ATB Series
Integral Throttle Body Actuators

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1 INTRODUCTION

The ATB Series integral throttle body electric actuators are designed to control the air or air/fuel mixture to a gas or gaseous-fueled engine. They are typically used to control an engine by working in tandem with a conventional fuel mixer.

- Cost-effective, maintenance-free, compact design
- Rapid response to transient load condition
- Mounts in any position; no mechanical linkage, no mounting brackets
- Flexible design for engine, manifold, and fuel mixer considerations
- Idle and max adjustment screws
- Optional high temperature and corrosive environmental conditions

NOTE CSA approved GAC ATBs are detailed in the CSA ATB Series Actuator Installation Manual. See your GAC representative for details.

2 CONFIGURATION NOMENCLATURE

SUFFIX	DEFINITION
1 4	High Temperature, Sealed
2	Mechanical Position indicator, Sealed (Only available with non-high-temp version, T2 units only)
F	Feedback Position Sensor, Sealed
N	Normal (Comes with no Feedback Position Sensor), Sealed

Examples:

PART NO.	SYMBOL(S)	DEFINITION
ATB452T2**N**-12	N	Does not include Feedback Position Sensor. Sealed to 5.0 bar
ATB452T2**N2**-12	N,2	Does not include Feedback Position Sensor, but has a mechanical position indicator. Sealed to 5.0 bar
ATB75T4**F14**-24	F,1,4	Includes Feedback Position Sensor, high temperature rated, sealed to 5.0 bar internally.

AVAILABLE BORE SIZES [MM] BY FAMILY	
BORE DIAMETERS	**FAMILY**
25, 30, 35, 40	T1
45, 55, 65	T2
75, 85 ,95	T4

SAMPLE ATB CONFIGURATIONS

ATB552T2N14-24

ATB552T2F14-12

ATB401T1F-24

ATB652T2N14-12

- All gaseous fueled engines require a positive fuel lockout.
- Throttle bodies will operate without electrical power.
- Gaseous fueled engines will retain unburnt fuel internally especially propane.
- Read this entire manual and all other related publications before installing, operating, or servicing this equipment.
- The engine or similar should be equipped with an overspeed shutdown device to protect against runaway or damage to the engine with possible personal injury or property damage.
- The overspeed shutdown device must be totally independent of the engine control system. An over-temperature or overpressure shutdown device may also be needed for safety, as appropriate.

3 ATB SIZING MATRIX

The following matrix matches the Engine size and RPMs to the ATB bore size. This chart is for reference only and were derived from averaging maximum velocity method and capacity index method at 75% butterfly travel position. Final sizing may differ depending on application. See your GAC representative for more information.

INDUSTRIAL ENGINE APPLICATIONS / 4 CYCLE / NATURAL GAS / STOICHIOMETRIC FA MIXTURE

	ENGINE SIZE (LITERS)																													
rpm	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10	11	12	13	14	15	16	17	18	19	20	21	22
600					25	25	25	25	30	30	30	30	30	30	35	35	35	35	35	40	40	40	40	45	45	45	55	55	55	55	55
800				25	25	25	30	30	30	30	35	35	35	35	35	40	40	40	40	45	45	55	55	55	55	55	55	55	65	65	65
1000			25	25	30	30	30	30	35	35	35	35	40	40	40	40	45	45	45	55	55	55	55	55	65	65	65	65	65	65	75
1200		25	25	30	30	30	30	35	35	40	40	40	40	45	45	45	55	55	55	55	55	65	65	65	65	65	75	75	75	75	75
1400		25	30	30	35	35	35	35	40	40	40	40	45	45	45	55	55	55	55	55	65	65	65	65	75	75	75	75	85	85	85
1500		25	30	30	35	35	35	40	40	40	40	45	45	55	55	55	55	55	55	65	65	65	65	65	75	75	75	85	85	85	85
1600		25	30	35	35	35	40	40	40	45	45	45	45	55	55	55	55	55	65	65	65	75	75	75	75	75	85	85	85	85	85
1800		25	30	35	40	40	40	40	40	45	45	45	55	55	55	55	65	65	65	65	75	75	75	75	75	85	85	85	95	95	95
2000		25	35	35	40	40	40	45	45	45	45	55	55	55	65	65	65	65	65	75	75	75	85	85	85	85	85	95	95	95	95
2200	25	30	35	40	40	40	45	45	45	55	55	55	55	65	65	65	65	65	75	75	75	85	85	85	85	95	95	95	95		
2400	25	30	35	40	45	45	45	55	55	55	55	55	55	65	65	65	75	75	75	75	85	85	85	85	95	95	95				
2600	25	30	35	40	45	45	55	55	55	55	55	55	65	65	65	75	75	75	75	75	85	85	95	95	95	95					
2800	30	30	40	45	45	45	55	55	55	55	65	65	65	65	75	75	75	75	75	85	85	85	95	95	95						
3000	30	30	40	45	45	55	55	55	55	65	65	65	65	75	75	75	75	75	85	85	85	95	95	95							
3200	30	30	40	45	55	55	55	65	55	65	65	65	65	75	75	75	85	85	85	85	95	95									
3400	30	30	40	45	55	55	55	65	65	65	65	65	75	75	75	85	85	85	85	95	95	95									
3600	30	30	45	55	55	55	65	65	65	65	65	75	75	75	85	85	85	85	85	95	95										

rpm	23	24	24	25	25	26	26	27	27	28	28	29	29	30	30
600	55	55	55	55	65	65	65	65	65	65	65	65	65	75	75
800	65	75	75	75	75	75	75	75	75	75	75	75	75	85	85
1000	75	75	75	85	85	85	85	85	85	85	85	85	85	85	85
1200	85	85	85	95	95	95	95	95	95	95	95	95	95	95	95
1400	95	95	95	95	95	95	95	95	95						
1500	95	95	95	95											
1600	95	95	95	95											

ATB sizing in MM inside diameter

These charts are for reference use only and were derived from averaging maximum velocity method and capacity index method at 75 % butterfly travel position. Final sizing may differ depending on application.

4 SPECIFICATIONS

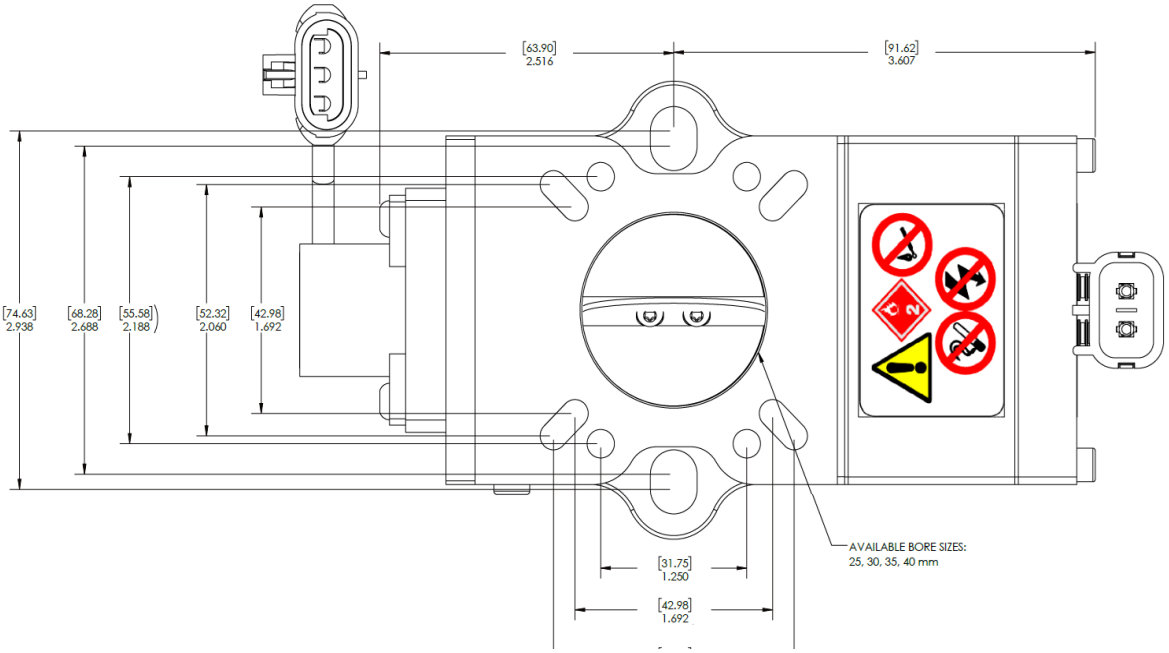
PERFORMANCE	
Maximum Throttle Plate Rotation	65° ±1°
Response	10 - 90 % < 35 ms
POWER INPUT for T1 - 25 mm to 40 mm Bore Size	
Operating Voltage	12 or 24 V DC
Normal Operating Current	3.0 A at 12 V DC 1.5 A at 24 V DC
Maximum Current	6.0 A at 12 V DC 3.0 A at 24 V DC
Coil Resistance (Nominal) (Red to White 12 V DC) (Red to White 24 V DC)	 2.2 Ω 8.6 Ω
Red to Housing	> 5 M Ω
POWER INPUT for T2 - 45 mm to 65 mm Bore Size	
Operating Voltage	12 or 24 V DC
Normal Operating Current	6.0 A at 12 V DC 3.0 A at 24 V DC
Maximum Current	9.0 A at 12 V DC 4.5 A at 24 V DC
Coil Resistance (Nominal) (Red to White 12 V DC) (Red to White 24 V DC)	 1.4 Ω 5.6 Ω
Red to Housing	> 5 M Ω
POWER INPUT for T4 - 75 mm to 95 mm Bore Size	
Operating Voltage	24 V DC
Normal Operating Current	6.5 A at 24 V DC
Maximum Current	10.0 A at 24 V DC
Coil Resistance (Nominal) (A - D 24 V DC)	 2.5 Ω
A to Housing	> 5 M Ω

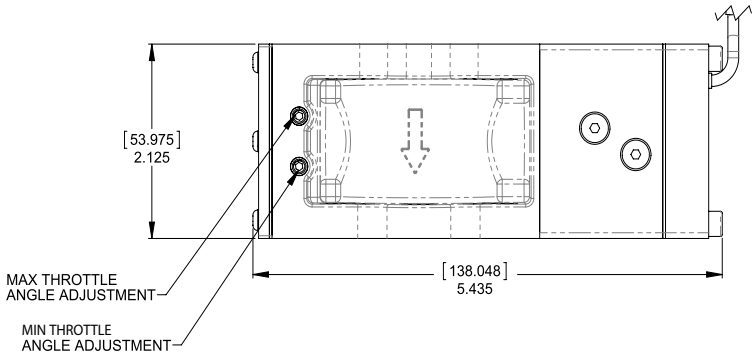
ENVIRONMENT	
Normal Ambient Operating Temperature Range	-40° to 200° F [-40° to 95° C]
High Temperature Ambient Operating Temperature Range	-40° to 250° F [-40° to 125° C]
Relative Humidity	SAEJ1455
Salt Spray	STMB117-97
All Surface Finished	Fungus & Corrosion Resistant
RELIABILITY	
Vibration	±4 g, 25 to 100 Hz
Shock	20 g, 11 ms
Testing	100% Functionality Tested
Rated Life	>40 Million Cycles
AGENCY COMPLIANCE	
CE Compliant	Stationary Industrial Markets Only
PHYSICAL	
Dimensions	See Section 5
Weight (T1)	3.0 lb [1.36 kg]
(T2)	6.0 lb [2.72 kg]
(T4)	15.0 lb [6.80 kg]
WIRING HARNESS	
T1/T2 (Packard) Cable Harness	CH1215
T4 (MIL) Cable Harness Mating Connector	CH1203, CH1210, or CH1212 EC1000 (Straight) or EC1010 (90 °) MIL
FEEDBACK SENSOR WIRING	
T2	CH1515 (Harness) & EC1515 (Mating Connector)
T1/T4	CH1243 (Harness) & EC1523 (Mating Connector)

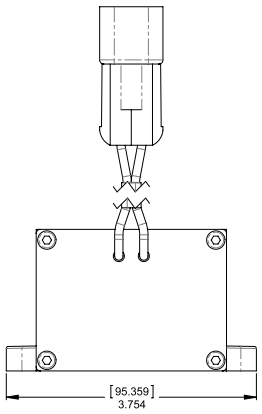
MAXIMUM WORKING PRESSURE		
Maximum Pressure, All Units Are Sealed	T1 and T2 Non-Feedback	5.0 bar (72 PSI)
	T1 - 25 to 40 mm with Feedback Sensor T2 - 45 to 65 mm with Feedback Sensor	0.8 bar (12 PSI)
	T4 - 75 mm to 95 mm	5.0 bar (72 PSI)

5 OUTLINE DIAGRAM

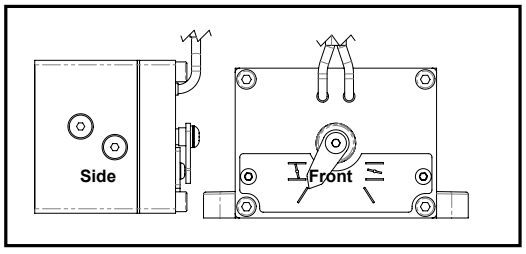
T1 SERIES





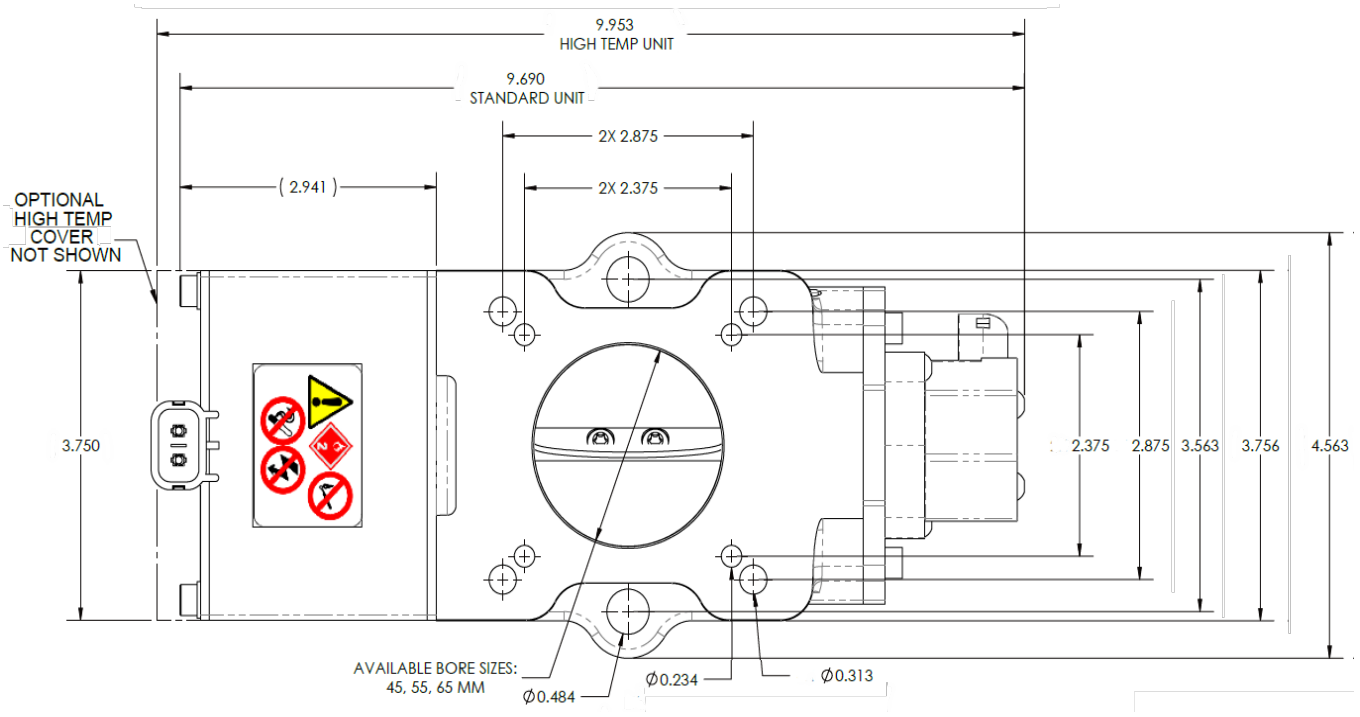


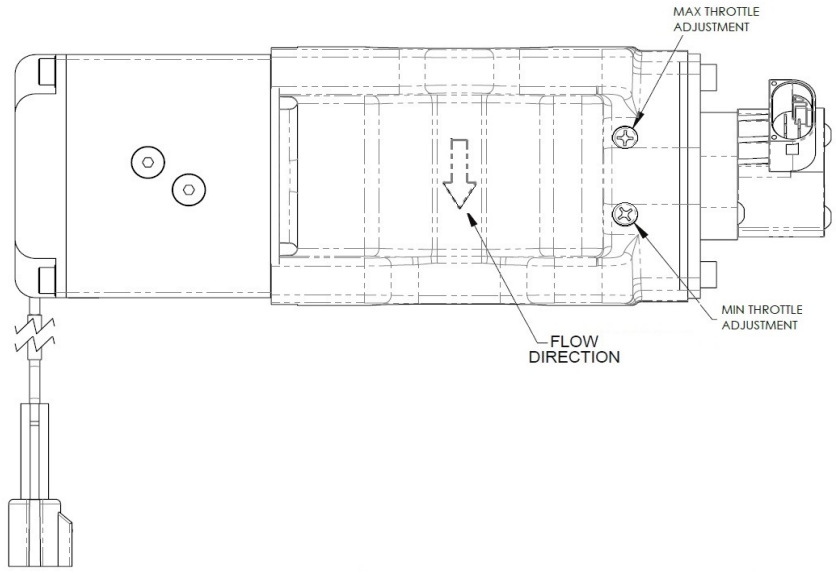
ATB MODELS WITH MECHANICAL POSITION INDICATOR

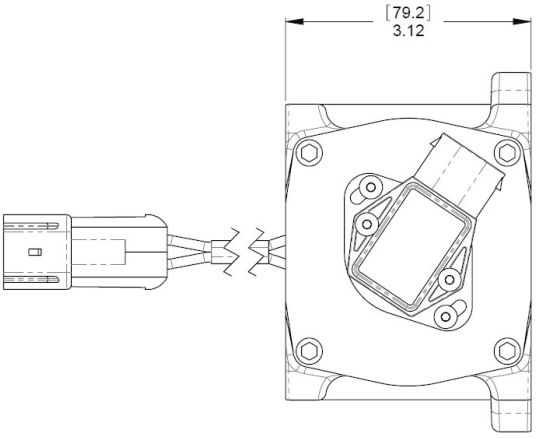


5 OUTLINE DIAGRAM (CONTINUED)

T2 SERIES

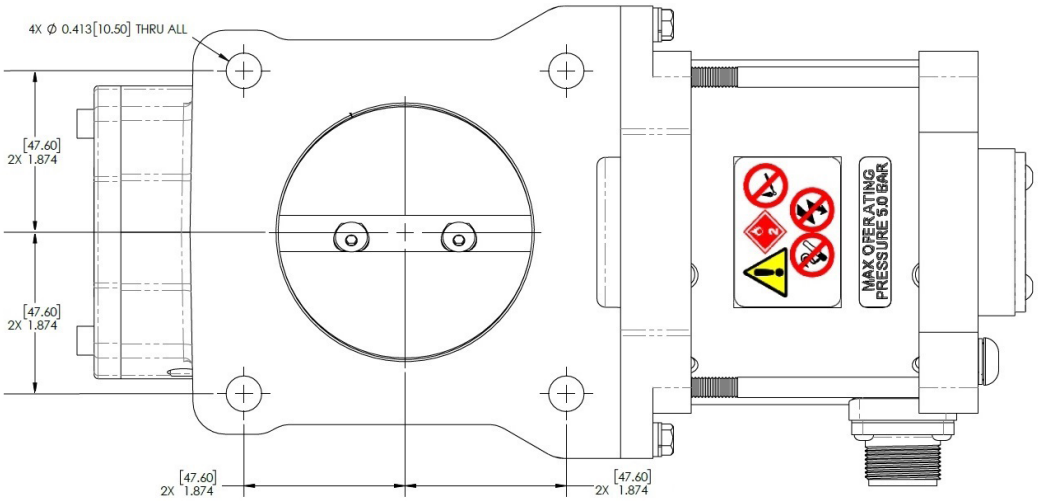


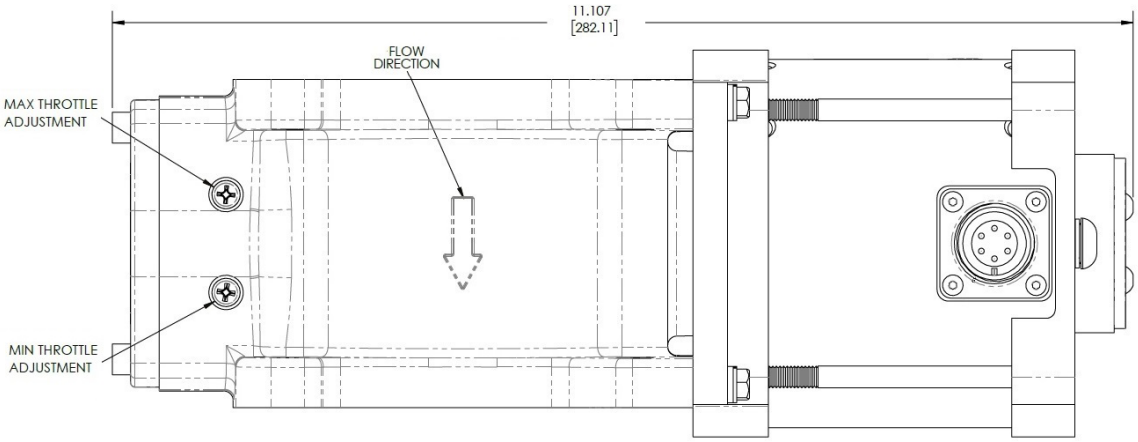


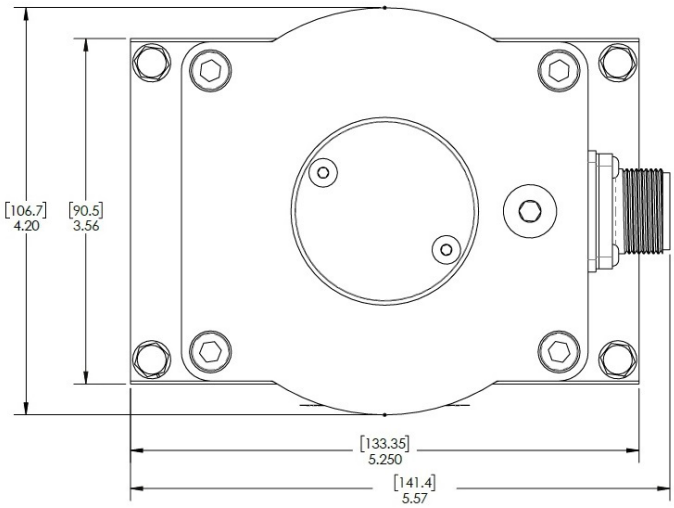


5 OUTLINE DIAGRAM (CONTINUED)

T4 SERIES







6 INSTALLATION

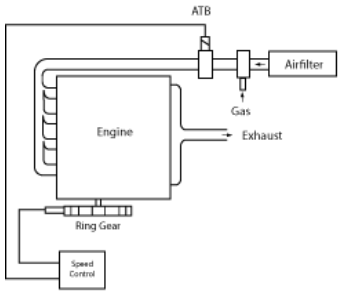
The actuator is mounted rigidly between the engine's intake manifold and the gas mixer. The preferred mounting orientation for the ATB Series is with the throttle shaft parallel to the engine crank shaft. Normal vibration from the engine will not affect the operation of the actuator.

The ATB Series is designed to provide an exact fit to the various manifolds and mixers available. Section 5 OUTLINE DIAGRAM show assembly dimensions for compatible interfacing.

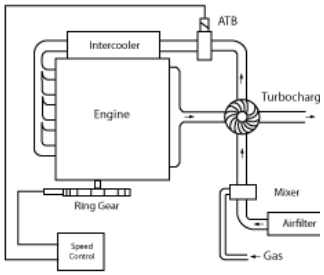
A Gaseous Fuel Shut-Off Valve, Independent of the Throttle Body Actuator, Should Be Provided to Prevent Loss of Engine Control or Propagation of a Hazardous Flammable Condition Which May Cause Personal Injury or Equipment Damage.

An overspeed shutdown device, independent of the governor system, should be provided to prevent loss of engine control, which may cause personal injury.

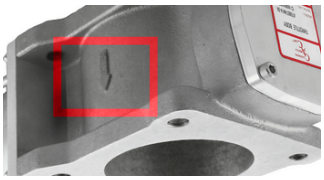
Naturally Aspirated Engines



Turbocharged-Intercooled Engines



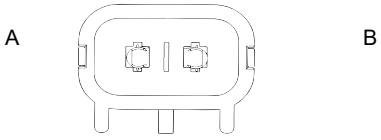
NOTE The arrow on the side of the ATB represents the direction of flow.



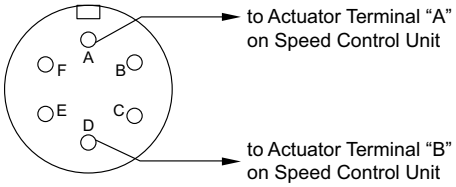
7 WIRING

All throttle body actuators are prewired for either 12 or 24 V DC systems. The wiring harness connects the actuator to the speed control unit's output terminals. Prior to connecting the actuator cable, twist it so that there is about one complete twist per 1.0 in [25.4 mm] along the entire length of the cable. This will substantially reduce EMI effects on the control system. For applications where EMI is still a concern, shielded cable for the actuator is recommended.

Packard Connector (T1, T2)



MIL Connector (ATB T4)

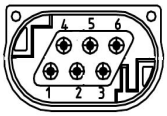


POSITION FEEDBACK SENSOR

Mating Connector EC1523 (ATB T1 & T4)

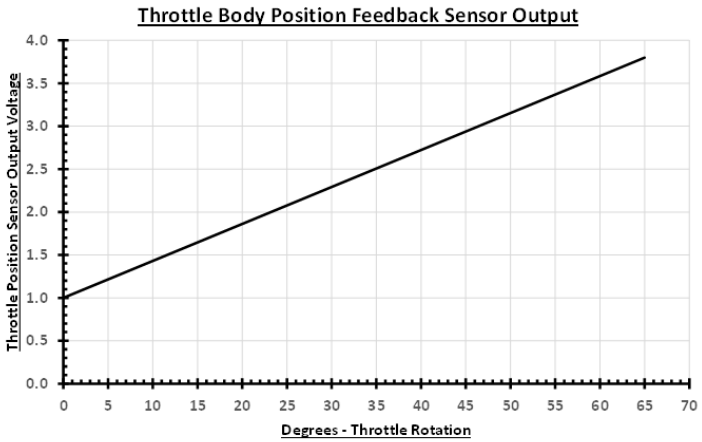
HARNESS	
PIN	SIGNAL
A	+5V
B	GND
C	OUT

Mating Connector EC1515 (ATB T2)



HARNESS	
PIN	SIGNAL
1	+5V
2	GND
4	OUT

NOTE The Position Feedback Sensor is installed and preset at no fuel (0%) at 1.0V output. Maximum opening (100%) at 65° is 3.8V.



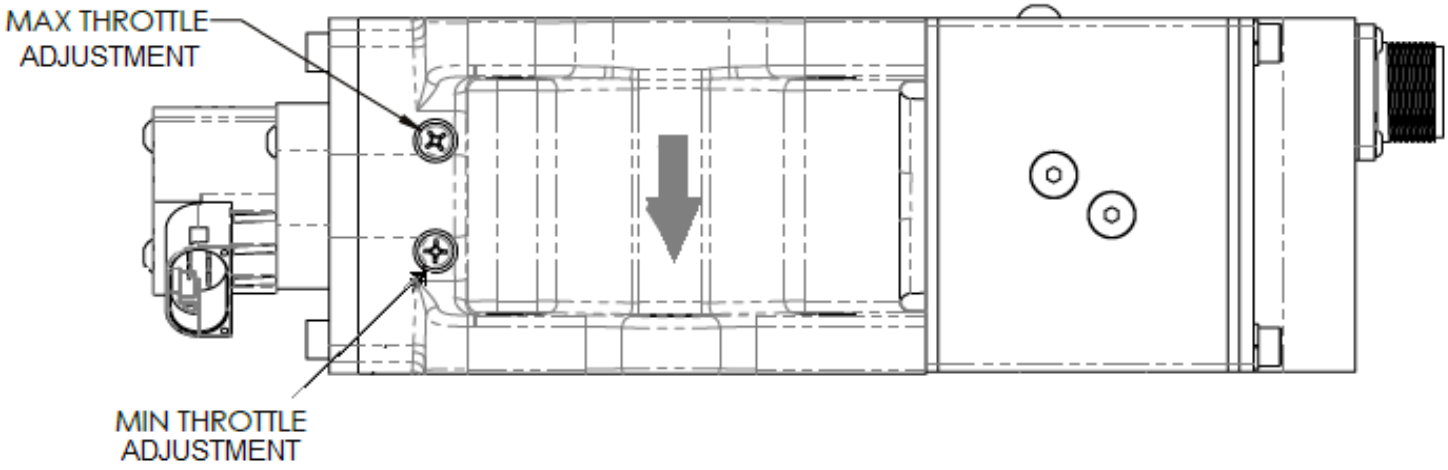
8 THROTTLE ADJUSTMENT

An adjustable Idle Stop set screw (Min Throttle Adjustment) is provided to set a fixed fuel opening if desired. Below represents where to generally find the adjustment screws on each ATB model.

Typically, the engine speed should be set by unplugging the actuator power to the governor or by turning off the governor power once the engine is running and then setting the engine speed to the desired setting.

NOTE Max Throttle Idle Stop set screw is factory set to 65 degrees.

IDLE STOP ADJUSTMENT	
1.	Using a small Phillips screwdriver, remove the sealing screws, saving the sealing screw and its seal. This gives you access to the inner idle setscrew.
2.	Insert a 2 mm Hex wrench into the set screw. Turn the set screw clockwise to **increase** the fixed throttle opening, or counterclockwise to **decrease** the opening.
3.	After adjusting the Idle set screw, insert the sealing screw and seal and tighten to snug plus ¼ turn. Apply Loctite 518 or equivalent.



9 TROUBLESHOOTING

If the governor system fails to operate, perform the following test. This test is only to ensure that there is no obstruction, wire breakage or metal-on-metal contact inside the throttle body.

1. Shut engine down, disconnect the actuator cable and measure the resistance at the actuator connector.
2. Check resistance from each wire to the actuator housing and compare readings to values shown in Resistance Measurement table. If the resistance values differ from values shown, the actuator is defective.
3. Reconnect the actuator cable.
4. Energize the actuator to full fuel (follow steps in the speed control publication). The throttle plate should move fully open.
5. Rotate the throttle plate to determine if the plate moves smoothly without binding or sticking.

RESISTANCE MEASUREMENT TABLE	
MEASURE THE RESISTANCE:	
T1 Coil Resistance	**(±10%)**
Red to White (12 V DC) Red to White (24 V DC)	2.2 Ω 8.6 Ω
T2 Coil Resistance	**(±10%)**
Red to White (12 V DC) Red to White (24 V DC)	1.4 Ω 5.6 Ω
T4 Coil Resistance	**(±10%)**
A-D (24 V DC)	2.5 Ω
T1, T2, & T4	**(±10%)**
Red (or A) to Actuator Housing	> 5 M Ω