

## Description

The T220 is a Single-Mode Fiber (SM) based Fiber Bragg Grating (FBG) based Packaged Surface Sensor for use in environments from -20°C to +60°C.

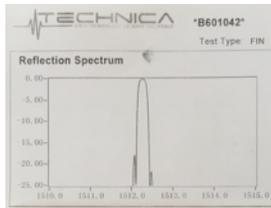
Available in a wide range of optical specifications. Packaged to eliminate influences from the ambient environment. Ready for direct mounting steel construction exhibiting excellent wavelength to temperature linearity. Calibration service available upon request. The full-scale (FS) accuracy and precision specifications take into account any hysteresis, non-linearities, and the repeatability of the sensor. The T220 sensor handling and installation is fast, easy and intuitive. Delivers the advantages inherent to FBG based sensors. Immune to lightning and electromagnetic interference (EMI).

T220 series Surface Strain Sensors are fabricated using licensed and proprietary state-of-the-art laser manufacturing technologies and product designs. The sensor packaging described herein represents the most popular configuration and can be customized.

## Key Features

### Strain and temperature linearity.

The unibody T220 design for both temperature and strain measurements uses precision made FBGs written into the fibers' core for producing a transducer configuration of high linearity, resolution, accuracy, and precision. SLSR & BW options.



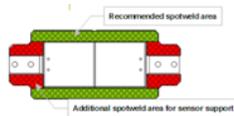
**Absolute temperature sensor included.** The T220 strain sensor includes an actual second absolute FBG temperature sensor embedded in its construction and serving as both precise temperature compensator and as an independent absolute temperature sensor.

**Pre-Strain level is adjustable during installation.** Field pre-strainable to the application requirements during installation using the associated T220 Strain Dial Tool.

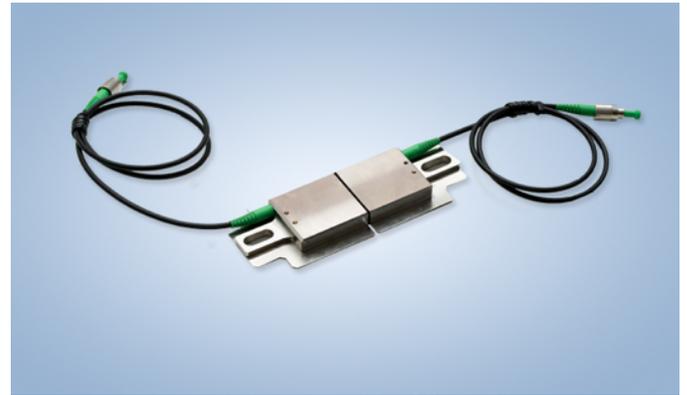


**Ready to be daisy chained.** Well suited for projects that include the need to monitor strain and temperature at one or many locations. Provided as single connectorized sensors or in ready to install arrays of various lengths and flexible number of sensors.

**Multiple installation options.** The T220 can be surface mounted using mounting screws, spot-welding, or by chemical (glue) bonding. Installation procedure provided with each sensor.



**Low cost and field proven.** For demanding projects that require both low cost per sensing point and stable operation for long-term.



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Parameter	Specifications
Wavelengths and Tolerance	1459 to 1621 nm, +/-0.5 nm; 980, 1060, 1310 nm, other
Reflection BW (FWHM)	0.1 nm to 2.0 nm; other opt.
Reflectivity %	75% (1% to 99% available)
SLSR	15 dB; other options
Strain Range and Anchors	+/- 2000 $\mu\epsilon$ , 105mm +/- 6mm
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 -20°C to +60°C range)
Ingress Protection Rating	IP67
Sensor Pigtail (Length, DIA)	1 m and 3mm, other options
Cable Bend Radius	30 mm Static, 40mm Dynamic
Optical Connector	FC/APC, or custom
Housing Material	Stainless Steel SS316L
Dimensions	127 x 35 x 8.2 mm
Weight	170 g
Mounting Methods	Spot Welding, Screws, or Glue

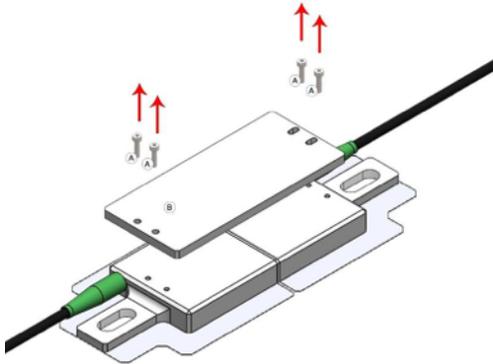
## Applications in Civil Engineering, Energy, Industrial, and Research Laboratories

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.

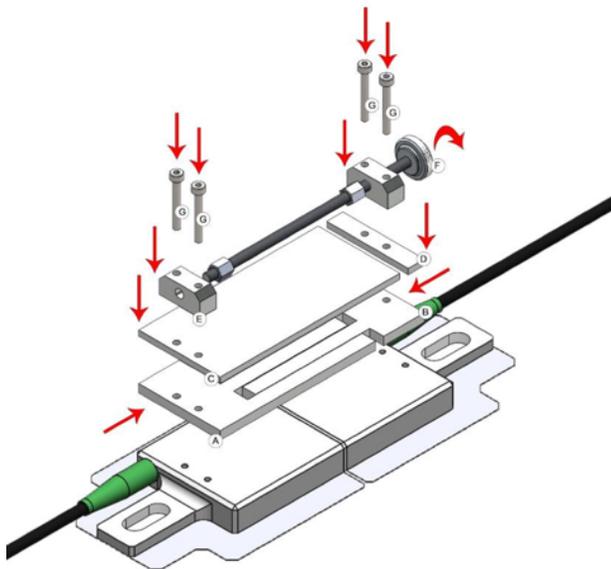
**Spot-welding** is the primary recommended method for achieving a long term stable bond between the monitored structure and the T220 sensor. It takes 10 minutes.

**Tools:** (1) T900 or equivalent spot welder for 0.2mm steel plates, (2) FBG interrogator, (3) T220 Pre-Strain Dial Tool.

**Remove T220 transportation screws (A) and Plate (B):**



**Mount the T220 Pre-Strain Dial Tool to the T220 sensor:**  
Install the 6 parts and 4 screws in the kit as shown below:

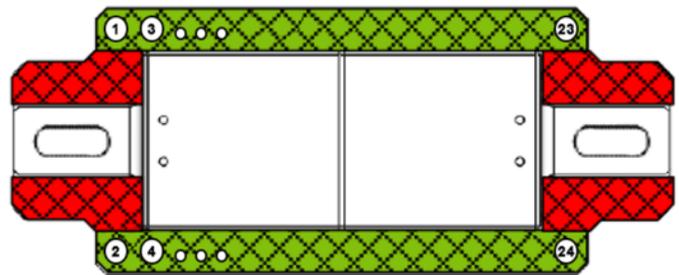


**Set up the T220 Pre-Strain Level (up to 4000 $\mu\epsilon$ ):**

Connect the T220 sensor to an interrogation unit and focus on the higher wavelength (the strain FBG). Use the F knob on top of the Dial Tool and rotate it clockwise to increase the pre-strain to the desired level according to the needs of the current application. Leave the T220 Pre-Strain Tool in place until after the spot-welding of the sensor.

**Surface preparation for spot welding:** Regardless of the installation method, it is advisable and in some cases even necessary to properly treat the surface to which the sensor should be applied. This process includes mechanical cleaning of the surface using abrasive materials and removing any paint, rust, debris or similar imperfection from the surface. Chemical treatment of the surface is advice 20min before the installation to avoid of creation of oxide layers on the mechanical treated surface. We recommended cleaning with Loctite 7061 or 7063.

**Spot welding of the sensor to the surface:** The T220 is surrounded by a 0.2mm SS304 metal sheet (base) allowing to spot-weld the sensor to the monitored structure. Necessary spot welding area of the sensor is shown below in Green. One side can typically contain 10-12 spot welds as minimum, so around 20-24 spot welds for both green areas together. Additional spot-welds are recommended in red areas to ensure the sensor is securely mated over its entire length with measured object. You can apply 2-3 spot welds per red section, so additional 8-12 spot welds for all red areas together.



**Removing T220 Pre-Strain Dial Tool from the sensor:**

Follow the reversed order of when the T220 Pre-Strain Dial Tool was installed. The same one Dial Tool can be re-used for installing many T220 sensors. After installation, it is recommended to verify actual the actual wavelengths of the T220 sensor with interrogator. Small wavelength shift that can occur during installation shouldn't exceed  $\pm 50\text{pm}$ .

**Alternative mechanical installation (screwing):**

Use two standard M6 metric screws (one at each side). These screws are not supplied with the sensor. This method could be applicable to concrete walls, to other materials, to metal structures (if spot welding is not allowed). The anchoring distance when drilling holes is 105 +/- 6mm.

**Alternative chemical installation (glue bonding):**

Use an adhesive that bonds the sensor with the measured surface. The glue is not supplied with the sensor. The selection of the right glue highly depends on the material of the surface and environmental conditions. Special curing procedures such as elevated temperature, pressure or air humidity may be required when using such adhesives.