

Nome do Produto: **Gen V eWastegate (configuração eletrônica)**
 Descrição do Produto: Gen V eWastegate
 Número de produto: TS-055X-15XX
 Versão do documento: V1.00 Rev A



NOTAS IMPORTANTES SOBRE SEU EWASTEGATE EXTERNO

- Turbosmart aceita nenhuma responsabilidade alguma por incorrecta instalação deste produto que é potencialmente perigoso e pode causar graves danos ao motor ou ferimentos pessoais.
- O eWastegate externo Gen V foi projetado para uso com um turboalimentador que não possui um wastegate interno.
- Consulte o seu especialista local antes de definir a pressão de alimentação desejada ; definir a aceleração além da capacidade do motor pode resultar em motor dano.
- Use apenas conexões de alta qualidade, garantindo a máxima confiabilidade de vedação . Kit de conexão Turbosmart opcional disponível.

RECOMENDAÇÕES

- **Sempre desconecte os fios do motor antes de remover a tampa superior do atuador**
- **Permita um fluxo de ar frio adequado ao redor do atuador eletrônico .**
- **NÃO monte a wastegate de forma que o atuador eletrônico esteja a menos de 100 mm de uma fonte de calor .**
- **NÃO envolva o corpo da wastegate com envoltório de escape**
- **A instalação de sua válvula de descarga Gen V pode exigir a fabricação ou modificação de seu coletor de escapamento . A Turbosmart recomenda que o seu wastegate é instalado por um técnico devidamente qualificado .**
- **A Turbosmart recomenda que a relação Ar / Combustível dos motores seja verificada durante o ajuste da pressão de alimentação desejada, conforme qualquer aumento em a pressão de alimentação pode fazer com que o motor funcione "LEAN", resultando em possíveis danos ao motor.**
- A Turbosmart recomenda que a pressão de turbo seja ajustada usando um dinamômetro e não em vias públicas.
- A Turbosmart recomenda que um manômetro seja instalado permanentemente no veículo.

CONTEÚDOS DO KIT

Por favor verifique que os seguintes itens tenham sido fornecidos em seu Gen V eWastegate kit.

Papel	Descrição	Usar
1	Turbosmart Gen V eWastegate	Unidade principal
2	Sede da Válvula	Sede da válvula
3	Braçadeira de entrada V-Band	Braçadeira de banda V de entrada
4	Flange de solda de entrada Braçadeira de saída V-Band	Flange de solda de banda V de entrada Braçadeira de banda V de saída
6	Flange de saída de solda	Flange de solda de banda V de saída
7	Ferramenta de colar	Ajustando a localização do atuador
8	Autocolante Turbosmart	Autocolante Turbosmart

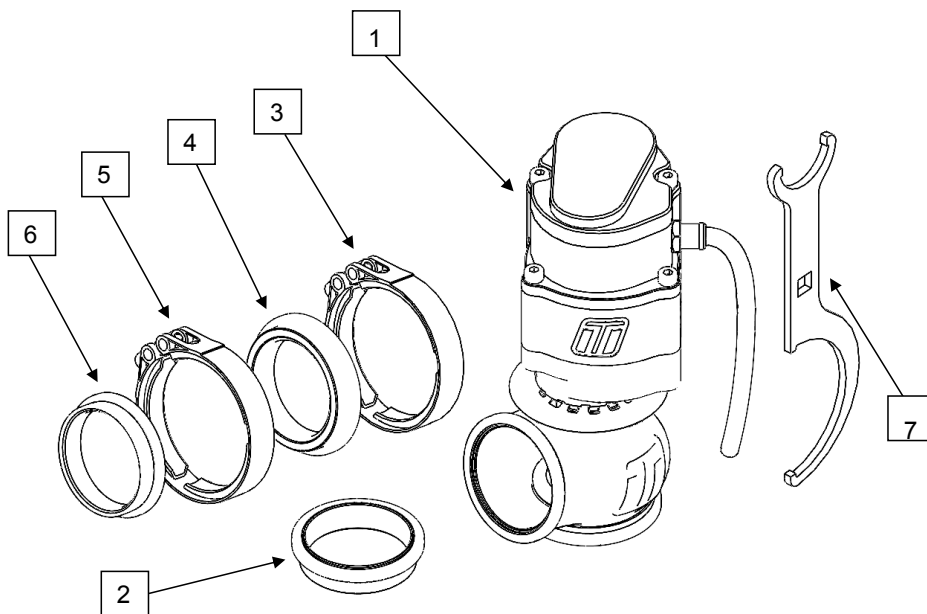


Figura 1 - Conteúdo do kit
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CONTEÚDO

CONTEÚDOS DO KIT 1

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FERRAMENTAS NECESSÁRIAS

- Soquete de unidade de ¼ "5mm
- Extensão da unidade de ¼ "
- ¼" unidade catraca
- Soquete profundo de 3/8 "quadrada
- Chave catraca quadrada
- Chave de torque (3/8 "de acionamento)
- Chaves de não marcação para apertar acessórios
- Ferramenta de colar torçãoa

LUBRIFICANTES E VEDANTES SUGERIDOS

- Loctite 243 Locker Thread
- Loctite 567 Vedante de Rosca
- Resbond 907TS Vermelho
- Óleo penetrante
- Graxa em spray Inox MX8

NÚMEROS DE PEÇA

TS-0553-1502 - Gen-V WG45 Hyper-Gate45 preto eletrônico
 TS-0555-1502 - Gen-V WG60 Powergate 60 eletrônico preto

GUIA RÁPIDO

COMO USAR

O Turbosmart eWastegate é uma maneira totalmente nova de acionar válvulas de válvula residual de reposição, que envolve o uso de um motor elétrico para dirigir a posição da válvula, esta permite agora um maior controlo sobre a válvula durante a sua actuação sobre o carro, este emparelhado com um aftermarket ECU controla -lo, permite a abundância de novas e mais seguras formas de controle de impulso em seu carro.

O corpo precisará ser instalado no veículo. **Veja o desenho explodido (figura 10)**. Isso envolve os dois V Bandas de grampos, a entrada (equipado com o escape colecto), e a saída que é onde as reguladas de escape de gases são contornado. Uma válvula de assento está montado dentro da entrada V Banda permitindo a válvula de vedação sobre fecho. É importante ter o válvula manualmente ajustada para cerca do meio de seu curso, bem como a sede da válvula instalada. Isto irá permitir um mais fácil instalação.

Veja abaixo uma maneira mais detalhada e útil de instalar o Turbosmart Gen V eWastegate.

MANUTENÇÃO

O Gen V eWastegate da Turbosmart exigirá a reaplicação periódica de graxa em spray, como a graxa em spray Inox MX8, isto é importante que a substituição manual seja usada para mover a válvula para cima e para baixo, permitindo que a graxa seja aplicada em toda a caixa de engrenagens da válvula. Turbosmart recomenda que este é feito regularmente pelo menos metade anualmente ou em exigentes ambientes de temperatura.

É também importante para verificar V Banda estanqueidade após a válvula de descarga tenha executado através de um par de ciclos de calor. Para garantir que a wastegate está assentada e vedando corretamente.

TEMPERATURA

O Turbosmart Gen V eWastegate tem um estresse térmico máximo de 1250 ° C por 24 horas se resfriado termicamente através do portas de arrefecimento com água, que é importante que o actuador interno carcaça não ir acima de uma temperatura de 150 C como este Maio causar danos aos componentes eletrônicos internos. A Turbosmart recomenda que o eWastegate seja refrigerado a água e emparelhado com bom fluxo de ar sobre o corpo para ajudar a regular a temperatura. A Turbosmart também recomenda o registro de dados da temperatura que é visto dentro do atuador usando o sensor de temperatura incluído na placa.

É recomendado que o arrefecimento água é em linha com o turbo este irá aumentar a longevidade do eWastegate e permitir que ele para operar perfeitamente. Isso depende de determinada aplicação e da taxa e período em que o eWastegate é exposto às altas temperaturas.

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PARÂMETROS BÁSICOS DE SINTONIA

It is important that the basic tuning parameters are discussed with a trained professional, please consult your ECU manufacture. There are a few basic parameters that are worth noting.

Motor polarity is important, Due to the nature of PID controllers (Proportional-integral-derivative controller) the eWastegate will be targeting a set position, this will move further away if the motor polarity is wrong as it's trying to reach it's setpoint.

Current limitations, it is important that the Current that is driven through the motor is limited to no more than 20amps for more than 1 second and 5 amps for more than 5 seconds. It is important that the current values such as the dead band are correctly set in the ECU to allow for the motor to only be active if needed.

Sensor Diagnostic limits should be monitored for values that are lower than 0.1V and higher and 2.15V with respect to the Temperature sensor and 0.1V-4.9V with the position sensor. It is also recommended that safety tuning strategies are in place to lower temperatures if the eWastegate internally reaches a temperature of 150degC (302degF).

Valve Position limits should be set to target 0% for valve closed and 90% for completely open, Since the design of the end stops is biased to operate better with the valve in the closed position it is recommended to avoid opening the valve to full lift.

WHAT'S NEW

Our new eWastegates are a direct fit upgrade to all 4th-generation Turbosmart wastegates and feature our unique collar-locking system, variable motor cap and base, strap-type V-band clamps, liquid-cooling, 1/8" NPT ports.

Control

With the introduction of the electronic motor to drive the eWastegate, a new level of control is now available to boost control, there is a wide range of tuning strategies that can be implemented to better control boost as well as engine protection. This allows the Engine to maintain much better control with the turbo boost strategies.

Adjustability

The 5th generation eWastegate range has been designed with maximum user-adjustability, without comprising performance. We designed this unit with almost infinite possibilities of directions in which the motor assembly can be mounted with the engine bay. So, if you need the eWastegate mounted in the opposite orientation to stop fouling with parts within the engine bay, there is an orientation that is suitable for the eWastegate to operate in. This mixed without the need of having to remove and reassemble due to changes in base wastegate spring pressure the eWastegate has next level control adjustability of the position of the wastegate valve.

Upgrades and Servicing

Due to the modular construction, the new range is also upgradeable and completely serviceable, as all components can be removed or upgraded. Components have been tested for over one million cycles so reliability will be rock-solid.

Flow and Thermal Performance

Our new range of wastegates out-flow all competitors thanks to our world-leading engineering and simulation abilities. Thermal performance has been improved drastically compared to our nearest rival, and all wastegates feature liquid cooling ports for further thermal performance if required.

GEN V EWASTEGATE OVERVIEW

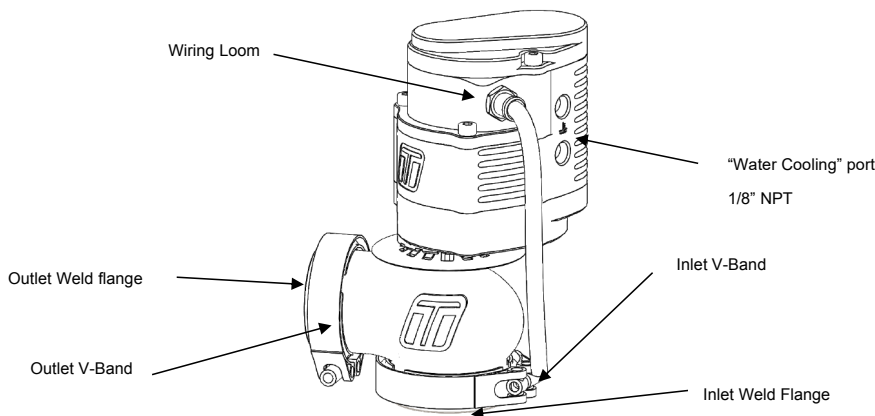


Figure 1 -Gen V eWastegate Overview



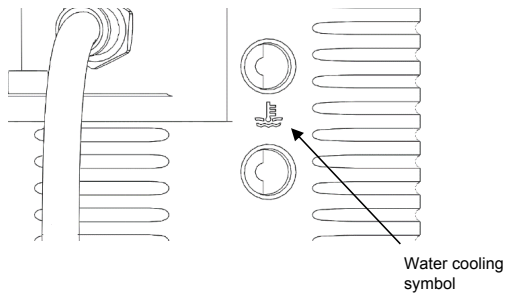


Figure 2 – Gen V eWastegate Water Cooling

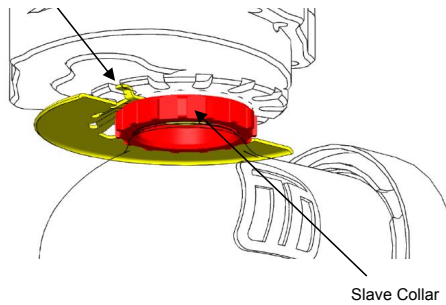


Figure 3 – Gen V eWastegate Locking

FITTING YOUR GEN V WASTEGATE

1 Mounting your New Turbosmart Gen V eWastegate

Water cooling is highly recommended for sustained heat exposure.

The Gen V series of Wastegate including Electronic is a direct fit replacement for the 4th gen wastegate range and no modification is necessary provided packaging space is sufficient within the engine bay.

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

For best results, an attempt should be made, if space allows, to mount the Gen V eWastegate 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.

CAUTION!
Do not place the eWastegate near a significant heat source as this could shorten the life of the internal electronics.

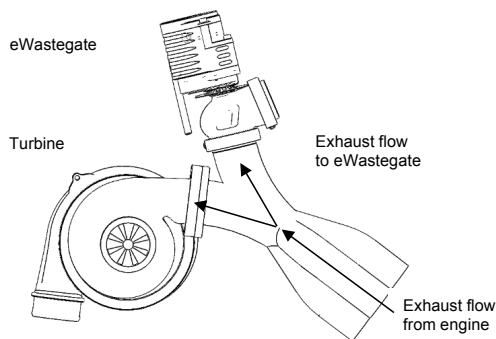


Figure 4 - Best flow - Symmetric mounting
Symmetric mounting allows an excellent flow of exhaust to the wastegate.

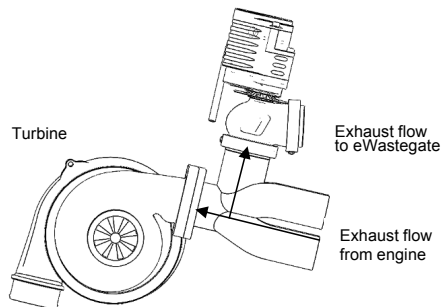


Figure 6 - 90 Degree mounting
90 Degree mounting gives poor exhaust flow to the wastegate and in some circumstances may contribute to over boosting.

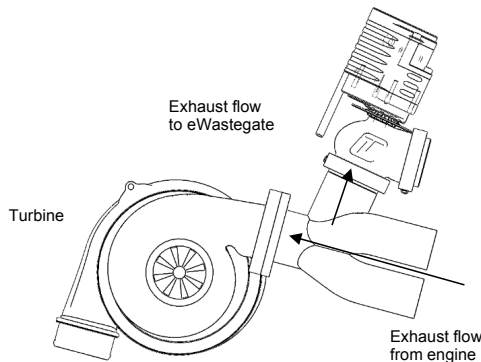


Figure 7 - Not Recommended - Less than 90 Degree Mounting
An angle mounting as shown in not recommended and gives extremely poor exhaust flow to the eWastegate which can contribute to poor boost control and over boosting.

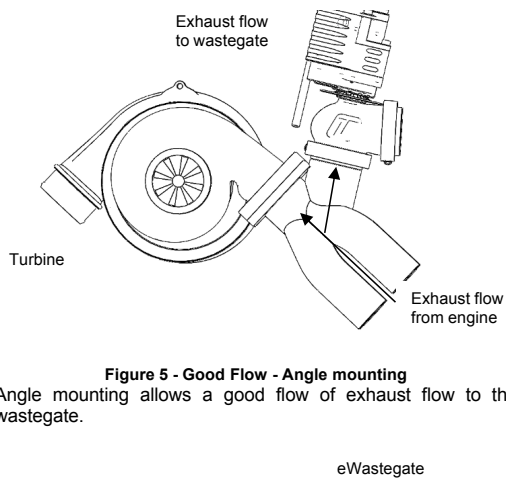


Figure 5 - Good Flow - Angle mounting
Angle mounting allows a good flow of exhaust flow to the wastegate.

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Fitting the Gen V eWastgate

Prior to mounting the Gen V eWastgate, place v-band (figure 9) 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.

Do not forget to put the valve seat into the body before mounting the unit on the exhaust manifold. 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.

It is important that the valve sits slightly open for installation. This allows for no interference during the installation process. This can be adjusted via the manual override. (Figure 8)

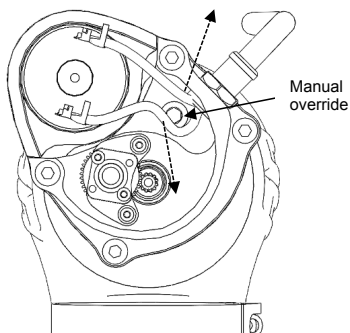


Figure 8 - Manual Override

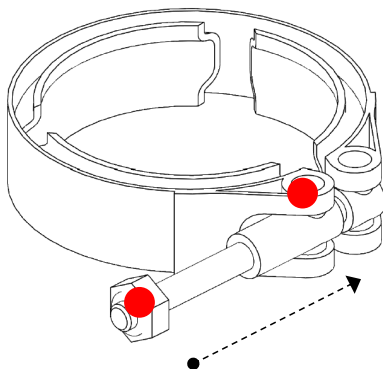


Figure 9 - V Band Clamp

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Connecting Your Wastegate

The Turbosmart Electronic wastegate come unterminated with 7 wires. A revision has been made to include the ability for a PWM signal. This is the Revision B (current). It can be identified by the colour of the wires and number of wires in the core (5 smaller gauge wires).

Revision B (current) - Wiring

	Colour	Description
1 single core wire each	Large Gauge Red	Motor A tending towards 0%
	Large Gauge Black	Motor B tending towards 100%
	Red	5V
Multi Core Wire	Black	Sensor ground 0V
	White	Position Signal 0-5V
	Blue	Pulse Width Modulation
	(Rev B Only) Yellow (Orange Rev A)	Signal Temperature Signal 0-5V

Sensor Voltage Limits

Deg C (Deg F)	Temperature Sensor Output (mV) Rev A	Temperature Sensor Output (mV) Rev B
0 (32)	500	2630
150 (302)	2000	538
Position Sensor	Target Voltage (V)	Duty Cycle (Rev B only)
100%	0.20-0.60V	~16%
0%	4.40-4.80V	~84%

CAUTION!

Turbosmart recommends calibrating the position sensor before connecting the motor wires to your motor drive.

The two large wires are directly connected to the motor of the wastegate and need to be connected to high power drives in a Full bridge configuration like that of an electronic throttle drive circuit, see your ECU supplier documents for suitable connections.

Turbosmart recommends the eWastgate should be driven by an external full bridge, that is at least 20Vdc seamless operation.

Connect the small Red Wire to a 5V power source from your ECU as well as the Black wire to Sensor ground. Connect the white wire to a 0-5V analogue input on your ecu as well as the orange temperature sensor signal.

CAUTION! temperature sensor is not required for operation it is recommended for activating failsafe protocols.

CAUTION!

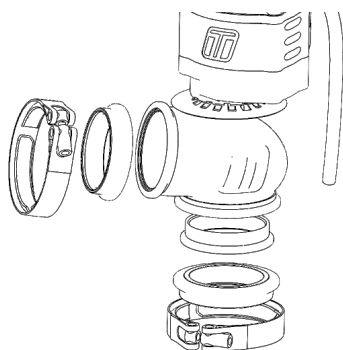


Figure 10 – Exploded drawing of assembly of eWastegate.

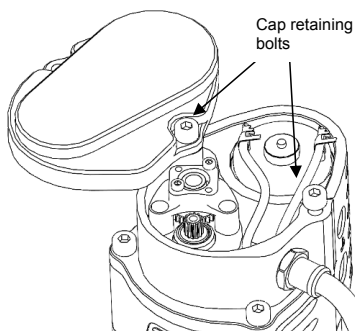
CAUTION!
Ensure all connections are high quality and away from any heat source.

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4 Calibration

CAUTION!
Disconnect the motor wires to prevent accidental spin up.

To calibrate the electronic wastegate the cap must be removed to allow access to the manual override screw. Please note that the valve seat must be in place before calibration.



Using an Allen key remove the 2 top bolts allowing the cap to be removed, and a spacer or shift the cap off to one side and reinsert at least one of the bolts. This prevents the preload in the mechanism separating the housing potentially effecting the calibration accuracy.

Figure 11 – Top Cap removed for calibration

Carefully move the motor wired allowing access to the manual override below (Figure 12)

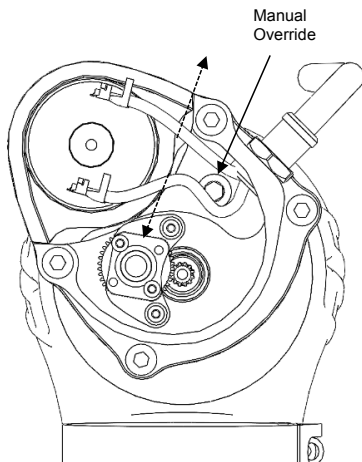


Figure 12 – Manual Override

Using a 1/4" drive extension with a 5mm socket, turn the manual override in a clockwise direction with your fingers until the mechanism stops rotating. In this position the valve should be home against the valve seat and will be your 0% position. **Remember to have the valve seat inserted.**

CAUTION!
Do not apply excessive force to the manual override, doing so will damage the product and effect the performance.

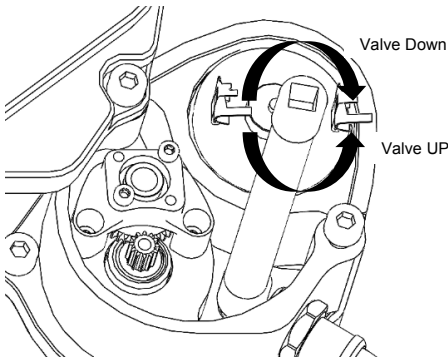


Figure 13 – 1/4 Drive extension with 5mm socket manually adjusting.

Using your ECU manager software, read the voltage from the sensor and set this as your closed position.

Wind the manual adjustment in an anticlockwise direction until it stops. From this position rotate the adjustment 2 full turns in a clockwise direction. Read the sensor value and set this as 100% valve travel.

Monitor sensor signal voltage to ensure no wrap around occurs throughout the stroke of the valve that could affect operation.

CAUTION!
It is critical not to set the 100% position at the end of the travel as this may lead to seizing of the wastegate and overloading the system.

NOTE!
Turbosmart recommends allowing additional clearance from the end stops until the wastegate control is tuned to minimise risk of overshoot into end stops at high speeds.

5 Tuning

The eWastegate will come calibrated from Turbosmart, the targeted values have been set with regards to the position sensor, and 0.5V (some older versions) and 0.5V (newer versions) through its range of motion that the valves are monitored to move from 4.5V decreasing to 0.5V, 0% open to 100% open. This should be done manually with the ECU package monitoring Voltage Values. The electronic motor should be disconnected at this point.

Voltage wraps around will cause errors with the eWastegate, this is when the Voltage increases from 4.8V up to 5V and jumps through to 0V.

Position Sensor	Target Voltage (V)	Duty Cycle (Rev B only)
100%	0.20-0.60V	~16%
0%	4.40-4.80V	~84%

It is important to set up the correct limits manually with eWastegate. Turbosmart recommends that the valve is only

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ever driven electronically to the maximum valve position of 90%.

Driving the valve to 100% will cause increased wear on components such as the electronic motor as it tries to force the valve to completely open.

Adjust the calibration to allow plenty of overshoot to the end stops of the valve, recalibrate as above once you have good control of valve position.

PLEASE NOTE that temperatures over 180 degC (356degF) will create an error in the temperature sensor readings.

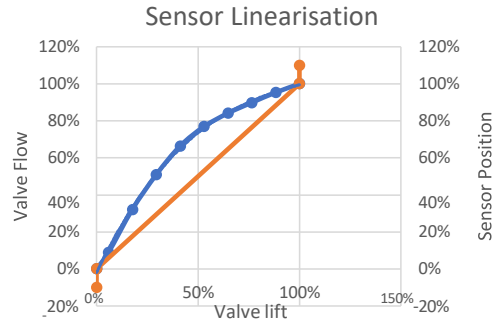
Therefore, the internal temperature is set to a temperature of 180 degC (356 degF) it is recommended to log and place sufficient alarms to monitor this.

PLEASE NOTE When driving the electronic actuator, the current should be limit to **no more** than 20 amps at a period of 1 second and 5 amps for more than 5 seconds.

Follow your ECU manufacturers guidelines for tuning wastegate servo control. Consult the ECU when it is needed. reasonable level to

6 Sensor Linearisation

Due to the nature of the poppet valve design, the flow characteristics are nonlinear. In some cases, it may be advantageous to correlate the linear sensor output to match the flow of the valve. The following plot compares valve position with valve flow. A 3rd order polynomial is provided to relate sensor position to flow. Note due to the design of the wastegate, the valve is on a preloaded mechanism to minimise binding at the end stops, this results in the sensor reading past the home positions and for this reason the calibration sequence with **low** force is essential.

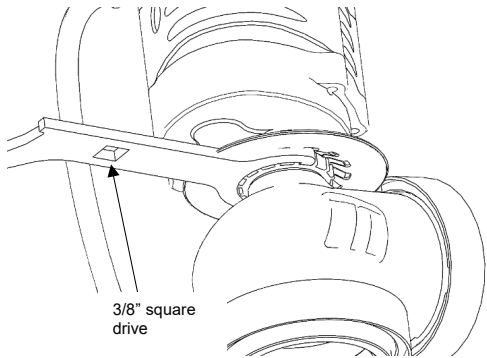


$$y = 0.5596x^3 - 1.8306x^2 + 2.2847x - 0.0189$$

$$R = 0.9989$$

ADVANCED FEATURES ON THE GEN V WASTEGATE

1 Re-Orientation of the Actuator



Turbosmart provide the Gen V eWastegate in a set orientation, in some applications it may be advantages to clock the actuator to allow clearance for fittings and wiring.

Locate the slave collar between the electronic actuator and the body underneath the heatshield. A tab on the heatshield will be folded down into a groove on this collar. Using a flat blade

screwdriver, pry this tab out of the groove allowing the collar to be loosened.

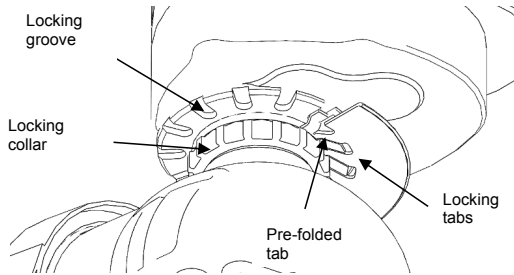
Using the small end of the supplied collar tool undo the slave collar 1 complete revolution (anti-clockwise as viewed from the bottom). One tab on the heatshield at the back of the wastegate is folded up to locate on the actuator, rotate the actuator to desired location ensuring the folded tab aligns with a groove in the bottom of the actuator. It is possible to fold down this tab and use another if the actuator cannot be positioned correctly on the original tab.

CAUTION!
Turbosmart does NOT recommend altering to position of the actuator once the wastegate has been used.

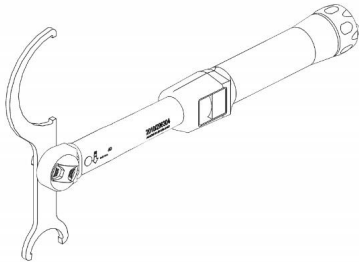
It is recommended that the electronic actuator be clocked without a valve seat installed to prevent damage to the valve.



Fit water-cooling port fittings Prior to mounting the wastegate, install 1/8" NPT fittings into the water ports, apply thread lubricant and screw in clockwise until finger tight, then tighten further 1-2



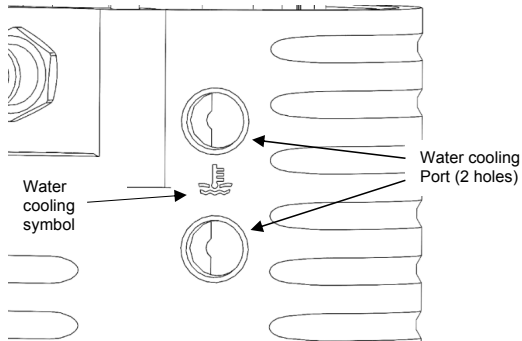
Tighten the collar using a torque wrench on the 3/8" square drive provided in the collar tool perpendicular to the length of the tool to **30N.m (22ft/lbs)**. Fold down a tab onto the slave collar to prevent the collar from coming loose during use.



2 Water Cooling

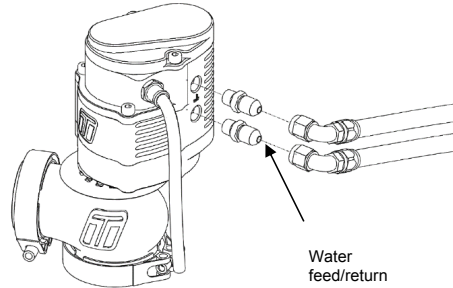
Turbosmart's Gen V eWastegate is equipped with water cooling ports to keep the wastegate cool in the most extreme conditions and keep consistent actuator temperature.

Identify the water cooling ports on the bottom of the actuator adjacent to the water-cooling symbol engraved in the actuator.



GenV Electronic Wastegate Instructions

turns for seal. Choose feed and drain source for the water and connect to the wastegate. Turbosmart recommends -4SAE fittings and hose compatible with coolant. It is **not** important which way the water flows through housing.



CAUTION!
Check for leak, ensure the water-cooling circuit is free from leaks.

TROUBLESHOOTING

- Wastegate not actuating - Confirm continuity of wiring, manually adjust valve position and feel for binding.
 - Poor wastegate actuation – Ensure wiring is correct, check for dirt and smooth operation by manual over-ride, ECU that is driving the valve may not be set up correctly.
 - Wraparound of signal on position sensor – Turbosmart Pre “time” every sensor, contact Turbosmart if this occurs.
 - Wastegate seized – Remove cap and manually move valve feeling for resistance.
 - Wastegate moves but sensor not reading – Check connections.
- Boost creeping at high rpm. Wastegate flow path is poor, wastegate is too small for the application.

8/9/2021

GenV Electronic Wastegate Instructions

- Boost creeping at high rpm - wastegate flow path is poor, wastegate is too small for the application.
 - Failing the above, submit a technical request to tech@turbosmart.com.au with information of your engine configuration and photos of installation.
-