

**TECHNICAL SPECIFICATIONS**  
**Optical Interrogator for FBG sensors**

The dynamic optical interrogator should be portable. It should be able to integrate the Fibre Bragg Grating sensors capable of measuring strains, temperatures, acceleration in concrete, steel and other building materials.

**1. Optical Interrogator**

<b>SI. No.</b>	<b>Specifications</b>	<b>Requirement</b>
1.	Wavelength Range	Minimum 100 nm (1500 to 1600 nm)
2.	No. of Optical Channels	8 or more parallel channels allowing simultaneous measurements
3.	Optical Source	Should be Inbuilt
4.	Scan Frequency / Sample Rate	<ul style="list-style-type: none"> <li>• 1000 Hz or more (All sensors Simultaneously),</li> <li>• User selectable</li> </ul>
5.	Supporting Sensors type	FBG Strain, Temperature, Accelerometer etc.
6.	Repeatability/ Resolution	$\leq 5\text{pm}$
7.	Wavelength Stability/ Accuracy	$\leq 10\text{pm}$
8.	Optical Connector	Suitable to sensors
9.	Communication Interface	Ethernet/ USB
10.	Power	Should be suitable for Indian electrical standard ie.230 $\pm 10\%$ VAC , 50 Hz
11.	Data Acquisition and Display	<u>Laptop with following minimum specifications (or better latest specifications) :</u> Processor-i7 (8 <sup>th</sup> Gen) 64 bit, RAM-8GB, HDD-1TB, Screen-15.6", preinstalled genuine windows 10 professional /upper version, 2 GB Graphic card, should have suitable interface to connect to the Optical Interrogator for FBG sensors
12.	Software	<ul style="list-style-type: none"> <li>• The software should be provided for operating the interrogator and should include: Hardware setup, data logging, viewing, analysis etc.</li> <li>• User friendly. No programming knowledge should be required to work on the software</li> </ul>
13.	Data format	Raw data should be exportable for further processing in MATLAB
14.	Training, Demonstration and Warranty	a) Demonstration and Training at Institute premises should be provided free of the cost.
15.	Accessories	Rugged Carrying Case, Adhesives, screws etc. to mount sensors to concrete, masonry and steel surfaces (Sufficient quantity for required number of sensors)
	Desirable Software Specification (optional):	Capability to log Optical gauges and other sensors viz. Foil gauges etc. in parallel and Visualize the same in parallel.

**Note:** Manufacturer (OEM) should be same for FBG Interrogator and sensors.

## **2. Specifications for FBG Strain Sensors**

### **2a. Surface Mountable Strain/Deformation Sensors (by Fastening) (05 No. strain sensors in an array) (Quantity- 02 No.)**

S.No	Specifications	
1.	Gauge Length	100 – 200 mm
2.	Measurement range	$\pm 2,000 \mu\epsilon$ or better
3.	Measurement Type	Static and Dynamic
4.	Wavelength	Unique in between 1500nm to 1600nm
5.	Sensitivity	$1.2\text{pm}/\mu\epsilon$ or better
6.	Reflectivity	$> 65\%$
7.	Passive cable between two sensors	Minimum 3 Meters between two consecutive sensors and 10 Meters between first sensor and interrogator
8.	Cable Type	Extra appropriate protection for rugged Outdoor use in harsh environment
9.	Multiplexing	Min. of 10 Strain sensors
10.	Calibration	Provide Calibration Certificate
11.	Connectors	Compatible with Interrogator
12.	Packaging/Mounting	Stainless Steel for Surface Mounting
13.	Operating Temperature and Environment Condition	$0^{\circ}\text{C}$ to $+60^{\circ}\text{C}$ or better  Suitable for harsh environment i.e. Insensitive to corrosion and vibrations and should be waterproof
14.	Installation	by fastening (bolt/screw) to concrete/brick/Masonry
15.	Mounting Accessories	Fasteners, bolts, screws, clamps, brackets etc. and all other sensor specific accessories for surface preparation and installation
16.	Support from Distributor	Installation and Training at the site
17.	Warranty/AMC	Minimum 1 Year warranty

### **2b. Surface Mountable Strain/Deformation Sensors (by Welding)**

**(05 No. strain sensors in an array) (Quantity- 02 No.)**

S.No	Specifications	
1.	Gauge Length	40-80 mm
2.	Measurement range	$\pm 2,000 \mu\epsilon$ or better
3.	Measurement Type	Static and Dynamic
4.	Wavelength	Unique in between 1500nm to 1600nm
5.	Sensitivity	$1.15\text{pm}/\mu\epsilon$ or better
6.	Reflectivity	$> 65\%$
7.	Passive cable between two sensors	Minimum 3 Meters between two consecutive sensors and 10 Meters between first sensor and interrogator
8.	Cable Type	Extra appropriate protection for rugged Outdoor use in harsh environment
9.	Multiplexing	Min. of 10 Strain sensors
10.	Calibration	Provide Calibration Certificate
11.	Connectors	Compatible with Interrogator

12.	Packaging/Mounting	Stainless Steel for Surface Mounting
13.	Operating Temperature and Environment Condition	0°C to +60°C or better  Suitable for harsh environment i.e. Insensitive to corrosion and vibrations and should be waterproof
14.	Installation	By Welding to Steel surfaces
15.	Mounting Accessories	Clamps, brackets etc. and all other sensor specific accessories for surface preparation and installation
16.	Support from Distributor	Installation and Training at the site
17.	Warranty/AMC	Minimum 1Year warranty

**OPTIONAL SENSOR 1-Surface Mountable Strain/Deformation Sensors (by Fastening)**

**(05 No. strain sensors in an array) (Quantity- 02 No.)**

S.No	Specifications (OPTIONAL SENSOR)	
1.	Gauge Length	1000 mm-2000 mm
2.	Measurement range	± 2,000 µε or better
3.	Measurement Type	Static and Dynamic
4.	Wavelength	Unique in between 1500nm to 1600nm
5.	Passive cable between two sensors	Minimum 3 Meters between two consecutive sensors and 10 Meters between first sensor and interrogator
6.	Cable Type	Extra appropriate protection for rugged Outdoor use in harsh environment
7.	Multiplexing	Min. of 7 Strain sensors
8.	Calibration	Provide Calibration Certificate
9.	Connectors	Compatible with Interrogator
10.	Packaging/Mounting	Stainless Steel for Surface Mounting
11.	Operating Temperature	0°C to +60°C or better  Suitable for harsh environment i.e. Insensitive to corrosion and vibrations and should be waterproof
12.	Installation	by fastening (bolt/screw) to concrete/brick/Masonry
13.	Mounting Accessories	Fasteners, bolts, screws, clamps, brackets etc. and all other sensor specific accessories for surface preparation and installation
14.	Support from Distributor	Installation and Training at the site
15.	Warranty/AMC	Minimum 1Year warranty

**OPTIONAL SENSOR 2- Packaged Surface Mountable Sensors (by Gluing)**

**(05 No. strain sensors in an array) (Quantity- 02 No.)**

S.No	Specifications (OPTIONAL SENSOR)	
1.	Gauge Length	<150 mm with Composite packaging (CFRP or GFRP or Santoprene)
2.	Measurement range	± 2,000 µε or better
3.	Measurement Type	Static and Dynamic

4.	Wavelength	Unique in between 1500nm to 1600nm
5.	Sensitivity	1.2pm/ $\mu\epsilon$ or better
6.	Reflectivity	> 65%
7.	Passive cable between two sensors	Minimum 3 Meters between two consecutive sensors and 10 Meters between first sensor and interrogator
8.	Cable Type	Extra appropriate protection for rugged Outdoor use in harsh environment
9.	Multiplexing	Min. of 10 Strain sensors
10.	Calibration	Provide Calibration Certificate
11.	Connectors	Compatible with Interrogator
12.	Packaging/Mounting	Composite packaging (CFRP/GFRP/ Santoprene) for Surface Mounting
13.	Operating Temperature and Environment	0°C to +60°C or better  Suitable for harsh environment i.e. Insensitive to corrosion and vibrations and should be waterproof
14.	Installation	by Gluing to concrete/brick/Masonry
15.	Mounting Accessories	Glue and all other sensor specific accessories for surface preparation and installation
16.	Support from Distributor	Installation and Training at the site
17.	Warranty	Minimum 1Year warranty