1130 User Guide

Go to this device's product page [1]

Getting Started

Checking the Contents

You should have received:	In order to test your new Phidget you will also need:
• A pH/ORP adapter board	• A PhidgetInterfaceKit 8/8/8
• A sensor cable	• A USB cable
	• A pH or ORP electrode

Connecting the Pieces

1. Connect the pH/ORP Adapter Board to the Analog Input #6 on the PhidgetInterfaceKit 8/8/8 board using the sensor cable. In this example, we are using a pH electrode.
2. Connect the electrode to the adapter board using the BNC connector.
3. Use the DIP switch to select pH or ORP to correspond to the type of electrode you are using.
4. Connect the InterfaceKit 8/8/8 to your PC using the USB cable.

Testing Using Windows 2000 / XP / Vista / 7

Make sure you have the current version of the Phidget library installed on your PC. If you don't, follow these steps:

1. Go to the Quick Downloads section on the Windows page
2. Download and run the Phidget21 Installer (32-bit, or 64-bit, depending on your system)
3. 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 ensure that your new Phidget works properly.

The source code for the **InterfaceKit-full** sample program can be found in the quick downloads section on the C# Language Page. If you'd like to see examples in other languages, you can visit our Languages page.

Updating Device Firmware

If an entry in this list is red, it means the firmware for that device is out of date. Double click on the entry to be given the option of updating the firmware. If you choose not to update the firmware, you can still run the example for that device after refusing.

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. View the unconverted pH value inside the Analog In boxes. At a pH level of 7 or with a neutral ORP, the SensorValue will be 500.
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 1130 - pH Adapter (pH) from the drop down menu. Alternatively, if you are using an ORP electrode, choose 1130 - pH Adapter (ORP).
2. The pH level measured by the sensor is shown here.
3. Formula used to convert the analog input SensorValue into pH (or ORP).
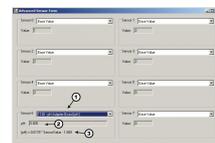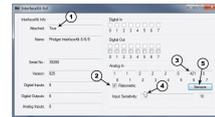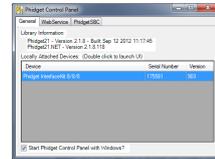
Testing Using Mac OS X

1. Go to the Quick Downloads section on the Mac OS X page
2. Download and run the Phidget OS X Installer
3. Click on System Preferences >> Phidgets (under Other) to activate the Preference Pane
4. Make sure that the is properly attached.
5. Double Click on in the Phidget Preference Pane to bring up the Sample program. This program will function in a similar way as the Windows version.

Using Linux

For a step-by-step guide on getting Phidgets running on Linux, check the Linux page.

Using Windows Mobile / CE 5.0 / CE 6.0

For a step-by-step guide on getting Phidgets running on Windows CE, check the Windows CE page.

Technical Details

Measuring the pH

To determine the pH of a solution, make sure the DIP switch on the board is flipped to the pH side. Given the SensorValue from the Phidget InterfaceKit, the following formula can be applied:

$$pH = 0.0178 \times SensorValue - 1.889$$

This formula assumes that the solution is at 25 degrees Celsius. Depending on the temperature of the solution and on the actual pH level, the SensorValue can change dramatically. To incorporate temperature (in degrees Celsius) for added accuracy, the following formula can be used:

$$pH = 7 - \frac{2.5 - \frac{SensorValue}{200}}{0.257179 + 0.000941468 \times Temperature}$$

The following example is to give an idea of how the temperature affects the SensorValue. A solution with a pH of 2 at a temperature of 25 degrees Celsius yields a SensorValue of 219. At 100 degrees Celsius, the SensorValue decreases to 148, and at 0 degrees celsius, the SensorValue reports 242. A solution with a pH of 8 with a temperature of 0, 25 and 100 degrees Celsius gives a SensorValue of 551, 556 and 570, respectively. It can be seen that the temperature has a greater affect on solutions that have a pH further away from the reference pH of 7. Additionally, temperature affects the impedance of the glass electrode, and can result in increased errors if not properly calibrated. If you want to monitor the temperature of the solution, you can use a thermocouple. You'll need to add some sort of protective shielding to the thermocouple if you're using acidic or basic solutions, though. Check out our thermocouple interfaces for more information.

Measuring Oxidation/Reduction Potential (ORP)

To determine the ORP of a solution, make sure the DIP switch on the board is flipped to the ORP side. Given the SensorValue from the PhidgetInterfaceKit, the following formula can be applied:

$$\text{ORP (V)} = \frac{2.5 - \frac{\text{SensorValue}}{200}}{1.037}$$

ORP electrodes give a typical range of -2V to 2V, where the positive values are for oxidizers and the negative values are for reducers.

Words of Caution

The pH Adapter Board should be used to measure solutions that are 'electrically quiet'. Measuring pH in electrically noisy environments such as tanks with mixing pumps, and even other measuring devices is not recommended.

Choosing Electrodes

Review the data sheet for the electrode you have selected for your application to ensure that it complies with the device specifications of the pH Adapter Board. The important specification is the output voltage of the electrode. Many electrodes will work but it is important to verify compliance before connecting an electrode to the Adapter Board. In fact, any type of sensor that uses a BNC connector and complies with the voltage range of the 1130 should work. We have reviewed the following electrodes, and found that they can be used with the pH Adapter Board. This is by no means a comprehensive list, but can be used as a comparison with other electrodes if necessary.

Manufacturer	Web Page	Part Number
Omega	www.omega.com	PHE13XX, PHE14XX, ORE1311, ORE1411
Cole-Parmer	www.coleparmer.com	EW-59001, EW27003
Mettler-Toledo	www.mt.com	InLab (BNC) Series

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.

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

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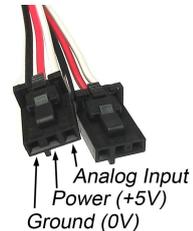
Further Reading

For more information on pH and ORP probes, check the PH/ORP Sensor Primer.

API

Phidget analog sensors do not have their own API- they simply output a voltage that is converted to a digital value and accessed through the "Sensor" properties and events on the PhidgetInterfaceKit API. It is not possible to programmatically identify which sensor is attached to the Analog Input. To an InterfaceKit, every sensor looks the same. Your application will need to apply formulas from this manual to the **SensorValue** (an integer that ranges from 0 to 1000) to convert it into the units of the quantity being measured. For example, this is how you would use a temperature sensor in a C# program:

```csharp
// set up the interfacekit object
InterfaceKit IFK = new InterfaceKit();

// link the new interfacekit object to the connected board
IFK.open("localhost", 5001);

// Get sensorvalue from analog input zero
int sensorvalue = IFK.sensors[0].Value;

// Convert sensorvalue into temperature in degrees Celsius
double roomtemp = Math.Round(((sensorvalue * 0.22222) - 61.11), 1);
```

See the PhidgetInterfaceKit User Guide for more information on the API and a description of our architecture.

For more code samples, find your preferred language on the Languages page.

Product History

Date	Board Revision	Device Version	Comment
March 2010	0	N/A	Product Release

References

[1] http://www.phidgets.com/products.php?product_id=1130

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