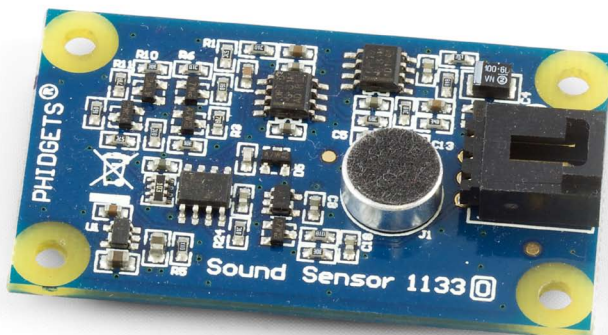# Product Manual

1133 - Sound Sensor

Phidgets 1133 - Product Manual

For Board Revision 0

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Contents

Product Features

- Measures sound pressure level (SPL) between 50db to 100dB

- Can be used to detect sounds, and approximate how loud the sound is

- Frequency range of 100Hz to 8kHz

- Connects directly into a Phidget InterfaceKit

Connections

Designed to connect to a:

- 1010 - PhidgetInterfaceKit 8/8/8 Mini-Format

- 1011 - PhidgetInterfaceKit 2/2/2

- 1018 - PhidgetInterfaceKit 8/8/8

- 1019 - PhidgetInterfaceKit 8/8/8 w/6 Port Hub

- 1072 - PhidgetSBC2

- 1203 - PhidgetTextLCD

Type of Measurement

The sensor uses non-ratiometric measurement.

Getting Started

## Checking the Contents

You should have received:

- A Sound Sensor
- A Sensor Cable

In order to test your new Phidget you will also need:

- A PhidgetInterfaceKit 8/8/8 or a PhidgetTextLCD
- A USB Cable

Connecting all the pieces

1. Connect the Sound Sensor to the Analog Input 6 on the PhidgetInterfaceKit 8/8/8 using the sensor cable.
2. Connect the PhidgetInterfaceKit to your PC using the USB cable.
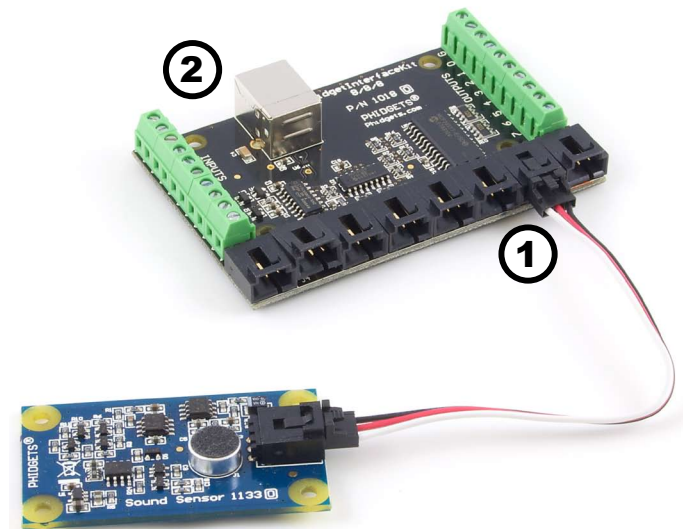
Testing Using Windows 2000/XP/Vista/7

Downloading the Phidgets drivers

Make sure that you have the current version of the Phidget library installed on your PC. If you don't, do the following:

Go to www.phidgets.com >> Drivers

Download and run Phidget21 Installer (32-bit, or 64-bit, depending on your PC)

You should see the ![Ph] icon on the right hand corner of the Task Bar.

Running Phidgets Sample Program

Double clicking on the ![Ph] icon loads the Phidget Control Panel; we will use this program to make sure that your new Phidget works properly. Since the sensor is connected to a 1018, the computer will see only the 1018. The sensor is providing data through the Analog input it is connected to.

The source code for the InterfaceKit-full sample program can be found under C# by clicking on www.phidgets.com >> Programming.

Double Click on the **Ph** icon to activate the Phidget Control Panel and make sure that the **Phidget InterfaceKit 8/8/8** is properly attached to your PC.
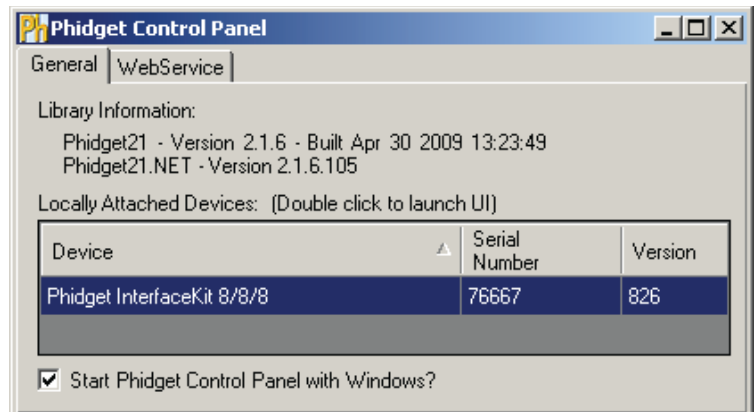
1. Double Click on **Phidget InterfaceKit 8/8/8** in the Phidget Control Panel to bring up InterfaceKit-full and check that the box labelled Attached contains the word True.
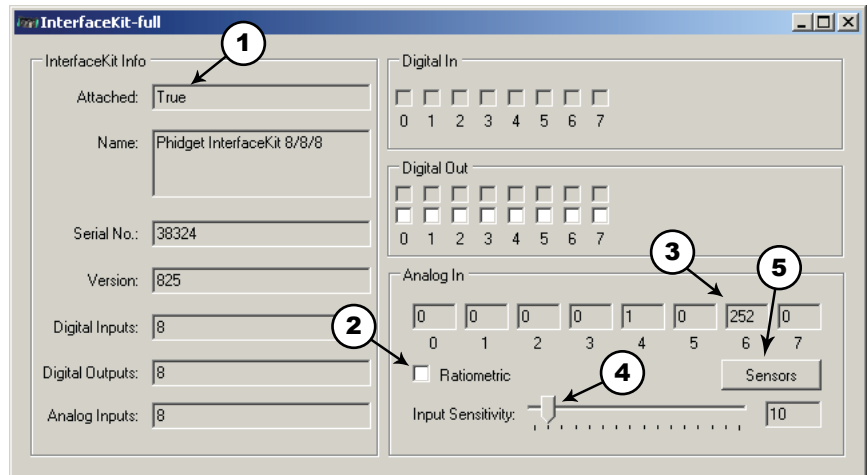
2. Make sure that the Ratiometric box is NOT Ticked.

3. When the Sound Sensor is placed beside a computer in a quiet room, the SensorValue will be approximately 10.

4. You can adjust the input sensitivity by moving the slider pointer.

5. Click on the Sensors button to bring up the Advanced Sensor Form.

1. In the Sensor 6 box, select the 1133 - Sound Sensor from the drop down menu.

2. The sound pressure measured by the sensor is shown here.

3. Formula used to convert the analog input SensorValue into decibels.
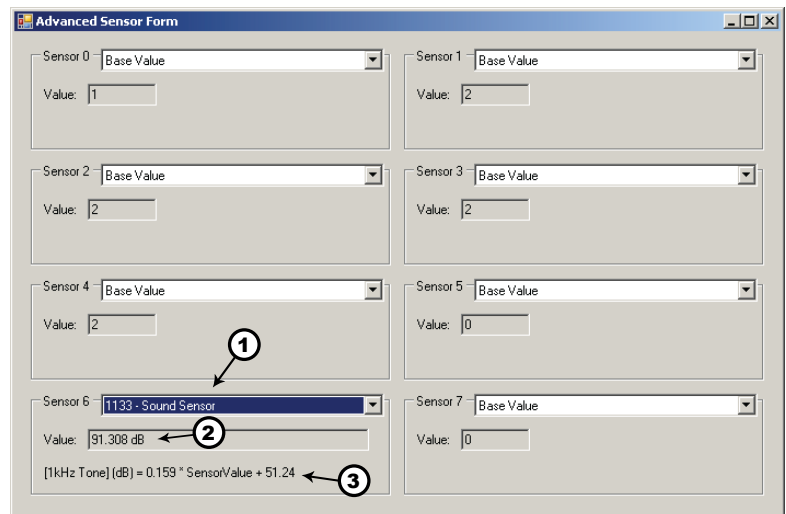
Testing Using Mac OS X

- Click on System Preferences >> Phidgets (under Other) to activate the Preference Pane

- Make sure that the Phidget InterfaceKit 8/8/8 is properly attached.

- Double Click on Phidget InterfaceKit 8/8/8 in the Phidget Preference Pane to bring up the InterfaceKit-Full example. This example will function in a similar way as the Windows version, but note that it does not include an Advanced Sensor Display.

Programming a Phidget

Phidgets' philosophy is that you do not have to be an electrical engineer in order to do projects that use devices like sensors, motors, motor controllers, and interface boards. All you need to know is how to program. We have developed a complete set of Application Programming Interfaces (API) that are supported for Windows, Mac OS X, and Linux. When it comes to languages, we support VB6, VB.NET, C#.NET, C, C++, Flash 9, Flex, Java, LabVIEW, Python, Max/MSP, and Cocoa.

Code Samples

We have written sample programs to illustrate how the APIs are used.

Due to the large number of languages and devices we support, we cannot provide examples in every language for every Phidget. Some of the examples are very minimal, and other examples will have a full-featured GUI allowing all the functionality of the device to be explored. Most developers start by modifying existing examples until they have an understanding of the architecture.

Go to www.phidgets.com >> Programming to see if there are code samples written for your device. Find the language you want to use and click on the magnifying glass besides "Code Sample". You will get a list of all the devices for which we wrote code samples in that language.

If this is your first time writing a program to control a Phidget, you should read the Getting Started Guide for the language you are planning to use.

Coding for your Sensor

Phidget analog sensors do not have their own API, but instead their output is a voltage that is converted to a digital value and accessed through the SensorValue properties and events on a PhidgetInterfaceKit. It is not possible to programmatically identify which sensor is attached to the Analog Input. Your application will need to apply any formulas from this manual to the SensorValue to translate it into usable data.

See the PhidgetInterfaceKit product manual for an overview of its API and a description of our architecture.

Technical Information

General

The pressure level of sound is measured in dB. The 1133 measures sound across a very wide range, with a frequency range of 100Hz to 8kHz and pressure level from 50dB to 100dB. The formula reports SPL (Sound Pressure Level), but the sensor is not sophisticated enough to be used as a substitute for a professional SPL Meter.

Formulas

The Formula to translate SensorValue into a sound pressure level is:

Sound Pressure Level due to a 1kHz tone (dB) = 16.801 * ln(SensorValue) + 9.872

Formula Dependencies

It is important to note that measuring sound pressure levels is very complex and depends on factors other than only the perceived volume. One of the major contributing factors is the frequency of the sound source. Different frequencies of a sine wave with identical amplitudes will generate very different sound pressure levels.

Other factors can be the distance between the sound source and the microphone, and even the type of sound source, such as speakers. The bandpass filter of any speaker can affect the output gain at certain frequencies without any change in the volume knob of the speaker.

Electrical noise in the power supplied to the sensor can affect the output. If the power supply is very noisy, this will introduce an offset in the output. It is much more noticeable when trying to measure smaller sound pressure levels due to the very small voltages of the microphone being affected much more.

As a result, the previous formula is only accurate for a 1kHz pure tone. At other frequencies, there can be up to an 8dB difference between the calculated SPL and the output of a calibrated Sound Pressure Level meter.

Sensor Response

The following graph is the response of the Sound Sensor to a 1kHz beep. The beep lasts 75ms. The 1133 has a response time of 1.40ms when placed 30 cm (11.9 inches) from the sound source. The output from the Sound Sensor reduces to normal over the next 80ms.
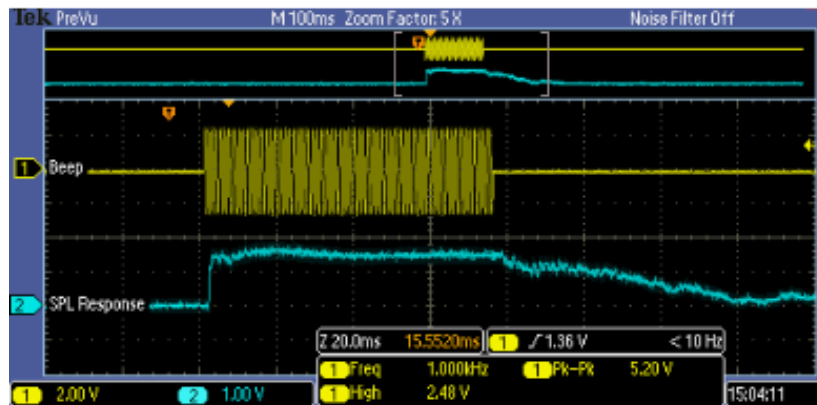
The output of the sensor can vary by up to 20 SensorValue in a pressure-stable environment. This is especially noticeable at lower output voltages. The best way to deal with this is to average a handful of reported values.

Other Interfacing Alternatives

If you want maximum accuracy, you can use the RawSensorValue property from the PhidgetInterfaceKit. To adjust a formula, substitute (SensorValue) with (RawSensorValue / 4.095)

If the sensor is being interfaced to your own Analog to Digital Converter and not a Phidget device, our formulas can be modified by replacing (SensorValue) with (Vin * 200). It is important to consider the voltage reference and input voltage range of your ADC for full accuracy and range.

Analog Input Cable Connectors

Analog Input
Power (+5V)
Ground (0V)

Each Analog Input uses a 3-pin, 0.100 inch pitch locking connector. Pictured here is a plug with the connections labeled. The connectors are commonly available - refer to the Table below for manufacturer part numbers.
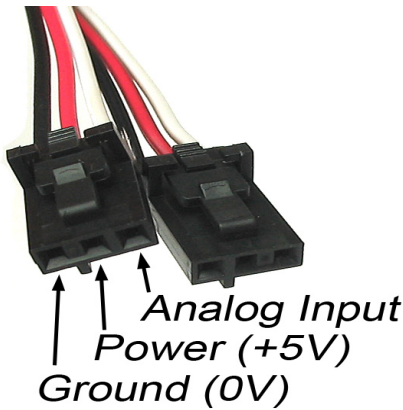
Cable Connectors		
Manufacturer	**Part Number**	**Description**
Molex	50-57-9403	3 Position Cable Connector
Molex	16-02-0102	Wire Crimp Insert for Cable Connector
Molex	70543-0002	3 Position Vertical PCB Connector
Molex	70553-0002	3 Position Right-Angle PCB Connector (Gold)
Molex	70553-0037	3 Position Right-Angle PCB Connector (Tin)
Molex	15-91-2035	3 Position Right-Angle PCB Connector - Surface Mount

Note: Most of the above components can be bought at www.digikey.com

Device Specifications

Characteristic	Value
Current Consumption	8.5 mA
Resolution	30mV/dB
Input Sound Range	50 to 100 dB
Error (@ 1000Hz)	±3dB
Input Frequency Range	100Hz to 8kHz

Product History

Date	Board Revision	Comment
March 2010	0	Product Release

Support

Call the support desk at 1.403.282.7335 9:00 AM to 5:00 PM Mountain Time (US & Canada) - GMT-07:00

or

E-mail us at: support@phidgets.com