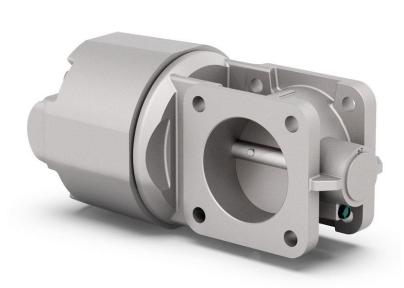


Product Manual 26846 (Revision -, 01/2023) Original Instructions



F-Tech IPTB Valve

Integrated Passive Throttle Body for Gasoline, CNG, & LPG Fuel-Injected Engines

Installation Manual



General

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment.

Practice all plant and safety instructions and precautions.

Precautions Failure to follow instructions can cause personal injury and/or property damage.



Revisions

This publication may have been revised or updated since this copy was produced. The latest version of most publications is available on the Woodward website.

www.woodward.com/publications

If your publication is not there, please contact your customer service representative to get the latest copy.



Any unauthorized modifications to or use of this equipment outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the equipment. Any such unauthorized modifications: (i) constitute "misuse" and/or "negligence" within the meaning of the product warranty thereby excluding warranty coverage for any resulting damage, and (ii) invalidate product certifications or listings.



Revisions— A bold, black line alongside the text identifies changes in this publication since the last revision.

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The following are trademarks of their respective companies: TE and GET (TE Connectivity)

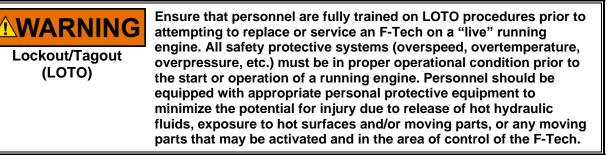
Warnings and Notices

Important Definitions



This is the safety alert symbol used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

- **DANGER** Indicates a hazardous situation, which if not avoided, will result in death or serious injury.
- **WARNING** Indicates a hazardous situation, which if not avoided, could result in death or serious injury.
- CAUTION Indicates a hazardous situation, which if not avoided, could result in minor or moderate injury.
- NOTICE Indicates a hazard that could result in property damage only (including damage to the control).
- **IMPORTANT** Designates an operating tip or maintenance suggestion.



Overspeed / Overtemperature / Overpressure The engine, turbine, or other type of prime mover should be equipped with an overspeed shutdown device to protect against runaway or damage to the prime mover with possible personal injury, loss of life, or property damage.

The overspeed shutdown device must be totally independent of the prime mover control system. An overtemperature or overpressure shutdown device may also be needed for safety, as appropriate.

Personal Protective Equipment

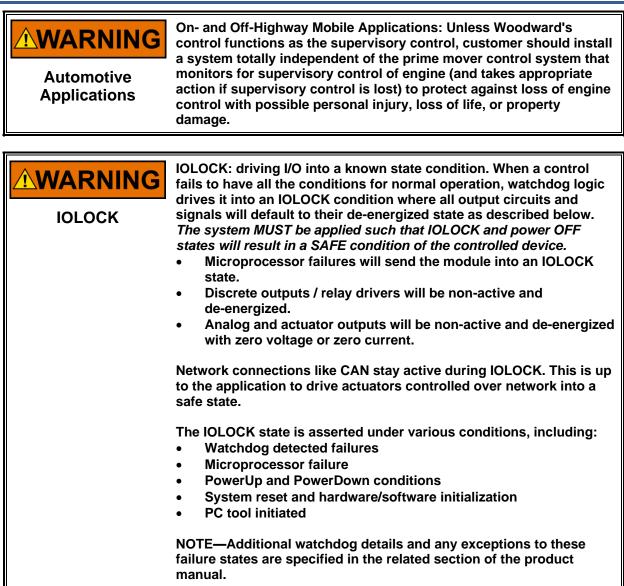
- The products described in this publication may present risks that could lead to personal injury, loss of life, or property damage. Always wear the appropriate personal protective equipment (PPE) for the job at hand. Equipment that should be considered includes but is not limited to:
 - Eye Protection
 - Hearing Protection
 - Hard Hat
 - Gloves
 - Safety Boots
 - Respirator

Always read the proper Material Safety Data Sheet (MSDS) for any working fluid(s) and comply with recommended safety equipment.



Be prepared to make an emergency shutdown when starting the engine, turbine, or other type of prime mover, to protect against runaway or overspeed with possible personal injury, loss of life, or property damage.

Woodward



NOTICE

To prevent damage to a control system that uses an alternator or battery-charging device, make sure the charging device is turned off before disconnecting the battery from the system.

Battery Charging Device

Electrostatic Discharge Awareness

NOTICE Electrostatic Precautions	 Electronic controls contain static-sensitive parts. Observe the following precautions to prevent damage to these parts: Discharge body static before handling the control (with power to the control turned off, contact a grounded surface and maintain contact while handling the control). Avoid all plastic, vinyl, and Styrofoam (except antistatic versions) around printed circuit boards. Do not touch the components or conductors on a printed circuit board with your hands or with conductive devices. To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual
	82715 , Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules.

Follow these precautions when working with or near the control.

- 1. Avoid the build-up of static electricity on your body by not wearing clothing made of synthetic materials. Wear cotton or cotton-blend materials as much as possible because these do not store static electric charges as much as synthetics.
- Touch your finger to a grounded surface to discharge any potential before touching the control, smart valve, or valve driver, or installing cabling connectors. Alternatively, ESD mitigation may be used as well: ESD smocks, ankle or wrist straps and discharging to a reference grounds surface like chassis or earth are examples of ESD mitigation.
 - ESD build up can be substantial in some environments: the unit has been designed for immunity deemed to be satisfactory for most environments. ESD levels are extremely variable and, in some situations, may exceed the level of robustness designed into the control. Follow all ESD precautions when handling the unit or any electronics.
 - I/O pins within connectors have had ESD testing to a significant level of immunity to ESD, however do not touch these pins if it can be avoided.
 - Discharge yourself after picking up the cable harness before installing it as a precaution.
 - The unit is capable of not being damaged or improper operation when installed to a level of ESD immunity for most installation as described in the EMC specifications. Mitigation is needed beyond these specification levels.



External wiring connections for reverse-acting controls are identical to those for direct-acting controls.

Regulatory Compliance

European Compliance for CE Marking:

These listings apply to stationary industrial markets only and are limited only to those units bearing the CE Marking.

EMC Directive:	Declared to Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to electromagnetic compatibility (EMC)
	Declared to 2011/65/EC COUNCIL DIRECTIVE of the European Parliament and the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment
	Exemption in use: 6(c)

Other European and International Compliance:

Compliance with the following European Directives or standards does not qualify this product for application of the CE Marking.

Machinery Directive:	Compliant as partly completed machinery with Directive 2006/42/EC of the European Parliament and the Council of 17 May 2006 on machinery
	Exempt per Article 1.2(j) of 2014/68/EU where pressure is not a significant design factor

North American Compliance:

These listings are limited only to those units bearing the CSA identification.

CSA: CSA Certified for Class I, Division 2, Groups A, B, C, & D, T3 at 105 °C ambient for use in Canada and the United States.

Certificate 1975931

Type 4 Enclosure Watertight

Special Conditions for Safe Use

The F-Tech IPTB (Integrated Passive Throttle Body) is designed to be used *only* with a corresponding Woodward OH6 or PG+ engine control module (SECM 70 or 112). It is not approved to be used with any other engine control module.

Wiring must be in accordance with North American Class I, Division 2 wiring methods as applicable, and in accordance with the authority having jurisdiction.

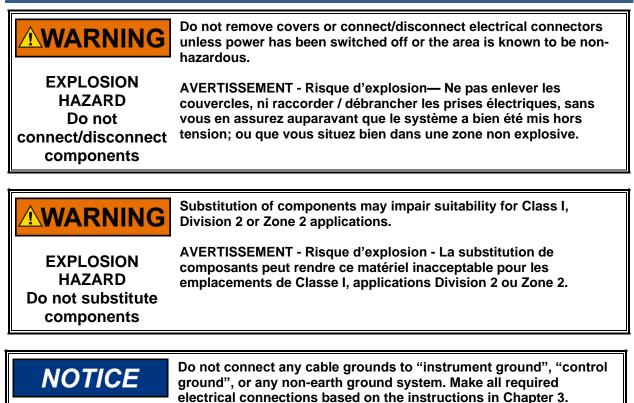
Field Wiring must be suitable for at least 105 °C.

Connect the ground lug of the F-Tech to earth ground.

This product is certified as a component for on-engine use. The final assembly is subjected to acceptance by authority having jurisdiction.

The Ingress Protection rating of the actuator depends on the use of proper mating connector. See chapter 3 of this manual for information on the proper mating connector for use with this control.

Compliance with the Machinery Directive 2006/42/EC noise measurement and mitigation requirements is the responsibility of the manufacturer of the machinery into which this product is incorporated.



Chapter 1. General Information

Purpose and Scope

The purpose of this manual is to provide OEMs and Channel Partners with the necessary background information for applying the F-Tech Integrated Passive Throttle Body (F-Tech IPTB), herein after referred to as F-Tech. Topics covered include mechanical installation, electrical wiring, and troubleshooting. While this manual is primarily targeted at OEM and Channel Partner customers, OEMs and Channel Partners themselves may find it useful to copy some of the information from this manual into their application user manuals.

Intended Applications

The F-Tech is designed for use on gaseous fuel injected engines. Approved platforms include PG+, OH-5 and OH-6 systems.

Overview

Two throttle position sensors are used to provide feedback to a Power-train / Engine Control Module (PCM/ECM). The PCM/ECM affects the performance of the throttle body by the speed of response, damping and overshoot parameters. The PCM/ECM must also not allow the throttle plate to hit the mechanical end stops under normal operating conditions. The other function of the PCM/ECM is to control the level of current through the motor where it will not be damaged through excess heat dissipation in the unlikely event that the plate should encounter an obstruction.

The data in this document reflects these requirements and shows performance using a corresponding PCM/ECM. The F-Tech is designed to be used only with a corresponding Woodward OH6 or PG+ ECM (SECM70 or SECM112). It is not approved to be used with any other ECM. If application of the F-Tech is desired on another system, the application must be reviewed, and an application recommendations document must be issued from the Woodward Engineering Applications staff.



Shutdown Devices

When included with an F-Tech, the actuator depends solely upon the return spring inside the throttle body assembly to drive toward minimum position when not powered. Therefore, other positive shutdown devices like fuel shut-off solenoids are recommended to ensure shut down upon loss of signal to the control system. Also, separate overspeed trip devices are always mandatory

External fire protection is not provided in the scope of this product. It is the responsibility of the user to satisfy any applicable requirements for their system.



Due to typical noise levels in turbine or engine environments, hearing protection should be worn when working on or around the F-Tech.

Hearing Protection



The surface of this product can become hot enough or cold enough to be a hazard. Use protective gear for product handling in these circumstances. Temperature ratings are included in the specification section of this manual.

Overspeed Overtemperature Overpressure The engine should be equipped with an independent fuel shut-off device to protect against fuel leakage or damage to the engine with possible personal injury, loss of life, or property damage. The fuel shut off device must be totally independent of the engine control system. An overtemperature or overpressure shutdown device may also be needed for safety, as appropriate.

Leak-check all gaseous fuel connections. Leaking gaseous fuel can cause explosion hazards, property damage, or loss of life.

Fuel Leakage



The F-Tech valve is NOT equipped with an overboard drain in the event of gas leakage through its various seals. The valve should therefore be used in a well-ventilated area. A methane detector should be used if the valve will be used in an enclosed installation.



The F-Tech valve shaft represents a pinch hazard even with the power disconnected. The internal return spring keeps the valve loaded closed. To prevent bodily harm or injury, always keep hands, fingers, etc. away from the valve element.

NOTICE

The F-Tech valve shaft is integral to the valve accuracy and performance. Take special care to prevent damage to the valve shaft or bore and do not use a sharp or metallic object to open the valve.

Chapter 2. Specifications & Performance

Available throttle body sizes are given in Woodward dwg 9999-1804 and listed below.

F-Tech Assembly Part No.	Throttle Option	Connector Plan	Fail Condition	Nameplate
8235-439	68/M10	С	Closed	Standard
8235-440	60/M10	С	Closed	Standard
8235-445	68/M10	В	Closed	Standard
8235-446	60/M10	В	Closed	Standard

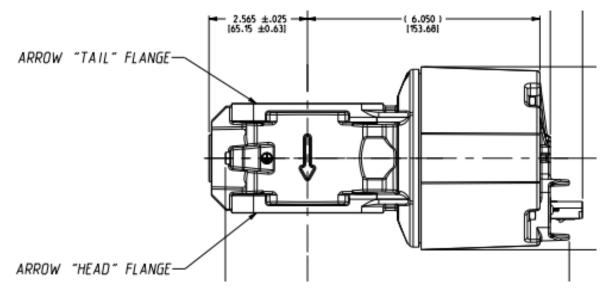


Figure 2-1. Arrow Head and Tail Flanges

Table 2-2.	F-Tech Throttle	Body Options	- Arrow Head Flange
		body opnonio	/ liten i load i lalige

Throttle	Bore		Arrow H	ead Flange		Throttle Description
Option	DOLE	B1	B2	B3	B4	(Reference)
60/STD	2.3625	Ø.394±.010	1.457	.480±.060	1.4215	60mm Bore. Thru Øs
00/310	(60.008)	(10.01±0.25)	(37.01)	(12.19±1.52)	(36.106)	for .375 Screws
60/M10	2.3625	Ø.453±.010	1.457	.480±.060	1.4215	60mm Bore. Thru Øs
00/10110	(60.008)	(11.51±0.25)	(37.01)	(12.19±1.52)	(36.106)	for M10 Screws
68/STD	2.6800	Ø.394±.010	1.457	.480±.060	1.4215	68mm Bore. Thru Øs
00/STD	(68.072)	(10.01±0.25)	(37.01)	(12.19±1.52)	(36.106)	for .375 Screws
68/M10	2.6800	Ø.453±.010	1.457	.480±.060	1.4215	68mm Bore. Thru Øs
00/10110	(68.072)	(11.51±0.25)	(37.01)	(12.19±1.52)	(36.106)	for M10 Screws

Throttle	Bore		Arrow Tail Flange			Throttle Description
Option	DOLE	A1	A2	A3	A4	(Reference)
60/STD	2.3625	Ø.394±.010	1.457	.480±.060	1.4215	60mm Bore. Thru Øs
00/310	(60.008)	(10.01±0.25)	(37.01)	(12.19±1.52)	(36.106)	for .375 Screws
60/M10	2.3625	Ø.453±.010	1.457	.480±.060	1.4215	60mm Bore. Thru Øs
00/10110	(60.008)	(11.51±0.25)	(37.01)	(12.19±1.52)	(36.106)	for M10 Screws
68/STD	2.6800	Ø.394±.010	1.457	.480±.060	1.4215	68mm Bore. Thru Øs
00/310	(68.072)	(10.01±0.25)	(37.01)	(12.19±1.52)	(36.106)	for .375 Screws
69/110	2.6800	Ø.453±.010	1.457	.480±.060	1.4215	68mm Bore. Thru Øs
68/M10	(68.072)	(11.51±0.25)	(37.01)	(12.19±1.52)	(36.106)	for M10 Screws

Table 2-3. F-Tech Throttle Body Options – Arrow Tail Flange

Table 2-4. F-Tech Specifications

Rated Voltage	10-32V*
Maximum Steady State Actuator Current @ 105 °C (227 °F)	4.0A
Maximum Transient Actuator Current @ 105°C (227 °F)	8.0A
Resistance at Room Temp	1.1 Ohms ± 10%
Inductance at 1 kHz	1.2 mH ± 10%
Position Sensing Output	SAE J2716 SENT or 0.06~0.44 Vdc ratiometric (positive and negative gain slope)
Torque Output	1.4 N-m (1.0 lb-ft) steady-state torque and 2.7 N-m (2.0 lb-ft) transient torque @ 105 °C.
Weight	4.6 kg (9.6 lb)
Available Bore Sizes	60, 68mm
Pressure Ranges	Throttle Inlet: 60, 68mm (4 bar) Inlet to Outlet Delta: 60, 68mm (4 bar)
Fuel Quality	Up to 1000 ppm H2S contamination
Storage Temperature	-40 °C to 105 °C (-40 °F to 221 °F)
Storage Life	600 hours @ maximum ambient
Operating Temperature Range	-40 °C to 105 °C (-40 °F to 221 °F)
Atmospheric Pressure	60 to 100 kPa
Relative Humidity	0 to 100% RH

(*) PCM / ECM control ensures that current limits are not exceeded with increasing voltage.

The F-Tech is designed to operate on air and gases ranging from pipeline quality natural gas to specialty gas (such as landfill, digester, or other biogases). The quality of specialty gas can vary significantly and has a direct impact on product life. F-Tech usage in landfill, digestor, and other biogases should be reviewed with Woodward for applicability.

NOTICE

Standard	Test Method	Description
		Direct ESD Immunity – Powered:
		\pm 8 kV Contact and \pm 15 kV Air Discharge, 10
	ISO 10605	pulses/polarity, Applied to the EUT
	130 10003	Indirect ESD Immunity – Powered:
_		\pm 8 kV Contact Discharge, 10 pulses/polarity, Applied to the horizontal coupling plane (HCP)
General Vehicle Industry		ESD Immunity – Packaging and Handling:
Requirements	ISO 10605	\pm 8 kV Contact Discharge, 10 pulses/polarity, Applied to the EUT connector pins
		Coupled Fast Transient Immunity:
		CCC method, $U_s = \pm 400 \text{ V}$ (Level IVx5)
	ISO 7637-3	Test Duration = 10 minutes/polarity
		Coupled Slow Transient Immunity:
		ICC method, $U_s = \pm 50 V$ (Level IVx5)
		Number of Pulses = 1000 at each polarity
		Ignition Noise Immunity:
Application Requirement	Woodward	25 kV applied at 2 cm distance from housing and wiring harness for 2 minutes at each
		orientation
	IEC 61000-4-4	Electrical Fast Transient (EFT) Immunity:
EN 61000-6-2 (2005)		± 2 kV (exceeds standard 1 kV requirement)
		Test Duration = 5 minutes/polarity
IEC 61000-6-4	CISPR 16-1-4 & 16-2-3	Radiated Emissions:
(2016)		EN: 30 MHz –1 GHz, IEC 61000-6-4 limits
	ISO 11452-4	Bulk Current Injection (BCI) Immunity:
-		150 kHz – 200 MHz: 120mA, CW and 80% AM @ 1 kHz (peak conservation)
		Radiated Immunity:
	ISO 11452-2	200 MHz – 1 GHz, 100 V/m, CW & 80% AM @
Vehicle EMC Directive, ECE Regulation 10, and		1 kHz (peak conservation) 800 MHz – 3 GHz, 50 V/m, CW and PM (PRR
General Vehicle Industry		= 217 Hz, PD = 577 us
Requirements		Class 3 Radiated Emissions
	CISPR 25	150kHz to 54 MHz
-		(Tested 150kHz to 200 MHz)
		Radiated Emissions:
	CISPR 16 & 25	30 MHz – 1 GHz, ECE Reg 10 Peak (BB)
		and Average (NB) Limits
NOTICE The OH-6 ECU estimates electric motor stator temperature. This information must be used on a continuous basis to maintain armature temperatures below 99°C. Should the stator temperature approach 220°C, immediate failure will result.		

Table 2-5. EMC (RFI/EMI) Requirements

AMP Checklist

The Application Management Procedure (AMP) checklist should be used to ensure all application guidelines are followed. This list contains some items with more detailed explanations in sections below.

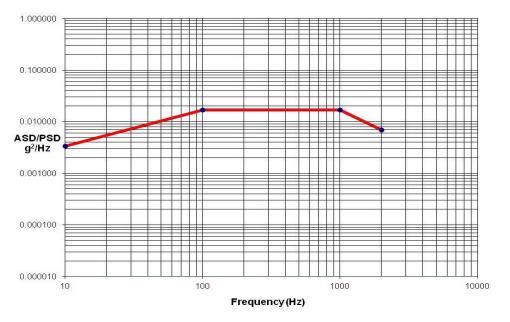
Table 2-6, AMP Checklist

Throttle Characteristics	Guidelines
Size	Throttle size for each application must be approved by Woodward application team.
	Use of proper electrical termination/connector practices.
	F-Tech requires 2 tin and 4 gold terminals in connector. Wire harness to be supported maximum 300mm from harness connection to F-Tech.
Electrical	All mating type terminals must match throttle body type terminals (Ex: Tin terminal to Tin terminals and Gold terminals to Gold terminals).
	Ensure that compression gasket is in place within the F-Tech connector housing, if throttle is provided with one.
Mounting & Orientation	Preferred mounting is throttle shaft horizontal. Installation can be reviewed and approved by Woodward.
Vibration	Component vibration data from actual application conditions should be captured multi-zone preferred.
	Application vibration levels are measured and approved by Woodward.
Water Condensation	Water condensation within the throttle (from EGR or other sources) must be minimized. Water damage internal to the throttle may not be covered by warranty.
	 This concern can be waived if application is: no EGR and with standard air to air intercooler boost levels are typical for past applications

Vibration Specifications

The source of the vibration level of the F-Tech as measured at the base of the IPTB shall not exceed the PSD amplitude as shown in the chart below. The vibration level should be verified by the engine OEM or final customer with all parts attached to the throttle body that are existing in the application.

During the vibration level measurement, the final application (i.e., a transportation bus) must be loaded to approximate no load, mid load, and full load. The vehicle should be operated from idle to its expected maximum operating set speed.



Woodward Recommended Maximum Vibration Level

Figure 2-2. Maximum Vibration Level Recommendations

Profile	WGC Grade	Standards Basis	Test Specification	Limits	Grms	Duration
RV1	Cab or Skid	MIL-STD 202F, M214A, TC(B), SAE J1455 Cab Data	0.04 G²/Hz	10-2000 Hz	8.2	1-1/2 Hrs/axis
RV2	Engine, Stationary, Locomotive	MIL-STD 202F, M214A, TC(D), DNV Random Vibration	0.1 G ² /Hz	10-2000 Hz	12.8	3 Hrs/axis
RV3	Engine, Mobile	MIL-STD 202F, M214A, TC(F), SAE J1455 Engine Data	0.3 G²/Hz	10-2000 Hz	22.1	3 Hrs/axis

Table 2-7. 20K-Hour Life Vibration Details

General Items for Collecting Vibration Data

When collecting vibration data on an engine, ensure that the following points are met:

- 1. Take data in three orthogonal axes, X, Y, and Z.
- 2. Orient X along the axis of the engine crankshaft, Y normal to the crankshaft in the horizontal plane, and Z in the vertical direction. If this orientation is not achievable, orient axes as close as possible and make sure to document axes with photos.
- 3. Take data at the mounting point of the F-Tech. Locate the accelerometer as close as possible to a mounting bolt preferably on the F-Tech. Ensure the location is sufficiently stiff for instance, sensor not located on a thin bracket.
- 4. Take data at two additional locations as shown in Figure 2-3.
- 5. If the product is mounted to a bracket, ensure that data is taken where the F-Tech mounts to the bracket (per 2 above) and at the base of the bracket where it connects to the engine. It is recommended to take data where the F-Tech mounts to a bracket and where that system connects to the main engine block.
- 6. When collecting the above data, record data at multiple engine conditions. At a minimum, take data at the maximum or rated engine output condition, but also consider other output conditions that may create different vibration levels. It is recommended to take data at 75% and 100% load at a minimum.

NOTICE

NOTICE

Any measured deviation above the operational limit line will result in reduced product life. Any and all efforts must be made to minimize vibration levels impacting the F-Tech valve.

Any deviation above the operational limit line should be discussed with Woodward. Woodward has the right to withhold warranty for parts that operate at a vibration level above this specified level.



Figure 2-3. Data Measurement Points on Throttle Body

IPTB Mechanical Performance

The construction of the throttle body is designed to meet the requirements set out in FMVSS 124, but the ability of the throttle to meet the intent of FMVSS-124 is somewhat dependent upon the customer defined default throttle angle and the vehicle operation at that angle.

Size	60, 68 mm
Input Voltage Range	18–32 Vdc
Input Current Range	4 A @ 24 Vdc steady state, 8 A @ 24 Vdc transient
Temperature Ranges	
Steady State Ambient	–20 to +105 °C (–4 to +221 °F)
Long Term Storage	–40 to +40 °C (–40 to +104 °F)
Short Term Storage	-40 to +105 °C (-40 to +221 °F)
Pressure Ranges	
Throttle Inlet	4 bar (60 mm and 68 mm)
Inlet to Outlet Delta	
Filter in the Gas Stream	Maximum mesh size 50 µm
Fuel Quality	Up to 1000 ppm H2S contamination
Desition Assures *	±1.3% FS @ (-20 to +85 °C)
Position Accuracy*	±2% FS @ (-40 to +125 °C)
Dynamics	
Position Response	3 db at > 7.5 Hz, with 1400%/second slew rate limit,
Demanded Flow Response	1 ms dead time. Overshoot < 1%
	Same as position loop response with addition of 2 ms flow
	loop update rate
Torque Output	Single magnet actuator:1.4 N-m (1.0 lb-ft) steady-state
	torque and 2.7 N-m (2.0 lb-ft) transient torque @ 105 °C.
Vibration	Random Vibration: Exceeds WGC RV3 Modified,
	10–2000 Hz @ 0.15 G ² /Hz (17.3Grms) 10 hours/axis
Shock	Per US MIL-STD-810C, Method 516.2, Procedure 1 (40 g)
	Vehicle EMC Directive, ECE Regulation 10: Methods:
EMC Standards	CISPR 16&25/ ISO 11452, 10605 and ISO 7637-3. IEC
	61000-6-4 & EN 61000-2
(*) All offacts accort long form drift	

Table 2-8. Throttle Body Specifications

(*) All effects except long term drift

Strength of Air Duct at Throttle Inlet

The clean side duct should also have a sufficient degree of stiffness to absorb some of the high-frequency vibration that can lead to terminal plating fretting.

Electrical Load Performance

- Vref supply: 4.5 to 5.5 Vdc
- Power up time: < 1 ms
- Response time: < 1 ms
- When measuring the sensor output voltage, the sensor must have the PCM's pull-up or pulldown resistor.

NOTICE

Default nominal battery supply voltage is 12 Vdc. Battery supply voltage for the motor may be 24 Vdc but motor coil current must be limited to maximum specification by controller. DC current may be limited by use of a PWM-based drive signal.

NOTICE

Reversing the sensor supply voltage (switching Vref and GND) will cause permanent damage to the sensor above 16 Vdc. The sensor output will no longer be functional.

Chapter 3 Wiring & Assembly

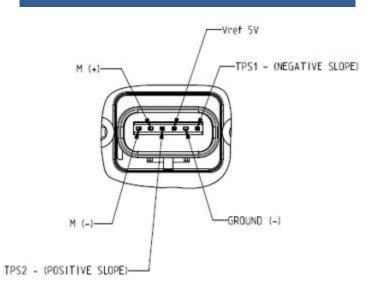




Table 3-1. IPTB Electrical Connection – Parallel Pin

Position	Connection	Material
1	TPS1 – NS	Gold
2	GND	Gold
3	Vref 5V	Gold
4	TPS2 – PS	Gold
5	M+	Tin
6	M-	Tin



Default nominal battery supply voltage is 12 Vdc. Battery supply voltage for the motor may be 24 Vdc but motor coil current must be limited to maximum specification by controller. DC current may be limited by use of a PWM-based drive signal.

Electrical Installation

Follow OH6 wiring diagram provided by Woodward with the OH6 system.

Electrical Connections & Wiring Requirements



Do not remove covers or connect/disconnect electrical connectors unless power has been switched off or the area is known to be nonhazardous.

Explosion Hazard

Use 16 to 18 AWG (1 to 1.5 mm²) stranded copper wire with insulation that meets SAE J1128 Type GXL (General Purpose, Cross (X) Linked Polyolefin Insulated) or Type TXL (Thin Wall, Cross (X) Linked Polyolefin Insulated). Plug all unused holes in actuator connector with sockets. All wires shall be automotive grade rated for -40 °C/F to 135 °C (275 °F) ambient or better for under hood installation.

All wires shall be 18 AWG, (0.75 mm²)

A wiring harness stress relief within 16" (406 mm) of the control's connector is recommended. Limit all I/O and signal lines to less than 30 m (98 ft). Also limit input power (B+/B–) connections to an earth grounded battery or conditioned power interface to less than 10 m (33 ft) from the product. Dress the harness with wire loom to contain it in a single bundle. Use grommets when passing the harness through metal panels.

IPTB Mating Connector Requirements

Sensor Connection

Table 3-2 provides wiring harness specifications on the TE 6-pin connector (4 gold pins/2 tin pins).

Electrical Connector Supplier	TE Connectivity
Wiring Harness Connector Shell P/N	1-1419168-2
Female Terminal Pin (Tin Plated) P/N	0-1393366-1
Female Terminal Pin (Gold Plated) P/N	0-1393365-1
Total Number of Pins (Gold Plated)	4
Total Number of Pins (Tin Plated)	2
Recommended Cable Temperature Rating (°C)	135 °C
Recommended Cable Wire Gauge (AWG)	18

Table 3-2. 6-Pin Connector Wiring Harness



Wire size 18 AWG is for F-Tech connector compatibility. For system compatibility the user should refer to the plant wire diagram for the system (example PCM128 may use a different wire size than ECM).

All wire insulation diameter shall be 1.40 – 2.06 mm

All mating type terminals must match throttle body type terminals. Example: Tin terminal to Tin terminals and Gold terminals to Gold terminals

The four sensor signal pins are gold-plated to provide a durable low resistance connection for the low current, (around 30mA) whereas the 2 motor pins are left tin-plated as the higher current (around 1 A) can easily cross the oxidation layer that may build up over time.

IPTB Wiring Harness Installation

To maintain electrical contact integrity, the throttle body harness should be secured to the IPTB using proper connector assembly. Follow the instructions below to establish correct connector interface connection.

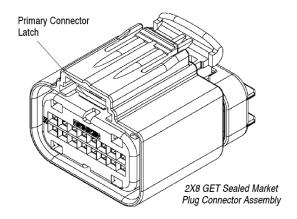


Figure 3-2. GET Sealed Market Plug Connector Assembly

The GET (Global Electronic Technology) sealed market plug connectors are designed to operate in areas of the vehicle that are subject to environmental conditions such as water, moisture, and humidity. The connectors are also designed to seal out various fluids found in and around road vehicles. The connector also provides moisture resistance through the use of a mat seal and a perimeter seal in the interface area.

These plug connectors are available on 2.54 mm [.100 in.] centerline spacing between circuits. An optional CPA is available on each connector. A Terminal Position Assurance (TPA) is designed on each plug connector to lock the contacts in the housing.

A special extraction tool (TE p/n 3-1579007-6) is required to remove the TPA and contacts. (See Tooling section.)

The 2x8 connector has 2 rows and 16 positions.

Wire Selection and Preparation

The socket contacts and plug connectors will accept a wire size of 18 AWG having insulation diameters of 1.40 - 2.06 mm [.055-.081 in.]. Only wires with insulation diameters within the recommended range should be used.

Terminate the wires according to the procedures and information provided in Application Specification 114-13060, available upon request from any TE Connectivity representative, or by calling the Product Information Center at (800) 522-6752). To view or download Application Specification 114-13060 click <u>here</u>.



DO NOT nick, scrape, or cut the wire conductor during the stripping operation.

Damaged product should not be used. If a damaged contact is evident, it should be cut from the wire and replaced with a new one. Contacts must not be re-terminated.

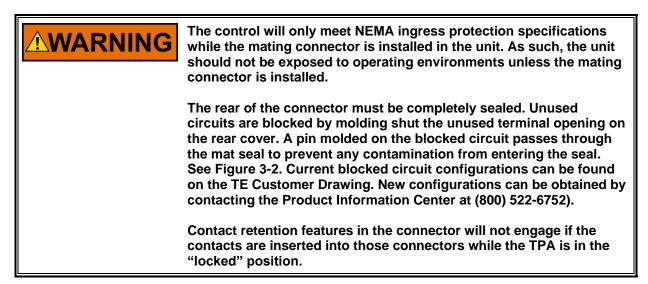
Interface Drawings

Interface drawings will be used to create the mating part for the plug connector assembly listed on this document. The interface drawings are available upon request from any TE Connectivity representative, or by calling the Product Information Center at (800) 522-6752).

- Interface Drawing Number 1438199
 - 1x6 Sealed Market Receptacle Connector

Assembly Procedures

After terminating the socket contacts with the correct wire sizes according to the requirements provided in Application Specification 114-13060, the assembly procedures are as follows.



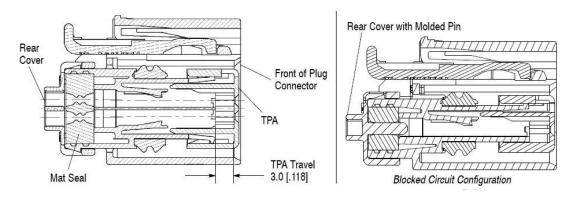


Figure 3-3. Connector Components

Compression Gasket

A compression gasket comes installed in each F-Tech connector housing. Its use is required for proper performance of the connector assembly during operation and to optimize the life of the connector (including the mating wire harness). Care must be taken to ensure that the item is in place within the F-Tech connector housing when installing the IPTB and when making electrical connection to it via wire harness.



Compression Gasket



Gasket in Connector Housing

Figure 3-4. F-Tech Compression Gasket

Procedure

1. Contact and Connector Assembly

Crimped socket contacts shall be manually loaded into the plug connectors. Insert the contacts into the connector with the information as follows:

- a) Verify that the TPA is in the pre-staged position (un-locked)._Prior to installing the contacts, the TPA and the front of the connector should be almost flush with each other. See Figure 3-3.
- b) Locate the desired circuit into which the individual socket contact will be loaded. The contact must be inserted from the wire end (rear) of the plug connector until it bottoms (there should be an audible and tactile "click"). Each socket contact must be locked in place. Gently pull on the wire to ensure proper contact locking and retention with a force of 4.5 to 8.9 N [1 to 2 lbf]. See Figure 3-5.

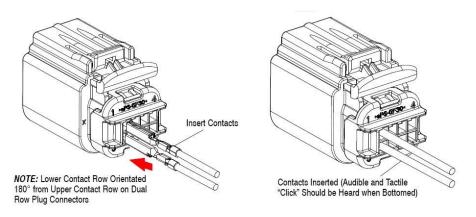


Figure 3-5. Inserting Contacts into Connector

c) When all the required socket contacts have been inserted, complete the assembly by pushing the TPA into the fully locked position. The TPA may be fully locked by holding the rear of the plug connector assembly and pushing the TPA toward the rear of the connector. See Figure 3-6.

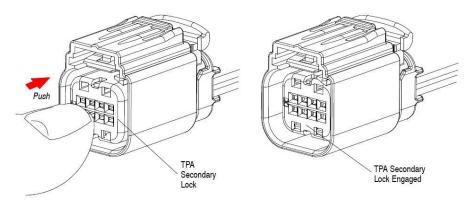


Figure 3-6. Engaging TPA Secondary Lock

NOTICE

If the TPA is not fully inserted and locked, repeat the previous step. When an audible and tactile "click" is heard and felt, the TPA secondary lock is in the final position. 2. Contact and Plug Connector Disassembly

TOOLING

Figure 3-7 shows the only tool needed for these connectors. Extraction Tool 3-1579007-6 is necessary to remove the Terminal Position Assurance (TPA) secondary lock from the set position.

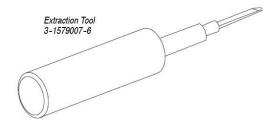
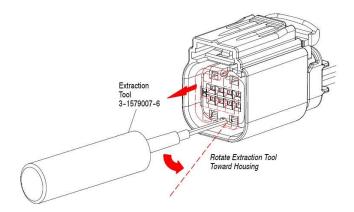
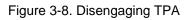


Figure 3-7. Extraction Tool

To remove the contacts for any reason, the following steps must be followed.

a) To disengage the TPA, insert Extraction Tool 3-1579007-6 in the center of the plug connector housing cutout on the TPA. Rotate the extraction tool toward the front of the connector to disengage the TPA. See Figure 3-8.





b) Place the extraction tool under the beam that holds the contact in place as shown in Figure 3-9.

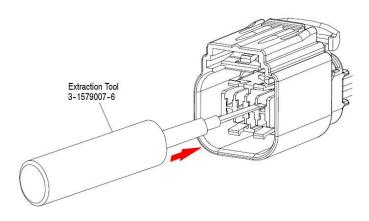
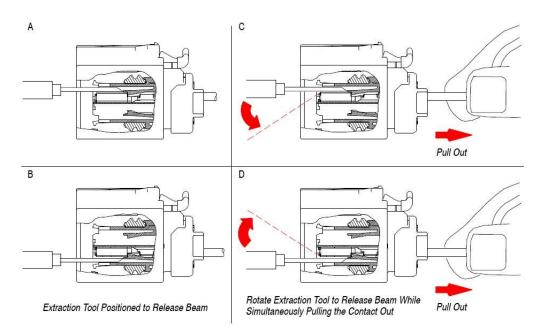
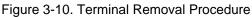


Figure 3-9. Removing Terminals from Connector

c) Refer to Figure 3-10 for contact removal process.





IMPORTANT Do not use re-use damaged or worn contacts. If a damaged contact is evident, it should be cut from the wire and replaced with a new one. Do not re-terminate contacts.

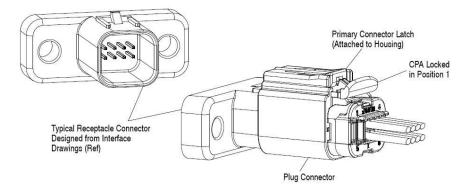
3. Receptacle and Plug Connector Assembly

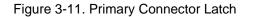
A variety of customer supplied receptacle connectors may be available for mating with the GET sealed market plug connector assembly.

Refer to TE Connectivity interface drawings for specific dimensions on these receptacle connectors or contact the Product Information Center at (800) 522-6752).

Mating instructions are provided as follows:

a) In Figure 3-11, the CPA is locked in Position "1" during shipping and handling before engaging the primary connector latch. The CPA cannot move forward until the connectors are mated and the primary connector latch is mated with an audible and tactile "click" which indicates connectors are engaged.





- b) To mate the two connectors together, push on the housing base or sides only. Do not push the CPA forward until the primary connector latch "clicks" and engages. See Figure 3-12A.
- c) Finally, to lock push the CPA forward until an audible and tactile "click" is heard and felt. This will engage the secondary lock and ensure proper CPA locking. See Figure 3-12B.

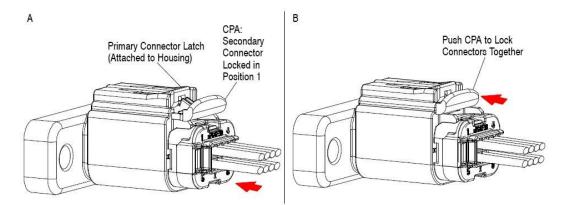


Figure 3-12. Locking Primary and Secondary Connectors

- 4. Un-mating of Receptacle and Plug Connector Assembly
 - a) To un-mate the receptacle and plug connector assemblies, lightly pull the CPA back to Position 1 (pre-installed position) until an audible and tactile "click" is heard and felt. See Figure 3-13(A).
 - b) With the CPA in Position 1, depress the primary connector latch, then simultaneously pull the connectors/wires while gripping the housing with the thumb, index finger, and palm if using the wire bundle. See Figure 3-13(B).

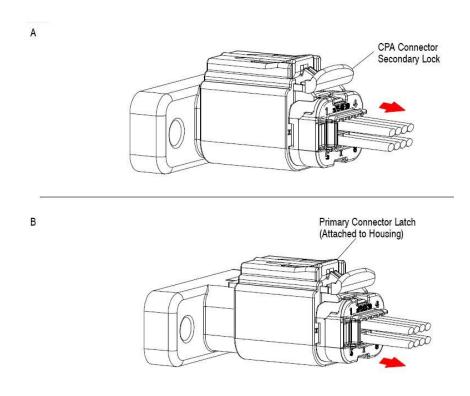


Figure 3-13. Unlocking Primary and Secondary Connectors

Final Assembly

Figure 3-14 shows a typical application of a GET sealed market plug connector assembly.

This illustration shows more than 6 terminals but should be used by production personnel to ensure a correctly applied product. Applications which DO NOT appear correct should be inspected using the information in the preceding pages of this manual.

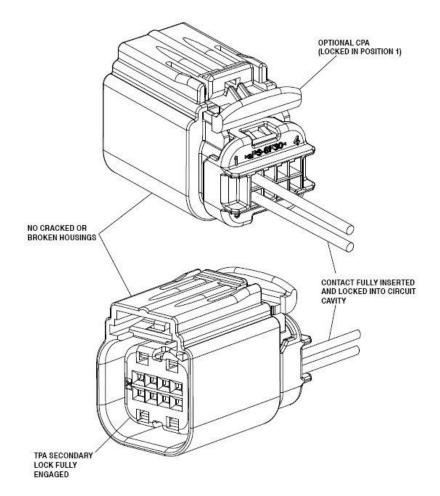


Figure 3-14. Final Assembly

Secure wire harness within 200 mm of connector. (See NOTICE below) The harness shall have a 200 mm \pm 13 mm [7" \pm 0.5"] loop from the end of the connector to retention to minimize terminal fretting.

	Special Conditions for Safe Use
	The F-Tech is only designed to be used with a corresponding Woodward OH6 or PG+ engine control module (SECM 70 or 112). It is not approved to be used with any other engine control module.
	Wiring must be in accordance with North American Class I, Division 2, wiring methods as applicable, and in accordance with the authority having jurisdiction.
	Field Wiring must be suitable for at least 105 °C.
	Connect the ground lug of the F-Tech to earth ground.
	This product is certified as a component for on-engine use. The final assembly is subjected to acceptance by authority having jurisdiction.
	The Ingress Protection rating of the actuator depends on the use of proper mating connector. See Chapter 3 of this manual for information on the proper mating connector for use with this control.
	Compliance with the Machinery Directive 2006/42/EC noise measurement and mitigation requirements is the responsibility of the manufacturer of the machinery into which this product is incorporated
NOTIOE	Support of the wire harness by use of stabilized mounting is required

NOTICE

Support of the wire harness by use of stabilized mounting is required for durability purposes. Failure to use this proper harness mounting design guidelines correctly will result in premature failure of the connector system (including, but not limited to, intermittent faults and poor product performance), which could affect warranty terms.

Alternate wire harness support methods deviating from recommended lengths must be approved by Woodward Engineering in writing to prevent voiding the manufacturer's warranty.

NOTICE

Do not remove or replace the actuator cover.

WARNING Explosion Hazard	EXPLOSION HAZARD—Do not remove covers or connect/disconnect electrical connectors unless power has been switched off or the area is known to be non-hazardous. Substitution of components may impair suitability for Class I, Division 2.
	Do not clean equipment unless the area is known to be non- hazardous.

RISQUE D'EXPLOSION—Ne pas enlever les couvercles, ni raccorder / débrancher les prises électriques, sans vous en assurez auparavant que le système a bien été mis hors tension; ou que vous situez bien dans une zone non explosive.
La substitution de composants peut rendre ce matériel inacceptable pour les emplacements de Classe I, Division 2.
Ne pas nettoyer l'équipement à moins de se trouver dans un emplacement non dangereux.

NOTICE Do not connect any cable grounds to "instrument ground," "control ground," or any non-earth ground system. Make all required electrical connections based on the instructions in this chapter.

NOTICE To ensure that the F-Tech performance is not inhibited by ignition system noise, Woodward recommends that the F-Tech housing and harness be kept at least 2 cm away from coil primary wires and 3 cm from high-voltage secondary leads/wires.

This recommendation assumes that the ignition system utilizes a resistive secondary (5 k Ω minimum) and a worst-case secondary voltage of 20 kV. In cases where the ignition does not utilize a resistive secondary or generates higher voltages, the distances may need to be increased to maintain compatibility.

IMPORTANT

On all applications, fuel must be introduced downstream of the throttle.



The input power must be fused. Failure to fuse the F-Tech valve could, under exceptional circumstances, lead to personal injury, damage to the control, and/or explosion.



When wiring pins, be careful to ensure that the external circuit interface is isolated from battery ground, either by means of galvanic isolation or differential input/output. If it is not, a ground loop could be formed that can cause excess noise on the lines and/or damage to circuits.

Chapter 4. **Installation and Maintenance**

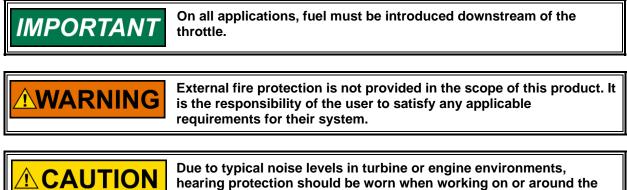
Installation Requirements

1. The IPTB should be mounted such that the throttle shaft is horizontal. Mounting the IPTB with the shaft in a vertical position is NOT recommended. See Figure 4-1.



Figure 4-1. IPTB Mounting with Shaft in Vertical Position (Not Recommended)

- 2. Approved fuels include CNG/LNG. The IPTB is **NOT** ECE Regulation 110 approved for fuel exposure. For all engines the fuel must be introduced after the throttle.
- 3. Remove all connectors prior to welding.
- 4. Mask IPTB before welding to protect plastic components.
- 5. After installation of the IPTB or PCM/ECM, allow the PCM/ECM to learn the settings of the IPTB; turn on the key, wait 10 seconds, and then turn off the key and wait for communications with the diagnostics tool to cease.

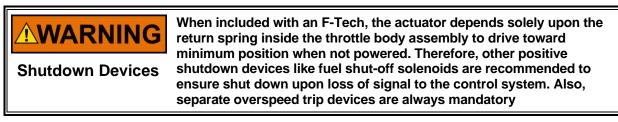


hearing protection should be worn when working on or around the F-Tech.

Hearing Protection



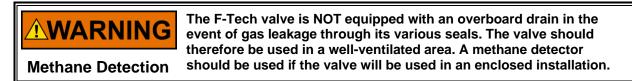
The surface of this product can become hot enough or cold enough to be a hazard. Use protective gear for product handling in these circumstances. Temperature ratings are included in the specification section of this manual.



Overspeed Overtemperature Overpressure The engine should be equipped with an independent fuel shut-off device to protect against fuel leakage or damage to the engine with possible personal injury, loss of life, or property damage. The fuel shut off device must be totally independent of the engine control system. An overtemperature or overpressure shutdown device may also be needed for safety, as appropriate.

Leak-check all gaseous fuel connections. Leaking gaseous fuel can cause explosion hazards, property damage, or loss of life.

Fuel Leakage





The F-Tech valve shaft represents a pinch hazard even with the power disconnected. The internal return spring keeps the valve loaded closed. To prevent bodily harm or injury, always keep hands, fingers, etc. away from the valve element.

The F-Tech valve shaft is integral to the valve accuracy and performance. Take special care to prevent damage to the valve shaft or bore and do not use a sharp or metallic object to open the valve.

NOTICE

The actuator's maximum slew rate can place stress on the fuel system stops and on the linkage between the actuator and the fuel system. The maximum actuator speed is 1800° per second in both increase and decrease fuel directions under normal operating conditions. Exceeding the control input voltage requirements may cause a unit shutdown in which the actuator speed may exceed 1800° per second.

Chapter 5. System IPTB Faults & Actions

Woodward recommends the following actions for each of the IPTB faults.

Table 5-1. Diagnostic Default Fault Actions for Saturated TPS Throttle

Fault	Actions
TPS1 Voltage High Fault	MIL on for key cycle
TPS1 Voltage Low Fault	Disable AL for key cycle
TPS2 Voltage High Fault	Torque derate most severe for key cycle
TPS2 Voltage Low Fault	
TPS Sensor Conflict	
TPS Intermittent	
Both TPS1 & TPS2 High or Low	MIL on for key cycle
TPS1 Adapt Low Min/Max Fault	Electronic throttle shutdown for key cycle
TPS2 Adapt Low Min/Max Fault	
ETC Spring Test Fault	
ETC Open Fault	
Manifold Pressure Higher than Expected Fault *	
ETC Shorted Fault	MIL on for key cycle
ETC Sticking Fault	 Electronic throttle shutdown for key cycle Shutdown ECM Throttle Driver Output and LPLO

(*) Manifold Pressure Higher than Expected fault is an improved strategy for the OH-5 and OH-6 systems to better protect for out-of-control air flow conditions (potentially due to throttle plate damage, manifold leaks, etc.). Default calibration is not sufficient for all applications and needs special calibration and validation for each engine application.

Chapter 6. PCM/ECM Control and Calibration

The F-Tech shall only be used in Woodward systems that have the proper control and diagnostic logic and calibration for this IPTB design.

VARNING The F-Tech is designed to be used only with a corresponding Woodward OH6 or PG+ engine control module (SECM 70 or 112). It is not approved to be used with any other engine control module.



Use of the F-Tech with incorrect control logic or calibration may result in underperformance, unstable performance, damage to the IPTB, unsafe operating conditions, and/or loss of warranty.

PCM/ECM Control and Diagnostic Logic

The IPTB shall be used only with approved PCMs/ECMs and systems where intended.

The software application position control logic is specially configured for the F-Tech and is not the same as that used by other manufacturer's IPTBs.

Only the approved GAP or MotoHawk position control and diagnostic software logic shall be used. No changes shall be made to the control and diagnostic logic without consulting the appropriate platform design team members.

PCM/ECM Calibration

The F-Tech shall be used only with the approved calibration settings released for each system type.

No changes shall be made to the calibration without consulting the appropriate platform design team members.

Failure Modes and Effect Tests (FMETs)

As the control and diagnosis of the IPTB has significant impact to the system safety, Woodward requires that the customer releasing this IPTB system perform FMET on the potential throttle or air flow control failure modes including validation of the fault action in the final application. The purpose of this testing is to ensure that the proper actions are taken at the proper condition and that the system including the customer wiring harness still results in the correct system faults be setting.

Failure modes that shall be tested include, but are not limited to, the following:

- All TPS sensor wiring failures as called out above
- Stuck throttle plate condition at wide open
- Shorted motor during operation

In addition to these IPTB failures, the OEM shall test for:

- Conditions that the IPTB positioning cannot detect
- Other system faults designed to detect the following:
 - Leakage of air in excess of the current throttle position (either due to a bent or damaged throttle plate or other manifold air leak)
 - The commanded IPTB position is proper for the operator torque request (torque security).
 - Examples include mismatch of torque request and foot brake, high operator torque request at engine starting, CAN based torque request from other source and operator request.

Chapter 7. Test Methods

Design Verification Plan and Report (DVP&R)

The electronic throttle body DVP&R consists of a series of tests that cover the following fundamental properties of electronic throttle body design:

- 1. Durability testing (simultaneous temperature, vibration, cycling)
- 2. Performance testing (step response and precision movements)
- 3. Airflow testing (flow mapping, set sensitivity)
- 4. EMC and ESD testing
- 5. Throttle torque testing and mechanism characteristics
- 6. Under hood environment

In addition to the DVP&R testing, the sensor and actuator suppliers contribute significantly to the overall IPTB testing effort.

Several hot and cold weather vehicle test trips have been conducted to ensure that the IPTB's perform exceptionally under the harshest environmental conditions.

IPTB Step Response Requirements

The following is an excerpt from the ETC system design specifications that govern the response time of the Woodward IPTB. The performance values are derived by using a Woodward manufactured PCM/ECM approved control and diagnostic logic, and approved calibration.

Step	Throttle Body Response
	With steady load on the throttle and steady position command, the steady state error shall always be less than $\pm 0.50\%$ of full scale at all positions, unless TPS sensor noise can be documented. In that case the position error may grow with amount of TPS sensor noise.
	Steady state error shall be unaffected by variations in battery voltage from 16 to 30 Vdc slow DC variation.
Stoody State	Steady state error shall be unaffected by variations in ambient temperature from - 40 °C to +125 °C (-40 °F to 257 °F).
Steady State	Steady state error shall be unaffected by operation on engine while the engine is running. Assuming the load is steady on the throttle and command is steady, testing shall be accomplished to quantify.
	Resolution of positioning shall be defined as comparing the smallest change that can be controllably adjusted by changing the command position percentage that can be seen in a 5-second average position feedback.
	Resolution of positioning shall be demonstrated to be better than 0.2% of full scale including command resolution to feedback from 2% to 100% position.

Table 7-1. IPTB Step Response Requirements

Table 7-1. IPTE	Step Respor	nse Requiremen	ts (cont'd.)

Step	Throttle Body Response
Large Step	Response time is defined as the time from the step command until the throttle
	reaches 90% of the target position and stays within this target.
	For all large step responses, overshoot or oscillation shall not exceed 4.0% of
	throttle full scale travel.
	Closed loop step response times shall not change by more than \pm 30% as a result of variations in battery voltage from 16 to 30 Vdc for slow DC change.
	Closed loop step response times shall not change by more than ± 30% as a result of
	variations in ambient temperature from -40 °C to +125 °C (-40 °F to 257 °F).
	Closed loop step response time from 10 to 90% throttle travel shall not exceed 400 msec.
	Closed loop step response time from 90 to 10% throttle travel shall not exceed 400 msec.
	On-engine testing shall quantify the small signal step response for a 3 to 8% step
	change (idle speed) and prove it does not degrade by more than 30% over the bench testing.
	On-engine testing shall quantify the small signal step response for an 8 to 3% step change (idle speed) and prove it does not degrade by more than 30% over the bench testing.
Small Step	Response time is defined as the time from the step command until the throttle
	reaches 90% of the target position and stays within this target.
	For all small step responses, overshoot or oscillation shall not exceed 2.0% of throttle full scale travel.
	Closed loop step response times shall not change by more than \pm 30% as a result of
	variations in battery voltage from 16 to 30 Vdc for slow DC change.
	Closed loop step response times shall not change by more than +/-30% as a result
	of variations in ambient temperature from -40 °C to +125 °C (-40 °F to 257 °F).
	Closed loop step response time from 47.5 to 52.5% throttle travel shall not exceed 400 msec.
	Closed loop step response time from 52.5 to 47.5% throttle travel shall not exceed 400 msec.
	Closed loop step response time from 2 to 6% throttle travel shall not exceed 400
	msec Closed loop step response time from 6 to 2% throttle travel shall not exceed 400
	msec.
	Closed loop step response time from 3 to 8% throttle travel shall not exceed 400 msec.
	On-engine testing shall quantify the small signal step response for a 3 to 8% step change (idle speed) and prove it does not degrade by more than 30% over the bench testing.
	On-engine testing shall quantify the small signal step response for an 8 to 3% step change (idle speed) and prove it does not degrade by more than 30% over the bench testing.
Sine	Sine response testing shall be conducted on the subsystem for a sine wave command of amplitude of 47.5 to 52.5% from 0.5 to 10 Hz and measure the gain and phase. The gain shall be better than -3dB from 0.5 to 2.5 Hz.
	Sine response testing shall be conducted for a sine wave command of amplitude of 4 to 6% from 0.5 to 10 Hz and measure the gain and phase. The gain shall be better than -3dB from 0.5 to 2.5 Hz.
	Sine response testing shall be conducted for a sine wave command of amplitude of 3 to 8% from 0.5 to 10 Hz and measure the gain and phase. The gain shall be better than -3dB from 0.5 to 2.5 Hz.

Step	Throttle Body Response
Slow Ramp	A slow ramp from 3% to 97% back to 3% shall be run, recording command and feedback, with a computation of error. Ramp time shall be 30 seconds opening and 30 seconds closing.
	Purpose of this is to ensure that the PID settings do not result in problems following slow changing signal response and jerky throttle behavior or other anomalies.
Gain Stability Margin	Gain stability margin will be measured on 10-90% step while gain error is increased until throttle becomes unstable. Throttle must be stable with error gain of 1.5 or less

Table 7-1. IPTB Step Response Requirements (cont'd.)

Chapter 8. Basic Troubleshooting

Visual/Physical Check

The visual/physical check is very important, as it can often correct a problem without further troubleshooting and save valuable time.

Perform the following during your visual check:

- Check the motor resistance.
- Check physical wiring connections.
- Check plate for binding and spring return action both above and below null point.

Difficult Starting, Launch, or Stall Issues

Prerequisite

Prior to any subsequent work being undertaken the following tasks must be performed.

- 1. Check for presence of diagnostic trouble code (SFC).
- 2. Confirm the SFC (refer to the OH6 service manual 26760).
- 3. Record the code for future appropriate paperwork.
- 4. Resolve and clear the fault code.
- 5. Recheck that difficulty in starting, launch, or stalling issues are still present.

If there are still performance problems or SFCs are present, follow the Visual/Physical check procedure above before replacing the unit.

Chapter 9. Valve Application Review

AMP Checklist

The Application Management Procedure (AMP) checklist found in <u>Table 2-6</u> should be used to ensure all application guidelines are followed.

Items to be Reviewed with Woodward

For full application warranty of the product, the following items at a minimum must be reviewed with Woodward application engineering team.

- Use of proper electrical termination/connector practices, including terminal material and plating, proper support of wire harness, wire size, etc.
- Mounting location and orientation of the throttle
- Manifold Pressure Higher-Than-Expected Fault to be calibrated properly (not all air leaks can be managed by the throttle)
- Application vibration levels are measured and approved by Woodward
- Armature temperature (maximum and steady state) of the motor is determined and approved by Woodward
- Throttle motion counters measured and correlated to warranty period, as excessive throttle movements will reduce throttle life
- A maximum of ninety (90) 1% movements of the throttle plate per kilometer of driving is required on bus applications with 100k kilometers of usage. Any throttle movement count higher than this must be approved by Woodward. Truck applications will vary by application and should be discussed with the Woodward application team at initial development.
- When used in an application with an EGR system, EGR must be introduced downstream of the throttle to prevent water condensation in motor housing or throttle plate icing to avoid stuck throttle or damaged throttle components. Throttle warranty will be void if EGR is introduced upstream of the throttle. Consult Woodward for application approval of all other EGR configurations.
- Throttle size for each application must be approved by Woodward application team.
- Customers who approve/stock multiple throttle sizes should have a method in place to prevent mixing the parts in stock and/or at installation.
- Approved software and calibration are being used for ECU throttle control.

Chapter 10. Product Support and Service Options

Product Support Options

If you are experiencing problems with the installation, or unsatisfactory performance of a Woodward product, the following options are available:

- 1. Consult the troubleshooting guide in the manual.
- 2. Contact the OE Manufacturer or Packager of your system.
- 3. Contact the Woodward Business Partner serving your area.
- 4. Contact Woodward technical assistance via email (EngineHelpDesk@Woodward.com) with detailed information on the product, application, and symptoms. Your email will be forwarded to an appropriate expert on the product and application to respond by telephone or return email.
- 5. If the issue cannot be resolved, you can select a further course of action to pursue based on the available services listed in this chapter.

OEM or Packager Support: Many Woodward controls and control devices are installed into the equipment system and programmed by an Original Equipment Manufacturer (OEM) or Equipment Packager at their factory. In some cases, the programming is password-protected by the OEM or packager, and they are the best source for product service and support. Warranty service for Woodward products shipped with an equipment system should also be handled through the OEM or Packager. Please review your equipment system documentation for details.

Woodward Business Partner Support: Woodward works with and supports a global network of independent business partners whose mission is to serve the users of Woodward controls, as described here:

- A **Full-Service Distributor** has the primary responsibility for sales, service, system integration solutions, technical desk support, and aftermarket marketing of standard Woodward products within a specific geographic area and market segment.
- An **Authorized Independent Service Facility (AISF)** provides authorized service that includes repairs, repair parts, and warranty service on Woodward's behalf. Service (not new unit sales) is an AISF's primary mission.
- A **Recognized Engine Retrofitter (RER)** is an independent company that does retrofits and upgrades on reciprocating gas engines and dual-fuel conversions, and can provide the full line of Woodward systems and components for the retrofits and overhauls, emission compliance upgrades, long term service contracts, emergency repairs, etc.

A current list of Woodward Business Partners is available at www.woodward.com/local-partner.

Product Service Options

Depending on the type of product, the following options for servicing Woodward products may be available through your local Full-Service Distributor or the OEM or Packager of the equipment system.

- Replacement/Exchange (24-hour service)
- Flat Rate Repair
- Flat Rate Remanufacture

Replacement/Exchange: Replacement/Exchange is a premium program designed for the user who is in need of immediate service. It allows you to request and receive a like-new replacement unit in minimum time (usually within 24 hours of the request), providing a suitable unit is available at the time of the request, thereby minimizing costly downtime.

This option allows you to call your Full-Service Distributor in the event of an unexpected outage, or in advance of a scheduled outage, to request a replacement control unit. If the unit is available at the time of the call, it can usually be shipped out within 24 hours. You replace your field control unit with the like-new replacement and return the field unit to the Full-Service Distributor.

Flat Rate Repair: Flat Rate Repair is available for many of the standard mechanical products and some of the electronic products in the field. This program offers you repair service for your products with the advantage of knowing in advance what the cost will be.

Flat Rate Remanufacture: Flat Rate Remanufacture is very similar to the Flat Rate Repair option, with the exception that the unit will be returned to you in "like-new" condition. This option is applicable to mechanical products only.

Returning Equipment for Repair

If a control (or any part of an electronic control) is to be returned for repair, please contact your Full-Service Distributor in advance to obtain Return Authorization and shipping instructions.

When shipping the item(s), attach a tag with the following information:

- return number;
- name and location where the control is installed;
- name and phone number of contact person;
- complete Woodward part number(s) and serial number(s);
- description of the problem;
- instructions describing the desired type of repair.

Packing a Control

Use the following materials when returning a complete control:

- protective caps on any connectors;
- antistatic protective bags on all electronic modules;
- packing materials that will not damage the surface of the unit;
- at least 100 mm (4 inches) of tightly packed, industry-approved packing material;
- a packing carton with double walls;
- a strong tape around the outside of the carton for increased strength.

NOTICE

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual 82715, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules.*

Replacement Parts

When ordering replacement parts for controls, include the following information:

- the part number(s) (XXXX-XXXX) that is on the enclosure nameplate;
- the unit serial number, which is also on the nameplate.

Engineering Services

Woodward's Full-Service Distributors offer various Engineering Services for our products. For these services, you can contact the Distributor by telephone or by email.

- Technical Support
- Product Training
- Field Service

Technical Support is available from your equipment system supplier, your local Full-Service Distributor, or from many of Woodward's worldwide locations, depending upon the product and application. This service can assist you with technical questions or problem solving during the normal business hours of the Woodward location you contact.

Product Training is available as standard classes at many Distributor locations. Customized classes are also available, which can be tailored to your needs and held at one of our Distributor locations or at your site. This training, conducted by experienced personnel, will assure that you will be able to maintain system reliability and availability.

Field Service engineering on-site support is available, depending on the product and location, from one of our Full-Service Distributors. The field engineers are experienced both on Woodward products as well as on much of the non-Woodward equipment with which our products interface.

For information on these services, please contact one of the Full-Service Distributors listed at <u>www.woodward.com/local-partner</u>.

Contacting Woodward's Support Organization

For the name of your nearest Woodward Full-Service Distributor or service facility, please consult our worldwide directory at <u>www.woodward.com/support</u>, where you may also find the most current product support and contact information.

Products Used in Electrical Power Systems

Products Used in Engine Systems

Products Used in Industrial Turbomachinery Systems

Facility Phone Number	Facility Phone Number	Facility Phone Number
Brazil +55 (19) 3708 4800	Brazil +55 (19) 3708 4800	Brazil+55 (19) 3708 4800
China +86 (512) 8818 5515	China +86 (512) 8818 5515	China +86 (512) 8818 5515
Germany:+49 (711) 78954-510	Germany +49 (711) 78954-510	India+91 (124) 4399500
India+91 (124) 4399500	India+91 (124) 4399500	Japan+81 (43) 213-2191
Japan+81 (43) 213-2191	Japan+81 (43) 213-2191	Korea+ 82 (32) 422-5551
Korea+82 (32) 422-5551	Korea+ 82 (32) 422-5551	The Netherlands+31 (23) 5661111
Poland+48 (12) 295 13 00	The Netherlands+31 (23) 5661111	Poland+48 (12) 295 13 00
United States+1 (970) 482-5811	United States+1 (970) 482-5811	United States+1 (970) 482-5811

Technical Assistance

If you need to contact technical assistance, you will need to provide the following information. Please write it down here before contacting the Engine OEM, the Packager, a Woodward Business Partner, or the Woodward factory:

If you have an electronic or programmable control, please have the adjustment setting positions or the menu settings written down and with you at the time of the call.

Revision History

New Manual—

Declarations

DECLARATION OF CONFORMITY

EU DoC No.: Manufacturer's Name:	00513-04-EU-02-01 WOODWARD, INC.
Manufacturer's Contact Address:	1041 Woodward Way Fort Collins, Colorado 80524 USA
Model Name(s)/Number(s):	F-Tech Integrated Passive Throttle Body
The object of the declaration described above is in conformity with the following relevant Union harmonization legislation:	Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to electromagnetic compatibility (EMC)
	Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (including amendments introduced by Delegated Directive 2015/863/EU)
	Exemption in use: 6(c)
Applicable Standards:	EN61000-6-4:2007/A1:2011: EMC Part 6-4: Generic Standards - Emissions for Industrial Environments EN61000-6-2:2005/AC:2005: EMC Part 6-2: Generic Standards - Immunity for Industrial Environments
	ued under the sole responsibility of the manufacturer. e equipment specified above conforms to the above Directive(s).
Ν	IANUFACTURER
/	unette Lynch
Signature	D
	Annette Lynch
Full Name	
Complian	ce Engineering Manager
Position	
Woodwor	d, Fort Collins, CO, USA
Place	u, Fort Commis, CO, USA
0.0	January 2023
Date	

5-09-1183 Rev 39

DECLARATION OF INCORPORATION Of Partly Completed Machinery 2006/42/EC

File name: Manufacturer's Name:	00513-EU-02-03 WOODWARD INC.
Manufacturer's Address:	1041 Woodward Way Fort Collins, CO 80524 USA
Model Names:	F-Tech Integrated Passive Throttle Body
This product complies, where applicable, with the following Essential Requirements of Annex I:	1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7

The relevant technical documentation is compiled in accordance with part B of Annex VII. Woodward shall transmit relevant information if required by a reasoned request by the national authorities. The method of transmittal shall be agreed upon by the applicable parties.

The person authorized to compile the technical documentation:

Name:	Dominik Kania, Managing Director
Address:	Woodward Poland Sp. z o.o., ul. Skarbowa 32, 32-005 Niepolomice, Poland

This product must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of this Directive, where appropriate.

The undersigned hereby declares, on behalf of Woodward Governor Company of Loveland and Fort Collins, Colorado that the above referenced product is in conformity with Directive 2006/42/EC as partly completed machinery:

MANUFACTURER

Signature	(innette Lynch
	Annette Lynch
Full Name	
(Compliance Engineering Manager
Position	
Woo	dward Inc., Fort Collins, CO, USA
Place	
	03 January 2023
Date	

Document: 5-09-1182 Rev 21

We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

Please reference publication 26846.





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Email and Website—www.woodward.com

Woodward has company-owned plants, subsidiaries, and branches, as well as authorized distributors and other authorized service and sales facilities throughout the world.

Complete address / phone / fax / email information for all locations is available on our website.