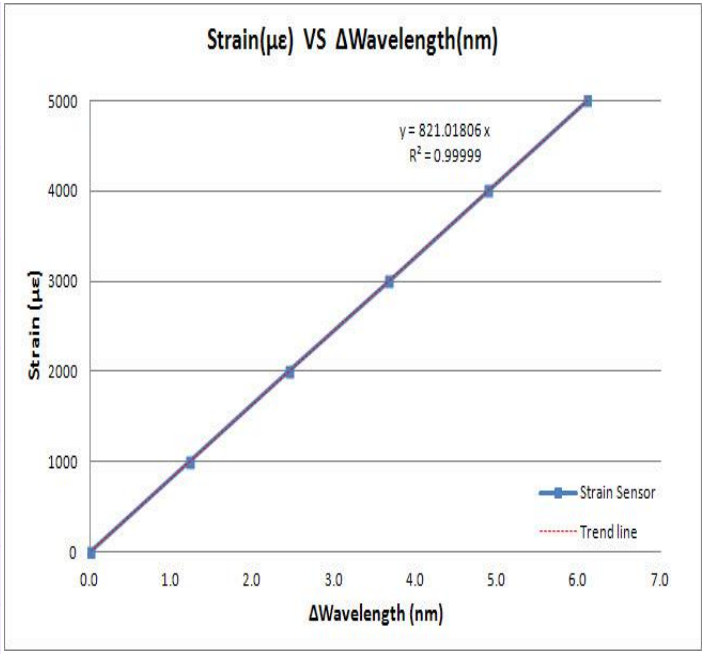
4.2 FBG Mountable Strain Sensor (Serially connectable long gauge)

Example of connection in succession

"USA, EU, China, Japan, Canada patents" registered

- ✓ Safety evaluation of structures
- ✓ Long-term strain measurements of the structures
- ✓ Strain and stress measurements of the structures strain measurements of the structures by external forces
- ✓ Deformation measurement of the outside of the structures or of its body
- ✓ High sensitivity due to the use of wavelength setting bolts
- ✓ Easy to install on a curved surface or slope by applying ball joints
- ✓ Possible to install sensors by connecting in succession on the same axis
- ✓ Easily replaceable and reusable

Model	FBG-ST-330
Gauge length(mm)	250~1,500 (Decision depend on the use)
Measurement range(με)	±2,000 (Decision depend on the use)
FWHM(-3 dB point)	≦ 0.3 nm
Resolution(%.F.S)	± 0.05
Accuracy(%.F.S)	± 0.25, 0.5, 1 (Depending on user's demand)
Sensitivity(με)	≧ 1,000pm@ 120g tension
Wavelength(nm)	1,511 ~ 1,590
Reflectivity(%)	≧ 70
Operating temperature(℃)	-20 ~ 80



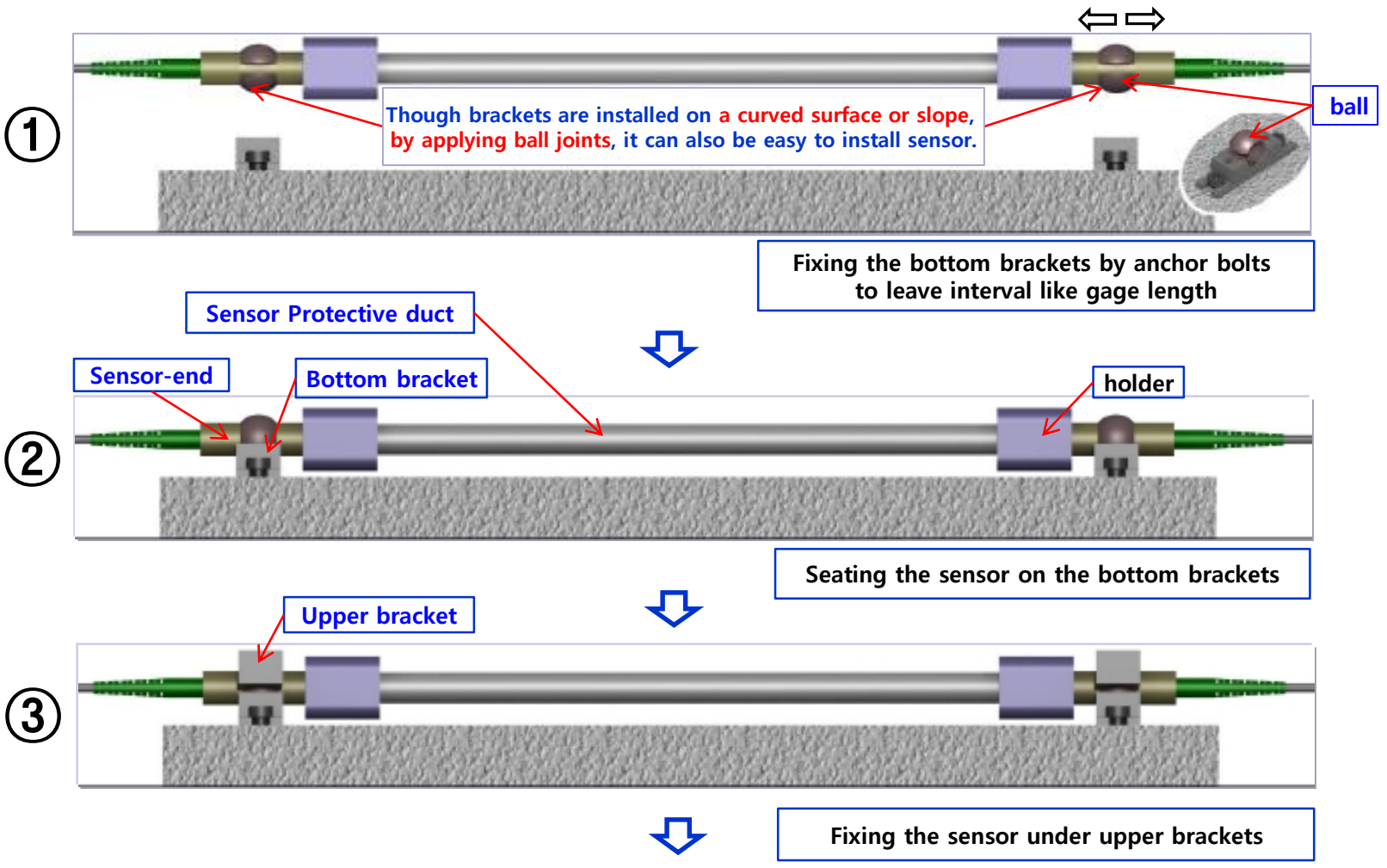
Wavelength set division

SET-A		SET-B	
No.	Operating Wavelength range (nm)	No.	Operating Wavelength range (nm)
1	1511.1~1516.2	1	1514.1~1519.2
2	1517.1~1522.2	2	1520.1~1525.2
3	1523.1~1528.2	3	1526.1~1531.2
4	1529.1~1534.2	4	1532.1~1537.2
5	1535.1~1540.2	5	1538.1~1543.2
6	1541.1~1546.2	6	1544.1~1549.2
7	1547.1~1552.2	7	1550.1~1555.2
8	1553.1~1558.2	8	1556.1~1561.2
9	1559.1~1564.2	9	1562.1~1567.2
10	1565.1~1570.2	10	1568.1~1573.2
11	1571.1~1576.2	11	1574.1~1579.2
12	1577.1~1582.2	12	1580.1~1585.2
13	1583.1~1588.2		

- 13 kinds of Set-A, 12 kinds of Set-B.
- Can make a total of 25 kinds from FBG Strain Sensor.

4.2 FBG Mountable Strain Sensor (Serially connectable long gauge)

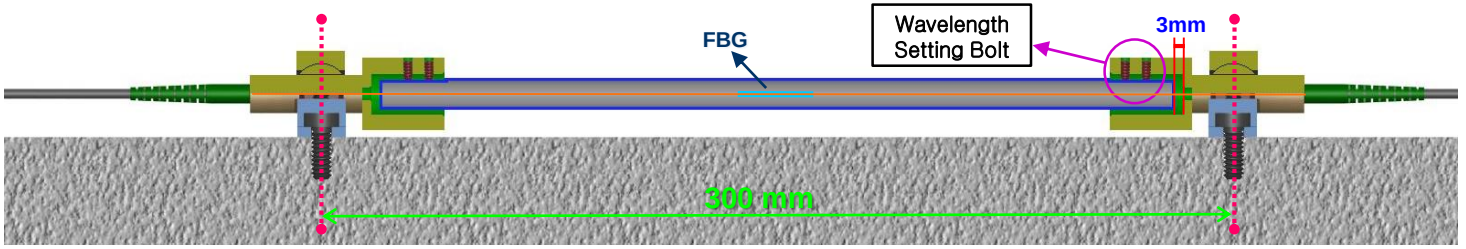
How to install FBG-ST-330



4.2 FBG Mountable Strain Sensor (Serially connectable long gauge)

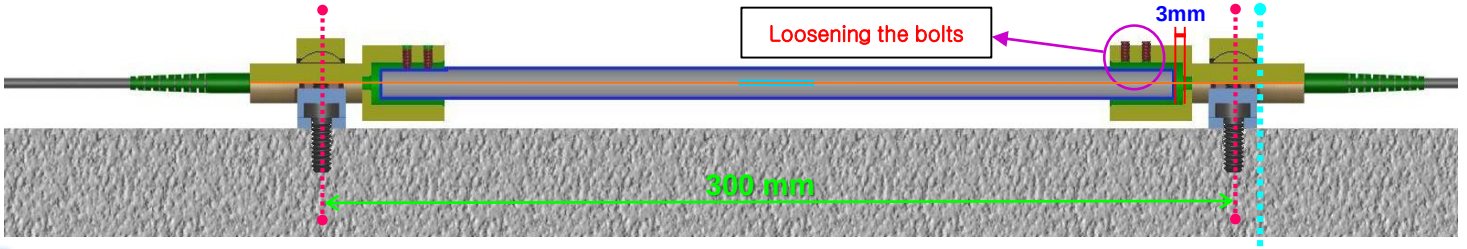
How to install FBG-ST-330

④ Before Installation



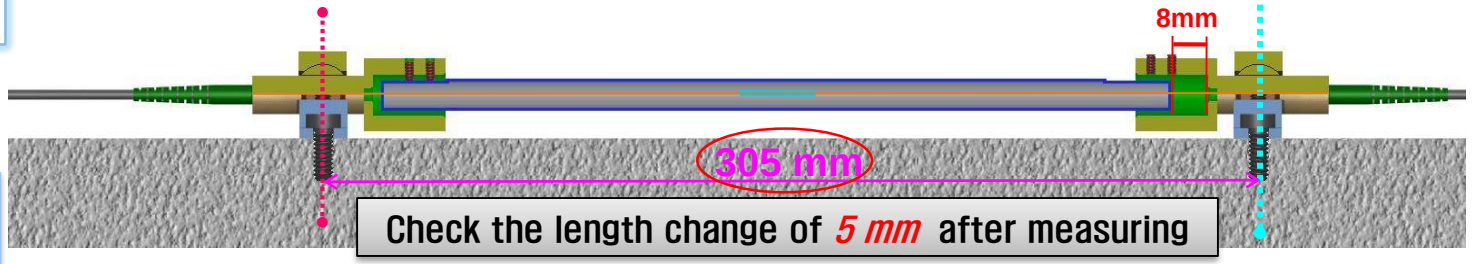
✓ Loosens wavelength setting bolts in the all of both in order to deliver displacement of measuring target to sensor.
(Possible to perform role of sensor by loosening just two bolts of one side)

⑤ After Installation



Measuring

⑥ Changed The length of sensor

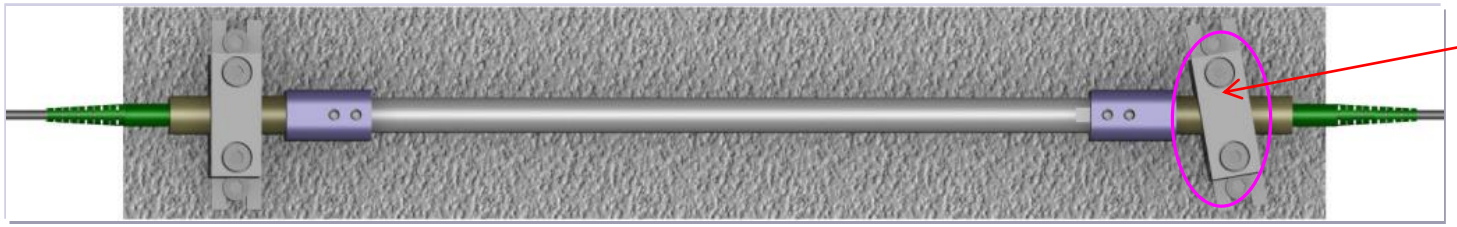


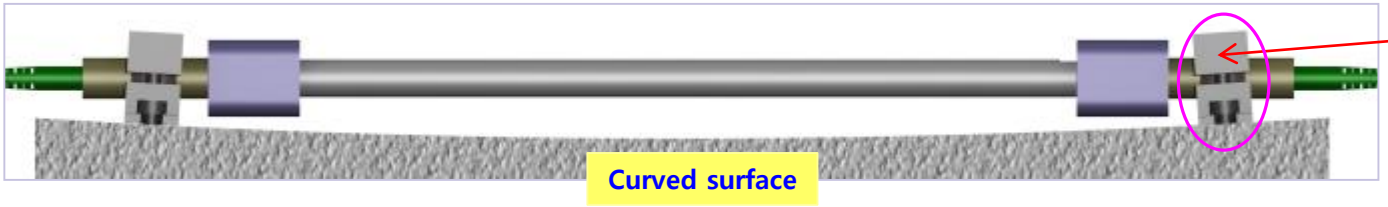
Check the length change of *5 mm* after measuring

✓ The length change of 5mm has been occurred at the measuring sensor because the gap between sensor protective duct and sensor-end became longer from 3mm to 8mm.
✓ Our sensor can measure resolution up to 1με to measure minute displacement.

4.2 FBG Mountable Strain Sensor (Serially connectable long gauge)

Examples of FBG-ST-330 installation



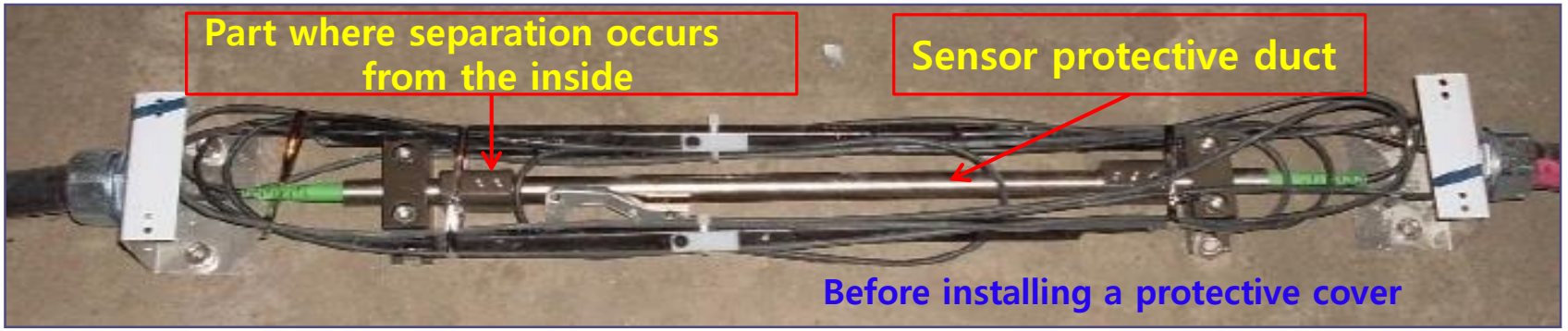


✓ Although the location to install sensors is curved, convex or sloped surface, it's easy to install our sensor. (Though brackets are installed crooked or sloped by applying ball joints, it can also be easy to install sensor)

4.2 FBG Mountable Strain Sensor (Serially connectable long gauge)

Characteristics of FBG Mountable Strain sensor

- Possible to be precisely measured because part where separation occurs can move by external forces within the sensor.
- Possible to measure resolution up to 1με to measure minute displacement.
- The FBG strain sensor is high sensitivity just as the bare FBG is installed.
- Easy to install on curved structures such as tunnels
  (By applying ball joints, it can be easy to install sensor on a curved surface or slope)
- Possible to install sensors by connecting in succession on the same axis



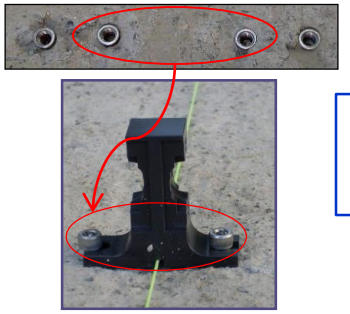
FBG-ST-330 Connection in succession on the same axis

4.2 FBG Mountable Strain Sensor (Serially connectable long gauge) - connecting in succession

Examples of on-site installation of FBG-ST-330

①

Plate in Nuclear Power Plant (At Wolsong of KOREA)

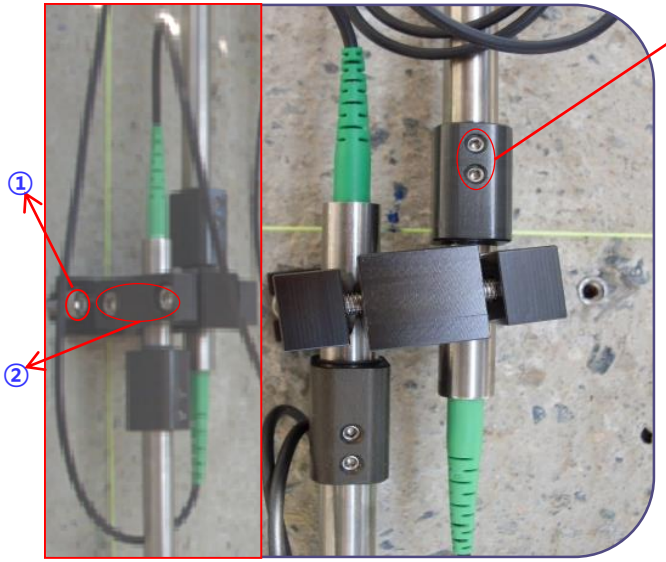


②

Fixing the bottom brackets by anchor bolts to leave interval like gage length

③

Assembling sensor



④

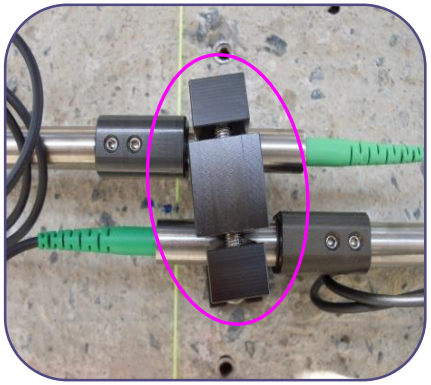
Fixing the sensor under upper brackets

Setting in order

① fixing bottom brackets by volts
② fixing sensor by volts
③ loosening wavelength setting bolts

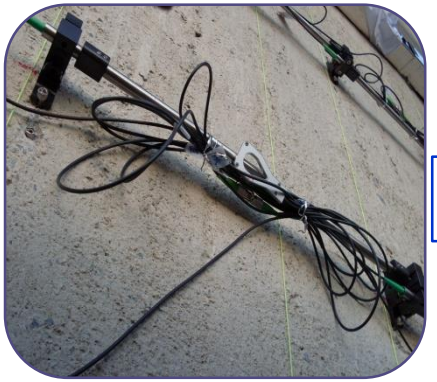
4.2 FBG Mountable Strain Sensor (Serially connectable long gauge) - connecting in succession

Examples of on-site installation of FBG-ST-330



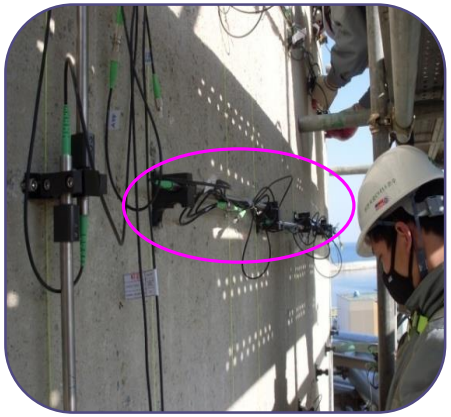
⑤

Though brackets are installed on a curved surface or slope, by applying ball joints, it can also be easy to install sensor.



⑥

Installing temperature sensors for temperature compensation



⑦

Installing sensors by connecting in succession

⑧

Completing the installation of sensor after assembling protective cover

Measuring the deformation of the structure after installing 500mm, 1000mm strain sensors by connecting in succession

4.2 FBG Mountable Strain Sensor (Serially connectable long gauge) - connecting in succession

Wolsong NPP1 Construction Method – procedure to install sensors by connecting together on the same line