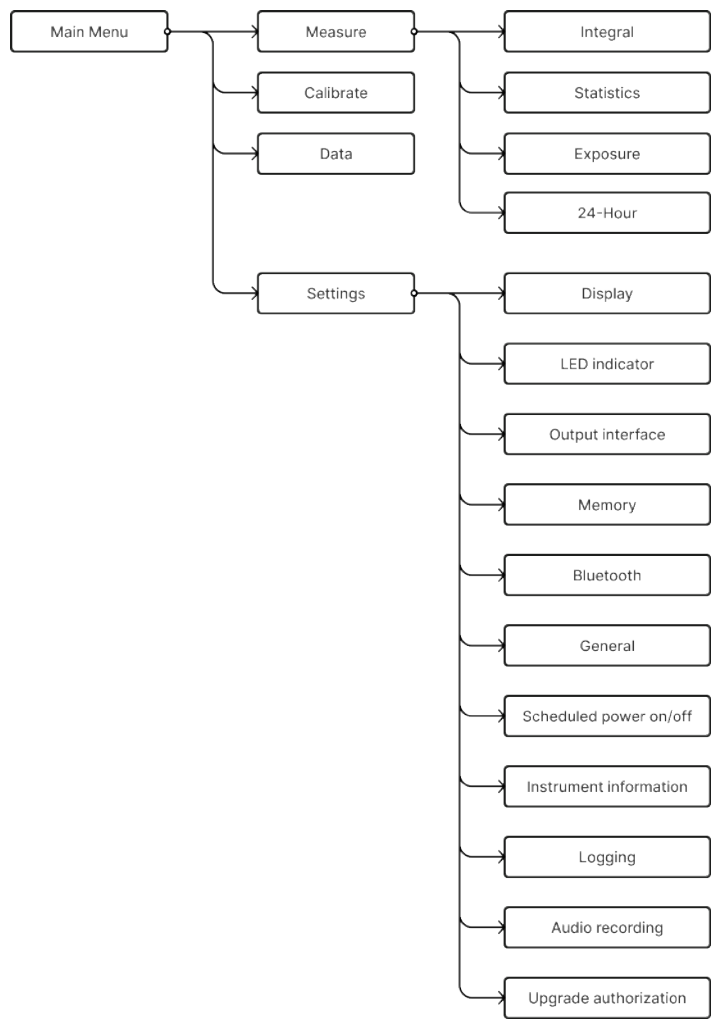


6. If you need to cancel the printing, press **Back** **⏮**, and the printer will stop.

6. Operation Interface

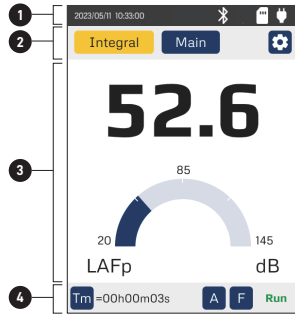
After powering on the device (ST-12D), **Main Menu** will be displayed. The following figure illustrates the page structure shown on the device.

- Use the Left ◀ or Right ▶ key to navigate.
- Use the Previous ⏮ or Next ⏭ key to change the option where it is located.
- Press OK  to confirm the selection, save the settings or enter a page.
- Press Back  to return to the previous page.

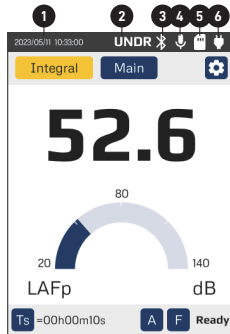




6.1 Basic Components

ST-12D interface includes several universal components that appear consistently across pages, such as top status bar, navigation, and bottom status bar. The figure below labels the fundamental components of ST-12D operation interface, each of which is described in the following tables:

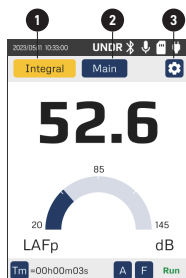


Top Status Bar



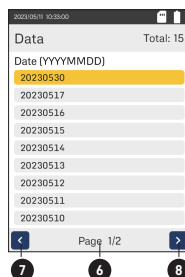
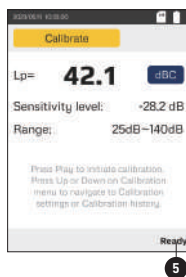
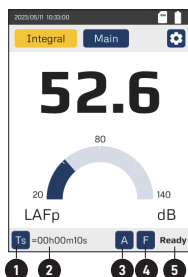
No	Item	Definition
1	Day & time	Show current data and time of this device
2	Over range indicator	Indicate the measurement result exceeds the preset measurement range; OVER OVER = overload; UNDR UNDR = underload
3	Bluetooth	Indicate Bluetooth function is enabled
4	Audio recording	Indicate the ongoing measurement includes audio recording
5	SD card	Indicate the ongoing measurement is being stored on the SD card
6	Power source	Show the device's power source; Battery icon  = battery level; Plug icon  = USB power delivery

Navigation



No	Item	Definition
1	Analyzer	Show current analyzer; Press Previous ◀ or Next ▶ to switch analyzer
2	Display view	Show current display view; Press Previous ◀ or Next ▶ to switch view
3	Analyzer settings	View and adjust analyzer measure settings, includes measurement run time, trigger mode

Bottom Status



No	Item	Definition
1	Measurement run time	Measurement time; Press Previous ◀ or Next ▶ to switch timer mode; Ts: Preset measurement time on Analyzer settings ; Tl: Remaining measurement time; Tm: Actual measurement time
2	Measurement time	Show measurement time in hr:min:sec
3	Frequency weighting	Show current frequency weighting
4	Time weighting	Show current time weighting; F = Fast-weighted; S = Slow-weighted; I = Impulse-weighted
5	Measurement status	Show measurement status
6	Page	Show current displayed page
7	Previous	Press OK to switch to previous page
8	Next	Press OK to switch to next page

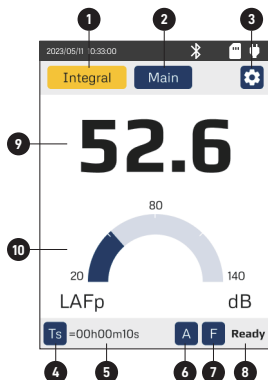
6.2 Measure

Each analyzer supports different display views. Refer to the following sections for details.

Integral

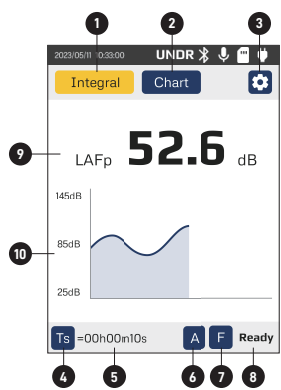
ST-12D supports three types of display view for Integrating analysis: Main, Chart, and List.

Main View



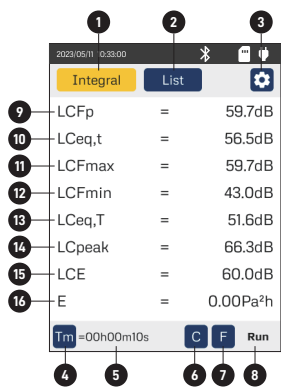
No	Item	Definition
1	Integrating analyzer	Show current analyzer: Integrating; Press Previous or Next to switch analyzer
2	Main display view	Show current display view: Main; Press Previous or Next to switch view
3	Integrating settings	View and adjust Analyzer measure settings, includes measurement run time and trigger mode
4	Measurement run time	Measurement time; Press Previous or Next to switch timer mode; Ts: Preset measurement time on analyzer settings page; Tl: Remaining measurement time; Tm: Actual measurement time
5	Measurement time	Show measurement time in hr:min:sec
6	Frequency weighting	Show current frequency weighting
7	Time weighting	Show current time weighting; F = Fast-weighted; S = Slow-weighted; I = Impulse-weighted
8	Measurement status	Show measurement status
9	Lxyp	Sound level where x = A, C, Z; y = F, S, I
10	Lxyp gauge	Sound level gauge

Chart View



No	Item	Definition
1	Integrating analyzer	Show current analyzer: Integrating; Press Previous ◀ or Next ▶ to switch analyzer
2	Main display view	Show current display view: Main; Press Previous ◀ or Next ▶ to switch view
3	Integrating settings	View and adjust Analyzer measure settings, includes measurement run time, trigger mode
4	Measurement run time	Measurement time; Press Previous ◀ or Next ▶ to switch timer mode; Ts: Preset measurement time on analyzer settings page; Tl: Remaining measurement time; Tm: Actual measurement time
5	Measurement time	Show measurement time in hr:min:sec
6	Frequency weighting	Show current frequency weighting
7	Time weighting	Show current time weighting; F = Fast-weighted; S = Slow-weighted; I = Impulse-weighted
8	Measurement status	Show measurement status
9	Lxyp	Sound level where x = A, C, Z; y = F, S, I
10	Lxyp chart	Sound level chart

List View

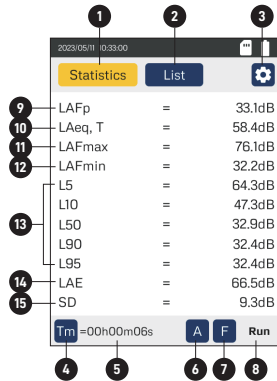


No	Item	Definition
1	Integrating analyzer	Show current analyzer: Integrating; Press Previous or Next to switch analyzer
2	List display view	Show current display view: List; Press Previous or Next to switch view
3	Integrating settings	View and adjust Analyzer measure settings, includes measurement run time, trigger mode
4	Measurement run time	Measurement time; Press Previous or Next to switch timer mode; Ts: Preset measurement time on analyzer settings page; Tl: Remaining measurement time; Tm: Actual measurement time
5	Measurement time	Show measurement time in hr:min:sec
6	Frequency weighting	Show current frequency weighting
7	Time weighting	Show current time weighting; F = Fast-weighted; S = Slow-weighted; I = Impulse-weighted
8	Measurement status	Show measurement status
9	Lxyp	Sound level where x = A, C, Z; y = F, S, I
10	Lxeq,t	Show equivalent continuous sound level with 1-sec interval
11	Lxymax	Maximum sound level where x = A, C, Z; y = F, S, I
12	Lxymín	Minimum sound level where x = A, C, Z; y = F, S, I
13	Lxeq, T	Show equivalent continuous sound level
14	Lxpeak	Show peak sound pressure level where x = A, C, Z
15	LxE (SEL)	Sound exposure level where x = A, C, Z
16	E	Show sound exposure in Pa²h (Pascal Squared Hours) for noise dose

Statistics

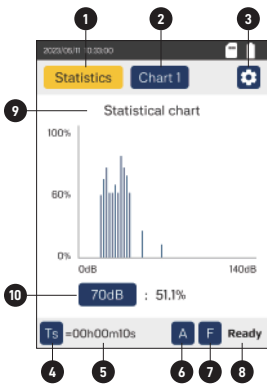
ST-12D supports three types of display views: List, Chart1 (Statistical chart), and Chart2 (Accumulation chart).







List View



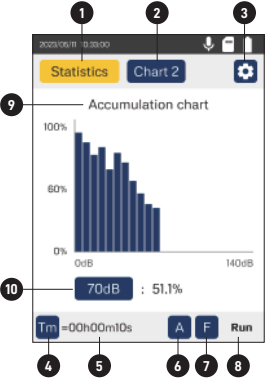
No	Item	Definition
1	Statistics analyzer	Show current analyzer: Statistics; Press Previous ◀ or Next ▶ to switch analyzer
2	List display view	Show current display view: List; Press Previous ◀ or Next ▶ to switch view
3	Statistics settings	View and adjust Analyzer measure settings, includes measurement run time, trigger mode
4	Measurement run time	Measurement time; Press Previous ◀ or Next ▶ to switch timer mode; Ts: Preset measurement time on analyzer settings page; Tl: Remaining measurement time; Tm: Actual measurement time
5	Measurement time	Show measurement time in hr:min:sec
6	Frequency weighting	Show current frequency weighting
7	Time weighting	Show current time weighting; F = Fast-weighted; S = Slow-weighted; I = Impulse-weighted
8	Measurement status	Show measurement status
9	Lxyp	Sound level where x = A, C, Z; y = F, S, I
10	Lxeq	Equivalent continuous sound level (time-average sound level) where x = A, C, Z
11	Lxymax	Maximum sound level where x = A, C, Z; y = F, S, I
12	Lxymiin	Minimum sound level where x = A, C, Z; y = F, S, I
13	Ln1, Ln2, Ln3, Ln4, Ln5	Statistical noise level, the percentage exceeded levels where n = 1 to 99; by default Ln1 = L5; Ln2 = L10; Ln3 = L50; Ln4 = L90; Ln5 = L95
14	SEL (LxE)	Sound exposure level where x = A, C, Z
15	SD	Standard deviation of statistics analyzer







Statistical Chart View



No	Item	Definition
1	Statistics analyzer	Show current analyzer: Statistics; Press Previous  or Next  to switch analyzer
2	List display view	Show current display view: List; Press Previous  or Next  to switch view
3	Statistics settings	View and adjust Analyzer measure settings, includes measurement run time, trigger mode
4	Measurement run time	Measurement time; Press Previous  or Next  to switch timer mode; Ts: Preset measurement time on analyzer settings page; Tl: Remaining measurement time; Tm: Actual measurement time
5	Measurement time	Show measurement time in hr:min:sec
6	Frequency weighting	Show current frequency weighting
7	Time weighting	Show current time weighting; F = Fast-weighted; S = Slow-weighted; I = Impulse-weighted
8	Measurement status	Show measurement status
9	Statistical chart	Show statistical distribution of sound levels
10	Sound level cursor	Show corresponding result of certain sound level

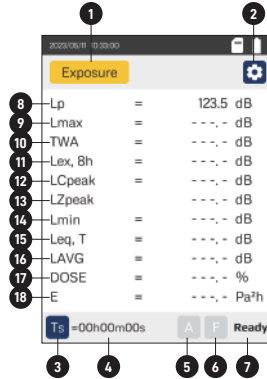
Accumulation Chart View







No	Item	Definition
1	Statistics analyzer	Show current analyzer: Statistics; Press Previous  or Next  to switch analyzer
2	List display view	Show current display view: List; Press Previous  or Next  to switch view
3	Statistics settings	View and adjust Analyzer measure settings, includes measurement run time, trigger mode
4	Measurement run time	Measurement time; Press Previous  or Next  to switch timer mode; Ts: Preset measurement time on analyzer settings page; Tl: Remaining measurement time; Tm: Actual measurement time
5	Measurement time	Show measurement time in hr:min:sec
6	Frequency weighting	Show current frequency weighting
7	Time weighting	Show current time weighting; F = Fast-weighted; S = Slow-weighted; I = Impulse-weighted
8	Measurement status	Show measurement status
9	Accumulative chart	Show accumulative distribution of sound levels
10	Sound level cursor	Show corresponding result of certain sound level

Exposure

All supported sound exposure parameter are listed in Exposure analyzer.

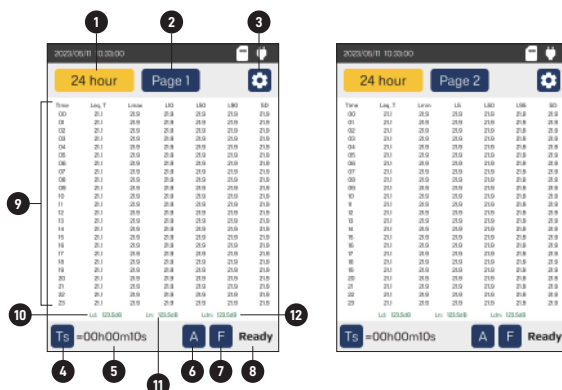


No	Item	Definition
1	Exposure analyzer	Show current analyzer: Exposure; Press Previous  or Next  to switch analyzer
2	Exposure settings	View and adjust Analyzer measure settings, includes measurement run time, trigger mode
3	Measurement run time	Measurement time; Press Previous  or Next  to switch timer mode; Ts: Preset measurement time on analyzer settings page; Tl: Remaining measurement time; Tm: Actual measurement time
4	Measurement time	Show measurement time in hr:min:sec
5	Frequency weighting	Show current frequency weighting
6	Time weighting	Show current time weighting; F = Fast-weighted; S = Slow-weighted; I = Impulse-weighted
7	Measurement status	Show measurement status
8	Lp	Show current sound pressure level (Instantaneous level)
9	Lmax	Show maximum sound level
10	TWA	Show TWA (Time Weighted Average)
11	Lex, 8h	Show daily noise exposure level (eight hours of exposure)
12	LCpeak	Show peak sound pressure level with C-weighted
13	LZpeak	Show peak sound pressure level with Z-weighted
14	Lmin	Show minimum sound level
15	Leq, T	Show equivalent continuous sound level
16	LAVG	Show average sound level
17	DOSE	Show the percentage of noise exposure compare to exposed to a fixed level for 8 hours
18	E	Show sound exposure in Pa ² h (Pascal Squared Hours) for noise dose

24-Hour Statistical Analyzer

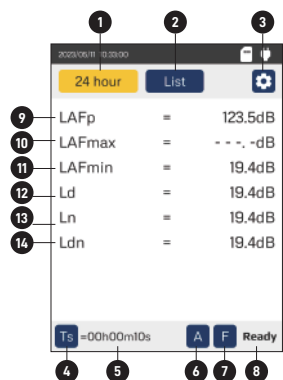
The 24-hour analyzer supports a matrix table for a matrix table view in **Page 1** and **Page 2** display views for one-day measurements. Switch to **List** or **Chart** view to check the details for each hour.

Table View



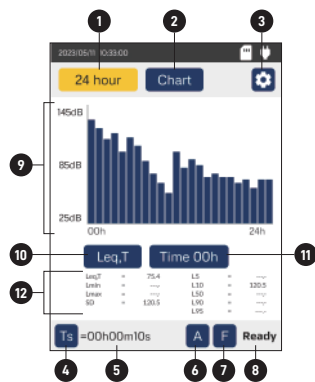
No	Item	Definition
1	24-hour statistics analyzer	Show current analyzer: 24-hour Statistics
2	Page1 display view	Show current display view: List; Press Previous ◀ or Next ▶ to switch view
3	24-hour statistics settings	View and adjust Analyzer measure settings, includes measurement run time, trigger mode
4	Measurement run time	Measurement time; Press Previous ◀ or Next ▶ to switch timer mode; Ts: Preset measurement time on analyzer settings page; Tl: Remaining measurement time; Tm: Actual measurement time
5	Measurement time	Show measurement time in hr:min:sec
6	Frequency weighting	Show current frequency weighting
7	Time weighting	Show current time weighting; F = Fast-weighted; S = Slow-weighted; I = Impulse-weighted
8	Measurement status	Show measurement status
9	24-hour statistical table	Show hourly statistical measurement result
10	Ld	Show day noise indicator
11	Ln	Show night noise indicator
12	Ldn	Show day-night noise indicator

List View



No	Item	Definition
1	24-hour statistics analyzer	Show current analyzer: 24-hour Statistics
2	Page1 display view	Show current display view: List; Press Previous or Next to switch view
3	24-hour statistics settings	View and adjust Analyzer measure settings, includes measurement run time, trigger mode
4	Measurement run time	Measurement time; Press Previous or Next to switch timer mode; Ts: Preset measurement time on analyzer settings page; TL: Remaining measurement time; Tm: Actual measurement time
5	Measurement time	Show measurement time in hr:min:sec
6	Frequency weighting	Show current frequency weighting
7	Time weighting	Show current time weighting; F = Fast-weighted; S = Slow-weighted; I = Impulse-weighted
8	Measurement status	Show measurement status
9	Lxyp	Sound level where x = A, C, Z; y = F, S, I
10	Lxymax	Maximum sound level where x = A, C, Z; y = F, S, I
11	Lxymin	Minimum sound level where x = A, C, Z; y = F, S, I
12	Ld	Show day noise indicator
13	Ln	Show night noise indicator
14	Ldn	Show day-night noise indicator

Chart View

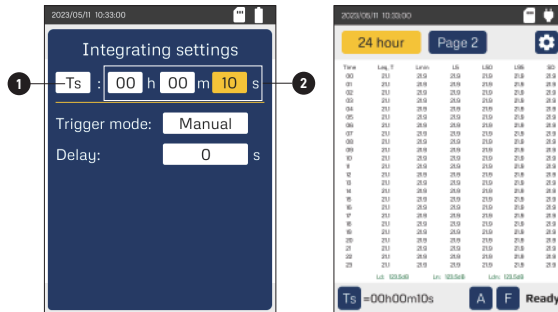


No	Item	Definition
1	24-hour statistics analyzer	Show current analyzer: 24-hour Statistics
2	Page1 display view	Show current display view: List; Press Previous ⏮ or Next ⏭ to switch view
3	24-hour statistics settings	View and adjust Analyzer measure settings, includes measurement run time, trigger mode
4	Measurement run time	Measurement time; Press Previous ⏮ or Next ⏭ to switch timer mode; Ts: Preset measurement time on analyzer settings page; Tl: Remaining measurement time; Tm: Actual measurement time
5	Measurement time	Show measurement time in hr:min:sec
6	Frequency weighting	Show current frequency weighting
7	Time weighting	Show current time weighting; F = Fast-weighted; S = Slow-weighted; I = Impulse-weighted
8	Measurement status	Show measurement status
9	24-hour Statistical chart	Show hourly statistical measurement result
10	Measurement parameter option	Indicate chart display measurement parameter; Show corresponding result of certain sound level
11	Hour option	Indicate corresponding hour of detail measurement result
12	Hourly measurement table	Show statistical distribution of sound levels

Analyzer Settings

Each analyzer has specific settings, including measurement time, measurement trigger mode, and analyzer-specific configurations.

Measurement Time



No	Item	Definition
1	Measurement time setting	Select measurement time; Press Previous ⏮ or Next ⏭ on Ts to switch options: 10s, 1min, 5min, 10min, 15min, 20min, 30min, 1h, 2h, 4h, 8h, 24h
2	Measure time interval	Set measurement time in hr:min:sec

Trigger Mode

There are five different trigger modes for the analyzer:

- **Manual:** Triggered by pressing Play ▶
- **Parameter:** Triggered when a specified parameter exceeds a threshold value
- **Schedule:** Triggered at a specific time
- **Interval:** Triggered periodically at set clock intervals
- **Continuous:** Triggered by pressing Play ▶, with the measurement automatically restarting after the previous measurement completes

Each analyzer supports different trigger modes.



No	Item	Definition
1	Trigger by manual	Start measurement by pressing Play
2	Delay	Set a trigger delay time after pressing Play , ranging from 0s to 99s
3	Trigger by parameter	Start measurement when the selected noise parameter exceeds the threshold
4	Parameter	Specify parameter and value that triggers the measurement; Parameter: Lxyp; Threshold: 10 to 180 dB (default is 100 dB).
5	Trigger by schedule	Start measurement at specific time
6	Start time	Set measurement start time. Press Previous or Next to select time (Switch option to ** to indicate all values)
7	Trigger by interval	Measure periodically at a set clock interval
8	Time period	Select clock interval: 10s, 30s, 1min, 2min, 5min, 10min, 20min, 30min, 1hr
9	Triger by continous	Continuous restart the measurement after pressing the Play with a set total count; Only the statistics analyzer supports this trigger mode
10	Total	Set the total measurement count in each file, ranging from 1 to 4320 records
11	Period	Select the mode for continuous measurement; Single: measure only 1 file; Repeat: measure repeatedly

Analyzer-Specific Settings

Statistics settings

Ts : 00 h 00 m 10 s

Trigger mode: Manual

Delay: 0 s

Ln1 : 05 Ln2 : 10

Ln3 : 50 Ln4 : 90

Ln5 : 95

Exposure settings

Ts : 00 h 00 m 10 s

Trigger mode: Manual

Delay: 0 s

Exchange rate: 3


Threshold level: 80 dB

Criterion level: 85 dB

No	Item	Definition
1	Ln (Percentile level)	Statistical noise level, representing the percentage of time that sound level is exceeded, where n = 1 to 99. By default: Ln1 = L5, Ln2 = L10, Ln3 = L50, Ln4 = L90, Ln5 = L95
2	Exchange rate (Q)	Energy-based average used for noise dose calculation
3	Threshold level	Sound level value below which should be disregarded for occupational regulation
4	Criterion level	Maximum Leq sound level allowed over an 8-hour period, corresponding to the 100% noise dose value (default is 85dB)

6.3 Data

Based on the chosen storage location in **Memory** settings, the historical records stored at the selected location will be displayed accordingly on **Data**. *(To change the storage location, refer to the Settings section for more details)*

Records are organized by measurement date, with the most recent date at the top. Within each date folder, records are further organized by measurement time, with the most recent record listed first. After navigating to **File name**, press OK  to view the detailed report.

2023/05/11 10:53:00

Data

Total: 15

Date (YYYYMMDD)

20230530

20230517

20230516

20230515

20230514

20230513

20230512

20230511

20230510

Page 1/2

2023/05/11 10:53:00

Data

Total: 15

Time (hh:mm:ss)

163213

162535

162046

161726

161013

155823

154456

153012

151509

Page 1/2

2023/05/11 10:53:00

20230530163241_Statistics.AWA

Type: Statistics

Start time: 2023/05/30 16:32:13

Trigger mode: Manual

Ts: 00:00:10

Tm: 00:00:10

Model: ST-920

Serial number: 000001

Calibrate time: 2023/04/16 16:10:16

Sensitivity: -25.2dB

Calibration level: 50.0dB

Weighting: A/F




Range: 25dB~140dB

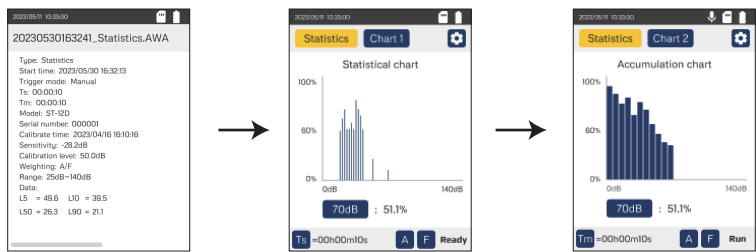
Data:

LS = 49.8 LID = 36.5


LSD = 26.3 LRD = 21.1

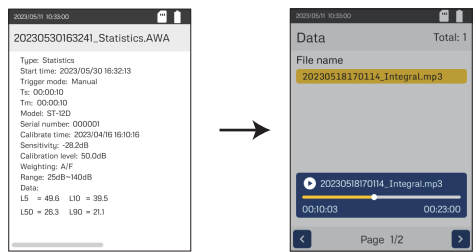
View The Chart

Data supports chart viewing. For example, with **Statistics historical record**, once you enter the report details page, press OK  again to display the chart. Navigate to the next chart page by pressing Previous  or Next .





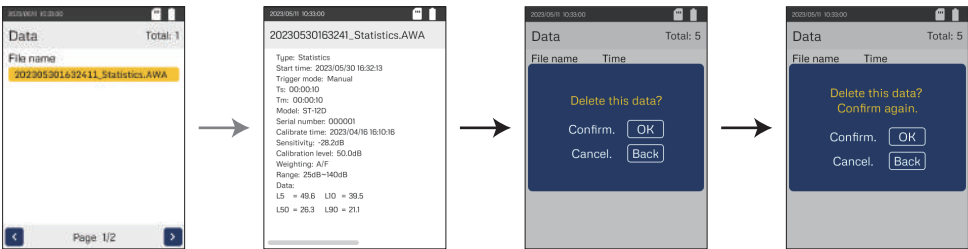
Replay The Audio Record

Data supports audio playback. Navigate to the MP3 or WAV file and press OK  to play the audio recording.






Delete a Specific Record

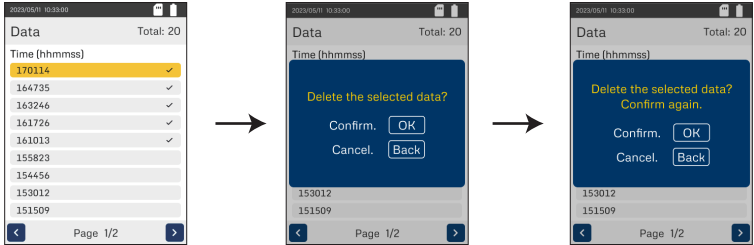
Navigate to one of the records and press OK  to view report details. Press Delete  to remove this specific record; a pop-up will appear to confirm the deletion.



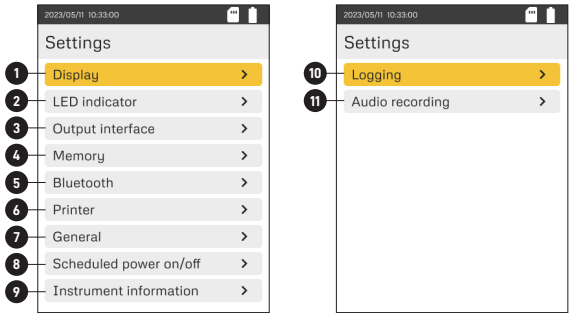
■ Delete Multiple Records

To delete multiple records at once, you can select the data first and remove them together.

1. Navigate to one of records and press Play  to select it. A checkmark icon will appear, indicating that the record is selected.
2. Navigate to other records and press Play  to select them.
3. After selecting the records you want to remove, remove them by pressing Delete ; a pop-up will appear to confirm the deletion.

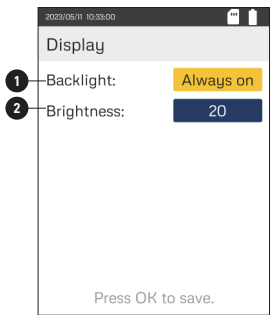


6.4 Settings



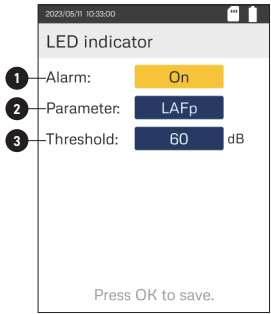
No	Item	Definition
1	Display	Change display backlight brightness
2	LED indicator	Change alarm LED threshold
3	Output interface	Config output interface settings
4	Memory	Check storage status and select where data stored
5	Bluetooth	Pair bluetooth printer
6	Printer	Select printer connection method and change printing mode
7	General	Change date and time, start menu; or restore to factory settings
8	Scheduled power on/off	Set automatic power-on and power-off schedule
9	instrument information	Device information of ST-12D
10	Logging	Select signal recording configuration (parameter & interval)
11	Audio recording	Select audio recording configuration



Display



No	Item	Definition
1	Backlight	Adjust the backlight duration. The default setting is Always on, or choose between 10 sec and 900 sec for automatic turn-off
2	Brightness	Adjust display brightness; Range from 4 (darkest) to 49 (brightest)

LED Indicator



No	Item	Definition
1	Alarm	Turn warning LED function on or off. The default setting is Off. Press Previous  or Next  to switch modes; On: Warning LED is enabled; Off: Warning LED is disabled
2	Parameter	Select the specific parameter for LED warning: Lxyp, Lxyeq, t where x = A, C, Z; y = F, S, I
3	Threshold	Set the trigger threshold for the selected parameter for the warning LED, ranging from 40 to 140 dB (default is 140dB)

Output Interface

2023/05/11 10:33:00

Output interface

1 Baud rate: 115200

2 AC output: On

3 Sensitivity: 6.86 mV/Pa

4 Weighting: Z

5 DC output: Off

6 Parameter: LAFp

Press OK to save.

No	Item	Definition
1	Baud rate	Select the connection baud rate: 115200, 9600, 4800
2	AC output	Turn the AC (Alternating current) signal output function on or off. The default setting is Off. Press Previous or Next to switch modes; On: AC signal output is enabled; Off: AC signal output is disabled
3	Sensitivity	Select the AC output signal sensitivity: 6.86 mV/Pa, 686 mV/Pa
4	Weighting	Select the frequency weighting of the AC signal output: A, C, Z
5	DC output	Turn the DC (Direct current) signal output function on or off. The default setting is Off. Press Previous or Next to switch modes; On: DC signal output is enabled; Off: DC signal output is disabled
6	Parameter	Select the DC signal output parameter: Lxyp, Lxyeq, t where x = A, C, Z; y = F, S, I

Memory

2023/05/11 10:33:00

Memory

Storage: 59.4G / 59.5G

1 USB drive mode: On




2 Delete all data: No

3 Storage location: Internal memory

Press OK to save.

No	Item	Options	Definition
1	USB drive mode	On / Off	Turn the USB drive mode on or off
2	Delete all data	Yes / No	Choose whether to delete all historical data on data page
3	Storage location	Internal memory / SD card	Choose the preferred storage location

Bluetooth

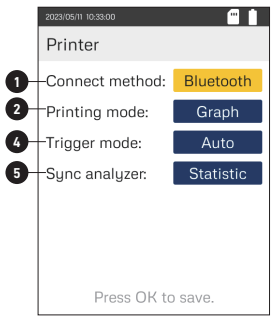
1. To pair the portable printer via Bluetooth, first power on the printer.
2. Turn on **Bluetooth** on this page and navigate to **Scan**, then press OK . The scanned devices will appear in a list.
3. Navigate to the specific device and press OK  to pair.
4. A pop-up will appear asking for the pairing password; *the default password for Scarlet's portable printer is 0000 (four zeros)*. Press OK  to confirm.
5. Once the printer is successfully connected to the ST-12D, the Bluetooth icon in the top bar will turn into white, and the name of the connected printer will appear above the list.



The connected printer will be indicated here.

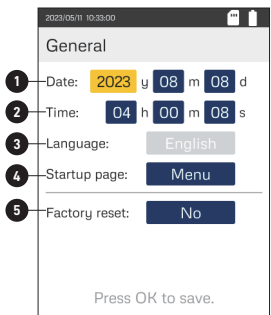
Printer




ST-12D supports pairing with a portable printer for a simple printout of measurement data. The printer can be wirelessly connected to the ST-12D via Bluetooth or connected with a printer cable.



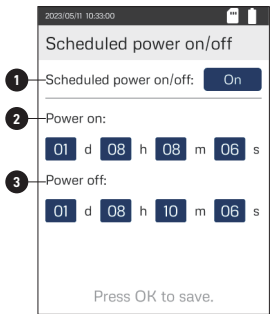
No	Item	Options	Definition
1	Connect method	Bluetooth / Serial port	Bluetooth: Connect via Bluetooth and pair with the printer on the Bluetooth settings page Serial port: Connect using the printer cable provided by Scarlet
2	Printing mode	Graph / Text only	Choose whether to include a graph in the printout result
3	Trigger mode	Auto / Manual	Auto mode: The result will be automatically printed from the Measure page Manual mode: The result will be printed only from the Data page
4	Sync analyzer	Integral / Statistics / Exposure / 1/1 OCT / 1/3 OCT	Choose the preferred analyzer for printing in Auto mode. Note: To use Auto mode, the analyzer's Trigger Mode must be set to Manual in the selected Analyzer settings page (<i>For more details, refer to the Operation section</i>)



General



No	Item	Definition
1	Date	Set device date
2	Time	Set device time
3	Language	ST-12D currently supports English
4	Startup page	Select the first screen displayed after the device boots up: Menu, Integral, Statistics, Exposure, 24-Hour
5	Factory reset	Restore the device configuration to factory settings (data will remain); The default setting is Off. Press Previous  or Next  to switch the option. A confirmation popup will appear; press OK  to proceed

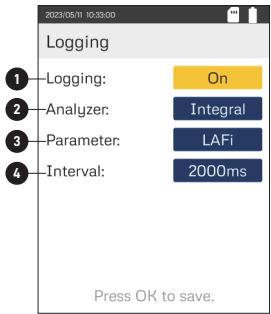
Scheduled Power On/Off





No	Item	Definition
1	Scheduled power on/off	Turn the Scheduled power on/off function on or off. The default setting is Off. Press Previous  or Next  to switch modes; On: Schedule power on/off is enabled; Off: Schedule power on/off is disabled
2	Power on	Config the schedule power on date and time
3	Power off	Config the schedule power off date and time

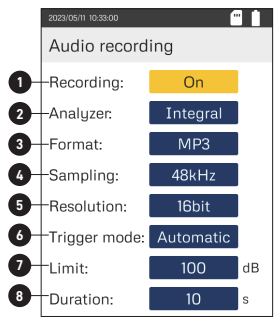




Logging



No	Item	Definition
1	Logging	Turn Logging function on or off. The default setting is Off. Press Previous  or Next  to switch modes; On: Logging is enabled; Off: Logging is disabled
2	Analyzer	Select the logging analyzer: Integral, Statistic, 1/1 oct, 1/3 oct. The default is Integral
3	Parameter	Select the specific parameter or all parameters to log
4	Interval	Define the logging interval from 20ms to 5000 ms. The default interval is 20ms

■ Audio Recording

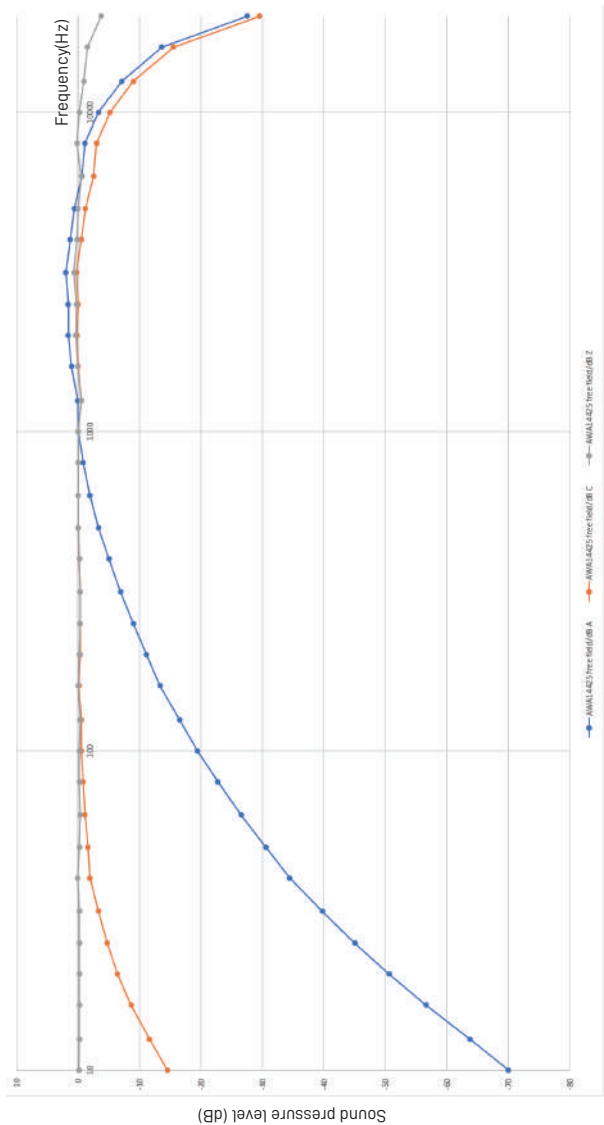


No	Item	Definition
1	Recording	Turn Audio recording function on or off. The default setting is Off. Press Previous  or Next  to switch modes; On: Audio recording is enabled; Off: Audio recording is disabled
2	Analyzer	Select the recording analyzer: Integral, Statistic, Exposure, 1/1 oct, 1/3 oct. The default is Integral
3	Format	Choose the recording file format: .wav, .mp3
4	Sampling	Set the sampling rate: 12kHz, 24kHz, 48kHz
5	Resolution	Choose the audio resolution (data bits): 16bit, 24bit (for .wav only)
6	Trigger mode	Select the audio recording trigger mode; Automatic: Recording during every measurement; Threshold: Recording starts when the selected parameter exceeds the threshold for a specified duration
7	Threshold	Set trigger threshold for audio recording
8	Duration	Define the duration of the audio recording

7. Appendices

7.1 Appendix A: Free-Field Response

Nominal Free-Field Response in the Reference Direction of a Sound Level Meter with ST-12D Microphone at Approximate Reference Environmental Conditions

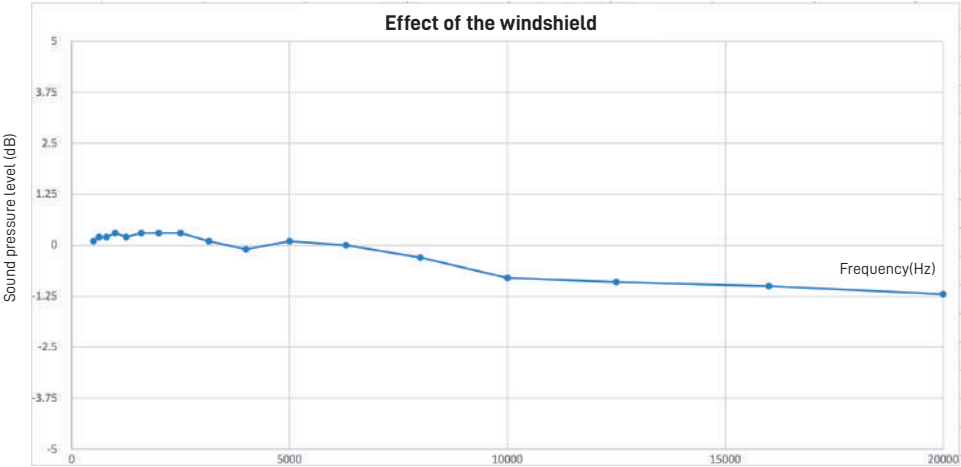


Frequency (Hz)	Free-field response using the ST-12D microphone (dB)		
	A	C	Z
110	-70.0	-14.5	-14.5
12.5	-63.7	-11.6	-11.6
16	-56.6	-8.6	-8.6
20	-50.6	-6.4	-6.4
25	-45.0	-4.7	-4.7
31.5	-39.7	-3.3	-3.3
40	-34.4	-1.9	-1.9
50	-30.5	-1.6	-1.6
63	-26.5	-1.1	-1.1
80	-22.7	-0.8	-0.8
100	-19.4	-0.5	-0.5
125	-16.5	-0.5	-0.5
160	-13.3	-0.1	-0.1
200	-11.1	-0.3	-0.3
250	-9.0	-0.3	-0.3
315	-6.9	-0.3	-0.3
400	-5.0	-0.2	-0.2
500	-3.3	0.0	0.0
630	-1.9	0.0	0.0
800	-0.8	0.0	0.0
1000	0.0	0.0	0.0
1250	0.1	-0.5	-0.5
1600	1.1	0.0	0.0
2000	1.6	0.2	0.2
2500	1.6	0.0	0.0
3150	2.0	0.3	0.3
4000	1.3	-0.5	-0.5
5000	0.6	-1.2	-1.2
6300	-0.6	-2.5	-2.5
8000	-1.1	-3.0	-3.0
10000	-3.3	-5.2	-5.2
12500	-7.1	-9.0	-9.0
16000	-13.6	-15.5	-15.5
20000	-27.5	-29.5	-29.5

7.2 Appendix B: Free-Field Response of Sound Level Meter at Different Directions

Frequency (Hz)	Free-field response using the ST-12D microphone at different directions (dB)					
	30°	60°	90°	120°	150°	180°
250	0.0	0.0	0.0	0.0	0.2	0.1
315	0.0	0.0	0.0	0.1	0.2	0.0
400	0.0	0.0	0.1	0.1	0.2	0.1
500	0.0	0.0	0.1	0.3	0.3	0.2
630	0.0	0.0	0.1	0.3	0.5	0.2
800	0.0	0.1	0.1	0.3	0.4	0.2
1000	0.0	0.0	0.1	0.2	0.4	0.0
1250	0.1	0.2	0.4	0.3	0.3	0.1
1600	0.1	0.2	0.0	0.1	0.6	0.1
2000	0.1	0.7	0.5	0.1	1.2	0.1
2500	0.2	0.4	0.7	0.9	1.7	0.2
3150	0.9	0.8	2.4	1.7	2.5	0.3
4000	0.4	0.1	0.8	0.6	0.6	0.9
5000	0.7	1.2	1.2	2.5	1.8	1.5
6300	0.4	0.4	2.5	2.9	2.6	2.0
8000	0.7	2.7	4.4	6.1	4.2	3.1
10000	1.4	3.1	5.7	6.2	5.0	3.8
12500	1.5	3.2	5.5	7.6	8.3	7.3
16000	0.9	4.0	7.7	10.6	8.2	9.3
20000	1.8	6.0	10.9	13.0	11.2	14.4

7.3 Appendix C: Windshield Effects



Frequency (Hz)	Effect of the windshield (dB)
500	0.1
630	0.2
800	0.2
1000	0.3
1250	0.2
1600	0.3
2000	0.3
2500	0.3
3150	0.1
4000	-0.1
5000	0.1
6300	0.0
8000	-0.3
10000	-0.8
12500	-0.9
16000	-1.0
20000	-1.2

8. Safety, Handling & Maintenance

8.1 Important safety information

WARNING: Failure to follow these safety instructions could result in fire, electric shock, or other injuries, as well as damage to the sound level meter or other property. Please read all the safety information below before using the sound level meter.

Operate

Avoid using the instrument in humid or wet environments. Ensure that humidity levels are within the limits specified in the next section. Do not operate the device in the presence of explosive gasses, combustible gasses, steam, or excessive dust. Always remember to power off the meter after use. If you do not plan to use the instrument for an extended period, remove the batteries to prevent battery leakage, which could damage its internal components.

Handling

Handle the sound level meter with care, as it contains sensitive electronic components. Damage can occur if the instrument is dropped, burned, punctured, crushed, or exposed to liquids. Do not use a damaged instrument, such as one with a cracked screen, as it may cause injury.

8.2 Important handling information

Cleaning

Clean the instrument immediately if it comes into contact with substances that may cause stains, such as dirt, ink, makeup, or lotions. Follow these steps to clean it:

- Disconnect all cables and turn the instrument off.
- Use a soft, lint-free cloth.
- Avoid getting moisture into any openings.
- Do not use cleaning products or compressed air.

Operating temperature

The instrument is designed to operate in ambient temperatures between 5°C and 40°C (41°F and 104°F), and should be stored in temperatures between -10°C and 60°C (14°F and 140°F). Operating or storing the instrument outside of these temperature ranges can lead to damage and shorten battery life. Avoid exposing the instrument to direct sunlight, even if the air temperature is within the specified limits.

Operating humidity

The instrument is designed to operate in humidity levels below 80% RH (Relative Humidity) and should be stored in a dry place where humidity is less than 70% RH.

Store microphone carefully

The microphone is a key component of the instrument. Store it in a dry place and avoid exposing it to severe shaking or vibration.



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