



Williams Controls  
**WCS-400627**  
 Williams Customer Specification

Original Release: 08/08/12  
 Original Project: Rev. B



**APPLICATIONS**

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

**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.

<b>CURTISS - WRIGHT</b>	PROCEDURE NAME:	DEPT:	030				
	<b>Williams Customer Specification Form</b>						
DOCUMENT NUMBER:	<b>WQF-030-021</b>	Revision Level	C	Date Effective	4/26/12	DAF#	00396
QEMS Representative	Tuan Nguyen	Process Owner	Vicki Slaughter	Department Manager	Scott Thiel		

**ABSOLUTE MAXIMUM ELECTRICAL/MECHANICAL RATINGS**

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

*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.

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**ENVIRONMENTAL VALIDATION**

Thermal Cycle/Thermal Stress	SAE J1455 -40°C to +85°C
Thermal Shock	-40to +85°C
Humidity	120 hour exposure at 95% humidity from +27°C to +75°C
Vibration	Random broadband 5-500 Hz, 4.0G's
Salt Fog	ASTM B-117 96 hr exposure
Dust Exposure	24Hr 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, 0.05RPM 1000 PSIG water at +75°C – 40 minute exposure, 0.05RPM
Mechanical Shock	SAE J1455 one meter drop to concrete
Emi Resistance	REFER TO SAE J1113-1

**REGULATORY VALIDATION**

FMVSS-302 Flammability	Per Federal Regulations
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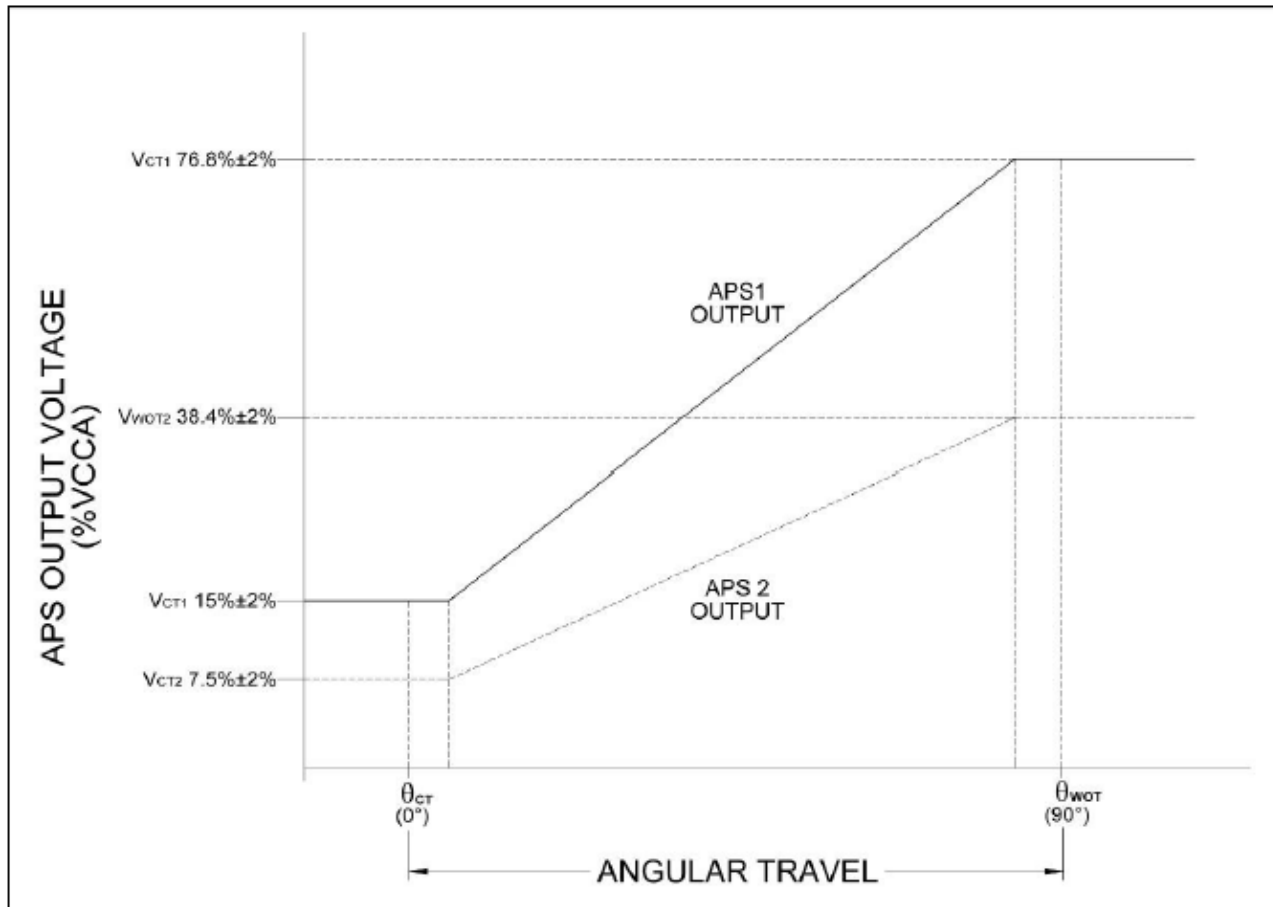
**MECHANICAL VALIDATION**

Full Stroke Cycles	5x10 <sup>5</sup>
Cycle Rate	0.2Hz
Overpressure Load	1.3Nm

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**TYPICAL OUTPUT CHARACTERISTICS**

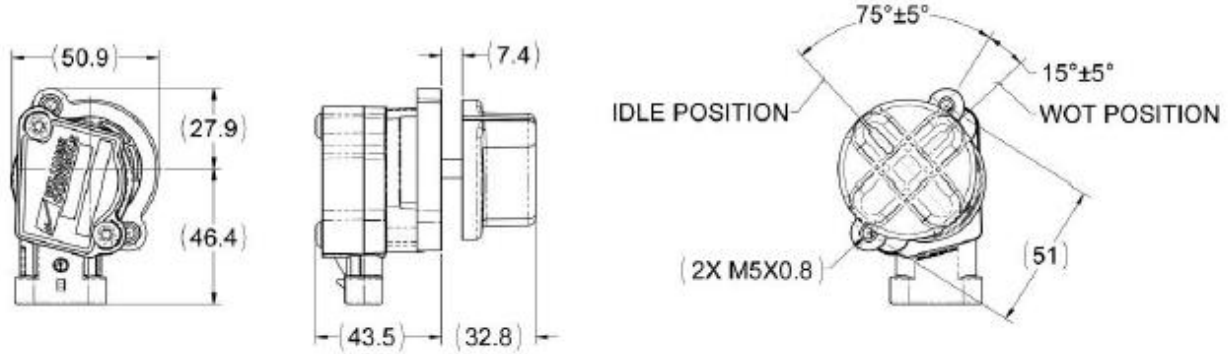


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**MECHANICAL DIMENSIONS AND CHARACTERISTICS (FOR REFERENCE ONLY)**

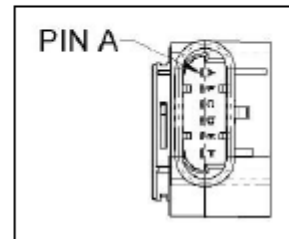
Measurements in mm



**Connector Pin Configuration:**

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

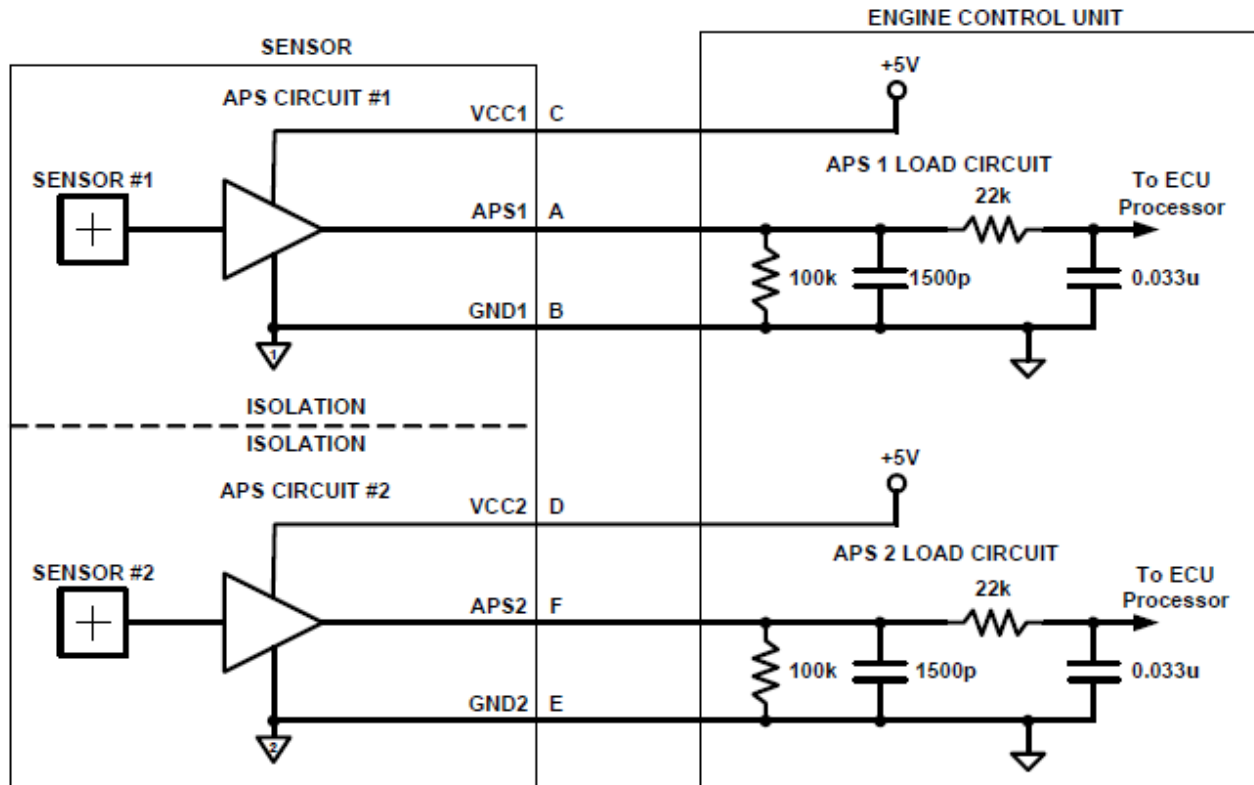
Pin	Function	Pin	Function
A	APS1	D	VCC2 (+5V)
B	GND1	E	GND2
C	VCC1 (+5V)	F	APS2



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**APPLICATIONS INFORMATION:**



**REFERENCED DOCUMENTS**

- Williams Controls drawing
- Williams Controls DWG #131507
- SAE J1113-1 Electromagnetic compatibility measurement procedures and limits for components of vehicles, boats and machines

**REVISION HISTORY**

Rev	Date	ECN#	Checked	Approved	Changes/Comments
A	08/08/12	006049			Initial alpha Release with change: Updated to current WCS Format
B	09/26/12	006742			Full stroke cycles: 5 x 10 <sup>5</sup> was 5 million

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