



Williams Controls WCS-400101 Williams Customer Specification

Original Release: 10/14/09

FEATURES

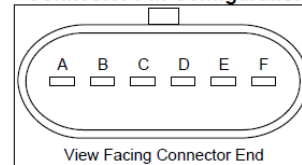
- 14° ± 2° Angular Rotation, Fore & Aft
- FMVSS 124 and 302 compliant
- -40°C to +85°C Operation
- + 5V Operations
- Electronics IP67 Sealed
- Dual Ratiometric APS Output
- Independent, Isolated APS Circuits
- Protected against Electrical Misconnection
- Metripak 150-series compatible connector
- Non Contact Sensor
- Highly Emi Resistant
- Black coated steel base and treadle
- Chromate conversion module components



APPLICATIONS

- Throttle with position sensor

Connector Pin Configuration



Pin	Function	Pin	Function
A	APS 1	D	VCC 2 (+5V)
B	GROUND1	E	GROUND2
C	VCC 1 (+5V)	F	APS 2

Mating Connector

Packard Electric "Metri-Pack" Series 150
Housing p/n: 12066317
Terminal p/n: 12103881

DESCRIPTION

The EFPA (Electronic Floor Pedal Assembly) is designed to provide a signal to the engine fuel control system in response to the driver's request for engine power. A sensor is employed which provides a voltage proportional to the supplied voltage based on the angular displacement of the treadle.

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QEMS Representative	Mary Knight	Process Owner	Michael Cooper	Department Manager	Scott Thiel		



ABSOLUTE MAXIMUM ELECTRICAL/MECHANICAL RATINGS

Supply Voltage (VCC1, VCC2)	5V ± 0.5V
Output Current (APS1, APS2 output)	±10mA
Operating Temperature	-40°C to +85°C
Storage Temperature	-40°C to +85°C
APS1,2 Short circuit duration to ground	20 Minutes Maximum
APS1,2 short circuit duration to VCC	20 Minutes Maximum
Static Load Limit (Forward/Reverse)	1500 N measured 150 mm from pivot
Side Load Limit	500 N measured 150 mm from pivot
Vertical Load Limit (Neutral)	1000 N measured center of treadle on pivot axis

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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ELECTRICAL SPECIFICATION; PEDAL ASSEMBLY

- Over -40°C to +85°C temperature range, $V_{cc}=5.0V$ unless noted

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP	MAX	UNITS
V_{CC}	APS Supply Voltage		4.5	5	5.5	V
I_{CC}	APS Supply Voltage			7	10	mA
V_{Span1}	Span output, APS 1	V_{REV} to V_{FWD}		80		% V_{CC}
V_{Span2}	Span output, APS 2	V_{REV} to V_{FWD}		80		% V_{CC}
V_{Rev1}	Reverse Output, APS 1	Reverse End Stop	86	90	92	% V_{CC}
V_{Rev2}	Reverse Output, APS 2	Reverse End Stop	8	10	14	% V_{CC}
V_{Neu1}	Neutral Output, APS 1	Pedal at Rest	46	50	54	% V_{CC}
V_{Neu2}	Neutral Output, APS 2	Pedal at Rest	46	50	54	% V_{CC}
V_{FWD1}	Forward Output, APS1	Forward End Stop	8	10	12	% V_{CC}
V_{FWD2}	Forward Output, APS 2	Forward End Stop	88	90	92	% V_{CC}

MECHANICAL SPECIFICATION; PEDAL ASSEMBLY

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Forward Lever Starts Angle	See Drawing	-2	0	2	°
Forward Lever Final Angle	See Drawing	12	14	16	°
Reverse Lever Start Angle	See Drawing	-2	0	2	°
Reverse Lever Final Angle	See Drawing	-16	-14	-12	°
Pedal Assembly Weight			2.5 (5.6)		Kg (Lbs)
Life Expectant; Cycles	Applied @ 0.5Hz	3,000,000			Cycles

DESIGN VERIFICATION TESTING (REGULATORY, MEHCANICAL, ENVIRONMENTAL)

REGULATORY VALIDATION	
FMVSS-124 RTI Return to Idle	Per Federal Regulations
FMVSS-302 Flammability	Per Federal Regulations

MECHANICAL VALIDATION	
Full Stroke Endurance/Durability	With periodically monitored electrical output
Ultimate Strength	With force vs displacement plots

Full Stroke Cycles	3,000,000 Cycled (Fwd & Rev)
Cycle Rate	0.5Hz

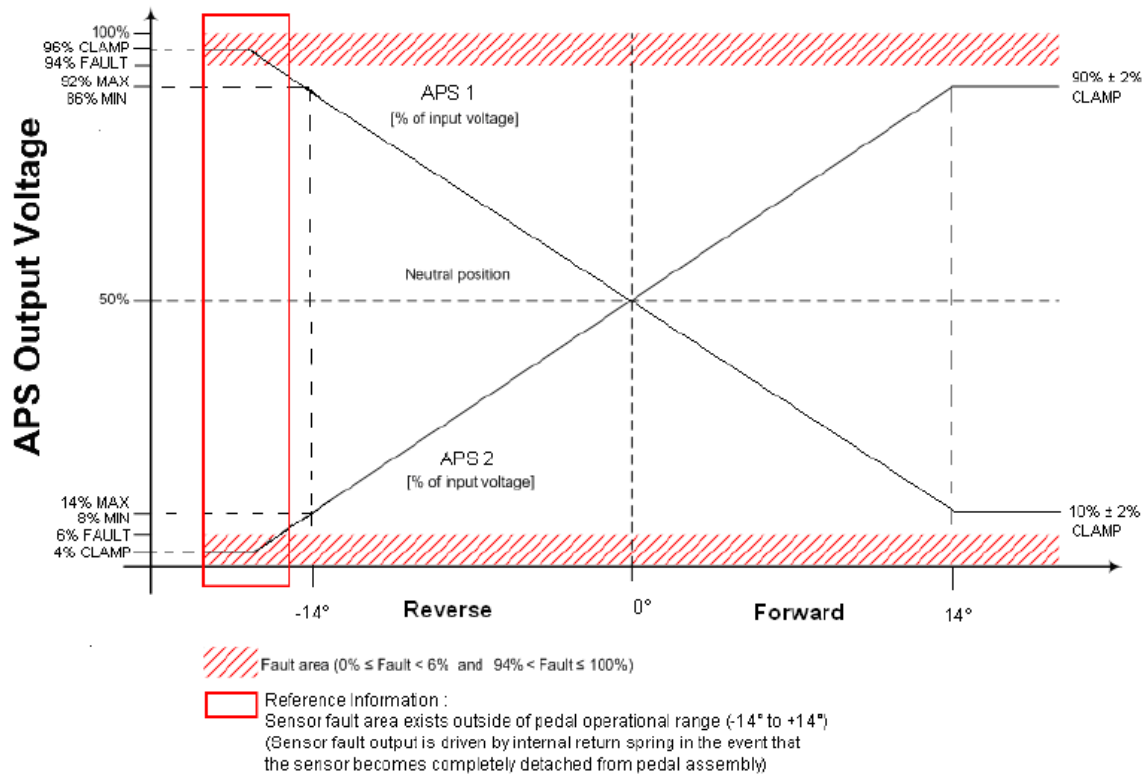
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PEDAL ENVIRONMENTAL VALIDATION

Thermal Cycle	Refer to Williams Spec WDS-010B
Thermal Stress	
Thermal Shock	
Humidity	
Vibration	
Salt Fog	
Dust Exposure	
Chemical Immersion	
Pressure Wash	
Mechanical Shock	
EMI Resistance	Refer to SAE J1113-1

TYPICAL OUTPUT CHARACTERISTICS



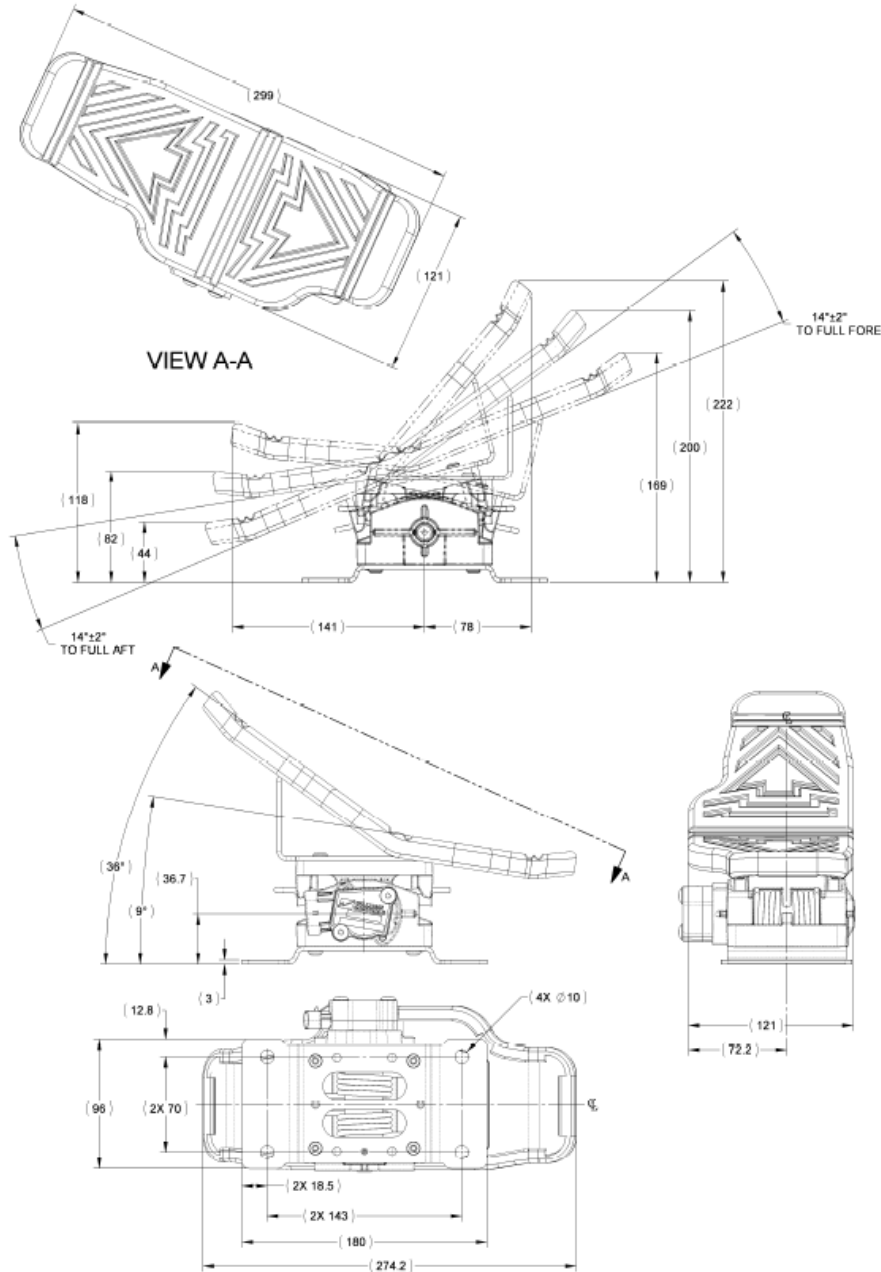
Angular Position

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MECHANICAL DIMENSIONS AND CHARACTERISTICS (FOR REFERENCE ONLY)

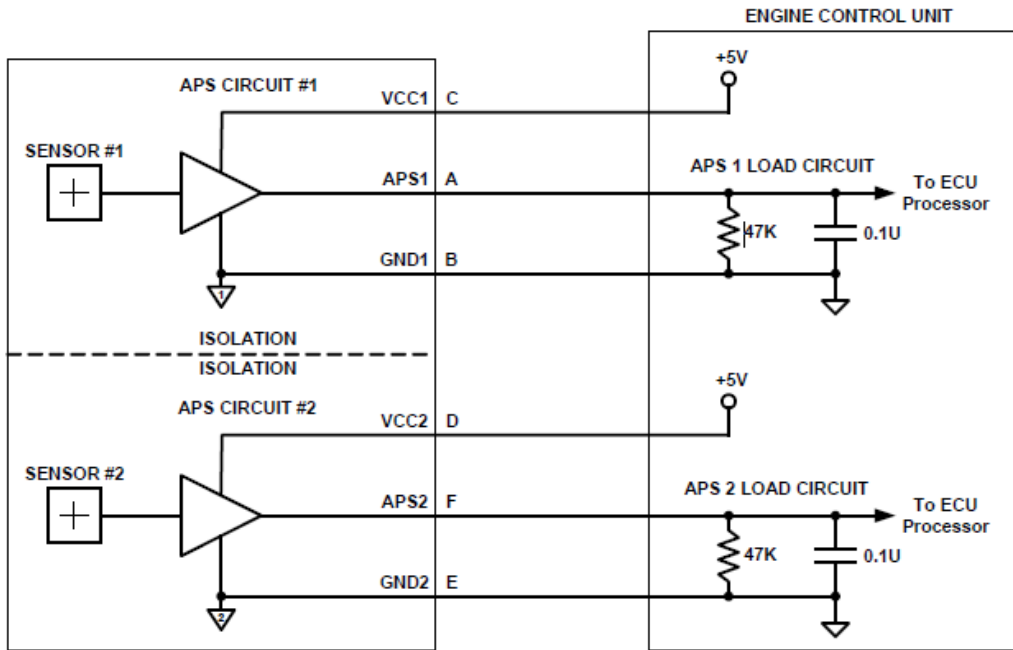
Measurements in mm



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APPLICATIONS INFORMATION:



REFERENCED DOCUMENTS

- Williams Controls DWG #400101
- Williams Controls Specification #WDS-010

REVISION HISTORY

Rev	Date	ECN#	Checked	Approved	Changes/Comments
001	10/01/09	001218			Preliminary Release
002	10/14/09	001224			Remove Revision from page 1 Revise ISo image and Mechanical Dims Image with NC Sensor
003	10/10/11	004800			Was rated IP66

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