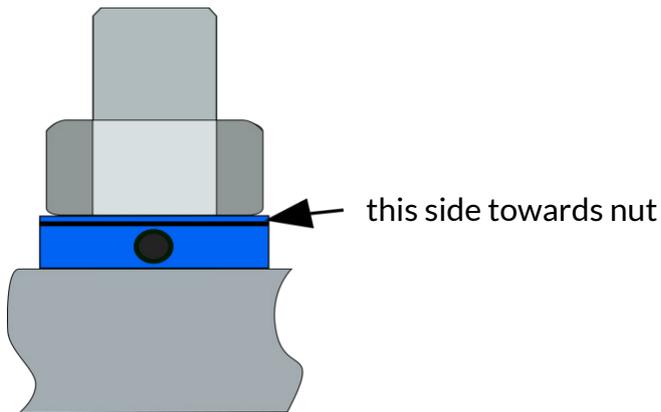


## Orientation of the BoltSafe sensor

Place the BoltSafe sensor with the “thin” section facing the nut, as indicated in the drawing. The effect of reversed orientation is within the stated system accuracy of 1% FS.



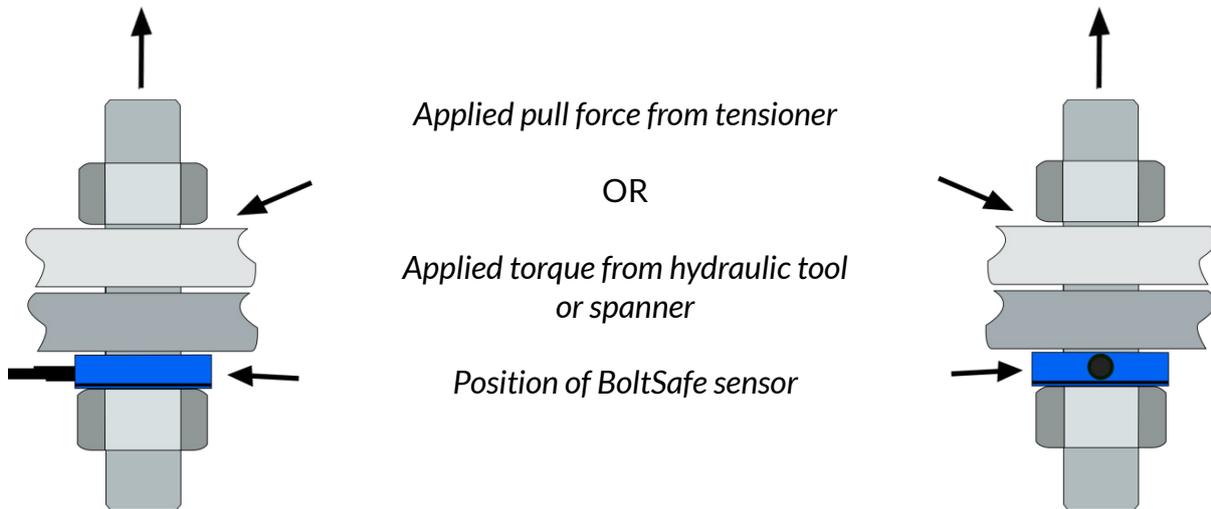
## Mechanical considerations

The design of the BoltSafe sensor is optimized to be very insensitive to mechanical boundary conditions. However, one has to bear in mind that the BoltSafe ‘washers’ are high-technology sensors, which means some precautions will have to be taken when installing them.

- The BoltSafe sensor should always be placed directly under the nut on the opposite side of the tool. This results in less rotation of the sensor. If placed under the nut where the torque wrenches or spanners are used, a hardened flat washer may be used between the nut and the sensor to avoid surface scratching of the sensor. This will however reduce the accuracy of the sensor reading slightly.
- The cable inlet is the weakest point on the BoltSafe CMS sensor, and care must be taken when installing the sensor to avoid too much bending and stress on the cable inlet.
- Point load from irregularities on the nut or flange face may affect the sensor. Even though the effect on accuracy is small, the nut and flange face should always be checked for irregularities.
- The marking side of the nut should not be placed against the BoltSafe sensor.
- The BoltSafe sensor is a specially designed sensor to monitor the bolt load in bolted joints, and should not be used for other applications or purposes without consulting your distributor.



Consider the following guidelines for placement of the BoltSafe sensors when installing them:



### **Use with tensioners**

The BoltSafe sensor can be placed under either of the two nuts as shown in the illustration to monitor the bolt load. However, the preferred placement is under the nut on the opposite of the tensioner's pulling direction. In this position, the force applied by the tensioner can be measured and assured through the process.

### **Use with torque wrenches or spanners**

If torque wrenches or spanners are used to achieve the desired bolt load, the preferred placement of the BoltSafe sensor is under the nut on the opposite side of the tool. This results in less rotation of the sensor. If placed under the nut where the torque wrenches or spanners are used, a hardened flat washer may be used between the nut and the sensor to avoid surface scratching of the sensor. This will however reduce the accuracy of the sensor reading slightly.

### **Caution: When using torque tools the BoltSafe sensor may rotate!**

This has to be monitored continuously throughout the tightening process. If not, it may result in the docking area on BoltSafe PMS Sensors becoming inaccessible, or the cable inlet on the BoltSafe CMS Sensors getting destroyed (pulled out).



## **What will affect the accuracy?**

Be aware of the following situations that may degrade the performance of the BoltSafe sensor:

- Uneven or irregular surface with deformations from earlier use of nut etc.
- Painted surfaces (with a thick layer of paint) may also cause reduced accuracy for the BoltSafe sensor.
- The BoltSafe sensors should not be used in a flat load situation (i.e. between flat surfaces. It is designed for a nut load on one side).
- Non-parallelity between surface and nut/bolt head (i.e. loading on only one side of the sensor).

Taking these precautions, the stated system accuracy of better than 1% FS will be valid in most cases.

