



Product Manual

1128 - Sonar Sensor



Phidgets 1128 - Product Manual

For Board Revision 0

© Phidgets Inc. 2009

Contents

4 Product Features

- 4 Connections
- 4 Type of Measurement

5 Getting Started

- 5 Checking the Contents
- 5 Soldering the Sensor Cable
- 5 Connecting all the pieces
- 6 Testing Using Windows 2000/XP/Vista
- 7 Testing Using Mac OS X

8 Programming a Phidget

- 8 Code Samples
- 8 Coding for your Sensor

9 Technical Information

- 9 Formulas
- 9 Other Interfacing Alternatives
- 10 Analog Input Cable Connectors
- 10 Device Specifications

10 Product History

10 Support

Product Features

- Detects objects from 0 inches to 254 inches (6.45 meters) with 1 inch resolution.
- Automatic calibration when powered up
- Operates between 2.5V to 5.5V
- Can be used for presence detection (i.e. in front of a computer), for robotics navigation, ...
- Requires soldering

Connections

Designed to connect to a:

- 1018 - PhidgetInterfaceKit 8/8/8
- 1019 - PhidgetInterfaceKit 8/8/8 w/6 Port Hub
- 1070 - PhidgetSBC
- 1202 - PhidgetTextLCD

Type of Measurement

The sensor uses ratiometric measurement.

Getting Started

Checking the Contents

You should have received:

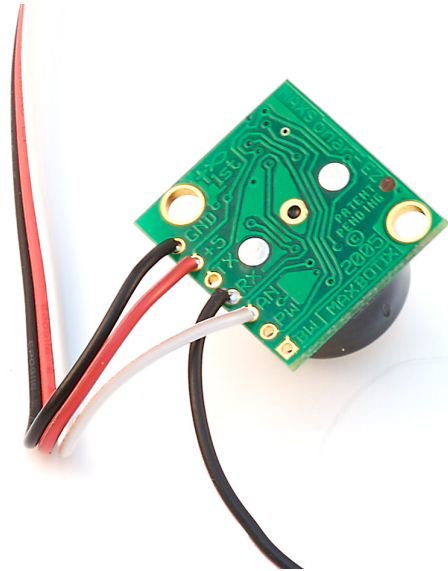
- A Sonar Sensor
- A Sensor Cable

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

- A PhidgetInterfaceKit 8/8/8 or a PhidgetTextLCD
- A USB Cable
- A soldering iron and solder
- A piece of wire (optional)

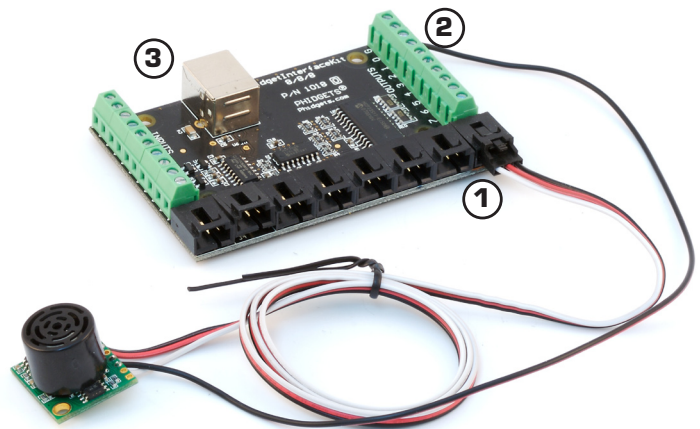
Soldering the Sensor Cable

Solder one end of the sensor cable to the Sonar Sensor. The black wire is soldered to GND, the red wire to +5 and the white wire to AN. Optionally a fourth wire can be soldered to RX in order to turn the sensor on and off from your computer.



Connecting all the pieces

1. Connect the Sonar Sensor to the Analog Input 7 on the PhidgetInterfaceKit 8/8/8 using the sensor cable.
2. If you are using the 4th wire connect it to a digital output port.
3. Connect the PhidgetInterfaceKit to your PC using the USB cable.




Testing Using Windows 2000/XP/Vista

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)

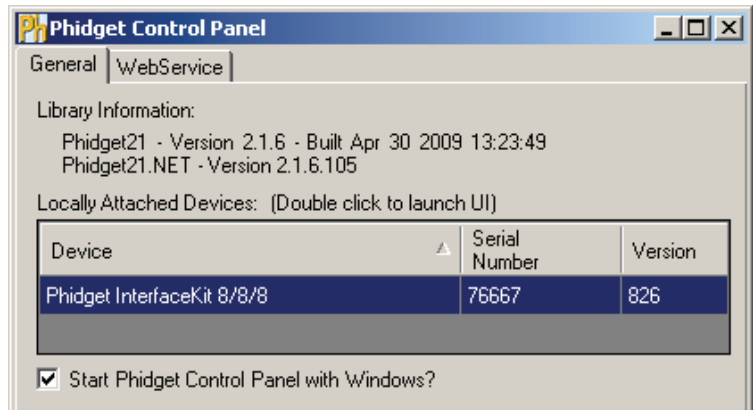
You should see the  icon on the right hand corner of the Task Bar.

Running Phidgets Sample Program

Double clicking on the  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.

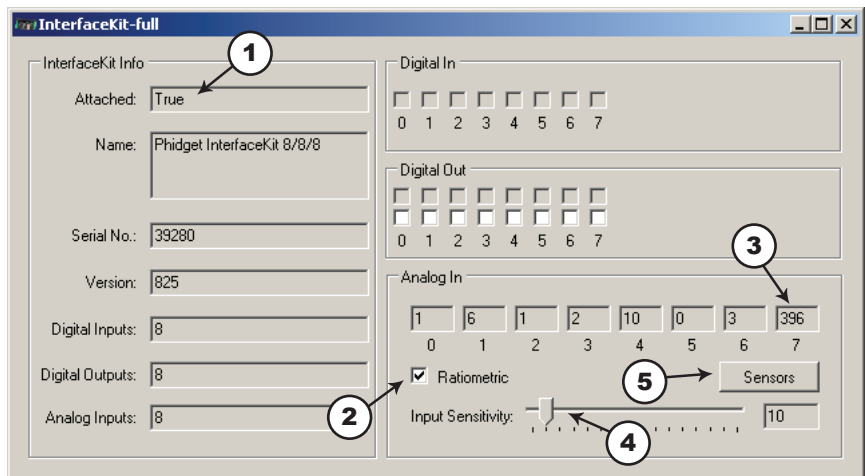
The source code for the InterfaceKit-full sample program can be found under C# by clicking on www.phidgets.com >> Programming.

Double Click on the  icon to activate the Phidget Control Panel and make sure that the **Phidget InterfaceKit 8/8/8** is properly attached to your PC.



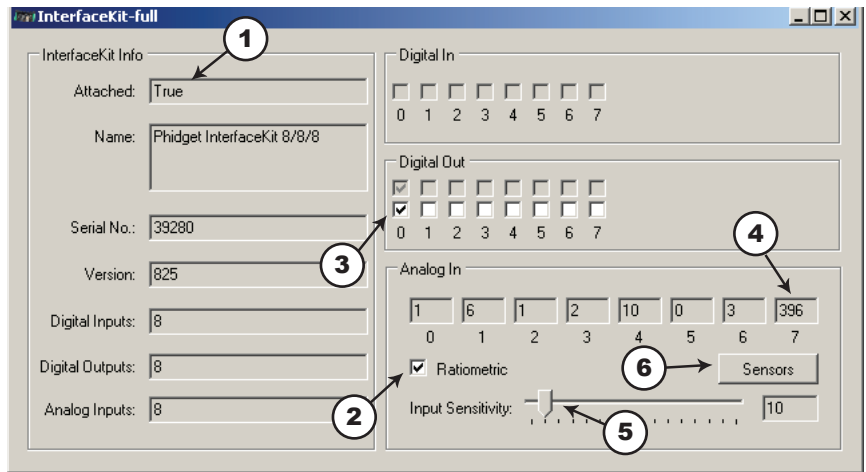
If you are using a 3-wire connection

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 Ticked.
3. Move the Sonar Sensor around and point at different objects. The distance is given in the Analog In box.
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.

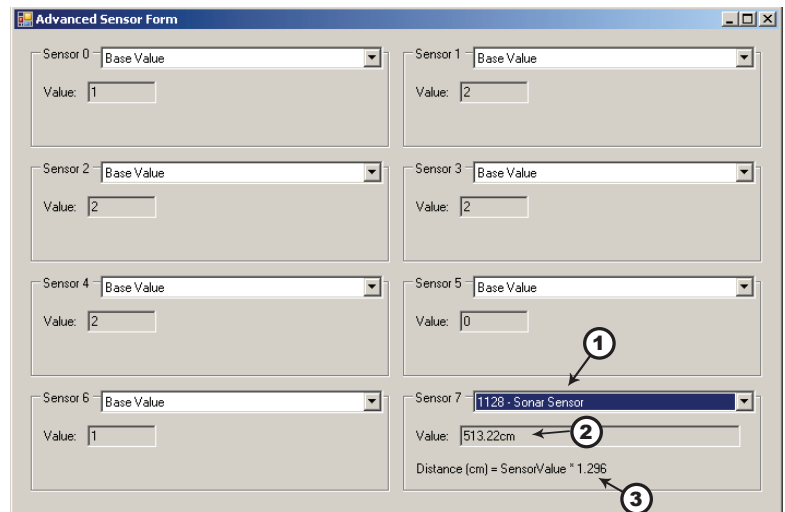


If you are using a 4-wire connection

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 Ticked.
3. Activate the Sonar Sensor, by clicking in the Digital Out box. A tick mark will appear and the Sonar Sensor is on. To turn the sensor off, click on the Digital box again. The tick mark disappears and the sensor is off. The bottom row shows the status of the request, while the top row displays the status of the digital output as reported by the 1128.
4. Move the Sonar Sensor around and point at different objects. The distance is given in the Analog In box.
5. You can adjust the input sensitivity by moving the slider pointer.
6. Click on the Sensors button to bring up the Advanced Sensor Form.



1. In the Sensor 7 box, select the 1116 - Sonar Sensor from the drop down menu.
2. The distance of the object from the sensor is shown here.
3. Formula used to convert the analog input SensorValue into distance.



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

The Sonar Sensor is manufactured by Maxbotix.com. We have added a sensor cable and instructions on soldering the cable to the sensor.

The Sonar Sensor is Ratiometric. Make sure that the ratiometric property is set to TRUE when programming the sensor.

Each time after the LV-MaxSonar®-EZ1™ is powered up, it will calibrate during its first read cycle. The sensor uses this stored information to range a close object. It is important that objects not be close to the sensor during this calibration cycle. The best sensitivity is obtained when it is clear for fourteen inches, but good results are common when clear for at least seven inches. If an object is too close during the calibration cycle, the sensor may then ignore objects at that distance.

The LV-MaxSonar®-EZ1™ does not use the calibration data to temperature compensate for range, but instead to compensate for the sensor ringdown pattern. If the temperature, humidity, or applied voltage changes during operation, the sensor may require recalibration to reacquire the ringdown pattern. Unless recalibrated, if the temperature increases, the sensor is more likely to have false close readings. If the temperature decreases, the sensor is more likely to have reduced upclose sensitivity. To recalibrate the LV-MaxSonar®-EZ1™, cycle power.

For more complete specifications on the MaxSonar-EZ1, please visit www.maxbotix.com

Formulas

The Formula to translate SensorValue into Distance is:

$$\text{Distance (cm)} = \text{SensorValue} * 1.296$$

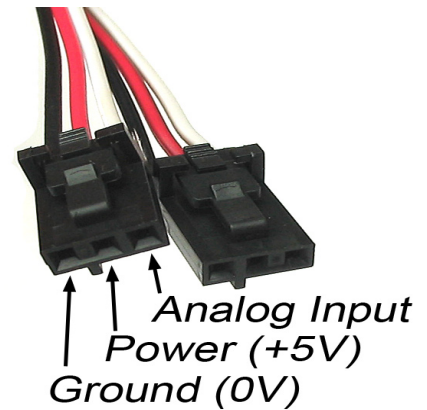
Other Interfacing Alternatives

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

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	3mA
Supply Voltage	3.0VDC to 5.25VDC
Ping Rate	20Hz
Sonar Range	6 inches to 254 inches (6.45m)
Range Resolution	1 inch

Product History

Date	Board Revision	Comment
February 2008	n/a	Product Release

Support

Call the support desk at 1.403.282.7335 8:00 AM to 5:00 PM Mountain Time (US & Canada) - GMT-07:00

or

E-mail us at: support@phidgets.com