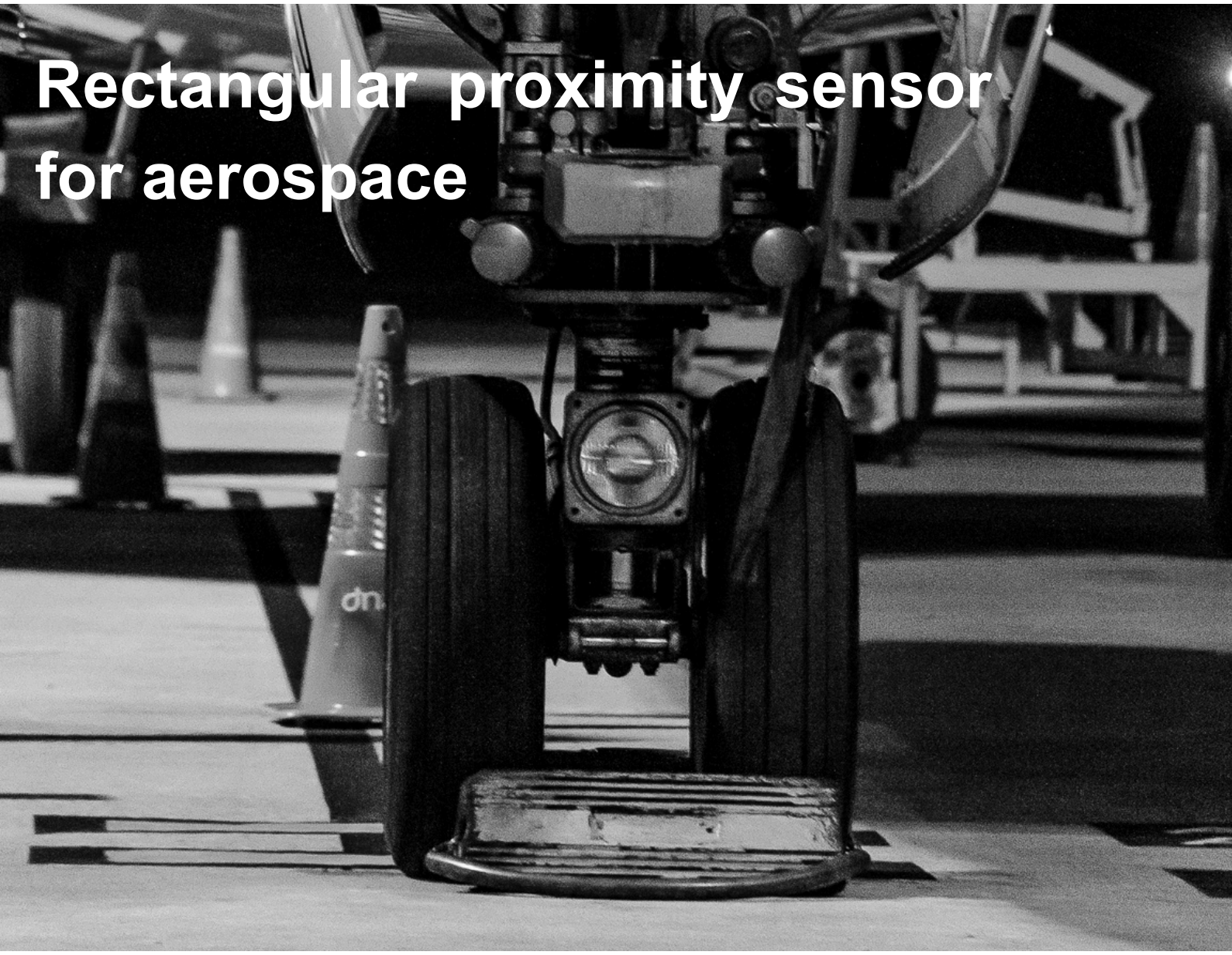
Rectangular proximity sensor for aerospace



Overview

Our rectangular proximity sensor is ideal for detecting the position of critical aircraft structures with lower geometric tolerances including landing gear doors, passenger doors, cargo doors and slats, and reverse thrusters. It has two inductive cores providing reliable high inductance and variable inductive reluctance to sense changes with respect to its distance from a ferrous target. This proximity sensor will perform in applications with a gap range up to 0.275 inches.

Key features

- Rectangular connector design
- MIL-STD-38999 connector
- Hermetically sealed construction
- Stainless steel housing
- Corrosion resistant MIL-SPEC mounting hardware
- Standard or customer specified targets
- ATA 32
- DO-160G Environmental Conditions and Test Procedures for Airborne Equipment
- MIL-STD-202G Method 213B Shock to 1,000 g
- 1,000,000 hour reliability
- AS9100 Quality Management System

Technical specification

Feature	Description
Type	Two-wire, passive proximity sensor, variable inductive reluctance
Electrical interface	MIL-DTL-38999 III circular connector, plug size 9, 3 position, cable (D38999/26FA98SN) or equivalent; sensor connector D38999/25 hermetic receptacle.
Connector pins	Pins A and C are connected, Pin B is not connected
Principals	The inductance of the sensor changes with respect to its distance from a ferrous target. The sensor inductance increases in an exponential fashion as the target approaches the sensor face. Reference inductance values given at 1.275V @ 588 Hz at room temperature (25°C).
Target material	17-4 Stainless steel per AMS 5604 heat treated H1050 condition
Inductance, target near	5.300±0.100 mH at 0.160” from a rectangular target with dimensions 1.5" long x 0.75" wide x 0.1" thick
Inductance, target far	4.960 ±0.050 mH at 0.250” from a rectangular target with dimensions 1.5" long x 0.75" wide x 0.1" thick
Side metal effect	The effect of adjacent (mild steel) side metal located behind the sensing face on the inductance of the sensor with a standard target and a gap of 2.5mm to the body of the sensor is less than ± 10uH
Temperature effect	≤ ±0.15 mH throughout the operating temperature range (-55°C to +70°C) referenced from the air inductance value with no target present at +20°C
Stability	≤ ±0.5% of reading change over the qualified life of the sensor referenced from the initial measurement taken at ambient temperature with target in the near state

Technical specification

Feature	Description
AC resistance	20Ω ±10% at room temperature using an excitation frequency of 586.94Hz ±0.1%
Dielectric	Dielectric Strength (MIL-STD-202, Method 301) ≤ 1 mA dielectric strength of 1.07 kV RMS (1.5kV Peak) applied for 1 minute between the input pins (A and C) and housing
Insulation resistance	Insulation Resistance (MIL-STD-202, Method 302) insulation resistance ≥ 20 MΩ with 1.5 kV DC applied for 2 minutes between the input pins (A and C) and the case.
Bonding and grounding	The maximum resistance between any point on the sensor and the connector shell is 2.5mΩ. Bonding path to airframe is provided by mounting hardware.
Certification	Refer to RTCA DO-160G Environmental Procedures & Test Conditions for Airborne Equipment unless otherwise stated in this document
Ground survival low temperature	-55°C (Cat D2)
Short time low operating temperature	-55°C (Cat D2)
Low operating temperature	-55°C (Cat D2)
Ground survival high temperature	+85°C (Cat D2)
Short time high operating temperature	+70°C (Cat D2)
High operating temperature	+70°C (Cat D2)
Maximum operating altitude	50,000 ft (Cat D2)

Technical specification

Feature	Description
Decompression	50,000 ft
Overpressure	-15,000 ft
Temperature variation	-55°C to +70°C (Cat A
Humidity	Cat C
Operational shock	Cat B
Crash safety	Cat B
MIL-STD-202-213 shock (specified pulse)	3 shocks, 1,000 g's, in all 6 orthogonal directions (±X, ±Y, and ±Z, 18 shocks total) in accordance with MILSTD-202-213 (MIL-STD-202G Method 213B) Condition E.
High-level, short duration vibration	Cat H, Curve P
Robust vibration (sine)	Cat R, Curve W
Robust vibration (random)	Cat R, Curves E & E1
Explosion proofness	Cat H Zone II
Waterproofness	Cat S & R
Fluid susceptibility	Cat F applicable fluids: hydraulic fluids (phosphate ester-based (synthetic), Type IV, MIL-PRF-5606K hydraulic fluid, petroleum base), lubricating oils (mineral based, ester based), cleaning fluids (isopropanol alcohol, denatured alcohol, cleaning compound for aircraft surfaces), de-icing fluid (ethylene glycol propylene glycol, AEA Type 1, AEA Type 2, SAE Type 1, SAE Type 2, SAE Type 4, and runway deicer

Technical specification

Feature	Description
Sand and dust	Cat S
Fungus resistance	Cat F
Salt fog	Cat S
Magnetic effect	Cat A, test - as part of system
Power input	N/A - no power input
Voltage spike	N/A - no power input
Audio frequency conducted susceptibility	MIL-STD-461E test category CS101 note - N/A power lines only, Test – as part of system.
Induced signal susceptibility	Cat CC, test – as part of system
Radio frequency susceptibility (radiated and conducted)	Cat YR, test – as part of system
MIL-STD-461E CS115 and CS116 (conducted susceptibility)	Test – as part of system.
Emission of radio frequency energy	Cat M except for subsection 21.4. MILSTD-461E test category RE103 in place of subsection 21.4. Cat H, test – As part of system.
Icing	Cat B, C
Static discharge	Cat A
Fire, flammability	Cat C
Storage temperature	+85°C

Technical specification

Feature	Description
Reliability	MTBF ≥ 1,000,000 hours
Connector	Hermetic-passivated stainless steel
Housing material	304 stainless steel
Length	See drawing
Diameter	See drawing
Mounting threads	N/A
Nut	N/A
Washer	N/A
Installation torque	Customer specified
Weight	0.120 lbs (0.055 kg)
Packaging	Curtiss-Wright specified packaging is used for shipping and storage. A protective cap is installed over the sensor face prior to shipping. Remove cap prior to installation.
Accessories	Standard ferrous targets

FAQs

What are some aerospace applications for proximity sensors?

Proximity sensors are used on aircraft for sensing the position of critical structures including landing gears and doors, passenger and cargo doors, slats and flaps and thrust reversers.

What target material is suitable for aerospace proximity sensors?

Sensor can detect ferrous metals only. Aluminum will cause deactuation and can therefore serve as a anti-target.

Will Curtiss-Wright perform a ‘test - as part of system’?

Electrical interface circuitry typically resides in landing gear control unit or proximity sensor electronics unit or proximity sensor module. Note that all tests designated as ‘test – as part of system’ will only be performed at customers’ request.

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