

TS-0565-1212-PSG50V Vacuum Pneumatic Straight Gate-Instructions



Product Name: PSG50V Vacuum Pneumatic Straight Gate
Product Description: PSG50V Vacuum Pneumatic Straight Gate
Product Number: [TS-0565-1212](#)

Important Notes on Your External Wastegate

- Turbosmart accepts no responsibility whatsoever for incorrect installation of this product which is potentially hazardous and can cause serious engine damage or personal injury.
- The Straight external Wastegate is designed for use with a turbocharger that does not have an internal wastegate.
- Consult your local specialist before setting your desired boost pressure, setting boost beyond your engines capability may result in engine damage.
- Use only high-quality fittings ensuring maximum sealing reliability.
- Correctly setting up a sensible boost control strategy to ensure engine safety is highly recommended.

Recommendations

- Allow for adequate cool airflow around actuator.
- DO NOT Mount the wastegate so that the actuator is less than 100mm from a heat source.
- DO NOT wrap the body of the wastegate with exhaust wrap.
- Fitting your Straight Wastegate may require fabrication or modification to your exhaust manifold. Turbosmart recommends that your
- wastegate is fitted by an appropriately qualified technician.
- Turbosmart recommends that the engines Air/Fuel ratio is checked while setting the desired boost pressure, as any increase in

- boost pressure can cause the engine to run “LEAN”, resulting in possible engine damage.
- Turbosmart recommends that boost pressure is set using a dynamometer and not on public roads.
- Turbosmart recommends that a boost gauge be permanently fitted to the vehicle.

Kit Contents

Please check that the following items have been provided in your Straight Wastegate kit.

Part	Description	Use	QTY
1	Turbosmart StraightGate	Main unit	1
2	Inlet V-band Clamp	Inlet V-band Clamp	1
3	Inlet Weld flange	Inlet V-band weld flange	1
4	Outlet V-Band clamp	Outlet V-band clamp	1
5	Outlet weld flange	Outlet V-band weld flange	1
6	Turbosmart Sticker	Turbosmart sticker	1

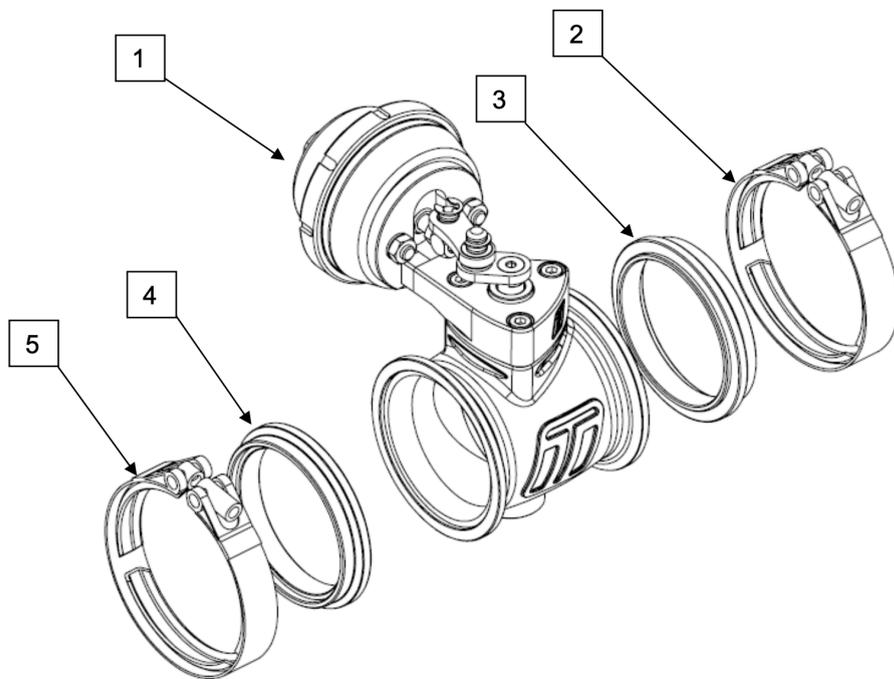


Figure 1 - Kit Contents

① Tools Required

- 3/8" square drive deep socket - Square drive ratchet wrench
- Torque wrench (3/8" drive)
- Metric Allen Key set

① Part Numbers

- [TS-0565-1212](#) – PSG50v Vacuum Pneumatic Straight Gate 6psi Black
- [TS-0565-1762](#) – PSG50 Pneumatic Straight Gate 6psi Black

Straight Pneumatic Wastegate Overview

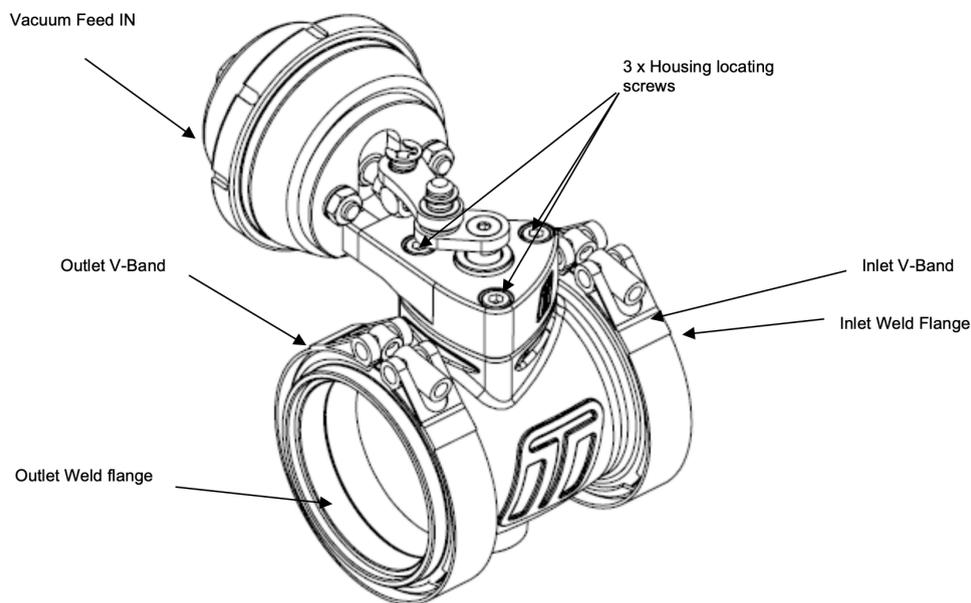


Figure 1 - Pneumatic Straight Gate Overview

Fitting Your Pneumatic Wastegate

Mounting Your New Pneumatic Straight Wastegate

The weld flanges should be welded to your exhaust system. The weld flanges are compatible with Stainless Steel and Mild steel welding rod material.

The Straight Gate utilises WG60 Outlet Flanges to connect the Pneumatic straight gate to exhaust manifolds.

💡 For best results, an attempt should be made, if space allows, to mount the Straight Gate at an angle to the exhaust flow to allow for better flow than a 90-degree mounting. See the schematic diagrams below for examples of mounting positions.

📄 NOTE: The Straight Gate can be used in both directions. Both directions will regulate the same. It is advisable however to place the Butterfly Valve pins exhaust side up.

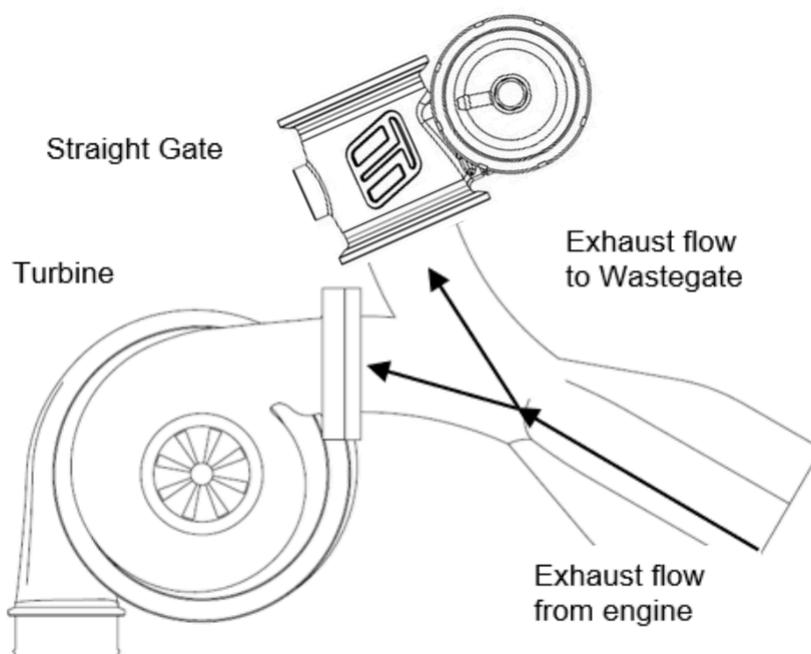


Figure 4 - Best flow - Symmetric mounting

Symmetric mounting allows an excellent flow of exhaust to the Straight Gate.

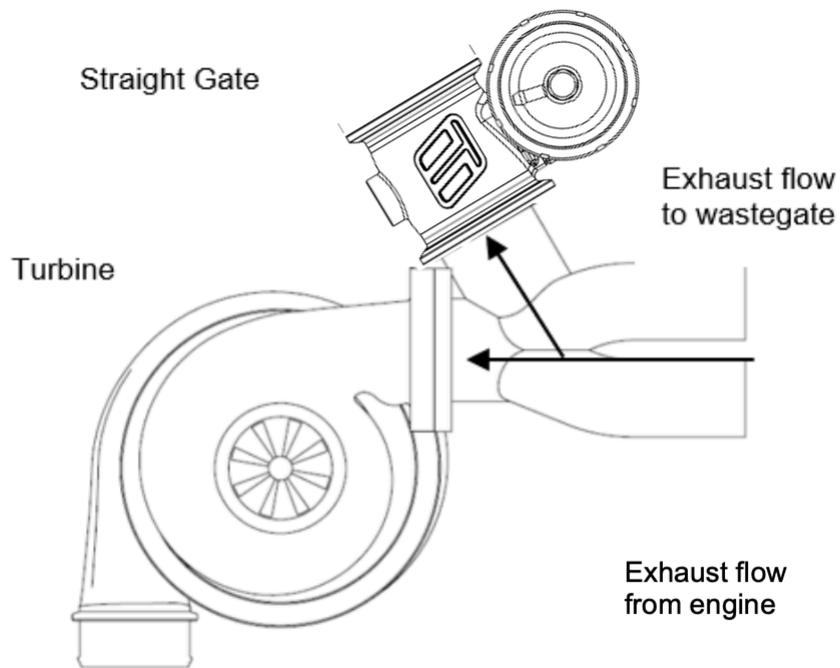


Figure 5 - Good Flow - Angle mounting

Angle mounting allows a good flow of exhaust flow to the Straight Gate.

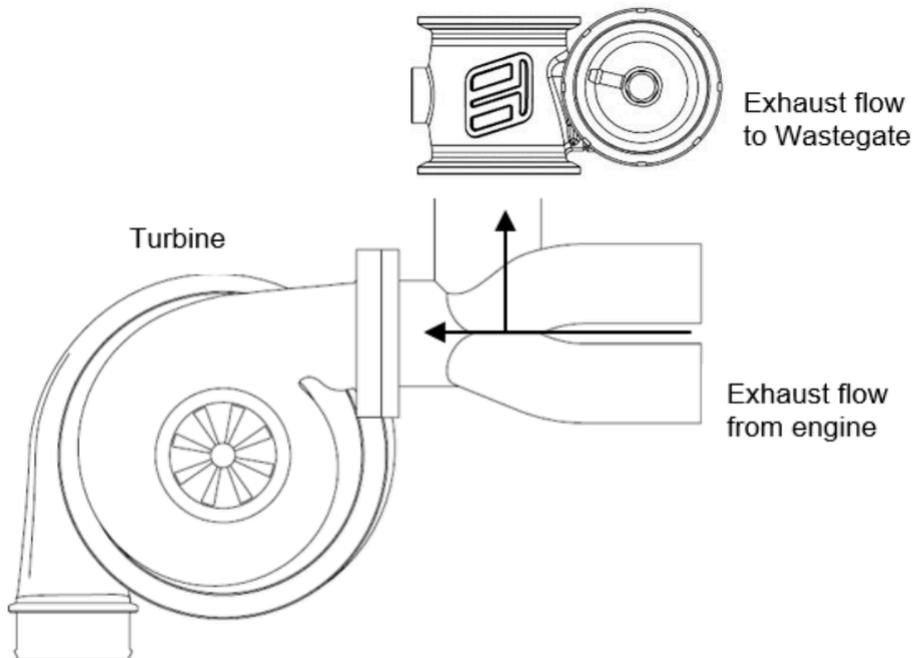


Figure 6 - 90 Degree mounting

90 Degree mounting gives poor exhaust flow to the Straight Gate and in some circumstances may contribute to over boosting.

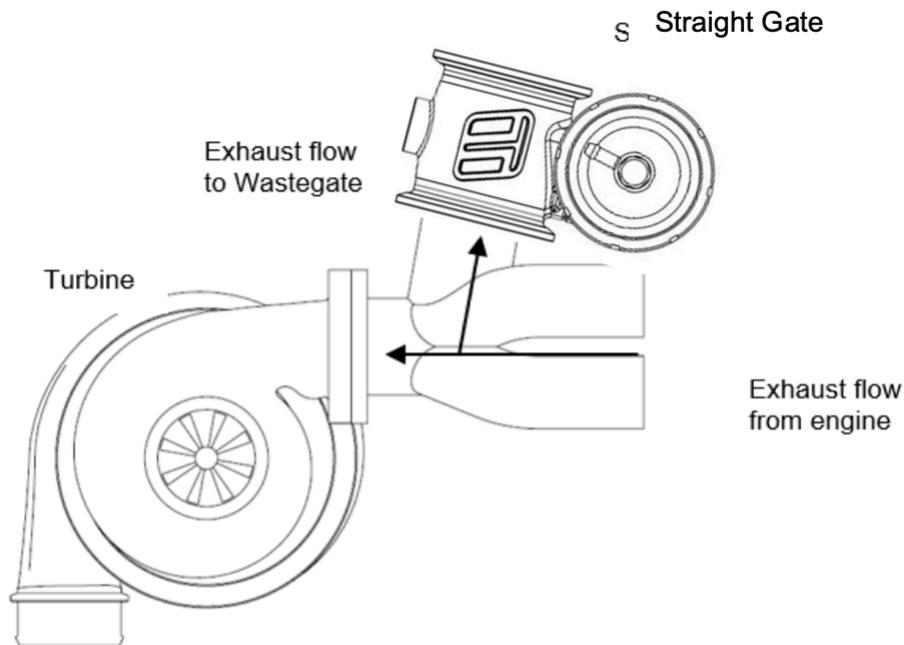


Figure 7 - Not Recommended - Less than 90 Degree Mounting.
 An angle mounting as shown in not recommended and gives extremely poor exhaust flow to the Straight Gate which can contribute to poor boost control and over boosting.

⚠ CAUTION! Do not place the Straight Gate near a significant heat source as this could shorten the life of the internal actuator.

Fitting the Pneumatic Straight Gate

📄 Even though possible to mount the Straight gate in both directions, it is suggested that the Butterfly valve pins (Figure 8) are facing towards the exhaust exit.

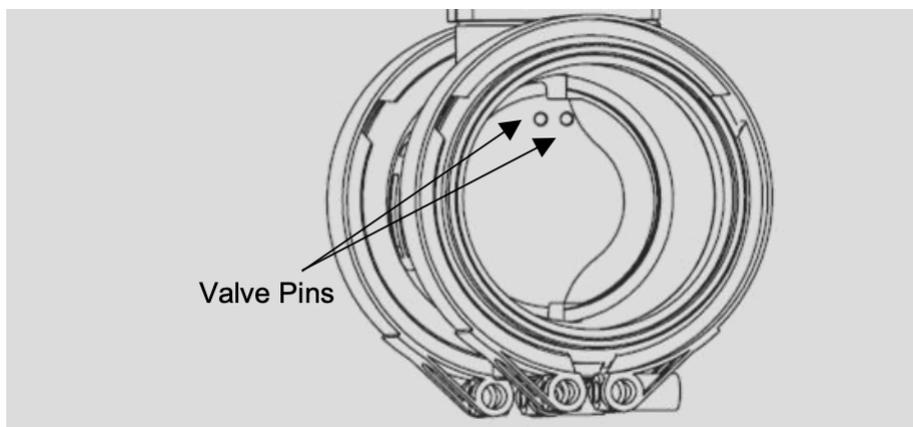


Figure 8 – Butterfly Valve Pins

Prior to mounting the Straight Gate, place v-band (Figure 10) over weld on flange by unscrewing the nut on the v-band as far out as possible and then squeezing the bolt in a syringe motion to expand the v-band (squeeze the dots together below). Once the v-band is in its fully expanded position, slide the v-band over the flange to allow for the wastegate to be installed.

Using the 3/8" deep socket and a torque wrench Tighten the V-Band to 7N.m (5 ft/lbs). Ensure the wastegate is home correctly while torquing the nut to not have a false torque as this will likely contribute to exhaust leaks.

Figure 9 – Manual Override

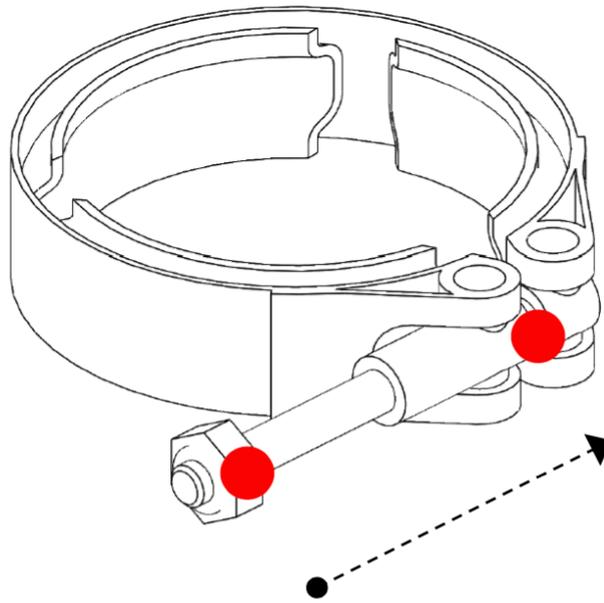


Figure 10 – V Band Clamp

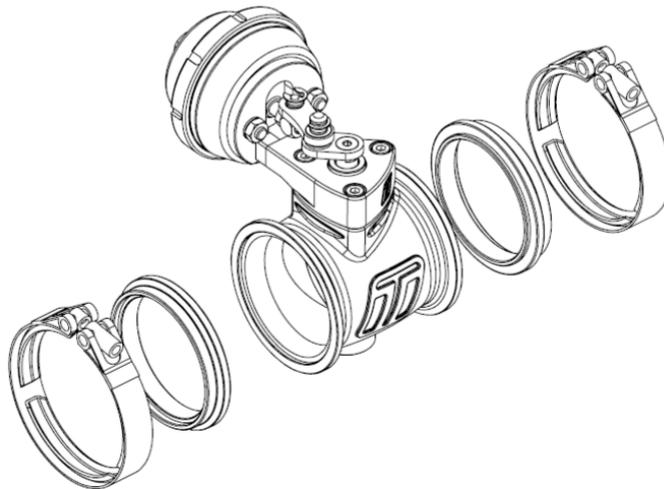
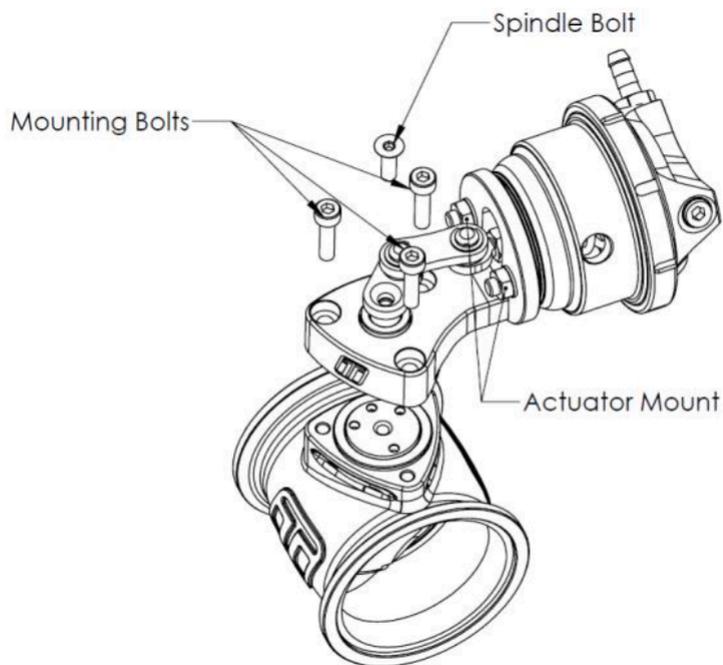


Figure 11 – Exploded drawing of assembly of Pneumatic Straight Gate.

Clocking Actuator Housing

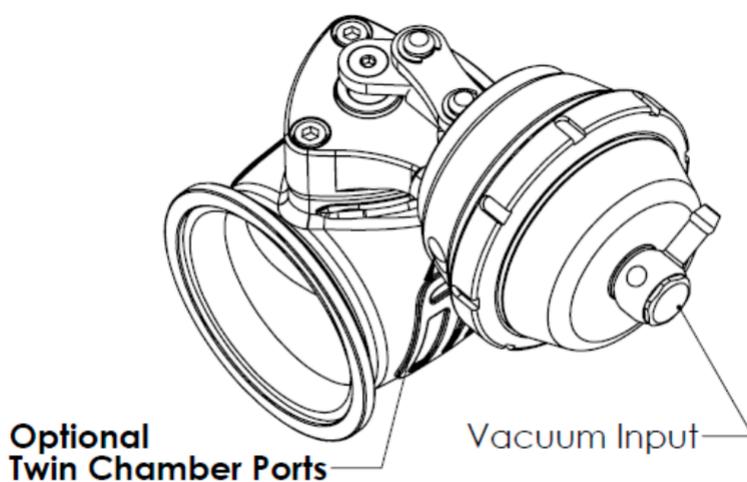
The actuator can be removed and rotated through 3 different orientations; these are every 120 degrees. The actuator 3 x M5 Allen bolts that lock the body to the actuator. It may be required to remove the snap ring ensuring

not to lose it. And one Spindle Bolt that locate the linkage to the shaft. Once these are removed the actuator can be rotated to two other positions of the three.



Connecting Your Wastegate

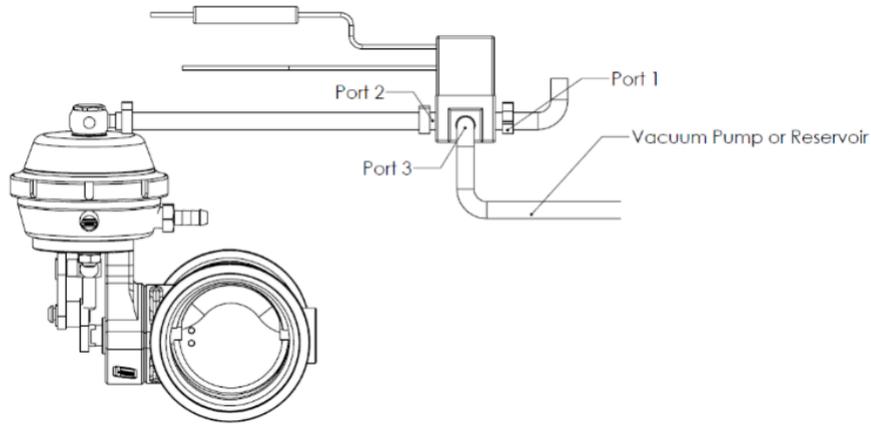
The Vacuum Wastegate is plumbed up utilising the top swivel nipple. This source is connected to an adjustable vacuum pressure source used to control the boost. The standard hook- up method is available below.



TopPort

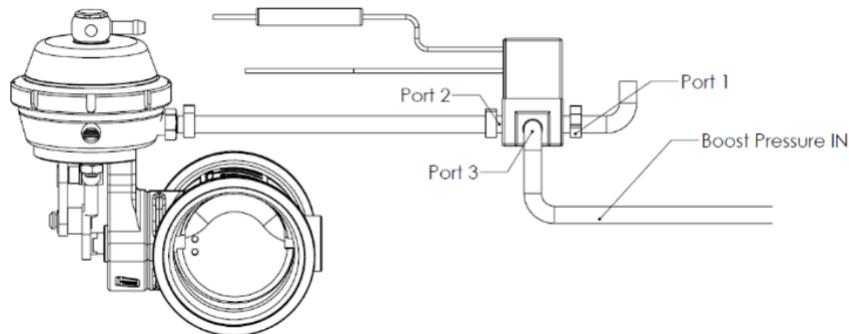
- Port 1 - Vent
- Port 3 - Vacuum Pressure In

- Port 2 – Top Port



IF REQUIRED Bottom Port (Top Port as Above)

- Port 1 - Vent
- Port 3 - Boost Pressure IN
- Port 2 – Bottom Port

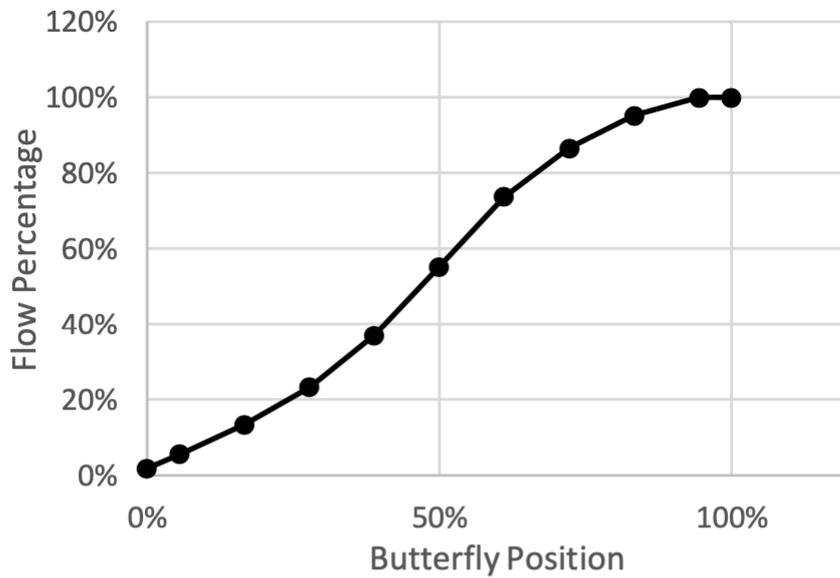


 Ensure all connections are high quality and away from any heat source.

Flow Characteristics

Due to the nature of the butterfly valve design, the flow characteristics are nonlinear. In some cases, it may be advantages to correlate the linear sensor output to match the flow of the valve. The following plot compares butterfly valve position with valve flow. A 3rd order polynomial is provided to relate valve position to flow.

$$y = -2.1519x^3 + 3.0586x^2 + 0.0582x + 0.0326 \quad R^2 = 0.999$$



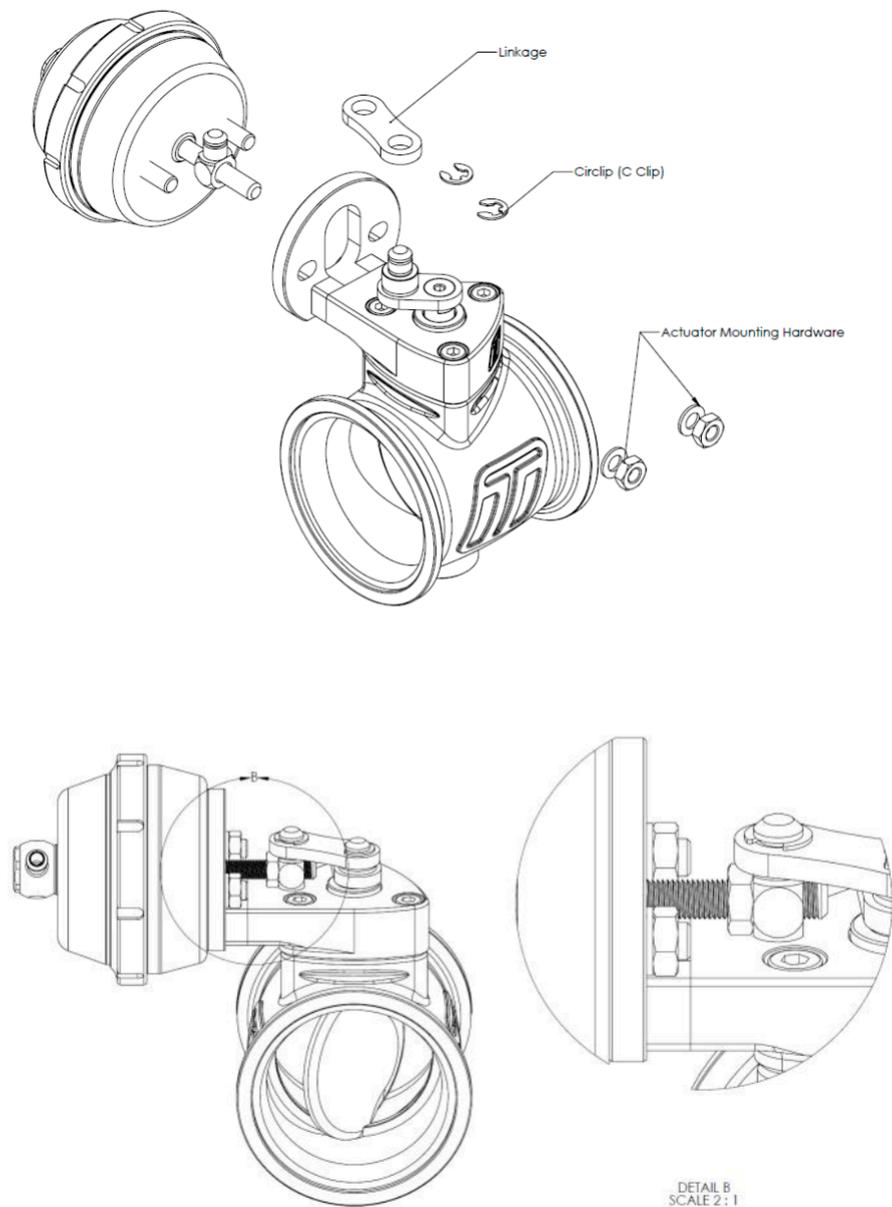
Butterfly Position	Flow Percentage
0%	3.3%
3%	3.7%
6%	4.7%
10%	6.7%
20%	14.9%
30%	26.7%
40%	40.8%
50%	55.7%
60%	70.4%
70%	83.4%
80%	93.5%
90%	99.4%
100%	100.0%

Checking/Adjusting Preload

NOTE! Turbosmart sets preload from factory and should only need to be set after changing springs.

To correctly preload the wastegate, ensure wastegate valve is in the full closed position by applying vacuum to the valve to set preload.

To apply 1mm/0.039” preload, simply turn the adjuster nut 1 full turn in the anticlockwise direction.



⚠ CAUTION! This step is important

To lock the actuator in this position, turn the locking nut by hand until finger tight, then proceed to tighten nut firmly to secure actuator in place. (6.5Nm / 4.8 ft lb)

How to Change Your Vacuum Diaphragm

Vacuum wastegate replacement diaphragm kit:

[TS-0600-3050](#): vIWG 57mm Diaphragm Replacement

[TS-0600-3052](#): vIWG 76mm Diaphragm Replacement

⚠ CAUTION!

- Ensure diaphragm is contained within the groove prior to cap re-assembly.
- Pay attention not to rotate diaphragm.

Remove Wastegate actuator from body

Remove vacuum pressure source hose from the wastegate Unscrew outlet V-Band nut in an anti-clockwise direction to the very end of the thread, Squeeze the nut against the V-Band in a syringe like motion to expand the V-band over the flange. Repeat for inlet V-Band.

⚠ CAUTION! Allow engine to cool down before removing your Vacuum wastegate.

Remove Top Cap

Prior to removing the Vacuum wastegate cap, remove the swivel nipple located on the top actuator. Press down on the cap in a press or vice. Unscrew locking collar with the large end of the provided collar tool in an anti-clockwise direction until completely disengaged and slowly remove tension from the press or vice allowing the spring to expand, finally remove cap when the spring has stopped expanding.

⚠ CAUTION! Use soft jaws to prevent damage.

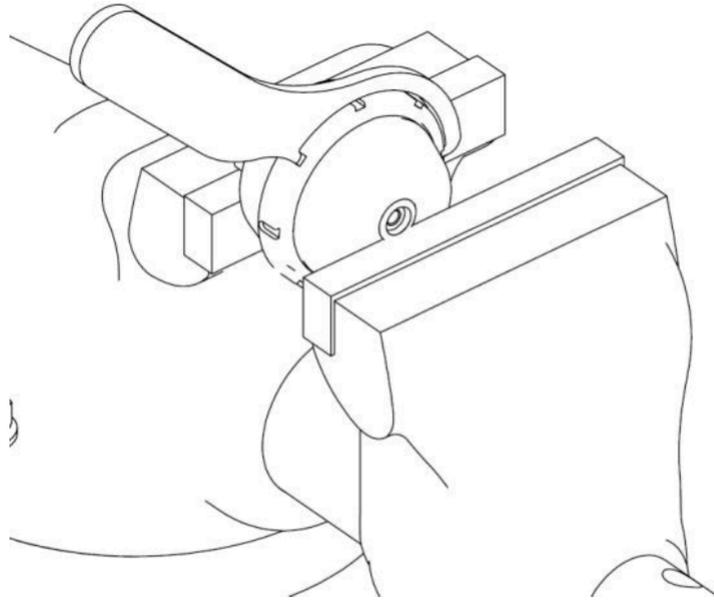


Figure 1 - Locking Collar removal

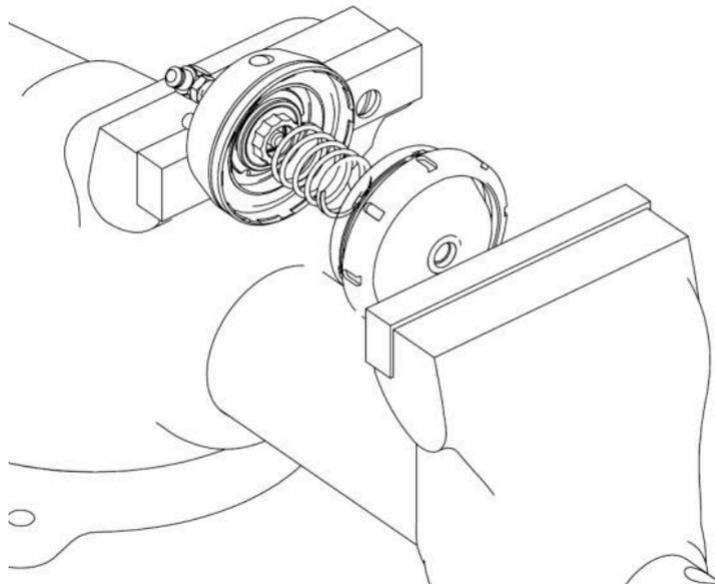


Figure 2 - Releasing spring pressure

Diaphragm Replacement

The clevis pin will need to be removed if not already removed. Simply undo the 10mm nut that is locked against the rod pin.

Once undone the Diaphragm rod can be placed in a vice being careful not to damage the rod and threads. Use a 12point 14mm socket to undo the diaphragm assembly. A small amount of Loctite 271 is required on the threads when replacing the new diaphragm.

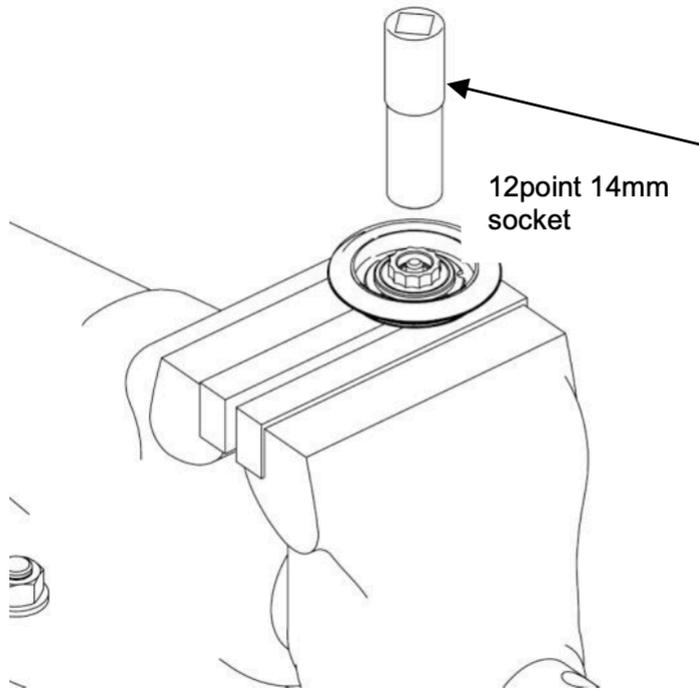


Figure 3 – Removing Diaphragm from rod

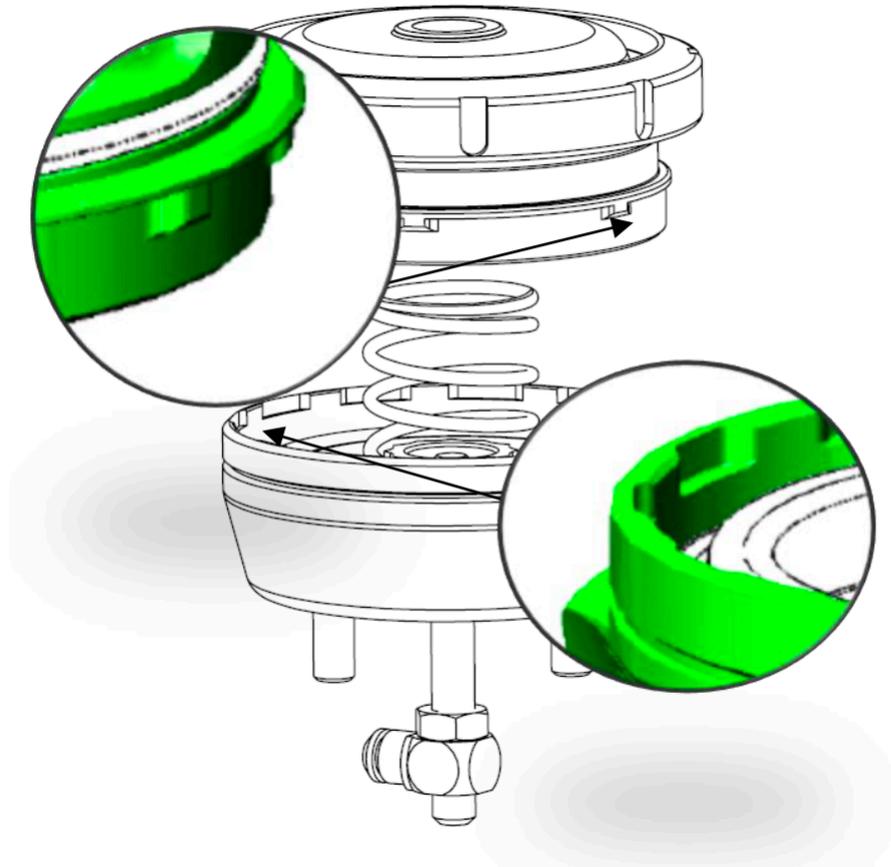
Take note of the orientation of the diaphragm, lift the old diaphragm out and discard. Use this opportunity to thoroughly clean the wastegate removing any dirt from the actuator, ensure the diaphragm groove is free of debris and fit your replacement diaphragm over the valve. The diaphragm should be torqued to 20N.m (15ft/lbs).

Familiarise Yourself with Gap and Body Notches

Locate cap and body notches and grooves which dictate the alignment of the cap. These notches are used to locate the cap onto the body and must be aligned prior to compression of the cap onto the body

Align the valve orientation marks and confirm the diaphragm bead is seated in the groove of the actuator. Install desired spring.

⚠ CAUTION! Ensure notches are aligned and seated home correctly prior to exerting force to tighten collar, permanent damage will occur if these are not aligned correctly.



Press cap onto body

Using a press or vice, compress the cap onto the body ensuring the notches are remaining aligned. Once the cap has seated home onto the body, screw the collar down by hand in a clockwise direction. While still in the press or vice, Tighten the collar further with the collar tool until the collar will not turn.

⚠ CAUTION!

- Maintain downward pressure on cap while tightening collar or non-repairable thread damage will occur.
- Reinstall fittings to the cap of the wastegate using fresh sealant.

Reinstall Vacuum Wastegate

Place v-band over weld on flange by unscrewing the nut on the v-band as far out as possible and then squeezing the bolt in a syringe motion to expand the v-band (squeeze the dots together below). Once the v-band is in its fully expanded position, slide the v-band over the flange to allow for the wastegate to be installed.

Using the 3/8" deep socket and a torque wrench Tighten the V-Band to 7N.m (5 ft/lbs).

ⓘ Troubleshooting

- Wastegate not actuating - Confirm signal hose is plumbed to a pressure only source, confirm preload during installation.
- Poor wastegate actuation - Ensure signal hose is not shared and is sourced as close to the compressor as possible, check seal
- on fittings.
- Poor wastegate actuation – Confirm no obstructions in actuator rod path.
- Boost creeping at high rpm - Wastegate flow path is poor, wastegate is too small for the application, ensure linkage joints are
- not seized.