L-Bracket Strain Sensor

FBGS-LB

INSTALLATION INSTRUCTIONS

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1 PRODUCT DESCRIPTION

The L-bracket strain sensor (FBGS-LB) is a fiber optic strain long gauge sensor specially designed for long term monitoring of structures. The sensor can be mounted directly on the surface of a structure, which enables the most accurate measurements of strain. It is supplied with two aluminum L-brackets and fasteners which facilitate the mounting on the structure. The strain changes are then measured as elongation, compression or bending of fiber between two fixed points.

Figure 1.1 L-bracket strain sensor

2 NECESSARY TOOLS AND EQUIPMENT

- Drill
- No. 2,5 hex-key wrench
- No. 19 mounting wrench

3 CABLE INSTALLATION

- During installation all equipment must be handled with great care. Any abuse can cause damage and might result in unexpected behavior of the system during its operation.
- Please follow the basic rules during (pre)installation.
- Every end of each cable must be protected against liquid, steam and dirt. Always use a shrink hose to protect the cable ends.
- Never drop the sensor/detector and never pull the cables connected to sensors.
- Prevent extreme bending on the cable and stepping on it.

4 INSTALLATION

- Put the strain sensor onto the area of monitoring interest and mark the positions of L-bracket anchors. The distance between the L-brackets has to correspond to the strain sensor length.
- Drill the holes into the surface of the structure at marked positions. Recommended mounting material is M8 dowel and M8x40 screw.
- Use the fixing material to mount the L-brackets and to tighten them onto the structure surface securely.
- Remove the L-bracket cover.
- Put the strain sensors into the L-bracket throughput. The adjustment nuts need to be on both sides of L-brackets.
- Return the L-bracket cover back to its original position and fix it securely using M3 hex screws. Use the M3 standoffs instead if you consider installing the protective cover.
- Use the No. 19 mounting wrench to fine-tune the sensor length depending on your measurement range demands. The fine tuning can be performed at any side of the sensor. First loosen the outside nut of the L-bracket. Use the wrench to tighten the inner nut of the L-bracket for fine tuning. Then tighten the outside nut after the fine tuning.

Note: It is highly recommended to use the FBGuard monitoring system, i.e. the FBG interrogator, because of the very precise setting of the compression/elongation measurement ranges during the fine tuning.

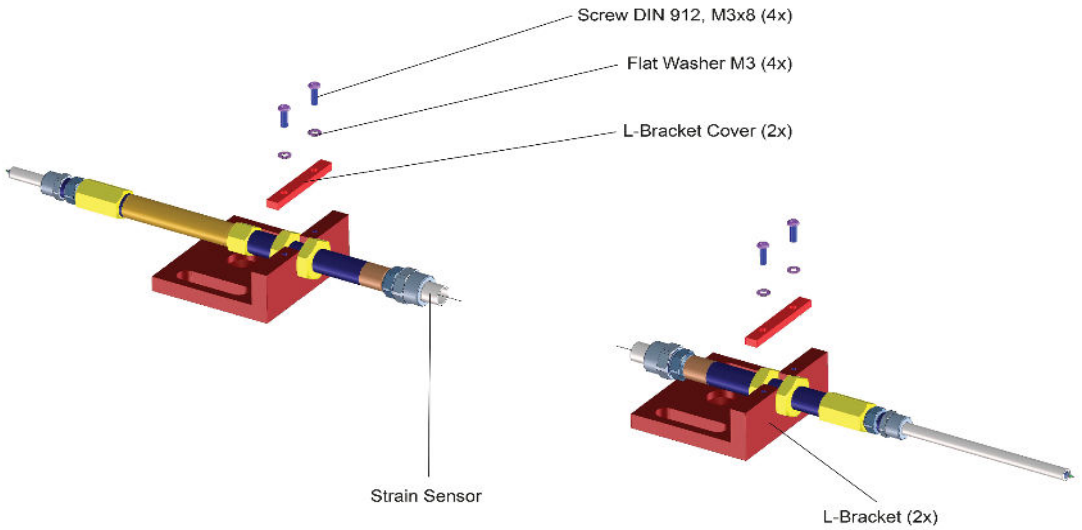

Figure 4.1 Installation

Note: The distance between the L-brackets has to correspond to the strain sensor nominal length L_0. If the span of L-brackets varies from the nominal distance, the correction factor $\frac{l}{L_0}$ needs to be implemented to recalculate the measured strain. The real strain σ_{real} is given by

$$\sigma_{real} = \frac{l}{L_0}\sigma_{measured}$$

where $\sigma_{measured}$ is the strain measured by the L-bracket sensor, l is the actual span of L-brackets and L_0 is the nominal sensor length.

5 OPTIONAL

5.1 Temperature Compensation

The temperature compensation sensor is used to eliminate the impact of temperature on the strain measurement.

The temperature sensor is an integrated part of the strain sensor located behind the mounting part of the sensor. It is equipped with the same L-bracket anchor that is being used for the installation of the strain sensor. Please, follow the installation instructions for the strain sensor in order to fix this sensor.

The fiber between the strain and the temperature sensor is loose to prevent the strain from affecting the temperature sensor.

Note: Please, do not stretch the fiber on both sides of the temperature sensor.

5.2 Protective Cover

The cover is designed to protect the long-gauge sensor against the direct impact of the environment, such as direct sunlight, frozen rain, etc. The cover is equipped with an insulation layer to minimize the impact of temperature on the strain measurement. For precise elimination of the temperature impact, please, use the additional temperature compensation sensor.

5.2.1 Necessary Tools And Equipment

- No. 2,5 hex-key wrench

5.2.2 Installation

- Check the positions of mounting holes with the L-bracket strain sensor standoff M3x10 located on top of the aluminum L-bracket.
- Take care of putting the sensor lead in/out cables into the cover throughputs.
- Use the cover plate with M3x8 screws with flat washer M3 to mount the cover to the sensor’s standoff using the No. 2,5 hex-key wrench.
- Tighten the screws securely.

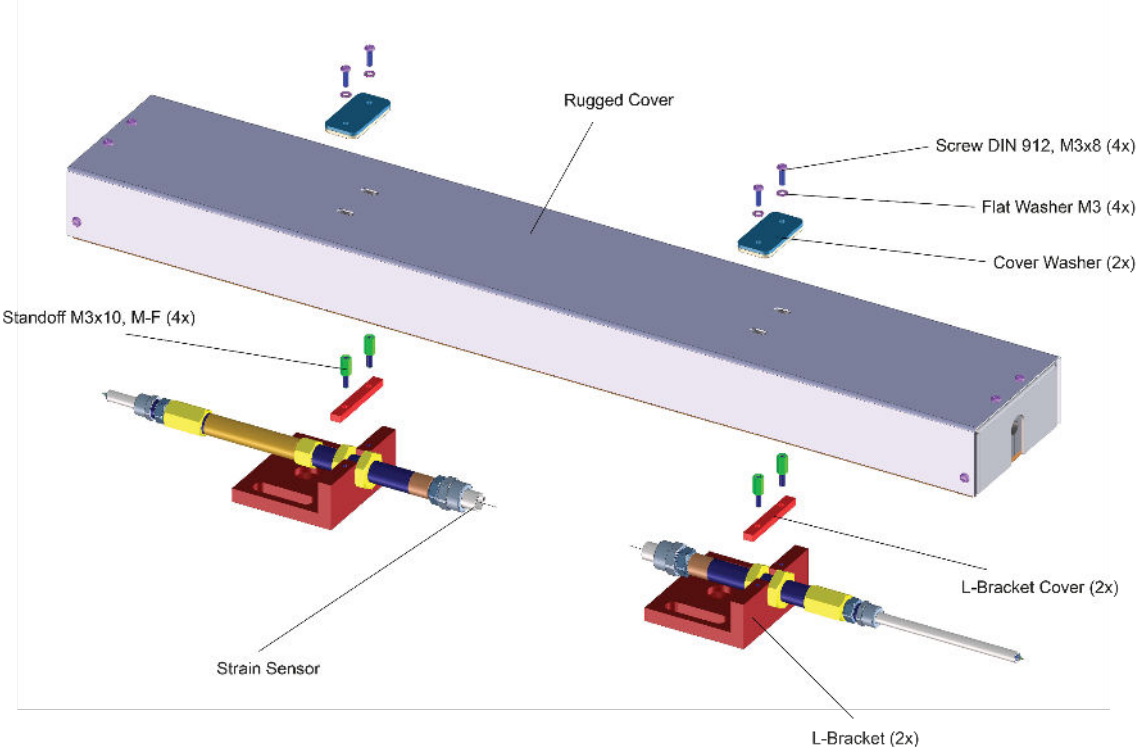

Figure 5.1 Installation

6 SUPPORT

Feel free to contact us for more information or additional support:

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