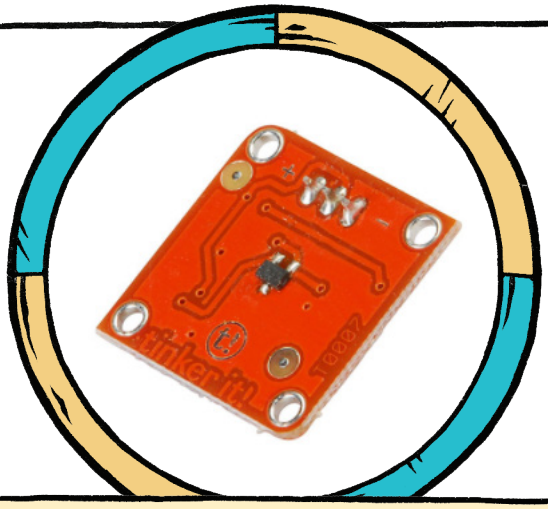
TOOL



ASSOCIATED SHEETS

Tinkerkit shield

TINKERKIT GAUSSMETER

Measures a magnetic field (that from a magnet for example).

Range: -2000 to 2000 gauss (1 gauss = 0.0001 teslas)
Accuracy: 4 gauss
Ease of use: simple
Use: measuring a magnetic field, measuring a distance, measuring an angle
Necessay hardware: a Tinkerkit shield, and a Tinkerkit cable

This sensor uses a Hall probe to measure the magnetic field.

Warning: the measurement is very sensitive to the orientation of the sensor, only the component of the magnetic field perpendicular to the surface of the sensor is measured!

Wiring

Install the Tinkerkit library on your computer, and the Tinkerkit shield on your Arduino board. Connect the sensor to the I0 input of the shield. If you do not have a suitable cable, or no Tinkerkit shield, connect your sensor to the A0 input of your Arduino board (see “Tinkerkit shield” sheet).

Coding

Once the Tinkerkit library is installed, open the sample program available from the File menu, Examples, Tinkerkit, HallSensor program.

<Tinkerkit.h>: this library defines the coding instructions necessary to communicate with the sensor.
TKHallSensor hs(I0): creates a variable ‘hs’, of type TKHallSensor (defined in the library Tinkekit), corresponding to a Tinkekit Hall Sensor connected to the input I0. The name of the variable can be changed, as can the input port.
hs.read() : this instruction retrieves the value of the magnetic field measured by the magnetometer associated with the hs variable. It is an integer value between 0 and 1023.
hs.polarity() : this instruction returns either NORTH or SOUTH. This corresponds to the direction of the magnetic field measured by the sensor..

The following program will have the same behavior as the Tinkerkit library example:

```
int MeasuredVoltage ;

void setup() {
  Serial.begin(9600);   // the serial communication between board and computer is initialized
}

void loop() {
  MeasuredVoltage = analogRead(A0) ;   // sensor should be connected to I0, or A0
  Serial.print("Value of the magnetic field = ");
  Serial.println(MeasuredVoltage);

  if ( MeasuredVoltage >= 512 ) {      // test of the direction of the magnetic field
    Serial.println("NORTH.");    }
  else {
    Serial.println("SOUTH.");     }
  delay(1000);
}
```

Open the serial monitor to observe the measurements made by the gaussmeter. Approach and move back a magnet and look at the effect on the measurement.
The measure is a number between 0 and 1023 with the approximate conversion:

- 0 = - 2000 gauss ;
- 512 = 0 gauss ;
- 1023 = 2000 gauss.

The sign of the magnetic field corresponds to its direction vis-à-vis the sensor. Here is the formula converting the measured value into gauss:

```
int MeasuredVoltage ;
int MagneticFieldInGauss ;

MeasuredVoltage = analogRead(A0) ;   // sensor should be connected to I0, or A0
MagneticFieldInGauss = (Measure - 512) * 2000 / 512 ;
```

Possible uses of the sensor:

- This sensor measures a magnetic field: it can test the proximity of a magnet, or the presence of a current in a coil;
- This sensor can be used to measure the distance between the sensor and a magnet. In this case, it is first necessary to calibrate the sensor by measuring the correspondance between field and distance with a ruler.