



# Grove - 3-Axis Digital Compass User Manual

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Version: 1.0

Wiki:[http://www.seeedstudio.com/wiki/Grove - 3-](http://www.seeedstudio.com/wiki/Grove_-_3-)

[Axis Compass V1.0](http://www.seeedstudio.com/wiki/Grove_-_3-Axis_Compass_V1.0)

Bazaar:<http://www.seeedstudio.com/depot/Grove-3Axis-Digital->

[Compass-p-759.html](http://www.seeedstudio.com/depot/Grove-3Axis-Digital-Compass-p-759.html)

## Document Revision History

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Revision	Date	Author	Description
1.0	Sep 23, 2015	Jiankai.li	Create file

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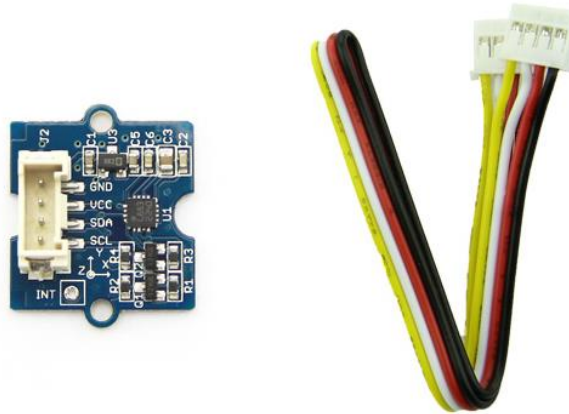
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## 1. Introduction

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This 3-axis digital compass features a low field magnetic sensing multi-chip module HMC5883L, which provides up to  $1^\circ$  to  $2^\circ$  heading accuracy. HMC5883L consists of high-resolution HMC118X series magneto-resistive sensors, as well as Honeywell developed ASIC containing amplification, automatic degaussing strap drivers, offset cancellation and 12 bit ADC. With peripheral power management circuit added, this is an easy to use and reliable compass module for low cost compassing and magnetometry.



## 2. Specifications

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- Input Voltage: 3.3V, 5V
- Sleep Mode Current: 2.5uA
- Measurement Mode Current: 640uA
- High resolution
- Easy to control I2C interface
- Compatible with either 3.3V or 5.0V development platform
- Max 116Hz output rate
- High heading accuracy

## 3. Demonstration

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### 3.1 With Arduino

This demo is going to show you how to read raw data, how to calibrate the data with your local magnetic declination angle and how to get heading angle.

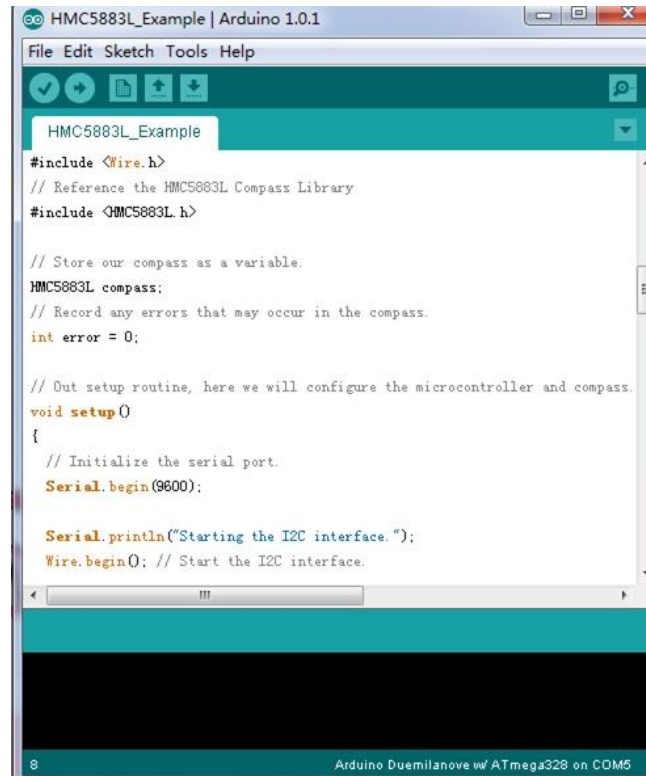
First off, before any action you are going to take, you need to prepare a parameter you are going to use in your demo. That's your local magnetic declination.

You can find it out in degree via [the magnetic declination webpage](#). For example, mine is  $-2^{\circ} 37'$  , which is  $-2.617$  degree.

Then transfer it from degree to radians, and there you get the "declinationAngle". For example, in my case,  $\text{declinationAngle} = -2.617 * \pi / 180 = -0.0456752665$  rad. Three significant figures are enough. So I would shorten it into  $-0.0456$  rad. And this is the parameter you are going to replace the value of "declinationAngle" in the demo code with.

Now let's start to run your compass.

1. Plug the 3-axis compass into the I2C port of Grove - Base Shield.
2. Download the library file: [Digital Compass Library](#). Unzip it into the libraries file of Arduino IDE by the path: `..\arduino-1.0.1\libraries`.
3. Open the demo by the path: `File -> Example -> Digital Compass -> HMC5883L_Example`.



```

HMC5883L_Example
#include <Wire.h>
// Reference the HMC5883L Compass Library
#include <HMC5883L.h>

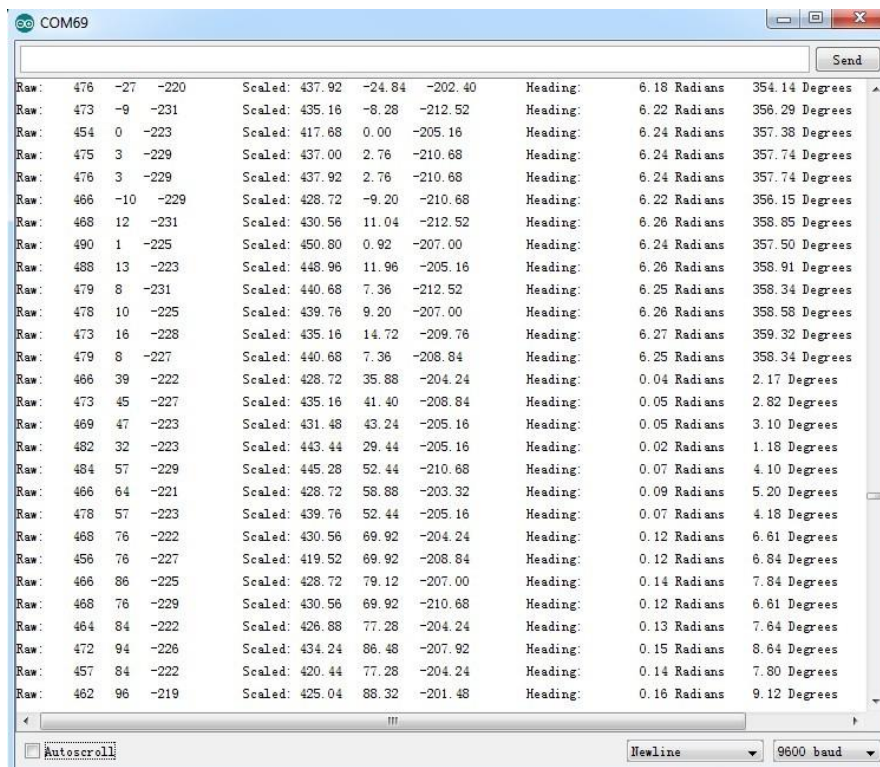
// Store our compass as a variable.
HMC5883L compass;
// Record any errors that may occur in the compass.
int error = 0;

// Out setup routine, here we will configure the microcontroller and compass.
void setup()
{
  // Initialize the serial port.
  Serial.begin(9600);

  Serial.println("Starting the I2C interface.");
  Wire.begin(); // Start the I2C interface.
}

```

4. Replace the value of variable "declinationAngle" with the one you've figured out already.
5. Upload the Code. Please click [here](#) if you do not know how to upload.
6. Check the output result by opening the serial monitor.



Raw	X	Y	Scaled X	Scaled Y	Scaled Z	Heading	Heading (Radians)	Heading (Degrees)
Raw: 476	-27	-220	Scaled: 437.92	-24.84	-202.40	Heading:	6.18 Radians	354.14 Degrees
Raw: 473	-9	-231	Scaled: 435.16	-8.28	-212.52	Heading:	6.22 Radians	356.29 Degrees
Raw: 454	0	-223	Scaled: 417.68	0.00	-205.16	Heading:	6.24 Radians	357.38 Degrees
Raw: 475	3	-229	Scaled: 437.00	2.76	-210.68	Heading:	6.24 Radians	357.74 Degrees
Raw: 476	3	-229	Scaled: 437.92	2.76	-210.68	Heading:	6.24 Radians	357.74 Degrees
Raw: 466	-10	-229	Scaled: 428.72	-9.20	-210.68	Heading:	6.22 Radians	356.15 Degrees
Raw: 468	12	-231	Scaled: 430.56	11.04	-212.52	Heading:	6.26 Radians	358.85 Degrees
Raw: 490	1	-225	Scaled: 450.80	0.92	-207.00	Heading:	6.24 Radians	357.50 Degrees
Raw: 488	13	-223	Scaled: 448.96	11.96	-205.16	Heading:	6.26 Radians	358.91 Degrees
Raw: 479	8	-231	Scaled: 440.68	7.36	-212.52	Heading:	6.25 Radians	358.34 Degrees
Raw: 478	10	-225	Scaled: 439.76	9.20	-207.00	Heading:	6.26 Radians	358.58 Degrees
Raw: 473	16	-228	Scaled: 435.16	14.72	-209.76	Heading:	6.27 Radians	359.32 Degrees
Raw: 479	8	-227	Scaled: 440.68	7.36	-208.84	Heading:	6.25 Radians	358.34 Degrees
Raw: 466	39	-222	Scaled: 428.72	35.88	-204.24	Heading:	0.04 Radians	2.17 Degrees
Raw: 473	45	-227	Scaled: 435.16	41.40	-208.84	Heading:	0.05 Radians	2.82 Degrees
Raw: 469	47	-223	Scaled: 431.48	43.24	-205.16	Heading:	0.05 Radians	3.10 Degrees
Raw: 482	32	-223	Scaled: 443.44	29.44	-205.16	Heading:	0.02 Radians	1.18 Degrees
Raw: 484	57	-229	Scaled: 445.28	52.44	-210.68	Heading:	0.07 Radians	4.10 Degrees
Raw: 466	64	-221	Scaled: 428.72	58.88	-203.32	Heading:	0.09 Radians	5.20 Degrees
Raw: 478	57	-223	Scaled: 439.76	52.44	-205.16	Heading:	0.07 Radians	4.18 Degrees
Raw: 468	76	-222	Scaled: 430.56	69.92	-204.24	Heading:	0.12 Radians	6.61 Degrees
Raw: 456	76	-227	Scaled: 419.52	69.92	-208.84	Heading:	0.12 Radians	6.84 Degrees
Raw: 466	86	-225	Scaled: 428.72	79.12	-207.00	Heading:	0.14 Radians	7.84 Degrees
Raw: 468	76	-229	Scaled: 430.56	69.92	-210.68	Heading:	0.12 Radians	6.61 Degrees
Raw: 464	84	-222	Scaled: 426.88	77.28	-204.24	Heading:	0.13 Radians	7.64 Degrees
Raw: 472	94	-226	Scaled: 434.24	86.48	-207.92	Heading:	0.15 Radians	8.64 Degrees
Raw: 457	84	-222	Scaled: 420.44	77.28	-204.24	Heading:	0.14 Radians	7.80 Degrees
Raw: 462	96	-219	Scaled: 425.04	88.32	-201.48	Heading:	0.16 Radians	9.12 Degrees



## 3.2 [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 i2c-x(1~3) by using a grove cable.

### 4. Navigate to the demos' directory:

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

- To see the code

```
nano grove_compass_lib.py
    nano grove_compass_example.py
import grove_compass_lib
c=grove_compass_lib.compass()
while True:
    print "X:", c.x, "Y:", c.y, "X:", c.z, "Heading:", c.headingDegrees
    c.update()
    time.sleep(.1)
```

### 5. Run the demo.

```
sudo python grove_compass_example.py
```

## 4. Resources

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- [Grove-3-Axis Digital Compass Eagle File](#)
- [File:HMC5883.pdf](#)
- [file:Digital Compass Library](#)

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