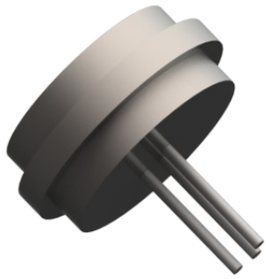
Millar | 22 Ti Titanium Sense

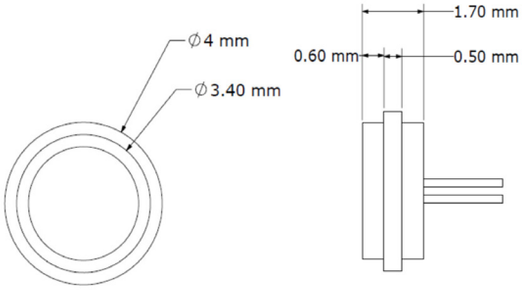


Making medical devices smarter, **long-term**.

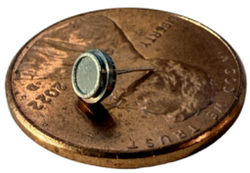
TiSense™ Module

The TiSense™ Module is a MEMS piezo-resistive sensor integrated into a titanium chronic implantable module, purposefully designed for medical devices requiring implantation periods > 5 years. It is an absolute half-bridge sensor that measures incident pressure relative to an internal vacuum, with connections exiting through a hermetically sealed feedthrough and requiring two external 3KΩ resistors to complete the bridge.

Mechanical Specifications		
Parameter	Size	Notes
Height of Module	1.57 - 1.83 mm	Pin length not included.
Diameter of Module	3.87 - 4.13mm	
Material	Titanium Grade 2	
Number of Pins	3	
For production use, it is recommended to use a flex PCB to terminate the pins.		



Left (Front view) and Right (Sideview) of TiSense module.

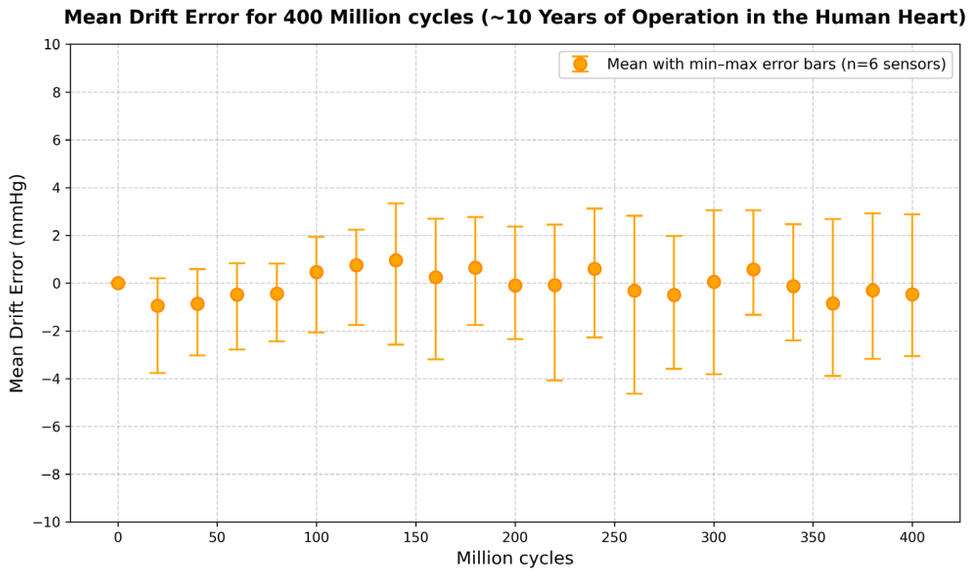


TiSense in comparison to a penny.

Technical Specifications

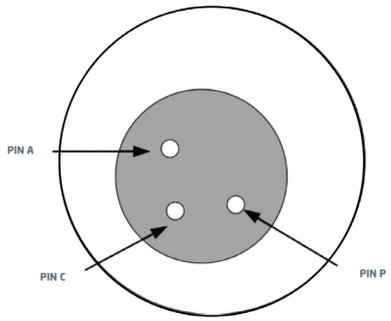
Parameter	Range	Notes
Sensor Operation Specifications		
Operational Pressure Range	510 - 1010 mmHgA	Range is ± 250 mmHg centered around atmospheric pressure (760 mmHg). There can be ± 0.5 mmHg variation in atmospheric pressure at the time of characterization.
Accuracy Error	-0.5 - 0.5 % of applied pressure	Includes errors from non-linearity over a range of 500 mmHg applied pressure.
Mean Drift Error	±2 mmHg	Mean drift error for TiSense modules from various batches
Electrical Specifications		
Resistance	2.2 - 4.2 KΩ	Resistance of each sensing element as measured from C-A pin or C-P pin.
Excitation Range	1 - 6 Volts DC	
Sensitivity of Sensor	8 - 14 µV/V/mmHg	Typically 10 µV signal per volt of excitation per mmHg incident pressure. When completed with equivalent 3K resistors into a full bridge.
Environmental Specifications		
Temperature Coefficient of Offset (TCO)	<10 mmHg/°C	TCO is <10 mmHg/°C for the operating temperature range of 25 - 39 °C
Storage Temperature Range	0 - 60 °C	Storage range until further testing is performed.

Drift Testing



- Sensors performed in saline at 37degrees C, to simulate actual body conditions.
- Sensors were exposed to 400 million sinusoidal pressure cycles with a range of 80-120 mmHg at 50 Hz.
- 400 million pressure cycles (equivalent to >10 years of cardiac cycles at normal sinus rhythm of 72 BPM).
- The mean drift data were corrected for temperature and atmospheric pressure changes.

Connection Diagram

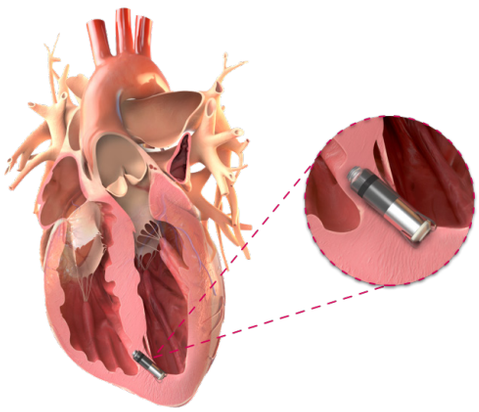


Backside view of TiSense

The three pins of the TiSense module can be trimmed to the desired length, with positive and negative designations determined by the C-A and C-P resistor values.

Wires may be soldered directly to the pins with minimal heat exposure, though for production applications a flex PCB with via holes is the recommended termination method.

Pin	Function
A	Negative (-) Signal pin
C	Center pin of half-bridge
P	Positive (+) Signal pin



Example of TiSense integrated into a leadless pacemaker.

Contact us to discuss your next breakthrough:
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