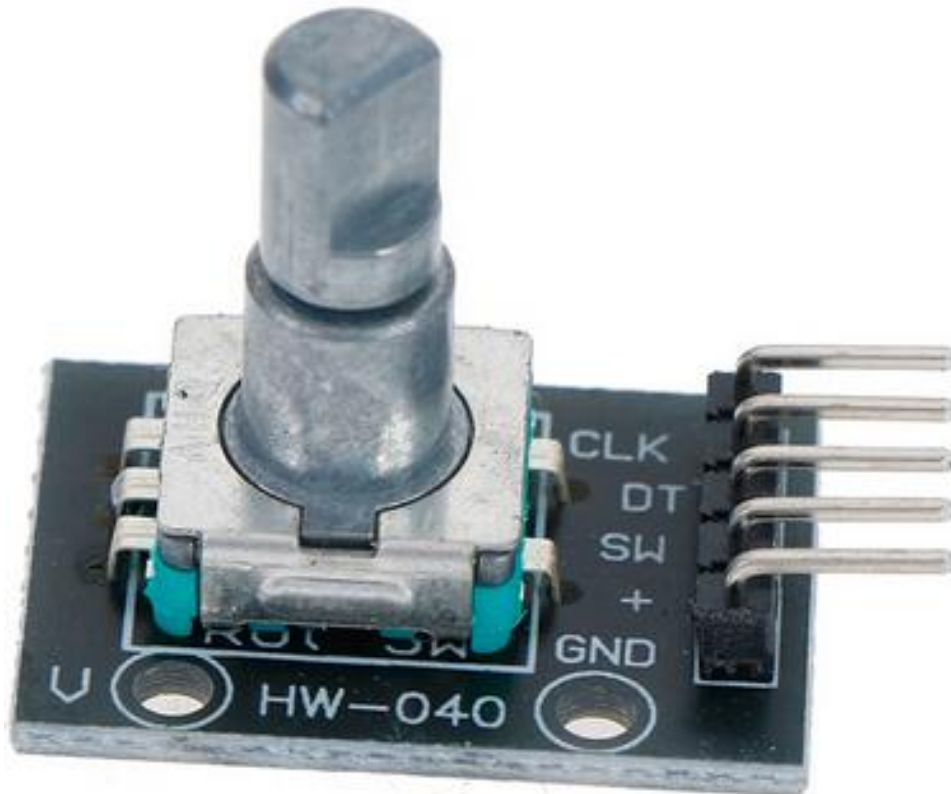


XD-88 360 Degree Rotary Encoder Module KY-040 for Arduino

Introduction:



XD-88 360 Degree Rotary Encoder Module KY-040 for Arduino can count the number of pulses output during the forward and reverse rotation by rotating. It is almost the same as potentiometer but with slight difference in how it functions. For instance, this rotary encoder have no limit to its rotation count unlike potentiometer. Furthermore, with the key or push button build in on the rotary encoder, it can be used to reset the rotation count to the initial state or in other words, reset to start counting back from zero.

Features:

- Working voltage: 5V
- Pulses per revolution: 20

Applications:

- Industrial controls
- Robotics
- Photographic lenses
- Optomechanical mice
- Trackballs
- controlled stress rheometers
- rotating radar platforms

Objectives:

This tutorial will shows you a few simple steps about how to test XD-88 360 Degree Rotary Encoder Module KY-040 for Arduino. At the end of this tutorial, you will get a result of comparison when the rotary encoder able to send input by turning clockwise, counter clockwise and key or button is pushed.

Components needed:

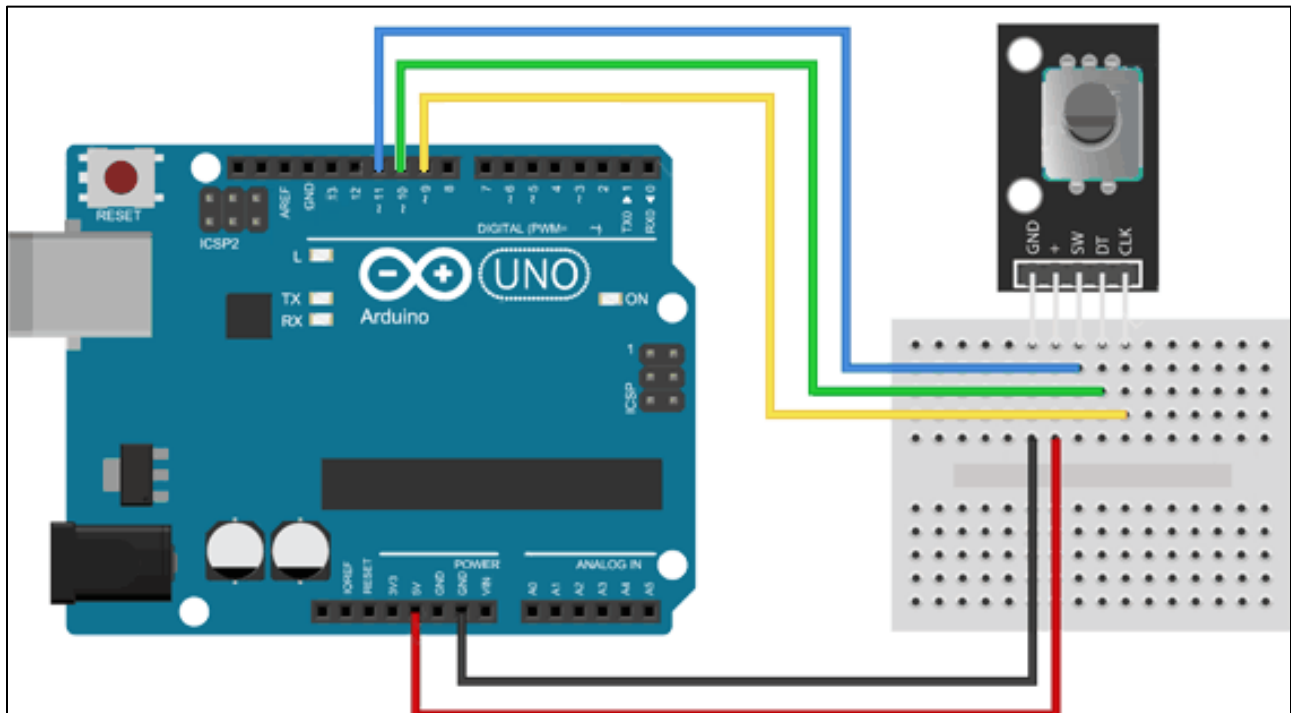
- Jumper wires.
- Arduino UNO.
- USB cable type B
- XD-88 360 Degree Rotary Encoder Module KY-040

Procedures:

Step 1: Wiring XD-88 360 Degree Rotary Encoder Module KY-040 for Arduino.

1. Wiring XD-88 360 Degree Rotary Encoder Module KY-040 to Arduino Uno by referring to the table and picture below.

Arduino Uno	XD-88 360 Degree Rotary Encoder Module KY-040
GND	GND
5V	+
11	SW
10	DT
9	CLK



Step 2: Upload test code for XD-88 360 Degree Rotary Encoder Module KY-040 for Arduino.

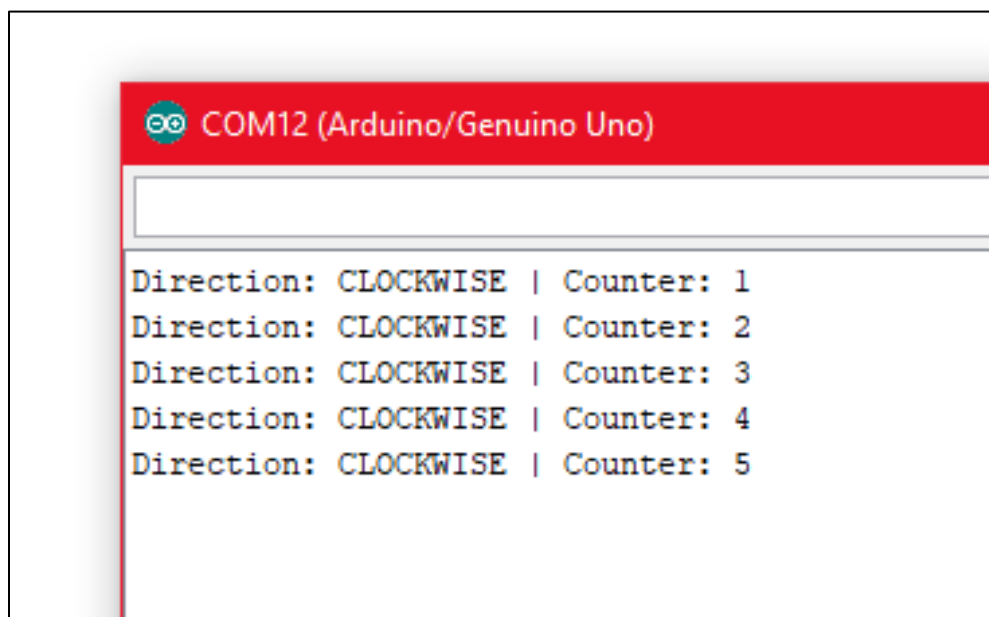
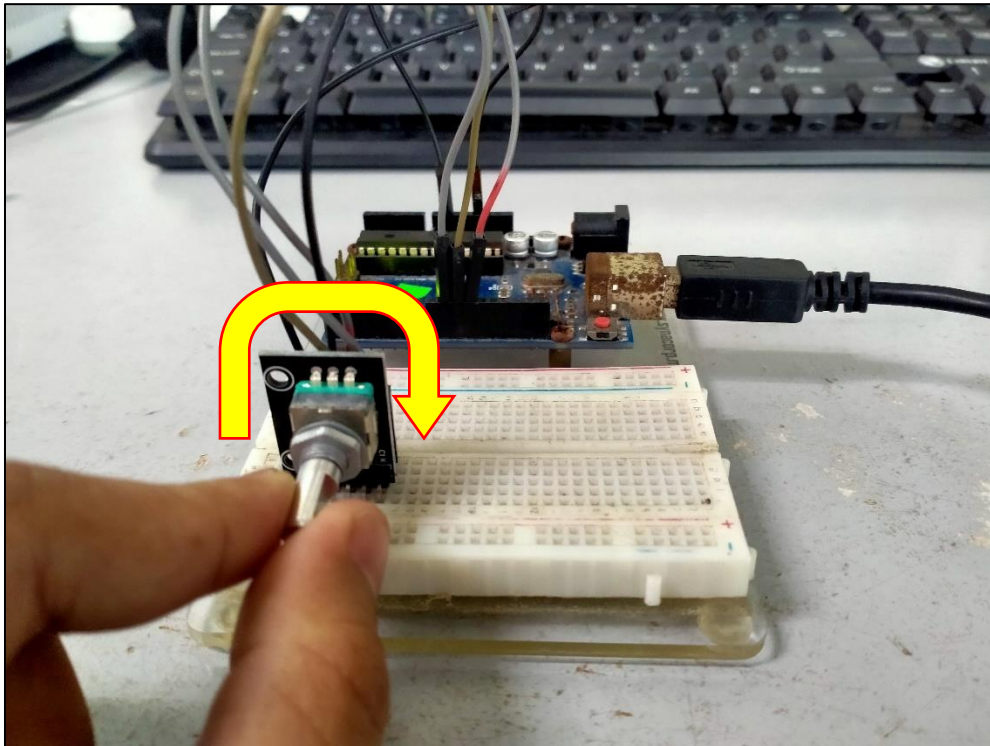
1. Use Arduino Uno board by clicking **Tools > Board > Arduino/Genuino Uno** in your Arduino IDE software and then choose the Arduino Uno COM by clicking **Tools > Port > COM** (COM for Arduino Uno that is currently connected to the PC).
2. Copy the code below to your Arduino IDE and then upload it to your Arduino Uno to test XD-88 360 Degree Rotary Encoder Module KY-040.

```
// Rotary Encoder Inputs
#define CLK 9
#define DT 10
#define SW 11
int counter = 0;
int currentStateCLK;
int lastStateCLK;
String currentDir = "";
unsigned long lastButtonPress = 0;
void setup() {
  pinMode(CLK,INPUT);
  pinMode(DT,INPUT);
  pinMode(SW, INPUT_PULLUP);
  // Setup Serial Monitor
  Serial.begin(9600);
  // Read the initial state of CLK
  lastStateCLK = digitalRead(CLK);
}
void loop() {
  // Read the current state of CLK
  currentStateCLK = digitalRead(CLK);
  // If last and current state of CLK are different, then pulse occurred
  // React to only 1 state change to avoid double count
  if (currentStateCLK != lastStateCLK && currentStateCLK == 1){
    // If the DT state is different than the CLK state then
    // the encoder is rotating clockwise so increment
    if (digitalRead(DT) != currentStateCLK) {
      counter ++;
      currentDir = "CLOCKWISE";
    }
  }
}
```

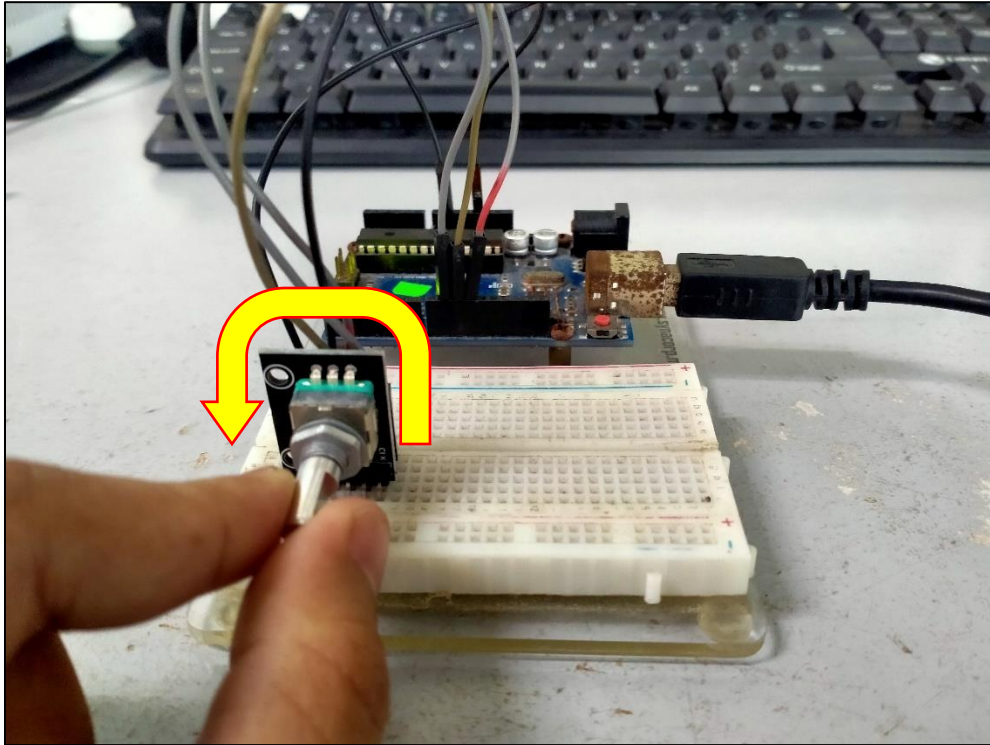
```
} else {  
    // Encoder is rotating anticlockwise so decrement  
    counter --;  
    currentDir = "ANTICLOCKWISE";  
}  
Serial.print("Direction: ");  
Serial.print(currentDir);  
Serial.print(" | Counter: ");  
Serial.println(counter);  
}  
// Remember last CLK state  
lastStateCLK = currentStateCLK;  
// Read the button state  
int btnState = digitalRead(SW);  
//If we detect LOW signal, button is pressed  
if (btnState == LOW) {  
    //if 50ms have passed since last LOW pulse, it means that the  
    //button has been pressed, released and pressed again  
    if (millis() - lastButtonPress > 50) {  
        counter = 0;  
        Serial.print("Reset button pressed!");  
        Serial.print(" | Counter: ");  
        Serial.println(counter);  
    }  
    // Remember last button press event  
    lastButtonPress = millis();  
}  
// Put in a slight delay to help debounce the reading  
delay(1);  
}
```

Step 3: Testing the XD-88 360 Degree Rotary Encoder Module KY-040 for Arduino.

1. Open serial monitor and set to 9600 baud to see the output when testing the rotary encoder.
2. Turn knob to the right or clockwise for increment value input.



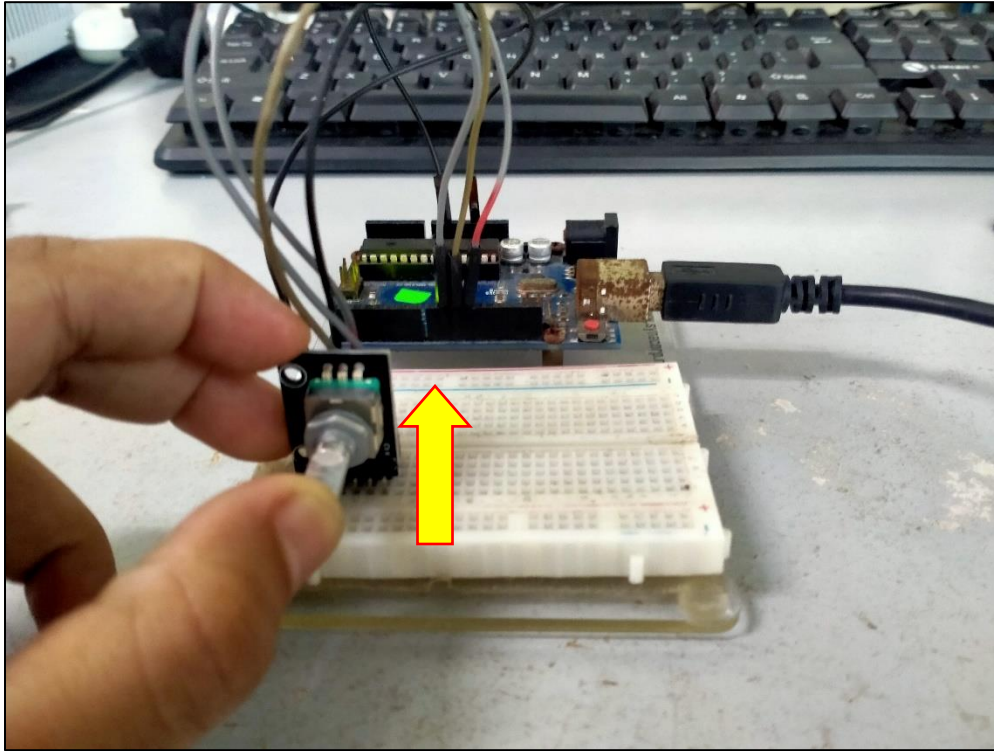
3. Turn knob to the left or anticlockwise for decrement value input.



```
COM12 (Arduino/Genuino Uno)

Direction: CLOCKWISE | Counter: 1
Direction: CLOCKWISE | Counter: 2
Direction: CLOCKWISE | Counter: 3
Direction: CLOCKWISE | Counter: 4
Direction: CLOCKWISE | Counter: 5
Direction: ANTICLOCKWISE | Counter: 4
Direction: ANTICLOCKWISE | Counter: 3
Direction: ANTICLOCKWISE | Counter: 2
Direction: ANTICLOCKWISE | Counter: 1
Direction: ANTICLOCKWISE | Counter: 0
Direction: ANTICLOCKWISE | Counter: -1
Direction: ANTICLOCKWISE | Counter: -2
Direction: ANTICLOCKWISE | Counter: -3
Direction: ANTICLOCKWISE | Counter: -4
Direction: ANTICLOCKWISE | Counter: -5
```

4. Push in the knob button to reset the input value.



```
COM12 (Arduino/Genuino Uno)

|

Direction: CLOCKWISE | Counter: 1
Direction: CLOCKWISE | Counter: 2
Direction: CLOCKWISE | Counter: 3
Direction: CLOCKWISE | Counter: 4
Direction: CLOCKWISE | Counter: 5
Direction: ANTICLOCKWISE | Counter: 4
Direction: ANTICLOCKWISE | Counter: 3
Direction: ANTICLOCKWISE | Counter: 2
Direction: ANTICLOCKWISE | Counter: 1
Direction: ANTICLOCKWISE | Counter: 0
Direction: ANTICLOCKWISE | Counter: -1
Direction: ANTICLOCKWISE | Counter: -2
Direction: ANTICLOCKWISE | Counter: -3
Direction: ANTICLOCKWISE | Counter: -4
Direction: ANTICLOCKWISE | Counter: -5
Reset button pressed! | Counter: 0
Direction: CLOCKWISE | Counter: 1
Direction: CLOCKWISE | Counter: 2
Direction: CLOCKWISE | Counter: 3
```


Conclusion:

XD-88 360 Degree Rotary Encoder Module KY-040 for Arduino works the same as a normal potentiometer but unlike potentiometer the turn rotation have no limit. Furthermore, the knob can also be push to act as a reset button for the rotation value. To test the rotary encoder is quite easy. A simple coding is used to see if the value input from turning and pushing the knob of the rotary encoder is working, as it should. Increment in value is by turning the knob clockwise, decrement in value is by turning the knob anticlockwise and lastly reset the rotation is by pushing the knob.