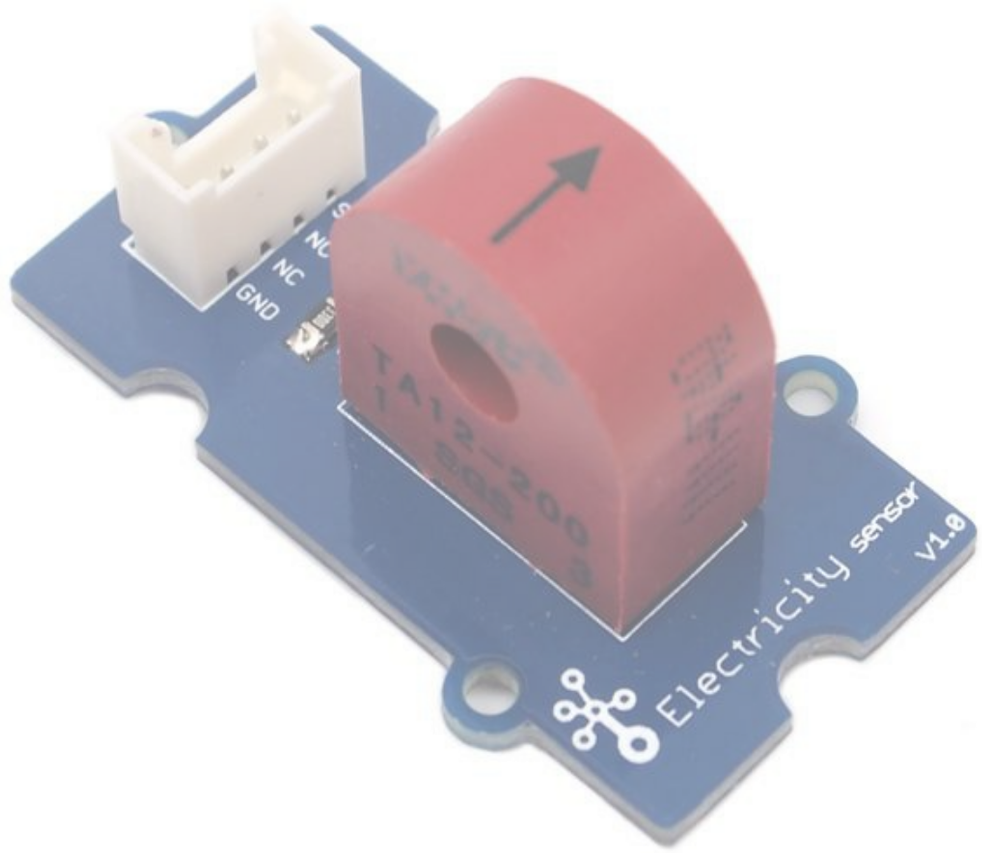
Grove - Electricity Sensor



The Electricity sensor module is a member of Grove. It is based on the TA12-200 current transformer which can transform the large AC into small amplitude. You can use it to test large alternating current up to 5A.

Features

- Grove compatible interface
- Maximum 5A input
- High accuracy
- Small size

> Tip
> More details about Grove modules please refer to Grove System

Application Ideas

- Alternating current measurement
- Device condition monitoring

Specification

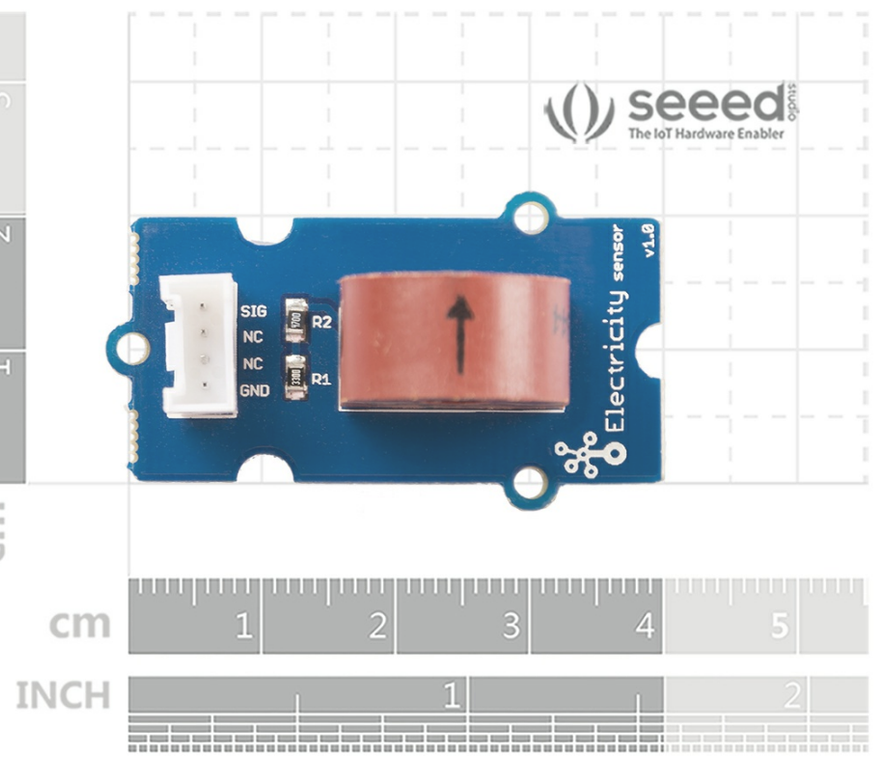
Key Specification

Items	Min
PCB Size	2.0cm*4.0cm
Interface	2.0mm pitch pin header
IO Structure	SIG,NC,NC,GND
RoHS	YES

Electronic Characteristics

Items	Min	Norm	Max	Unit
Transformation ratio	-	2000:1	-	-
Input Current	0	-	5	A
Output Current	0	-	2.5	mA
Sampling Resistance	-	800	-	Ω
Sampling Voltage	0	-	2	V
Working Frequency	20	-	20K	HZ
Nonlinear scale	-	-	0.2%	-
Phase Shift	-	-	5'	-
Operating Temperature	-55	-	85	℃
Dielectric strength	-	6	-	KVAC/1min

Hardware Overview



Platforms Supported

Arduino	Raspberry Pi	

> Caution
> The platforms mentioned above as supported is/are an indication of the module's software or theoritical compatibility. We only provide software library or code examples for Arduino platform in most cases. It is not possible to provide software library / demo code for all possible MCU platforms. Hence, users have to write their own software library.

Getting started

Play with Arduino

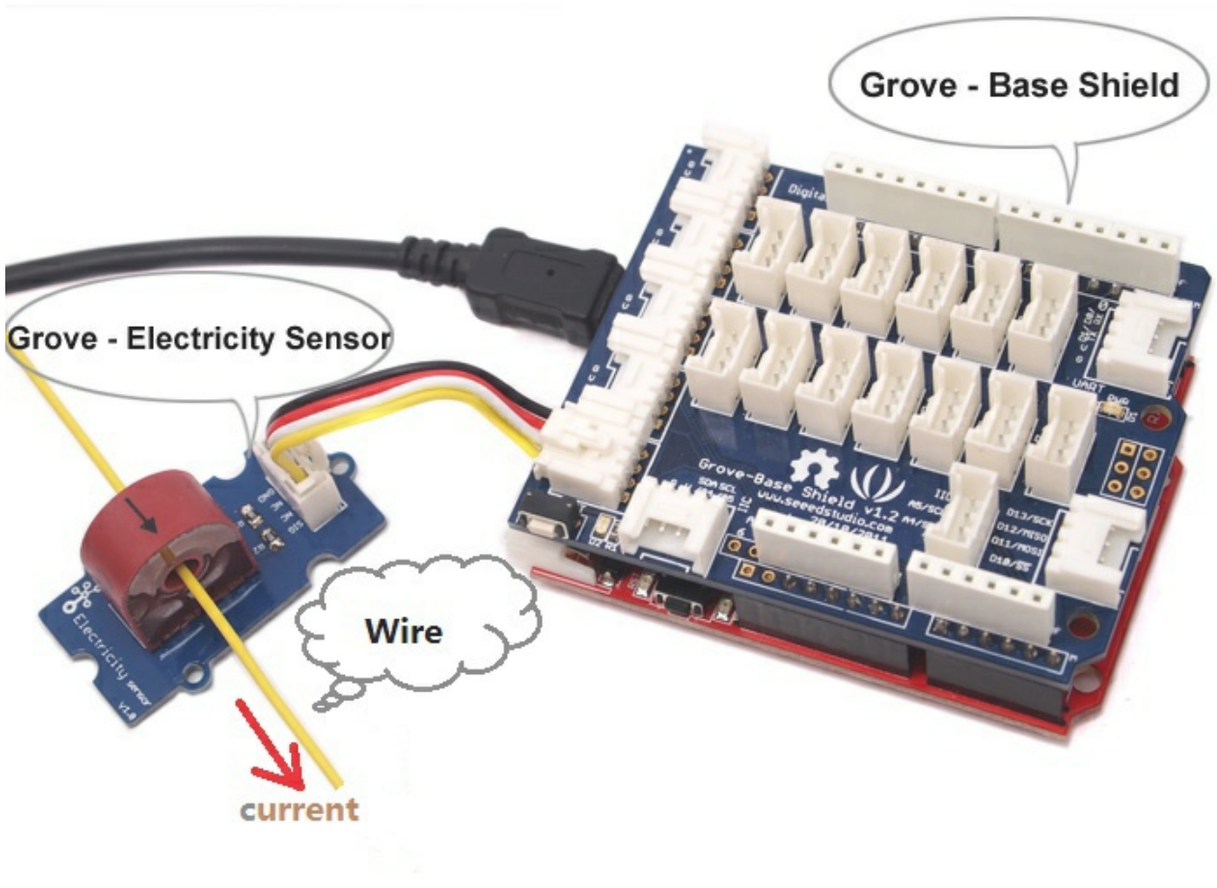
The following sketch demonstrates a simple application of measuring the amplitude of the alternating voltage. The SIG pin will output a alternating voltage based on the alternating current being measured. You can measure the value using ADC.

Hardware

- Step 1. Prepare the below stuffs:

Seeeduino V4.2	Base Shield	Grove-Electricity_Sensor
		
Get One Now	Get One Now	Get One Now

- Step 2. Connect Grove-Electricity_Sensor to port A0 of Grove-Base Shield.
- Step 3. Plug Grove - Base Shield into Seeeduino.
- Step 4. Connect Seeeduino to PC via a USB cable.



> Note
> If we don't have Grove Base Shield, We also can directly connect this module to Seeeduino as below.

Seeeduino	Grove-Electricity_Sensor
5V	Red
GND	Black
Not Conencted	White
A0	Yellow

Software

Step 1. Copy the code and flash it into the controller board and upload the code.

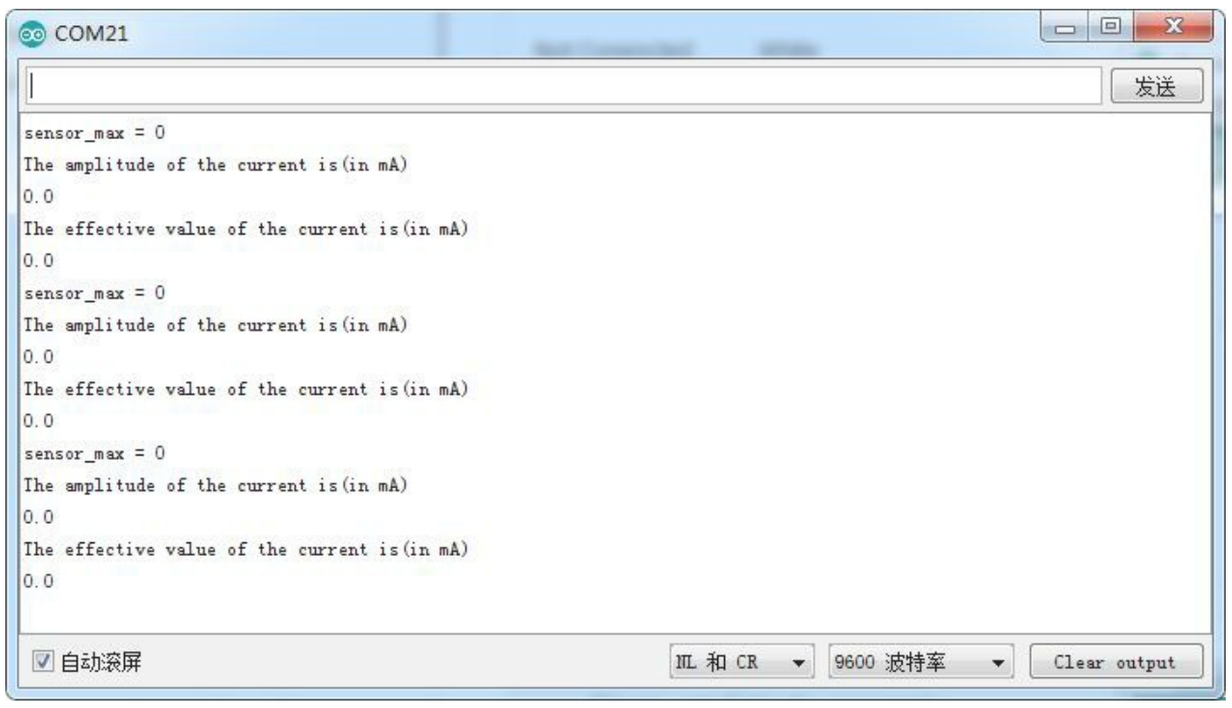
```
/*****************************************************************************/
//  Function: Measure the amplitude current of the alternating current and
//          the effective current of the sinusoidal alternating current.
//  Hardware: Grove - Electricity Sensor
//  Date:    Jan 19,2013
//  by www.seeedstudio.com
#define ELECTRICITY_SENSOR A0 // Analog input pin that sensor is attached to

float amplitude_current;            //amplitude current
float effective_value;      //effective current

void setup()
{
    Serial.begin(9600);
    pins_init();
}
void loop()
{
    int sensor_max;
    sensor_max = getMaxValue();
    Serial.print("sensor_max = ");
    Serial.println(sensor_max);
    //the VCC on the Grove interface of the sensor is 5v
    amplitude_current=(float)sensor_max/1024*5/800*2000000;
    effective_value=amplitude_current/1.414;//minimum_current=1/1024*5/800*20
00000/1.414=8.6(mA)
                    //Only for sinusoidal alternating current
    Serial.println("The amplitude of the current is(in mA)");
    Serial.println(amplitude_current,1);//Only one number after the decimal point
    Serial.println("The effective value of the current is(in mA)");
    Serial.println(effective_value,1);
}
void pins_init()
{
    pinMode(ELECTRICITY_SENSOR, INPUT);
}
/*Function: Sample for 1000ms and get the maximum value from the SIG pin*/
int getMaxValue()
{
    int sensorValue;            //value read from the sensor
    int sensorMax = 0;
    uint32_t start_time = millis();
    while((millis()-start_time) < 1000)//sample for 1000ms
    {
        sensorValue = analogRead(ELECTRICITY_SENSOR);
        if (sensorValue > sensorMax)
        {
            /*record the maximum sensor value*/
            sensorMax = sensorValue;
        }
    }
    return sensorMax;
}
```

> Note
> The minimum effective current that can be sensed by the code can be calculated using the equation below. minimum_current=1/1024*5/800*2000000/1.414=8.6(mA).

- Step 2. Open the serial monitor, The results is as follows：



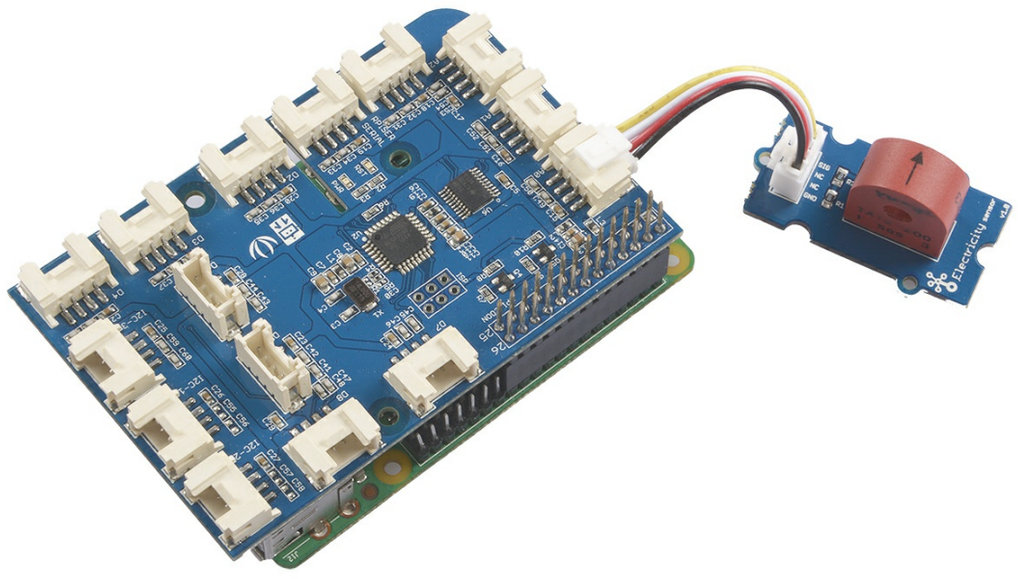
With Raspberry Pi

Hardware

- Step 1. Prepare the below stuffs:

Raspberry pi	GrovePi_Plus	Grove-Electricity_Sensor
		
Get One Now	Get One Now	Get One Now

- Step 2. Plug the GrovePi_Plus into Raspberry.
- Step 3. Connect Grove-Electricity_Sensor to A0 port of GrovePi_Plus.
- Step 4. Connect the Raspberry to PC through USB cable.



Software

- Step 1. Follow Setting Software to configure the development environment.
- Step 2. Git clone the Github repository.

```
cd ~
git clone https://github.com/DexterInd/GrovePi.git
```

- Step 3. Excute below commands to use this sensor

```
cd ~/GrovePi/Software/Python
python grove_electricity_sensor.py
```

Here is the code of example:

```
#!/usr/bin/env python
#
# GrovePi Example for using the Grove Electricity Sensor (https://www.seeedstudio.com/wiki/Grove_-_Electricity_Sensor)
#
# The GrovePi connects the Raspberry Pi and Grove sensors.  You can learn more about GrovePi here:  http://www.dexterindustries.com/GrovePi
#
# Have a question about this example?  Ask on the forums here:  http://forum.dexterindustries.com/c/grovepi
#
'''
## License
The MIT License (MIT)
GrovePi for the Raspberry Pi: an open source platform for connecting Grove Sensors to the Raspberry Pi.
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LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM,
OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN
THE SOFTWARE.
'''

import time
import grovepi

# Connect the Grove Electricity Sensor to analog port A0
# SIG,NC,NC,GND
sensor = 0

grovepi.pinMode(sensor,"INPUT")

# Vcc of the grove interface is normally 5v
grove_vcc = 5

while True:
  try:
      # Get sensor value
      sensor_value = grovepi.analogRead(sensor)

      # Calculate amplitude current (mA)
      amplitude_current = (float)(sensor_value / 1024 * grove_vcc / 800 * 2000000)

      # Calculate effective value (mA)
      effective_value = amplitude_current / 1.414

      # minimum_current = 1 / 1024 * grove_vcc / 800 * 2000000 / 1.414 = 8.6(mA)
      # Only for sinusoidal alternating current

      print("sensor_value", sensor_value)
      print("The amplitude of the current is", amplitude_current, "mA")
      print("The effective value of the current is", effective_value, "mA")
      time.sleep(1)

  except IOError:
      print ("Error")
```
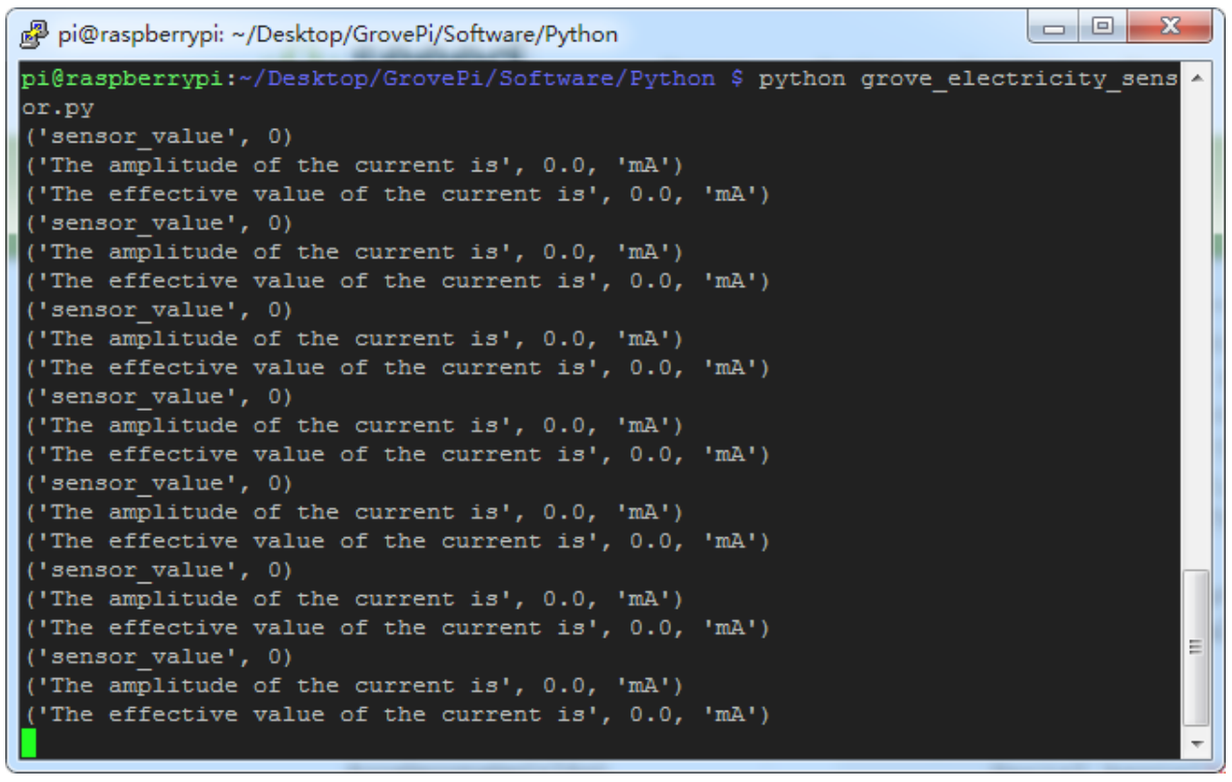

Here is the result.



```
pi@raspberrypi:~/Desktop/GrovePi/Software/Python $ python grove_electricity_sensor.py
('sensor_value', 0)
('The amplitude of the current is', 0.0, 'mA')
('The effective value of the current is', 0.0, 'mA')
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```

Schematic Online Viewer

Resources

- [Eagle] Grove -Electricity Sensor Eagle File
- [PDF] Schematic in PDF

Tech Support

Please submit any technical issue into our forum .