

## Description

The T290 is a Single-Mode Fiber (SM) based Fiber Bragg Grating (FBG) embedded in a bolt, yielding a commercially packaged Bolt Strain Sensor for measuring the tension in fasteners used for joining the components of a structure in environments from -40°C to +85°C.

Integrated into a small recess bored and threaded into the center of the head and shank of a bolt, rivet, stud, screws. Available in a wide range of optical specifications. The accuracy and precision specifications take into account any hysteresis, non-linearities, and the repeatability of the sensor. The T290 sensor installation is fast, easy, intuitive. Delivers the advantages inherent to FBG sensors. Immune to lightning and electromagnetic interference (EMI).

T290 series Surface Strain Sensors are fabricated using licensed and proprietary state-of-the-art laser manufacturing technologies and a patented product design. The sensor packaging described herein is the most popular configuration and can be customized.

## Key Features

**Self-temperature compensated.** The T290 design consists of two precision made FBGs written into the fibers' core and packaged to detect strain and temperature for producing a transducer configuration of high linearity, resolution, accuracy, and precision. SLSR & BW options.

**Pre-strained at the factory.** Each Bolt Strain Sensor is pre-strained so that it can measure both compression and expansion forces within the fastener.

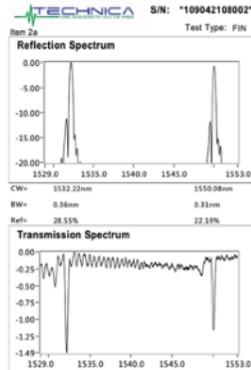
**Ready to be multiplexed.** Well suited for projects that include the need to monitor fastener strain and temperature at one or many locations. Provided as single-ended connectorized sensors ready to be multiplexed in a star architecture with various pigtail lengths and with a flexible number of sensors to be monitored.

**Available as fully assembled Bolt Strain Sensor (standard), or as Bolt Core Insert (option, see image to the right).** The T290-BCI "Bolt Core Insert" option allows it to be installed into the fasteners (bolts, rivets, studs, screws) by the customer with virtually no effect on the tensile strength of the respective fastener as long as the fastener OD > 12.5mm and its shank length is such that the bottom of the Insert terminates above the threads of the bolt.

**Low cost and field proven.** For demanding projects that require both low cost per sensing point and stable operation for long-term. Suitable for hazardous environments. Field proven since 2012.



Manufactured and sold by Technica under International Licenses from Raytheon and Cleveland Electric Labs



| Parameter  | Specifications  |
|--|---|
| Wavelengths and Tolerance                            | 1460 to 1620 nm, +/-0.5 nm  |
| Reflection BW (FWHM)                                 | < 0.5 nm; other options.  |
| Reflectivity %                                       | > 20%; other options  |
| SLSR   | >10 dB; other options   |
| Strain Range   | +/- 5000 $\mu\epsilon$  |
| Strain Accuracy                                      | <0.5% FS (<0.25% FS typical)  |
| Strain Precision                                     | <0.25% FS (<0.15% FS typical)   |
| Temperature Compensation                             | Integrated within the sensor  |
| Temperature Accuracy                                 | <1°C (for -40°C to +85°C range)   |
| Pigtail Type, Length, DIA, Min Bend Radius           | Armored, 1m, 3mm, 30mm other lengths available  |
| Optical Connector                                    | FC/APC, or custom   |
| Bolt Core Insert's Standard Lengths, DIA, Screw Type | L = 32mm or 51mm, DIA = 5mm, 10-32 UNF Class 3 STD  |
| Fastener (Bolt) Minimum Length, Min DIA              | Bolt Shank L => Bolt Core Insert Length + Length of the fastener's (bolt's) thread, DIA => 12.5mm |
| Ingress Protection Rating                            | IP67  |



## Applications in Civil Engineering, Energy, Industrial, Transportation, Research Laboratories

Technica undertakes a rigorous development process before products release. The company is also firmly committed to continuous improvements after release to insure performance to the highest standards, hence, specifications are subject to update without notice.

