



Scidle

Science and technology

Home Biology Chemistry Engineering Mathema
Twitter YouTube

How to use a pH sensor with Arduino

Posted on March 10, 2017 by David Cervantes Caballero



— pH Sensor with Probe.

Measuring the pH can be very useful if we are developing an aquarium, a hydroponic or an automated aquaponic. Next we will explain how this sensor works, how we should calibrate it and we will put an example of functional code to use it with *Arduino*.

How it works

PH is a measure of acidity or alkalinity of a solution, the pH scale ranges from 0 to 14. The pH indicates the concentration

GAOHOU PH0-14 Value Detect Sensor Module + ...

\$34.96

(68)

Liquid PH0-14 Value Detect Sensor Module + PH Ele...

\$8.00

(4)

RECENT POSTS

Stopclickbait: change Clickbait honest headlines
Generating MIDI music with Re Networks
Coloring images and video with Learning
How to use a pH sensor with A
How to use Mouse Scroll Whee Arduino
Non-Invasive Current sensor S ESP8266, the low-cost Wi-Fi ch
How to use Ultrasounds Modul
How to use a Water Level Sens Arduino
How to use a Soil Moisture Ser

This website uses cookies to improve your experience. We'll assume you're ok with this, but you can opt-out if you wish. [Leer más](#) [Aceptar](#)

/ silver chloride) and a glass electrode that is sensitive to hydrogen ion. This is what form the probe. We also have to use an electronic circuit to condition the signal appropriately and we can use this sensor with a micro-controller, such as Arduino.

Here are some examples of everyday substances and their pH:

Substance	pH approximate
Lemon juice	2,4 – 2,6
Cola drink	2,5
Vinegar	2,5 – 2,9
Orange or apple juice	3,5
Beer	4,5
Coffee	5,0
Tea	5,5
Milk	6,5
Water	7,0
Saliva	6,5 – 7,4
Blood	7,38 – 7,42
Seawater	8,0
Soap	9,0 a 10,0
Bleach	13

Specifications

We discuss the specifications of circuit and probe separately since they can be purchased separately and there are variations that must be taken into account depending on the probe used.

CATEGORIES

- Biography
- Chemistry
- Engineering
- Hardware
- Mathematics
- Physics
- Software
- GAOHOU PH0-14 Value

Gravit

TAGS

74HC245 adafruit (68) AI Android Animation

Arduino IDE Arduino Intelligence 328 biosensor

Google Google TensorFlow Humidity

Linux Machine Learning No

Sensors open-source Pro Trinket PWM

SCT-013 SCT-013-000 SD Card SE

Liquid PH0-14 Value Detect Analogue

Temperature Module TF16 Trinket TTS Pro

Videos Wi-Fi Cam wikipedia

\$8.00 (4) \$69.9

RECENT POSTS

- Stopclickbait: change Clickbait honest headlines
- Generating MIDI music with Re Networks
- Coloring images and video with Learning
- How to use a pH sensor with A
- How to use Mouse Scroll Whee Arduino
- Non-Invasive Current sensor S ESP8266, the low-cost Wi-Fi ch
- How to use Ultrasounds Modul
- How to use a Water Level Sens Arduino
- How to use a Soil Moisture Ser

Electrode Type	pH Range	Temperature (°C)	Zero Point (pH)	Response Time (min)	Nois (mV)
65-1	0-14	0-80	7±1	<2	
BX-5	0-14	0-80	7X±11	<2	
E-201	0-14	0-80	7±0.5	<2	<0.5
E-201-C	0-14	0-80	7X±0.5	<2	<0.5
95-1	0-14	0-80	7X±0.5	<2	<0.5
E-900	0-14	0-80	7X±0.5	<2	<0.5

Circuit Specifications:


The circuit we are using has screen printed www.auto-crtl.com and **Logo_PHsensor v1.1** on the bottom layer of the circuit.

Supply Voltage	5 V
Current	5-10 mA
Consumption	≤ 0.5 W
Working Temperature	10-50 °C
Green LED	Power
Red LED	Límite de pH

Pinout

To	Temperature
Do	Limit pH Signal
Po	Analog pH value
G	Analog GND

CATEGORIES

Biology
Chemistry
Engineering
Hardware
Mathematics
Physics
Software

GAOHOU PH0-14 Value

Gravit

TAGS

Arduino IDE Arduino Intelligence

Google Google TensorFlow Humidity Linux Machine Learning No

Sensors open-source Pro Trinket PWM SCT-013 SCT-013-000 SD Card SE

Liquid PH0-14 Value Detect Analogue

Sensor Module pH Tr

Videos Wi-Fi Cam wikipedia

\$8.00

(4)

\$69.9

- RECENT POSTS
- Stopclickbait: change Clickbait honest headlines

Generating MIDI music with Re Networks

Coloring images and video with Learning

How to use a pH sensor with A

How to use Mouse Scroll Whee Arduino

Non-Invasive Current sensor S ESP8266, the low-cost Wi-Fi ct

How to use Ultrasounds Modul

How to use a Water Level Sens Arduino

How to use a Soil Moisture Ser

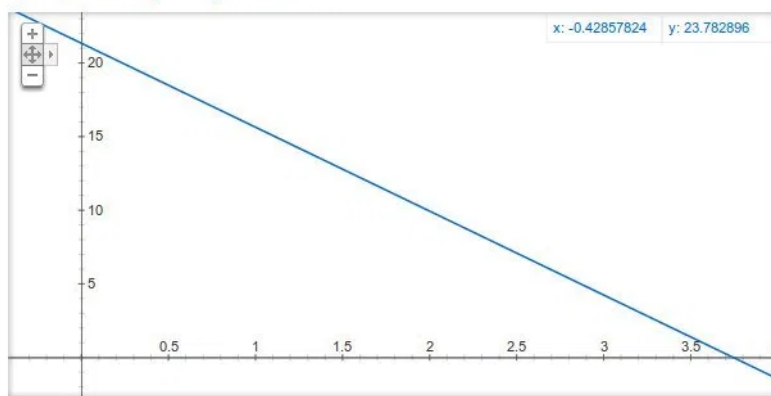
Calibrate the sensor

As we can see that there are two potentiometers in the circuit. Which it is closer to the *BNC* connector of the probe is the **offset regulation**, the other is the **pH limit**.

- **Offset:** The average range of the probe oscillates between negative and positive values. The 0 represents a pH of 7.0. In order to be able to use it with Arduino this circuit adds an offset value to the value measured by the probe, so the *ADC* will only have to take samples of positive voltage values. Therefore we will force a pH of 7.0 by disconnecting the probe from the circuit and short-circuiting the inside of the BNC connector with the outside. With a multimeter measure the value of **Po pin** and adjust the potentiometer to be 2.5V.
- **PH Limit:** This potentiometer is to set a limit value of the pH sensor circuit that causes the red *LED* to light up and the **Do pin** signal to turn ON.

In addition we have to calculate the voltage conversion that will give us the pH sensor so we will need two pH reference value and measure the voltage returned by the sensor on the **pin Po**. The best thing to do is to use a calibration solution in powders, there are also in liquid but it is easier to preserve the powders. These solutions are sold in different values but the most common are pH 4.01, pH 6.86 and pH 9.18.

Graph for $(-5.7)*x+21.34$



— Graph of the measured voltage and pH equation. $y = -5.70 * x + 21.34$

Using the powders with **pH 4.01 and pH 6.86** we obtain the voltages on the pin Po **3.04V and 2.54V** respectively. The sensor is linear so by taking two points we can deduce the equation to convert the measured voltage to pH. The general formula would be $y = mx + b$, so we have to calculate m and b .

CATEGORIES

Biology

Chemistry

Engineering

Hardware

Mathematics

Physics

Software

[GAOHOU PH0-14 Value](#)

[Gravit](#)

TAGS

74HC245 adafruit AI Android Animation (68)

Arduino IDE Arduino

Intelligence 328 biosensor

Google Google TensorFlow Humidity

Linux Machine Learning No

Sensors open-source Pro Trinket PWM

SCT-013 SCT-013-000 SD Card SE

Liquid PH0-14 Value Detect Analogue

Temperature DHT11 Pro Trinket TTS Pro

Videos Wi-Fi Cam wikipedia \$69.9

(4)

RECENT POSTS

- Stopclickbait: change Clickbait honest headlines
- Generating MIDI music with Re Networks
- Coloring images and video with Learning
- How to use a pH sensor with A
- How to use Mouse Scroll Wheel Arduino
- Non-Invasive Current sensor S ESP8266, the low-cost Wi-Fi ch
- How to use Ultrasounds Modul
- How to use a Water Level Sens Arduino
- How to use a Soil Moisture Ser

This website uses cookies to improve your experience. We'll assume you're ok with this, but you can opt-out if you wish. [Leer más](#) [Aceptar](#)

Connection with Arduino

To connect with Arduino we will need an analog input (**A0**), power (**5V**) and two **GND** that actually in the sensor circuit are separated but we can use the same.

Code

The code consists of **taking 10 samples of the analogue input A0**, ordering them and discarding the highest and the lowest and **calculating the mean** with the six remaining samples by **converting this value to voltage** in the variable **pHVol**, then using the equation that we have calculated with the pH reference values we convert **pHVol** to **pHValue** and send it to the serial port to see it in the serial monitor.

```

1  const int analogInPin = A0;
2  int sensorValue = 0;
3  unsigned long int avgValue;
4  float b;
5  int buf[10], temp;
6  void setup() {
7      Serial.begin(9600);
8  }
9
10 void loop() {
11     for(int i=0; i<10; i++)
12     {
13         buf[i]=analogRead(analogInPin);
14         delay(10);
15     }
16     for(int i=0; i<9; i++)
17     {
18         for(int j=i+1; j<10; j++)
19         {
20             if(buf[i]>buf[j])
21             {
22                 temp=buf[i];
23                 buf[i]=buf[j];
24                 buf[j]=temp;
25             }
26         }
27     }
28     avgValue=0;
29     for(int i=2; i<8; i++)
30     avgValue+=buf[i];
31     float pHVol=(float) avgValue*5.0/1024/6;
32     float pHValue = -5.70 * pHVol + 21.34;
33     Serial.print("sensor = ");
34     Serial.println(pHValue);
35
36     delay(20);
37 }

```

CATEGORIES

Biology

Chemistry

Engineering

Hardware

Mathematics

Physics

Software

[GAOHOU PH0-14 Value](#)

[Gravim](#)

TAGS

74HC245

(68)

adafruit AI Android Animation

Arduino IDE Arduino

Intelligence

Google Google TensorFlow 328 biosensor

Linux Node.js Learning No

Sensors open-source Pro Trinket PWM

SCT-013 SCT-013-000 SD Card SE

Liquid PH0-14 Value Detect Anal

Sensor Module pH Etc

Temperature Del TF Pro Trinket TTS

Videos Wi-Fi Cam wikipedia

\$8.00

(4)

\$69.9

RECENT POSTS

Stopclickbait: change Clickbait honest headlines

Generating MIDI music with Re Networks

Coloring images and video with Learning

How to use a pH sensor with A

How to use Mouse Scroll Whee Arduino

Non-Invasive Current sensor S ESP8266, the low-cost Wi-Fi ch

How to use Ultrasounds Modul

How to use a Water Level Sens Arduino

How to use a Soil Moisture Ser

This website uses cookies to improve your experience. We'll assume you're ok with this, but you can opt-out if you wish. [Leer más](#) [Aceptar](#)



Liquid PH0-14
Value Detect
Sensor Module +
\$8.00
PH Ele...

(4)



Liquid PH 0-14
Value Sensor
Module Accuracy
\$31.49

(1)

Comments are disabled

NEXT →

Rundown - Proudly powered by WordPress

- How to use a pH sensor with Arduino
- How to use Mouse Scroll Wheel with Arduino
- Non-Invasive Current sensor SENSECLAMP
- ESP8266, the low-cost Wi-Fi chip
- How to use Ultrasonics Module HC-SR04
- How to use a Water Level Sensor with Arduino
- How to use a Soil Moisture Sensor with Arduino

Gravit

.....

How to use a Soil Moisture Sensor

6/6