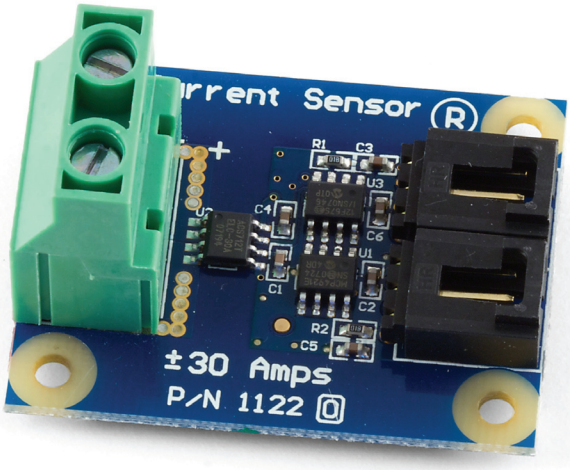
Product Manual

1122 - 30 Amp Current Sensor AC/DC



Phidgets 1122 - Product Manual

For Board Revision 0

Contents

Product Features

- Measures alternating current up to 30Amps and direct current from -30Amps to +30Amps.
- Dual outputs allow the user to measure both the AC and DC components of complex current waveforms separately.

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 ratiometric measurement.

Getting Started

Checking the Contents

You should have received:

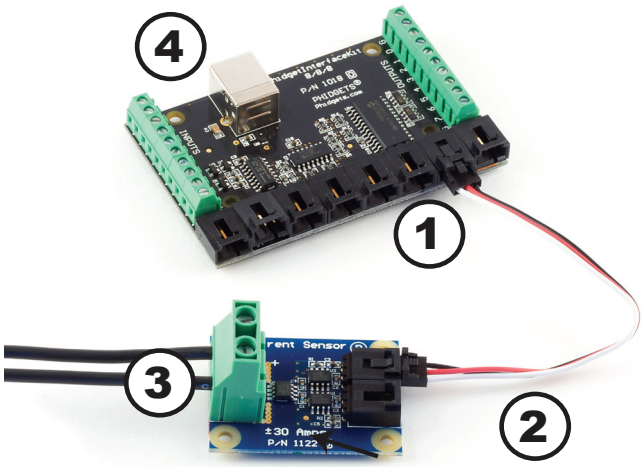
- A 30 Amp Current Sensor AC/DC
- A Sensor Cable

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 30 Amp Current Sensor AC/DC to the Analog Input 6 on the PhidgetInterfaceKit 8/8/8 using the sensor cable.
2. To measure alternating current, use the AC connector.
3. Connect your power source to the terminal block.
4. 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)

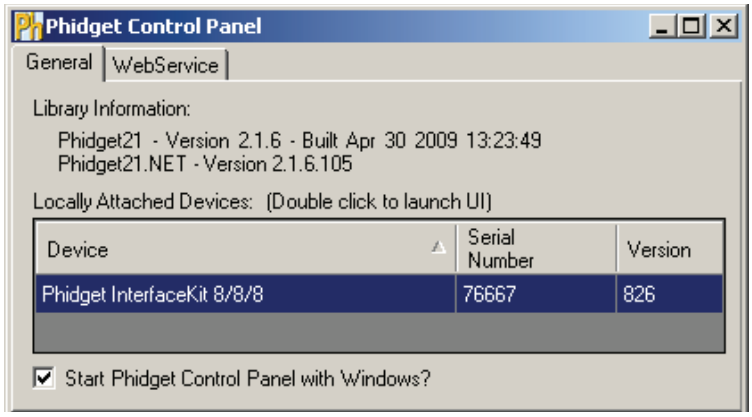
You should see the  icon on the right hand corner of the Task Bar.

Running Phidgets Sample Program

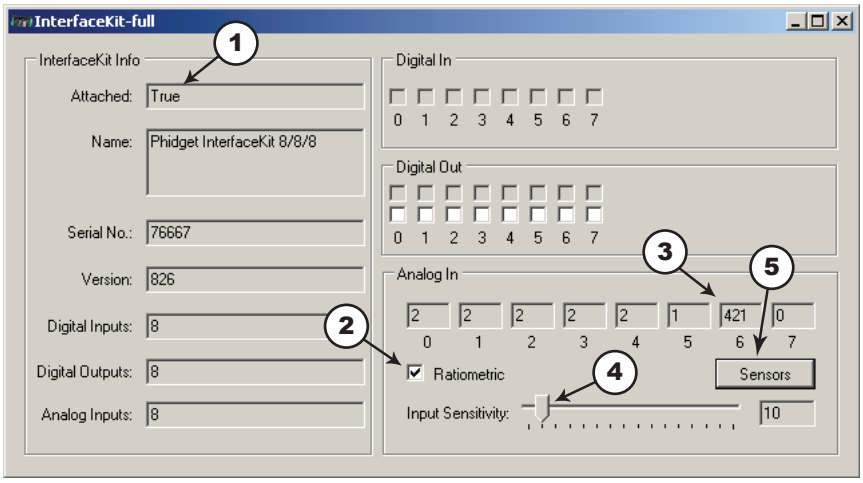
Double clicking on the  icon loads the Phidget Control Panel; we will use this program to make sure that your new Phidget works properly. Since the sensor is connected to a 1018, the computer will see only the 1018. The sensor is providing data through the Analog input it is connected to.

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

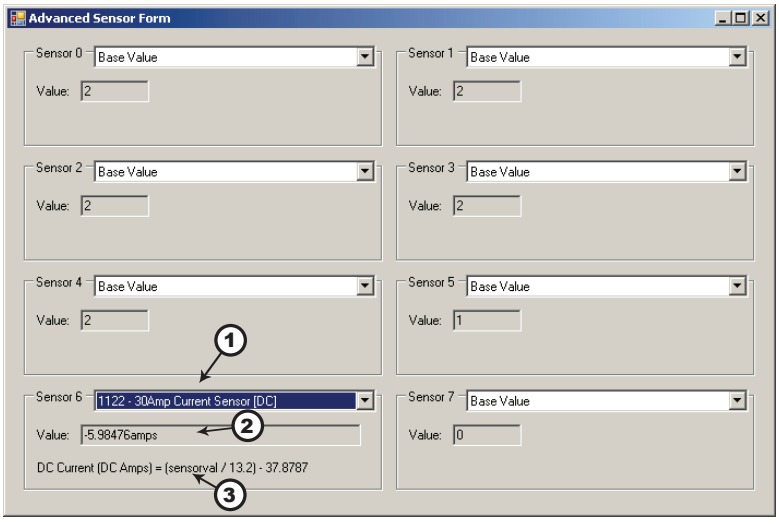
Double Click on the icon to activate the Phidget Control Panel and make sure that the **Phidget InterfaceKit 8/8/8** is properly attached to your PC.



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. The Amp value of your power source is displayed in the Analog In box. If you do not connect any power source to the sensor board, the Analog In value should be 500 if you use the DC connector and 0 if you use the AC connector.



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 1122 - 30Amp Current Sensor [DC] or [AC] from the drop down menu.
2. The current measured across the sensor is shown here.
3. Formula used to convert the analog input SensorValue into current.

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.

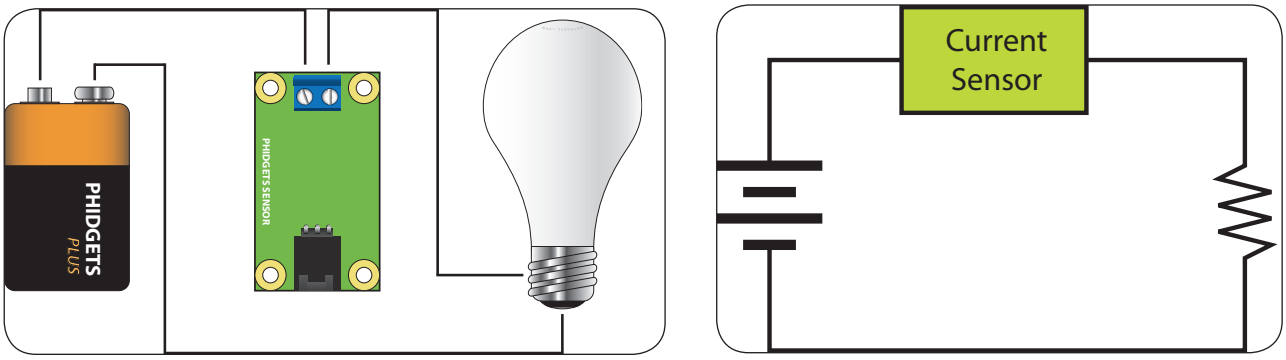
See the PhidgetInterfaceKit product manual for an overview of its API and a description of our architecture.

Technical Information

The 30 Amp Sensor measures alternating current (AC) up to 30 Amps and direct current (DC) between –30 and +30 Amps. The AC output will give the RMS (Root Mean Square) value of an alternating current assuming the current is sinusoidal, and the sine wave is varying equally across the zero point. The AC output can also be used for signals that are not varying evenly around the zero point but the value will be the RMS plus a DC component. If a DC signal is being measured, the AC output will produce a signal that can be used to calculate the current but without the value representing direction of current flow.

Measuring Current

The Phidgets Current Sensor should be wired in series with the circuit under test, as shown in the following diagrams.



In the diagrams above, the voltage source is represented by the battery symbol. The load is represented by a light bulb or schematic resistor symbol. The current flowing from the battery to the load is measured through the current sensor.

Formulas

The formula to translate SensorValue into Current is:

DC Amps = (SensorValue / 13.2) - 37.8787

AC RMS Amps = SensorValue x 0.04204

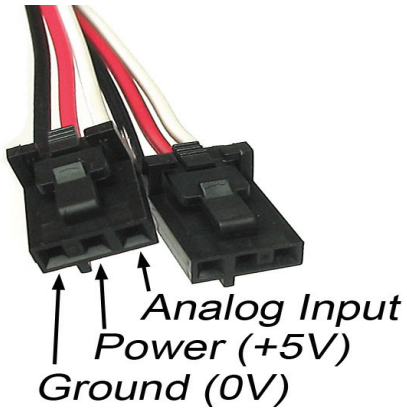
Other Interfacing Alternatives

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
Active Current Consumption	10mA
Output Impedance	1K ohms
Minimum Measurable AC Current	75mA
Minimum Measurable DC Current	±75mA
Maximum Measurable AC Current	30A
Maximum Measurable DC Current	±30A
Maximum Measurable AC Frequency	10kHz
Current Conductor Resistance	1.5mΩ
Maximum Supply Voltage	5.5VDC
Minimum Supply Voltage	4.5VDC
Terminal Block Recommended Wire Size	10 - 26 AWG
Wire Stripping Length	6-7mm
Total Output Error [1]	±5% Max between -40°C to +85°C
Total Output Error (Typical)	±1.5% @ 25°C

Characteristic	Notes	Value
Reinforced Isolation Voltage[2]	Current loop to Sensor Output, 1 minute, T_A=25°C	2100V
	Voltage applied to current loop, based on IEC 60950, suitable for 110VAC	$184V_{peak}$
Basic Isolation Voltage[2]	Current loop to Sensor Output, 1 minute, T_A=25°C	1500V
	Voltage applied to current loop, based on IEC 60950, suitable for 240VAC	$354V_{peak}$

[1] Note about accuracy

We specify maximum error on our sensors using the numbers from the sensor manufacturer. The maximum error is obtained from testing millions of sensors in a wide temperature range. The typical error on a given sensor is 25% or less of the maximum error. If you limit your temperature range at room temperature, the error rate may decrease by another 75%. In these conditions, a 6% maximum error translates to 1- 2% typical error. For most prototype applications, our sensors are extremely accurate. If, on the other hand, your application demands known accuracy, you will need to calibrate every individual sensor.

[2] These values are taken from Allegro's sensor datasheet.

Product History

Date	Board Revision	Comment
March 2008	n/a	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