

# Sound Level Sensor

for the LogIT Microsense® system



## Overview

This analogue Microsense® sensor is designed to measure general and comparative levels of sound, such as environmental noise.

## In Use

The sound level sensor can be plugged directly into any Microsense® compatible interface or datalogger (eg. LogIT Voyager, DataMeter, DataVision or Black Box) or used remotely using a sensor extension cable. Sound levels are not usually measured very close to the source of the sound but from the closest distance which someone would normally be positioned. For example, traffic noise is usually measured from the side of the road with the sensor held about 1 metre above the ground, but in a noisy room or hall the sensor would ideally be positioned at ear level.

The sensor is specifically designed to record average levels of reasonably continuous sound. It therefore allows trends of sound level to be easily recorded using LogIT Autolog and with relatively large sample time intervals.

## Specifications

Microphone type:	Omnidirectional electret condenser element
Frequency response:	A-weighted (see overleaf)
Calibrated range:	50 to 100dBA
Accuracy nominal:	+/- 5dB
Response time (damping):	approx 0.5 seconds

## Safety

**WARNING:** Prolonged exposure to noise levels of 90dBA or greater can result in permanent damage to your hearing.

## Care

If you use the sensor outside remember to shield it from any wind. Also ensure that no water or rain falls on it or any of the logging equipment and cables. It can be firmly fixed to a surface using Microsense® sensor mounting clip or similar 'terry-clip'. Do not remove the protective felt filter on the top of the sensor.

## Instructions & Resources

The resources shown overleaf are also available in PDF form at [www.logitworld.com](http://www.logitworld.com)



Waste electrical and electronic products must not be disposed of with household waste. Please recycle where facilities exist. Check with your Local Authority or Retailer for recycling advice.



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## Calibration

When experimenting and analysing sound level measurements you should consider that the dBA scale is logarithmic (like the human ear) and that a doubling of the noise power only shows an increase of 3 decibels. A 3dB increase is only just detectable to the human ear - it is interesting to note that a 100 Watt sound system is actually only 3dB louder than a 50 Watt system!

The human ear and brain do not respond to noise equally at all audible frequencies - they are most sensitive in the range of 400Hz to 4kHz. This sensor has been designed to have a similar response which is internationally known as the A-weighted response. The range of the sensor is from just under 50dBA to over 100dBA which is approximately equivalent to the sound level range of a quiet conversation to a pneumatic hammer.

Sound can be reflected and absorbed so that in some environments small changes in position can make significant changes to the reading. For comparative tests use the sensor firmly fixed in the same position away from vibrations and keep away from nearby hard surfaces which can reflect or deflect unwanted sound towards the sensor.

## Trouble shooting

Your software and/or LogIT with display may need updating to support this sensor, which is usually available over the internet free of charge.

If the sensor is not recognised by your software or LogIT (for example if the datalogger displays ???) you need a software update.

LogIT Lab will also update the LogIT datalogger - if you are using different data logging software you can download an evaluation version of LogIT Lab to update your LogIT(s):

- Visit the LogIT website [www.logitworld.com](http://www.logitworld.com)
- To upgrade your datalogging software click on the 'Downloads' tab followed by 'Software Updates'. The installation instructions are available from the same page.
- To upgrade the datalogger, select the logger from the list on the left of the page followed by the 'Support' tab and then select 'Logger Updates'.

Follow the on screen instructions.

## Instructions & Resources

# Sound and Distance

**Subject: Physics**

**Overview:**

Sounds are all around us from traffic in noisy streets to birds in the country side. Have you noticed, however, that some sound is loud and some is quiet? Why? What can change the loudness of sound ?

**Aim:**

Using the sound sensor we can investigate one of the properties of sound – its volume or loudness. The class can spend some time discussing loud and quiet sounds and what can effect the volume (the change between noisy and quiet).

**Equipment required:** LogIT Datalogger

Datalogging software, computer,

Constant sound source e.g. electronic keyboard, radio not tuned to a station ('hiss')

Metre rule to measure start and finish distance.

Clamp stand (optional)

**Hazards:**

Children should be supervised at all times.

Prolonged exposure to high noise levels (e.g. of 90dB or more) can result in permanent damage to your hearing.

If used outside shield sensor from wind and ensure that no liquid contacts any of the datalogging equipment or cables.

Always check your local regulations or the school advisory service such as CLEAPSS or SSERC for guidance on the use of any hazardous material.

**Method:**

1. Place the metre rule on a flat desk with the sound source at one end.
2. Mount the Sound sensor in the clamp stand and position it in front of the sound source.
3. Turn on the sound source.
4. Turn on the datalogger or start the software.
5. Slowly move the sound sensor away from the sound source - ensure that the sensor is kept pointed at the source.
6. At about 1 metre stop logging.

**Results:**

- Did the level of sound change with distance?
- What shape graph was plotted - was it a gradual slope?
- Did the volume continue to drop or did it fall to a certain point and then remain there?
- Was care needed in 'aiming' the sound sensor at the sound source?
- Did the type of sound source matter – try different sources (ensure their volume is set so that the starting level is the same as the original sound source; also ensure that the sound sensor is the same starting distance from the source).

**Going further:**

- What else can effect the loudness of a sound ?
- Do sounds appear to be the same loudness to everybody ?
- Think about noise pollution.
- Study the difference between noise in the school, by roads and in rural areas.
- Monitor and analyse classroom noise for a day
- Monitor traffic noise - do certain vehicles make more noise than others ? did the noise level change during the day ?
- Point the sound sensor across a road (at a 90° angle to the kerb side) and notice what happens when a vehicle passes from one side to the next - passing in front of the sound sensor.

# Sound Proofing

## Subject: Physics

### Overview:

The loudness of a sound can depend on how far we are away from it. If we find ourselves in a loud environment we could always move away from the source so that it does not effect us; this is not always practical though since you cannot move a house away from a noisy road or a person operating machinery often needs to be next to it e.g. road drill. This is where special materials can come in useful to help Absorb or Reflect the noise.

### Aim:

To test a range of different materials to see which help reduce or stop noise from a source reaching the sound sensor.

**Equipment required:** LogIT Datalogger  
 Datalogging software, computer,  
 Constant sound source e.g. electronic keyboard, radio not tuned to a station ('hiss')  
 A range of different materials to place in front of the sound source or sensor.

Note: A good mix of materials should include soft/hard, light/heavy, thick and thin. This is particularly important when trying to decide which materials to use for different tasks e.g. sound proofing a room or making ear defenders.

### Hazards:

Prolonged exposure to high noise levels (e.g. of 90dB or more) can result in permanent damage to your hearing.

If used outside shield sensor from wind and ensure that no liquid contacts any of the datalogging equipment or cables.

Always check your local regulations or the school advisory service such as CLEAPSS or SSERC for guidance on the use of any hazardous material.

### Method:

1. Connect the Datalogger to the computer and run the datalogging software. Set up the snapshot facility of the software (if available).
2. Think about which materials to try out. Discuss which materials the students think will block the most sound and which will let the most pass.
3. Place the sound sensor at a fixed distance from the sound source.
4. Turn on the sound source.
5. Press the snapshot button for the software and note down what the first reading was without material.
6. Choose a piece of material and write down its description so that when you come to view the graph you know which point on the graph refers to which piece of material.
7. Place the material between the sound source and sensor at a predefined place.
8. Press the snapshot button for the software.
9. Repeat this for each piece of material to be tested.

### Results:

- Did placing material between the sound source and sound sensor change the level?
- Did it matter how close the material was to the source?
- Did hard material effect the sound differently from soft ?
- Was care needed in 'aiming' the sound sensor at the sound source ?

### Going further:

- Investigate whether it matters how close the blocking material is placed to the sound source or sensor.
- Which material would be best to sound proof the classroom ?
- Think about noise pollution.
- Study the difference between noise in the school, by roads and in rural areas.
- Monitor and analyse classroom noise for a day.
- Monitor traffic noise - do certain vehicles make more noise than others ? Did the noise level change during the day ?