



Aerospace Temperature Sensors

Overview

RTCA DO-160G is a comprehensive standard that defines environmental conditions and test procedures for airborne equipment. It ensures that aerospace components can withstand the diverse and harsh environments encountered in aviation. The specifications cover a wide range of factors, including temperature extremes, vibration, humidity, water resistance, and electromagnetic interference. Components must pass rigorous tests for each of these factors to demonstrate their reliability and durability under operational conditions. Compliance with RTCA DO-160G is critical for ensuring the safety and performance of avionics and other aircraft systems, making it a fundamental standard for the aerospace industry.



Minco's RTCA DO-160G qualified Aerospace Temperature Sensors offer fast and reliable sensing solutions for aircraft environmental systems and fluid temperature sensing applications. These sensors are designed to exceed performance expectations beyond the requirements of DO-160, including response time, operational range, reliability, durability, accuracy, and repeatability.

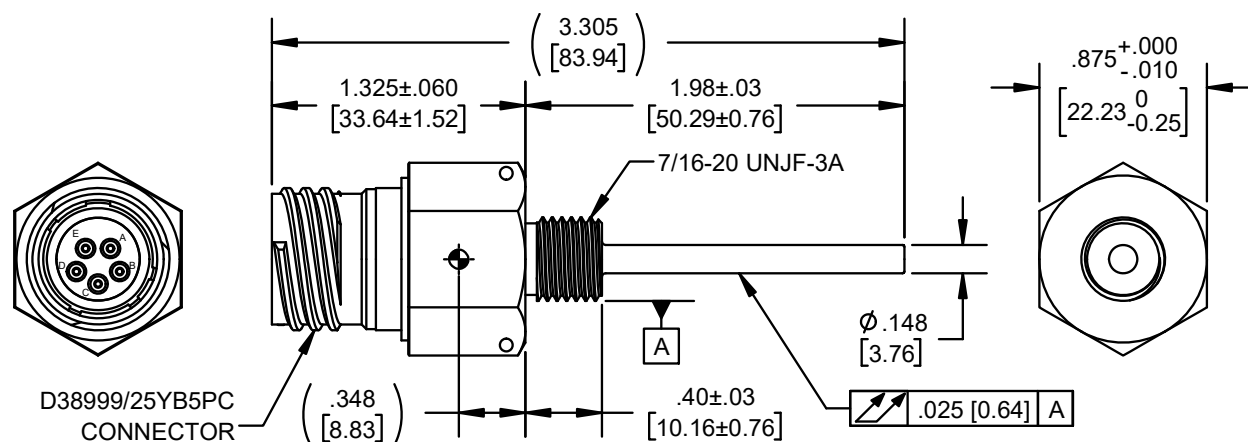
Minco offers these sensors with element configurations to suit any application, along with two physical configurations commonly used in commercial aircraft. They are offered as commercial off-the-shelf products or can be customized to meet your specific requirements.

Features

Characteristic	RTD Probe S239610	Thermistor Probe TS239620
Element	IEC60751 Class A, Class B Platinum, 1.3851 ppm/°C 100 Ω , 500 Ω , or 1000 Ω at 0°C	10,000 $\Omega \pm 1\%$ at 25°C BETA 25-85 = 3976K $\pm 2\%$
Temperature range	-55 to 300°C continuous use <ul style="list-style-type: none"> Capable of frequent excursions to 300°C Capable of reporting fail conditions outside of continuous use range without damage: <ul style="list-style-type: none"> excursions below -80°C short duration excursions up to 500°C 	-55 to 260°C continuous use <ul style="list-style-type: none"> Capable of frequent excursions to 300°C
Material	AISI 304/304L (all external surfaces)	AISI 304/304L (all external surfaces)
Environmental protection	Fully hermetic	Fully hermetic
Mass	53 g $\pm 10\%$	65 g $\pm 10\%$
Connector	MIL-DTL-38999, Shell Size 11 <ul style="list-style-type: none"> D38999/25YB5PC stocked 	MIL-DTL-38999, Shell Size 11 <ul style="list-style-type: none"> D38999/25YB5PC stocked
Self-heating (still air)	.195 °C/mW Dissipation constant: 5.1 mW/°C	.370 °C/mW Dissipation constant: 2.7 mW/°C
Response time	(τ 0.632 in 1 m/s water): 1 s	(τ 0.632 in 1 m/s water): <1 s
Response time variation	(σ , part-part): .2 s typical	(σ , part-part): .2 s typical
Additional features:	<ul style="list-style-type: none"> Robust to extreme icing and physical load conditions Single or dual element variations Customizable element resistance and interchangeability 	



Minco RTD Probe S239610



RTCA DO-160G Qualifications

S239610 RTD Probe

§	Title	Category	Additional details
4	Temperature and Altitude	D3	<ul style="list-style-type: none"> Duct outside: 120°C Duct inside: 260°C
5	Temperature Variation	A	
6	Humidity	B	
7	Operational Shocks and Crash Safety	B	<ul style="list-style-type: none"> 20 g each axis
8	Vibration	Random: R Sinusoidal: H	<ul style="list-style-type: none"> Random: Greatest of curves D & E + Greatest of curves D1 & E1 Sinusoidal: Curve P
9	Explosive Atmosphere	E, H	
10	Waterproofness	R	
11	Fluids Susceptibility	F	
12	Sand and Dust	S	
13	Fungus Resistance	F	
14	Salt Fog	S	
15	Magnetic Effect	Z	
22	Lightning Induced Transient Susceptibility	Z4XXXX	<ul style="list-style-type: none"> 1500 V_{AC, RMS} (2000 V_{peak})
23	Lightning Direct Effects	N/A	
24	Icing	A	
25	Electrostatic Discharge	N/A	
26	Fire and Flammability	C	

Note: §16-21 are omitted because they cannot be considered without other system components.



Other Tests

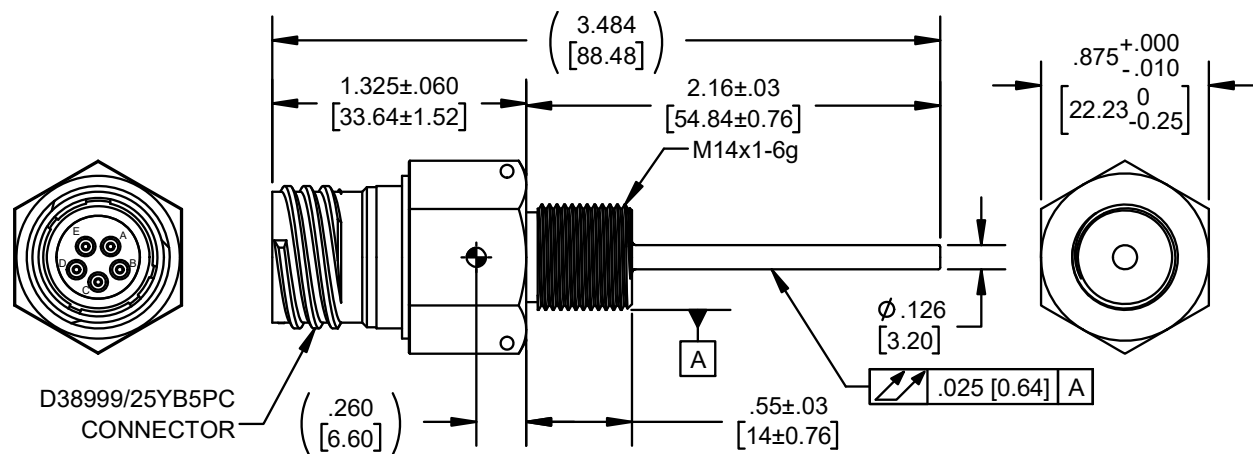
S239610 RTD Probe

Beyond standard qualification testing, these sensors have undergone rigorous robustness and maturity testing to ensure long-term performance. Leveraging decades of sensor design experience, Minco has engineered these sensors for minimal part-to-part thermal response time variation and the ability to withstand extreme conditions that competitors' products cannot.

Test	Details
Proof Pressure	>>1200 psig (at 300°C)
Burst Pressure	>>2500 psig (at 300°C)
High Temp Endurance	>1700 h at 300°C, >236 h at 270°C, >1487 h at 260°C
Low Temp Endurance	>50 h at -55°C
Thermal Cycling	>10000 cycles between 0 and 250°C
Vibration	1.5 * DO-160 Qualification level (~20 g_{RMS})
Shock	1.5 * DO-160 Qualification level (30 g)
HALT	25C to -94°C to 181°C (1 hour cycle) at each 9 g, 12 g, 15 g, 21 g, 27 g, 33 g, 39 g, and 45 g (8 hours total) → no failures



Minco Thermistor Probe TS239620



RTCA DO-160G Qualifications

TS239620 Thermistor Probe

§	Title	Category	Additional details
4	Temperature and Altitude	D2	
5	Temperature Variation	A	
6	Humidity	B	
7	Operational Shocks and Crash Safety	B	<ul style="list-style-type: none"> • 20 g each axis
8	Vibration	Random: R Sinusoidal: H	<ul style="list-style-type: none"> • Random: Greatest of curves D & E + Greatest of curves D1 & E1 • Sinusoidal: Curve P
9	Explosive Atmosphere	E, H	
10	Waterproofness	R	
11	Fluids Susceptibility	F	
12	Sand and Dust	S	
13	Fungus Resistance	F	
14	Salt Fog	S	
15	Magnetic Effect	B	
22	Lightning Induced Transient Susceptibility	Z4XXXX	<ul style="list-style-type: none"> • 1500 V_{AC, RMS} (2000 V_{peak})
23	Lightning Direct Effects	N/A	
24	Icing	A	
25	Electrostatic Discharge	N/A	
26	Fire and Flammability	C	

Note: §16-21 are omitted because they cannot be considered without other system components.



Other Tests

TS239620 Thermistor Probe

The TS239620 thermistor temperature sensor offers the same design features and considerations as the RTD model but has been specifically tested for use in a narrower ambient temperature range.

Test	Details
Proof Pressure	>>1250 psig (at 260°C)
Burst Pressure	>>3200 psig (at 260°C)
High Temp Endurance	>1800 h at 125°C
Low Temp Endurance	>50 h at -55°C
Thermal Cycling	>10000 cycles between 0 and 75°C
Vibration	1.5 * DO-160 Qualification level (~20 g_{RMS})
Shock	1.5 * DO-160 Qualification level (30 g)
HALT	25C to -94°C to 181°C (1 hour cycle) at each 9 g , 12 g , 15 g , 21 g , 27 g , 33 g , 39 g , and 45 g (8 hours total) → no failures

