Description:

The Rotary Hand Control is designed to provide a signal to the engine fuel control system in response to the driver's request for engine speed. A sensor is employed which provides dual linear output voltage proportional to the rotational position of the knob. This device's two outputs are independent and electrically isolated, supporting the implementation of highly fault tolerant and reliable systems.

Applications:

- Throttle control interface with position sensor.
- This product is designed to set a constant engine speed which does not conform to FMVSS-124. The hand control is not approved for primary on-highway throttle applications.

Absolute Maximum Electrical/Mechanical Ratings

APS Circuit:	
Supply Voltage (VCC1, VCC2)	5V ± 10%
Output Current (APS1, APS2 output)	10 mA
APS1,2 short circuit duration to ground	Indefinite
APS1,2 short circuit duration to VCC	Indefinite
Whole Assembly	
Operating Temperature	-40°C to +85°C
Storage Temperature	-40°C to +105°C
Static Load (Torque) Limit	4.5 Nm
Mounting Screw Torque	4.5 Nm

Operation of this device beyond absolute maximum ratings may result in permanent damage.

Vehicle System Safety Information

During FMEA analysis (Failure Modes and Effects Analysis, a.k.a. Hazard Analysis), Williams Controls (WMCO) has identified the following potential failure mode of its Non Contact Sensors that can not be mitigated within the sensor assembly:

- Sensor output APS1 or APS2 (applicable for Dual APS Sensor only) or APS or IVS output (applicable for APS/IVS Sensors only) could get “electrically stuck” at an arbitrary output signal level (for APS only – IVS could get stuck at High or Low signal level) within the operating range of the sensor

This potential failure mode can not be detected and/or resolved within the sensor assembly itself and diagnostic information about this issue can not be transmitted and/or generated by the sensor assembly, but must be detected by the vehicle powertrain control system(s). To mitigate this potential failure mode, WMCO designed and released sensors feature a “Dual Redundant Output” concept. This sensor will produce two electrically independent output signals that are in direct correlation with each other.
To mitigate the risk named above, Williams Controls strongly recommends using the sensor’s built-in redundancy feature. The first APS signal would be used as the source of accelerator position signal information, and the second APS signal (or IVS signal, depending on sensor type) would be used for diagnostic purposes only. The comparison of the second (diagnostic) signal with the first (accelerator position) signal enables the vehicle to fully detect the described “electrically stuck” output failure mode.
Software algorithms specifically designed for this purpose (e.g. “stuck throttle routine”, “stuck pedal routine”...) are commonly used in the industry and known to mitigate this risk.

Environmental Validation (Refer to Williams Spec WDS-010)

Thermal Cycle / Stress:	SAE J1455 -40°C to +85°C
Thermal Shock:	-40°C to +85°C
Humidity:	120 hour exposure at 95% humidity from +27°C to +75°C
Vibration:	Random broadband 5-500 Hz, 4.0 G's
Salt Fog:	ASTM B-117 96 hr exposure
Dust Exposure:	24 Hr exposure, pedals cycled
Chemical Immersion:	Diesel fuel, brake fluid, antifreeze, and plastic protectant exposure.
Pressure Wash:	250 psig detergent at +75°C - 40 minute exposure, 0.05 rpm 1000 psig water at +75°C - 40 minute exposure, 0.05 rpm
Mechanical Shock:	SAE J1455 One meter drop to concrete
EMI Resistance:	**Refer to SAE J1113-1**

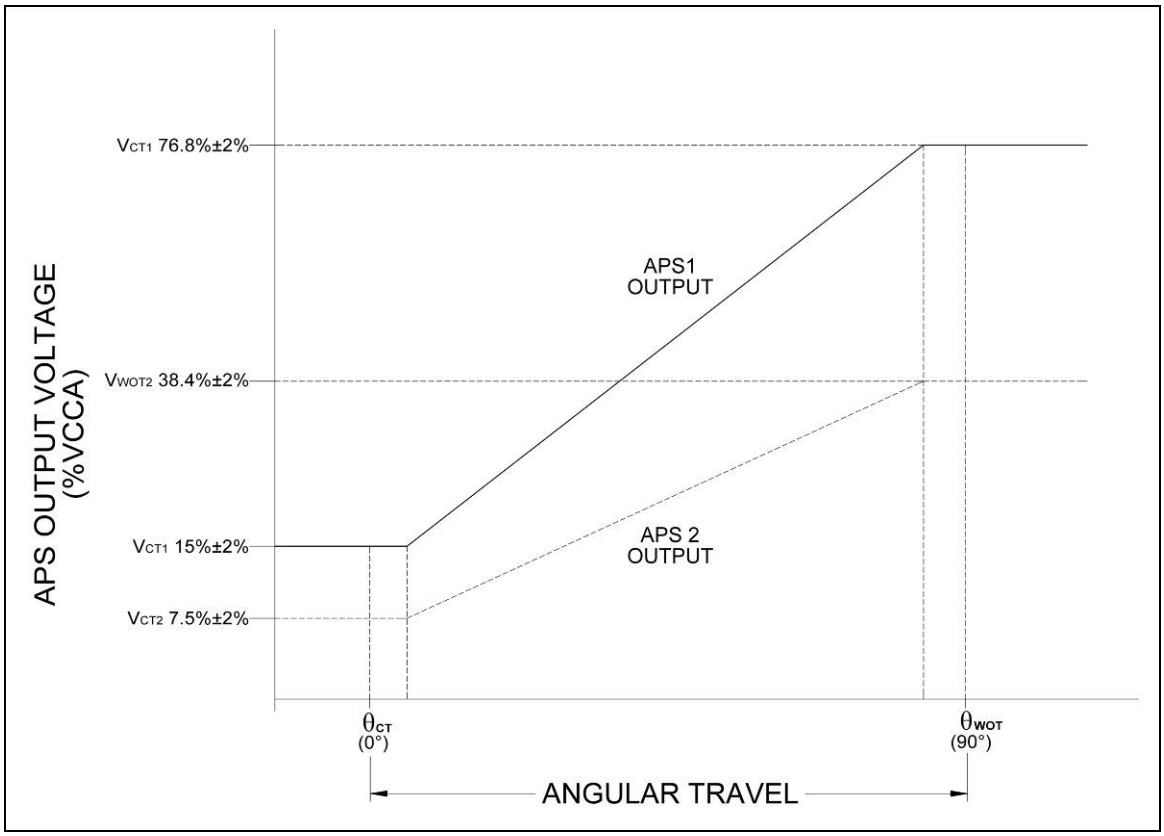
Regulatory Validation

FMVSS-302 Flammability	Per Federal regulations

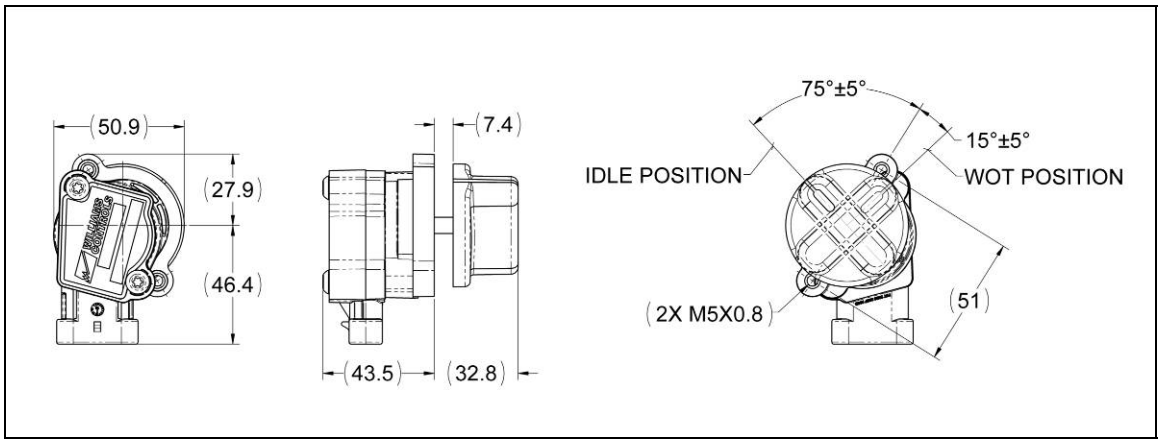
Mechanical Validation

Full Stroke Cycles:	5×10^5
Cycle Rate:	0.2 Hz
Overpressure Load:	1.3Nm

Typical Output Characteristics [KPC]



Mechanical Dimensions and Characteristics (for reference only)

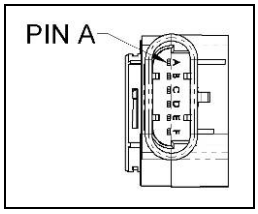


Dimensions in millimeters

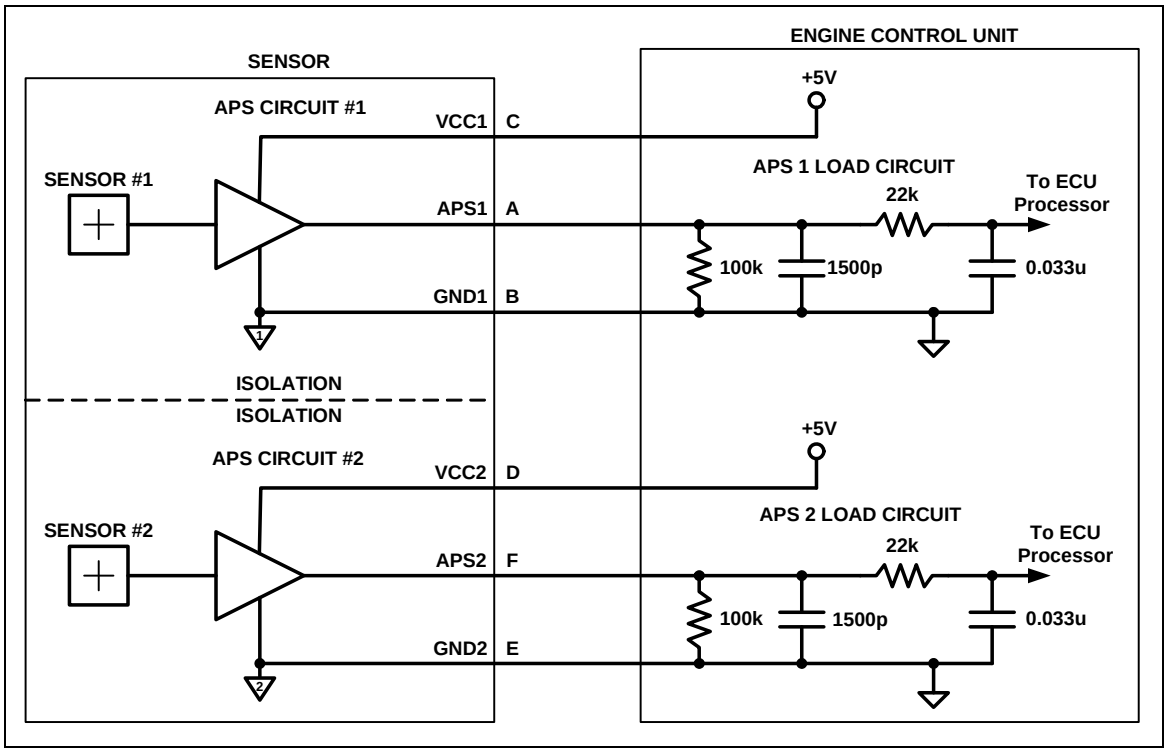
Connector Pin Configuration:

- Mating Connector type: Packard Electric “Metri-Pack” 150 Series
  - 12066317 – Connector and Seal
  - 12103881 – Terminal (Female)

Pin	Function	Pin	Function
A	APS1	D	VCC2 (+5V)
B	GND1	E	GND2
C	VCC1 (+5V)	F	APS2



Applications Information:



Referenced Documents:

- Williams Controls drawing
- Williams Controls Specification # WDS-010
- *SAE J1113-1 – Electromagnetic Compatibility Measurement Procedures and Limits for Components of Vehicles, Boats, and Machines*

Revision History

Rev	Date	ECN#	Changes/Comments
A	08-08-12	006049	(1) Initial Alpha Release with change; (2) Updated to current WCS format
B	09-26-2012	006742	(1) Full Stroke Cycles: 5 X 10^5 was 5 million