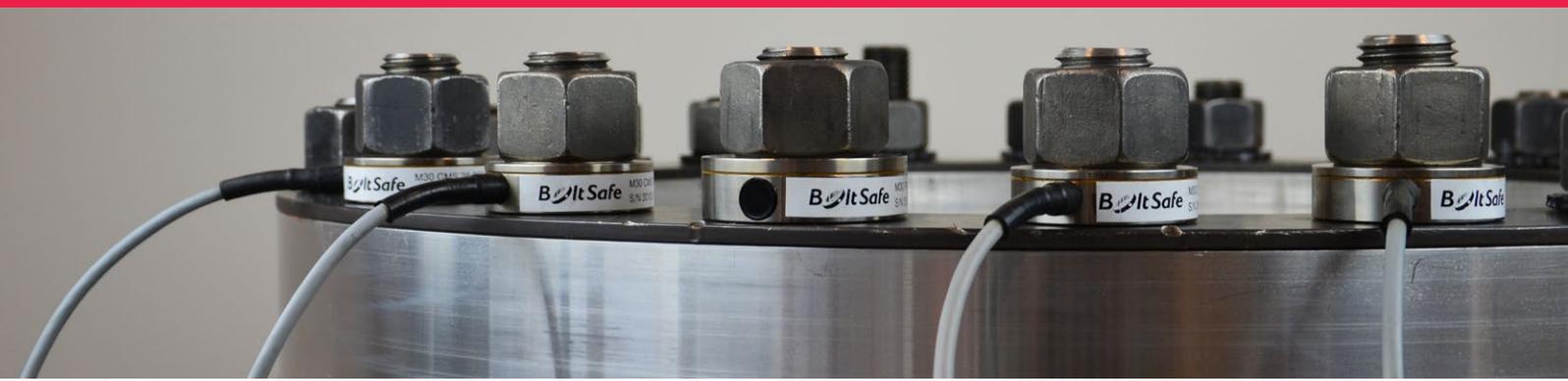


# BoltSafe product line overview



## The problem

The problem with bolted joints has always been; how can you be sure your threaded assemblies have achieved and/or have kept the required bolt load? Unequal and insufficient bolt load is in most cases reason for gasket joints to start leaking. During assembly gaskets get an overload to compensate later relaxation, especially with hydraulic tensioners. It remains unclear what the relaxation will be over time. Other bolting insecurities are:

- Bolts break due to fatigue issues. But when?
- During operation bolt loads may vary. But how much?
- Bolts become loose. But why?
- How can maintenance costs on bolting be reduced?
- What is the coefficient of friction?
- What is the right tool setting, or best bolting procedure?

This resulted in expensive check ups and re-tightening procedures to become common for high loaded bolts in (steel) constructions such as cranes and wind turbines.

## The solution

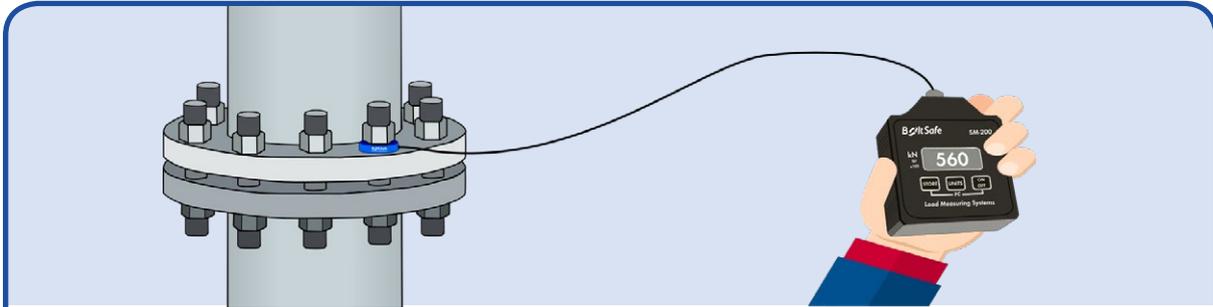
Place a BoltSafe washer between the nut/bolt head and the flange surface, and measure the actual bolt load during the assembly. This way the correct residual bolt load is ensured. After assembly, the actual bolt load can be monitored, so under-/overload and expensive check ups can be avoided. With a simple test the coefficient of friction can be determined rather than assumed or guessed. The same test shows you the exact tool settings to reach the desired bolt load.

This leads to enhanced safety, dependable joints, better control and improved cost benefit both during installation and throughout the joint's service life.

To avoid bolting related failures has never been this easy.

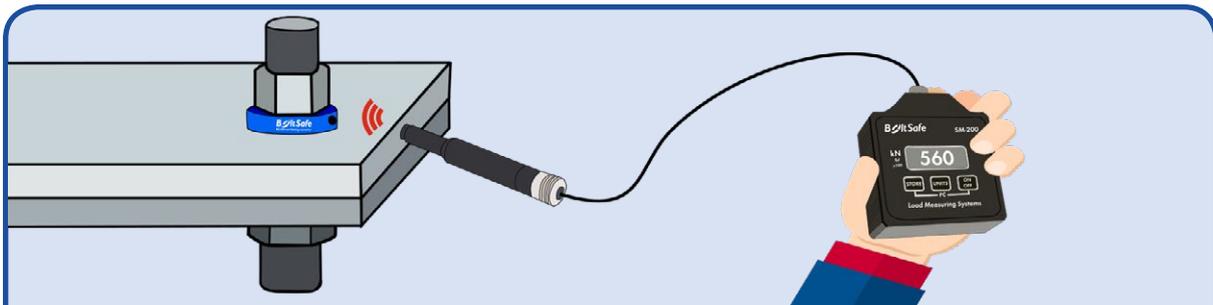


# Ways to visualise boltload



## Handheld Reader

The SM-200 Handheld Reader is a handheld instrument which has the function to read and store data from both the CMS (Continuous Monitoring Sensor) and PMS (Periodic Monitoring Sensor) BoltSafe washers. The user can monitor the residual bolt load directly on the instrument. With the PC connection cable you can send the measured bolt load data to a PC afterwards. You can analyze this measured bolt load data with the special software called "BS Report Generator".



## Wireless in combination with the Handheld Reader

BoltSafe can also be used in small spaces where cables do not fit. Narrow spaces happen to be the speciality of the PMS washer. BoltSafe Sensors PMS have a non-contacting interface and require no cable connections. During service, the unit is powered over an inductive interface connected to a Handheld Reader. The BoltSafe Sensor PMS can be read by the Handheld Reader in combination with a PMS-probe. The user can monitor the residual bolt load directly on the instrument.



### Network with PDI

With the PDI box and a network of CM-1000 boxes, you can visualize the bolt load continuous. You can connect up to eight BoltSafe sensors to one CM-1000 box and you can use up to 31 CM-1000 boxes in a network to one PDI box in combination with a PC. You can analyze the continuous bolt load data with the special software called "BS2000 Network Monitoring".



### Network with PDI-NT

With the PDI-NT box, you can visualize the bolt load on the BoltSafe sensors continuous. The difference with the PDI box mentioned earlier, is that with the PDI-NT no PC is needed because it has a HMI Display and the PDI-NT can provide various output signals, like 4-20 mA or serial data. Other functions are:

- Generating alarm at too high or too low bolt load
- Trending the bolt load during a predefined period
- Creating custom-made applications
- Connect the BoltSafe washers to other platforms



### The new RS-232 and Analog converter

With the BoltSafe RS-232 and Analog converter it is easy to connect a BoltSafe CMS sensor (Continuous Monitoring System) directly to any Data acquisition system, computer or PLC. The free Windows-based software allows users to easily readout the load that is applied to the sensor.

The software can also be used to adjust the moment when the BoltSafe RS-232 and Analog converter has to switch a relay on or off (in kN or as percentage of full scale). This makes it possible to use the converter standalone; to activate an alarm or warning light.

The RS-232 and Analog converter can also be used to switch off a remote control or even a complete pump or (electric) torque tool. The complete serial communication protocol will be provided, which also enables users to use their own software and adjust settings via their computer or PLC.

- Digital readout in RS-232
- Analog readout: 0-5Vdc, 0-10Vdc, 0-20mA and 4-20mA

### Alarming

This graph shows the measured results. Alarming too low or too high can be adjusted with a network interface.

It is possible to set an alarm with a PDI-NT box and the RS-232 and Analog converter.

