

# TS-0265-1042 - eBG50 Electronic Boost Gate

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Product Name: eBG50 Electronic BoostGate50 Black

Product Description: eBG50 Electronic BoostGate50 Black

Product Number: TS-0265-1042

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## Important notes on your new Electronic Boost Gate

- The electronic boost gate is designed for use with a forced induction engine. The boost gate bypasses some of the intake air flow (boost pressure) in order to control total boost delivered to the engine.
- 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.
- It is important during the setup of the eBoostGate, that some precautions are taken to ensure that the unit does not malfunction. Firstly, the output from the ECU should be limited to 15%. As well as an inline fuse (5A-10A) or breaker to protect the eBoostGate. Once correct operation has been verified the fuse and limits can be restored to a more suitable limit.
- Incorrectly wiring BoostGate sensors to chassis ground rather than a dedicated sensor ground will cause the unit to malfunction. Sensor Ground must be connected to the ECU Sensor ground. Do NOT connect ECU Grounds and Chassis Grounds together they must remain separate.
- Correctly setting up a sensible boost control strategy to ensure engine safety is highly recommended.

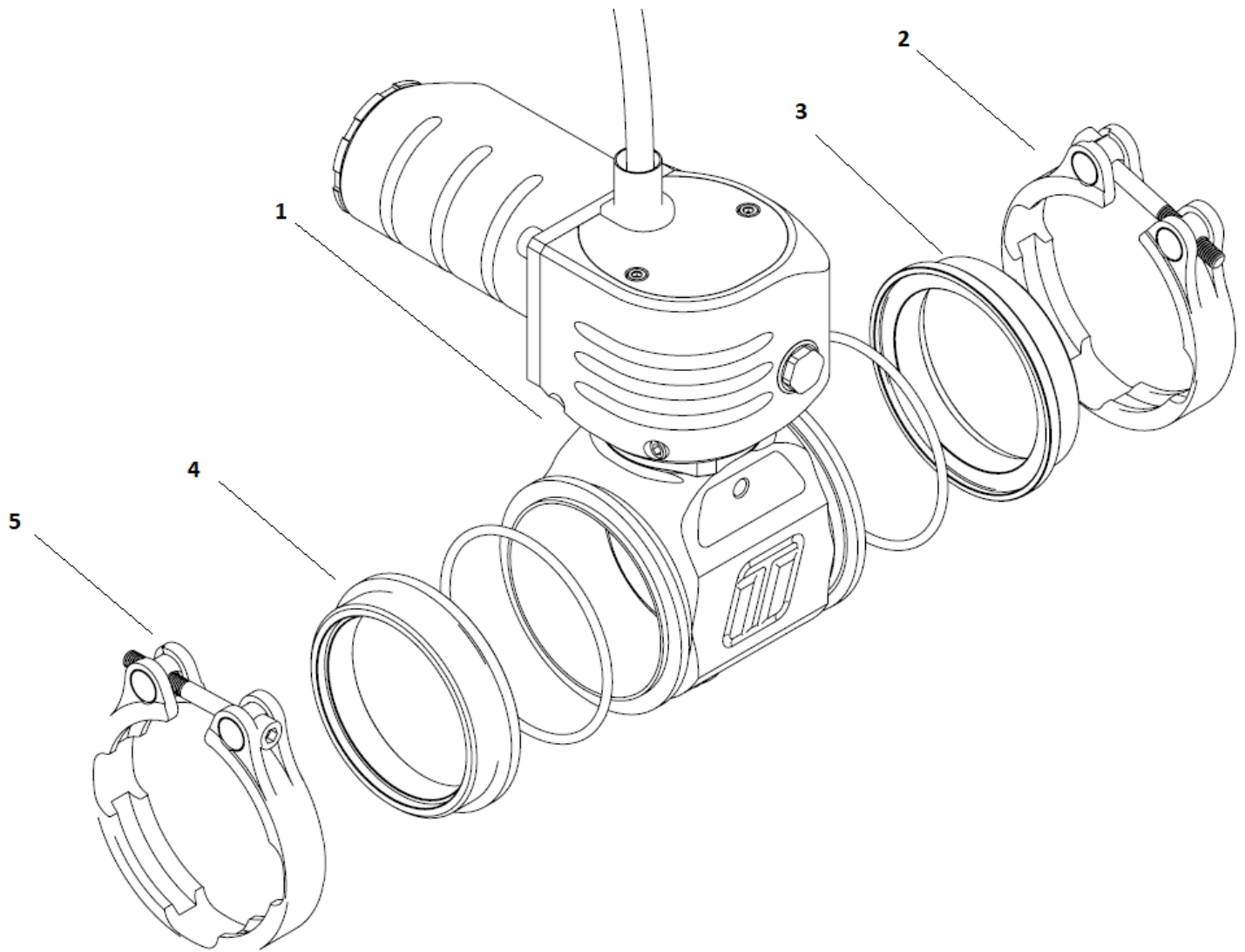
## Recommendations

- **Always disconnect motor wires before removing the end cap off the actuator**
- **Allow for adequate cool airflow around electronic actuator**
- **DO NOT Mount the electronic boostgate so that the electronic actuator within 100mm from a heat source.**
- **Fitting your Electronic boostgate may require fabrication or modification to your intake piping. Turbosmart recommends that your boost gate 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

Part	Description	Use	QTY
1	Turbosmart Electronic Boost Gate	Main unit	1
2	Inlet V-Band clamp	Inlet V-band clamp	1
3	Inlet Weld flange	Inlet V-band weld flange (O-Ring included)	1
4	Outlet V-Band clamp	Outlet V-band clamp	1
5	Outlet weld flange	Outlet V-band weld flange (O-ring included)	1
6	Turbosmart Sticker	Turbosmart sticker	1



## Tools Required

- ¼" drive socket 5mm
- ¼" drive extension
- ¼" drive ratchet
- 14mm square drive deep socket
- Square drive ratchet wrench
- Torque wrench (3/8" drive)
- Metric Allen Key set - 2.5mm, 3mm, 4mm Allen key
- Non-marking spanners to tighten fittings

## SUGGESTED LUBRICANTS AND SEALANTS

- Loctite 243 Thread locker
- Loctite 567 Thread Sealant
- Resbond 907TS Red

- Penetrating oil
- Inox MX8 spray grease (Or Equivilant)

## QUICK START GUIDE

### CAUTION!

**It is important during the setup of the eGate, that some precautions are taken to ensure that the unit does not malfunction. Firstly, the output from the ECU should be limited to 15%. As well as an inline fuse (5A-10A) or breaker to protect the eGate. Once correct operation has been completed, initial safety setups can be lifted to operational limits.**

## HOW TO USE

The Turbosmart Boost Gate is a brand-new way to control boost pressure, it involves using an electric motor to drive the position of the butterfly valve, this allows far greater control over conventional pneumatic boost control during its actuation on the car. This paired with an aftermarket ECU controlling the boost gate, allows for plenty of new and safer ways to control boost on your car.

The body will need to be fitted to the vehicle. This involves the two V Band clamps. The Inlet (fitted to the intercooler piping), and the outlet which is where boost pressure is bypasses to (commonly vented to atmosphere via a BoostGate Trumper such as TS-0265-3001). It is important to have the butterfly valve manually set to about the middle of its stroke. This will allow for an easier installation. The Straight Gate can be mounted in either direction.

Please see below for a more detailed and helpful way of installing the Turbosmart Electronic BoostGate

## MAINTENANCE

Turbosmart Electronic BoostGate will require periodic reapplication of spray grease such as Inox MX8 spray (Any high temperature high pressure grease will suffice) grease. It is important that the manual override is used to move the butterfly valve through its range of motion, allowing the grease to be applied throughout the entire butterfly valve gearbox. Turbosmart recommends that this is done regularly at least half yearly or more in demanding temperature environments.

It is also important to check V Band tightness after the wastegate has run through a couple of heat cycles. To ensure that the BoostGate is seated and sealing correctly.

## TEMPERATURE

It is important that the actuator internal housing doesn't go above a temperature of 150degC (302degF) as this may cause damage to the internal electronics. Turbosmart recommends that the BoostGate is installed with good airflow over the body to help regulate temperature. Turbosmart also recommends data logging the temperature sensor that is seen inside the actuator.

## BASIC TUNING PARAMETERS

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

**Motor polarity may be important**, Depending on how you are driving the BoostGate (external device such as the Turbosmart BlackBox or directly from an ECU) motor polarity may be important to the correct operation of the system. Please check with the manufacturer how they suggest wiring the high power motor drive wires.

**Current limitations**, it is important that the allowable motor current is limited a maximum of 20amps for no 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 to ensure correct operation of your BoostGate. The temperature sensor output should not drop below 0.1V or go above 2.15V in normal operations. The position sensor should not go below 0.1V or above 4.9V. Turbosmart also recommends putting in place a tuning strategy that lowers temperatures if the BoostGate internally exceeds a temperature of 150degC (302degF).

**Butterfly Position limits** should be set to target 0% for butterfly closed and 90% for completely open. Due to the shape of the butterfly valve on the BoostGate50 maximum flow is actually achieved at 90% open and flow decreases between 90 and 100% opening it is recommended you avoid 100% butterfly opening.

**Boost cut** should be set to ensure the safety of your engine a sensible boost cut should be set with in the ECU to control any possible over boost issues that could be detrimental to your engine.

## WHAT'S NEW

The new Turbosmart Electronic BoostGate is Turbosmart's addition to its electronic wastegate line-up. A new level of control is now available with the butterfly valve and offers the option for customers who require another packaging or new level of control.

### Control

With the introduction of the electronic motor to drive the Electronic Boost Gate, 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 over the turbocharger.

### Adjustability

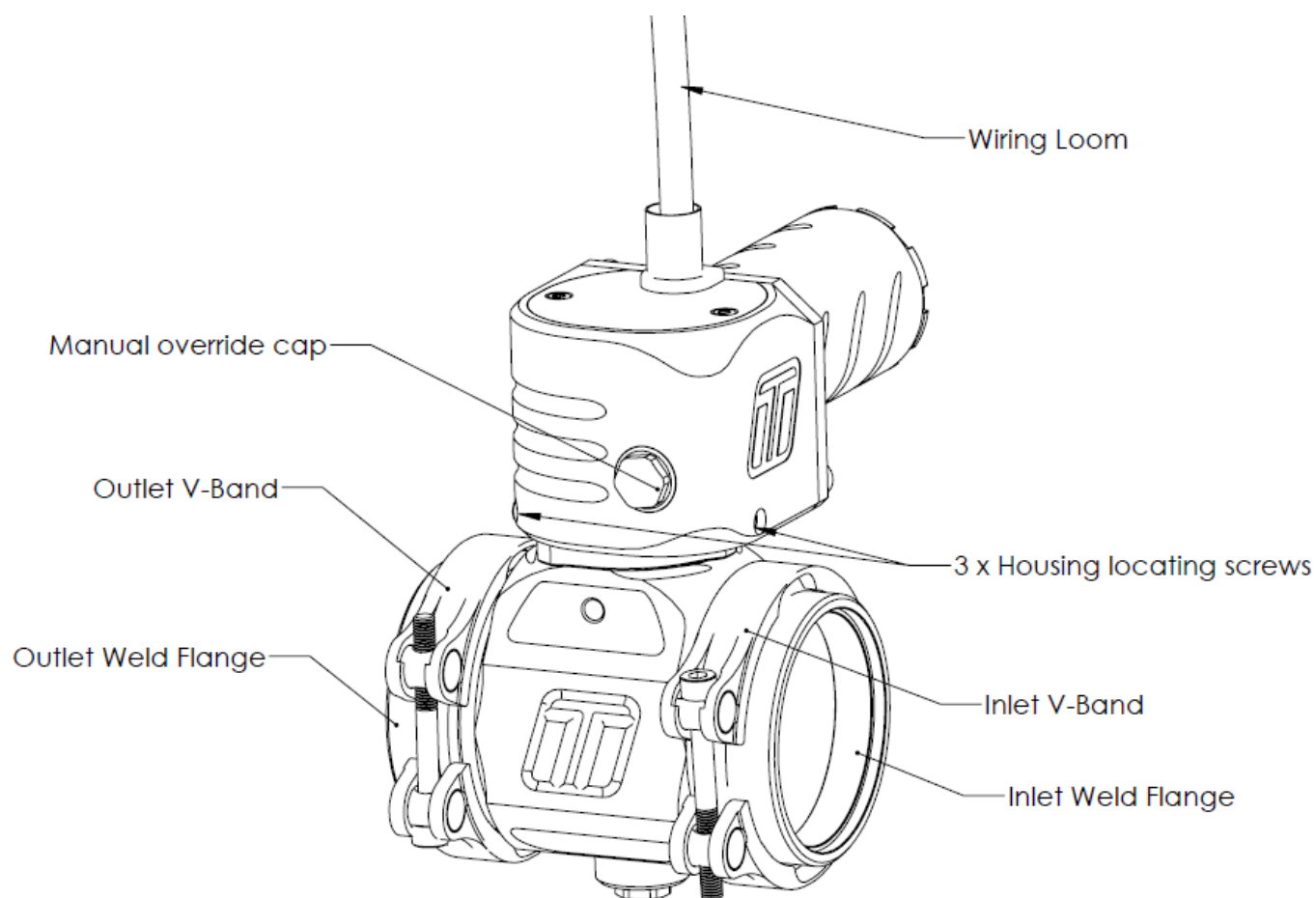
The straight gate has multiple options for orientation of the motor to the body, this is coupled with infinite possibilities for location of the weld flanges means you really are the master of your own destiny when it comes to the boostgate mounting location. So, if you need the

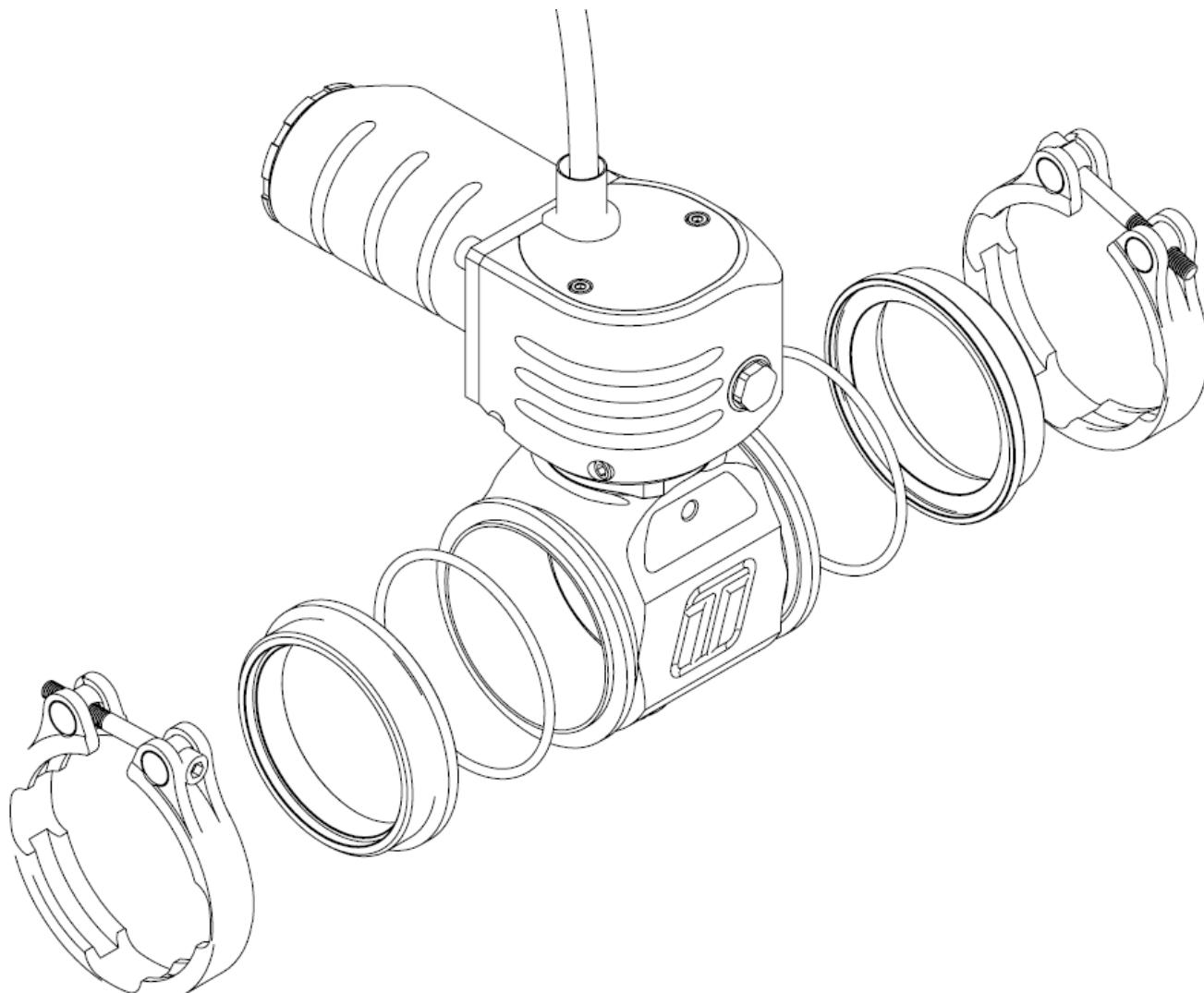
Electronic Boost Gate mounted in the opposite orientation to stop fouling with parts within the engine bay, there is an orientation that is suitable for the Electronic Straight Gate to operate in.

### Flow and Thermal Performance

The new boost gate is a world first in its class and features excellent flow properties thanks to our world-leading engineering and simulation abilities. Thermal performance is a critical key performance factor within the design of all our products.

## STRAIGHT ELECTRONIC BOOSTGATE OVERVIEW





## **FITTING YOUR ELECTRONIC BOOSTGATE**

### **Mounting your new Turbosmart Electronic Boostgate**

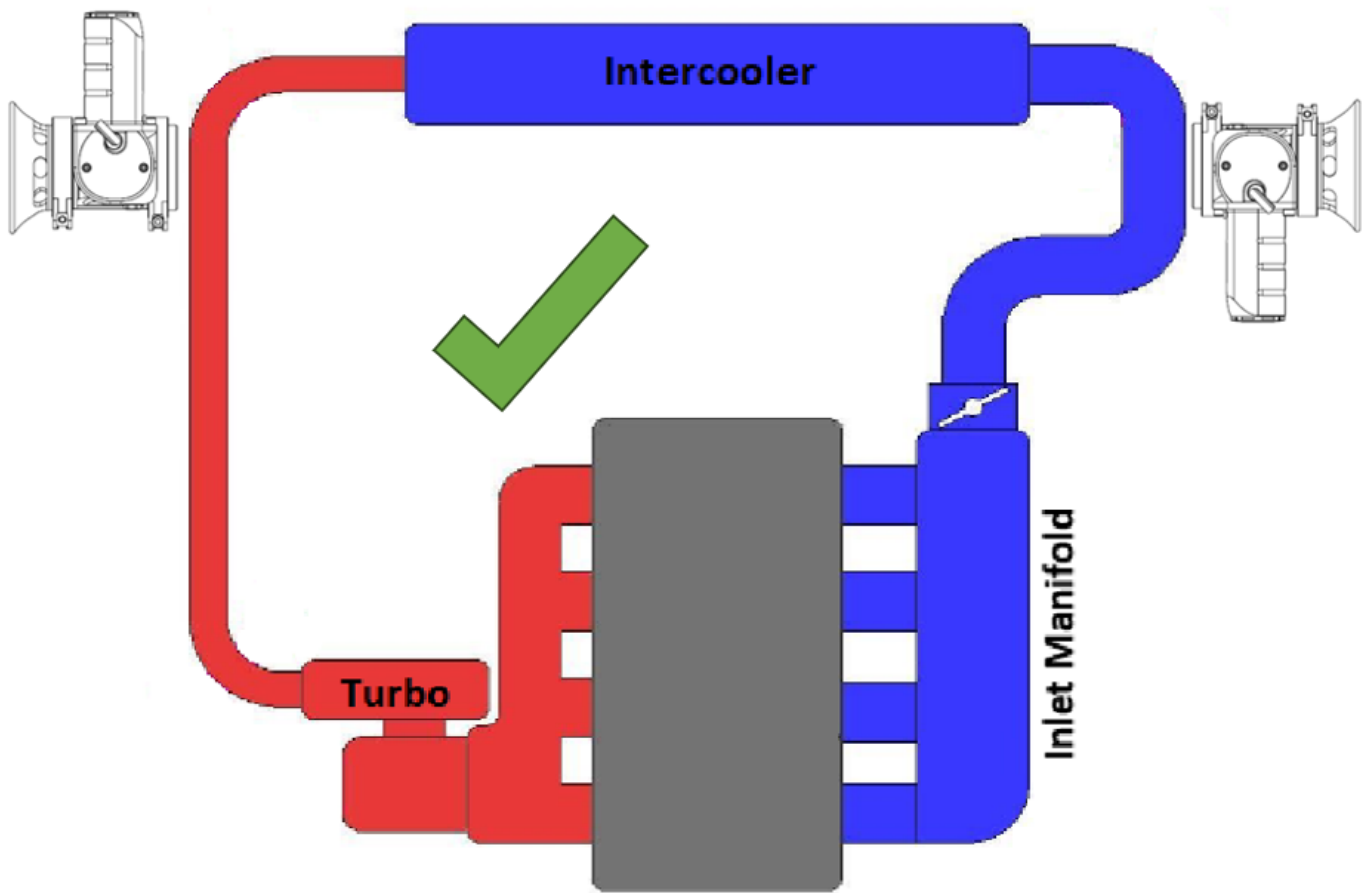
The weld flanges should be welded to your intake system. The weld flanges are compatible with aluminium rod material.

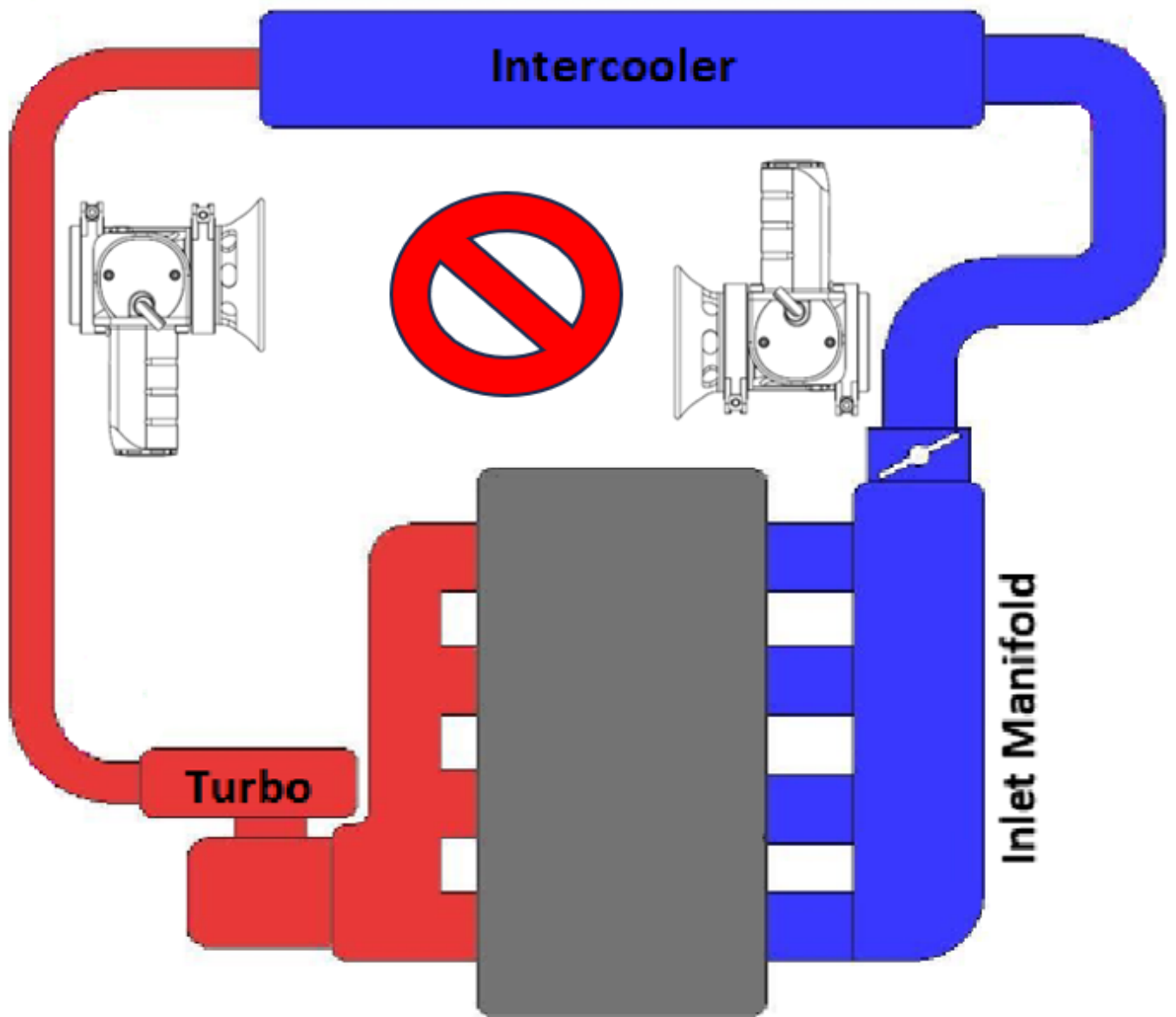
The Straight Gate utilises the pro port weld flanges, this allows for a straight swap over for engines running those blow off valves.

#### **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.**

Ideally placing the boostgate on the outside edge of the intercooler will aid in its ability to dissipate as much air as needed to maintain boost control. Two examples are made below. Note that both are possible but the recommendation is for the boost gate to be on the outside perimeter.





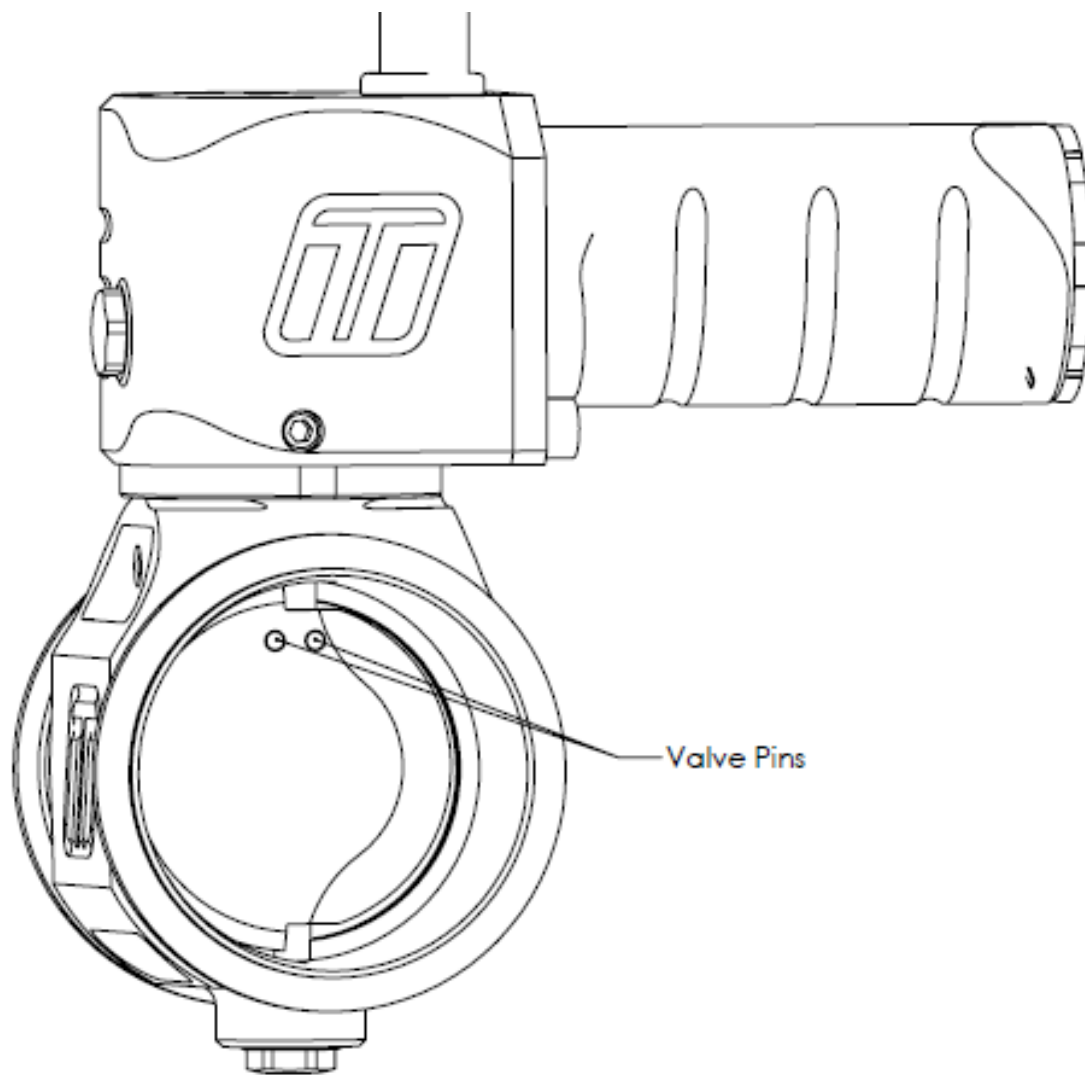
## CAUTION!

Do not place the Straight Gate near a significant heat source as this could shorten the life of the internal electronics.

## Fitting your new Turbosmart Electronic BoostGate

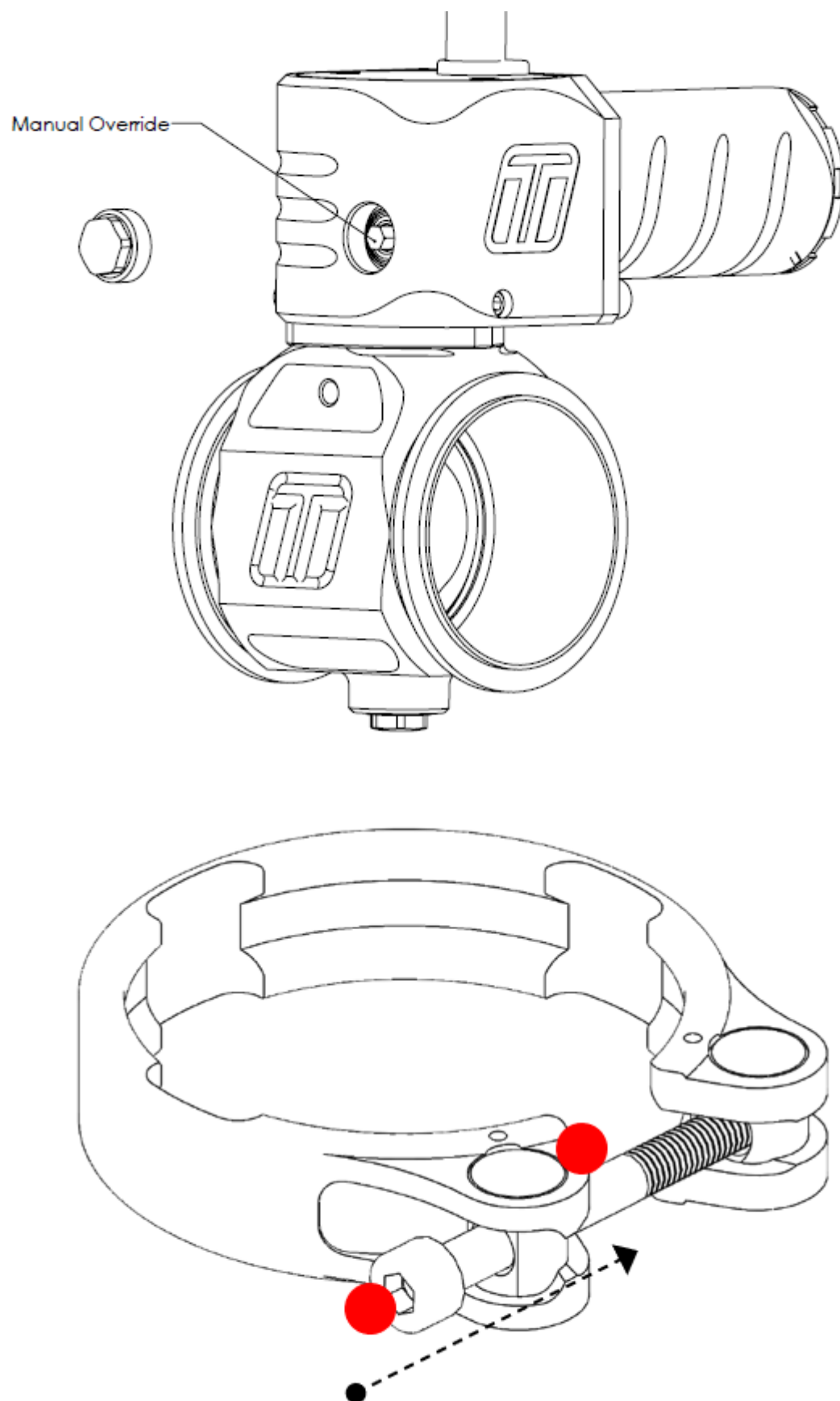
Even though possible to mount the BoostGate gate in both directions, it is suggested that the Butterfly valve pins are facing away from the intake system.

Prior to mounting the BoostGate, place v-band over weld on flange by unscrewing the screw 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 a 4mm allen key and a torque wrench tighten the V-Band to 3N.m (2 ft/lbs). Ensure the boostgate is seated in the v-band flange correctly while torquing the screw to prevent intake leaks.

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



## Connecting your Turbosmart Electronic Boostgate

The Turbosmart Electronic BoostGate wiring has been left unterminated, there are 7 wires.

Wiring Pinout

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%
Multi Core Wire	Red**	5V
	Black***	Sensor ground 0V
	White	Position Signal 0-5V
	Blue  (Rev B Only)	*Unfiltered Signal Output  (Position Output)
	Yellow (Orange Rev A)	Temperature Signal 0-5V

**\*Note:** The Blue (unfiltered position signal) is not required for use & is for development purposes only.

**\*\*Note:** The 5V red wire has no reverse polarity protection, use only 5V wired in correctly.

**\*\*Note:** The sensor ground must be grounded at the ECU Sensor ground and **NOT** the chassis

Sensor Voltage Limits

Deg C (Deg F)	Temperature Sensor Output (mV)
0 (32)	2630
150 (302)	538

Position Sensor	Target Voltage (V)	Duty Cycle
100% (Open)	0.2-0.6V	~16%
0% (Closed)	4.2-4.6V	-84%

## CAUTION!

**Turbosmart recommends calibrating the position sensor using the manual calibration procedure 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 eBoostGate should be driven by dual H-Bridge outputs that can supply up to 20A of peak current.

Connect the small red wire to a regulated 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. The blue wire (Revision B only) is an unfiltered position output signal for development purposes - This can be left unterminated.

## CAUTION!

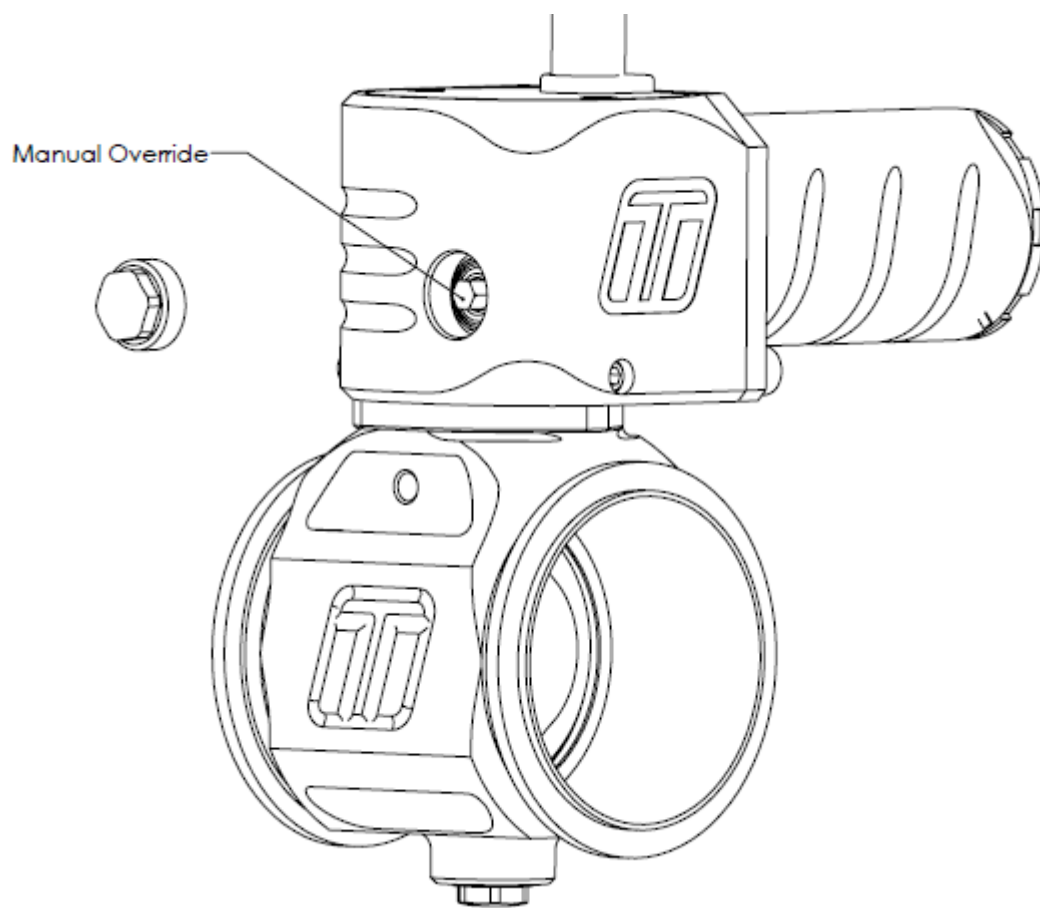
**Whilst the temperature sensor is not required for operation it is recommended for activating failsafe protocols.**

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

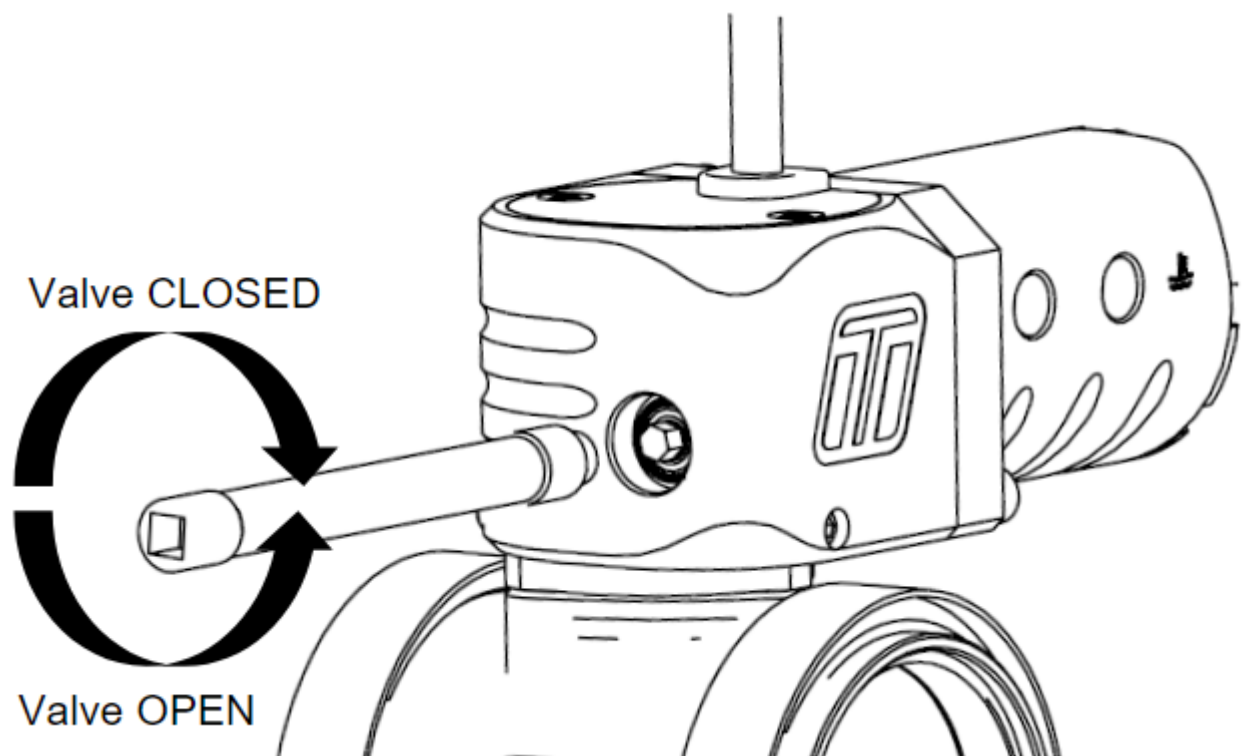
**It is important during the setup of the eGate, that some precautions are taken to ensure that the unit does not malfunction. Firstly, the output from the ECU should be limited to 15%. As well as an inline fuse (5A-10A) or breaker to protect the eGate. Once correct operation has been verified the fuse and limits can be removed.**

## Calibration

To calibrate the electronic boostgate firstly the manual override cap must be removed to allow access to the manual override. A non marking 14mm is required to remove the cap from the body.



Using a ¼" 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 butterfly valve should be seated against the valve seat and will be your 0% position.



**CAUTION!**

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

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% butterfly valve travel.

Monitor sensor signal voltage to ensure no wrap around occurs throughout the stroke of the butterfly 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.**

**Tuning**

The eBoostGate will come calibrated from Turbosmart, the targeted values have been set with regards to the position sensor are approx. 0.5V (completely open) and approx. 4.5V as (completely closed), It is important to note that as the butterfly valve moves through its range of motion that the sensor 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.

If the sensor voltage for any reason goes beyond 4.8V a phenomenon known as position wrap around can occur where the sensor output value drop back to zero, this should be avoided at all costs as it will send an incorrect position signal to the ECU..

Position Sensor	Target Voltage (V)	Duty Cycle
100% (Open)	0.2-0.6V	~16%
0% (Closed)	4.2-4.6V	-84%

It is important to set up the correct limits manually with boost gate. Turbosmart recommends that the butterfly valve is only ever driven electronically to the maximum butterfly position of 90%.

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

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

**PLEASE NOTE** that temperatures over 180 degC (356degF) will create an error in the temperature sensor readings. Therefore, the internal temperature is rated to a temperature of 150degC (302degF) 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.

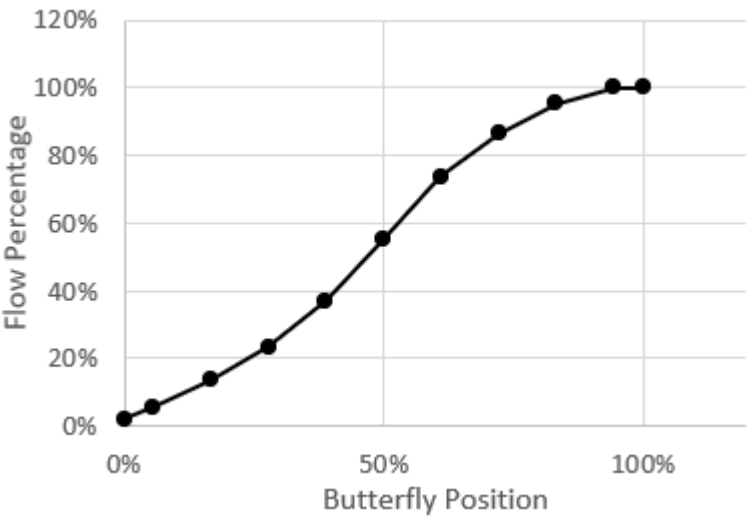
Follow your ECU manufacturers guidelines for tuning wastegate servo control. Ensure dead band is set to a reasonable level to not have the output active when not needed.

Sensor Linearisation

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 3<sup>rd</sup> order polynomial is provided to relate sensor position to flow. Note due to the design of the electronic straight wastegate, the butterfly 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.

$y = -2.1519x^3 + 3.0586x^2 + 0.0582x + 0.0326$

$R^2 = 0.999$



Butterfly Position	Flow Percentage
0%	3.3%
3%	3.7%
6%	4.7%
10%	6.7%
20%	14.9%

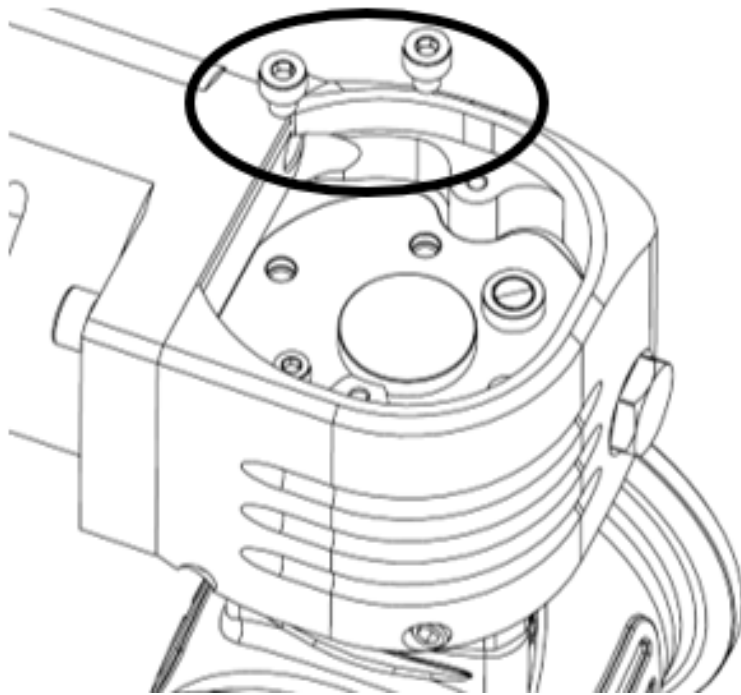
30%	26.7%
40%	40.8%
50%	55.7%
60%	70.4%
70%	83.4%
80%	93.5%
90%	99.4%
100%	100.0%

## HOW TO CONDUCT MAINTENANCE ON YOUR ELECTRONIC BOOST GATE

### Basic Maintenance

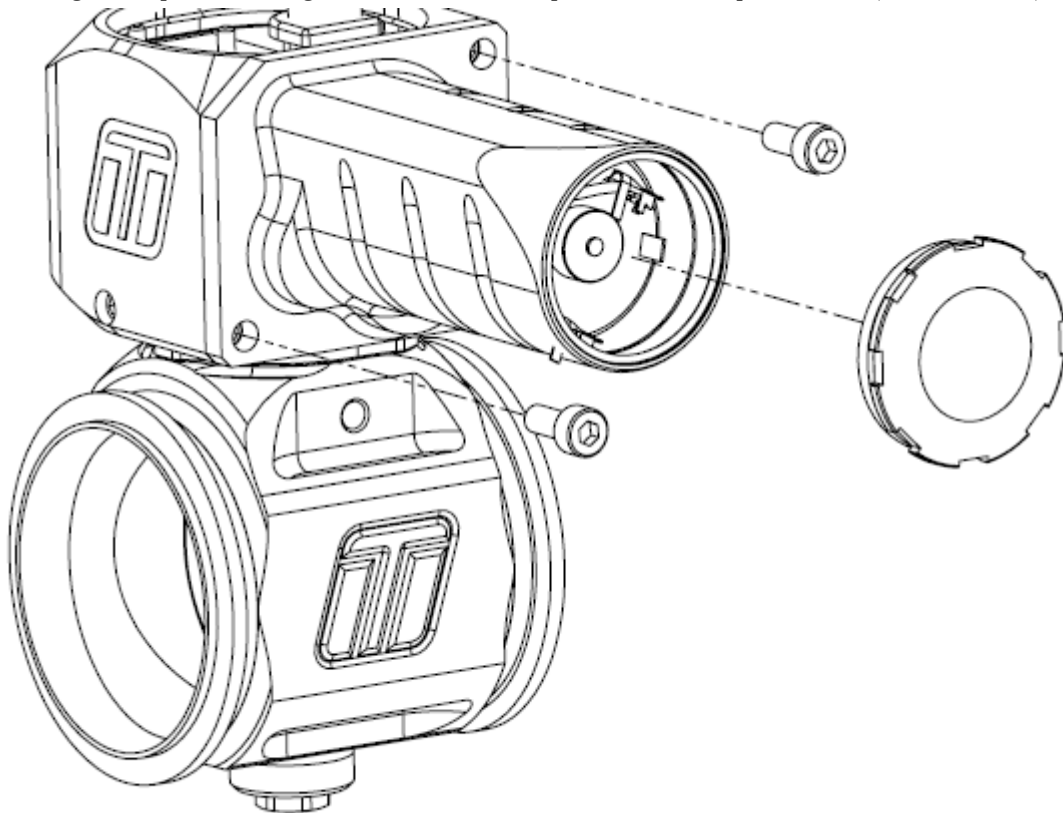
The Straight gate will require periodic maintenance depending on application. In high demand, unusually environments, it is advisable to increase the service interval. At a minimum 50 hours is expected.

Turbosmart recommends that the internal gearbox is regreased with a spray type grease such as Inox MX8 spray grease this should be conducted half yearly or more depending on environment. With the top plate removed grease can be sprayed into the small inspection hole located near the magnet covered by a M4 bolt as well as located near the motor.

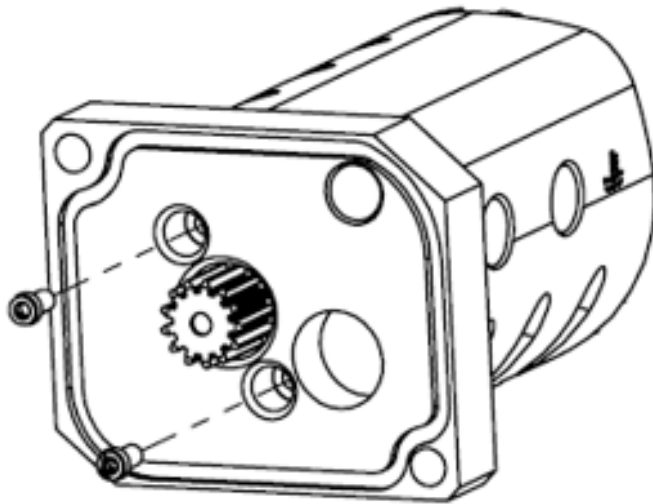


## Motor Replacement

In the event of the motor failing, it can be easily replaced. The Motor Housing (figure 15) must be disassembled, the cap must be removed with the Turbosmart rear housing tool, this opens the rear of the motor housing. Once open, the motor wires will need to be moved out of the way. The black wire is matched to the red dot on the back of the motor cover. With the wiring clear the 4mm Allen keys will need to be removed. The rear housing will separate. Pulling it off the back. The replacement motor part number (TS-0550-3123)

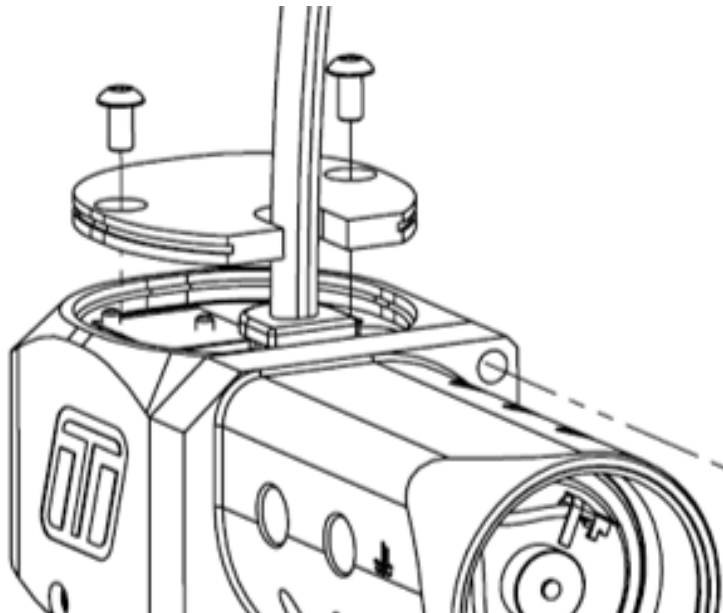


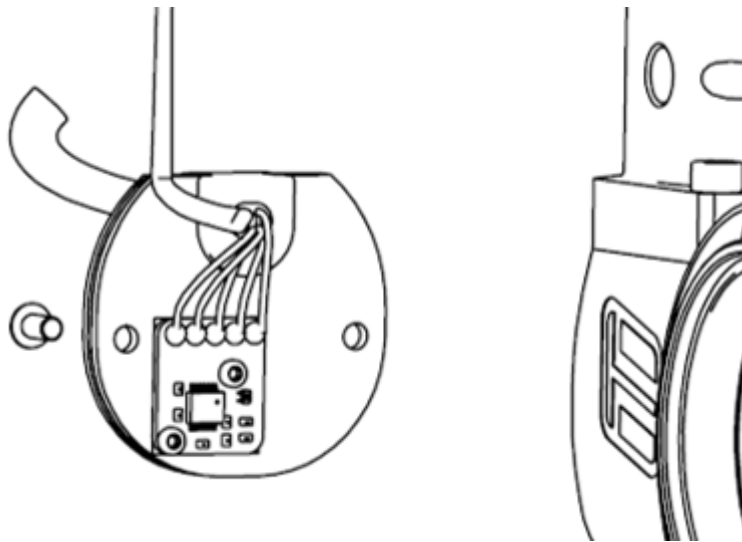
A 2.5mm Allen key will be required to remove the motor screws. With both undone. The motor can be lightly pushed out. When reinstalling, use a small application of Loctite 243



## Sensor Replacement

In the event that the sensor fails, it is located under the top cap, it is held on with two 2.5mm Allen keys for the cap and two 2.5mm for the encoder. The replacement sensor part number (TS-0550-3123). The encoder is located underneath the top cap of the electronic straight gate the grommet will remain attached to the top cap and be removed as one piece





## Actuator Replacement

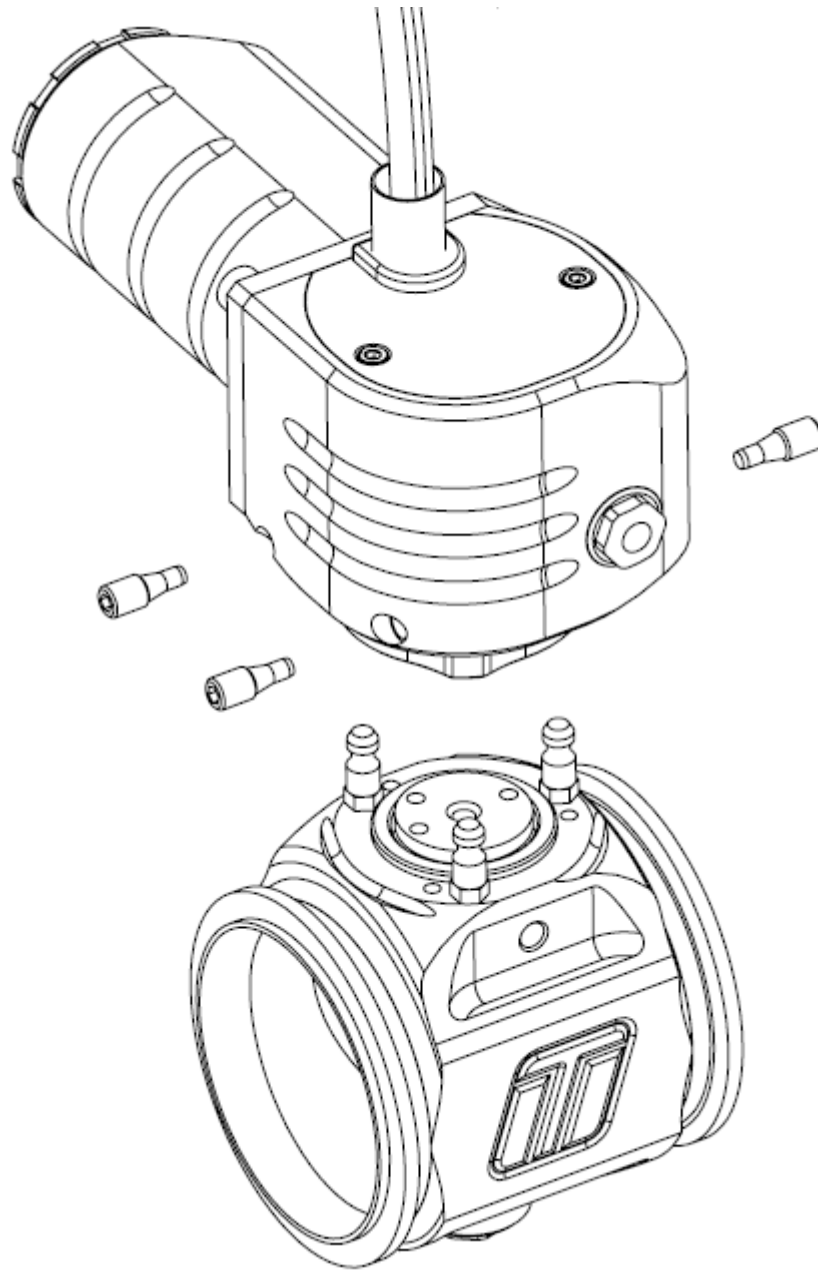
The actuator can be removed and rotated through 3 different orientations; these are parallel to the body, 30 deg to the body and the current configuration 90 deg to the body.

The actuator locking pins are 3mm Allen keys that lock the body to the actuator. It is important that the butterfly remains in the same position, the recommended position is to be just off the valve seat. It is also advisable to not to move the manual override during this process.

**CAUTION! Moving body and actuator while separated will cause issues with calibration. If moving to one of three mounting options observe positions before moving readjusting.**

With the Allen key pins removed the body can be separated from the actuator and one of the three options can be picked.

The actuator locking pins are to be Torqued to 6N/mm as well as a new application of Loctite 243 is also required.



## TROUBLE SHOOTING

- Boost gate not actuating - Confirm continuity of wiring, manually adjust butterfly position and feel for binding.
- Poor boost gate actuation – Ensure wiring is correct, check for dirt and smooth operation by manual over-ride, ECU that is driving the butterfly may not be set up correctly.
- Wraparound of signal on position sensor – Turbosmart Pre calibrate every sensor so that this should not occur. Contact Turbosmart if this occurs.
- Boost gate fluctuates and fails to find targeted position, motor wires may be the incorrect way. Swap and test to see. Ensure to use sensible current limits to prevent over currenting.
- Boost gate seized – Remove cap and manually move butterfly feeling for resistance.
- Boost gate moves but sensor not reading – Check connections.

- Boost creeping at high rpm - Boost gate flow path is poor, boost gates too small for the application.
- Failing the above, [contact us](#) with information of your engine configuration and photos of installation.