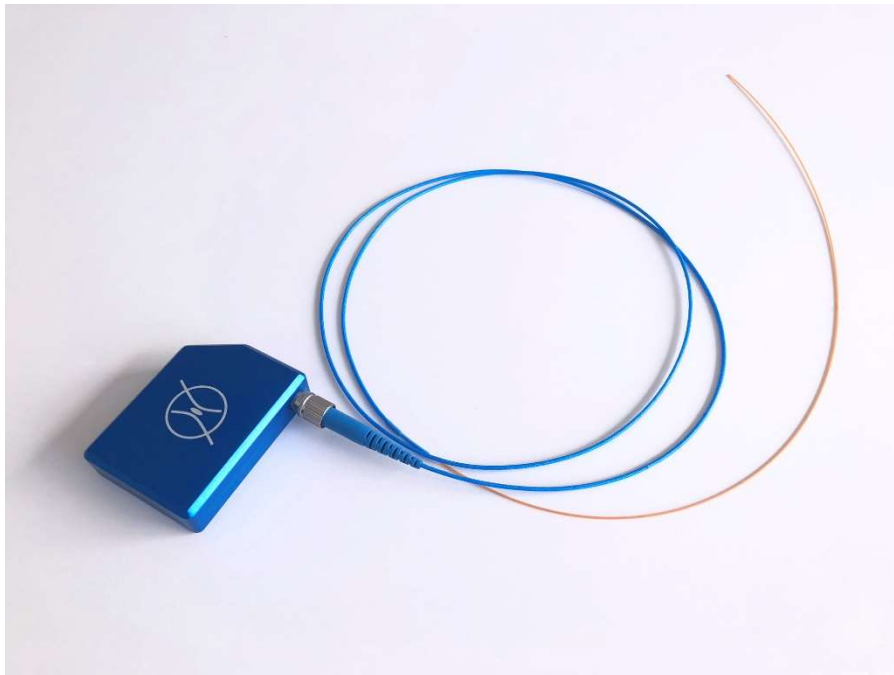![micronor a division of PHOTON CONTROL]

FiSens FBG System
BraggSens® Software Installation and Quick Start Guide

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1. Overview

This quick start guide is intended to guide you through the installation of BraggSens, the initial setup of your FBG system and several basic troubleshooting tips. A comprehensive User Manual is supplied on the FiSens Zip Drive (supplied with the FBG interrogator) or can be downloaded from the Micronor website via https://www.micronor.com/products/files/FISENS/MICRONOR_MANUAL_FISENS.pdf.

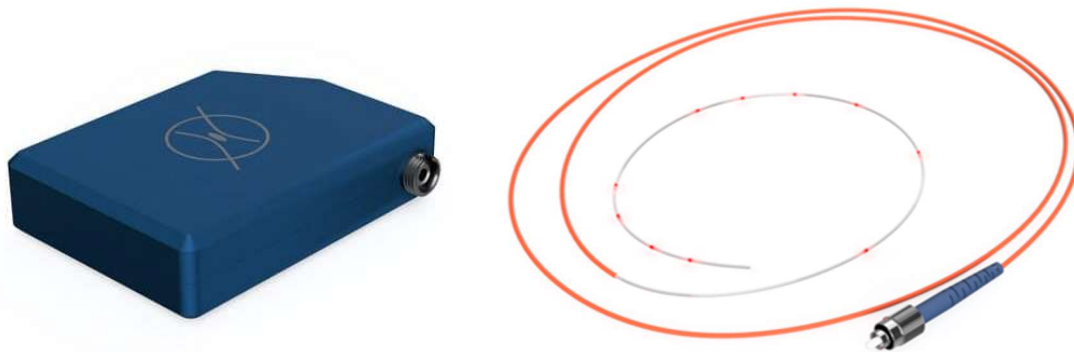## 1.1. A Complete FBG System

Figure 1: FBG Interrogator (left) and FBG Sensor Chain (right)

A complete FBG system requires the following components:
- FBG Interrogator (X100, X150 or other FiSens interrogator)
- FBG Sensor Chain
- USB to micro-B USB Cable (provided with interrogator)
- Computer capable of running BraggSens software (requires Windows 10)

FiSens' software requires the following programs/drivers (all are supplied on the FiSens Zip Drive):
- BraggSens software
- LabView Runtime
- FTDI CDM driver

Notes:
- Fiber optics are very sensitive to dirt and dust; one can permanently damage the device if optical connections are not kept clean.
- Connectors should be kept covered when not in use.
- When making connection, pay careful attention to not tough the ends of the connectors.

2. Quick Start Instructions

2.1. Installation of Software

Begin by connecting the FiSens interrogator to your PC via the USB cable provided. This connection will automatically install the FTDI driver if the PC is connected to the internet. The FTDI driver is also provided on the FiSens Zip Drive under *Software\ FTDI driver\ CDM21228_Setup.exe*. Further information can be found in the PDF files in the same directory. After successful installation of the driver, the FiSpec device can be found in Windows Settings under Devices as seen in *Figure 2*.
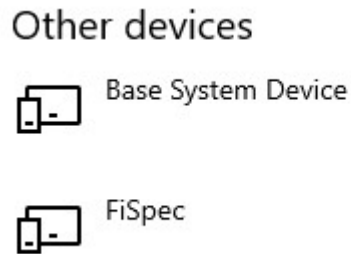

Figure 2. Installed FiSpec in Windows Settings

Next, install both the LabView runtime environment and the BraggSens software. Both are installed by downloading *Software\ FiSens BraggSens 1.87 Install\ Volume\ FiSens BraggSens 1.87 install.exe*. This will also create a shortcut to BraggSens that will be placed on the desktop.

NOTE: The software version may increase, but the latest version can always be downloaded from the Micronor website via https://micronor.com/products/files/FISENS/BraggSens.zip.

2.2. Fiber Optic Connection

To connect the interrogator with the sensor chain, remove the dust cap from each unit. Then, align the key of the optical coupler and lightly screw until tight.

2.3. Initial BraggSens Configuration

1. Connect the interrogator to your PC using the USB cable provided. Open BraggSens and confirm that it recognizes the device. If the USB connection is interrupted, press the "Connect Spectrometer" button in the top right.
2. Set the Operating Mode to "Gauβ Peak Detection".
3. Make sure the LED is in the ON position (orange color, not brown).
4. Choose the desired sensing application under Sensor Type, either "Temperature" or "Strain".
5. Click on "Auto-Set Channels". There should now be a colored box for each FBG grating and its corresponding wavelength in the center of the screen.
6. Enter your desired sampling rate in the Target Rate (Hz) box and click "Auto-Optimize". While this will update the Effective Rate (Hz) to nearly match the target rate, it may be necessary increase or decrease the Integration Time to achieve the target rate. See section 2.3 of the FiSens manual for further details.
7. Once properly configured, reset the Operating Mode to "Onboard Peak Detection" as it provides a more stable signal, but will no longer update the image of the spectrum.
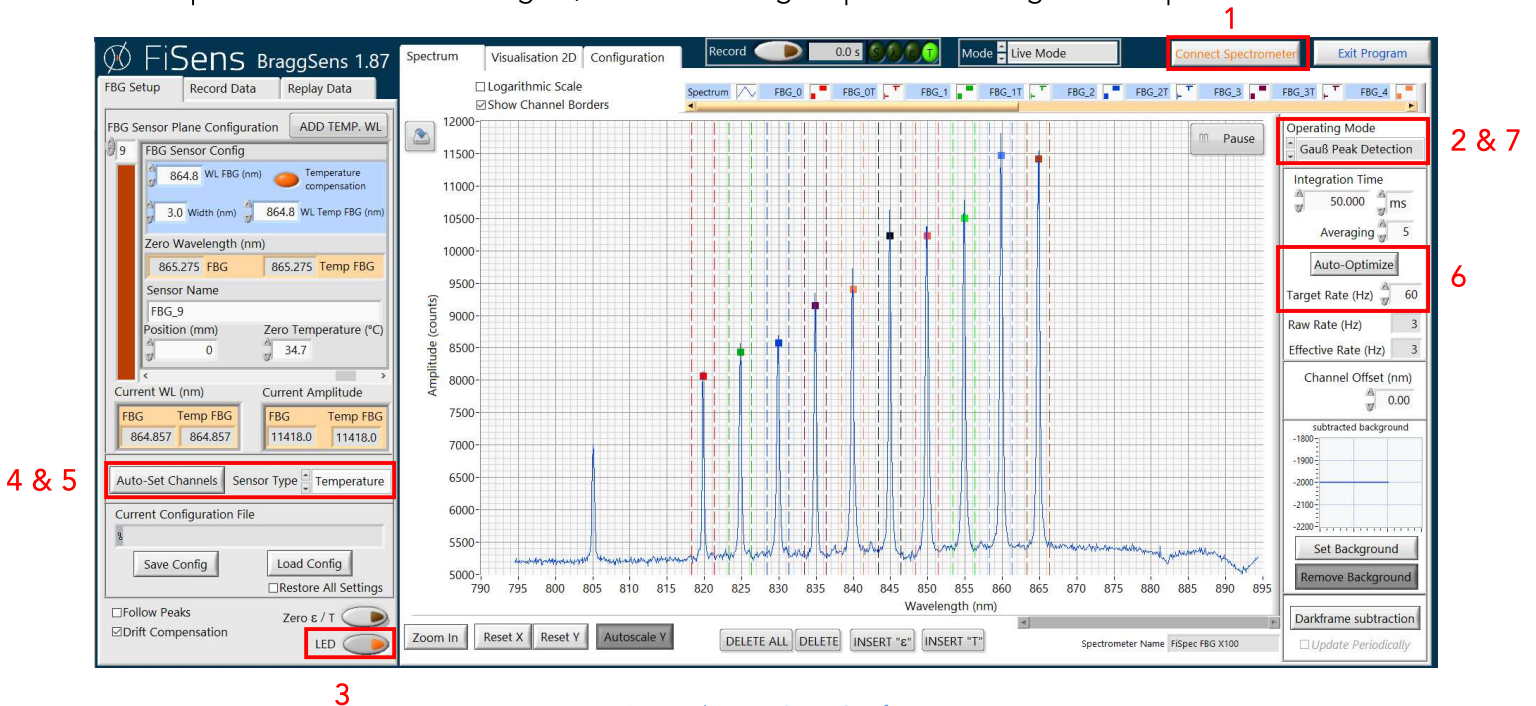

Figure 3. Initial BraggSens Configuration

2.4. Signal Conditioning

1. In the bottom left, check the box for "Drift Compensation" to set it to ON.
2. Open the "Configuration" tab.
3. On the second row, open the "System Drift Compensation" tab.
4. Check the box for "Use Internal Reference FBG for Drift Compensation" to set it to ON.
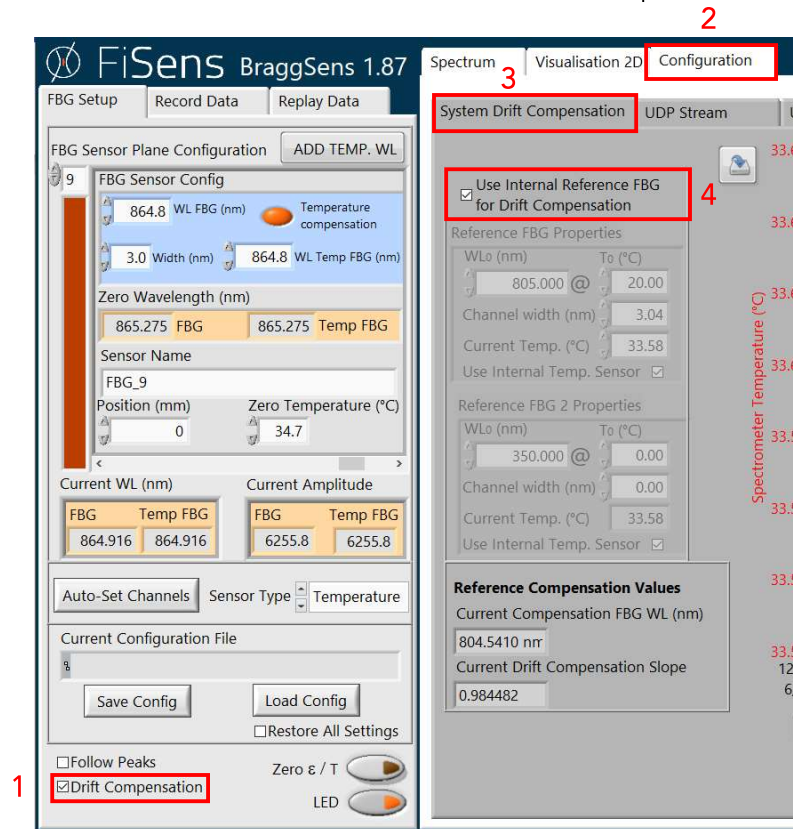

Figure 4. Signal Conditioning

2.5. Calibration

For best performance, all FBGs should be calibrated simultaneously.

2.5.1. Temperature

Temperature calibration can be done using a uniform temperature calibration bath or a similar device. Begin by inserting the sensor chain into the bath, ensuring that all FBGs are submerged, and let the bath stabilize.

In BraggSens, open the "Configuration" tab, followed by the "Miscellaneous Settings" tab. Enter the bath's temperature as the "Zero Temperature (°C)". Once set, click on "Auto-Set Channels" to update the zero temperature for all FBGs followed by "Zero ε / T" to zero the FBGs.
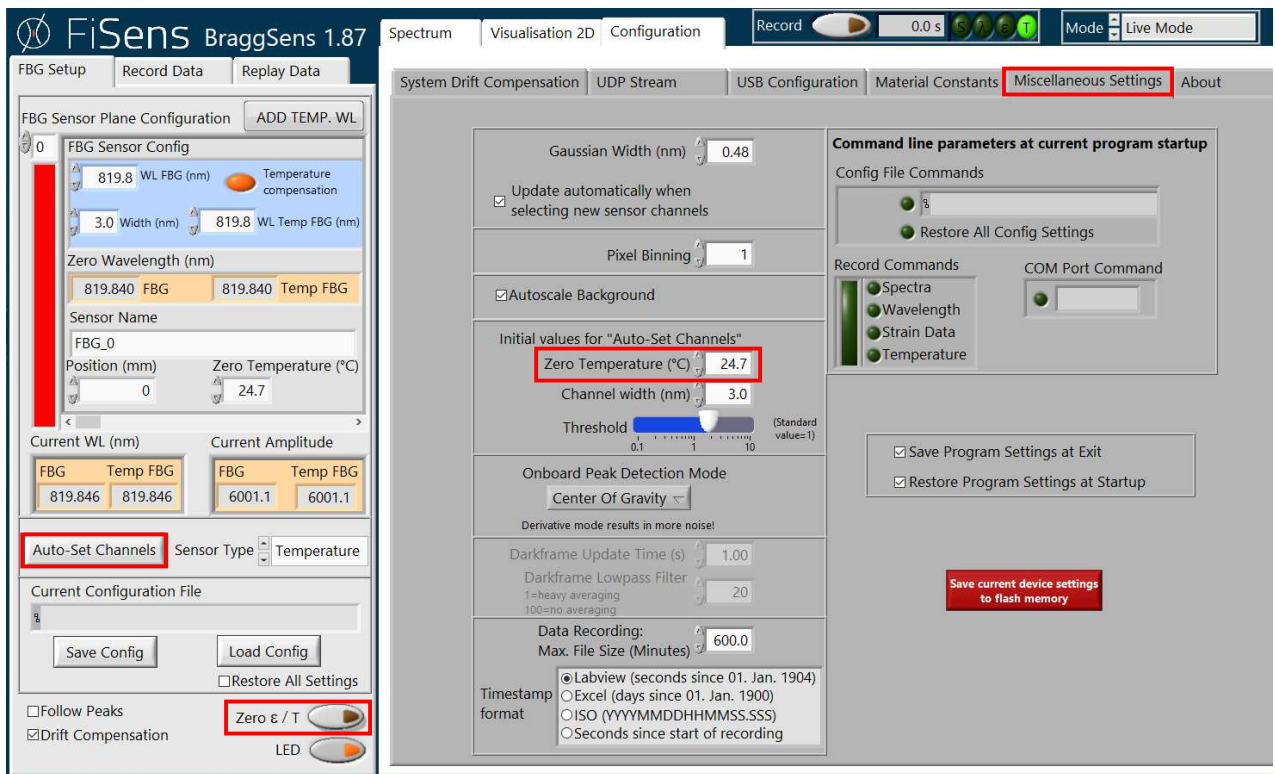

Figure 5. FBG Temperature Calibration

2.5.2. Strain

To calibrate the FBGs for strain, begin by installing the sensor chain onto the apparatus to be measured. While the apparatus is in a no-load position, click on "Zero ε / T". All strain measurements will be relative from this initial calibration position.

2.6. Recording Data

1. On the left side of the screen, open the "Record Data" tab.
2. Under Saving Folder, enter a file path or browse available folders to which you would like to save the data.
3. Under Saving Name, enter a file name for the file. Write a new name for each file or the time of recording will be used as the file name.
4. Select the data you would like to record in the file by checking the box(es) next to Spectra, Wavelength, Strain Data and/or Temperature.
5. At the top of the window, click on "Record" to begin recording. The button will change to orange from brown while recording.
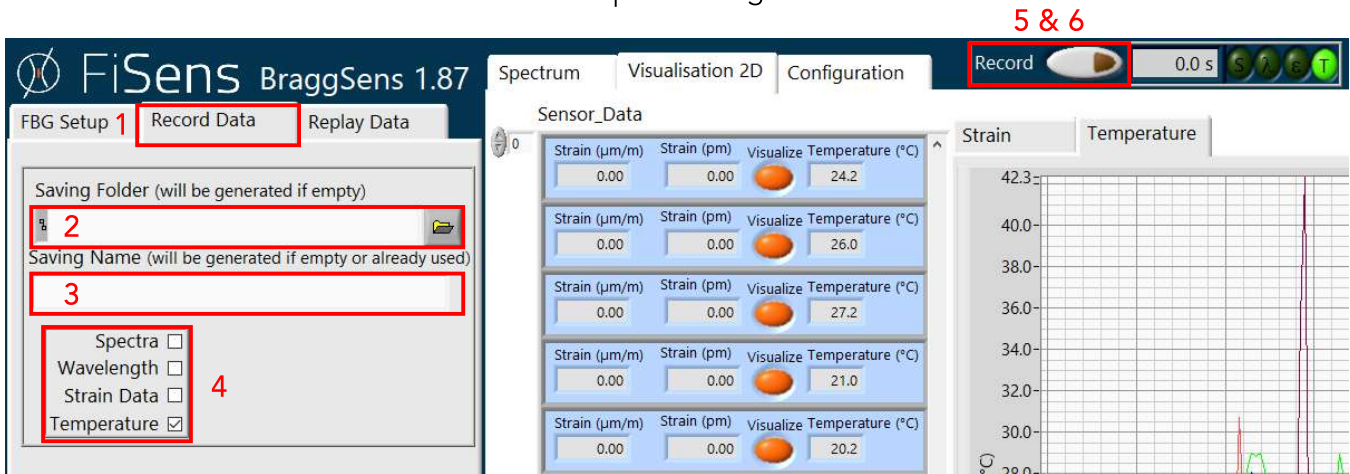6. Click on "Record" a second time to stop recording.

Figure 6. Recording Data

3. Basic Troubleshooting

Below is a list of common errors and how to fix them.

3.1. Device Not Found

1. Ensure that LabView runtime and the FTDI driver are properly installed.
2. Ensure that the FiSpec device appears as a device in Windows Settings as seen in _Figure 2_.
3. Use a USB port with 200mA available.
4. Use the latest version of BraggSens.
5. Try a new USB cable.

3.2. Over-Exposure Warning

1. Decrease the integration time.

3.3. Too Much of a Noise Baseline

1. The noise is inversely related to sampling rate. So, increasing the integration time or increasing the averaging will both decrease noise. However, this does come at the cost of a lower sampling rate.

3.4. High Sampling Rate Not Achievable

1. To reach the highest possible sampling rates, the USB latency must be decreased.
2. Under the "Configuration" tab, click on the "USB Configuration" tab.
3. Enter a value as low as 1 ms and click "Set Latency". 16 ms is the default value.
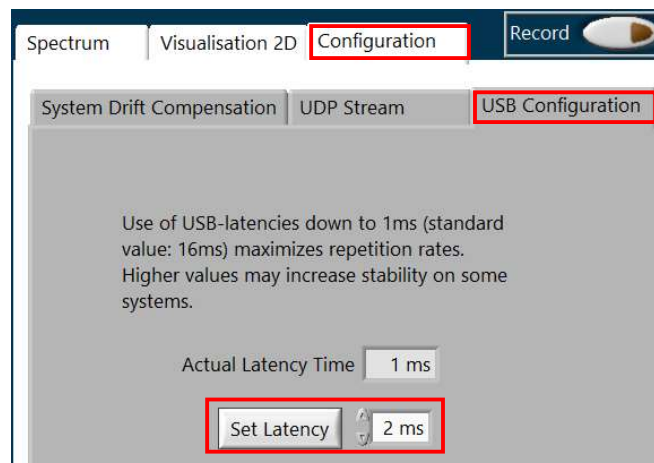4. NOTE: This can affect system stability in some cases.

Figure 7. USB Latency