Through Bore Encoder

Through Bore Encoder - Overview

The REV Through Bore Encoder is specifically designed with the end user in mind, allowing teams to place sensors in the locations closest to the rotation that they wish to measure. This rotary sensor measures both relative and absolute position through its ABI quadrature output and its absolute position pulse output.

Features

- Incremental and absolute magnetic encoder
  - Built-in magnet
  -

    - Quadrature output - A, B, and Index
    - Absolute output - Pulse Width (Duty Cycle)
    - Broadcom AEAT-8800
- Factory calibrated zero-positionb
    - Zero calibrated to notch in case
- Through-bore design
    - Easily mounted to any shaft
    - Bore inserts
        - 1/2" Hex (default)
        - 3/8" Hex
        - 5mm Hex
        - 1/4" Round
- Mounting holes
    - Holes spacing matches common FRC gearboxes and chassis

> The FTC Control System only supports Incremental Encoder input through the motor encoder ports at this time. Absolute pulse input is not supported.

> **Do not disassemble the sensor.** Disassembling the Through Bore Encoder will dereference the zero position with the physical case notch. It is not possible to recalibrate the zero position as it is permanently saved inside the sensor at the factory

Kit Contents

Part Number	Description	Qty
REV-11-1271	Through Bore Encoder	1
-	3/8" Hex Insert	1
-	5mm Hex Insert	1
-	1/4" Round Insert	1
REV-11-1275	JST-PH 6-pin to JST-PH 6-pin Cable	1
REV-11-1817	JST-PH 6-pin to 4 x 3-pin 0.1" (PWM/Dupont) Cable	1
REV-31-1815	JST-PH 6-pin to JST-PH 4-pin Cable	1

Specifications

General Specifications

Parameter Description	Parameter
Sensor Type	Digital, Encoder
Connector	JST-PH 6-pin
Mounting Holes	#10 Clearance

Electrical Specifications

Parameter	Min	Typ	Max	Units
Input Voltage	3.3	-	5.0	V
Logic Level	-	3.3	5.0	V
Maximum RPM	-	-	10000	RPM

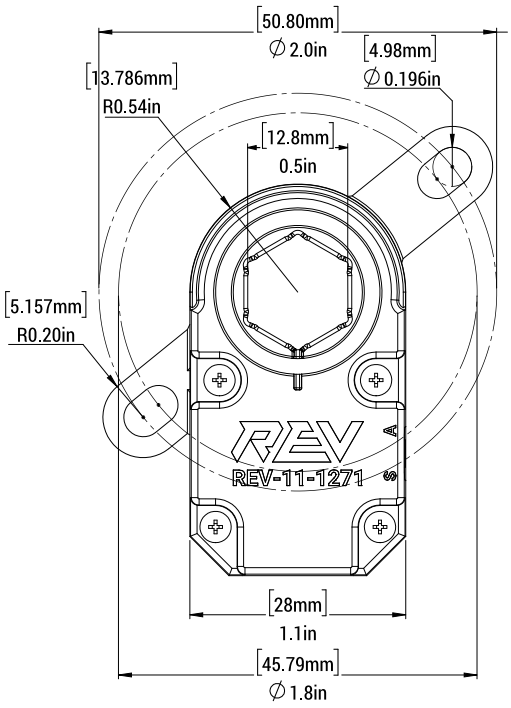
Incremental Output

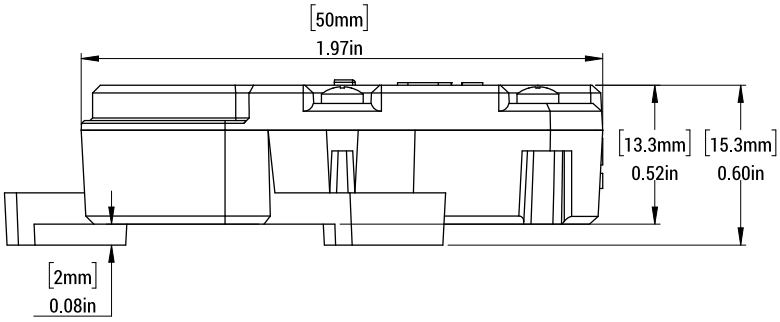
Parameter	Min	Typ	Max	Units
Quadrature Resolution	-	2048	-	Cycles per Rev
	-	8192	-	Counts per Rev
Index Pulse Frequency	-	1	-	Pulse per Rev
Index Pulse Width	-	90	-	°e

Absolute Pulse Output (Duty Cycle)

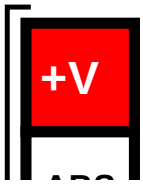
Parameter	Min	Typ	Max	Units
Period	-	1025	-	µs
Frequency	-	975.6	-	Hz
Minimum Pulse (0°)	-	1	-	µs
Maximum Pulse (360°)	-	1024	-	µs
Pulse Resolution	-	10	-	bit

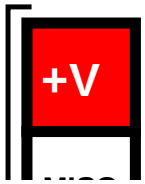
Mechanical Drawings

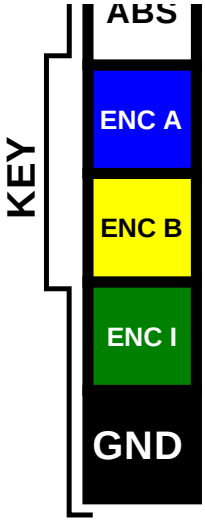




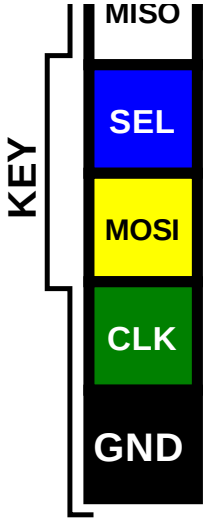
Pinout







ENCODER MODE PINOUT



SPI/SSI MODE PINOUT

Application Information

The REV Through Bore Encoder uses the Broadcom AEAT-8800-Q24 magnetic rotary sensor to measure the rotation of a magnet embedded and geared to the through bore shaft hole. The AEAT-8800-Q24 uses hall effect technology to measure changes in the magnetic field as the shaft and magnet rotates.

A major benefit of the REV Through Bore Encoder is the flexibility of measuring any shaft in your system. Directly measuring the rotation of an output shaft allow users to read encoders without having to calculate gear ratios.

Cable Options

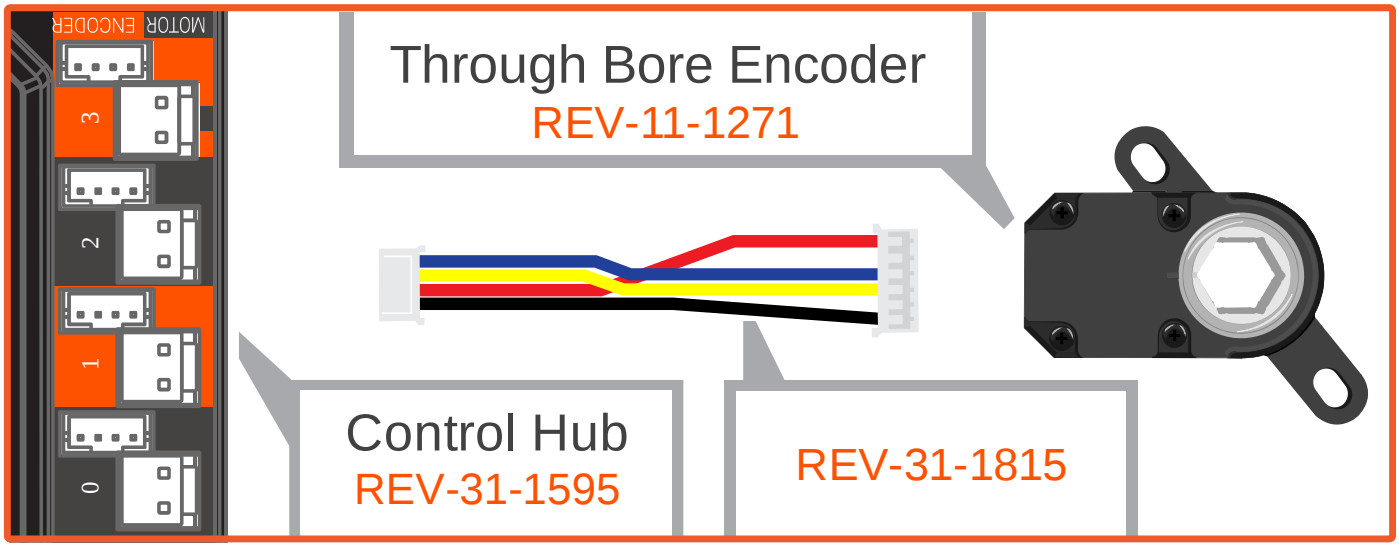
Cable	Output Connector	Intended System	Output Signals
REV-11-1275	6-Pin JST PH	SPARK MAX Brushed Motor Mode	A, B, I, ABS
REV-11-1817	3-pin 0.1" Connector (PWM/Dupont) (4x)	roboRIO DIO	A, B, I, ABS
REV-31-1815	4-Pin JST PH	Control/Expansion Hub Encoder Port	A, B

Wiring Examples

The Through Bore Encoder comes with several different cables making it easier to connect to different devices. Below are a few wiring examples for the more commonly used devices with the Through Bore Encoder.

Control Hub (REV-31-1595)

To connect the Through Bore Encoder to a Control Hub, use the included JST PH 6-pin to JST PH 4-pin cable. The Through Bore Encoder plugs into the Encoder ports on the Control Hub.

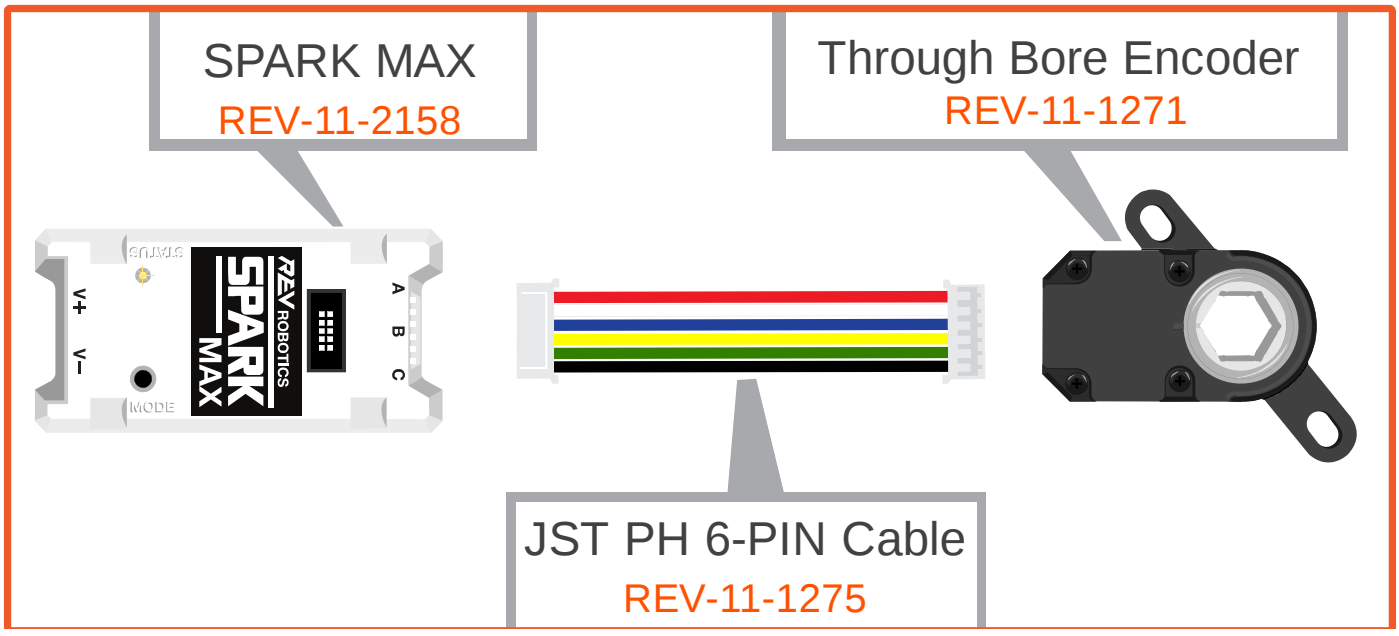


SPARK MAX (REV-11-2158)

Wiring of the Through Bore Encoder to a SPARK MAX changes depending on the motor type being used with the SPARK MAX. Both motor types use the included JST PH 6-pin cable.

Brushed Motors

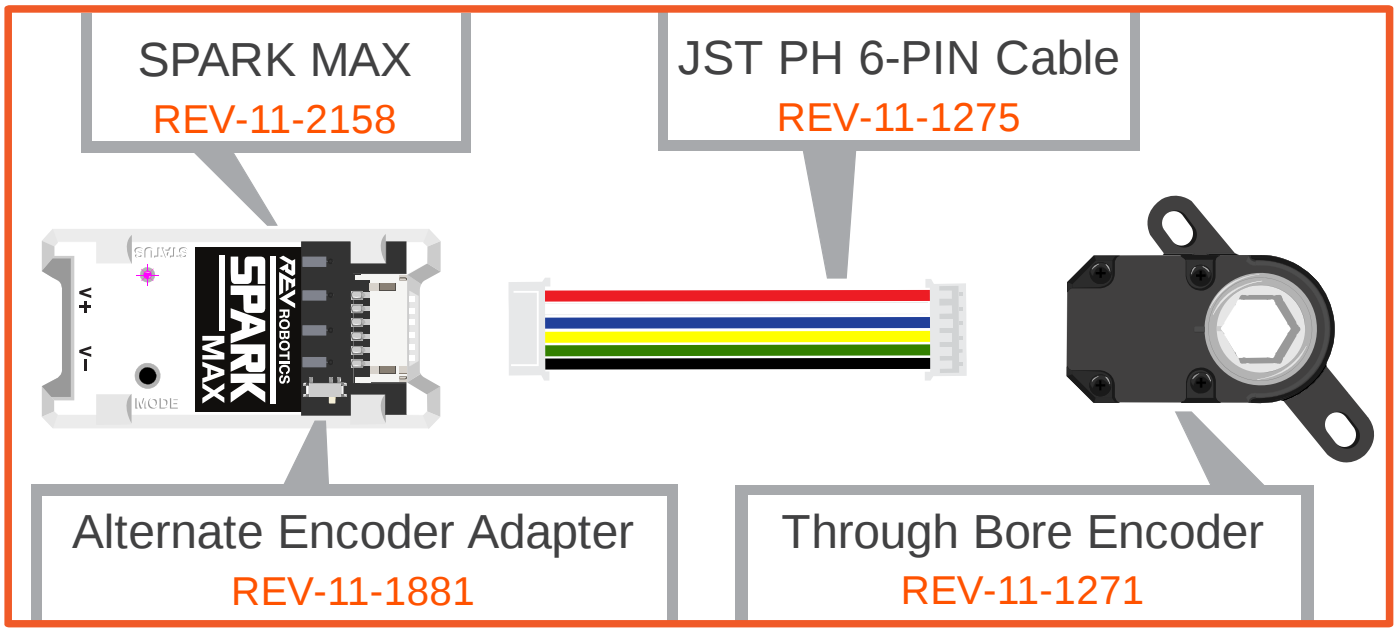
When using a brushed motor with SPARK MAX, the Through Bore Encoder is connected directly to the Encoder Port on the front of the SPARK MAX.



Brushless Motors

When using a brushless motor with SPARK MAX, the Through Bore Encoder is used as an Alternate Encoder. Using the Alternate Encoder Adapter (REV-11-1881) with the SPARK MAX allows for the JST PH 6-pin cable to connect directly to the adapter and the Through Bore Encoder.

> ⚠ Make sure to check the Alternate Encoder Mode bring up in the SPARK MAX documentation before connecting the Through Bore Encoder.

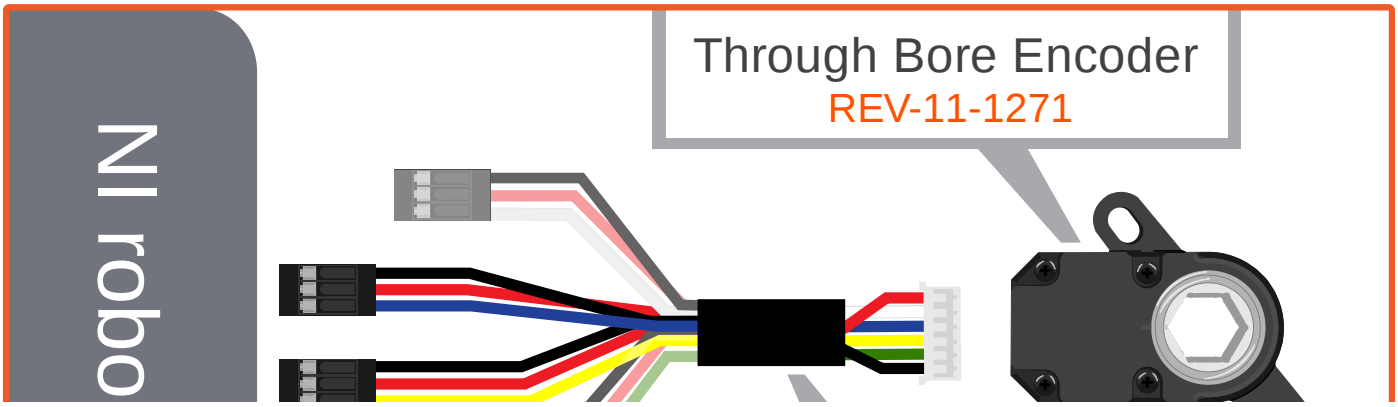


NI roboRIO

NI's roboRIO supports both quadrature and duty cycle encoders. There are slight differences in wiring depending on what mode is desired. Both wiring setups use the included JST PH 6-pin to 4 Channel PWM Cable.

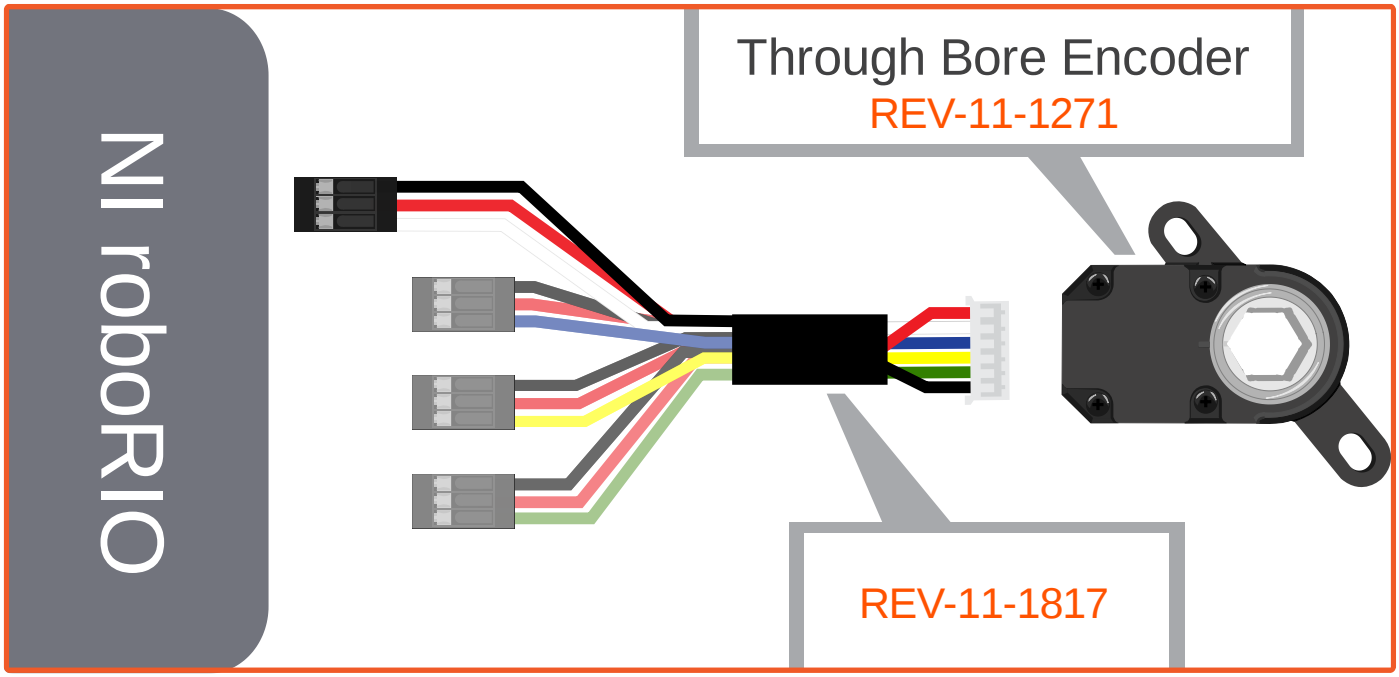
Quadrature Encoder (Relative)

When using the Through Bore Encoder as a quadrature encoder, plug the ENC A (blue) and ENC B (yellow) signal lines into the DIO ports on the roboRIO.



Duty Cycle Encoder (Absolute)

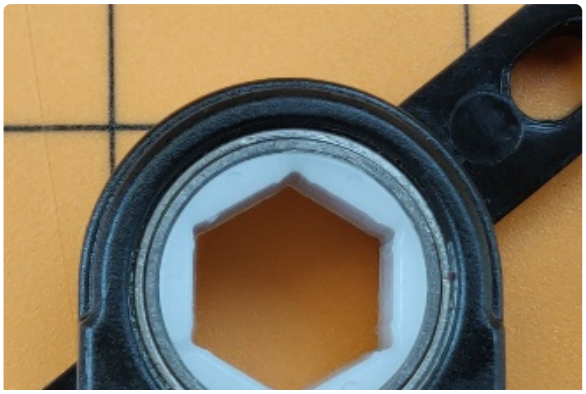
When using the Through Bore Encoder as a duty cycle encoder plug the ABS (white) signal line into a DIO port on the roboRIO.



Shaft Options

1/2” Hex

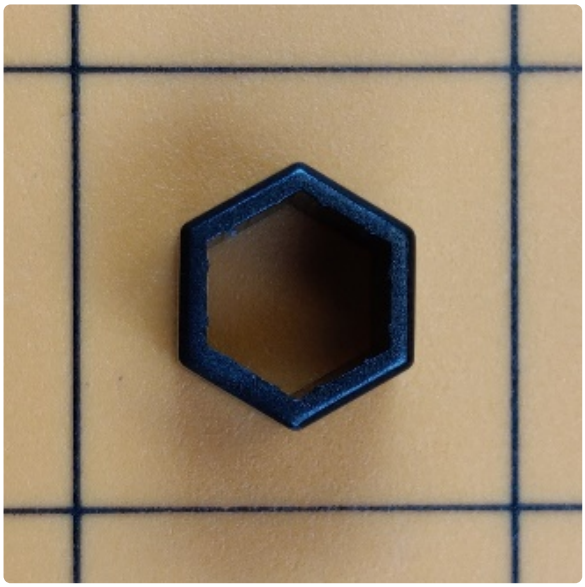
This is the default shaft configuration that comes with the encoder out of the box.



3/8” Hex

When using the 3/8” Hex insert, press the insert into the 1/2” Hex hole.

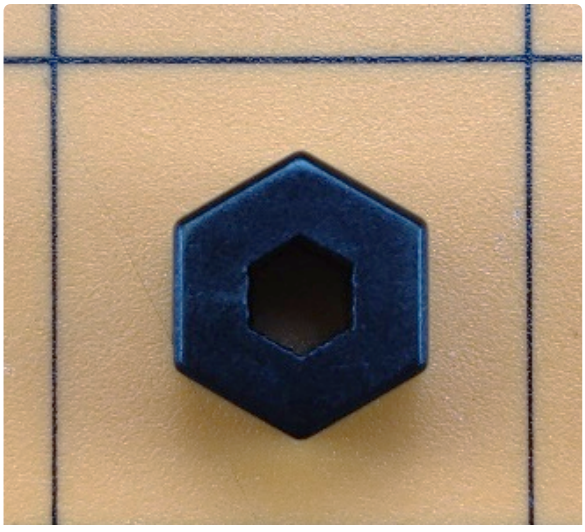
If you are having difficulty pressing the insert into the encoder, try flipping the insert over and press it in. There is a slight taper in the insert, so it is recommended to press the insert with the smaller end first. When removing, it is recommended to push the insert out in the reverse order (larger end first).



5mm Hex

When using the 5mm Hex insert, press the insert into the 1/2” Hex hole.

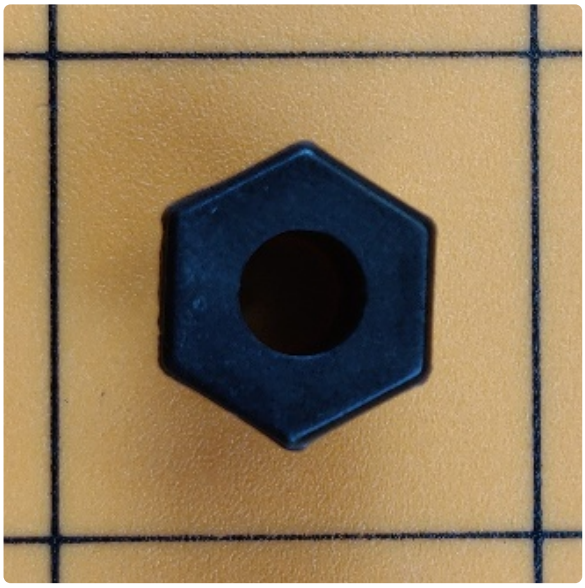
If you are having difficulty pressing the insert into the encoder, try flipping the insert over and press it in. There is a slight taper in the insert, so it is recommended to press the insert with the smaller end first. When removing, it is recommended to push the insert out in the reverse order (larger end first).



1/4" Round

When using the 1/4” round insert, press the insert onto the shaft first and then place the encoder onto the insert.

This adapter fits the encoder shaft on common gearboxes like the Toughbox Mini, which is traditionally included in the FRC Kit of Parts Chassis.



Switch Options

There is a switch on the side of the encoder and with two options: ‘A’ and ‘S’. ‘A’ is the ABI encoder output mode which outputs the incremental and absolute encoder signals. ‘S’ is the SSI/SPI mode used in the manufacturing stage and potential future features. Currently, only the ‘A’ mode is supported. Make sure that the switch is in the ‘A’ position when using this encoder.

Additional Resources

Additional information about the AEAT-8800-Q24, its capabilities, and its features can be found in the following datasheet:

- AEAT-8800-Q24 Datasheet