

PH meter(SKU: SEN0161)



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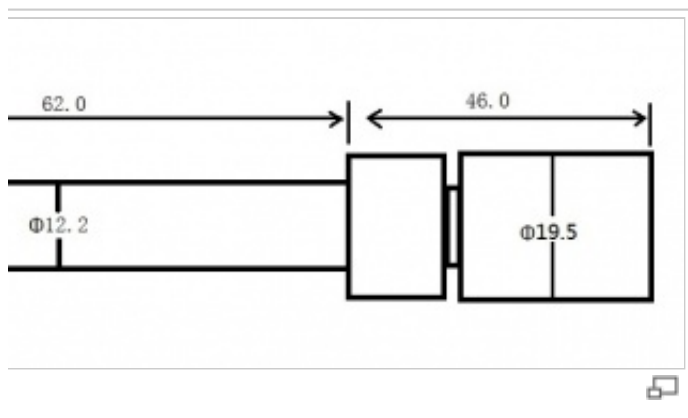
Introduction

Need to measure water quality and other parameters but haven't got any low cost pH meter? Find it difficult to use with Arduino? Here comes an analog pH meter, specially designed for Arduino controllers and has built-in simple, convenient and practical connection and features. It has an LED which works as the Power Indicator, a BNC connector and PH2.0 sensor interface. To use it, just connect the pH sensor with BNC connector, and plug the PH2.0 interface into the analog input port of any Arduino controller. If pre-programmed, you will get the pH value easily. Comes in compact plastic box with foams for better mobile storage.

NOTE: Difference between SEN0161 and SEN0169:

Their usages/ specifications are all the same. The only difference is that SEN0169(black) is for industry purpose which allows the probe could stay in solution for a long time, generally speaking, it could lasts for half a year or more, depending on the solutions. You could clean the probe by clean water or better with KCL 5N solution when you find its reading is not stable or inaccurate. While the SEN0161(blue) should be taken out from the solution once you finished your test.

Specification



- Module Power: 5.00V
- Circuit Board Size: 43mm×32mm
- Measuring Range:0-14PH
- Measuring Temperature:0-60 °C
- Accuracy: ± 0.1 pH (25 °C)

- Response Time: $\leq 1\text{min}$
- pH Sensor with BNC Connector
- PH2.0 Interface (3 foot patch)
- Gain Adjustment Potentiometer
- Power Indicator LED

pH Electrode Characteristics

The output of pH electrode is Millivolts, and the pH value of the relationship is shown as follows (25 °C):

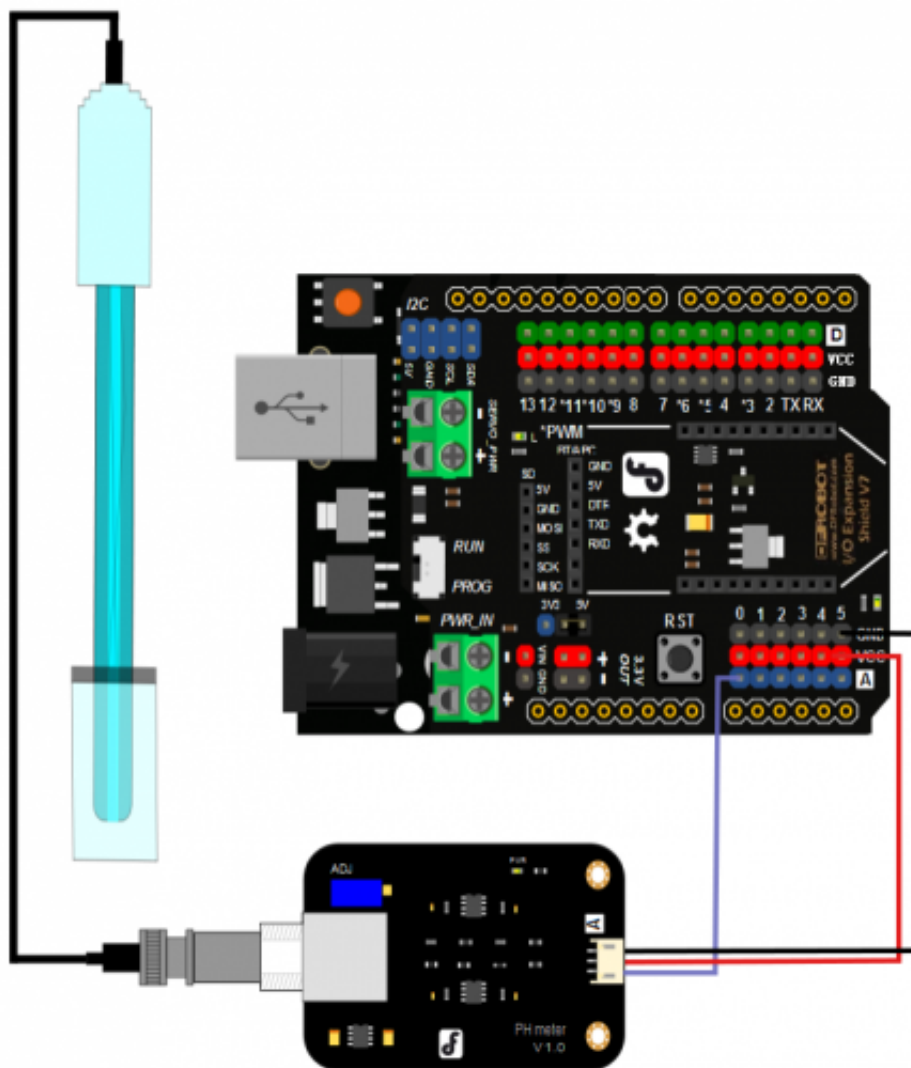
VOLTAGE (mV)	pH value	VOLTAGE (mV)	pH value
414.12	0.00	-414.12	14.00
354.96	1.00	-354.96	13.00
295.80	2.00	-295.80	12.00
236.64	3.00	-236.64	11.00
177.48	4.00	-177.48	10.00
118.32	5.00	-118.32	9.00
59.16	6.00	-59.16	8.00
0.00	7.00	0.00	7.00

Usage

Connecting Diagram

NOTE:

- Please make sure the **power supply** is as close as possible to the +5.00V. More accurate the voltage, higher the accuracy!
- Before the use of the electrode every time, you need to **calibrate it by the standard solution** to obtain more accurate results. And subsection calibration could help you get a better accuracy.



- If you measure the **acidic** sample, the pH value of the standard solution should be 4.00.
- If you measure the **alkaline** sample, the pH value of the standard solution should be 9.18.
- Before the pH electrode measured different solutions, you need to use water to wash it. We recommend deionized water.
- The most suitable **environment temperature** is about 25 °C, the result is very close to the actual pH value.

Steps

(1) Connect equipments according to the graphic, that is, the pH electrode is connected to the BNC connector on the pH meter board, and then use the connection lines, the pH meter board is connected to the analog port 0 of the Arduino controller. When the Arduino controller gets power, you will see the blue LED on board is on.

(2) Upload the sample code to the Arduino controller.

(3) Put the pH electrode into the standard solution whose pH value is 7.00, or directly shorted the input of the BNC connector. Open the serial monitor of the Arduino IDE, you can see the pH value printed on it, and the error does not exceed 0.3. Record the pH value printed, then compared with 7.00, and the difference should be changed into the "Offset" in the sample code. For example, the pH value printed is

6.88,so the difference is 0.12.You should change the "# define Offset 0.00" into "# define Offset 0.12" in your program.

(4) Put the pH electrode into the pH standard solution whose value is 4.00.Then wait about one minute,adjust the gain potential device, let the value stabilise at around 4.00.At this time,the acidic calibration has been completed and you can measure the pH value of an acidic solution.

If you want to measure the pH value of other solution, you must wash the pH electrode first!

(5) According to the linear characteristics of pH electrode itself, after the above calibration,you can directly measure the pH value of the alkaline solution, but if you want to get better accuracy, you can recalibrate it. Alkaline calibration use the standard solution whose pH value is 9.18.Also adjust the gain potential device, let the value stabilise at around 9.18. After this calibration, you can measure the pH value of the alkaline solution.

Sample Code

Sample code for testing the PH meter and get the sensor feedback from the Arduino Serial Monitor.

```

1  /* ?
2  # This sample code is used to test the pH
3  # Editor : YouYou
4  # Ver    : 1.0
5  # Product: analog pH meter
6  # SKU    : SEN0161
7  */
8  #define SensorPin A0          //pH meter
9  #define Offset 0.00          //deviation
10 #define LED 13
11 #define samplingInterval 20
12 #define printInterval 800
13 #define ArrayLenth 40        //times of collec
14 int pHArray[ArrayLenth];     //Store the aver
15 int pHArrayIndex=0;
16 void setup(void)
17 {
18     pinMode(LED,OUTPUT);
19     Serial.begin(9600);
20     Serial.println("pH meter experiment!");
21 }
22 void loop(void)
23 {
24     static unsigned long samplingTime = milli
25     static unsigned long printTime = millis()
26     static float pHValue,voltage;
27     if(millis()-samplingTime > samplingInterv

```

```

28 {
29     pHArray[pHArrayIndex++]=analogRead(Se
30     if(pHArrayIndex==ArrayLenth)pHArrayIn
31     voltage = avergearray(pHArray, ArrayL
32     pHValue = 3.5*voltage+Offset;
33     samplingTime=millis();
34 }
35 if(millis() - printTime > printInterval)
36 {
37     Serial.print("Voltage:");
38     Serial.print(voltage,2);
39     Serial.print("    pH value: ");
40     Serial.println(pHValue,2);
41     digitalWrite(LED,digitalRead(LED)^1
42     printTime=millis();
43 }
44 }
45 double avergearray(int* arr, int number){
46     int i;
47     int max,min;
48     double avg;
49     long amount=0;
50     if(number<=0){
51         Serial.println("Error number for the ar
52         return 0;
53     }
54     if(number<5){ //less than 5, calculated
55         for(i=0;i<number;i++){
56             amount+=arr[i];
57         }
58         avg = amount/number;
59         return avg;
60     }else{
61         if(arr[0]<arr[1]){
62             min = arr[0];max=arr[1];
63         }
64         else{
65             min=arr[1];max=arr[0];
66         }
67         for(i=2;i<number;i++){
68             if(arr[i]<min){
69                 amount+=min; //arr<min
70                 min=arr[i];
71             }else {
72                 if(arr[i]>max){
73                     amount+=max; //arr>max
74                     max=arr[i];
75                 }else{
76                     amount+=arr[i]; //min<=arr<=max
77                 }
78             }//if
79         }//for
80         avg = (double)amount/(number-2);
81     }//if
82     return avg;
83 }

```

Precautions

- The electrode used for the first or long set without

re-use, the electrode bulb and the sand core, immersed in the 3NKCL solution activated eight hours.

- The electrode plug should be kept clean and dry.
- Electrode reference solution is the 3NKCL solution.
- Measurement should be avoided staggered pollution between solutions, so as not to affect the accuracy of measurement.
- Electrode blub or sand core is defiled which will make PTS decline, slow response. So, it should be based on the characteristics of the pollutant, adapted to the cleaning solution, the electrode performance recovery.
- The electrode should not be long-term immersed in acid chloride solution.
- Electrode when in use, the ceramic sand core and liquid outlet rubber ring should be removed, in order to make salt bridge solution to maintain a certain velocity.

FAQ

Q1. My PH sensor readings are not correct, what did I miss? Or the module is defective?

A1

1. Check if the pH sensor circuit board is good?
[Read on the Forum.](#) or [on wiki](#) for the steps. During the transport, there might be crash causing the probe head cracked, please check if the probe is good or not.
2. If you don't use Arduino as the controller, then please check your ADC module that whether it converts the 5V analog input to 1024, if it is 4096(or other byte), please re-determine the equation in the code.

Q2. Big fluctuations in ph meter readings. When I make measurements in a glass, I have correct, stable reading. But when I put it inside the aquarium with the pumping system working, the easurement varies even more than a degree, and it's not stable, if I swicth off the pump the given value doesn't oscilate anymore.

A2. There should be no working electrical device in the container. Any tiny leakage of electricity will cause the probe working error.