

DISPLACEMENT SENSOR

DISPLACEMENT SENSOR SERIES (DS)

-  **±0.25% FSO Uncertainty**
-  **Electrical Isolation**
-  **Transmission Distance**
-  **EMI & Radiation Immune**

Optical displacement sensors offer a method of collecting small variations in length within a single axis of a structure. The Fibos Displacement Sensor utilizes two FBG sensors for effective temperature compensation and is available in daisy chain or point measurement configuration. If using in series with other FBG sensors, a conventional FBG spectrum can be provided and the desired wavelengths for each FBG can be set. If using a PiMS™ (Pi-FBG Measurement Standard) signal conditioner, please select the PiMS™ FBG configuration. Mounting dimensions and alternative cable lengths can be provided upon request.

The performance specifications presented used a signal conditioner that utilizes the PiMS™ technique. Performance with other interrogators is not guaranteed as the interrogator's measurement performance will impact the overall measurement performance.

APPLICATIONS

Ideal for measurements on large structures, such as bridges, buildings, and wind turbines. The Displacement Sensor can be used in high voltage and high electromagnetic areas with long transmission distances without signal integrity issues. Typical applications include:

- Structural health monitoring
 - Bridge, tunnel, and other infrastructure monitoring
- Oil and gas containment tank monitoring

PERFORMANCE

Transducer Operating Range ¹	-20 to 70°C
Measurement Range	0 to 100 mm
Displacement Sensitivity ^{1,2}	22 µm/mm
Temperature Sensitivity ^{1,2}	22 µm/°C
Displacement Resolution ³	0.0005 mm
Temperature Resolution ³	0.0005°C
Displacement Uncertainty ⁴	±0.09 mm
Temperature Uncertainty ⁴	±0.09°C
Optical Sensor Specifications	PiMS™ Compliant or Standard FBG

¹ As designed. Laboratory tested between 0 to 70°C

² As designed. Sensitivity will be provided for each unit

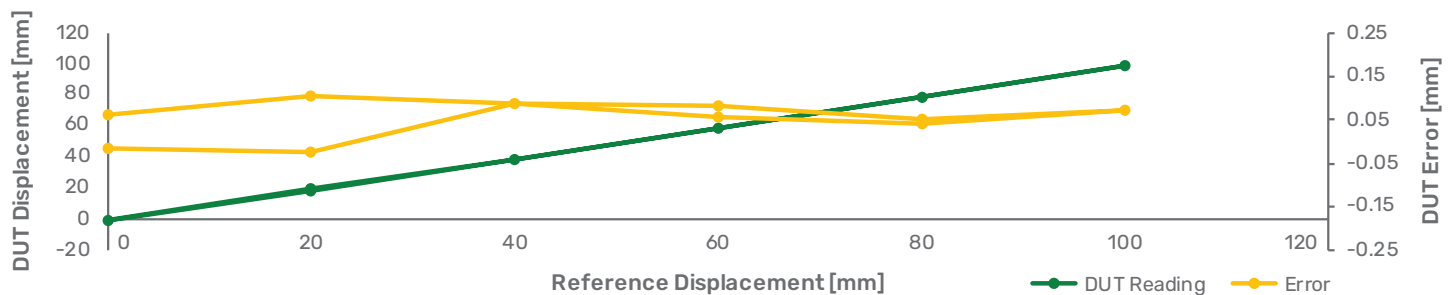
³ Based on a PiMS™ compliant signal conditioner with 0.01 µm resolution

⁴ Based on a PiMS™ compliant signal conditioner with ±2 µm measurement uncertainty

ENVIRONMENTAL

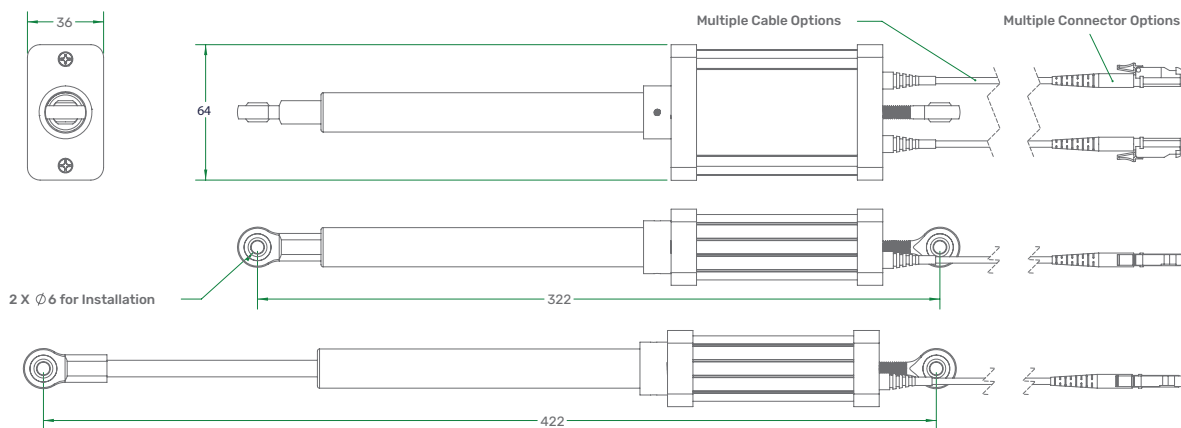
Mounting Method	M6 Rod Ends (both ends)
Dimensions (L x W x H)	276 x 64 x 36 mm (without rod ends & cables)
Cable Temperature (OFNP Cable)	-40 to 70°C
Minimum Cable Bend Radius	16 mm
Optical Connector	E2000/APC, FC/APC, or No Connector
Fiber Type	SMF28 Compatible

Continued product improvement necessitates that Fibos reserve the right to modify these specifications without notice. With continuous improvement, extensive testing, and conservative specifications, Fibos ensures product reliability expected within the industry.



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Reference drawing provided for model #DS-SPPS-NB1E2



MODEL PART NUMBER TABLE

DS - 1 2 3 4 - 5 6 7 8

1. Temperature Range

S – Standard (-20 to 70°C)

2. FBG Type

P – PiMS™

S – Standard FBG
(0.3 nm FWHM, >90% R)

X – Custom

3. FBG Wavelength

P – PiMS™

1 – 1528.5 nm

2 – 1530.1 nm

3 – 1533.3 nm

4 – 1539.7 nm

5 – 1545.8 nm

6 – 1552.1 nm

7 – 1558.5 nm

X – Custom

4. Tilt Range

S – 0 to 100 mm

X – Custom

5. Cable Jacket

N – OFNP

Z – No jacket

X – Custom

6. Cable Outer Diameter

A – 0.9 mm

B – 2.0 mm

X – Custom

7. Cable Length

1 – 2.5 m

2 – 5.0 m

X – Custom

8. Connector Type

E2 – E2000/APC

FC – FC/APC

TYPICAL CALIBRATION DATA

(DS-SPPS-NB1E2 USED FOR REFERENCE)

Typical Displacement Calibration:
Displacement = Y (FBG1 – FBG2) + B

Set Temperature [°C]	Displacement [mm]	FBG1-FBG2 Delta [nm]
21.0	0	-0.4336
21.0	20	-0.9120
21.0	40	-1.3368
21.0	60	-1.7773
21.0	80	-2.2078
21.0	100	-2.6106
21.0	80	-2.2108
21.0	60	-1.7845
21.0	40	-1.3368
21.0	20	-0.8759
21.0	0	-0.4108

Typical Temperature Calibration

Calibration Temperature [°C]	Temperature Wavelength [nm]
0	1549.878
25	1550.112
50	1550.361
75	1550.624

Notes:

1. Calibration can be performed via comparison between the device under test and a traceable reference sensor. Calibration above was conducted with a displacement sensor mounted onto a compression fixture.
2. Fibos can provide commercial calibration with metrological traceability to the SI. Calibration certificates from accredited calibration laboratories can be provided upon request.
3. Calibration data is provided with every sensor produced. This information can be used with a PiMS™ signal conditioner to achieve the specifications listed on the previous page. Performance with alternative interrogators can be provided upon request.

About us

Developers of a unique optical point sensing platform that can be utilized in a variety of industrial applications.

We design, manufacture, and support customers of the optical platform from our headquarters in Toronto, Canada.

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