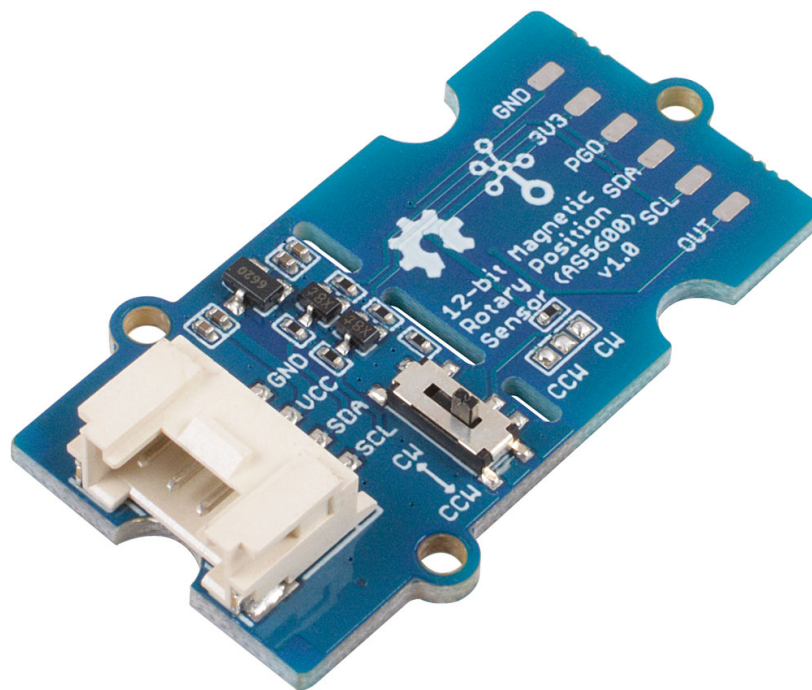


# Grove - 12 bit Magnetic Rotary Position Sensor(AS5600)



The Grove - AS5600 is a programmable 12-bit high-resolution contactless magnetic rotary position sensor. The Grove - AS5600 can work as a magnetic potentiometer or a magnetic encoder with excellent reliability and durability.

Compared with the traditional potentiometer/encoder, the Grove - AS5600 has significant advantages: high precision, non-contact, no rotation angle limitation. All those advantages making it suitable for non-contact angle measurement applications, such as the robot arm, tripod head, motor closed-loop control, machine tool axis positioning.



[<https://www.seeedstudio.com/Grove-12-bit-Magnetic-Rotary-Position-Sensor-AS5600-p-4192.html>]

## Feature

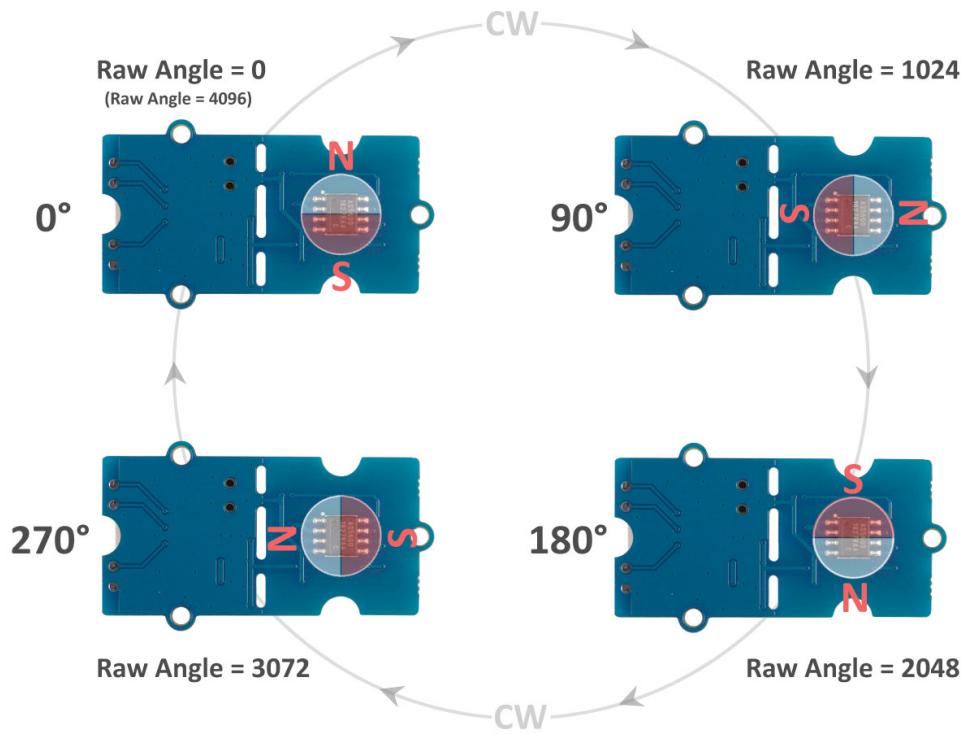
- Non-contact, no rotation angle limitation
- 12-bit high-resolution, 4096 positions per round
- Grove I2C, PWM/Analog Output
- Great flexibility on angular excursion: Maximum angle programmable from 18° up to 360°

## Specification

Parameter	Value
Supply voltage	3.3V / 5V
Operating ambient temperature	-40 – 125°C
Input Current	-100-100mA
Flexibility	Maximum angle programmable from 18°-360°
Interface	I2C(Default I2C Address: 0x36) & Non-Changeable
Output	Analog/PWM output
Output Resolution	12-bit DAC

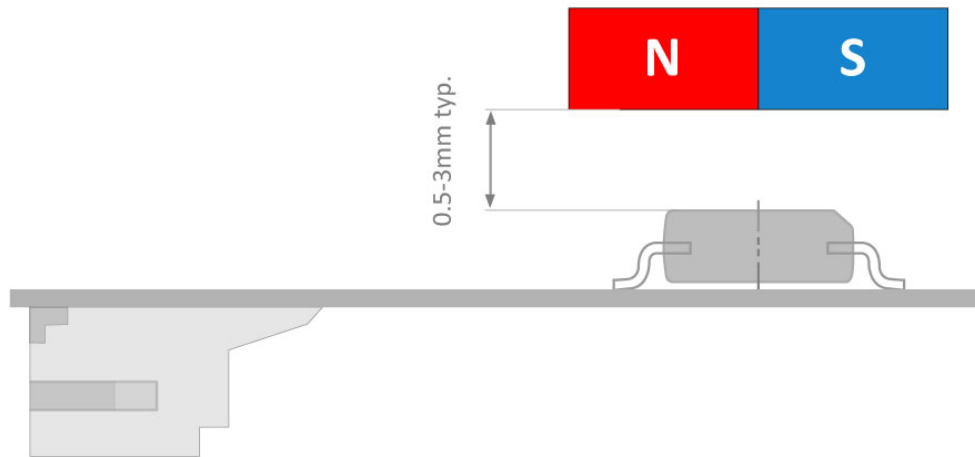
## Working Principle

Grove - AS5600 is based on the Hall Effect, the build-in Hall sensor can detect changes in the direction of the magnetic field, thus there is also no rotation angle limit. The magnetic field direction information is amplified by the amplifier, with the help of the build-in 12-bit A/D, the AS5600 module can output 4096 positions per round. The output is selectable, you can either use the I2C interface to output the RAW data or output the PWM wave/Analog wave via the OUT pin. Meanwhile, the maximum angle is also programmable, you can set the maximum angle from 18° to 360°, which means that the measured angular accuracy is up to 18/4096.

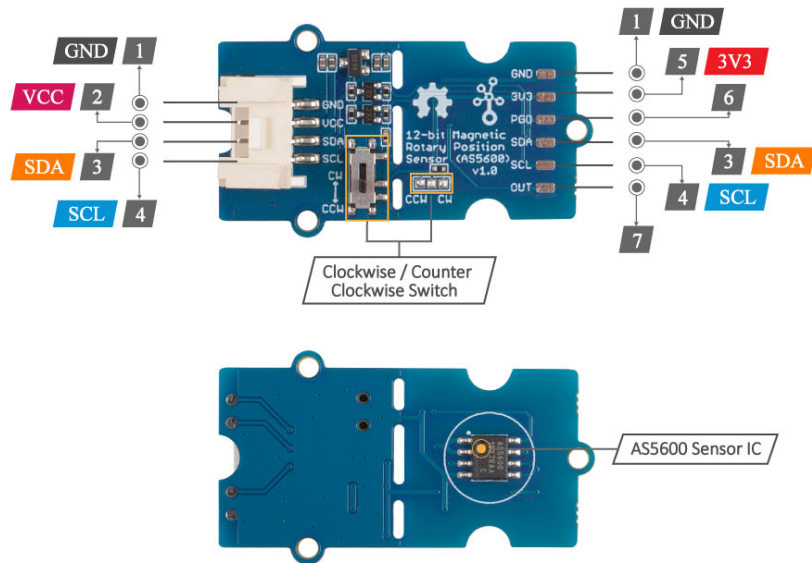


#### Note

The AS5600 has certain requirements for the magnetic field to be measured. Please use a magnet similar in size to the chip. The module should be measured as close as possible to the magnetic field and the AS5600 sensor center should be aligned with the center of the magnetic field. The vertical distance is preferably from 0.5 mm to 3 mm.





## Hardware Overview



- 1** : Connect to the system GND
- 2** : VCC power supply, 5V/3.3V
- 3** : Serial data of I2C
- 4** : Serial clock of I2C
- 5** : VCC power supply for IC, 3V3 only
- 6** : The PGO pin is used to initialize programming to set the initial and end positions of the rotation angle.
- 7** : The OUT pin is used to output the duty cycle signal, and the way to output the signal can be configured by software.

[<https://files.seeedstudio.com/wiki/Grove-12-bit-Magnetic-Rotary-Position-Sensor-AS5600/img/Grove-12-bit-Magnetic-Rotary-Sensor-AS5600-pin.jpg>]

## Platforms Supported

Arduino	Raspberry Pi	
		

# Getting Started

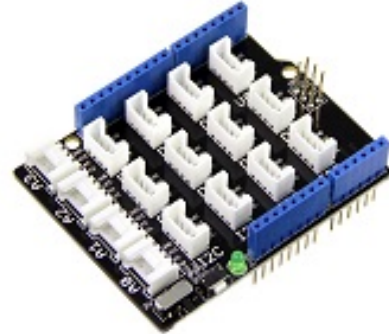
## Play With Arduino

### Materials required

Seeeduino V4.2



Base Shield



Get ONE Now

[<https://www.seeedstudio.com/Seeeduino-V4.2-p-2517.html>]

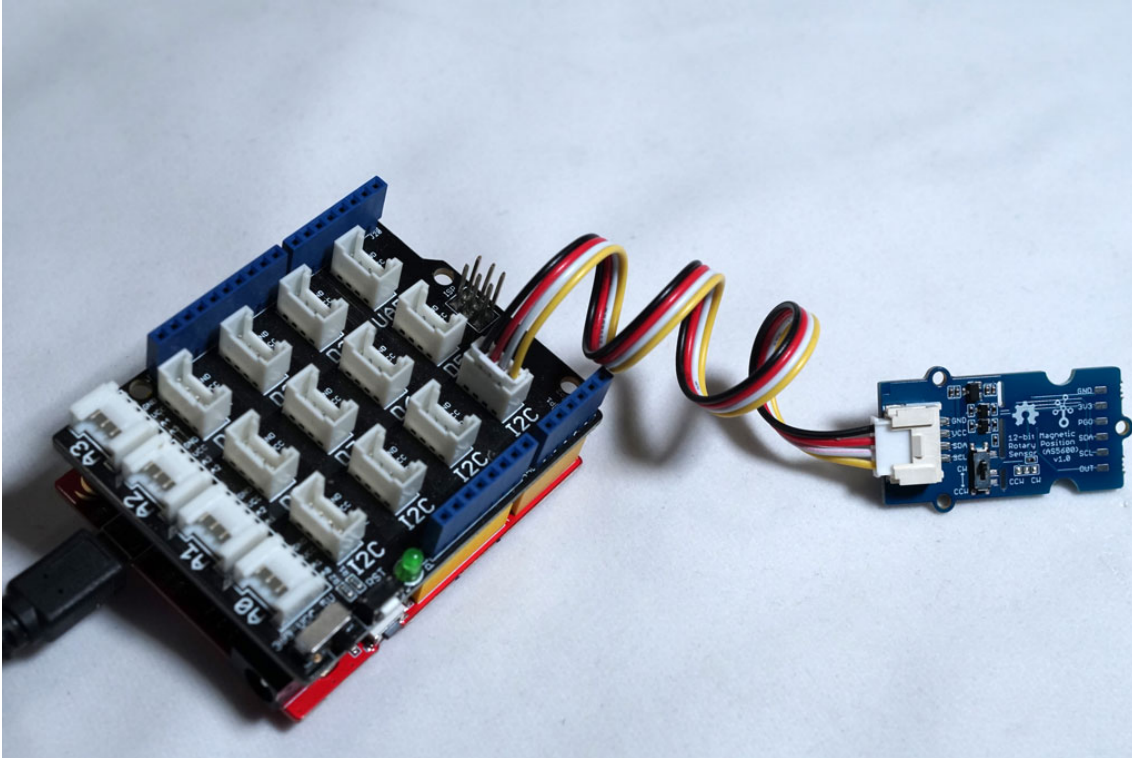
Get ONE Now

[<https://www.seeedstudio.com/Base-Shield-V2-p-1378.html>]

In addition, you can consider our new [Seeeduino Lotus M0+](https://www.seeedstudio.com/Seeeduino-Lotus-Cortex-M0-p-2896.html) [<https://www.seeedstudio.com/Seeeduino-Lotus-Cortex-M0-p-2896.html>], which is equivalent to the combination of Seeeduino V4.2 and Baseshield.

### Hardware Connection

- **Step 1.** Connect the Grove - 12-bit Magnetic Rotary Position Sensor / Encoder (AS5600) to the **I2C** port of the Base Shield.
- **Step 2.** Plug Grove - Base Shield into Seeduino.
- **Step 3** Connect the Seeduino to PC via a USB cable.



## Software



### Attention

If this is the first time you work with Arduino, we strongly recommend you to see [Getting Started with Arduino](https://wiki.seeedstudio.com/Getting_Started_with_Arduino/) [https://wiki.seeedstudio.com/Getting\_Started\_with\_Arduino/] before the start.

- **Step 1.** Download the [AS5600](https://github.com/Seeed-Studio/Seeed_Arduino_AS5600) [https://github.com/Seeed-Studio/Seeed\_Arduino\_AS5600] Library from Github.



### Note



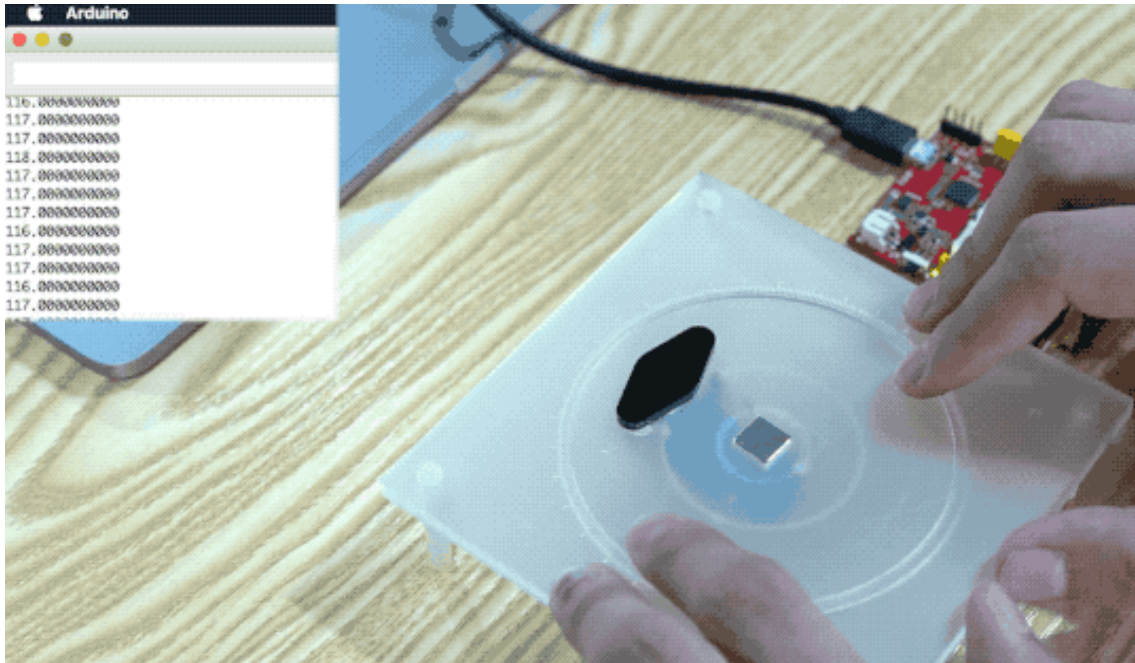


```

27     else{
28         SERIAL.println("Can not detect magnet");
29     }
30     delay(1000);
31 }
32 }
33 }
34 /*****
35  * Function: convertRawAngleToDegrees
36  * In: angle data from AMS_5600::getRawAngle
37  * Out: human readable degrees as float
38  * Description: takes the raw angle and calculates
39  * float value in degrees.
40  *****/
41 float convertRawAngleToDegrees(word newAngle)
42 {
43     /* Raw data reports 0 - 4095 segments, which is 0.087
44     float retVal = newAngle * 0.087;
45     ang = retVal;
46     return ang;
47 }
48 void loop()
49 {
50     SERIAL.println(String(convertRawAngleToDegrees(ams56
51 }

```

- **Step 3.** Upload the demo. If you do not know how to upload the code, please check [How to upload code](#) [[https://wiki.seeedstudio.com/Upload\\_Code/](https://wiki.seeedstudio.com/Upload_Code/)].
- **Step 4.** Open the **Serial Monitor** of Arduino IDE by click **Tool->Serial Monitor**. Or tap the `Ctrl + Shift + M` key at the same time. Set the baud rate to **115200**.
- **Step 5.** The result should be like this when it detected magnet underneath the sensor:

**Note**

A calibrator is used here. The Calibrator 2D file is listed in Resources, so feel free to download and laser cut yourself!

## FAQ

**Q1#** How to achieve maximum accuracy?

**A1:** Make sure the Grove - 12-bit Magnetic Rotary Position Sensor / Encoder (AS5600) sensor is at a fixed distance/position to the magnet. Rotate the magnet to get from angle 0 all the way to angle 360 at first time to ensure positioning is correct.

The [AS5600](https://github.com/Seeed-Studio/Seeed_Arduino_AS5600) [https://github.com/Seeed-Studio/Seeed\_Arduino\_AS5600] library also provides a full testing function to operate for the sensor.

## Schematic Online Viewer



## Resources

- **[ZIP]** [Grove - 12-bit Magnetic Rotary Position Sensor / Encoder \(AS5600\) Schematic file](https://files.seeedstudio.com/wiki/Grove-12-bit-Magnetic-Rotary-Position-Sensor-AS5600/res/Grove%20-%2012-bit-Magnetic-Rotary-Position-Sensor-AS5600.zip)  
[<https://files.seeedstudio.com/wiki/Grove-12-bit-Magnetic-Rotary-Position-Sensor-AS5600/res/Grove%20-%2012-bit-Magnetic-Rotary-Position-Sensor-AS5600/>]

bit%20Magnetic%20Rotary%20Position%20Sensor%20(AS5600).zip]

- **[PDF] AS5600 Datasheet**  
[<https://files.seeedstudio.com/wiki/Grove-12-bit-Magnetic-Rotary-Position-Sensor-AS5600/res/Magnetic%20Rotary%20Position%20Sensor%20AS5600%20Datasheet.pdf>]
- **[DWG] Grove - 12 bit Magnetic Rotary Position Sensor(AS5600) Calibrator**  
[[https://files.seeedstudio.com/wiki/Grove-12-bit-Magnetic-Rotary-Position-Sensor-AS5600/res/Grove%20-%2012%20bit%20Magnetic%20Rotary%20Position%20Sensor\(AS5600\)%20Calibrator.dwg](https://files.seeedstudio.com/wiki/Grove-12-bit-Magnetic-Rotary-Position-Sensor-AS5600/res/Grove%20-%2012%20bit%20Magnetic%20Rotary%20Position%20Sensor(AS5600)%20Calibrator.dwg)]

## Tech Support

Please submit any technical issue into our [forum](#)

[<https://forum.seeedstudio.com/>]



[[https://www.seeedstudio.com/act-4.html?utm\\_source=wiki&utm\\_medium=wikibanner&utm\\_campaign=newproducts](https://www.seeedstudio.com/act-4.html?utm_source=wiki&utm_medium=wikibanner&utm_campaign=newproducts)]