

INSTALLATION GUIDE FOR GARRETT GVW EXTERNAL WASTEGATES

Garrett
ADVANCING MOTION



GARRETT VENT | EXTERNAL WASTEGATES

High flowing external wastegates for turbocharged racing and performance engines



Garrett Vent | External Wastegates regulate turbocharger shaft speed by venting exhaust gas around the turbine stage of the turbocharger. CFD optimized design maximizes flow and delivers optimum boost control. Advanced thermal optimization increases durability of the diaphragm. The cap design makes spring changes and serviceability of the entire GVW lineup easier and more reliable to perform.

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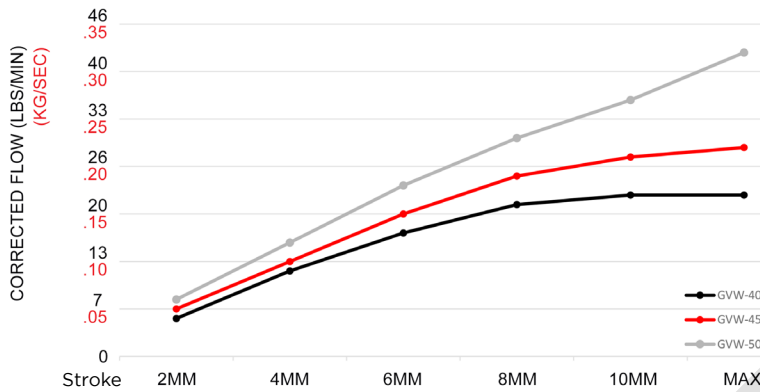
We recommend that Garrett products be installed by a qualified automotive technician. If you have any doubts as to your ability to install our product, consult with a local automotive repair company. Please be sure to carefully read all of the attached instructions prior to starting the installation process. If you have any questions about the enclosed parts or the instructions, call the distributor that you purchased the kit from for clarification. Prior to the Garrett product installation, be sure that the vehicle



Warning: cancer and reproductive harm www.p65warnings.ca.gov

GVW WASTEGATE FEATURES

Flow Data



Features:

- CFD tested for maximum flow and thermal efficiency
- Optimized actuation stability and temperature resistance for superior durability
- Replaceable valve and bushing components to increase service life
- Robust design for easy diaphragm replacement
- Liquid-cooled actuator ports for use on severe applications (up to 52% reduction in body temp)
- Anodized aluminum actuator cover

Mechanical Data	GVW-40	GVW-45	GVW-50
Valve Diameter	40mm	45mm	50mm
Valve Mass	1.27kg 45oz	1.47kg 52oz	1.56kg 55oz
Max Spring Base Pressure	1.7 bar 25 psi (1:1 backpressure ratio)		
Minimum Spring Base Pressure	0.2 bar 3 psi (1:1 backpressure ratio)		
Port Fitting: Air	M10x1.0 to hose barb (Hose ID 6mm .25in)		
Port Fitting: Liquid	M8x1.0 to AN-3		

Material Data	GVW-40 GVW-45 GVW-50
Valve Housing	High temp stainless steel rated up to 1050°C
Diaphragm	High temp Nomex reinforced elastomer
Actuator Cover	Fully-machined anodized 6061 aluminum
Valve Guide/Bushing	Nitronic 60
Valve	High temp stainless steel with plated stem
V-Band	CNC machined 304 stainless steel
Flanges	Fully-machined 304 stainless steel
Springs	17/7 PH stainless steel

Garrett Vent | External Wastegates are created by the engineers that designed G-Series and GTX Gen II turbochargers. Available in three sizes: 40mm | 45mm | 50mm and four color combinations: Red | Blue | Black | Silver. The valve housing is cast from high temp stainless steel and rated for exhaust temperatures up to 1050° C. CFD optimized for maximum flow and thermal efficiency. Our Nomex reinforced elastomer diaphragm provides exceptional durability and fatigue resistance.

GVW wastegates are set to 1 Bar | 14.5 PSI of base pressure and can be configured from 0.2 Bar | 2.9 PSI - 1.7 Bar | 24.7 PSI (considering 1:1 backpressure). The actuator design allows for multiple air/liquid fitting orientations. All fasteners, springs, fittings, V-bands, clamps, and flanges included.

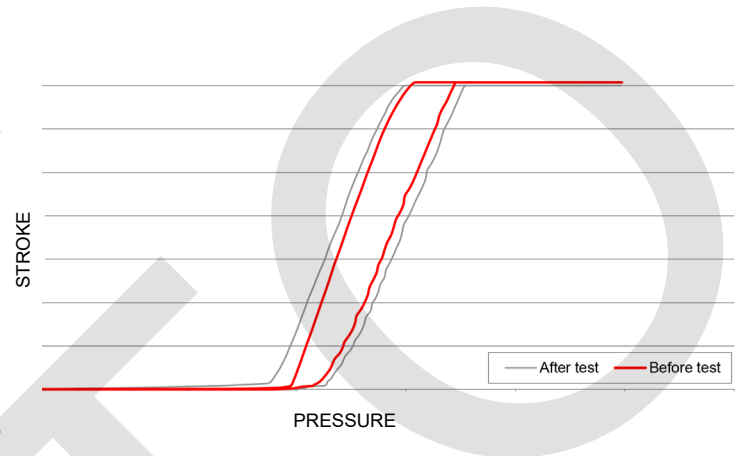


GVW WASTEGATE FEATURES

When researching and testing common shortfalls of wastegates, we observed how heat cycling and normal wear can rapidly change their actuation characteristics. Garrett engineers created GVW as a high flowing product with low degradation in performance over its lifespan.

Actuation data (opening and closing) in the chart was measured before and after extreme testing conditions. Results show the heat cycled GVW product maintains linear control of the wastegate as compared to the new product.

Precise actuation of the GVW provides accurate calibration settings and performance throughout the lifespan of the product. Accurate wastegates, allow for optimum performance of the turbocharger.



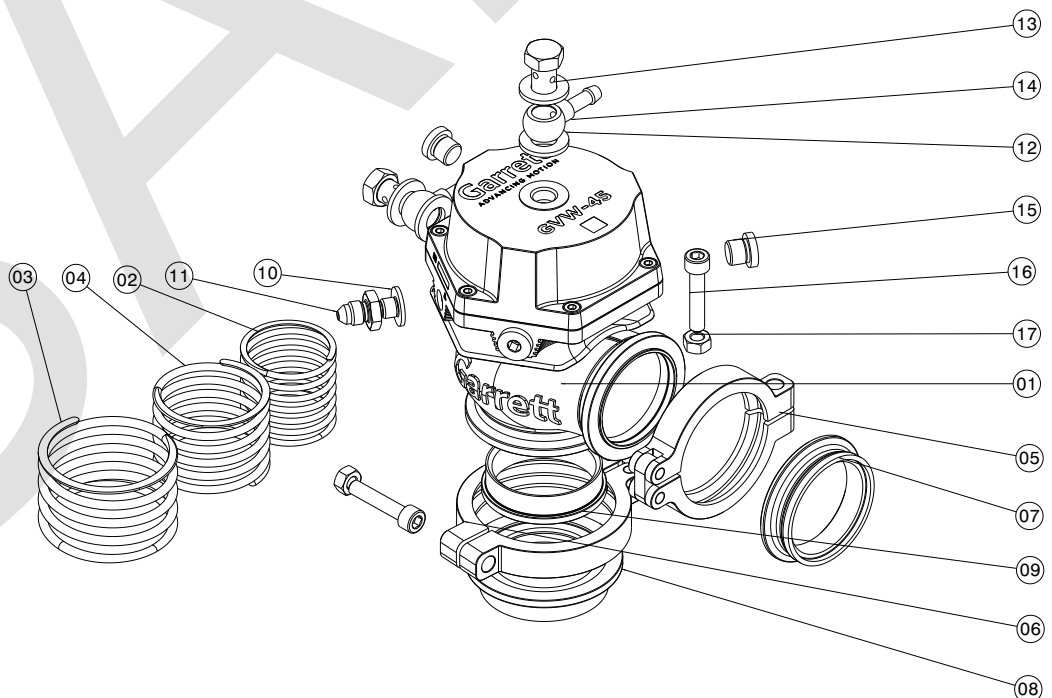
Thermal Data

GVW-40 | GVW-45 | GVW-50

Max Thermal Stress (Non-Cooled)	270°C actuator body temp during thermal cycle test
Max Thermal Stress (Liquid-Cooled)	130°C actuator body temp during thermal cycle test
Max Exhaust Temp: Peak	Up to 1050°C

KIT CONTENTS

NO	Description
1	Wastegate
2	Spring
3	Spring
4	Spring
5	V-band outlet
6	V-band inlet
7	Outlet flange
8	Inlet flange
9	Valve seat
10	M8 Washer
11	Water fitting
12	M10 Washer
13	Banjo bolt
14	Banjo fitting
15	Plug
16	V-band bolt
17	V-band nut

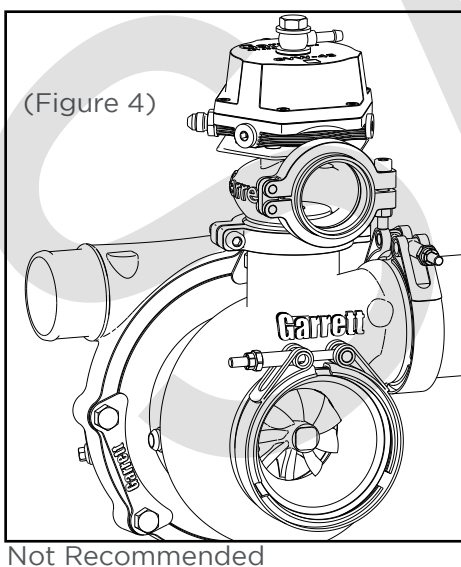
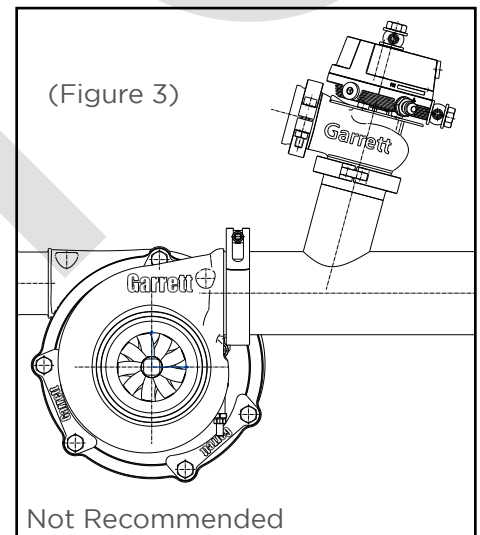
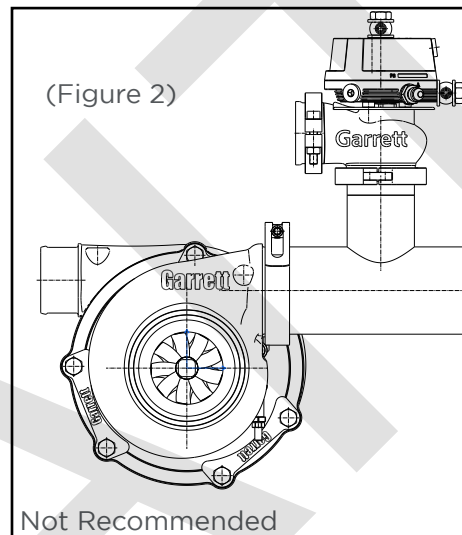
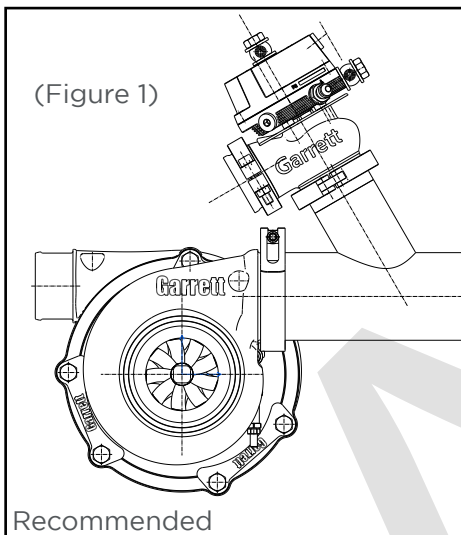


GVW WASTEGATE PLACEMENT SUGGESTIONS

Wastegate placement on the exhaust manifold is a key factor in wastegate performance. The following suggestions can help identify the best choice when purchasing or fabricating an exhaust manifold for your project. The connection on the manifold greatly affects flow capability, and correct orientation of the wastegate to the manifold is essential.

The ideal connection is at 45° with a smooth transition (Figure 1). Placing the wastegate at 90° to the manifold (Figure 2) will reduce flow capacity by up to 50 percent and can cause over boosting! More reduction in flow capacity will result if the wastegate is placed at angles greater than 90° (Figure 3).

Figures 2, 3 and 4 greatly reduce the control you have over the system and can put your entire drive train at risk. Never mount the wastegate to the turbine housing at any time, this will reduce the performance of the turbocharger (Figure 4). Contact an authorized distributor for additional information.



CHANGING SPRINGS

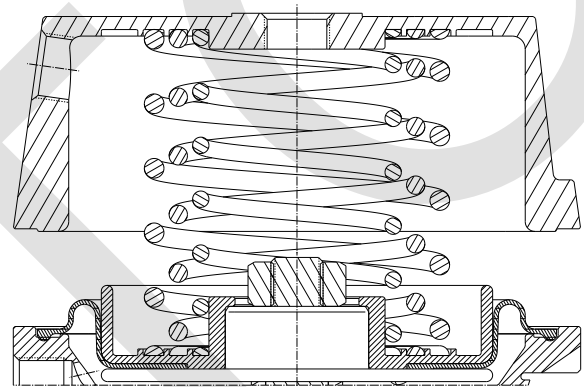


Watch The Installation Video

Description	Tightening Torque Nm ft-lb	Tool Needed
Changing Spring Pressures		Arbor Press Vise
Bolt, Actuator Cap	2.5 2.0	3mm Hex
Bolt, Banjo Fitting	15 11	14mm Socket

Wastegate springs are under pressure and can cause bodily harm if improperly installed. Please wear eye protection. If you have any doubts as to your ability to install this product, consult a local automotive repair company.

Remove the wastegate from the manifold. Place wastegate into an arbor press and depress the ram so it creates downward pressure on the top cap banjo fitting. Use a fitting to avoid scratching the cover. The ram should be in the center of the cap. Remove the (6) 3mm hex-head screws in the top cap while maintaining pressure on the ram as to keep the cap from lifting off the body.



Once all 6 screws are removed, slowly raise the ram on the arbor press to release the pressure on the springs. Using the spring chart below, identify the appropriate springs you wish to install. GVW wastegates are assembled to 1 Bar | 14.5 PSI.

The springs must sit properly in the grooves to align the diaphragm assembly and actuator cover. Improper placement of the springs may result in failure of the wastegate. Set replacement springs in the diaphragm assembly grooves. Place top cap on and align the longest spring with the appropriate groove in the cap. Place the wastegate in the arbor press and center it under the ram. Lower the ram slowly until the top cap touches the actuator body. Align the holes in the top cap with the threaded holes on the bottom cap, then install the (6) 3mm hex-head crews. Once all (6) screws are tight, raise the ram, remove the wastegate and torque the hex-head screws to 2.5Nm | 2.0 ft-lb.

	BASE PRESSURE																
	PSI 3	4	6	7	9	10	12	13	14.5	16	17	19	20	22	23	25	
GVW-40	Bar 0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	
Red	x					x	x			x							
Blue		x						x	x		x			x	x	x	
Green			x			x		x				x			x		
White				x			x					x	x			x	
Brown					x				x					x			
Purple										x	x	x	x		x	x	
GVW-45 GVW-50	PSI 3	4	6	7	9	10	12	13	14.5	16	17	19	20	22	23		
	Bar 0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6		
Blue	x				x	x		x	x	x				x	x		
Green		x						x			x	x		x			
White			x		x		x		x				x		x		
Brown				x		x	x	x	x	x	x						
Purple												x	x	x	x		
Black										x	x	x	x	x	x		

Spring pressures are calculated based on a 1:1 boost/backpressure ratio. Actual intake manifold (boost) pressure can vary

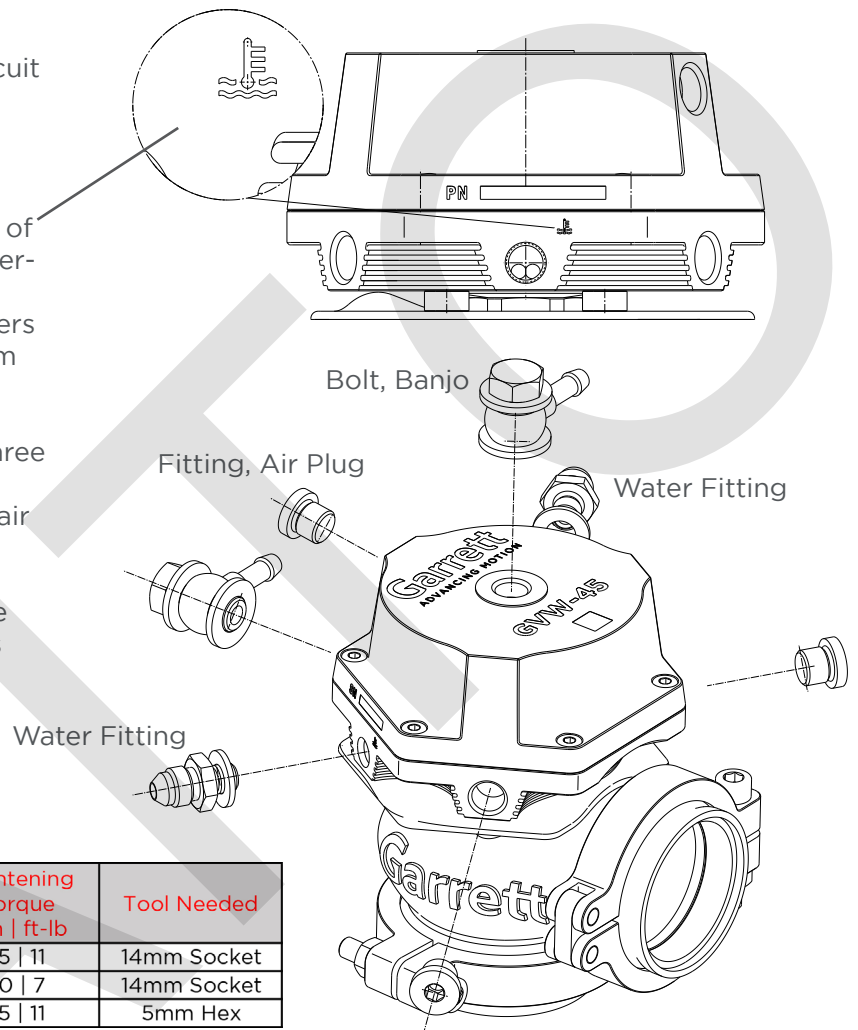
WASTEGATE PORT FITTINGS

GVW wastegates feature a water-cooling circuit which allows the product to be operated in extremely high temperature conditions while maintaining its actuation characteristics.

Water-cooling symbols are etched near both of the fitting ports for easy identification. If water-cooling, both ports must be used to create a coolant loop. (2) Water fittings and (2) washers are included and can be installed with a 14mm wrench or socket.

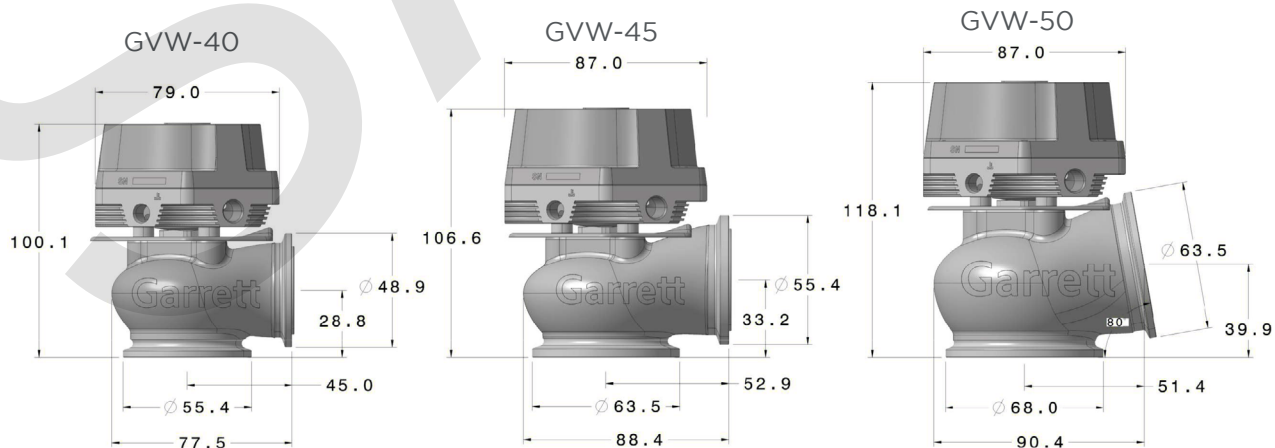
There are two air ports on the top cap and three air ports on the valve body. (2) 14mm Banjo fittings with washers and (3) 5mm hex head air plugs are included.

Please see the boost control section for more information on how to install the port fittings based on your application.



Description	Tightening Torque Nm ft-lb	Tool Needed
Bolt, Banjo Fitting	15 11	14mm Socket
Fitting, Water 8mm	10 7	14mm Socket
Fitting, Air Plug 10mm	15 11	5mm Hex

WASTEGATE FLANGE DIAGRAMS



Measurements in MM

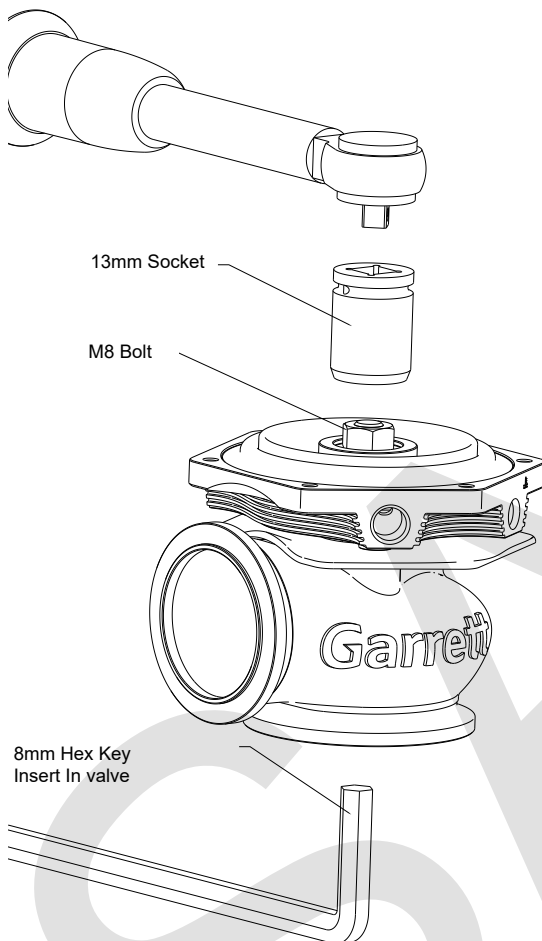
REPLACING THE DIAPHRAGM



Watch The
Installation Video

Description	Tightening Torque Nm ft-lb	Tool Needed
Kit: Diaphragm (Diaphragm Assy, Valve Stem Nut)		Arbor Press Vise
Bolt, Actuator Cap	2.5 2.0	3mm Hex
Bolt, Banjo Fitting	15 11	14mm Socket
Nut, Valve	10 7	13mm Socket

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Remove the wastegate from the manifold. Place wastegate into an arbor press and depress the ram so it creates downward pressure on the top cap banjo fitting. Use a fitting to avoid scratching the cover. The ram should be in the center of the cap. Remove the (6) 3mm hex-head screws in the top cap while maintaining pressure on the ram as to keep the cap from lifting off the body.

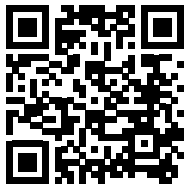
Once all 6 screws are removed, slowly raise the ram on the arbor press to release the pressure on the springs. Remove the top cap and springs. Insert an 8mm hex key into the opening at the bottom of the valve, use a 13mm socket and ratchet to loosen and remove the valve stem nut.

While supporting the valve in the up position, remove the old diaphragm and set the new on in place making sure the spring seat grooves face up. Hand thread on the new valve stem nut. Using the 8mm hex, and 13mm socket and ratchet, torque the nut to 10 Nm | 7 ft-lb.

Reinstall the springs and cap. The springs must sit properly in the grooves to align the diaphragm assembly and actuator cover. Improper placement of the springs may result in failure of the wastegate. Set replacement springs in the diaphragm assembly grooves. Place top cap on and align the longest spring with the appropriate groove in the cap. Place the wastegate in the arbor press and center it under the ram.

Lower the ram slowly until the top cap touches the actuator body. Align the holes in the top cap with the threaded holes on the bottom cap, then install the (6) 3mm hex-head crews. Once all (6) screws are tight, raise the ram, remove the wastegate and torque the hex-head screws to 2.5Nm | 2.0 ft-lb.

REPLACING THE VALVE AND BUSHING



Watch The Installation Video

3mm Hex Key

3x Bolt

3x Bolt

Actuator Body

3x Spacer

Heat Shield

Housing

24mm Socket

Bushing

Housing

Description	Tightening Torque Nm ft-lb	Tool Needed
Kit: Valve/Bushing (Valve, Bushing, Seal Washer, O-Ring, Valve Stem Nut, Seat)		Arbor Press Vise
Bolt, Actuator Body	5 4	3mm Hex
Bolt, Actuator Cap	2.5 2.0	3mm Hex
Bolt, Banjo Fitting	15 11	14mm Socket
Bushing	30 22	24mm Socket
Nut, Valve	10 7	13mm Socket

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Remove the wastegate from the manifold. Place wastegate into an arbor press and depress the ram so it creates downward pressure on the top cap banjo fitting. Use a fitting to avoid scratching the cover. The ram should be in the center of the cap. Remove the (6) 3mm hex-head screws in the top cap while maintaining pressure on the ram as to keep the cap from lifting off the body.

Once all 6 screws are removed, slowly raise the ram on the arbor press to release the pressure on the springs. Remove the top cap and springs. Insert an 8mm hex key into the opening at the bottom of the valve, use a 13mm socket and ratchet to loosen and remove the valve stem nut. While supporting the valve in the up position, remove the diaphragm. Next, remove the valve.

Remove the (3) 3mm hex-head screws from the actuator body. Remove the actuator body. Be careful not to lose the (3) spacers, (1) O-ring, (1) disc spring, or heat shield as these will move freely once the actuator body and actuator body screws are removed.

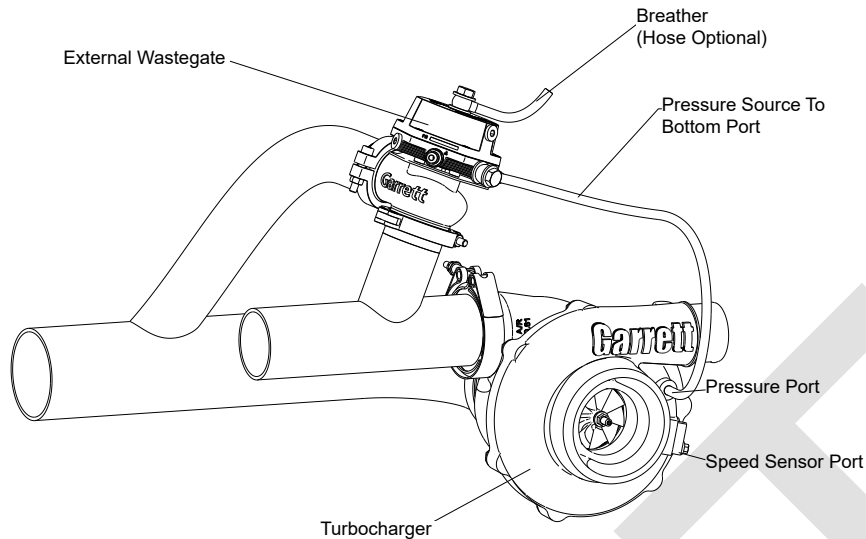
Place actuator housing into a vise and use a 24mm socket and ratchet to loosen and remove the bushing. Replace the bushing and torque to 30 Nm | 22 ft-lb.

Set the heat shield on the actuator housing with the rolled edge over the outlet. Place (3) spacers over each threaded hole. Slide the disc spring over the bushing stem. Slide the o-ring over the bushing stem. Place actuator body over the bushing stem with the preferred port orientation. Double check alignment of the spacers then install (3) 3mm hex-head screws making sure the screw goes through each spacer. Torque to 5 Nm | 4 ft-lb.

Insert the valve into the bushing and set the diaphragm on top making sure the spring seat grooves face up. Hand thread on the new valve stem nut. Using the 8mm hex, and 13mm socket and ratchet, torque the nut to 10 Nm | 7 ft-lb.

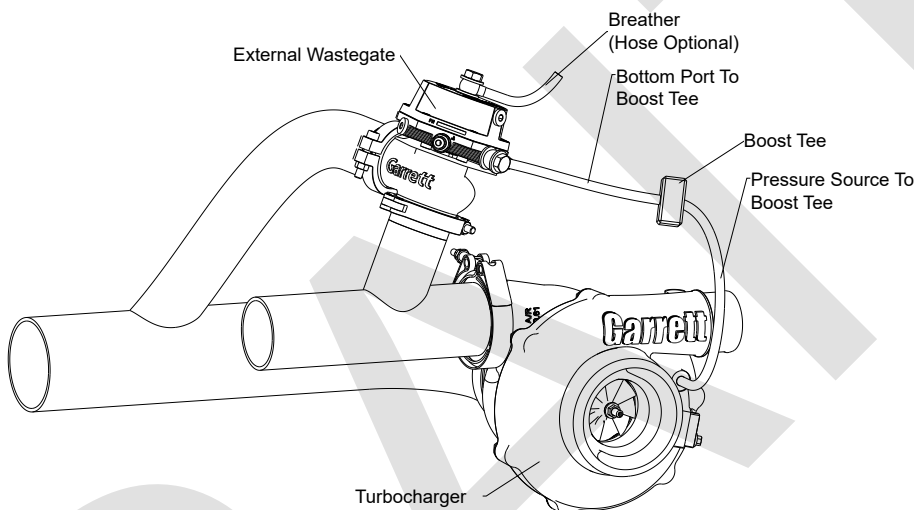
Reinstall the springs and cap. The springs must sit properly in the grooves to align the diaphragm assembly and actuator cover. Improper placement of the springs may result in failure of the wastegate. Set replacement springs in the diaphragm assembly grooves. Place top cap on and align the longest spring with the appropriate groove in the cap. Place the wastegate in the arbor press and center it under the ram. Lower the ram slowly until the top cap touches the actuator body. Align the holes in the top cap with the threaded holes on the bottom cap, then install the (6) 3mm hex-head screws. Once all (6) screws are tight, raise the ram, remove the wastegate and torque the hex-head screws to 2.5Nm | 2.0 ft-lb.

BOOST CONTROL CONFIGURATIONS



Spring Pressure

Connect the pressure source from the turbo to one of the bottom air ports of the wastegate. Garrett G-Series and GTX Gen II turbochargers have a fully machined pressure port for this purpose. Do not use the speed sensor port. (See diagram) One of the top wastegate ports should be left open as a breather. Connect a hose to the banjo barb to reduce the likelihood of contamination to the actuator.

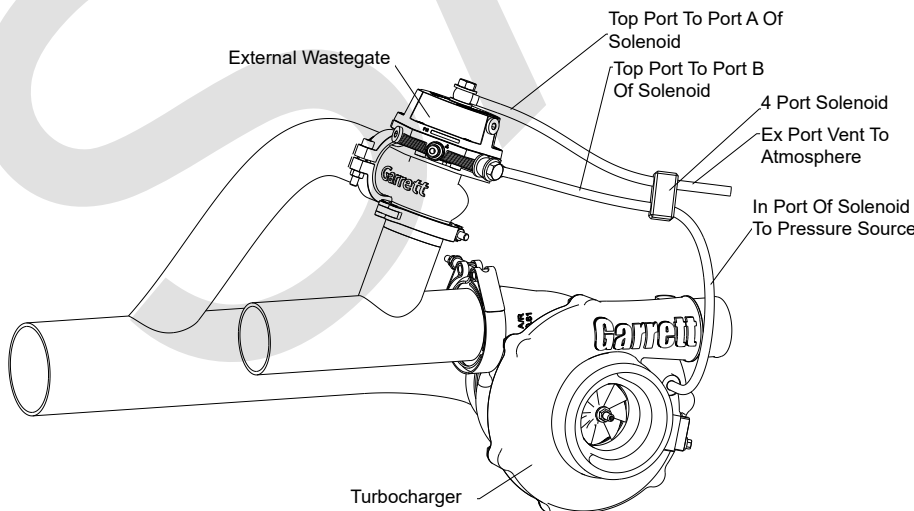


Manual Boost Controller

Connect the pressure source from the turbo to the inlet of the manual boost controller. Then from the outlet of the boost controller to one of the bottom air ports on the wastegate. One of the top wastegate ports should be left open as a breather. Connect a hose to the banjo barb to reduce the likelihood of contamination to the actuator.

For multiple wastegate or twin turbo applications, use one pressure source into the controller, followed by a line T, then the signal line into one of the bottom air ports on each wastegate.

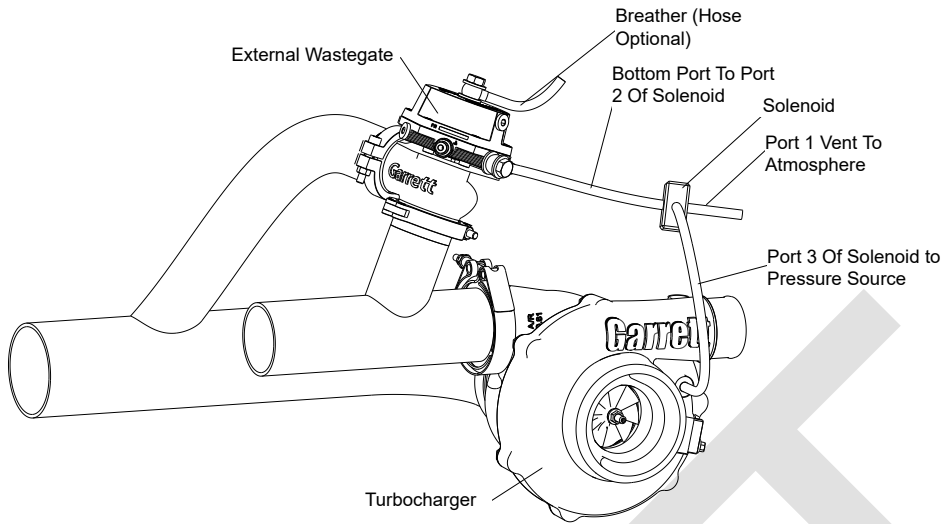
Reference the instructions supplied with the manual boost controller for more information.



Two-Port Connection

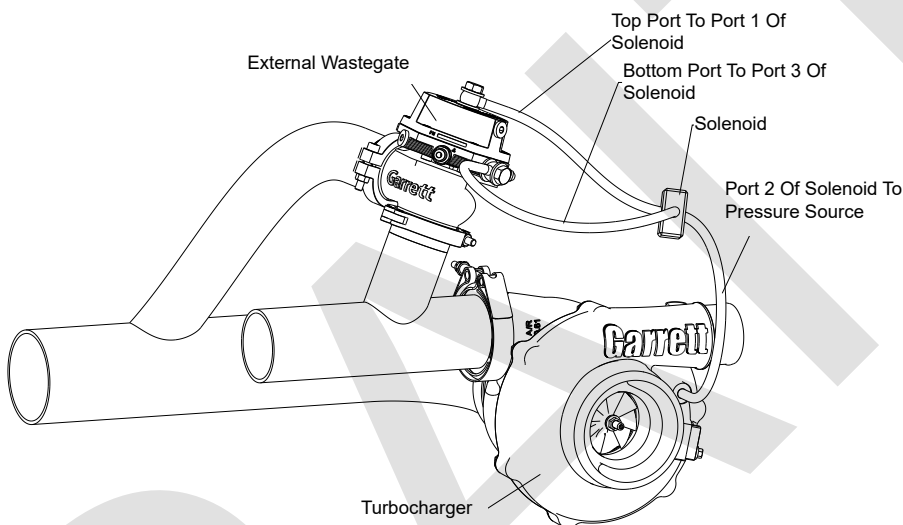
- Use for wide ranges of boost pressures 3–25 PSI
- Pressure source, solenoid IN port
- Solenoid EX port, vent to atmosphere
- Solenoid port A, top port of wastegate
- Solenoid port B, bottom air port on wastegate
- This method may not provide a smooth boost curve

BOOST CONTROL CONFIGURATIONS



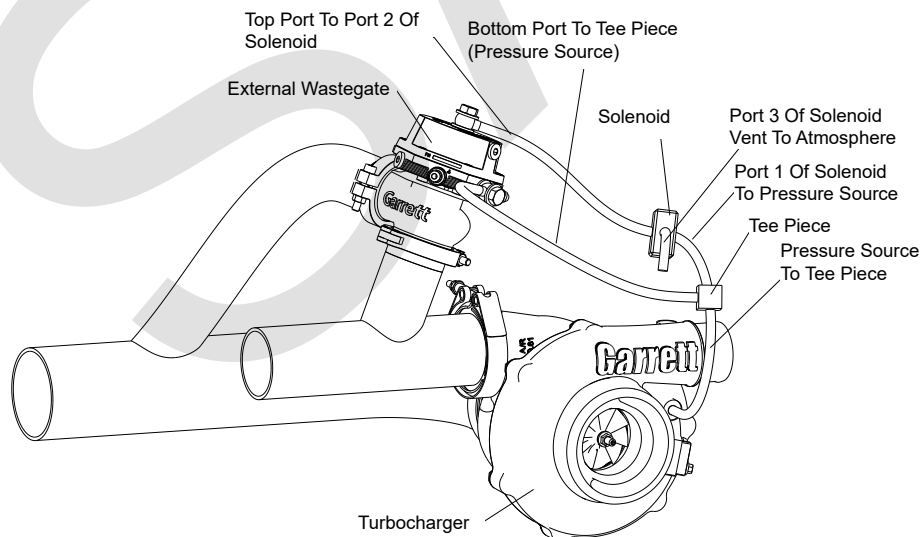
Single-Port Connection

- Pressure source, solenoid port 3
- Solenoid port 1, vent to atmosphere
- Solenoid port 2, bottom air port on wastegate



Two-Port Connection (for high boost pressures)

- Pressure source, solenoid port 2
- Solenoid port 1, top port of wastegate
- Solenoid port 3, bottom air port on wastegate



Two-Port Connection method (for high back pressure systems)

- Pressure source, bottom air port of wastegate and solenoid port 1
- Solenoid port 2, top port of wastegate
- Solenoid port 3, vent to atmosphere

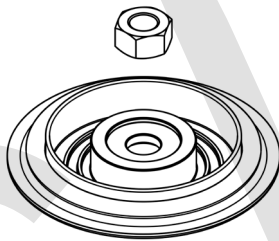
SPARE PARTS GUIDE | TORQUE SPECS

Description	Tightening Torque Nm ft-lb	GVW-40	GVW-45	GVW-50
Kit: Air Fitting (Banjo Fitting, Bolt, 2 Crush Washers)	15 11		910477-0001	
Kit: Diaphragm (Diaphragm Assy, Valve Stem Nut)	10 7	910476-0001	910476-0002	
Kit: Valve/Bushing (Valve,Bushing,Seal Washer,O-Ring,Valve Stem Nut,Seat)	10 7	910478-0001	910478-0002	910478-0003
Kit: V-Band Inlet (V-Band, Bolt, Locknut)	15 11	910475-0001	910475-0003	910475-0004
Kit: V-Band Outlet (V-Band, Bolt, Locknut)	15 11	910475-0002	910475-0001	910475-0003
Bolt, Actuator Body	5 4			
Bolt, Actuator Cap	2.5 2.0		894537-0001	
Bolt, V-band	NA		894540-0006	
Bolt, Banjo Fitting	15 11			
Bushing	30 22			
Fitting, Water 8mm	10 7		895520-0001	
Fitting, Plug Air 10mm	15 11		895519-0001	
Flange, Inlet Weld	NA	894649-0003	894649-0001	894649-0007
Flange, Outlet Weld	NA	894649-0004	894649-0002	894649-0008
Locknut, V-band	15 11		905694-0001	
Nut, Valve	10 7			
Nut, V-Band	15 11			
Seat, Valve	NA	894648-0002	894648-0001	894648-0004
Spring, Red (See Spring Chart For Spring Pressure)	NA	898344-0001		
Spring, Blue (See Spring Chart For Spring Pressure)	NA		898344-0002	
Spring, Green (See Spring Chart For Spring Pressure)	NA		898344-0003	
Spring, White (See Spring Chart For Spring Pressure)	NA		898344-0004	
Spring, Brown (See Spring Chart For Spring Pressure)	NA		898344-0005	
Spring, Purple (See Spring Chart For Spring Pressure)	NA		898344-0006	
Spring, Black (See Spring Chart For Spring Pressure)	NA		898344-0008	
Washer, Crush 8mm	NA		895518-0002	
Washer, Crush 10mm	NA		895518-0001	

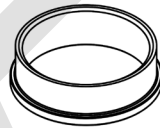
GVW Replacement Part Kits



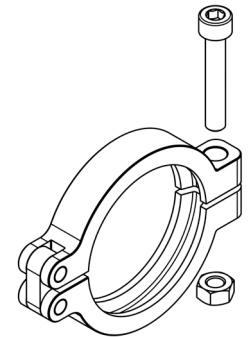
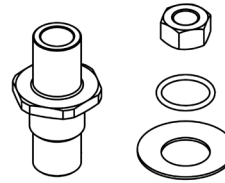
Air Fitting Kit



Diaphragm Kit



Valve/Bushing Kit



V-Band Inlet | Outlet Kit