Strain Sensors

Model DTD2684 Series

- **Flight Qualified**
- **Choice of Sensitive Axis Orientation**
- **Ease of Installation**
- **High Output - Two Active Arms**

Columbia's Foil Strain Sensors measure the fatigue loading experienced by aircraft under various conditions of speed, weight and mission configuration more accurately than by older, less accurate counting accelerometer methods. These sensors allow critical undercarriage structures and surfaces to be more accurately monitored for potential fatigue damage induced by thousands of flight hours, high stress maneuvers and landings. The simplicity and reliability of these sensors also makes them suitable for routine use in the laboratory.

These sensors are available in a choice of sensitive axis orientations. Models DTD2684 -1, -2, -3, -4, -5 are flight-qualified sensors and have been the industry standard since introduced in the early 1980's. Models DTD2684-11, -12, -13, -14 provide all the accuracy, ruggedness and ease of installation but with an alternate sensitive axis direction. Models are available to compensate materials commonly used in aircraft structural fabrication. Columbia Model 5802 Strain Gage Amplifier is designed to amplify the sensor signals providing both strain and temperature outputs.

Note: Exports from the United States are subject to the licensing requirements of the Export Administration Regulations (EAR) and/or the International Traffic in Arms Regulations (ITAR).

SPECIFICATIONS

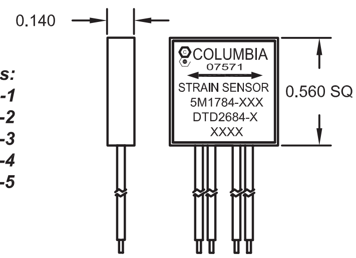
Operational [1]	Series DTD2684
Input Resistance	1000Ω, ±2%
Sensitivity	1.025(±1%)mV/V/1000µЄ
Rated Excitation Voltage	10.0VDC
Linearity	±0.5% Max.
Zero Offset	±0.5mV/V Typ.
Operating Range	-3500 to +5000µЄ
Output Resistance	1000Ω, ±2%
Sensitivity Shift	±0.013% / °F
Hysteresis, Repeatability	±0.5% Max.
Zero Shift	±0.00025mV/V/°F Typ.
Creep	<0.5%, 5 Min. @ 5000µЄ

Environmental [2]	
Temperature Range	-54° to +125°C
Vibration	30g, 10Hz to 2KHz
Humidity	MIL-STD-202 Method 103B
Salt Spray	MIL-STD-202 Method 101D (168 Hours)
Insulation Resistance	100 Meg. min @ 500VDC
Dielectric Strength	1050VRMS, 60Hz, 1 Min.
Altitude	Sea Level to 70,000 Ft.
Flammability	MIL-STD-202 Method 111A
Shock	100g, 11mSec
Fluids	Resistance to short term exposure to fuel, lubricating oils and hydrolic fluids

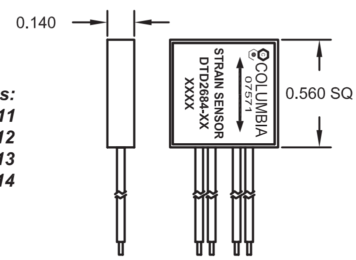
Physical	
Size	0.560" x 0.560" x 0.150" Thick
Encapsulation	Silicone Rubber per MIL-S-23586A Type I, Class 2, Grade A
Weight	Approx. 13gms (Depending on length of leads)
Matrix	0.001" Polyimide
Leads	#26AWG, Teflon Ins, SPC, 12" Min.

[1] @25°C [2] Installed Gage

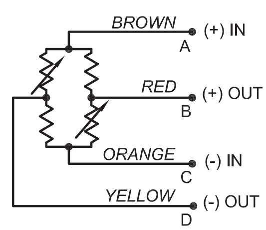
Models:
DTD2684-1
DTD2684-2
DTD2684-3
DTD2684-4
DTD2685-5



Models:
DTD2684-11
DTD2684-12
DTD2684-13
DTD2684-14



SCHEMATIC DIAGRAM



A=EXCITATION(+) -BROWN
B=SIGNAL OUT(+) -RED
C=EXCITATION(-) -ORANGE
D=SIGNAL OUT(-) -YELLOW

Ordering Information (Note Sensitive Axis)

Model	Lead Length	Compensating Material
DTD2684-1	48"	Aluminum 7075-T6 or 7050-T73651, IVD
DTD2684-11	48"	
DTD2684-2	24"	Steel, AISI 4130 or HP9-4-.20
DTD2684-12	48"	
DTD2684-3	48"	Titanium TI-6AL-4V Annealed
DTD2684-13	48"	
DTD2684-4	24"	Carbon/Epoxy MMS 549 Type 1
DTD2684-5	48"	
DTD2684-14	48"	

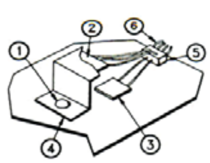


Fig. 1 - Typical Installation of Old Style Strain Gages

1. Bolt or rivet removed from assembly
2. Dummy gage(s) bonded to “Z Tab” of same material as structure.
3. Active gage bonded to structure under test.
4. “Z Tab” mounted to structure with bond or rivet.
5. Strain gage leads interwired and soldered to junction block.
6. Entire unit covered with protective material.

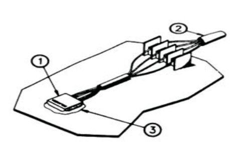


Fig. 2 Installation of Columbia Strain Sensor

1. Strain Sensor bonded to surface under test.
2. Leads connected to wire harness.
3. Coat sensor and wires with waterproofing material.

ADVANTAGES

- **Higher level accuracy**
- **Twice the output**
- **Less installation time**
- **No loss of structural integrity**
- **Optimum temperature compensation**

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