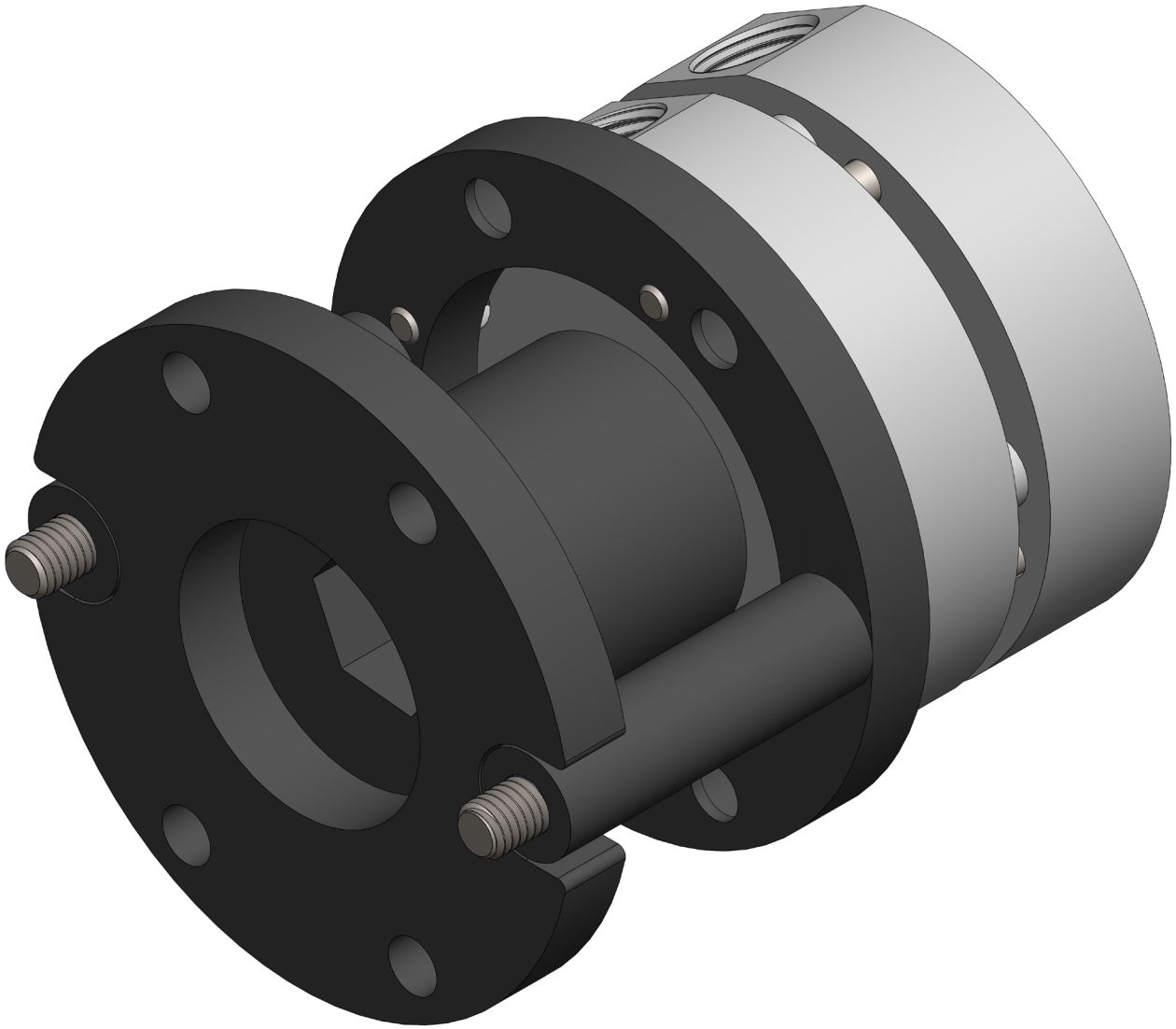
WCP Friction Brake (1/2" Hex) - User Guide (Rev 1)



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What is the WCP Friction Brake (3/8” & 1/2” Hex)?

The WCP Friction Brake is designed to solve the issue of holding a system in place when there is no or little power applied. This can be useful for teams with limited controls experience or just want to hold their robot in place at the end of the match.

The design goal of this brake is to be placed in the FIRST reduction of a gearbox. It is NOT designed to be on the last stage of the gearbox or support the full weight of a mechanism 1:1.

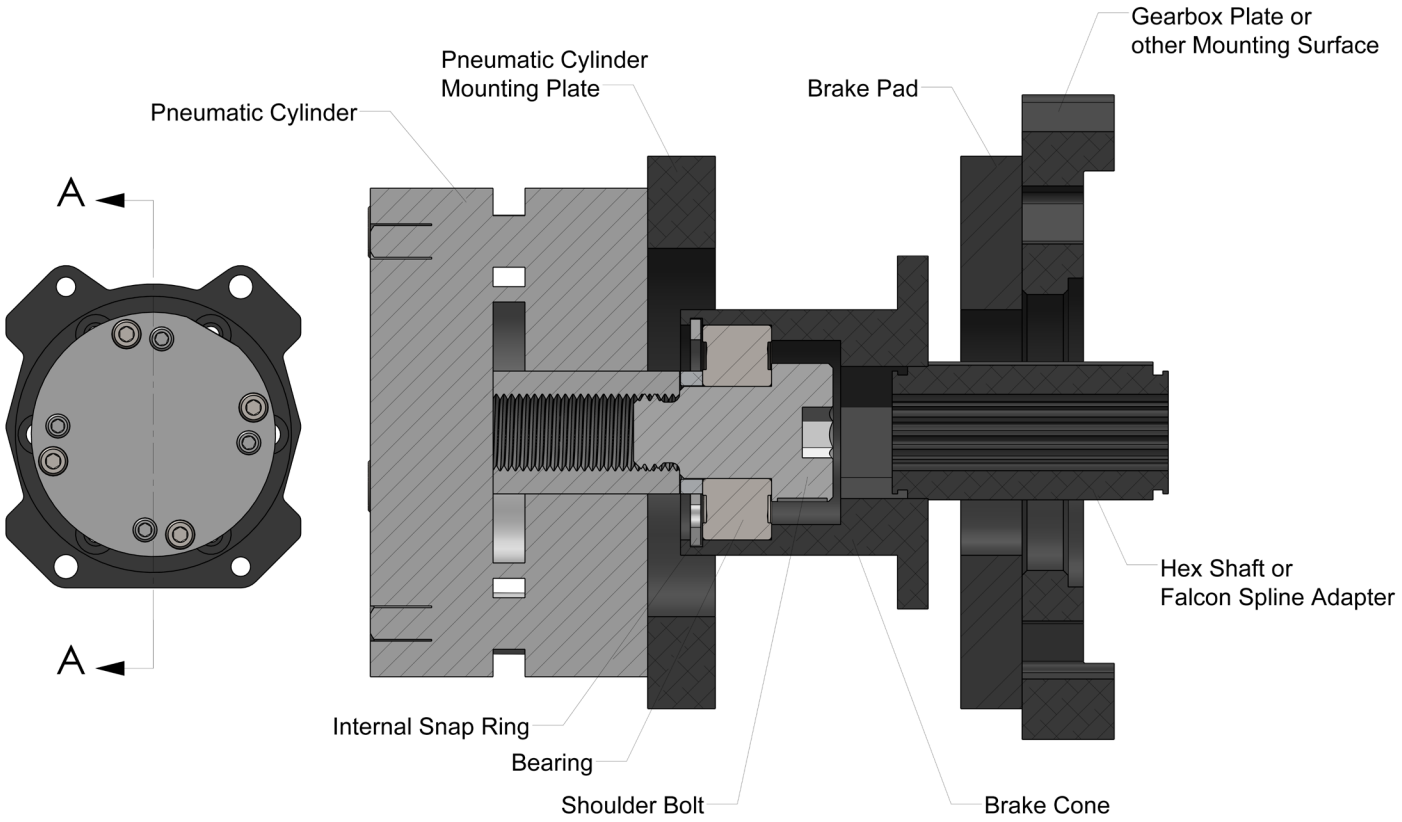
It is compatible out of the box with the Rotation SS Gearbox and Versablock V2. These are some examples where you can use the Friction Brake.

Also if you’d like to increase the “friction” between the cone and the pad you can take a file or rough up the cone physically. This should provide greater output force for the brake. We chose silicone rubber as it was a nice in between holding force and wear time. There are other options for brake pads that are available on McMaster, search “clutch lining”.

How does the WCP Friction Brake work?

The Brake Cone Assembly is attached to the pneumatic piston via a shoulder bolt passing through a captured bearing. This captured bearing allows the Brake Cone to free spin when the piston is retracted. The Brake Cone is then connect to an extended shaft from a gearbox or the Falcon Spline adapter to connect directly to the Falcon motor.

When the cylinder extends, the Brake Cone is pressed into the Brake Pad attached to the gearbox plate. The friction between the Brake Pad and the Brake Cone cause the braking for the gearbox.



SECTION A-A
SCALE 2 : 1

WCP Friction Brake Holding Torque

The following values were found using the WCP Friction Brake, unmodified, and with the WCP Friction Brake Pad. The pneumatic cylinder was run at 60 psi.

Holding Torque

- Nominal - 1.5 ft-lbs
- Min - 1 ft-lbs
- Max - 2 ft-lbs

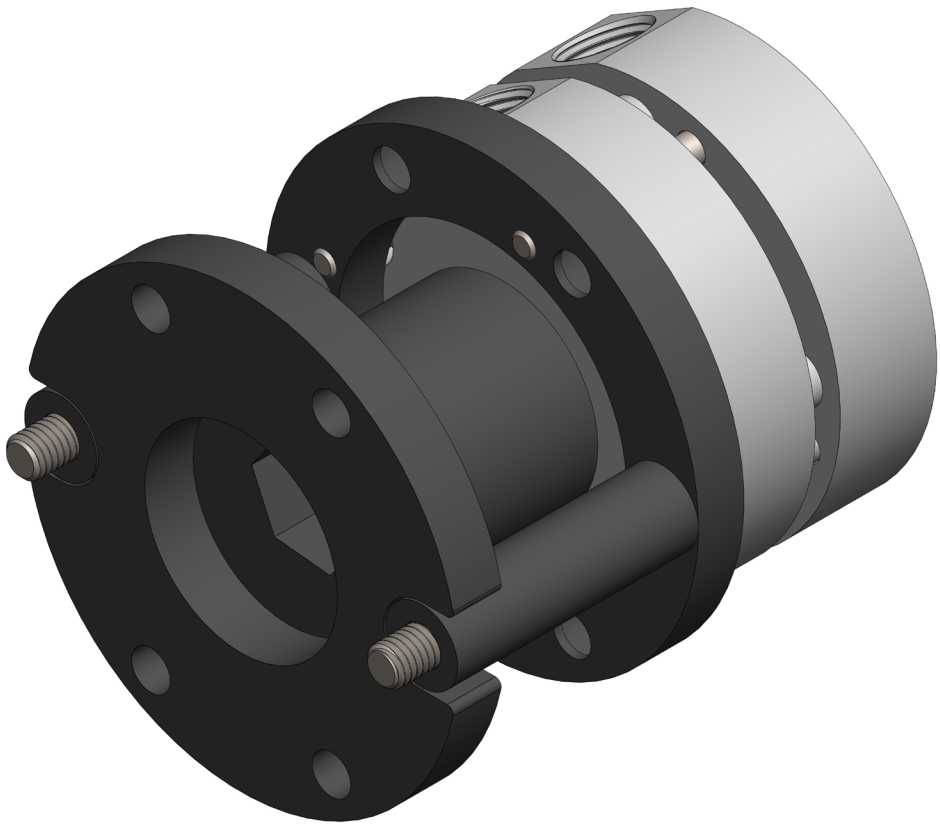
Note: The numbers were measured directly at the brake. These are without a motor attached. Adding a motor in brake mode will increase these values.

Recommended Tools

Picture	Name
	Allen Key Set
	Loctite 248 Stick (McMaster P/N 1004A12)
	Snap Ring Pliers

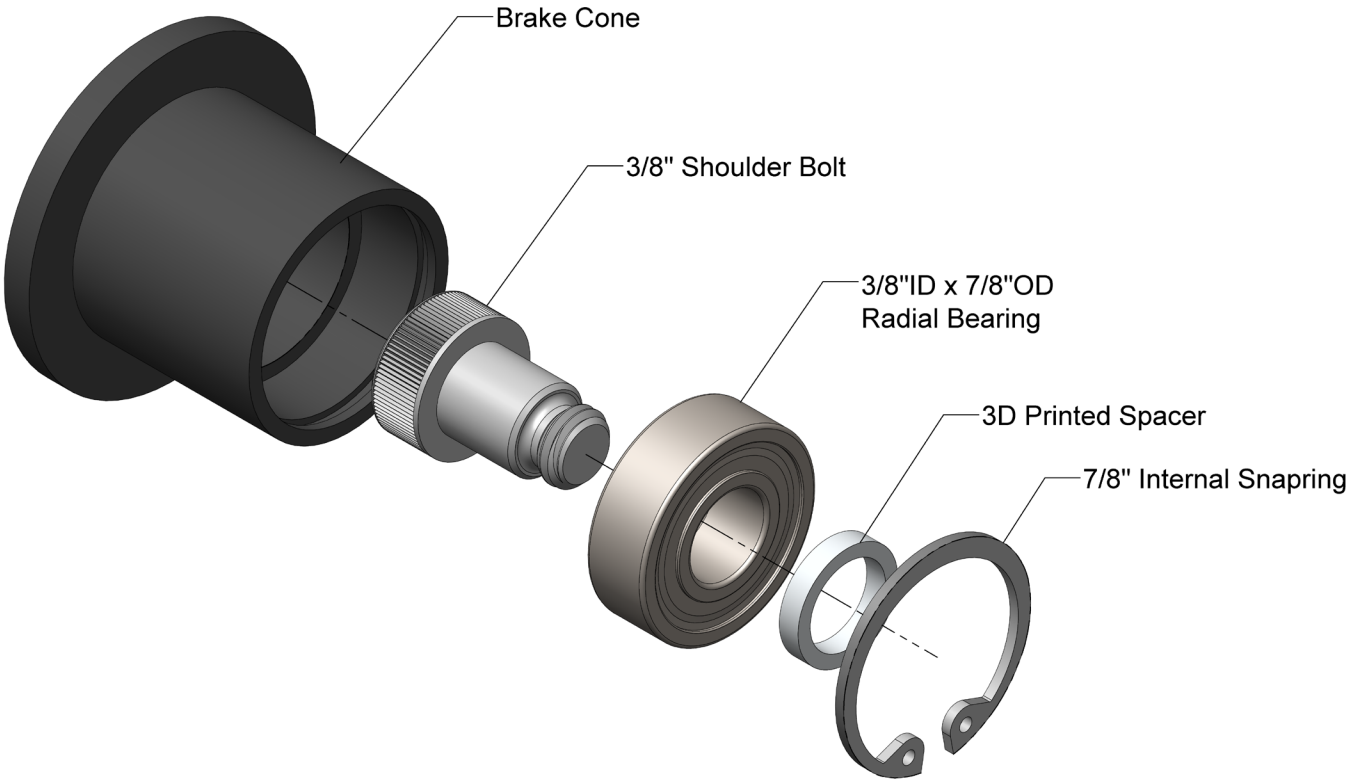
Assembly Instructions

Disclaimer: Piston not included. Can be purchased from McMaster (P/N 1691T142)



Step 1

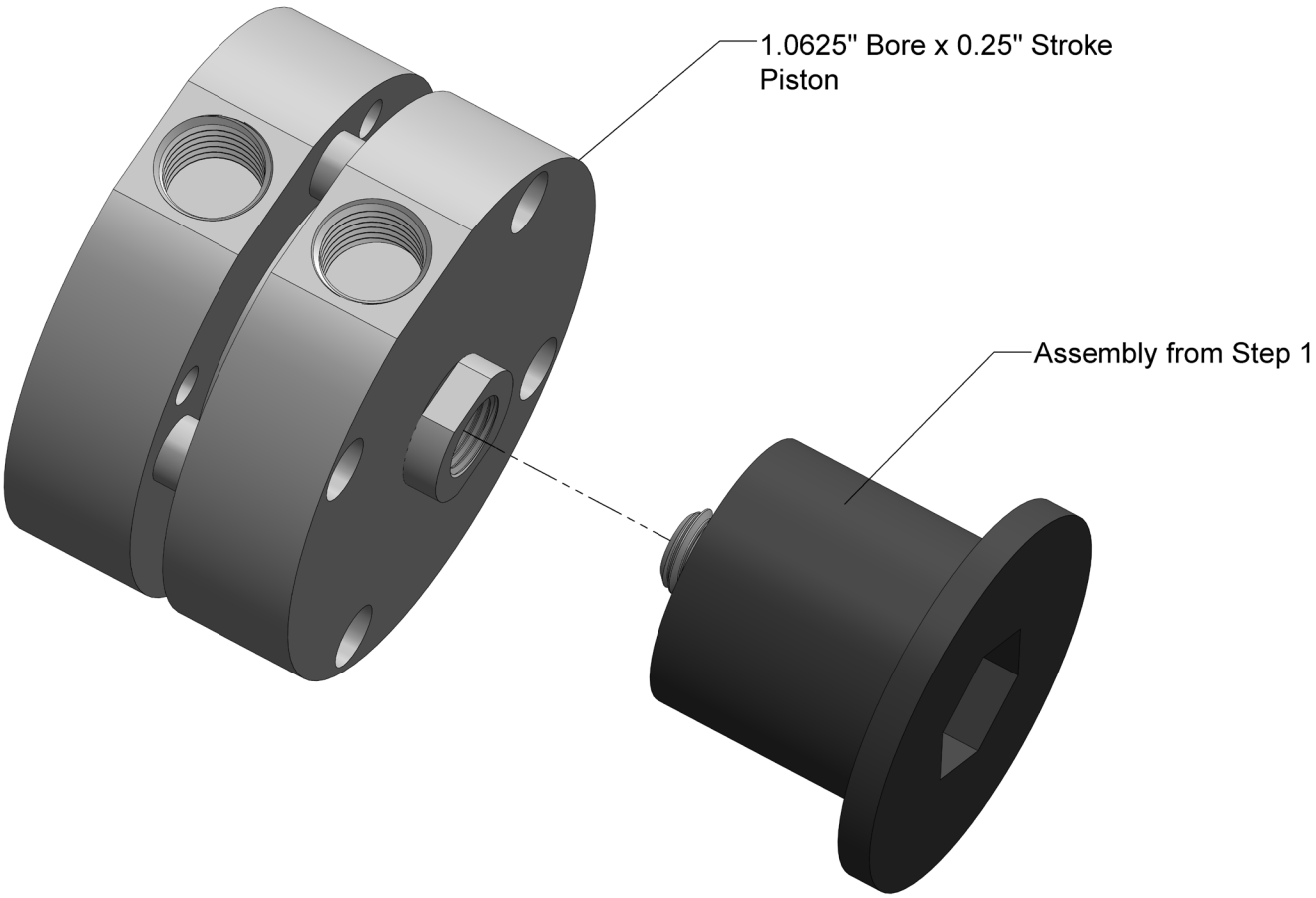
These will come pre-assembled. This step is used if you need to disassemble or change from the 1/2” hex cone to the 3/8” hex cone.



Step 2

Thread brake cone onto rod of cylinder. The threads of the shoulder bolt are relatively short so Loctite is recommended to be used.

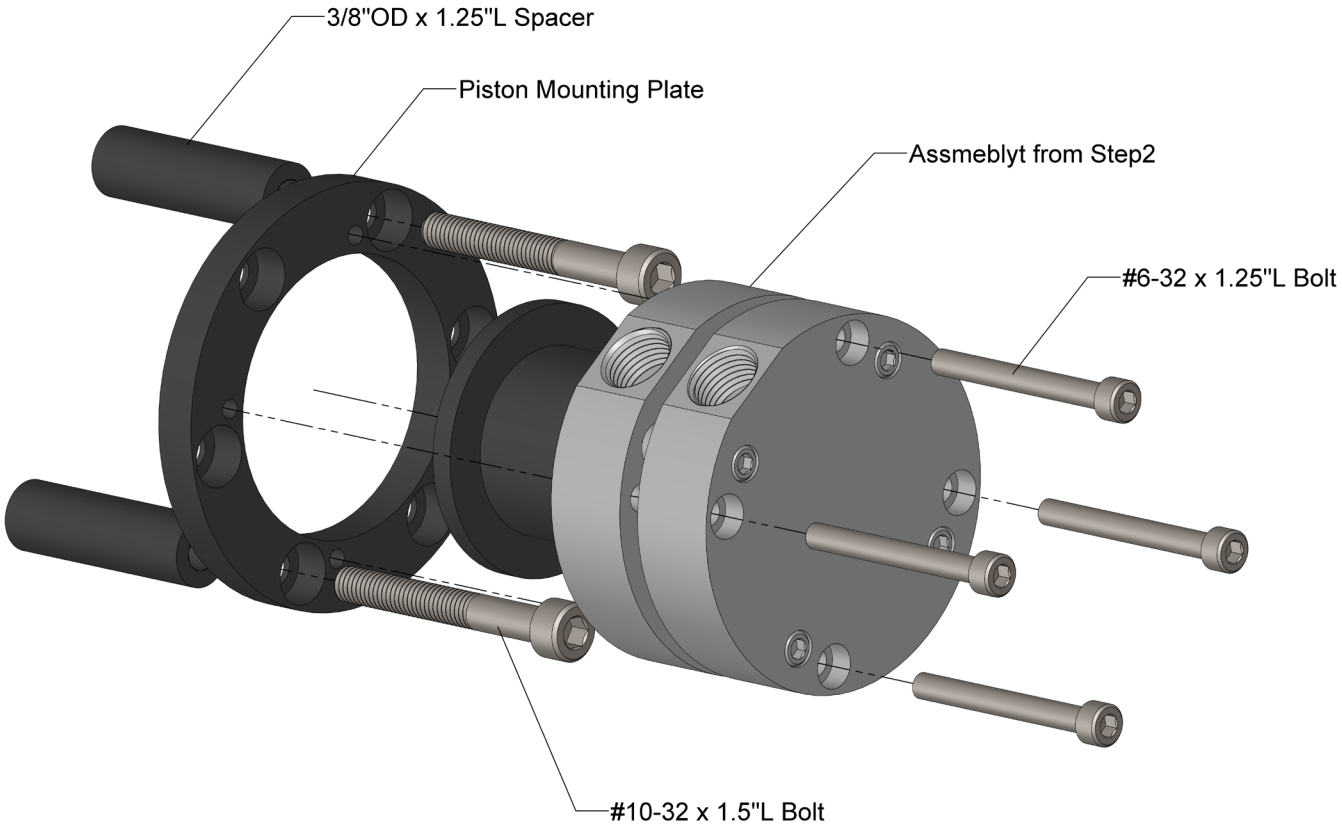
Note: We recommend attaching your desired pneumatic fittings in this step as the installation will be the easiest here.



Step 3

The two #10-32 x 1.5”L bolts must be installed first due to the piston covering the heads of these bolts once the piston is mounted.

Note: This step must be done during the final intallation to the gearbox/plate where the brake will be mounted



Available Kits

Kit Number	Name
KIT-0001	Friction Brake (1/2” Hex)

KIT-0001: Friction Brake (1/2” Hex)

Part Number	Name	QTY
WCP-0200	Friction Brake (1/2” Hex)	1
WCP-0201	Friction Brake Pad (1-7/8” Bolt Pattern, Silicone Rubber, 40A)	1

WCP-0200: Friction Brake (1/2” Hex)

Part Number	Name	QTY
WCP-0200-001	WCP Brake - Piston Mounting Plate	1
WCP-0200-002	WCP Brake - Bolt Spacer	1
WCP-0200-003	Friction Brake (1/2" Hex)	1
217-3239	R6-ZZ Bearing	1
WCP-0352	3/8” Round x 3/8” L Shoulder Bolt (5/16”-24, Steel, Black Oxide)	1
WCP-0222	Aluminum Spacers (.196” ID x 3/8” OD x 1-1/4” WD)	1
WCP-0257	#10-32 x 1.500” L BHCS (Steel, Black Oxide)	2

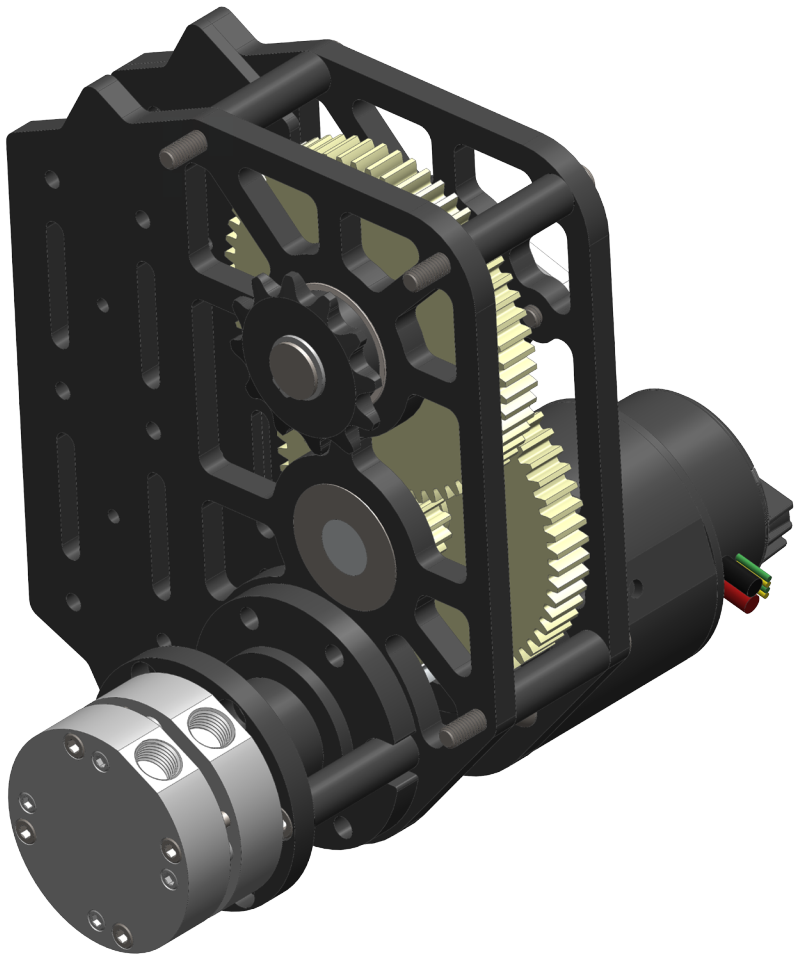
Recommended Parts to Buy

Part Number	Name	QTY
McMaster 91251A155	#6-32 x 1.25”L Bolt	1
McMaster 1691T142	1.0625” Bore x 0.25” Stroke Piston	1

Application Example - WCP Rotation SS Gearbox

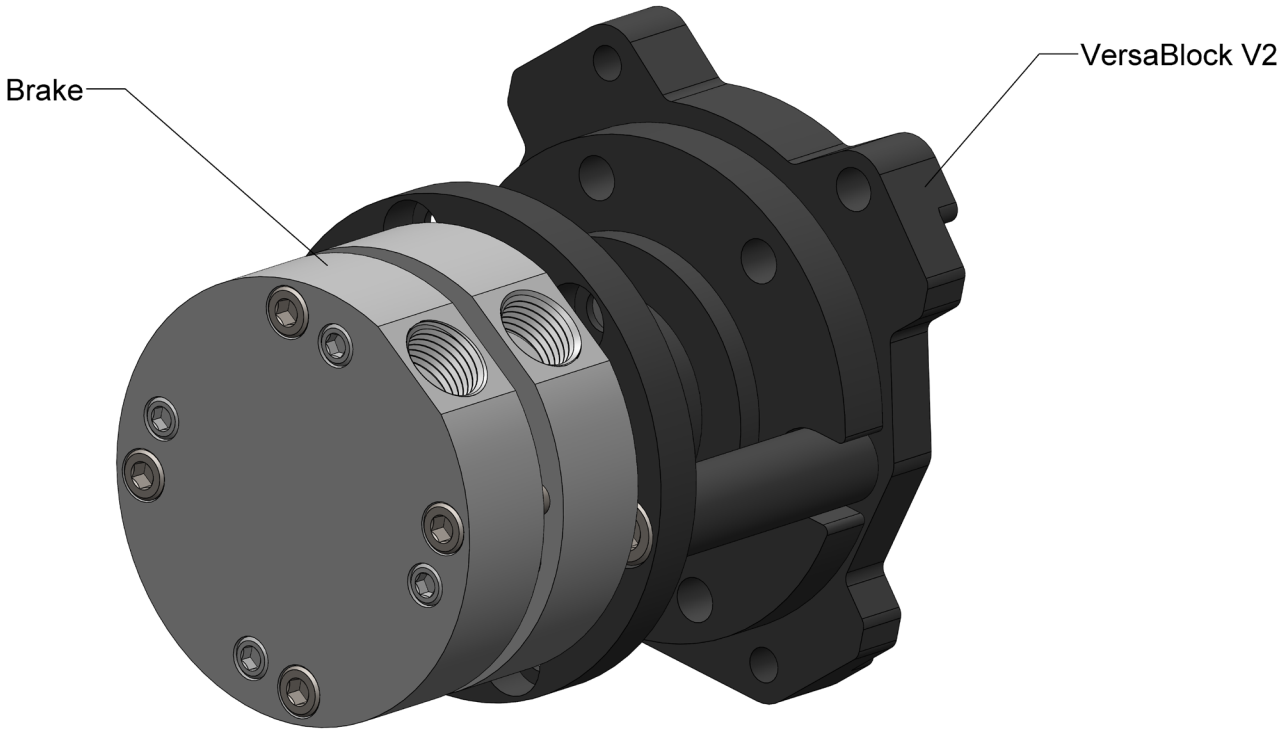
The WCP Rotation SS Gearbox and the WCP Friction Brake are a perfect combo for teams that want to control an arm or similar mechanism.

Note: The brake pad must be bolted to the mounting surface for the max braking force.



Application Example - VersaBlock Mounting

Note: The brake pad must be bolted to the mounting surface for the max braking force.



FAQ

Q: What PSI should I run the piston at?
A: 60 PSI

Q: What stage can I put the brake on?
A: Any stage or position on the robot, but we recommend the first stage or the closest to the motor as possible. The results will be much better.

Q: What is the holding force of the brake?
A: The WCP Friction Brake with the WCP Brake Pad can support 1.5 ft lbs by itself at 60 PSI. The max/min that we have recorded in testing has been 1-2 ft lbs. These values are recorded at the brake and without a motor attached. Adding a motor in brake mode will increase these values.

Trouble Shooting

Issue: Brake does not disengage.

Possible Solutions:

1. Check that the shoulder bolt attaching the cone to the piston is threaded all the way in.
2. Check the air pressure for the piston. If it is too low, the piston will struggle to disengage.

Revision Table

Revision Date	Revision #	Description
1/5/2020	1.0	First revision created.
3/16/2020	1.1	Updated how to mount brake pad.
6/7/2021	1.2	Added explanation of how the brake functions.
7/7/2021	1.3	Added brake holding torques.
11/29/2021	1.4	Updated kit and trouble shooting.