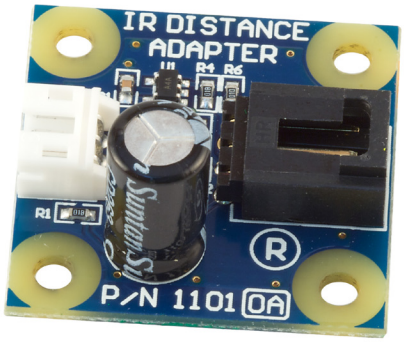
Product Manual

1101 - IR Distance Adapter



Phidgets 1101 - Product Manual

For Board Revision 0

Contents

Product Features

Applications

- Designed to bridge compatible Sharp IR sensors to PhidgetInterfaceKit analog inputs such as:
  - 3520 - Sharp Distance Sensor GP2D120XJ00F (4-30cm)
  - 3521 - Sharp Distance Sensor GP2Y0A21YK0F (10-80cm)
  - 3522 - Sharp Distance Sensor GP2Y0A02YK0F (20-150cm)

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 adapter uses ratiometric measurement.

Getting Started

Checking the Contents

You should have received:

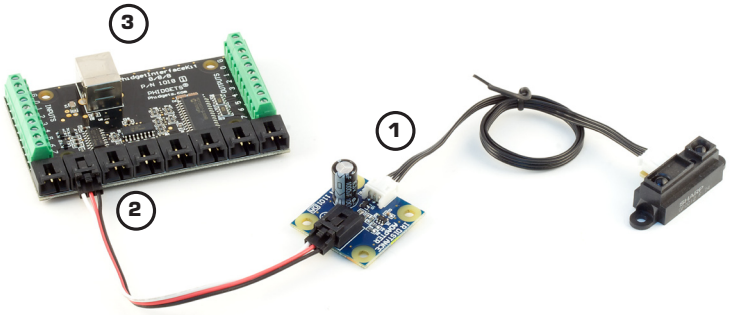
- An IR Distance Adapter
- A 60cm Sensor Cable
- An Interface Cable for connecting the IR Distance Sensor to the Adapter

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

- A compatible Sharp IR Distance Sensor
- A PhidgetInterfaceKit 8/8/8 or a PhidgetText LCD
- A USB Cable

Connecting all the pieces

1. Connect the IR Distance sensor to the Distance Adapter Board using the interface cable. We are using a 3521 - Sharp Distance Sensor GP2Y0A21YK0F (10-80cm).
2. Connect the Distance Adapter Board to the Analog Input 1 on the PhidgetInterfaceKit 8/8/8 board using the sensor cable.
3. Connect the PhidgetInterfaceKit board 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)

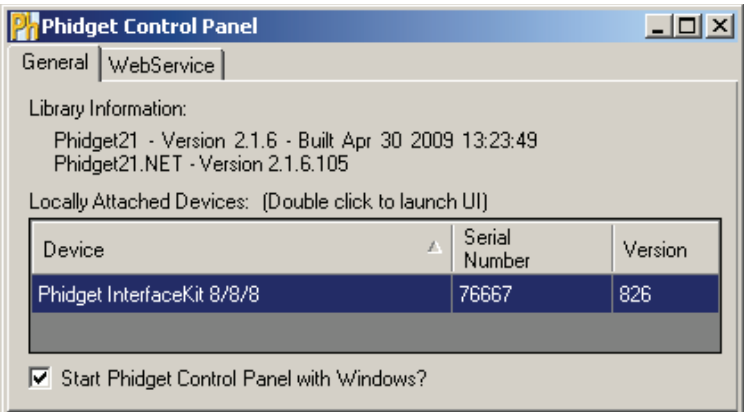
You should see the  icon on the right hand corner of the Task Bar.

Running Phidgets Sample Program

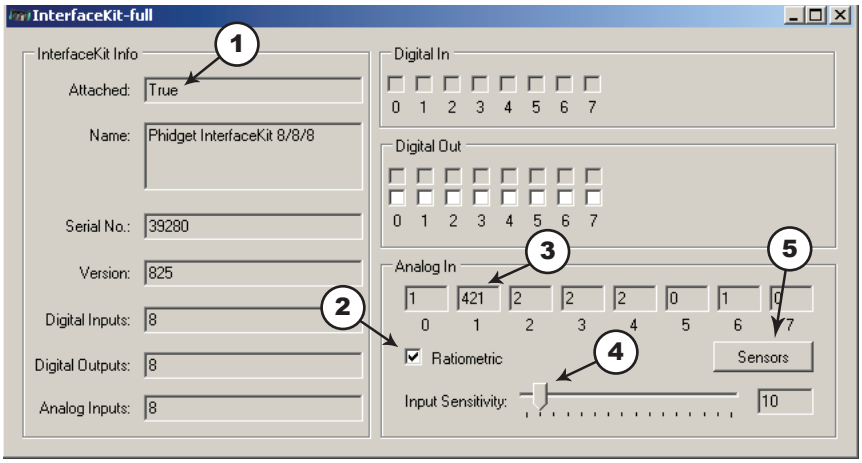
Double clicking on the  icon loads the Phidget Control Panel; we will use this program to make sure that your new Phidget works properly. Since the sensor is connected to a 1018, the computer will see only the 1018. The sensor is providing data through the Analog input it is connected to.

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

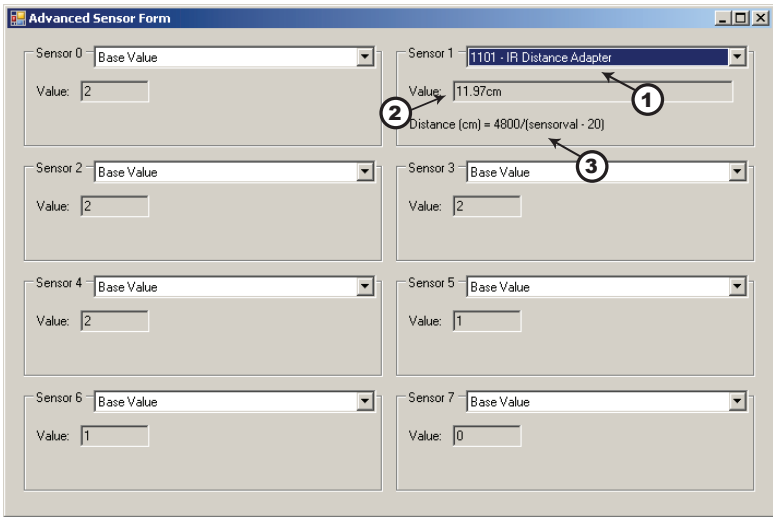
Double Click on the icon to activate the Phidget Control Panel and make sure that the **Phidget InterfaceKit 8/8/8** is properly attached to your PC.



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. Place an object in front of the IR Sensor. A number less than 1000 should be returned.
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 1 box, select the 1101 - IR Distance Adapter 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 function of the IR Distance Adapter Board is to regulate the power requirement of the connected sensor. Although the specified current consumption may be low for these types of sensors, they may draw much more current for short periods of time during measurements. If two or more of these sensors are directly connected to the analog inputs of a PhidgetInterfaceKit, (which can source a maximum of 500mA current total) then the InterfaceKit may potentially experience an overload. Up to eight Sharp IR Distance sensors can safely be connected to the PhidgetInterfaceKit 8/8/8 at the same time through IR Distance Adapter Boards, which prevents the possibility of overcurrent.

Sharp IR distance sensors are recommended for use with the IR Distance Adapter board. The sensor values given will be outside the specified range when no object is present, and fall between a specific range when an object is detected. For analog type sensors, the output is roughly inversely proportional to the distance between the specific range. For digital type sensors, output below a certain value can be treated as a detection.

It is recommended that in order to ensure proper operation, the distance of the object being measured must be within the distance range of the sensor. When the object is outside the valid sensor's distance range, the returned value should be discarded. You must be especially careful when the object is closer than it should be, as the returned value might be within the SensorValue range but is not meaningful.

Formulas

These formulas are derived from the Sharp datasheets to compute distance.

The formula to translate SensorValue into Distance for Sharp 4-30cm analog sensor is:

Distance (cm) = 2076/(SensorValue - 11)

This formula is only valid over the SensorValue range 80-530.

The formula to translate SensorValue into Distance for Sharp 10-80cm analog sensors is:

Distance (cm) = 4800/(SensorValue - 20)

This formula is only valid over the SensorValue range 80-500.

The formula to translate SensorValue into Distance for Sharp 20-150cm analog sensors is:

Distance (cm) = 9462/(SensorValue - 16.92)

This formula is only valid over the SensorValue range 80-490.

For digital distance sensors, SensorValue will be greater than 200 if the distance of the object being measured is less that the detection distance of the sensor. Otherwise the SensorValue will be less that 200.

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.

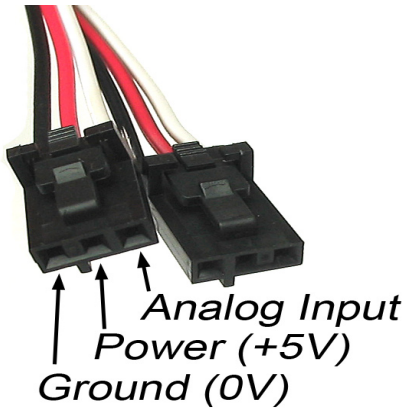
Compatible Infrared Sensors

The following is a list of distance sensors that are known to work with the IR Distance Adapter Board. If the product is not listed here, it can be assumed to be incompatible.

IR Distance Sensors		
Manufacturer	Part Number	Description
Sharp	GP2Y0A02YK0F	20-150cm Analog
Sharp	GP2Y0A02YK	20-150cm Analog (non-RoHS)
Sharp	GP2Y0D21YK0F	24cm Digital
Sharp	GP2Y0D21YK	24cm Digital (non-RoHS)
Sharp	GP2D14J0000F	24cm Digital
Sharp	GP2D15	24cm Digital (non-RoHS)
Sharp	GP2Y0D02YK0F	80cm Digital
Sharp	GP2Y0D02YK	80cm Digital (non-RoHS)
Sharp	GP2D150AJ00F	15cm Digital
Sharp	GP2D140A	15cm Digital (non-RoHS)
Sharp	GP2Y0A21YK0F	10-80cm Analog
Sharp	GP2D12	10-80cm Analog (non-RoHS)
Sharp	GP2Y0A21YK	10-80cm Analog (non-RoHS)
Sharp	GP2D120XJ00F	4-30cm Analog
Sharp	GP2D120	4-30cm Analog (non-RoHS)

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

Analog Input Cable Connectors



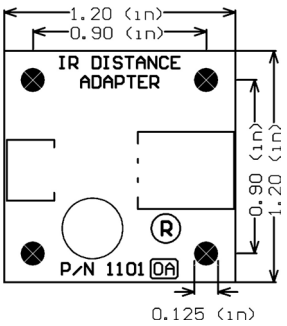
Each Analog Input uses a 3-pin, 0.100 inch pitch locking connector. Pictured here is a plug with the connections labeled. The connectors are commonly available - refer to the Table below for manufacturer part numbers.

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

Mechanical Drawing

1:1 scale



Note: When printing the mechanical drawing, "**Page Scaling**" in the Print panel must be set to "**None**" to avoid re-sizing the image.

Device Specifications

Characteristic	Value
Current Consumption	3mA
Output Impedance	1K ohms
Supply Voltage	4.75VDC to 5.25VDC

Product History

Date	Board Revision	Comment
October 2005	n/a	Product Release
May 2008	Board Revision 0A	

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