Grove - Electricity Sensor

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Wiki: http://www.seeedstudio.com/wiki/index.php?title=Twig_-_Electricity_Sensor

Bazaar: http://www.seeedstudio.com/depot/Grove-Electricity-Sensor-p-777.html?cPath=25_28

Document Revision History

Revision	Date	Author	Description
1.0	Sep 22, 2015	Loovee	Create file

Contents

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For physical injuries and possessions loss caused by those reasons which are not related to product quality, such as operating without following manual guide, natural disasters or force majeure, we take no responsibility for that.

Under the supervision of Seeed Technology Inc., this manual has been compiled and published which covered the latest product description and specification. The content of this manual is subject to change without notice.

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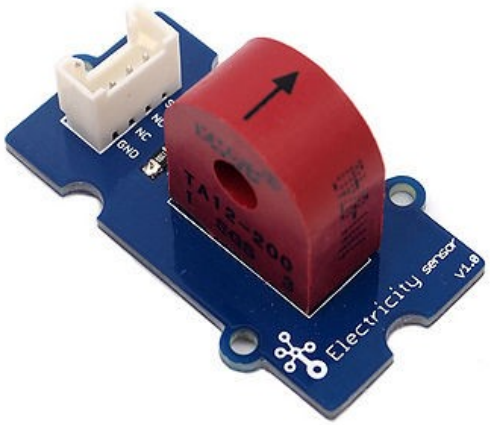
1. Introduction

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.



2. Features

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

3. Application Ideas

- Alternating current measurement
- Device condition monitoring

4. Specification

4.1 Key Specification

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

4.2 Electronic Characteristics

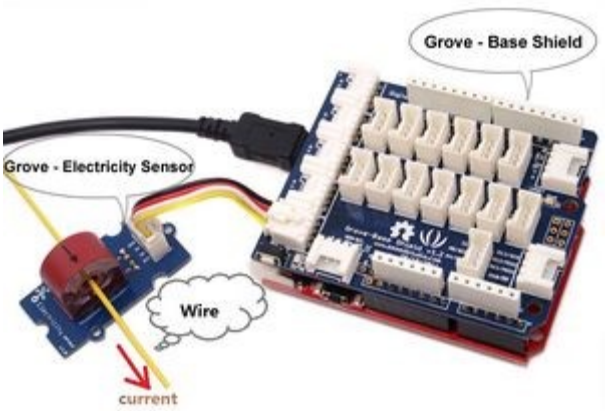
Items	Min	Norm	Max	Unit
Transformation ratio	-	2000:1	-	-
Input Current	0	-	5	A
Output Current	0	-	2.5	mA
Sampling Resistance	-	800	-	Ω
Sampling Voltage	0	-	2	V
Working Frequency	20	-	20K	HZ
Nonlinear scale	-	-	0.2%	-
Phase Shift	-	-	5'	-
Operating Temperature	-55	-	85	℃
Dielectric strength	-	6	-	KVAC/1min

5. Usage

5.1 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.

- Connect the module to the analog A0 of Grove - Base board
- Put the alternating current wire through the hole of the current transformer.



- Copy and paste code below to a new Arduino sketch.

```
/*****************************************************************************/
//   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*2000000/1.414=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;
}
```

- Upload the code, please click here if you do not know how to upload.

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).

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

5.2 With Raspberry Pi

1. You should have got a raspberry pi and a grovepi or grovepi+.

2. You should have completed configuring the development enviroment, otherwise follow here.

3. Connection

   - Plug the sensor to grovepi socket A0 by using a grove cable.

4. Navigate to the demos' directory:

```
cd yourpath/GrovePi/Software/Python/
```

To see the code

```
nano grove_electricity_sensor.py   # "Ctrl+x" to exit #
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"
```

5. Run the demo.

```
sudo python grove_electricity_sensor.py
```

6. Resources

- Grove -Electricity Sensor Eagle File
- Schematic in PDF

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