

Guidance for Adjusting the EFR Wastegate System (for internally-wastegated turbos)

Rod (& Spring) Preload (mm / nut turns)	Remaining Stroke Capability inches (mm)	179282, 179420, or 179285 <u>Low Boost WG Canister</u>		179283, 179421, or 179286 <u>Medium Boost WG Canister</u>		179284, 179422, or 179287 <u>High Boost WG Canister</u>	
		WG Crack-Open Pressure (psi)	Full Stroke Pressure (psi)	WG Crack-Open Pressure (psi)	Full Stroke Pressure (psi)	WG Crack-Open Pressure (psi)	Full Stroke Pressure (psi)
0	0.67" (17mm)	4.0	13.7	8.8	20.6	16.8	32.3
1	0.63" (16mm)	4.9	13.8	9.6	20.6	17.3	32.3
2	0.59" (15mm)	5.7	14.0	10.8	20.6	17.6	32.3
3	0.55" (14mm)	6.1	14.1	11.2	20.6	17.8	32.3
4	0.51" (13mm)	6.8	14.3	11.9	20.6	17.9	32.3
5	0.47" (12mm)	7.3	14.4	12.3	20.6	18.1	32.3
6	0.43" (11mm)	8.0	14.4	13.2	20.6	18.6	32.3
7	0.39" (10mm)	8.5	14.6	14.0	20.6	19.0	32.3
8	0.35" (9mm)	9.1	14.6	14.5	20.6	19.3	32.3
9	0.31" (8mm)	9.6	14.7	14.8	20.6	19.4	32.3
10	0.28mm (7mm)	9.9	14.7	15.9	20.6	19.6	32.3

Use with up to 13psi applied pressure

Use with up to 19psi applied pressure

Use with up to 31psi applied pressure

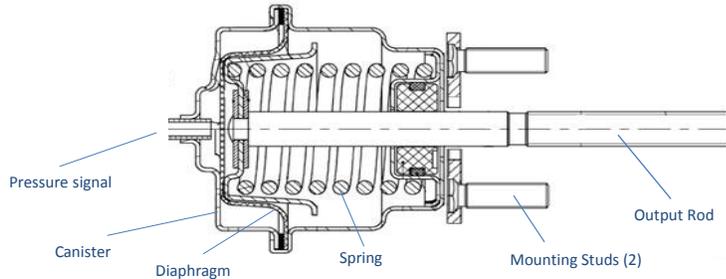
Note 1: Avoid too little preload. The diaphragm can rub (and wear) against the top of the can. We recommend 3mm of preload as a starting point.

Note 2: Avoid too much preload. Too much preload can cause premature diaphragm wear, but can be used functionally to limit travel and avoid boost droop at high RPM.

Note 3: When using solenoid valve boost control, the signal pressure that the WG canister sees can be bled off. Select a canister that will allow nearly full stroke.

Note 4: The "use with up to" pressures avoid long-term wear. By bottoming out the stroke, the diaphragm can be distressed over the course of time.

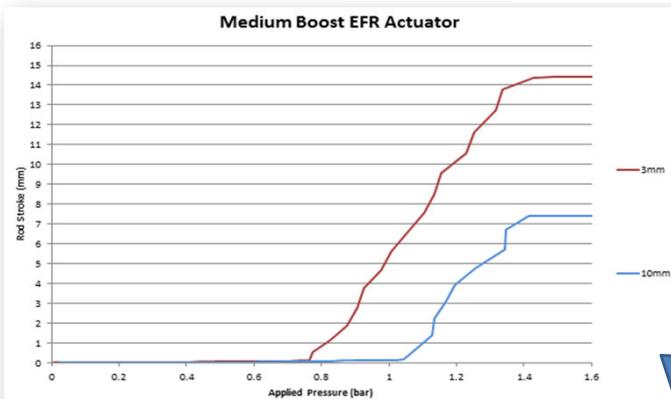
Note 5: EFR turbo assemblies come standard with the "Medium Boost" WG canisters. "Low" or "High" boost actuator canisters can be purchased from any EFR dealer.



When pressure is applied, the rod strokes in this direction by up to 17mm. (0.67")

When preload is added by the user, the rod is pulled out of the can in this direction.

Preload compresses the spring and as a result the "crack-open" pressure becomes higher. Also, since the preload length subtracts from the total stroke length available, the resulting working stroke is diminished. This can be used as a feature if less stroke is desired such as combatting boost droop at high RPM.



Further explained in the chart... (3mm and 10mm preload cases shown)

- 10mm preload requires significantly more pressure in order to crack open the wastegate than 3mm preload does.
- With 3mm preload, there is a working stroke of ~14mm available. By the time 1.4 bar (~20.6psi) is applied, the rod will be fully extended and the wastegate valve will be opened to a large angle.
- With 10mm preload, the stroke is limited to ~7mm and the wastegate will not open nearly as far when 1.4bar is applied... or when any pressure higher than 1.4 bar is applied.
- Of course, the solenoid valve (BCSV) can be used to spill the signal pressure being sent to the actuator canister nipple. If 10mm preload is applied then the force loading will be quite high. If the solenoid valve's duty cycle is 100% up until the point that 1.4bar boost is reached and then snapped to 0%, then in theory the wastegate would go from fully closed to fully open (7mm stroke) when that signal change happens.

Recommended sequence of events:

1. Start with the Medium Boost actuator unless your targeted boost pressure is higher than 18psi. If you want to run more than 18psi, then consider the High Boost actuator or at least have it on hand for your tuning process.
2. Tune your boost controller to 0% duty cycle (no signal spill) and start adjusting boost pressure by only using the rod preload. Start at 3mm preload and make an assessment of spool-up, boost response, and overboost. Keep increasing preload until you hit the target boost pressure on at least some portion of the RPM range.
3. Complete the fine-tuning using solenoid duty cycle (your boost control output) to fine-tune the boost curve across the RPM range.
4. If there's boost droop (boost too low at high RPM), go back and add more preload. If all else fails and you are out of options with the medium boost canister, switch to the High Boost actuator by ordering one from your EFR dealer.