

 THERMOCOAX Aircraft Products.
Bleed Air Leak Detector
NEGACOAX®



➤ Test Loop

Thermocoax offers as option an upgrade of the detector with integrated shunt resistor in the connector. This shunt (>30KΩ) is connected between the core and the sheath.

➤ Electronic System

NEGACOAX is compatible with any electronic system with the following characteristic:

Alternative Voltage	Square or sinusoidal wave
Frequency	400-2000hz
DC Offset	0Vdc+/-0.02V
Maximum Voltage	15 Vrms (without current)
Minimum Voltage	1 Vrms (<100 mA)
Maximum Current	100 mA

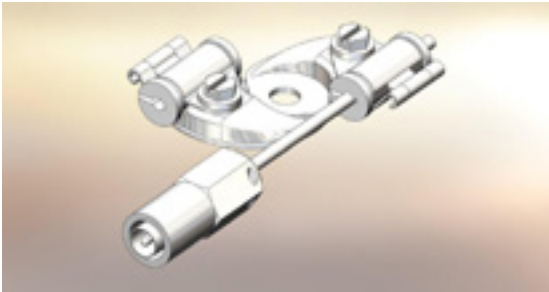
Thermocoax is working in partnership with aircraft industry electronic specialists.

➤ Accessories

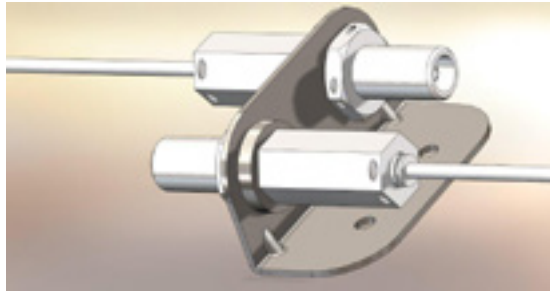
Thermocoax supplies a large range of accessories to fix the detectors on the aircraft structures

Mechanical System for:

1 loop



2 loops



➤ Installation

Recommendations

The following points illustrate the care that must be taken when mounting or handling the sensors.

- ▶ The sensors must be stored in their original packaging (polyethylene bag) and kept in a dry place until they are ready for use.
- ▶ Do not use any lubricants on the connector threads or expose them to contamination of any kind.
- ▶ Do not apply a DC voltage to the sensor to measure the insulation resistance between the sheath and the conductor, it can damage the sensor permanently.
- ▶ Avoid bending the sensor cable at distances less than 50 mm (≥ 2") from the connector.
- ▶ Do not apply any mechanical load or fixing when mounted.

Thermocoax has a large experience on aircraft platform with :

- ▶ McDonnell Douglas MD90
- ▶ Airbus A340
- ▶ Dassault Falcon F5X
- ▶ Embraer KC390
- ▶ Bombardier Global Express
- ▶ Airbus Helicopter

SYSTEM FUNCTION

The leak detection system serves to detect any ambient overheat in the vicinity of the bleed air ducts which run through the engine pylons, the wings and the fuselage. The purpose of this monitoring system is to prevent any damage to the structures and components which could result from a hot air flow. The system is made up of several tenof sensing elements and cable connectors connected in series, which form the detection loops.

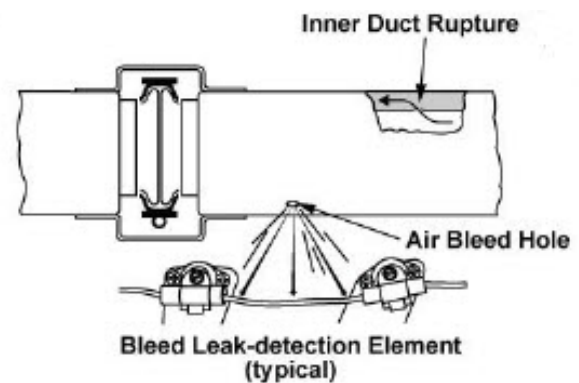
The leak detection loops are monitored by the Bleed Monitoring Computers (BMC). If a BMC detects a leak it will automatically shut off the related bleed air supplies.

Each channel of the BMC performs the following functions :

- ▶ loop continuity and ground insulation check at BMC power-up or BITE test,
- ▶ leak detection by continuously monitoring the ground insulation of its associated loops,
- ▶ leak localisation capability when hot air is detected.

The overheat detector system can be composed of single or dual loops in all of the monitor. In dual loop version, to trigger a "LEAK" red warning, the two loops must detect the leak. The two loops, A and B, are routed in parallel along the air ducts.

The bleed air ducts are made of stainless steel, insulated, and encased by a protective outer cover. A series of holes are drilled at designated locations in the outer cover, and sensing elements are installed adjacent to these holes. If a bleed air duct leak develops, these holes direct the escaping hot air toward the leak detection sensing elements.



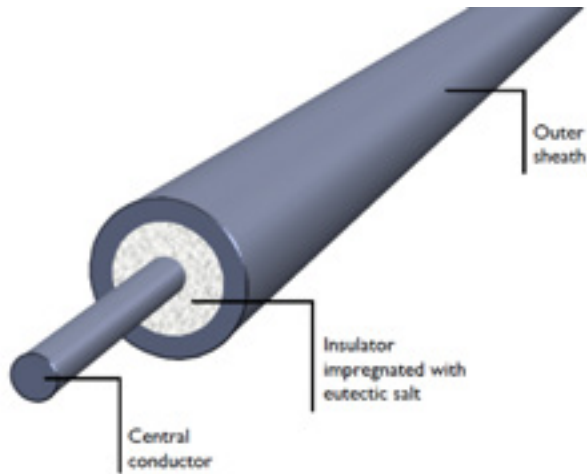
TECHNOLOGY

NEGACOAX® sensors consist of an outer metallic sheath, a central conductor, insulated from the sheath by a ceramic insulator impregnated with an eutectic salt.

The eutectic salt is carefully selected so that its melting temperature corresponds to the specific temperature required to activate an alarm. We can offer detectors for the following alarm temperatures (124°C, 154°C, 180°C, 204°C, 215°C, 232°C).

The triggering of the alarm temperature is based on the melting of the eutectic salt which occurs when this temperature is reached. The eutectic salt melts and the insulation resistance decreases sharply, generating a short-circuit between the conductor and the sheath which can be measured with appropriate electronic equipment.

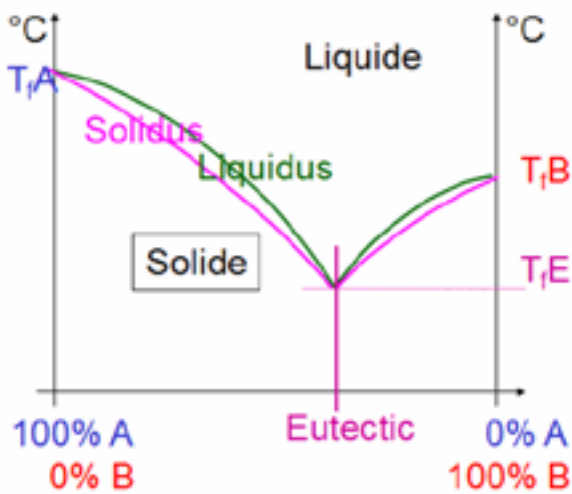
As the temperature returns to normal, the eutectic salt solidifies returning to its original state. The detector is qualified to meet up to 24 overheat events.



THERMOCOAX current technology uses the Binary compound within Eutectic as described below, in other words, liquidus and solidus will melt entirely at the same temperature.

This specificity gives a high accuracy to this technology:

Binary Compound within Eutectic



Insulated Cable homemade manufacturing, this technology offers a high reliability and nearly no maintenance.

The maximum length of each **NEGACOAX** detector is 5 meters. We have **no length limitation** regarding the number of detector connected together to make a complete loop.

THERMOCOAX's **NEGACOAX** detectors are usually installed at heat critical points throughout the aircraft structure. Typically, these are located in the wings, engine pylon, fuselage, empennage and tail cone (APU compartment).

This technology can be applied to military, commercial transport and general aviation aircraft.

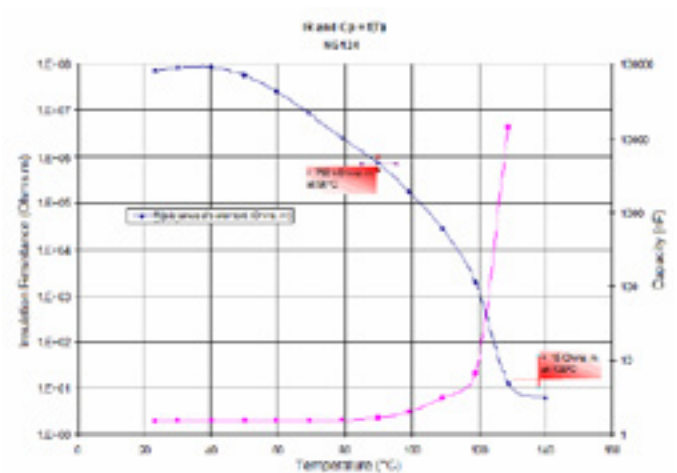
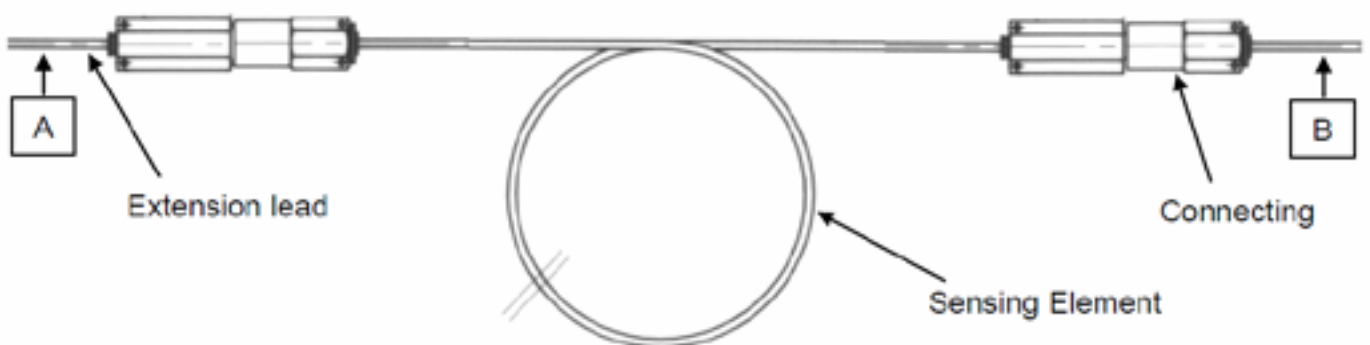


Figure 10: Impedance Profile of the NG124

➤ PRODUCT RANGE

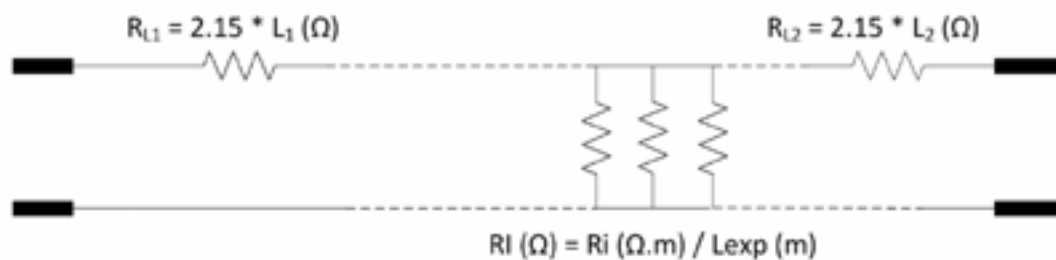


Type	NG124	NG154	NG180	NG204	NG215	NG232
Detection	124°C	154°C	180°C	204°C	215°C	232°C
Accuracy	±5%					
Diameter	Ø2.2mm					Ø1.8mm
Line resistance 20°C	2.15 Ω/m					1 Ω/m
Wire	constantan	constantan	constantan	constantan	constantan	Nickel 200
Connector	5/16-24					
Sheath material	Nickel 200					
Number of detection	>24 detections qualified. >2000 detections tested					
Detector's Length	From 500mm to 5 000mm per detector					
Loop Length	unlimited					
Mass	25gr+(27*L)gr with L=Lenght in meter					
Service life	20 years					
Mil & RTDO160 Standard	Yes					
Flight hours	>100 000					
MTBF	>300*10 ⁶ hours					
FMEA	1,954*10 ⁻⁷ Failures/Flight hour					

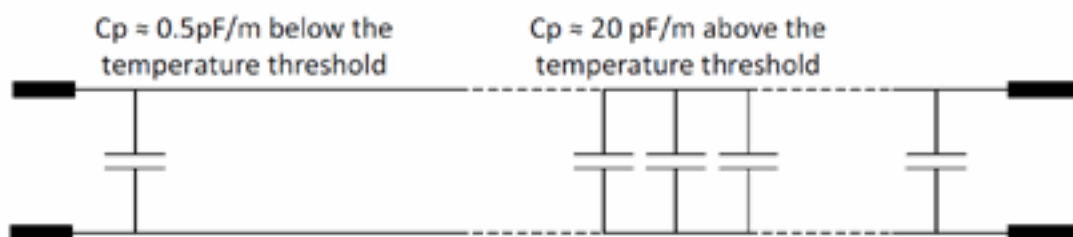
➤ Electrical parameter :

The NEGACOAX® technology offers two electrical value to monitor and detect an alarm. This means, the electronic control system associated will get two separated electrical parameters:

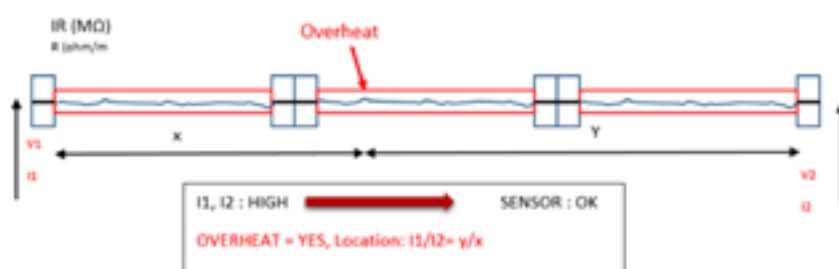
Impedance



Capacitance



By connecting both ends of the **NEGACOAX** loop with the electronic system, the leakage can be located by current ratio.






OUR COMPANY

With nearly 60 years of experience in heating solutions and temperature measurement, THERMOCOAX has acquired a great deal of skill and expertise. THERMOCOAX products are widely used and endorsed in many industries where the highest quality and utmost reliability are essential. All our mineral insulated cables are manufactured in-house with our proprietary and unique procedures.



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Thermocouples
 & Heating Elements
 ATEX
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