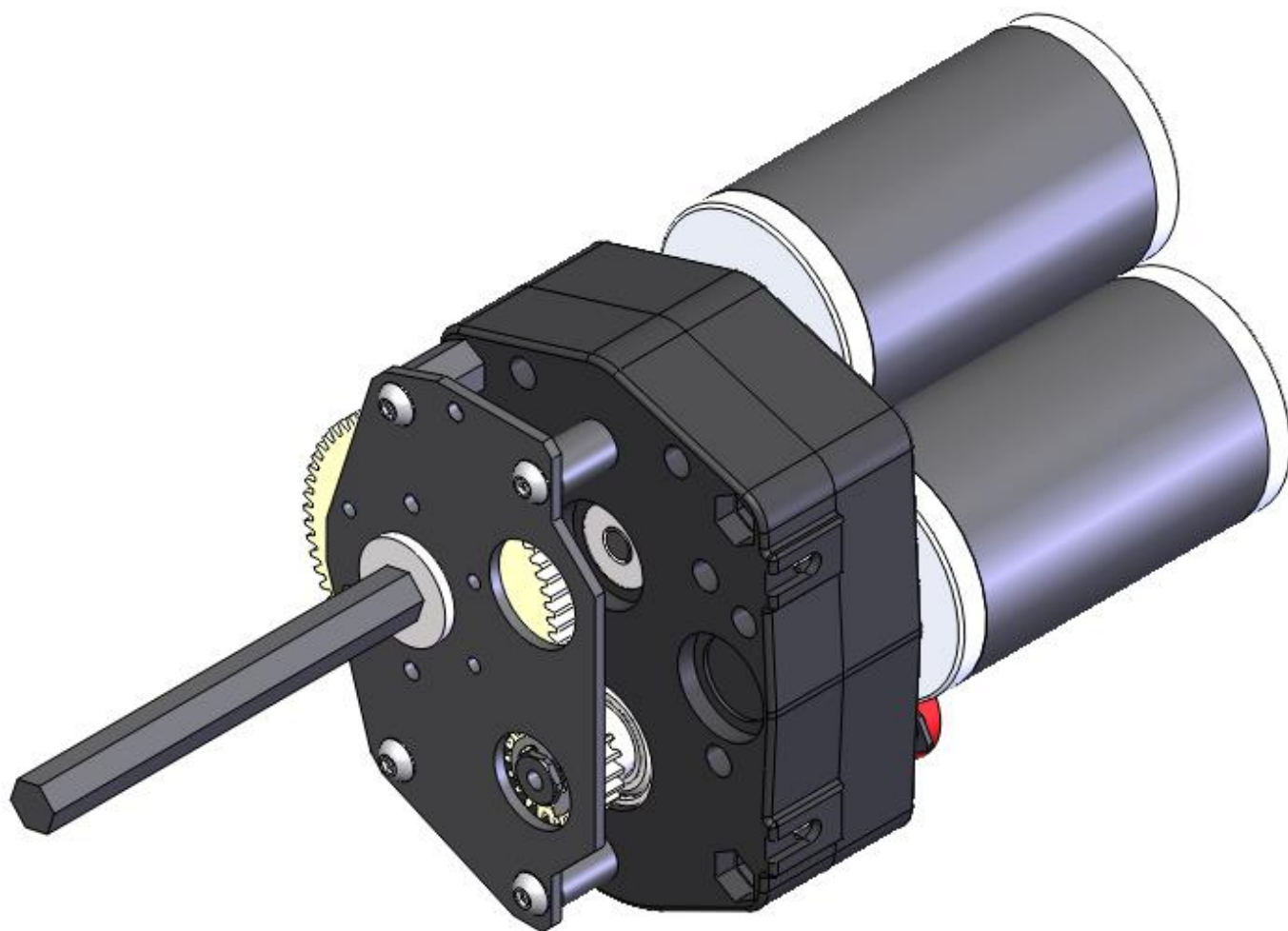


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VEXpro 3 CIM Ball Shifter with 3<sup>rd</sup> Stage

# VEXpro 3 CIM Ball Shifter with 3<sup>rd</sup> Stage

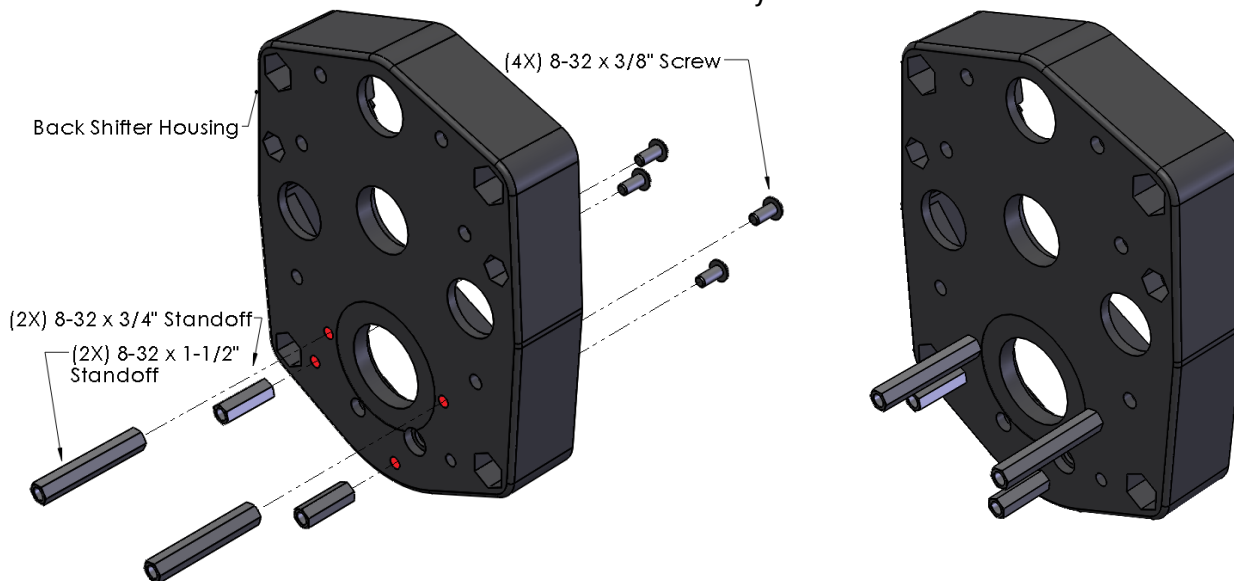
*Assembly Instructions*



## VEXpro 3 CIM Ball Shifter with 3<sup>rd</sup> Stage

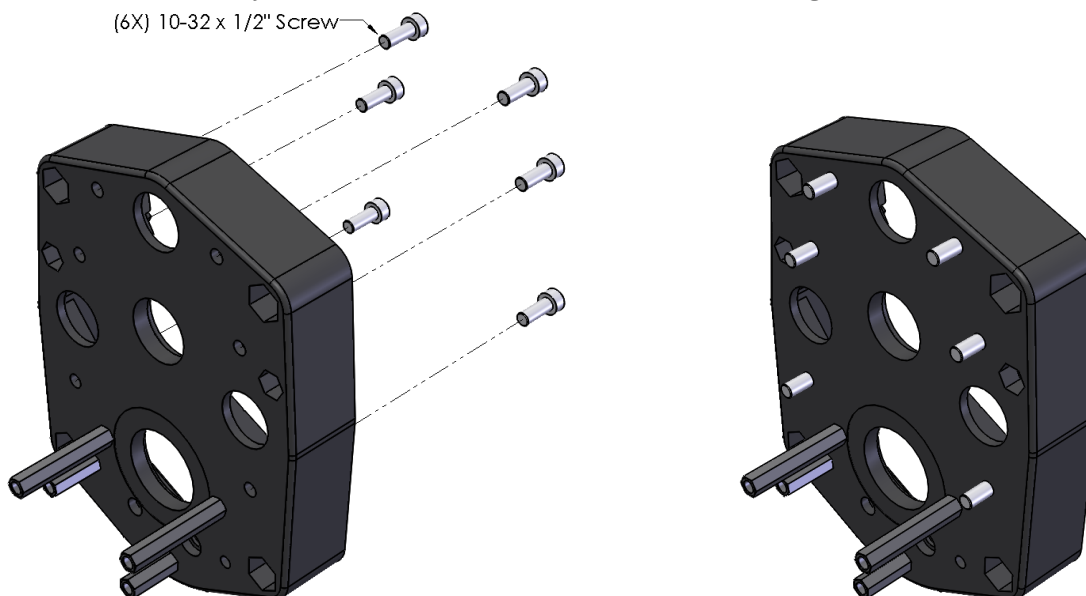
### Step 1 (Grayhill Series 63R Encoder):

If using a Grayhill Series 63R encoder, use (4X) 8-32 x 3/8" screws to attach (2X) 8-32 x 1-1/2" and (2X) 8-32 x 3/4" standoffs to the back shifter housing. The use of Loctite is recommended with all screws that do not have a Nylock Patch.



### Step 2:

Insert (6X) 10-32 x 1/2" screws into the back shifter housing. These will be used later to mount the 3 CIM motors. Only use (4X) screws if 2 CIMs are being mounted.



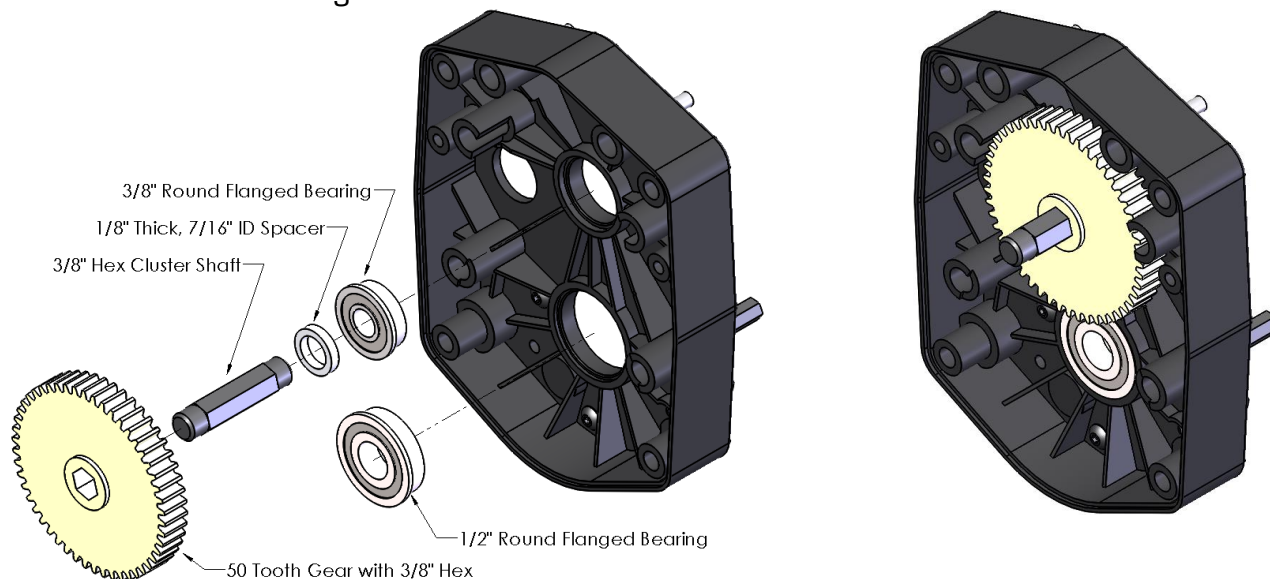
**Note:** The screws are not retained in this step, but may be impossible to install later depending on the user selected gear ratio.

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## VEXpro 3 CIM Ball Shifter with 3<sup>rd</sup> Stage

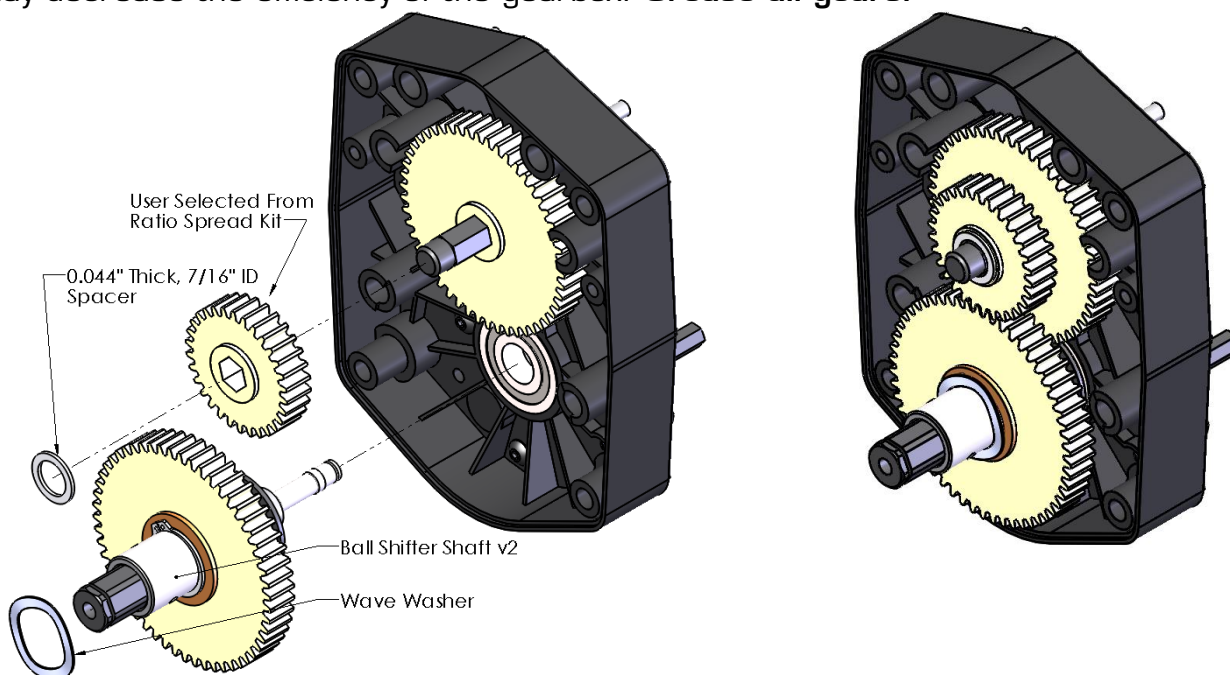
### Step 3:

Insert 1/2" and 3/8" round flanged bearings, cluster shaft, 1/8" spacer, and 50 tooth gear into the back shifter housing.



### Step 4:

Install the pre-assembled ball shifter shaft, user selected gear, and 0.044" spacer. Installation of the included wave spring is optional. Its use may reduce "slop" along the shifter shaft but may decrease the efficiency of the gearbox. **Grease all gears.**



**Note:** A liberal application of white lithium grease is required on all gears

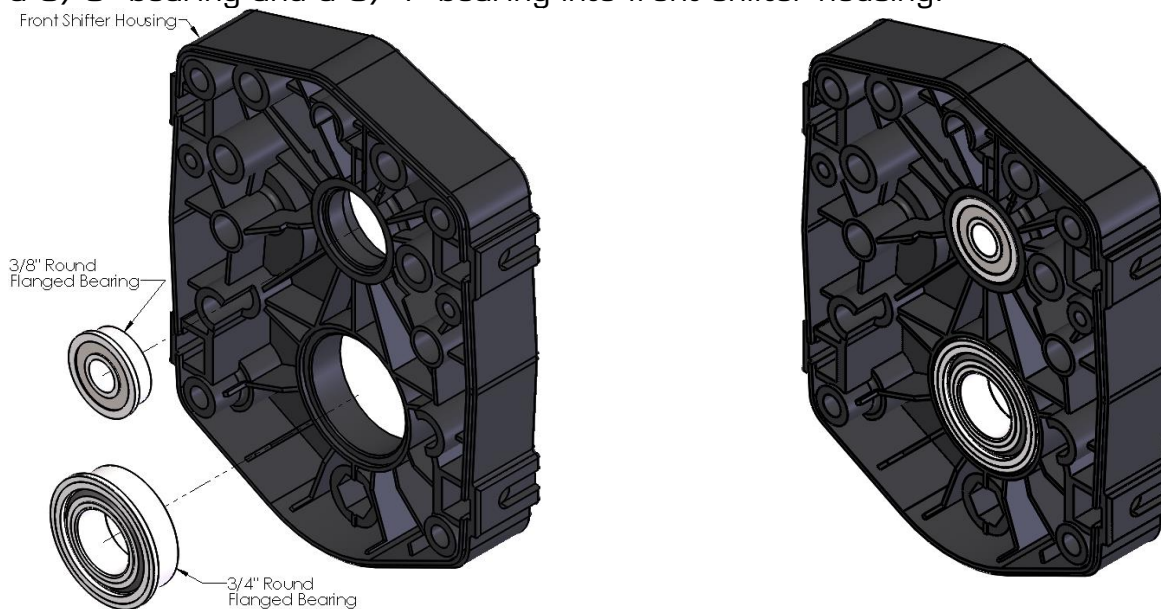


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## VEXpro 3 CIM Ball Shifter with 3<sup>rd</sup> Stage

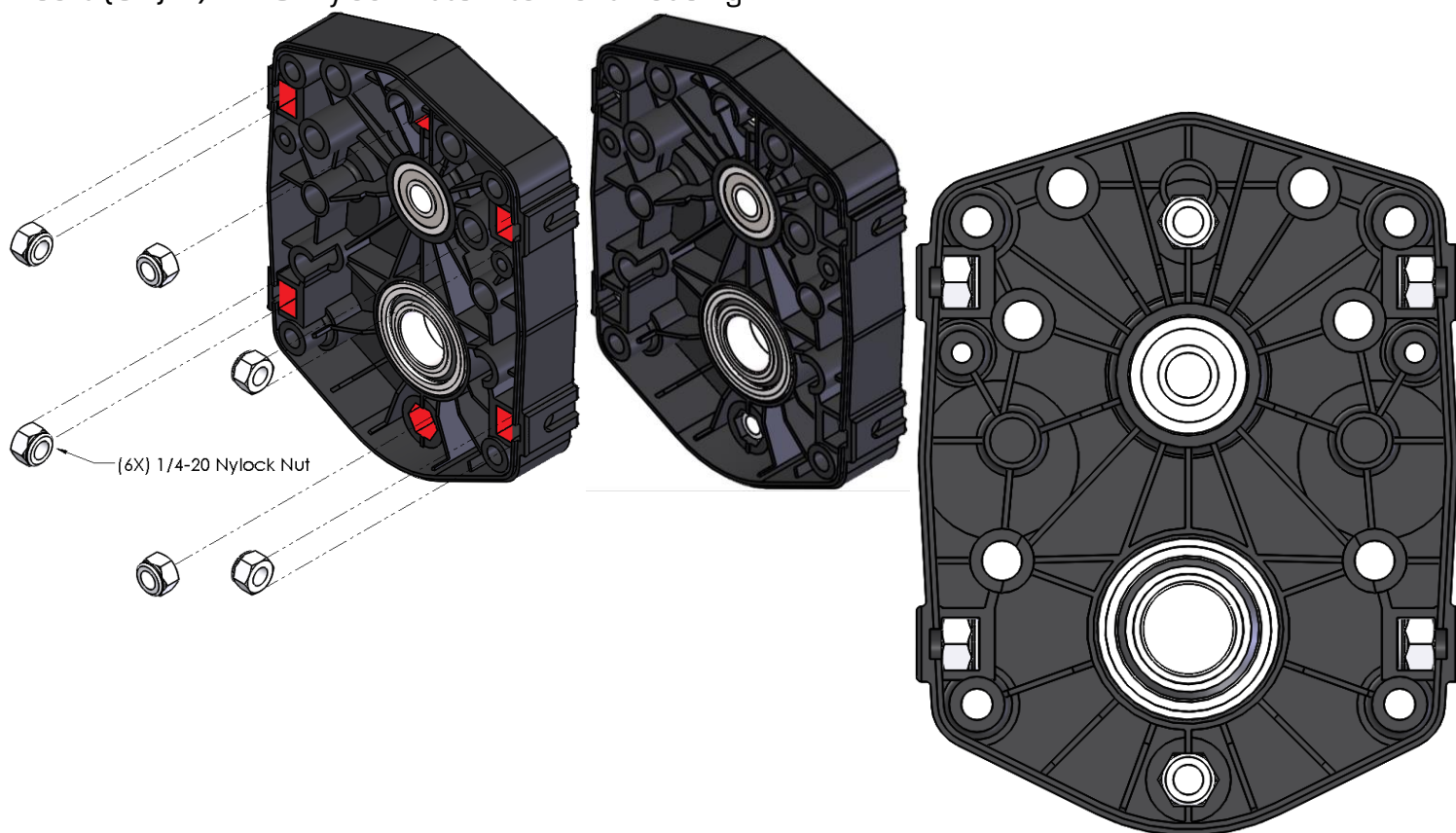
### Step 5:

Insert a 3/8" bearing and a 3/4" bearing into front shifter housing.



### Step 6:

Insert (6X) 1/4-20 Nylock nuts into front housing.

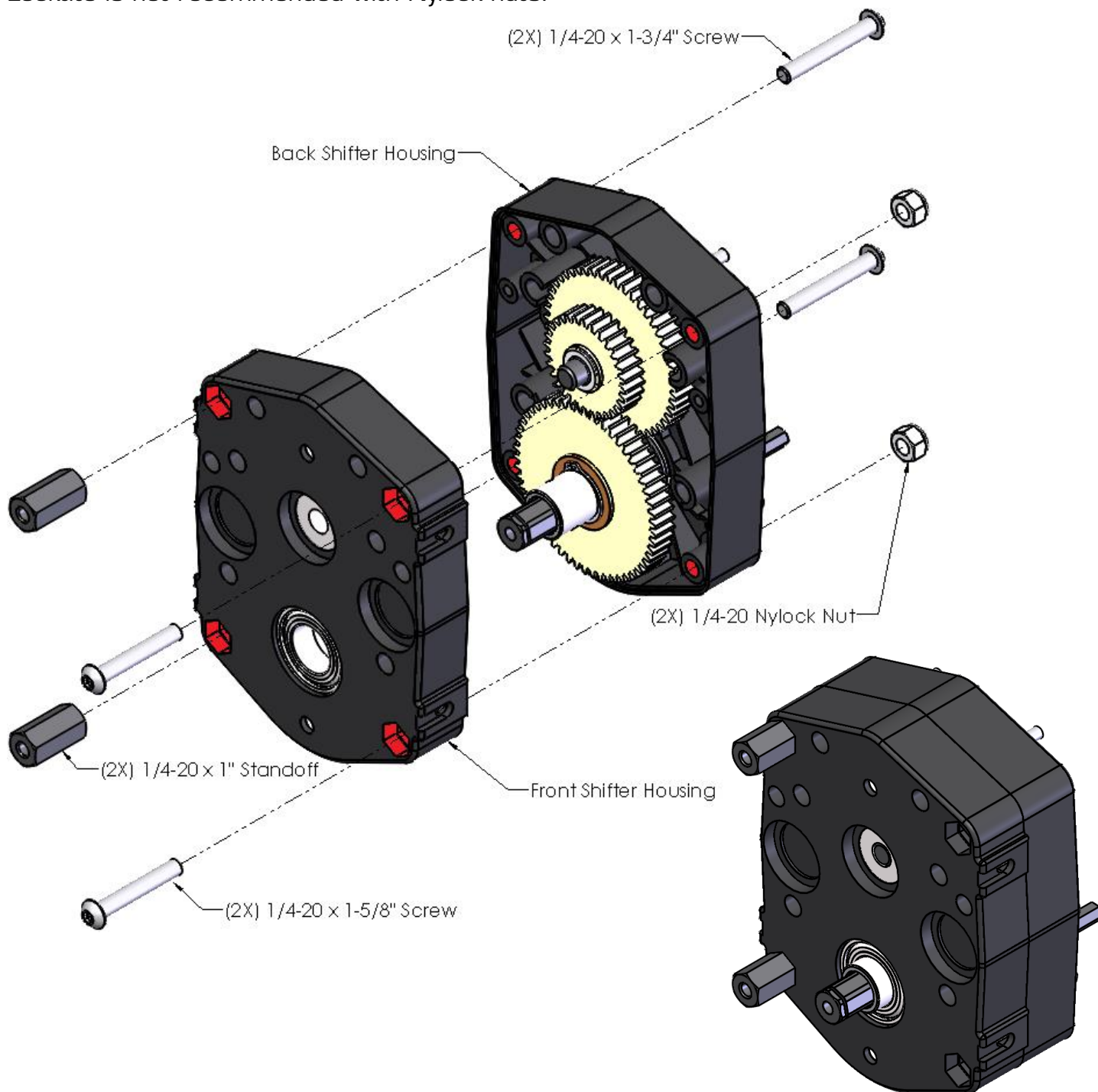


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## VEXpro 3 CIM Ball Shifter with 3<sup>rd</sup> Stage

### Step 7:

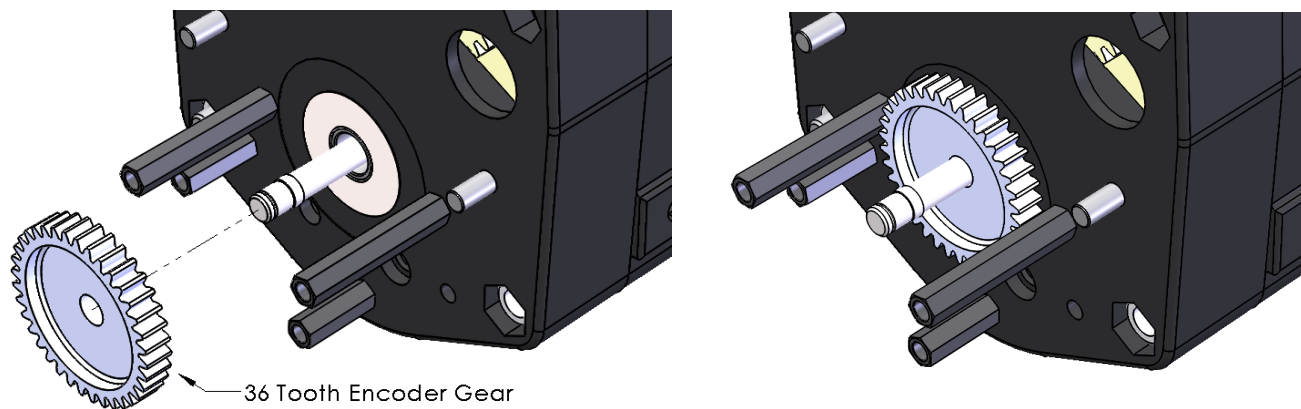
Connect the Front and Back Housings using (2X) 1/4-20 x 1-3/4" screws, (2X) 1/4-20 x 1" standoffs, (2X) 1/4-20 Nylock nuts, and (2X) 1/4-20 x 1-5/8" screws as shown. Use of Loctite is not recommended with Nylock nuts.



## VEXpro 3 CIM Ball Shifter with 3<sup>rd</sup> Stage

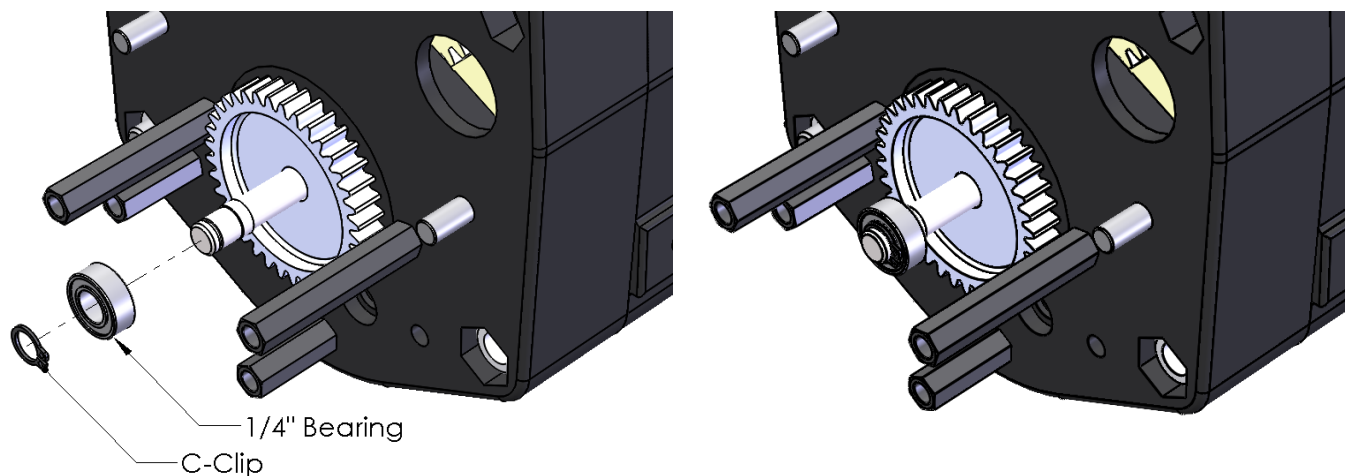
### Step 8:

Insert the 36 tooth encoder gear into the rear of the shifter shaft. Insertion will require a light press. It is recommended that a deep socket be used to press the gear in. Slide a deep socket over 1/4" shaft and apply force to the socket to press in the gear.



### Step 9:

Slide the 1/4" bearing onto the shaft. Install the C-Clip or Clip Ring into the groove to retain the bearing.



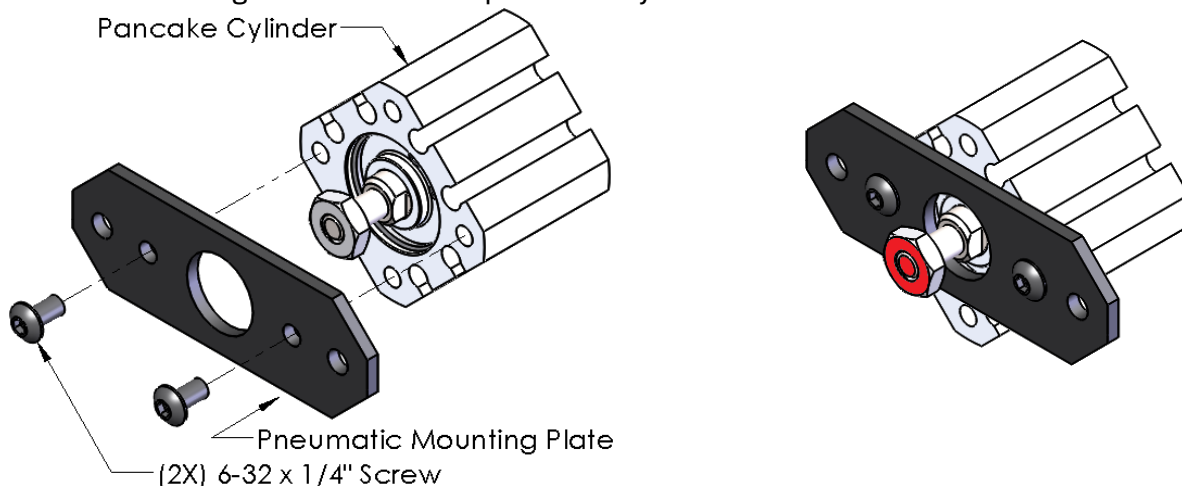


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## VEXpro 3 CIM Ball Shifter with 3<sup>rd</sup> Stage

### Step 10:

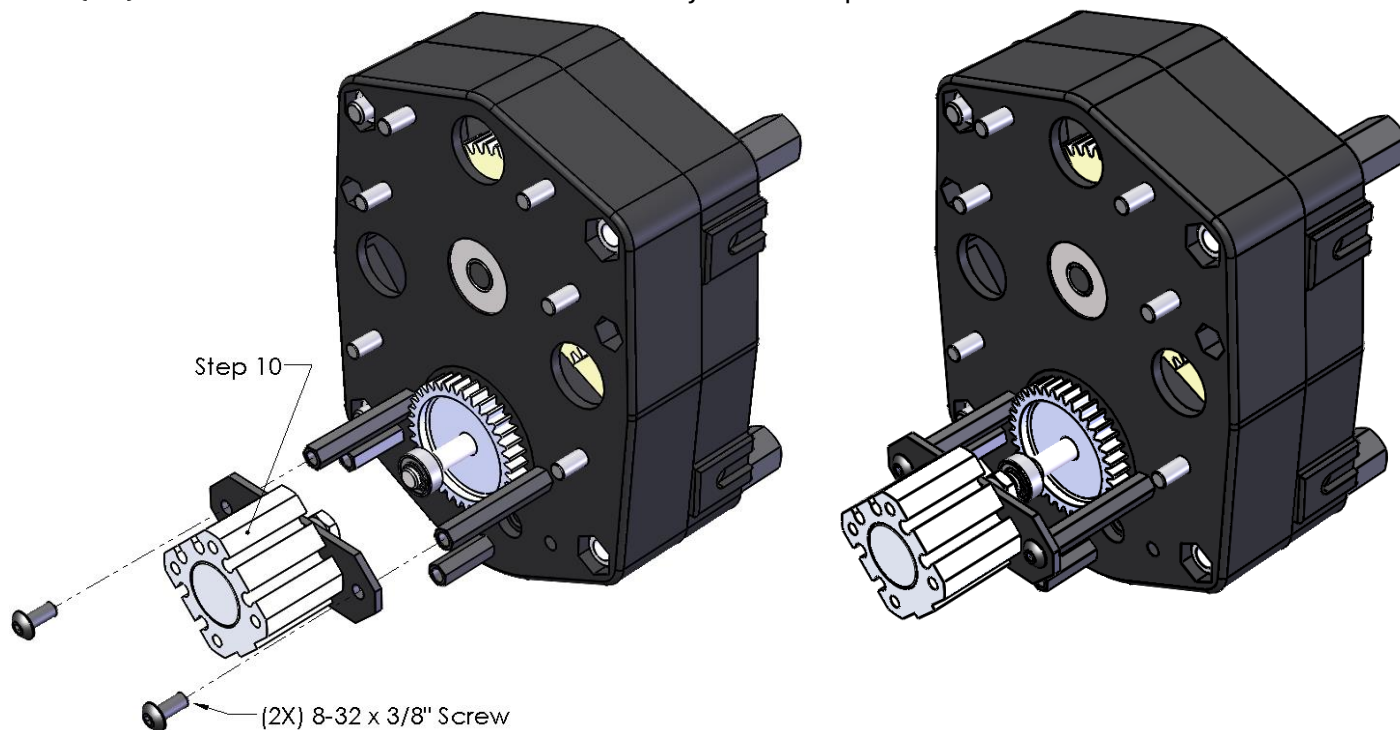
Install choice of pneumatic fittings. Then use (2X) 6-32 x 1/4" screws to attach the pneumatic mounting bracket to the pancake cylinder.



**Note:** The hex nut **MUST BE FLUSH** with the end of the piston rod.

### Step 11:

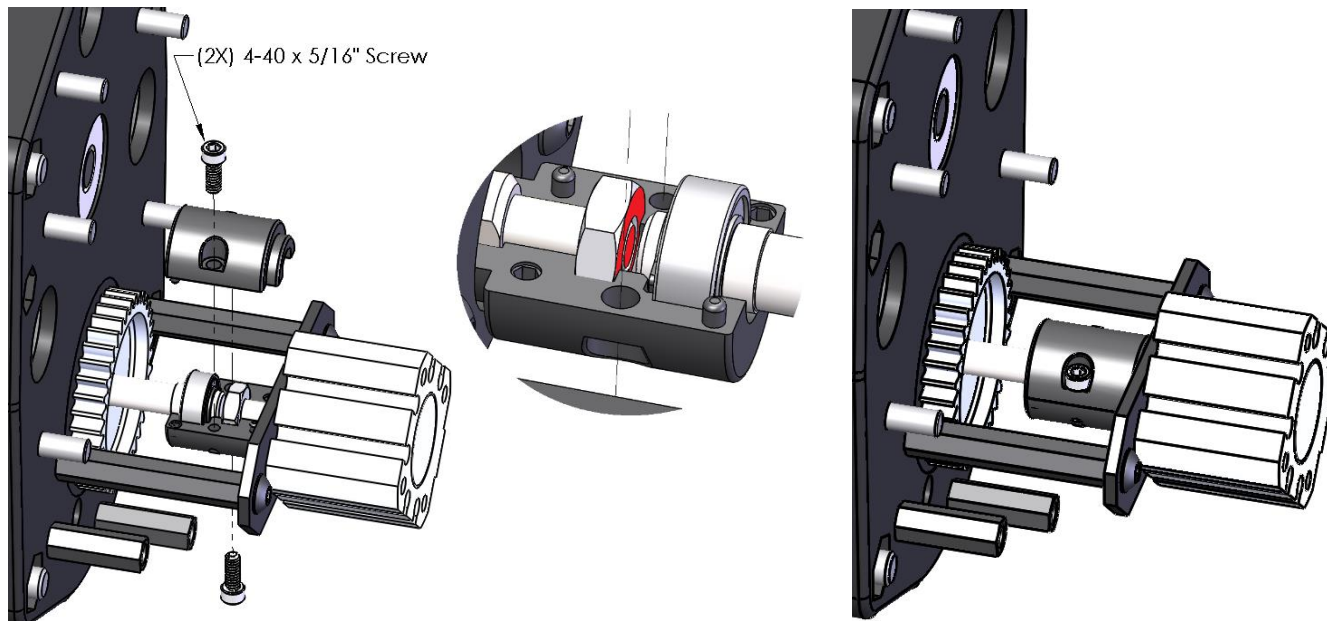
Use (2x) 8-32 X 3/8" to mount the assembly from Step 10.



## VEXpro 3 CIM Ball Shifter with 3<sup>rd</sup> Stage

### Step 12:

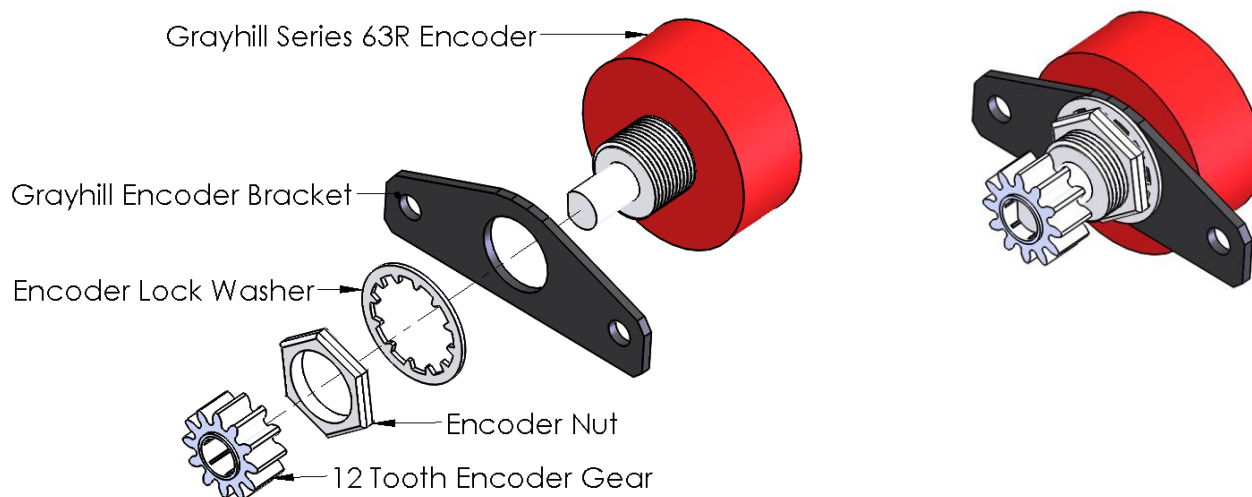
Use a pneumatic coupler half to capture the nut on the pancake rod and the bearing installed in Step 9. Make sure the nut is fully seated in the coupler then use (2X) 4-40 x 5/16" screws to attach the two halves.



**Note:** Double check that the hex nut is **FLUSH** with the end of the piston rod.

### Step 13:

If using a Grayhill Series 63R encoder (not included), use the nut and lock washer included with the encoder to mount it to the Encoder Mounting Bracket. Lightly press on the 12 tooth encoder gear.

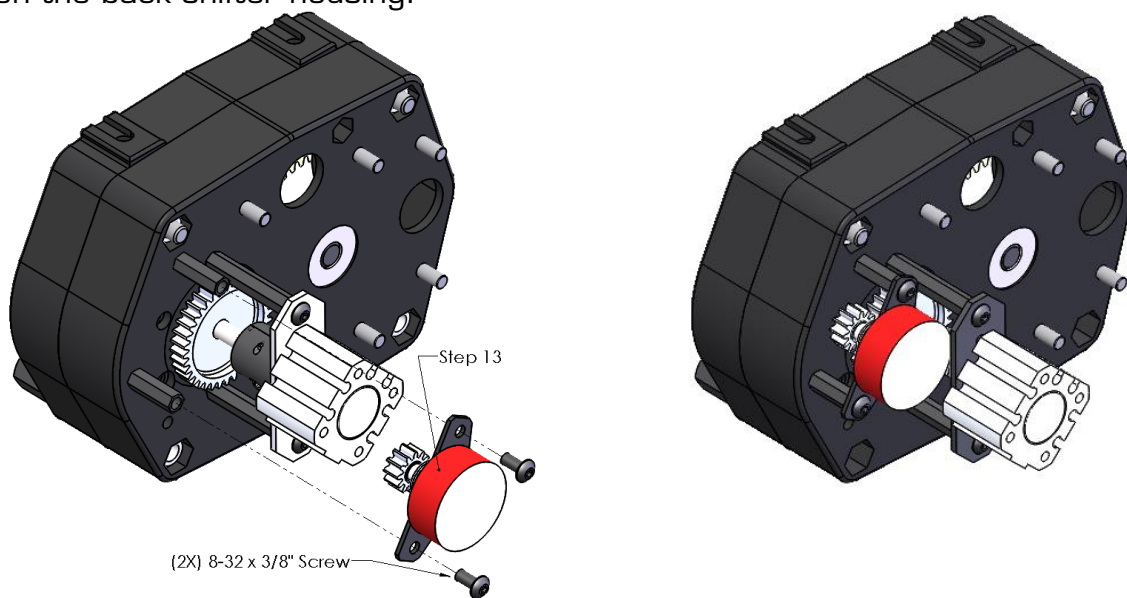




## VEXpro 3 CIM Ball Shifter with 3<sup>rd</sup> Stage

### Step 14:

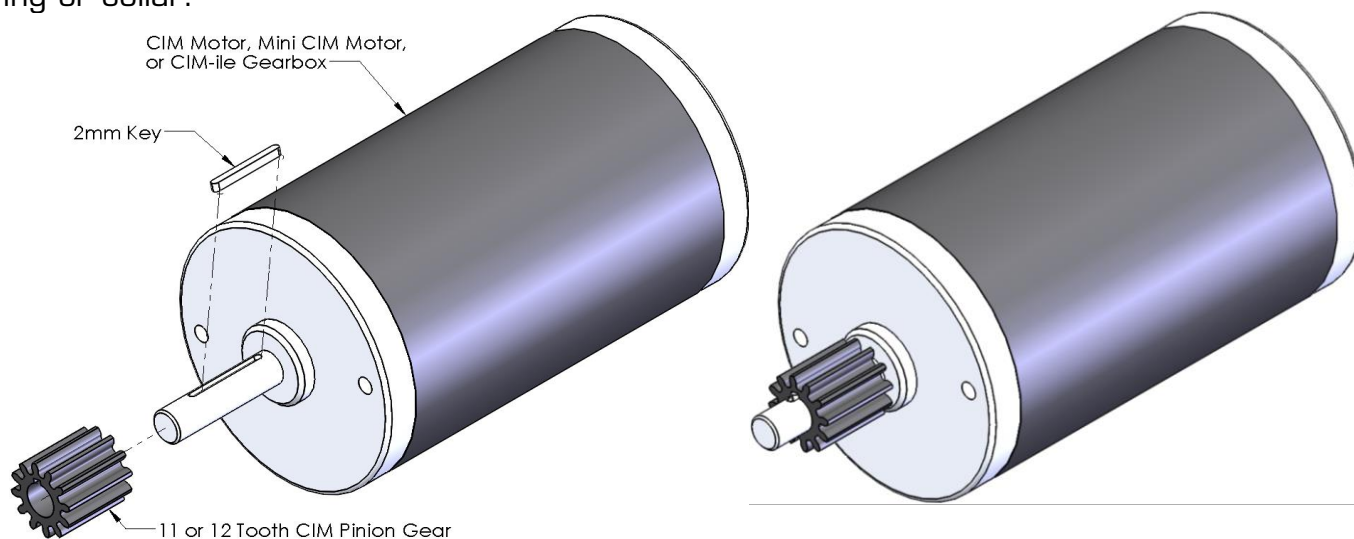
Use (2X) 8-32 x 3/8" screws to mount the encoder assembly from step 13. After the encoder is mounted, adjust the position of the 12 tooth encoder gear to ensure that it is not rubbing on the back shifter housing.



**Note:** For every 1 revolution of the output shaft the encoder will make 3 revolutions.

### Step 15:

Insert a 2mm key into the keyway of the motor and slide the 11 or 12 tooth CIM pinion gear on. The pinion gear is retained by the front and back shifter housing. Do not use a retaining ring or collar.



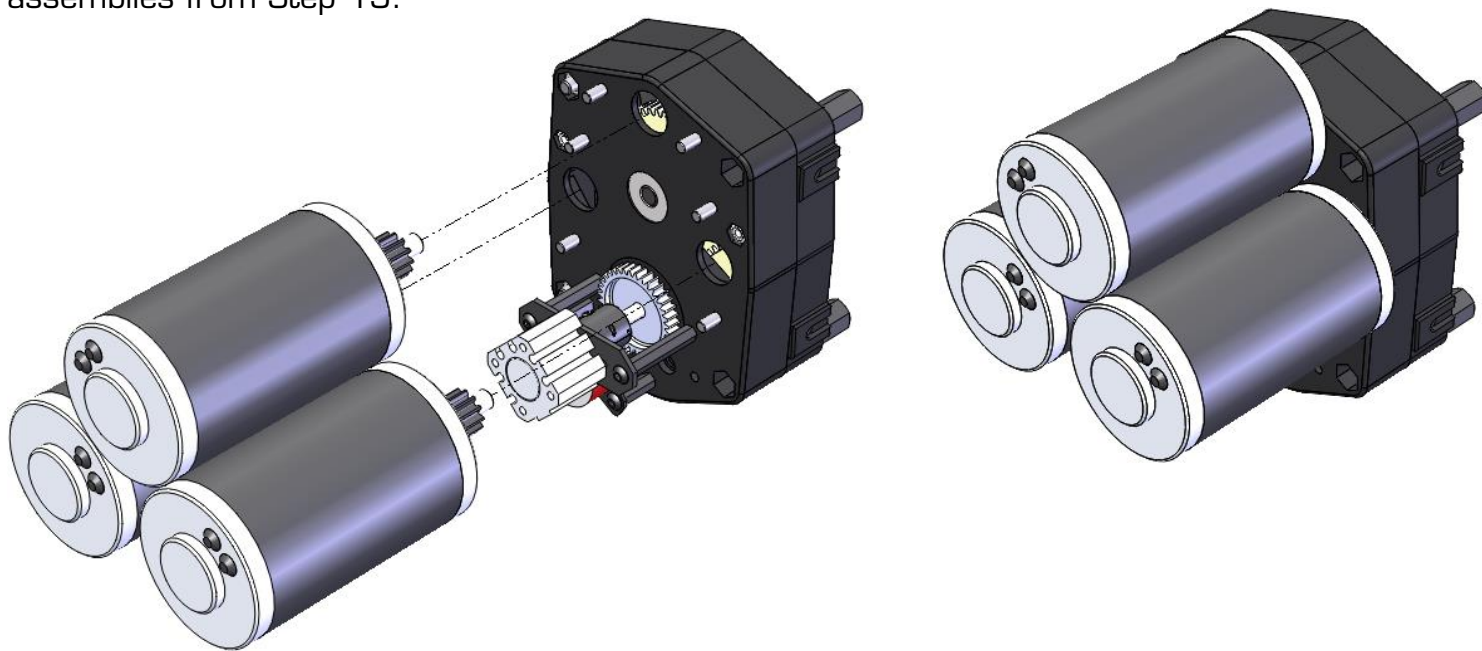
**Note:** No retaining ring or collar is needed. Using a retaining collar will bind the gearbox.

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## VEXpro 3 CIM Ball Shifter with 3<sup>rd</sup> Stage

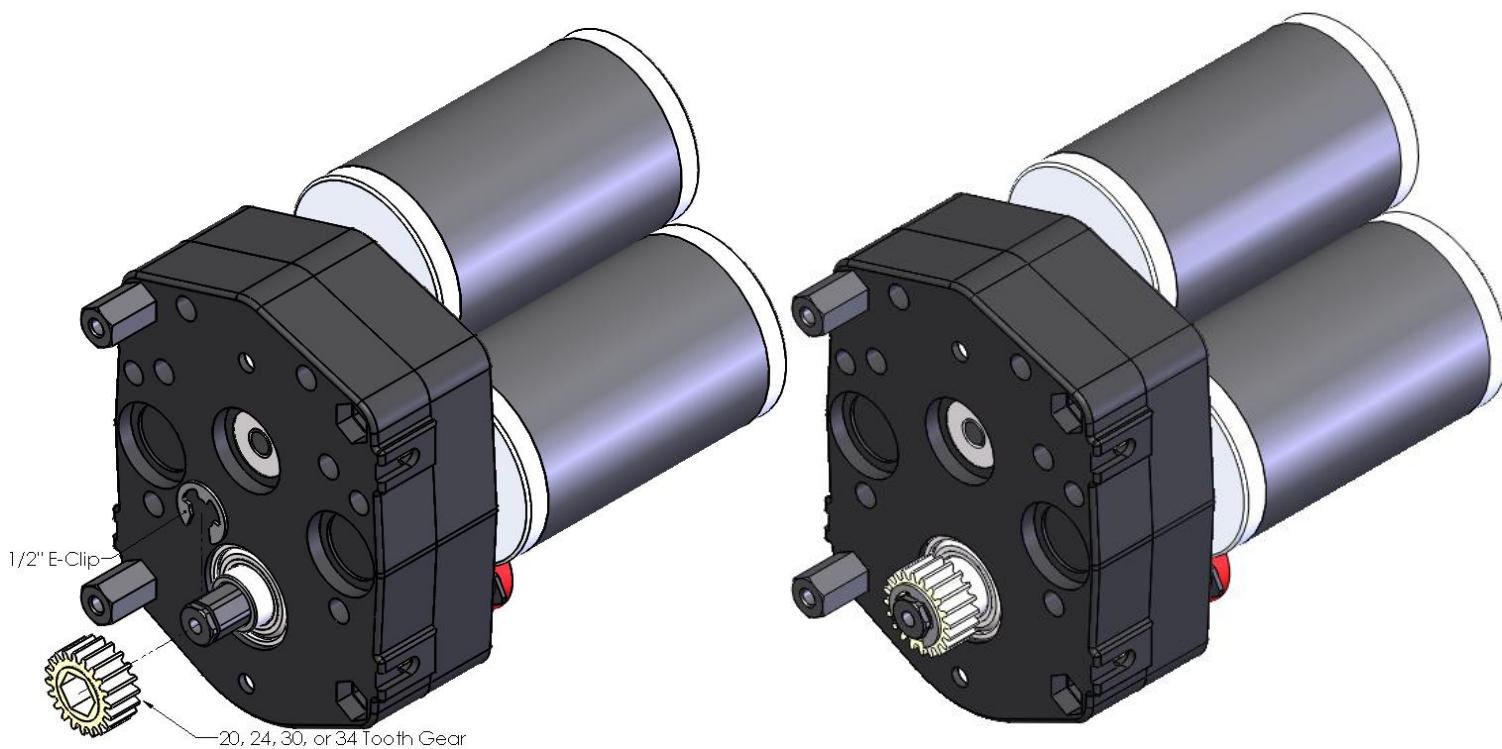
### Step 16:

Use the (6X) or (4X) 10-32 x 1/2" screws from Step 2 to mount (3X) or (2X) motor assemblies from Step 15.



### Step 17:

Install a 20, 24, 30, or 34 tooth gear. Insert a 1/2" E-Clip to retain the gear.

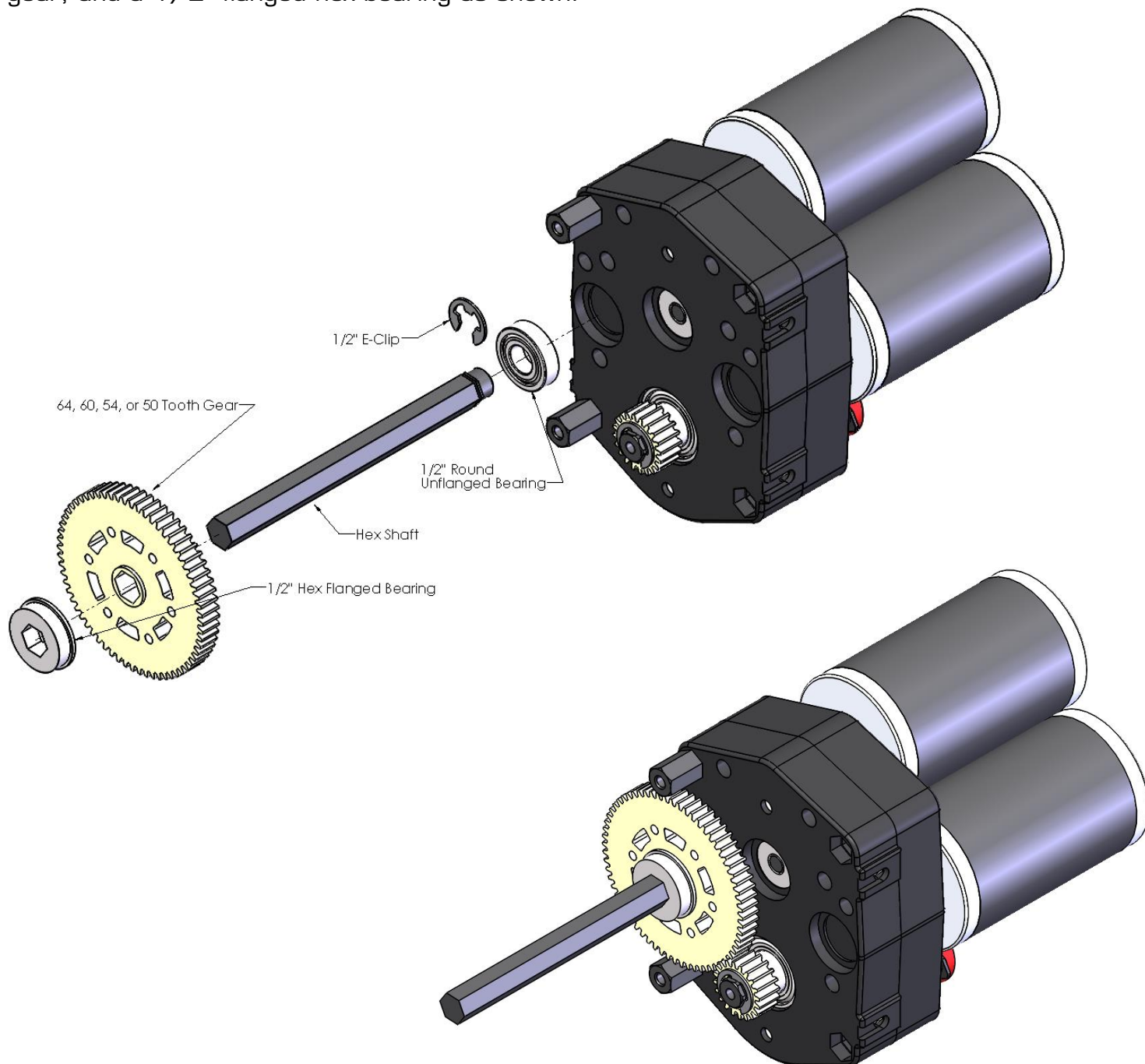


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## VEXpro 3 CIM Ball Shifter with 3<sup>rd</sup> Stage

### Step 18:

Install a 1/2" unflanged round bearing, hex output shaft, E-Clip, a 64, 60, 54, or 50 tooth gear, and a 1/2" flanged hex bearing as shown.



**Note:** The sum of the two gears teeth must be equal to 84.



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## VEXpro 3 CIM Ball Shifter with 3<sup>rd</sup> Stage

### Step 19:

Install (2X) 3/4" spacers, 3<sup>rd</sup> Stage Plate, (2X) 1/4-20 x 5/8" screws, and (2X) 1/4-20 x 1-1/4" screws.

