

New

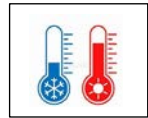
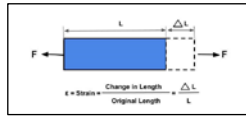


# Biosirus

## Opto-Sensor

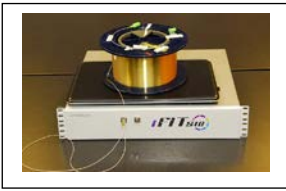
### Optical Thermal/Strain Mapping System

Single fiber sensor  
 Max. 10-20 km loop; Resolution 1 m along fiber  
 Sensing Range -50 to +500 deg C



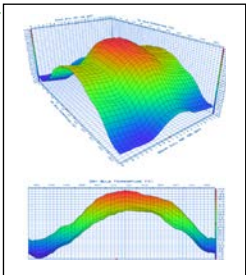
**Application:**

- **Industry:** Energy, Nuclear, Mining, Oil & Gas, Automotive, Steel, Aerospace, Defence
- **Equipment:** Power Plant, Substations, Cables, Lines, Transformer, Batteries
- **Renewable Energy:** Wind Turbine blade deflection; Solar PV Panel temperature
- **Asset Management:** Real-time Operations; Digital Twin; Remote Monitoring
- **OEM Prototype Tests:** Batteries, Aircraft vibrations; Ship-hull deflections; E-mobility
- **Asset Safety:** Mines, Pressure Vessels, Aviation, Power/Nuclear, Other assets



**Features:**

- Max. fiber length/channel (10-20 km loop); Can be laid close (cm apart) for measurement.
- Temperature accuracy 0.5 deg C ( $\pm\Delta T/T$ ) over -50 deg C to +500 deg C range
- Strain accuracy 0.1% ( $\pm\Delta L/L$ ) in both tension/compression
- Measurement distance every 1 meter along fiber; Accuracy  $\pm 1\%$  per meter length
- Real-time data integration into SCADA/DMS/ADMS/BMS/Other
- Multi-channel for logical and physical fiber separation
- Programmable zones and sampling rates (0.5 min. to >60 min); Min-Max & Ramp alerts



**How Does It Work:**

- Optical/stimulated Brillouin scattering principle. The fiber is the sensor.
- Fiber embedded or external (for strain applications fiber needs to be bonded)
- Entire fiber is scanned and the synchronized data-set is time stamped
- Programmable focus on specific areas of interest with more sensing points
- DNP3, IEC 61850-GOOSE protocols; 10BaseT, RJ45, TCP/IP; cloud server upload

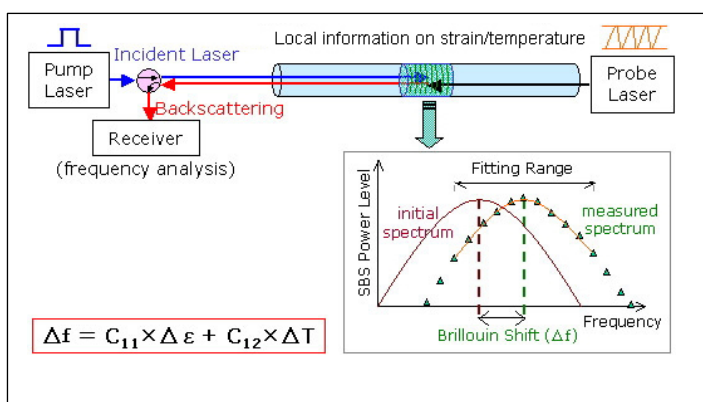
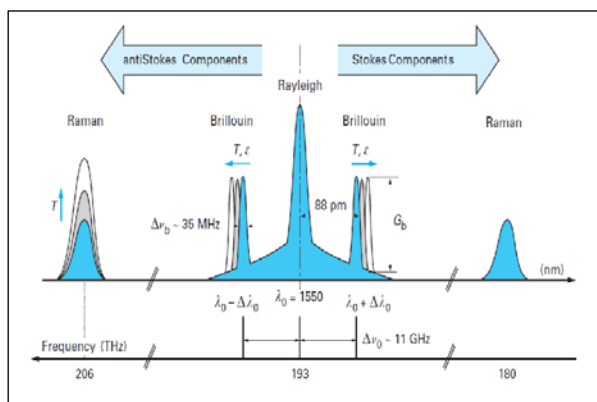


**Technical Data:**

- **Controller:** 3U 19" rack mount; 100-240VAC or 24-120V DC; 200W; IP40/20 (F/B); 8.1 kg.
- **Fiber:** Selectable fiber type to suit measurement application
- **Ambient Operating Temperature:** -40 deg C to +80 deg C; 95% RH non-condensing
- **Environment:** EHV, Explosive, EMI, RF, Substation (IEEE1613, IEC61850-3) compliant
- **Fiber Dielectric:** Full withstand (air & oil) for AC 60Hz and Impulse wave (standard and switching surges)
- **Software:** Cloud-based software with analytics and 3D visualization

**Operation:**

Self-contained all-in-one controller which houses both the optics and power electronics. The two ends of the fiber loop are fed into the optical ports. Measured data can be stored locally or exported periodically.



# Tech Talk: Power of Optical Sensing

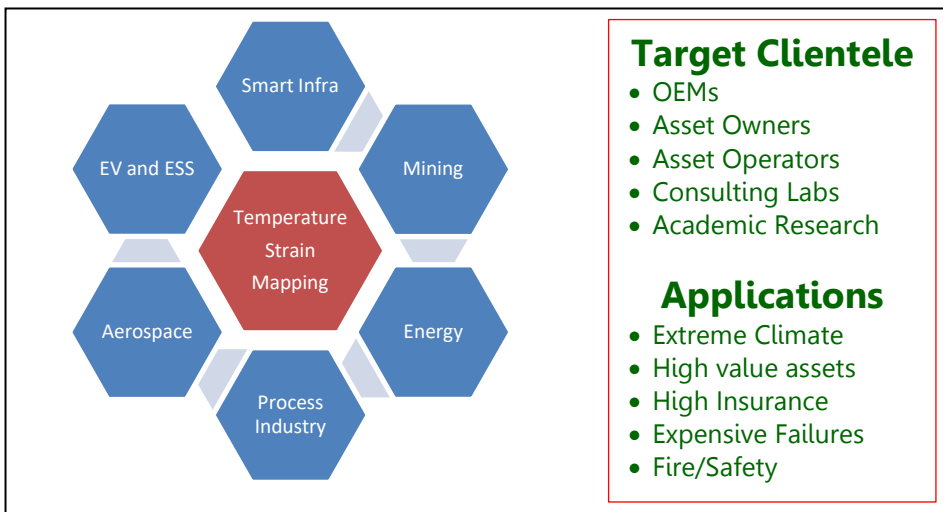
The fiber is the sensor. Does the work of thousands of thermocouples and strain gauges.

*These are not Bragg grating sensors which require predetermined sensing location points on the fiber & fiber placement.*

Thermal ratings of all equipment including their sophisticated digital twins are largely based on interpolation or extrapolation of empirical formulae, obtained from a few temperature measurements. In other cases, it is derived from electrical parameters such current ( $I^2R$ ). This is because vast temperature measurements using thermocouples and RTDs are impossible to map all over the asset. So, model approximation continues to be the norm.

Climate Change and rising ambient temperatures is requiring all existing infrastructure assets (electric, water, gas, telecom, transport) to be suitably de-rated. It also requires asset owners, utilities and OEMs to provide new/add-on designs that can compensate for this higher ambient temperature. Extreme swings are flashing a warning sign that we need to (a) determine name-plate derating factors for all assets; (b) ascertain real-time operating limits for all assets and systems during extreme swings; and (c) re-assess performance of aging assets.

The new optical sensor mapping system, allows both temperature and strain to be mapped along a fiber length using the "Stimulated Optical Brillouin Scattering" principle. This scattering shift is proportional to the temperature and strain at each point of measurement along the fiber. Each synchronized data set (sampled across the whole fiber) is time stamped. *The fiber loop can be arranged to match the physical asset, to provide a comprehensive 3D map.* For example, a 10 km fiber loop, measured every meter, at 15-minute intervals, yields about 40,000 synchronized, time-stamped data every hour. This can be fed in real-time into a SCADA or BMS system to manage asset performance for varying ambient and load conditions.



## Typical Applications

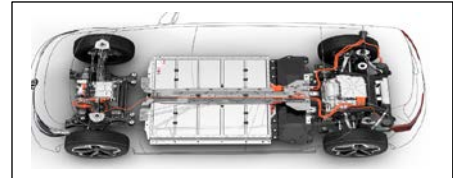
Energy- GT&D, RE, Nuclear, O&G



Process Industries & Pressure Vessels



ESS – Batteries, Fuel Cells, Hydrogen



Mine Fire-Safety



## And Savings Too:

*This ensures lower costs, greater ROI and a scalable speedier long-term solution. A two-for-one benefit.*

## Best Value Applications:

| Parameters                    | Platinum Savings | Gold Savings | Silver Savings | Bronze Savings |
|-------------------------------|------------------|--------------|----------------|----------------|
| High Value Asset (> 1.5 M\$)  | *****            | ****         |                |                |
| Long-lead Replacement         | *****            | ****         |                |                |
| High Insurance Asset          | *****            | ****         |                |                |
| Fire & Safety Implications    | *****            | ****         |                |                |
| OEM Prototyping/Validation    | *****            | ****         | ***            | **             |
| Academic R&D Labs             |                  | ****         | ***            | **             |
| Extreme hot/cold climate      | *****            | ****         | ***            |                |
| Typical Pay back (simple ROI) | 1 Year           | 2 Years      | 3 Years        | 4 Years        |

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or a trial project**