



# TEMPERATURE SENSOR

## MINIATURE NON-CONDUCTIVE SERIES (TSMN-H)

 **±0.5°C Uncertainty**

 **Electrical Isolation**

 **Intrinsically Safe**

 **EMI & Radiation Immune**

Optical temperature sensors provide high-quality measurements in harsh environments not suitable for electrical equivalents. The Fibos TSMN models are miniature non-conductive sensors that protect the optical fiber with a non-conductive sheath material, such as PEEK plastic or a ceramic. Standard geometries are shown in the configuration table. Material substitutions, custom tip dimensions, and alternative cable lengths can be provided upon request.

Fibos optical temperature sensors meet PiMS™ (Pi-FBG Measurement Standard). To achieve the performance specifications presented, a signal conditioner that utilizes the PiMS™ technique is required.

### APPLICATIONS

Leverage the benefits of optical measurements to collect better quality data in applications requiring electromagnetic immunity, long transmission distance, high-voltage isolation, and/or intrinsic safety. Typical applications include:

- Automotive research and development
  - Battery pack temperature measurements
  - Electric motor internal temperatures
- High voltage temperature measurements
  - Power transformer health monitoring
  - Power generators
  - Battery storage facilities
- Gas turbine engine temperature rake

### PERFORMANCE

Sensor Operating Range <sup>1</sup>	-50 to 200°C
Absolute Uncertainty <sup>2,3</sup>	±0.5°C
Relative Uncertainty <sup>2,4</sup>	±0.2°C
Resolution	0.01°C
Time Constant <sup>5</sup>	60 ms
Optical Sensor Specifications	PiMS™ Compliant

<sup>1</sup> Care must be taken not to overheat the cable

<sup>2</sup> Measurement uncertainty includes error of signal conditioner (PiMS™ compliant)

<sup>3</sup> Uncertainty possible due to interchanging signal conditioners

<sup>4</sup> Uncertainty possible during continuous operation with signal condition in stable ambient conditions

<sup>5</sup> Time required to measure 90% change in temperature when inserted into liquid bath (1/16" Stainless Steel)

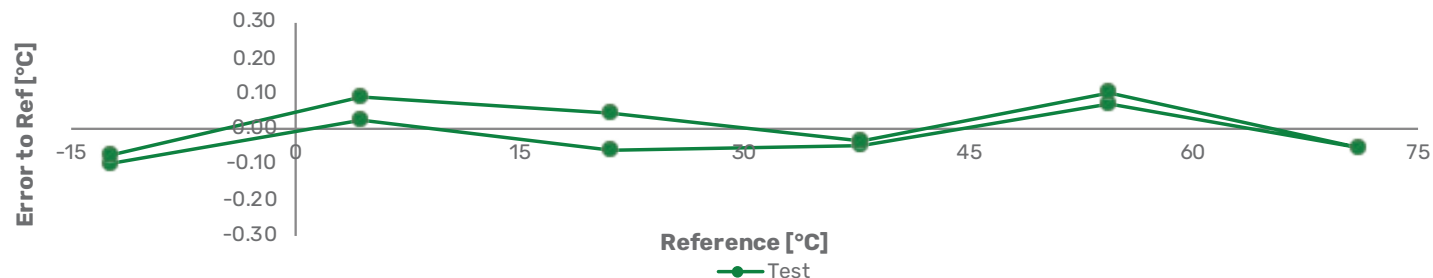
### ENVIRONMENTAL

Gauge Distance to Probe Tip <sup>1</sup>	5 mm
Alumina/PEEK Maximum Temperature	260°C
Cable Temperature (OFNP Cable)	-40 to 70°C
Minimum Cable Bend Radius	16 mm (5 mm on request)
Optical Connector	E2000/APC
Fiber Type	SMF28 compatible

<sup>1</sup> Distance to tip depends on probe tip material and geometry. Exact location will be indicated for each sensor

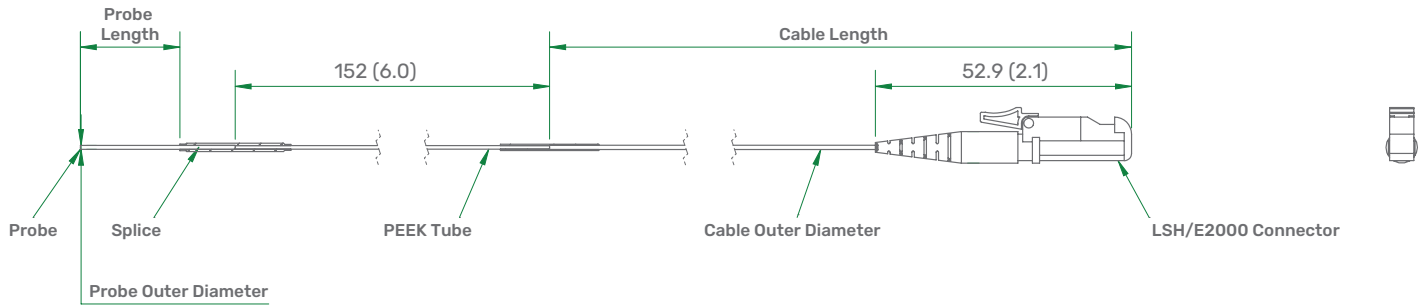
Continued product improvement necessitates that Fibos reserve the right to modify these specifications without notice. With continuous improvement, extensive testing, and conservative specifications, Fibos ensures product reliability expected within the industry.

### Typical Calibration Results: Error relative to reference



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Reference drawing provided for model #TSMN-HAFA-NA1E2



## MODEL PART NUMBER TABLE

**TSMN -** \_\_\_\_\_ - \_\_\_\_\_  
 1 2 3 4 5 6 7 8

### 1. Temperature Range

**H** – High (-50 to 200°C)

### 2. Probe Material

**A** – Alumina  
**P** – PEEK  
**X** – Custom

### 3. Probe Length

**F** – 25 mm (1")  
 + 152 mm PEEK  
**X** – Custom

### 4. Probe Outer Diameter

**A** – 0.8 mm (1/32")  
**C** – 3.175 mm (1/8")  
**E** – 0.92 mm (0.036")  
**X** – Custom

### 5. Cable Jacket

**N** – OFNP  
**Z** – No jacket  
**X** – Custom

### 6. Cable Outer Diameter

**A** – 0.9 mm  
**B** – 2.0 mm  
**D** – 0.25 mm  
**X** – Custom

### 7. Cable Length

**1** – 2.5 m  
**2** – 5.0 m  
**X** – Custom

### 8. Connector Type

**E2** – E2000/APC

## TYPICAL CALIBRATION DATA

Calibration Temperature [°C]	Temperature Sensor Wavelength [nm]
-50	1549.4581
-25	1549.6598
0	1549.8780
25	1550.1119
50	1550.3607
75	1550.6242
100	1550.8997

### Notes:

1. Calibration can be performed via comparison between the device under test and a traceable reference sensor. A programmable drywell or stirred liquid bath is used to exercise the device under test through its calibrated range.
2. Fibos can provide commercial calibration with metrological traceability to the SI from -20°C to 240°C. 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.



## 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.

V1.0-083019

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