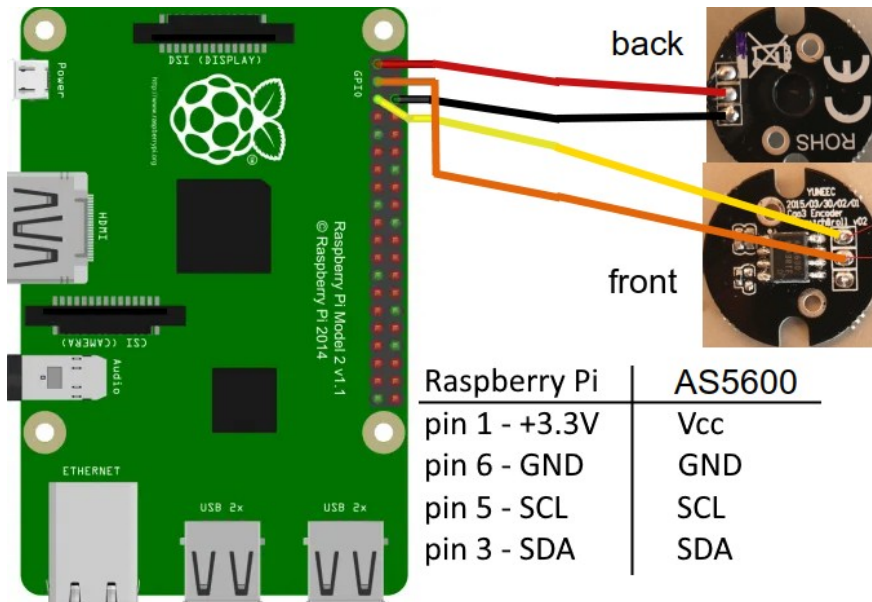# Preparations

Enable I2C: `sudo raspi-config` > Interface Options > I2C > Yes
Install i2cdetect:

```
sudo apt-get install i2c-tools
```

Connect Sensor and check wiring.

Raspberry Pi	AS5600
pin 1 - +3.3V	Vcc
pin 6 - GND	GND
pin 5 - SCL	SCL
pin 3 - SDA	SDA

Check if AS5600 is available: `i2cdetect -y 1` **> should be appear at address 0x36**

Download "AS5600_cali_tool.zip" from GitHub and unzip it. The executable binary is "imu_test".
Maybe you have make it executable:

```
chmod +x ./imu_test
```

AS5600 Register

Address	Name	R/W	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Configuration Registers [1], [2]										
0x00	ZMCO	R							ZMCO(1:0)	
0x01	ZPOS	R/W/P					ZPOS(11:8)			
0x02			ZPOS(7:0)							
0x03	MPOS	R/W/P					MPOS(11:8)			
0x04			MPOS(7:0)							
0x05	MANG	R/W/P					MANG(11:8)			
0x06			MANG(7:0)							
0x07	CONF	R/W/P			WD	FTH(2:0)			SF(1:0)	
0x08			PWMF(1:0)		OUTS(1:0)		HYST(1:0)		PM(1:0)	
Output Registers										
0x0C	RAW ANGLE	R					RAW ANGLE(11:8)			
0x0D		R	RAW ANGLE(7:0)							
0x0E	ANGLE	R					ANGLE(11:8)			
0x0F		R	ANGLE(7:0)							
Status Registers										
0x0B	STATUS	R			MD	ML	MH			
0x1A	AGC	R	AGC(7:0)							
0x1B	MAGNITUDE	R					MAGNITUDE (11:8)			
0x1C		R	MAGNITUDE(7:0)							
Burn Commands										
0xFF	BURN	W	Burn_Angle = 0x80; Burn_Setting = 0x40							

Note(s):

1. To change a configuration, read out the register, modify only the desired bits and write the new configuration. Blank fields may contain factory settings.
2. During power-up, configuration registers are reset to the permanently programmed value. Not programmed bits are zero.

Read Register with button "AS5600 Reg". Same as button Read CONF but jumps to Table to see all register values for verification.

To read values from data registers click on "AS5600 Cyc" (Read cyclic).

Yuneec settings (without magnet)

Conf Register:	0000 0000	1110 0000
Power mode:	00	NOM
Hysteresis:	00	OFF
Output stage:	01	Analog (reduced range from 10% to 90% between GND and VDD
PWM frequency:	11	920Hz
Slow filter:	00	16x
Fast filter threshold:	00000	Slow filter only
Watchdog:	0	OFF
n/a:	00	

Status Register:	0000 0000	Sensor without magnet near by
n/a:	011	(factory settings? Ignore)
MH:	0	AGC minimum gain OK
ML:	1	AGC maximum gain overflow, magnet too weak
MD:	0	Magnet was not detected
n/a:	00	

Magnet Detection

As a safety and diagnostic feature, the AS5600 indicates the absence of the magnet. If the measured magnet field strength goes below the minimum specified level (Bz_ERROR), the output is driven low, without regard to which output mode has been selected (analog or PWM) and the MD bit in the STATUS register is 0.

Maximum angular range   **Start and end position**

MANG = 0x0000   ZPOS = 0x0000   MPOS = 0x0000
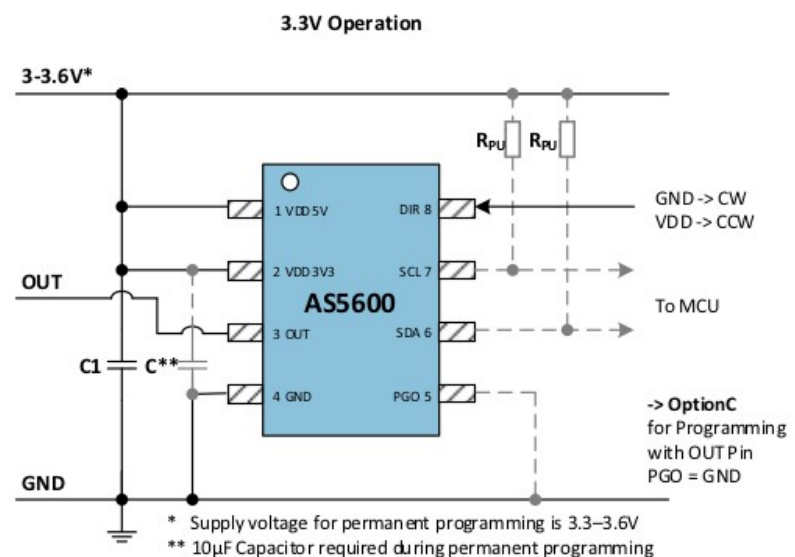
DIR pin

GND   CW (clockwise)

Note: To change Conf register do not change n/a bits. Those may contain factory settings.

Programming (Option A with I²C)

Use the correct hardware configuration (Option A and C).

Option A: Write CONF register
Option C: Set Maximum Angle

Burn: Permanently save both.

3.3V Operation

3-3.6V*

R_PU R_PU

1 VDD 5V   DIR 8   GND -> CW
                          VDD -> CCW

OUT

2 VDD 3V3   SCL 7   To MCU

AS5600

3 OUT   SDA 6

C1 C**

4 GND   PGO 5   -> OptionC
                          for Programming
                          with OUT Pin
GND   PGO = GND

* Supply voltage for permanent programming is 3.3–3.6V
** 10µF Capacitor required during permanent programming

Connect AS5600 to Raspberry Pi with I²C interface and power up the AS5600.
Start the tool "imu_test". Go to Page "AS5600". It will go to "AS5600" page if this is the only detected sensor on I²C bus.

Read the register of AS5600.
  • Button "AS5600 Reg" or button "Read CONF"

Calibration procedure:
Step 1: Turn the magnet to the start position.
Step 2: Read the RAW ANGLE register. Write the RAW ANGLE value into the ZPOS register. Wait at least 1 ms.
  • Button "2. Set Zero Pos"
Step 3: Rotate the magnet in the direction defined by the level on the DIR pin (GND for clockwise, VDD for counterclockwise) to the stop position. The amount of rotation must be greater than 18 degrees.
Step 4: Read the RAW ANGLE register. Write the RAW ANGLE value into the MPOS register. Wait at least 1 ms. Proceed with Step 6 to permanently program the configuration.
  • Button "4. Set Max Pos"

Step 5: Perform a BURN_ANGLE command to permanently program the device. Wait at least 1 ms.
  • Button 5. Burn A
Step 6: Verify the BURN_ANGLE command: Write the commands 0x01, 0x11 and 0x10 sequentially into the register 0xFF to load the actual OTP content. Read the ZPOS and MPOS registers to verify that the BURN_ANGLE command was successful.
  • Button "6. Read OTP"

**Step 7**: Read and verify the ZPOS and MPOS registers again after a new power-up cycle.
- Button "AS5600 Reg"

Note: Do not touch Configuration, at least do not burn config.
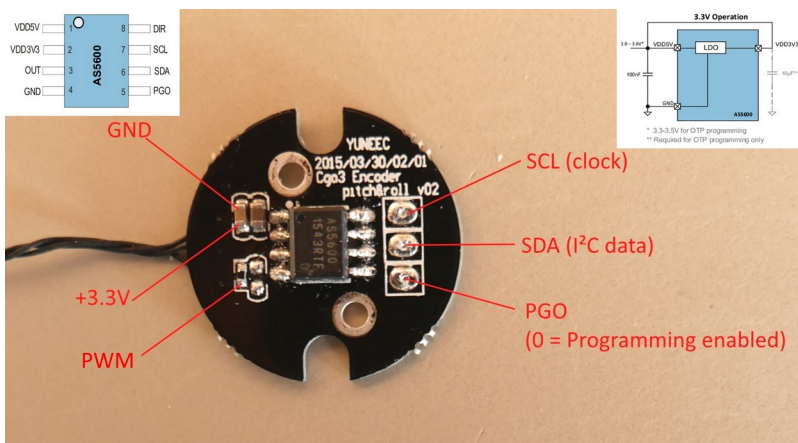Basically, do only something when you exactly know what you are doing, especially "Burn" actions.
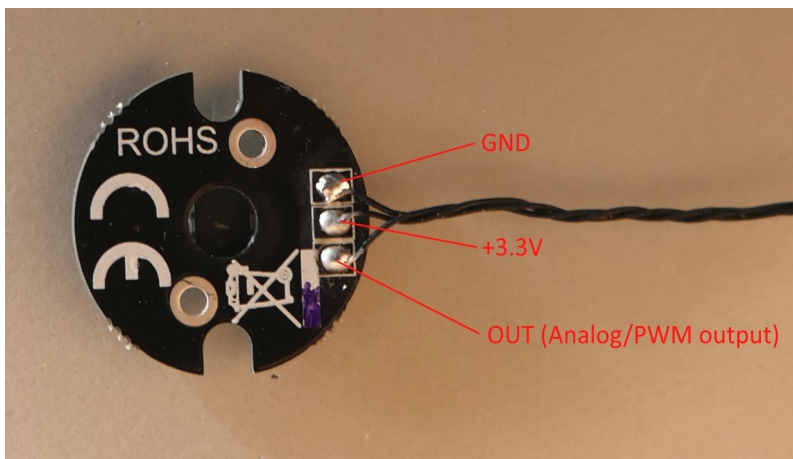Before perform a burn-command read carefully the **rules and restictions** for the OTP mentioned in AS5600 datasheet.

HW settings
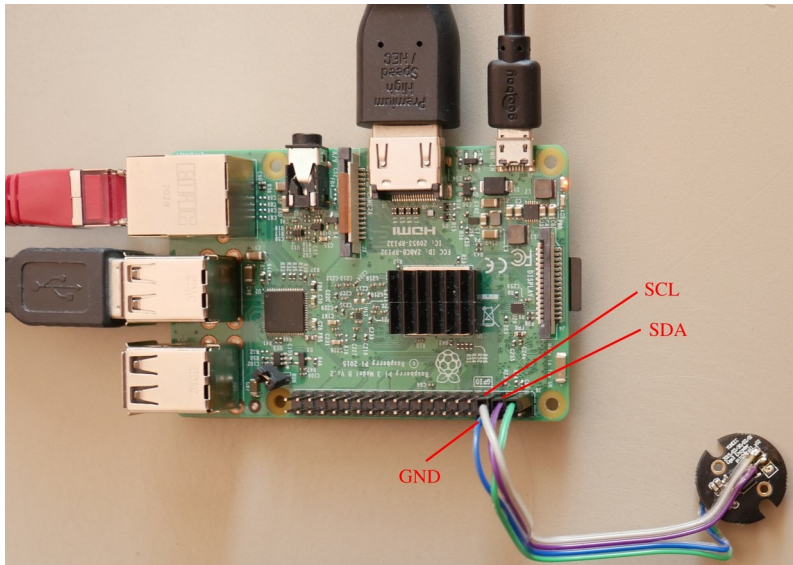
Sensor connected to Raspberry Pi by I²C interface.

I²C bus SCL and SDA is 3.3V signal.
PGO pin is not needed when programming via I²C.

Power supply is 3.3V. It canbe done by camera or Raspberry PI.
GND must be connected to Raspberry Pi.