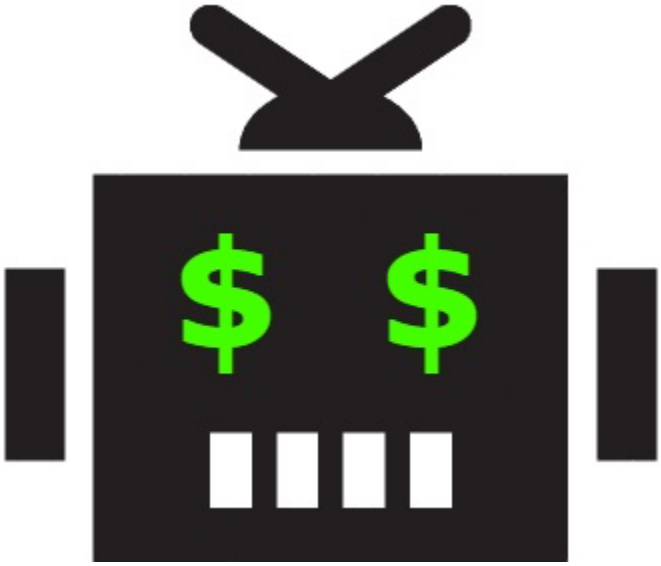
Thrifty Encoder User Guide

Last revised on January 19, 2023



The Thrifty Bot

www.thethriftybot.com

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1. Device Description:

The Thrifty Encoder was designed to provide teams a lower cost option for absolute position sensing. Simply plug the included PWM cable into your controller of choice and read the included magnet's absolute position. This device can connect to a RoboRIO as well as a REV Spark Max or CTRE Talon SRX.

Kit Contents:

1x case of your choice - CTRE Case (Swerve Drive Specialties Compatible), Thrifty Swerve Case or West Coast Product Swerve X Case

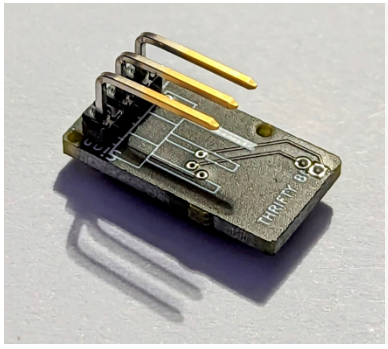
1x 0.25” x 0.50” diametrically polarized magnet

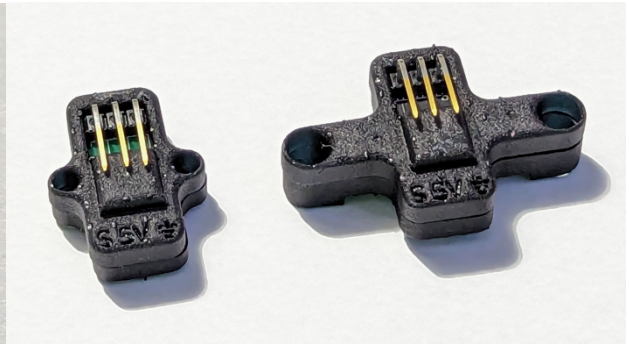
1x Encoder board

1x 36” 3-Wire PWM-Style Cable*

2x associated mounting hardware

1x selected SLA printed case



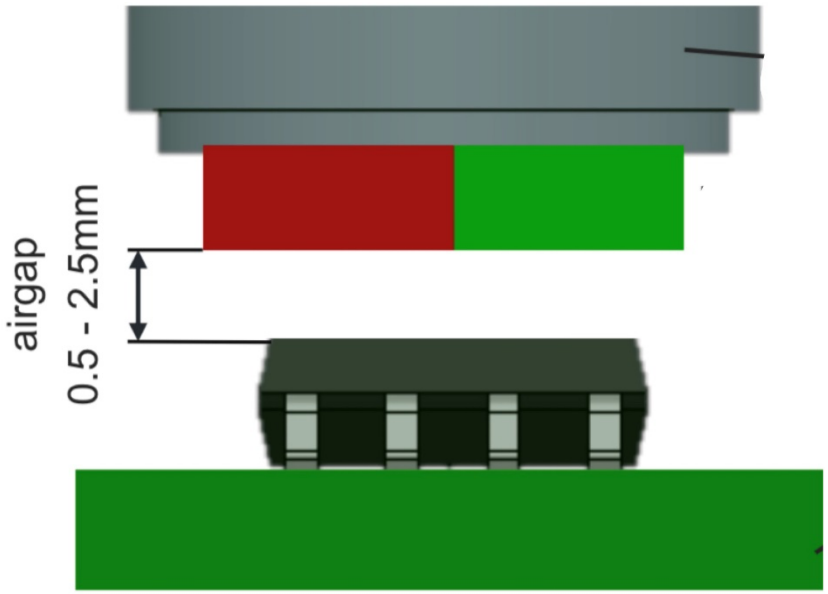


*Note on cable construction – this cable is only to be used for signal purposes, and will not hold carry more than 100 mA current as designed

2. Magnet Placement:

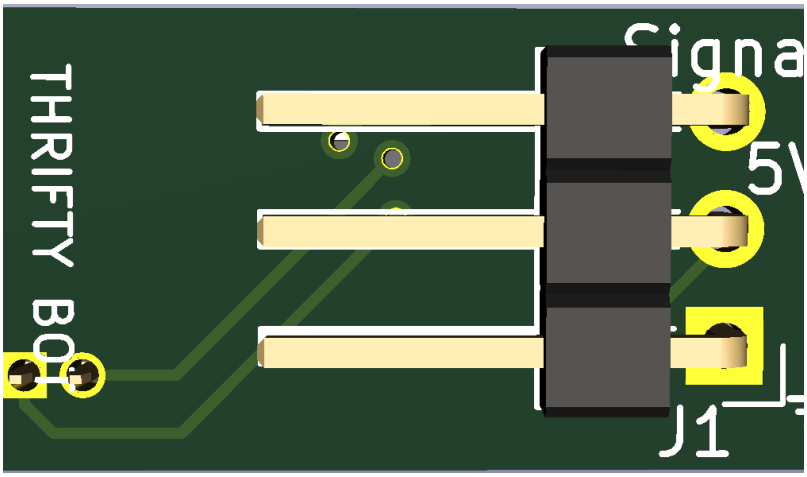
To implement, simply place a diametric magnet (included) on a shaft slightly offset from the IC and center the board on the magnet. To mount the encoder, use the attached case.

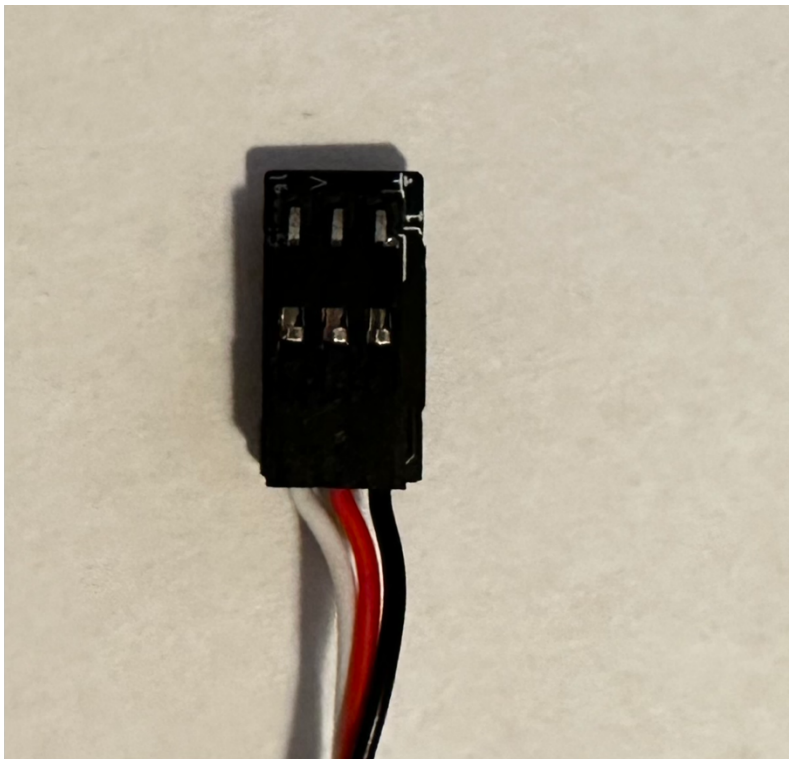
Below is our recommended distance from chip to magnet. We recommend using the included magnet or a magnet of a similar size (1/4 inch).



3. Interface Instructions

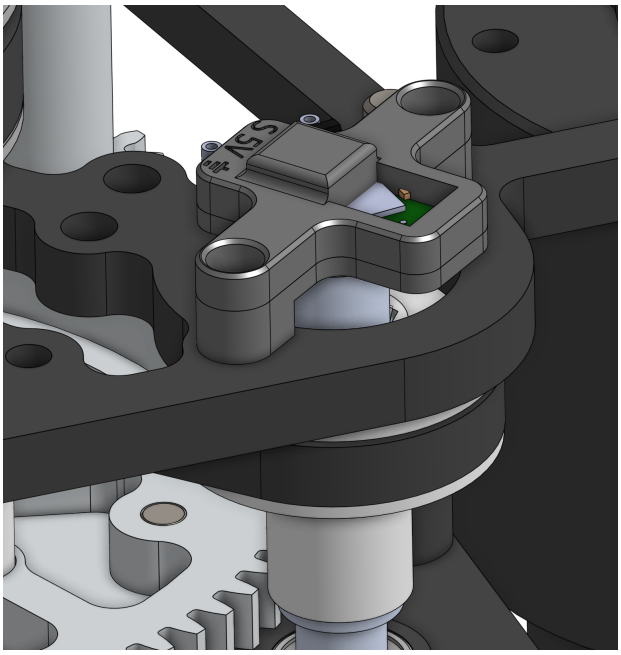
To interface, use the included PWM cable to wire directly to one of the RoboRIO's Analog ports or the motor controller of your choice. The pinout of the connector is such:



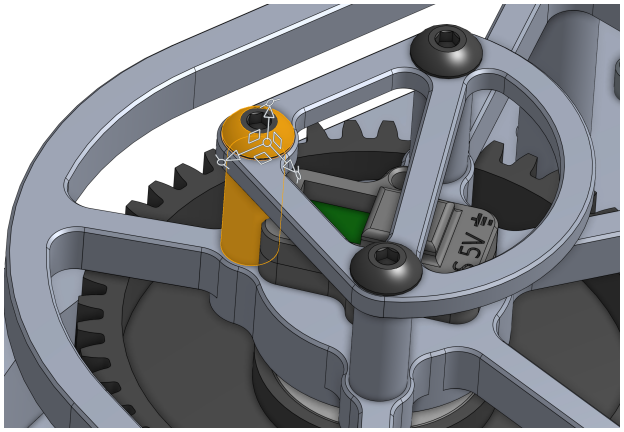


The signal pin is a 12-bit absolute position reference with the lower bound being the ground pin and the upper bound being the 5V pin. This 5V is relative to the 5V rail on the Roborio, which is often not exactly 5V. This allows for a resolution of 1/4096*360 (~.09) degrees.

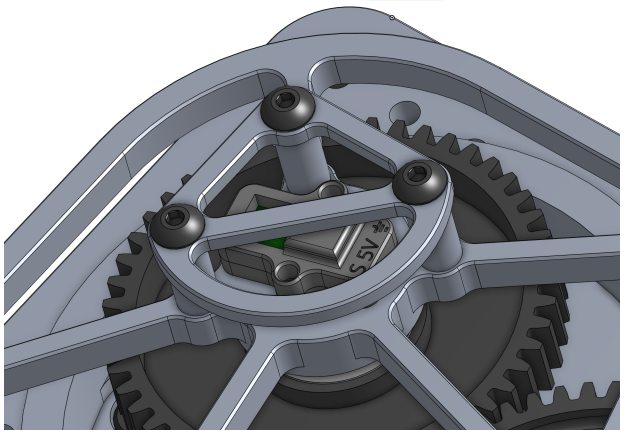
Swerve X:

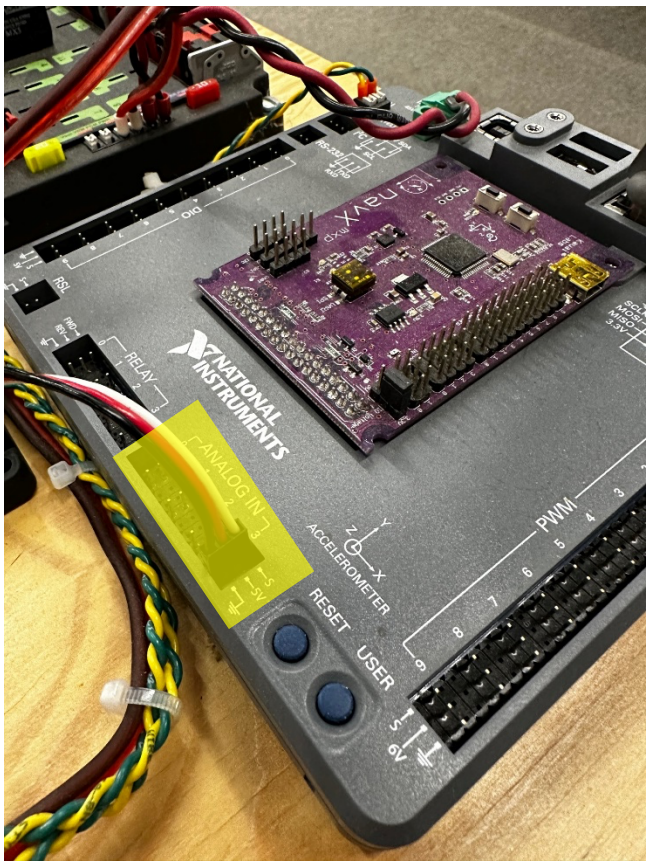


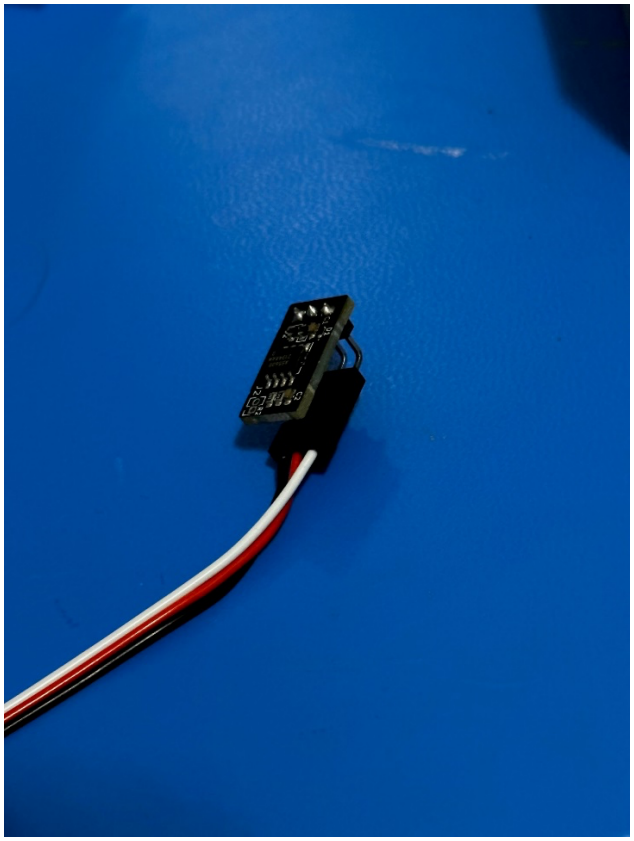
SDS MK4i:



With new case, you need to remove standoff for optimal wire routing, or use the other set of holes as pictured below:




DIO
RSL
RELAY
NATIONAL INSTRUMENTS
ANALOG IN
5V
ACCELEROMETER
RESET
USER
PWM
5V
6V



4. Code

Python:

```python
from wpilib import AnalogEncoder


analogPort = 0 # 0, 1, 2, 3
encoder = AnalogEncoder(analogPort)

print(encoder.getAbsolutePosition())
```

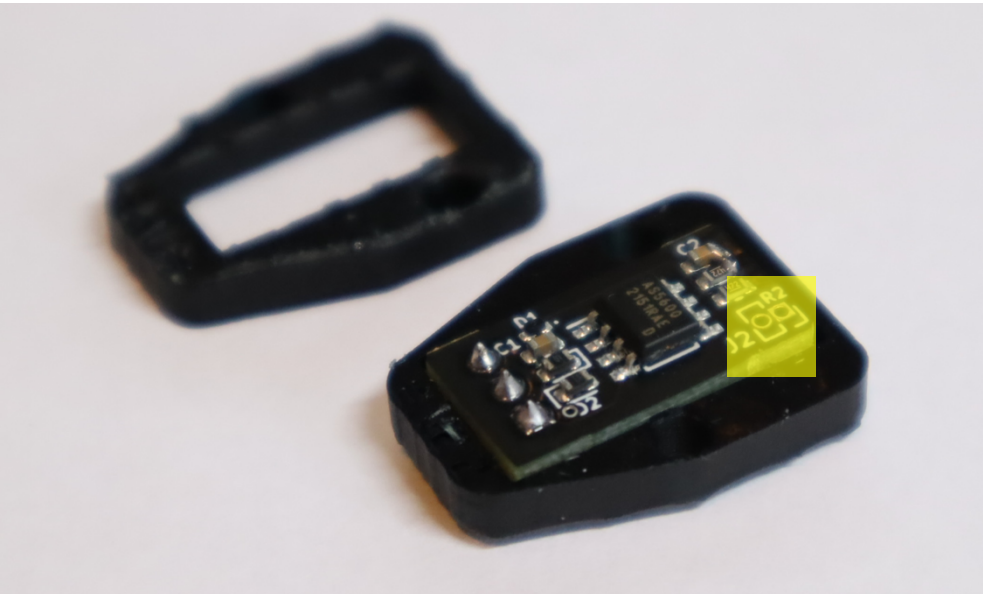
Java:

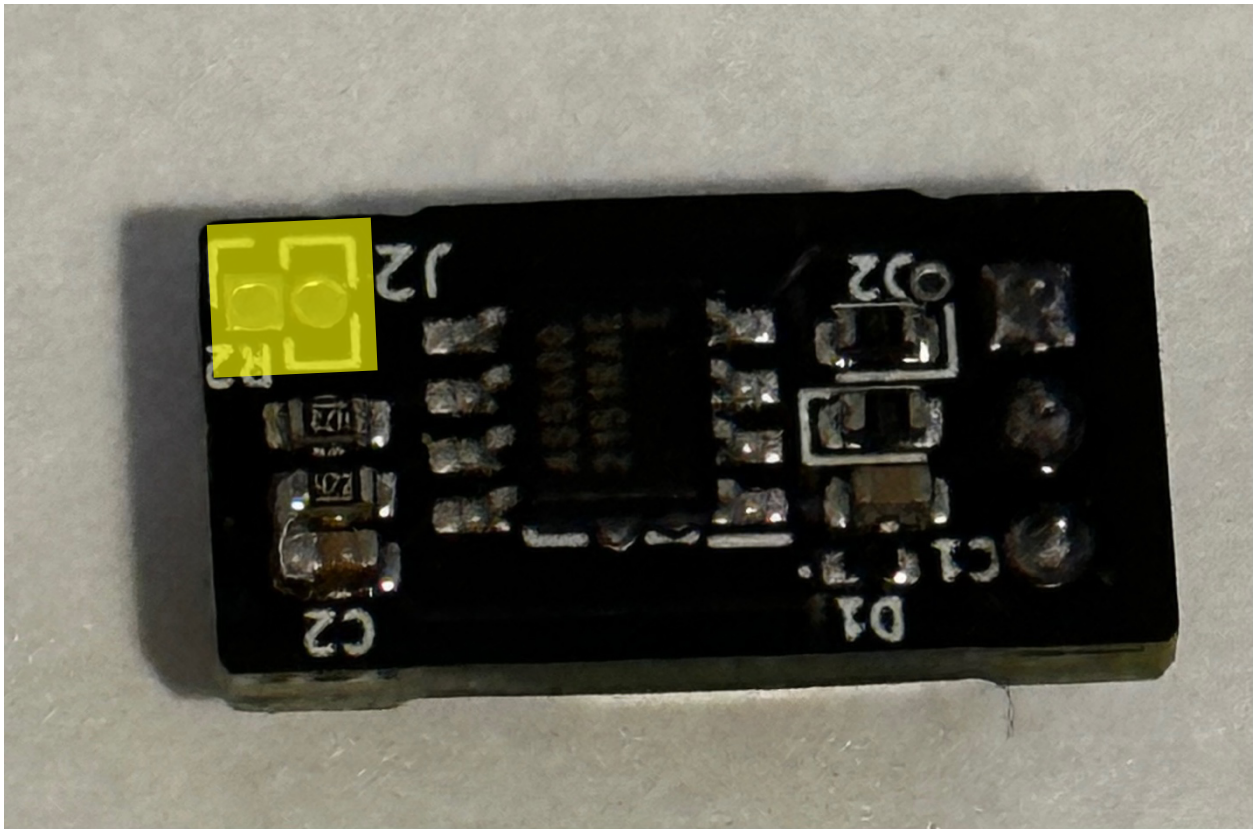
```java
public AnalogEncoder(AnalogInput analogInput) {
    m_analogInput = analogInput;
    init();
}

* Get the encoder value since the last reset.
   *
   * <p>This is reported in rotations since the last reset.
   *
   * @return the encoder value in rotations
   */
  public double get() {
    if (m_simPosition != null) {
      return m_simPosition.get();
    }
```

For more information, please see the [WPILIB Repository].

5. Using with 3.3 V

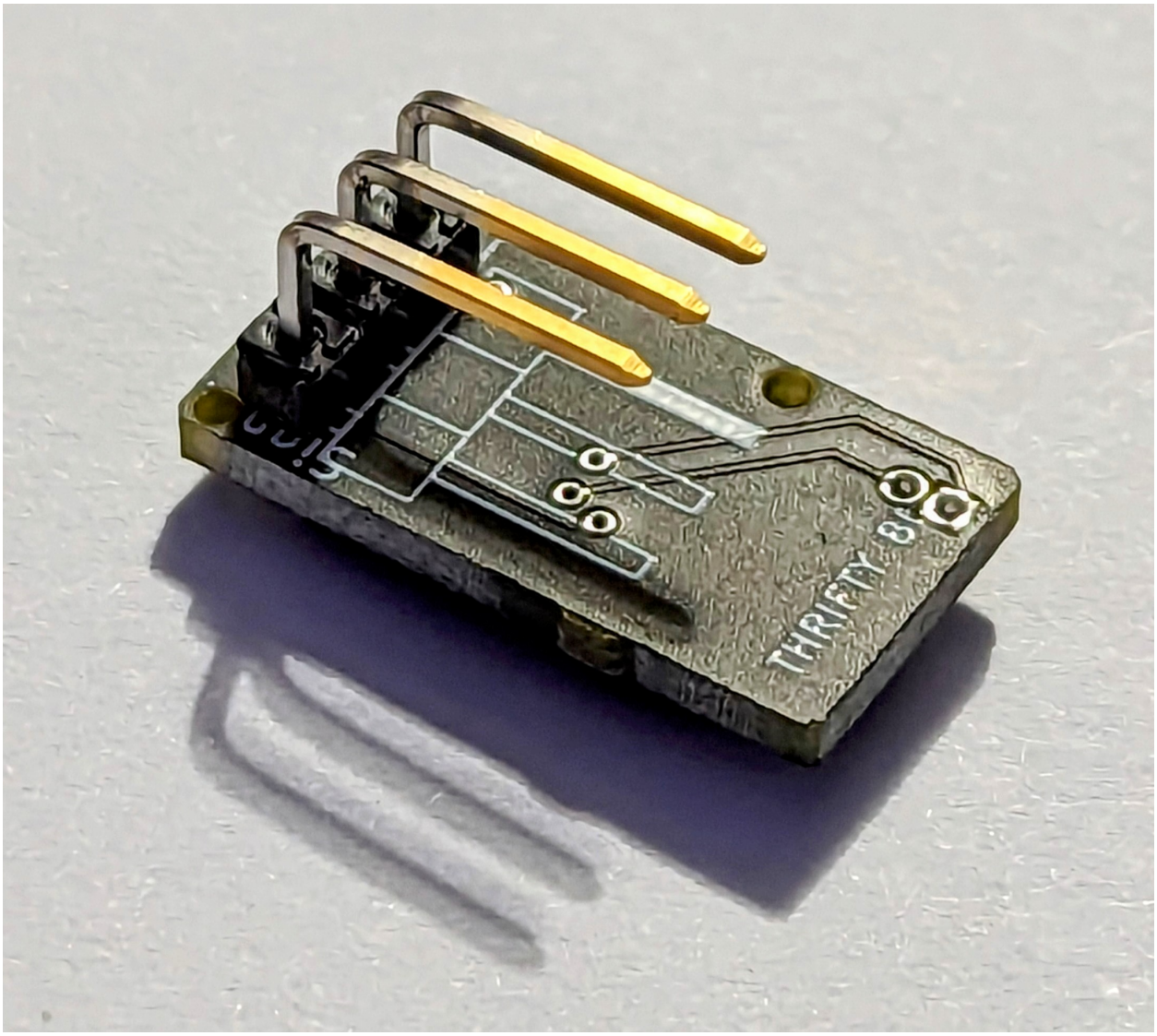
If desired, the encoder may be used with 3.3V. To do this, the user must solder a bridge between the 2 pins on J2, as shown below. This shorts the 5V rail with the 3.3V rail. This makes the encoder useful for FTC.





V2 Differences:

Note that in October 2022, we switched to a through hole connector for strength of connection. This increased the length of the PCB.



6. Absolute Maximum Ratings

Symbol	Paramter	Min	Max	Units	Comments
5V Pin	Voltage in and analog max	-0.3	6.1	V	
ESDHBM	Electrostatic Discharge HBM	±1		KV	MIL 883 E method 3015.7
TBODY	Temperature of IC Chip		260	°C	
TPCB	Temperature of PCB		140	°C	
MSL	Moisture Sensitivity Level	5	85	%	
RHNC	Relative humidity (non-condensing)	3			ICP/JEDEC J-STD-033
ISCR	Input Current	-100	100	mA	

Typically, the encoder will source around 7 mA of current.