

3M Occupational Health & Environmental Safety Division
3M™ Sound Detector SD-200



Sound Detector SD-200 User Manual

3M

3M™ Sound Detector SD-200

SD-200: dangers, warnings, cautions & battery



Danger!

Failure to observe the following procedures may result in serious personal injury

- Not for use in explosive or hazardous locations. This product is not intrinsically safe.
- Contains built-in lithium polymer battery. Do not incinerate or dispose of in fire. Do not disassemble, alter, or re-construct.



Warning!

Failure to observe the following procedures could damage the instrument

- Read the manual before operation.
- Do not store in temperatures exceeding 70°C (158°F).
- Do not immerse in liquids.
- Condensation may damage your instrument.
- Substitution of components may impair the accuracy of the instrument. Repair should be done by authorized service personnel only.



Caution!

General

- The battery in this instrument has limited shelf-life, even if never used.
- A non-condensing environment is required for proper measurements.
- Do not charge battery outside the range of 0°C to 40°C (32°F to 104°F).
- Battery run-time may be reduced when operating at lower than 0°C (32°F) temperatures.

Battery power and first use recommendation

It is recommended to fully charge the SD-200 for approximately 12 hours prior to first use.

Intended Use:

The SD-200 is intended to measure sound pressure levels in air. Consult your company's safety professional for local standards, or call 3M at 1-800-243-4630.

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SD-200 Overview

The SD-200 is intended to provide measurements of sound pressure levels in air. With five easy-to-use keys, the keypad is used for powering on/off, viewing and/or running measurements, navigating, and setting parameters. (See Table 1-2 for more information.)

Note: for typical sound measurements when determining hearing protection, the SD-200 may be set to "A weighting" with "Slow" response.

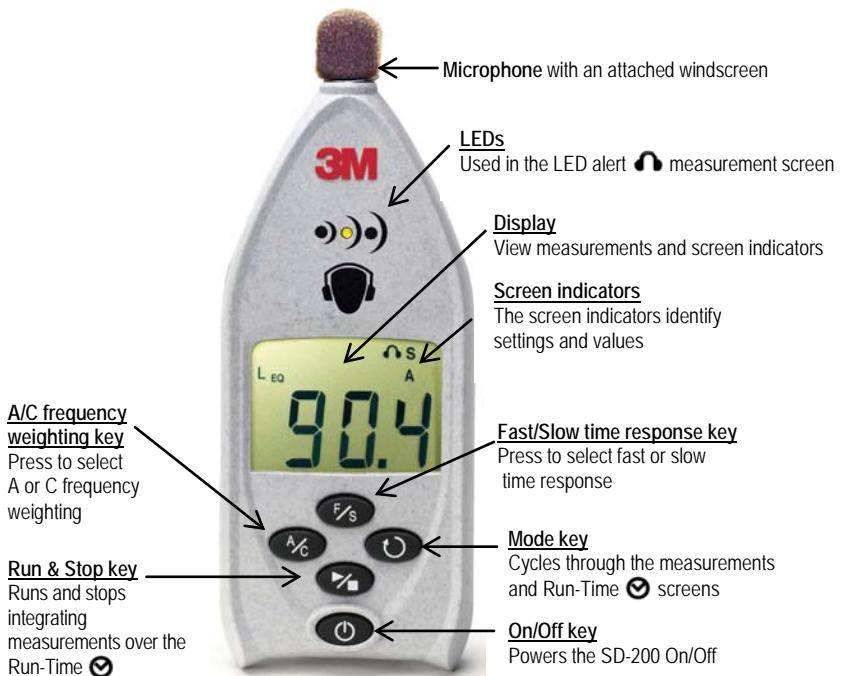


Figure 1-1: SD-200 overview

Powering on

Press  key until the LCD turns on. (Warm-up time is about 5 seconds.)

When powered on, a self test screen flashes with country code and revision level (e.g. U1.0) and exchange rate (e.g.3 L_{EQ}/5 L_{Avg}). Then a measurement screen appears.

Viewing Sound Pressure Level (SPL)

The measurement screen will display the current Sound Pressure Level (SPL) in dB or the previously viewed screen prior to powering off.

Note: no screen indicator appears for SPL.



Figure 1-2: Powered on with SPL screen displayed

Powering off

Once powered off, the SD-200 will save the instrument's settings and measurements which are displayed again when powered back on. The SD-200 will not power off while in run mode.

1. Press and hold  key until OFF disappears. Releasing within two seconds will keep the instrument powered on.

Note: while in run, the instrument will not power off until stop is pressed. If the instrument powers off due to low battery, it will store the last viewed measurements. (See "Resetting" for more information.)



Figure 1-3: Power off screen indication

Operating

Overview of operation

The list below is a brief overview of the steps for running a study.



Quick Help List: typical sound session

1. Power on the SD-200 and ensure the windscreens is attached.
 Note: if battery indicator  appears, this signifies the instrument needs to be charged. (See "Charging")
2. Select the desired settings (A/C weighting, F/S response) and the desired measurement via the keypad.
3. Position the SD-200 microphone so it is angled about 70 degrees from the noise source.
4. Measures: when first powered on, the SD-200 displays the current SPL or the last viewed parameter prior to power off.
 - For integrated measurements, press  key. (Noting the L_{EQ}/L_{AVG} values will provide steadier values over a period of time.)
 - To view measurements, repeatedly press  key and the SD-200 will toggle through the various screens (SPL, L_{EQ}/L_{AVG} , LED Alert , MAX, MIN, Run-Time 

Integrating measurements

Integrating measurements compute the average value over a period of time. In many work environments, noise levels may be highly variable making it difficult to assess the sound level. With the averaging function, you will see steadier values over the Run-Time (RT).

The chart below depicts the SPL and L_{EQ} values measured over the RT. When the measurements are compared, the SPL values measure the maximum and minimum values while the L_{EQ} provides steadier readings over the length of the study.

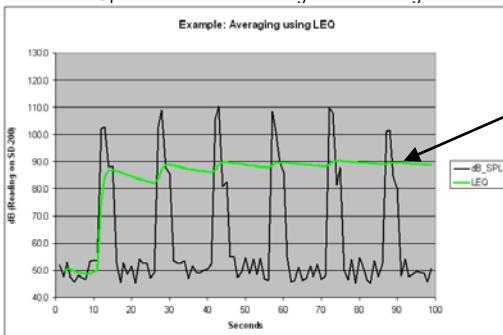


Figure 1-4: Comparison of noise sampled over Run-Time (SPL & L_{EQ} values)

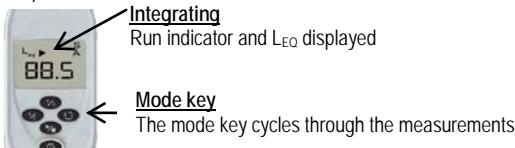
Running and stopping

The run and stop keys are used to start and stop the Run-Time  for integrating measurements which include: L_{EQ}/L_{AVG} (see Table 1-2 for more information), LED Alert , MAX, and MIN screens.

1. While powered on, press  key. The  icon appears.
- Note:** While in run mode, the settings cannot be changed. (See "Settings" for more information.)
2. To stop, press  key. The  icon disappears.

Viewing measurements

The mode key is used to view each measurement screen with its related value. There are six measurement screens: SPL (no measurement indicator), L_{EQ}/L_{AVG} , MAX*, MIN*, LED alert *, and Run-time * screens (*while integrating has occurred).



Measurement screen examples

(1) SPL screen (2) L_{EQ}/L_{AVG} (3) LED Alert  (4) MAX (5) MIN (6) Run-Time 

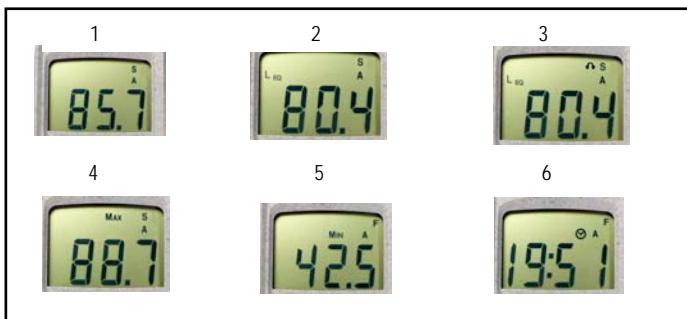


Figure 1-5: Measurement screens

LED alert screen

The LED alert  screen displays L_{EQ}/L_{AVG} measurements, a detection icon  , and activated LED indicator levels. This measurement screen provides an alternative view to detect the average dB levels with visual preset LED noise levels. Please refer to Table 1-1 for the levels.



Figure 1-6: LED alert screen

LED Alert Levels	
	Green LED Flashes when measurements are between 80 to 85 dB
	Yellow LED Flashes when measurements are between 85 to 105 dB
	Red LED Flashes when measurements are above 105 dB

Table 1-1: LED alert levels

Screen indicators

Screen indicators are a type of notification identifying measurement parameters &/or screen icons.

Indicators	Explanation
SPL	Sound pressure level - The basic measure of noise loudness expressed in decibels. SPL uses the ratio between a reference level of 20 microPascals (.00002 Pascals) and the level being measured. It is displayed in decibels (dB).
MAX	Maximum sound level - The highest SPL measured during integrating period.
MIN	Minimum sound level - The lowest SPL measured during integrating period.
$L_{\text{EQ}}/L_{\text{AVG}}$	Equivalent pressure sound level/Average sound pressure level - The true equivalent sound level (or average SPL) measured over the integrating period. The term L_{EQ} is used when 3 dB exchange rate is applied: The L_{AVG} is used when 5 dB exchange rate is applied.
	Battery indicator – There are two battery indicator states. <ul style="list-style-type: none"> When battery power icon appears, this indicates the instrument has low power and needs to be charged. Battery power icon flashing indicates the battery is charging.
 Run	Run indicator - Signifies that you are measuring $L_{\text{EQ}}/L_{\text{AVG}}$, LED Alert  , MAX, and MIN screens over the Run-Time  .
 Detection	Detection icon – Appears when viewing the LED Alert screen. (Note: LEDs will flash if set points are met or exceeded. See "LED Alert" for more info.)
 Run-Time	Run-Time – Indicates the time elapsed from the start of the run mode which is used to calculate the $L_{\text{EQ}}/L_{\text{AVG}}$, LED Alert  , MAX, and MIN values. Run-Time starts as minutes and seconds and then changes to hours and minutes when 20 minutes is reached. It will display hours only after 20 hours.
OL	Overload – Indicates that the dB has exceeded the range of SD-200 (40 -130 dB).
UR	Under Range – Indicates that the displayed measurement is below the linearity range (45 -130 dB).
F/S	Fast/Slow time response - The response time setting determines how quickly the unit responds to fluctuating noise. Typically, noise is not constant. If you were to try to read the sound level without a response time, the readings would fluctuate so much that determining the actual level would be extremely difficult. While the terms slow and fast have very specific meanings (time constraints), they work very much as you would expect. The fast response would result in a more fluctuating sound level reading than would the slow response. (See Specifications, "Time Response")
A/C	A frequency weighting or C frequency weighting - These are frequency filters that approximate the equal loudness response of human hearing at low, medium, and high SPL's. A frequency weighting is the most commonly used filter defined in the international standard IEC 61672:2003. Common applications of A weighting include industrial noise applications and community noise regulations (such as: manufacturing noise or machine shop monitoring.) The A frequency weighted filter makes the sound level meter respond closer to the way the human ear responds to noise at lower levels. It attenuates the low frequency noise below several hundred Hertz as well as the high frequency above six thousand Hertz. C frequency weighting is intended to represent how the ear responds to very high levels.

Table 1-2: Screen indicators

Settings

Typical sound level measurements are performed with A frequency weighting, Slow time response, and the factory default 3 dB exchange rate. If your application requires other settings, please change accordingly.

Frequency weighting and time response

The frequency weighting and the time response can be changed on the instrument by pressing the following when in stop mode.

1. To change A or C frequency weighting, press  key.
2. To change Fast or Slow time response, press  key.

Exchange rate (ER)

The exchange rate can be set to either 3 dB (for L_{EO} values) or 5 dB (for L_{AVG} values). The factory default is set at 3 dB. To change, please follow below:

1. While powered off, press and hold  key and then press  key.
2. The exchange rate screen (with L_{EO} / L_{AVG} indicators) will appear. Press  key to change the setting.
3. Press  key to accept the setting. (To cancel, press  key.)

Charging

Using the computers USB port, the SD-200 is charged with a mini-USB cable plugged into the bottom of the instrument. It will charge in 2.5 to 12 hours when the battery is fully discharged based on available power.

Note: when connecting the instrument to your pc, a new device hardware wizard will appear. If you cancel the wizard, the instrument will charge without the drivers. If you wish to install the drivers, they are located at:

www.3M/SoundDetector.com.

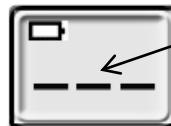


SD-200 with USB connector



Battery icon

When SD-200 is turned on, it will flash. When fully charged, it will no longer flash.



Charging indicator

When turned off, dashes will appear with the charge icon flashing.

Figure 1-7: Charging

Windscreen

The SD-200 features a removable windscreen. This is primarily used to reduce noise effects from wind with minimal effects on the readings. It is recommended to use the instrument with the windscreen on at all times in order to protect the microphone.

When the instrument is shipped, the windscreen will be detached. To attach, slide the windscreen completely over the microphone.



Figure 1-8: Windspeed attached

Positioning and tripod mount

If hand-held, position the SD-200 microphone angling it at about 70 degrees from the noise source. To place the instrument in a work zone/area, a tripod may be used by connecting it to the tripod mount while positioning it at about a 70 degree angle towards the noise source.



Figure 1-9: Positioning and tripod mount

Calibrating

A field calibration may be performed before taking measurements to ensure that your measurements are accurate for the current environment. An optional calibrator and calibrator adapter are used for this procedure. (See "Accessories" for more information).

1. While the instrument is off, press and hold  key and then press  key. Then release the keys. "CAL" will appear on the screen.
2. Place the calibrator adapter and the calibrator over the microphone, and then turn the calibrator on.
3. To adjust the level to match the calibrator, press either  key to increase or  key to decrease.
4. To accept the level, press  key or press  key to cancel.



Figure 1-10: Calibrating the SD-200

Self help Resetting

In the event your SD-200 locks up for an unknown reason, the SD-200 is equipped with a reset feature. To reset the instrument, press and hold  key for at least 20 seconds and then release the key. The instrument will power back on.

 **Note:** after a reset, L_{EO}/L_{AVG} , LED Alert , MAX, and MIN, measurement screens will display dashes, “---” and Run-Time will display zero, “0:00”.

Please see "Contact/Service information" for additional support.

Appendix A: Specifications

*All specifications subject to change

Standards

ANSI S1.4 1983 (R 2006)

ANSI S1.43 1997(R 2007)

IEC 61672-1 (2002)

IEC 61010-1 (2010)

CE mark

Mechanical characteristics

Housing	ABS/polycarbonate
Size (Length x Width x Thickness)	16.5 cm x 6.1 cm x 2.3 cm 6.5" x 2.4" x .9"
Weight	125 g (4.4 oz)
Tripod Mount	Accepts a 1/4" – 20 screw (located on bottom, backside of the instrument).

Electrical characteristics

Battery type	Lithium polymer battery (1000 mAh), rechargeable.
Battery life	3 yr or 500 charge cycles
Battery runtime	<ul style="list-style-type: none">• 35 hours with LEDs activated (minimum hours (40 hours, typical)• 50+ hours without LEDs activated
Microphone	Omni-directional ; Class/Type 2; 1/2" diameter; electret condenser
Frequency range	31.5 to 8000 Hz

Environmental effects

The typical time intervals needed to stabilize after changes in environmental conditions include:

- For temperature change of 10 °C (18 °F) allow at least 5 minutes.
- For relative humidity change of 30% (non-condensing) allow at least 30 minutes.
- For static pressure change of 10 kPa allow at least 5 seconds.

Temperature Ranges

Operating temperature:	32 °F to 104 °F (0 °C to 40 °C)
Operating atmospheric pressure:	80 -110kPa
Relative humidity:	0%-90%, non-condensing
Storage temperature:	-4 °F to 158 °F (-20 °C to 70 °C)
Storage atmospheric pressure:	50 -150kPa

User Interface

Display

Digit Size: 2 cm (3/4")

Resolution: 0.1 dB

Update Rate: 0.5 sec.



Keypad

5 keys: F/S key, A/C key, Mode key, Run/Stop key, Power On/Off key.

Measurements

Displayed data and status indicators	Sound Pressure Level (SPL), Average value ($L_{\text{EO}}/L_{\text{AVG}}$), LED Alert (●), Maximum value (Max), Minimum value (Min), and Run-Time (max 99 hours), Overload (Ol), and Under-Range (Ur)
Display Range	40 to 130 dB (Dynamic range)
Linearity Range	45 to 130 dB (Dynamic range)
Frequency Weighting	A or C
Time Response	Fast (125 msec) or Slow (1 sec)
Exchange Rate (ER)	3 dB or 5 dB

Calibration

Calibrator Calibrations should be performed at 114 dB at 1kHz.

Charging

Using the computer's USB port, the SD-200 is charged with a mini-USB cable plugged into the bottom of the instrument. It will charge in 2.5 to 12 hours when the battery is fully discharged based on available power.

Special functions

LED's: light-emitting diodes are activated in the LED alert screen. They will flash at the following levels:

- Green LED flashes when measurements are between 80 to 85 dB
- Yellow LED flashes when measurements are 85 to 105 dB
- Red LED flashes when measurements are above 105 dB

Product information

- Sound Detector Kit, USB Cable, Windscreen (70-0715-6546-2)

Accessories

- Windscreen (one included) (3M ID: 70-0716-0639-9)
- Mini-USB cable (one included) (3M ID: 70-0715-8175-8)
- 056-990 0.5" Calibrator adapter (3M ID: 70-0715-8115-4)
- Calibrator: QC-10: 114dB at 1 kHz output (3M ID: 70-0715-7972-9)
- Tripod (3M ID: 70-0715-8374-7)

Updates

In the interests of continuous product improvements, 3M™ reserves the right to make changes to product specifications without notice. To understand the latest updates that have been implemented into this product and to download the most current version of this user manual, visit Website: www.3M.com/OccSafety or www.questtechnologies.com.

Warranty

3M™ Sound Detector SD-200 LIMITED WARRANTY. 3M™ warrants the Sound Detector SD-200 will be free from defective materials and workmanship for one year from date of purchase (indicated on the sales receipt), provided it is maintained and used in accordance with 3M instructions and/or recommendations. If any component becomes defective during the warranty period, it will be replaced or repaired free of charge. This warranty does not apply to units that have been altered or had repair attempted, or that have been subjected to abuse, accidental or otherwise. The above warranty is in lieu of all other express warranties, obligations or liabilities. THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE ARE LIMITED TO ONE YEAR FROM THE PURCHASE DATE. 3M shall not be liable for any other warranty, express or implied, arising out of or related to the appropriate use of hearing protection devices. Manufacturer or its agent's liability shall be limited to replacement or repair as set forth above. Buyer's sole and exclusive remedies are return of the goods and repayment of the price, or repair and replacement of defective goods or parts.

Contact/Service information

In United States, contact:

Website: www.3M.com/OccSafety

Technical Assistance: 1-800-243-4630

For other 3M products: 1-800-3M HELPS

Or 1-651-737-6501

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