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**SENSORS**



**MONITORS**



**SOFTWARE**

# RUGGED MONITORING PRODUCT LINE



Automotive



Industrial



Medical



RF/Microwave



Research Lab



Energy



Food & Beverage



Emobility

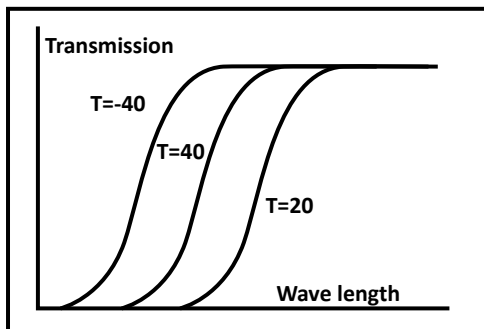
# What is Fiber Optic Temperature Sensing

Temperature is one of the most important variable to be considered and measured during any research, product development, testing and day to day working. Real time temperature measurement and monitoring with higher accuracy and repeatability is necessary in designing and operating high quality products.

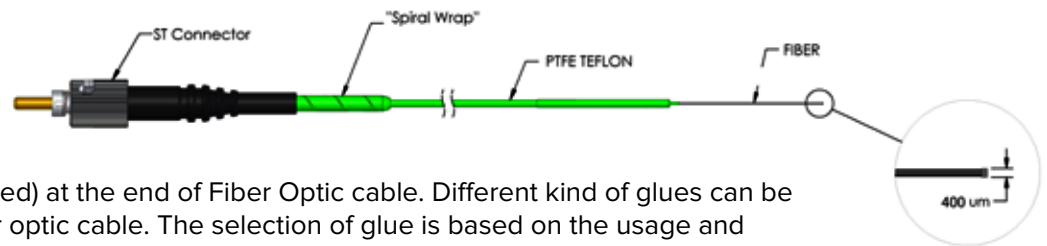
Thermocouples, Thermistors and RTDs (Resistive Temperature Devices) have been traditionally used for temperature monitoring across all industries. However, it becomes difficult to use them in harsh and hazardous environment such as explosive environment, presence of electro-magnetic waves, high voltage and strong magnetic fields.

Use of fiber optic sensors for real time and accurate temperature monitoring has been in use for decades. Fiber optic temperature sensors are proved to be very accurate, stable and robust specially with harsh and hazardous environments.

## Principle of Fiber Optic Temperature Sensor



Semiconductor crystals GaAs (Gallium Arsenide) is being used as the main sensor for direct contact temperature measurement. The light absorption/transmission property of GaAs crystal varies with its temperature and can be predicted / modelled for temperature measurement. The crystal's transmission spectrum shifts to higher wavelengths with increasing temperature of crystal.



A very small crystal of GaAs is bonded (glued) at the end of Fiber Optic cable. Different kind of glues can be used for bonding the crystals with the fiber optic cable. The selection of glue is based on the usage and application of fiber optic temperature sensors. A reflective dielectric film is deposited at one end of crystal for reflecting light that is being injected from a light source. Fiber optic cable is used to inject light to the crystal and also receive reflected light from crystal. Injected and Reflected wavelengths are analysed by a monitoring instrument in determining temperature of the object that is in contact with GaAs crystal.

GaAs crystal and fiber optic cable are protected by Teflon and polyimide material making it robust for installation into harsh and hazardous environment applications.

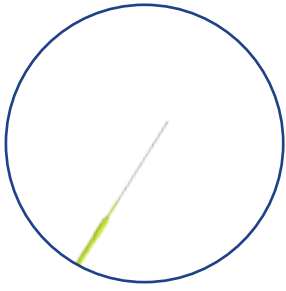
## Why to use Fiber Optic Temperature Sensors?

All components of fiber optic temperature sensor have high dielectric strength, that enables temperature measurement without the need of any electric signal carrying wire as used in thermocouple or RTDs. The main advantages of fiber optic temperature sensors over traditional temperature sensors are:



- Tiny size of the sensor allows it to be installed in places with very limited space constraint e.g. electronic manufacturing (PCBs)
- Safe to install and use in hazardous environment e.g. High Current, High Voltage (HV) Assets
- Long term durability even in harsh conditions
- Sensors are easy to install (or replace) and connect to the monitors
- Faster response time with highest accuracy and repeatability over a wide range of temperature, 4 °Kelvin to +250 °C
- Complete immunity to radiofrequencies (RFI), electromagnetic waves (EMI), Nuclear Magnetic Resonance (NMR), Corrosive and Microwave (MW) radiation
- Sensors are highly stable and do not shift over time, hence no need for any recalibration
- Small size of the GaAs crystal does not act as a heat sink for small test objects

## Lsens-B Fiber Optic Temperature Sensor



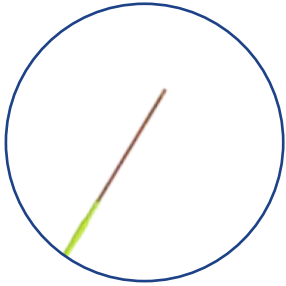
Open Fiber Optic Temperature Sensors that fits into tiniest space (up to 0.4mm diameter) and provides fastest response time (up to 35ms) along with highest degree of accuracy and repeatability.

- Small diameter (0.4mm) for fast response and fitting into places with very limited space
- Outstanding repeatability improves accuracy of testing instruments
- Complete immunity to RFI, EMI, NMR and microwave radiation
- Plug and Play operation, does not require setup or calibration
- Minimal thermal shunting

### Applications

- Semi-conductor
- Electronic component
- Magnetic, RF and microwave environments
- Catheter design
- Medical applications
- Microwave assisted chemistry
- Sterilization applications
- RF and microwave drying applications

## Lsens-C Fiber Optic Temperature Sensor



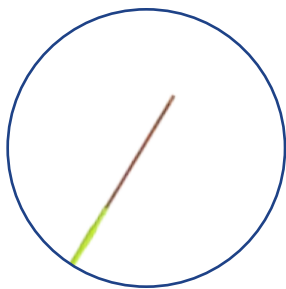
Fiber Optic temperature sensor with a capability to measure the lowest temperature of up to 4K (-269 °C / -452 °F) with highest accuracy and repeatability

- Small tip and Polyimide protection makes it suitable for harsh environment like cryogenic applications
- Outstanding repeatability with high flexibility
- Complete immunity to RFI, EMI, NMR and microwave radiation
- Does not require recalibration or complex inputs to operate
- Suitable for applications that require to measure lower range of temperature (4 °Kelvin to +85 °C)

### Applications

- Cryogenic and vacuum environment
- Medical applications
- Nuclear and hazardous environments
- Chemical and Process Industries
- RF and microwave drying applications

## Lsens-P Fiber Optic Temperature Sensor



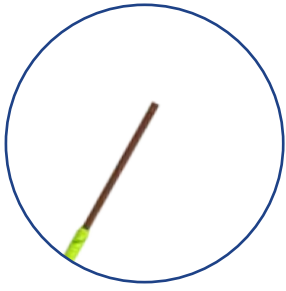
Solutions for scientists working in laboratories, research centres and universities who are looking for reliable instruments with fast response & dielectrically neutral in advanced research applications.

- Small tip with Polyimide protection makes it robust for applications with small space for sensor fitting
- Faster response and outstanding repeatability with high flexibility
- Complete immunity to RFI, EMI, NMR and microwave radiation
- Does not require recalibration or complex inputs to operate
- Wide temperature range: -200 °C to +250 °C

### Applications

- Medical applications
- Nuclear and hazardous environments
- Electric Vehicle and Battery Testing
- Chemical and Process Industries
- RF and microwave drying applications

## Lsens-R Fiber Optic Temperature Sensor



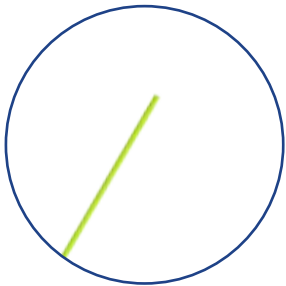
Most robust fiber optic temperature sensor with thicker Polyimide protection that protects sensor from bending during operation/testing. Ideal for harsh and hazardous environment that has risk of bending and damaging sensors.

- Robust Polyimide protection with fast response time and highest accuracy
- Outstanding repeatability without any need for calibration
- Complete immunity to RFI, EMI, NMR and microwave radiation
- Available in different cables and sheath options
- Minimal thermal shunting

### Applications

- Wood and Textile Drying Industry
- RF and microwave drying applications
- Microwave assisted chemistry
- Sterilization applications
- Industrial process control and monitoring applications
- Medical applications
- Semiconductor and Electronic component
- Magnetic, RF and microwave environments

## Lsens-T Fiber Optic Temperature Sensor



A multiple use fiber optic temperature sensor for measurement in a wide range of demanding applications, where immunity to electromagnetic fields is mandatory.

- Small tip with PTFE Teflon protection suitable for all applications
- Outstanding repeatability with high flexibility
- Complete immunity to RFI, EMI, NMR, Corrosive and microwave radiation
- Customizable according to customer specific applications
- Suitable for OEM-type applications

### Applications

- Electric Vehicle and Battery Testing
- Food Processing
- Nuclear and Hazardous Environments
- Medical Applications
- Industrial process control and monitoring applications
- Chemical and Process Industries
- RF and microwave drying applications
- Magnetic, RF and microwave environments

## Accessories

The following standard accessories for fiber optic temperature sensors are provided in order to fit to customer needs and installation requirements:



Optical feedthrough for wide range of pressure conditions



Terminal rings for fiber optic probe tip mounting



Fiber Optic extension cables



Interface box with leak proof design



Tank wall plate for transformers



Dinrail mounting brackets for monitors

## L201 - Rugged Fiber Optic Temperature Monitor



Rugged design, designed for reliability, multichannel fiber optic temperature monitor for Industrial and Laboratory applications.

- Rugged, Compact Design
- 2 to 8 Channels, Expandable
- Plug and Play
- Best in class EMI, ESD Immunity
- Software designed to be interfaced with other testing platforms

### Applications

- Electric Vehicle and Battery Testing
- Medical Equipment testing (MRI, PETSCAN, NMR)
- Commercial Grade Microwave Radiation
- Industrial process control and monitoring applications
- Chemical and Process Industries - Food and Beverage Processes - Wood drying industry



## T301 - Rugged Fiber Optic Temperature Monitor



Rugged design, designed for reliability, multichannel fiber optic temperature monitor for Industrial and Laboratory applications.

- Rugged, Compact Design
- 4 to 24 Channels, Expandable
- Plug and Play, No field calibration
- Best in class EMI, ESD Immunity
- 8 Programmable relays, Form - C - Software designed to be interfaced with other testing platforms

### Applications

- Transformer Hot Spot monitoring
- Industrial process control and monitoring
- Electric Vehicle and Battery Testing
- Medical Equipment testing (MRI, PETSCAN, NMR)
- Commercial Grade Microwave Radiation
- Food and Beverage Processes





## R501 - Rugged Fiber Optic Temperature Monitor



Fully flexible rack mount unit for fiber optic temperature monitoring with additional analog and digital input output options. Field upgradable to scale up to 64 Fiber Optic channels into one chassis.

- Robust and modular unit suitable for monitoring large number of measurement points
- Outstanding repeatability without any need for calibration
- Best in class EMI, ESD Immunity; range of communication options and protocol support
- Customizable according to customer specific applications
- Range of communication modules to integrate with other systems for data input and output
- Software designed for integration into test platforms
- Suitable for OEM-type applications

### Applications

- Battery banks / Panels for data centres
- Electric Vehicle and Battery Testing
- Wood / Fabric drying industry
- Food and Beverage Processes
- MV/HV Electric Assets (Transformers, Switchgears, Motors)
- Medical Equipment testing (MRI, PETSCAN, NMR)
- Industrial process control and monitoring applications
- Commercial Grade Microwave Radiation



## O101 - Rugged Fiber Optic Temperature Monitor

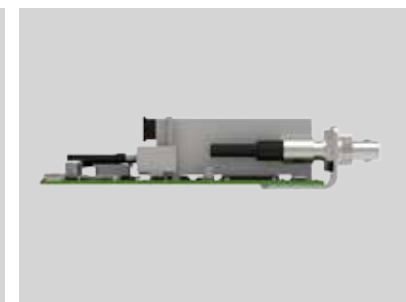


Compact design with multiple mounting and communication options to meets OEM specific requirements.

- Compact size with option for 1 to 8 fiber optic channels
- Easy din-rail mount into customer panel
- Independent operation mode without any mounting
- Option for mounting without any enclosure
- Analog and relay outputs with custom logic features
- Support for Modbus and canbus protocols ensures easy integration with other test platforms

### Applications

- Electric Vehicle and Battery Testing
- Chemical and Process Industries
- Commercial Grade Microwave Radiation
- Food and Beverage Processes
- Industrial process control and monitoring applications
- Medical Equipment testing (MRI, PETSCAN, NMR)
- Wood drying industry
- High voltage asset manufacturer e.g. Transformers, Switchgears



# Rugged Connect Software

Rugged connect provides remote visualization of temperature and other data being measured / monitored by various rugged monitoring systems. The software can connect to multiple monitoring devices for data collection and advance visualization. The intuitive user interface of the software is designed to give quick access to the most relevant information with highest level of data security. The key features of rugged connect software are:



- Compare Channels of different monitoring devices into one screen
- Real time data
- Signal strength - Troubleshooting
- Customization - Channel name, Storage rate etc.
- Designed to handle multiple parameters e.g. Temp, Pressure, Vibration, Current etc.
- Min / Max with time stamping
- Trending for user selectable duration (1 min, 2 min, 5 min, 10 min, 30 min, 1 hr, 4 hr, 8 hrs, 1 day, 4 days)
- Export into JPG, Excel format with save option
- Easy set up
- Channel Enable / Disable feature
- Support multiple languages
- Collect data to micro SD cards
- Easy to configure communication protocols (Modbus, Canbus, DNP3.0, Profinet, IEC 60870-5-101, IEC 60870-5-104, IEC61850)

## Integration with third party systems



Rugged connect provides easy to configure protocols for integration with third party systems. It supports the following protocols for data input and output:

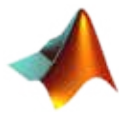
- Serial Protocols: Canbus, Profinet, Modbus, DNP3.0, IEC 60870-5-101
- Ethernet (TCP/IP) Protocols: Modbus, DNP3.0, IEC 60870-5-104, IEC61850

## Third party drivers available

Drivers for the following computing environment and programming languages are provided by the software. These drivers enable customers to use the measured / monitored temperature data directly into their existing computing environment.



LABVIEW



MATLAB



PYTHON

## **SENSOR**

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Lsens-B

Lsens-C

Lsens-P

Lsens-R

Lsens-T





## Lsens-B Fiber Optic Temperature Sensor

- Small diameter for fast response
- Outstanding repeatability
- Complete immunity to RFI, EMI, NMR and microwave radiation
- Plug and Play operation, does not require setup or calibration
- Minimal thermal shunting

Solutions for scientists working in laboratories, research centers and universities who are looking for reliable instruments with fast response & dielectrically neutral in advanced research applications.

## Product Summary

A multiuse fiber optic temperature sensor designed for a wide range of applications, especially for the use in demanding applications. The sensor offers complete immunity to RFI, EMI, NMR and microwave radiation. The standard temperature sensor has a response time of 0.2 s. With a standard deviation of +/-0.2 °C it allows precise and repeatable measurements. The coating of the temperature sensor is made of PTFE, and the fiber tip has 0.3 mm x 0.3 mm area with a Polyimide coating. The fiber optic probe consists of a PTFE protected glass fiber and a GaAs-crystal (Gallium Arsenide) at the sensor tip. It is totally free of metal and is immune to external fields. Therefore, the probes are explicitly suitable for use in large temperature ranges as well as in aggressive operating environments. The sensor length can be from several meters to 1 kilometer in length without impacting the accuracy of the measurement result. Other sensor lengths and connector types are available upon request.

## Applications

- Semi-conductor
- Electronic component
- Magnetic, RF and microwave environments
- Catheter design
- High voltage environments
- Medical applications
- Microwave assisted chemistry
- Sterilization applications
- RF and microwave drying applications

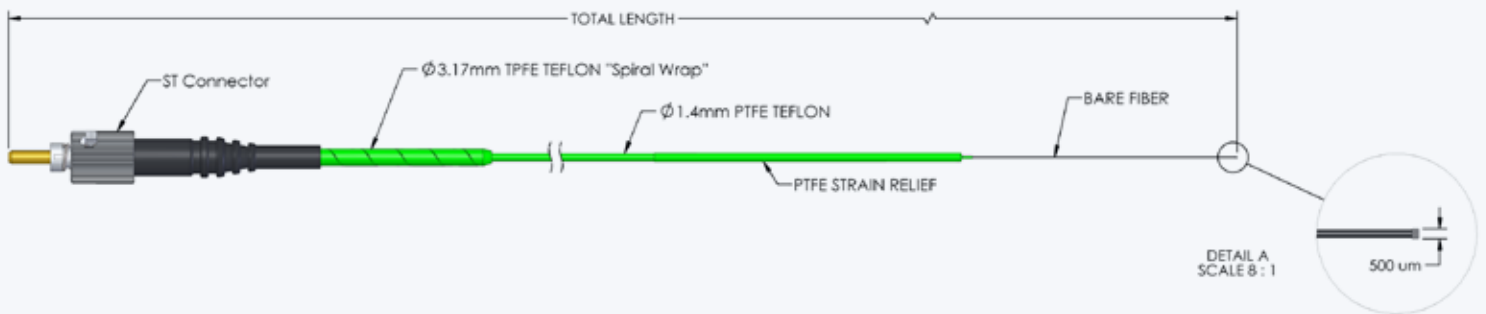
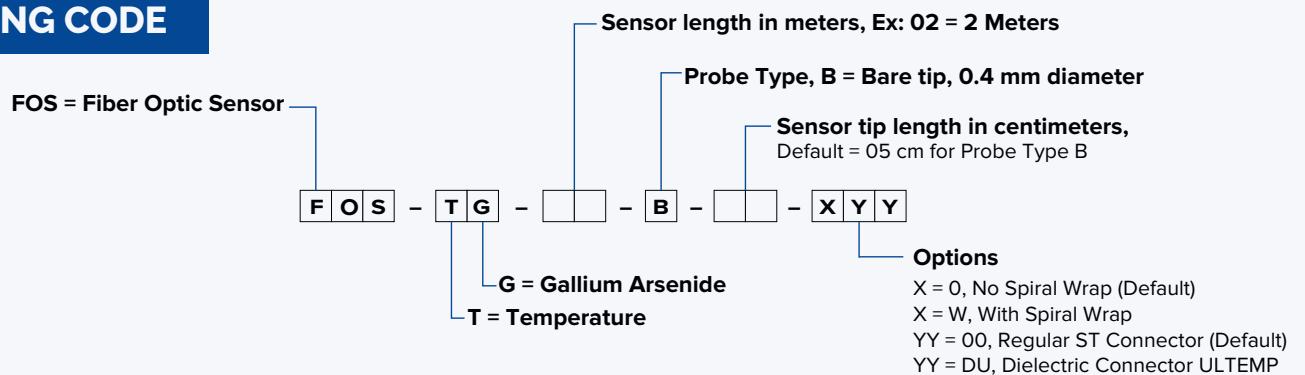
## Benefits

- Sensors do not require any recalibration
- High Stability, no shift over time
- Direct and accurate readings
- Robust fiber optic temperature sensor
- Available in different cables and sheath options
- Customizable according to customer specific applications
- Suitable for OEM-type applications

## TECHNICAL SPECIFICATIONS

Temperature range	-200 °C to +250 °C
Temperature range (Optional Range extensions)	Down to 4 °K / Up to +300 °C
Repeatability	0.2 °C
Accuracy absolute temperature	+/- 0.8 °C
Accuracy relative temperature	+/- 0.2 °C
Probe sheathing material	Teflon Coated, except for the sensor tip
Connector	Stainless Alloy / Optional - Dielectric
Response time	As fast as 35 ms
Probe sensitive area - Diameter	0.3 mm x 0.3 mm
Longevity	Probe accuracy & repeatability constant over time

## ORDERING CODE



### Rugged Monitoring Services

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### About Rugged Monitoring

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# Lsens-C Fiber Optic Temperature Sensor



- Small tip Polyimide, protected
- Outstanding repeatability with high flexibility
- Complete immunity to RFI, EMI, NMR and microwave radiation
- Does not require recalibration or complex inputs to operate
- Cryogenic temperature range ( as low as 4 °Kelvin )

**A multiple use fiber optic temperature sensor for measurement in a wide range of demanding applications, where immunity to electromagnetic fields is mandatory.**

## Product Summary

A multiuse fiber optic temperature sensor designed for a wide range of applications, especially for the use in demanding applications. The sensor offers complete immunity to RFI, EMI, NMR and microwave radiation. The standard temperature sensor has a response time of 0.2 s. With a standard deviation of +/-0.2 °C it allows precise and repeatable measurements. The coating of the temperature sensor is made of PTFE, and the fiber tip has 0.3 mm x 0.3 mm area with a Polyimide coating. The fiber optic probe consists of a PTFE protected glass fiber and a GaAs-crystal (Gallium Arsenide) at the sensor tip. It is totally free of metal and is immune to external fields. Therefore, the probes are explicitly suitable for use in large temperature ranges as well as in aggressive operating environments. The sensor length can be from several meters to 1 kilometer in length without impacting the accuracy of the measurement result. Other sensor lengths and connector types are available upon request.

## Applications

- Electric Vehicle and Battery Testing
- High voltage environments
- Nuclear and hazardous environments
- Medical applications
- Chemical and Process Industries
- RF and Microwave drying applications
- Cryogenic and vacuum environment available ( Optional )

## Benefits

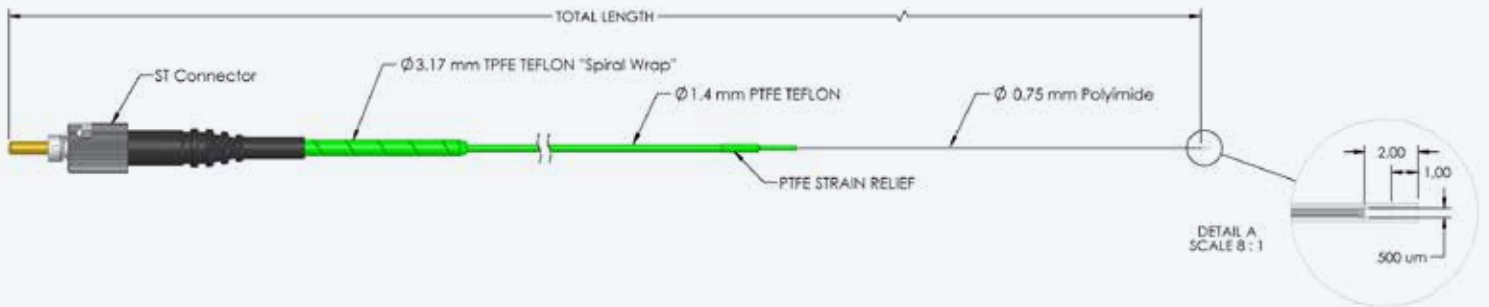
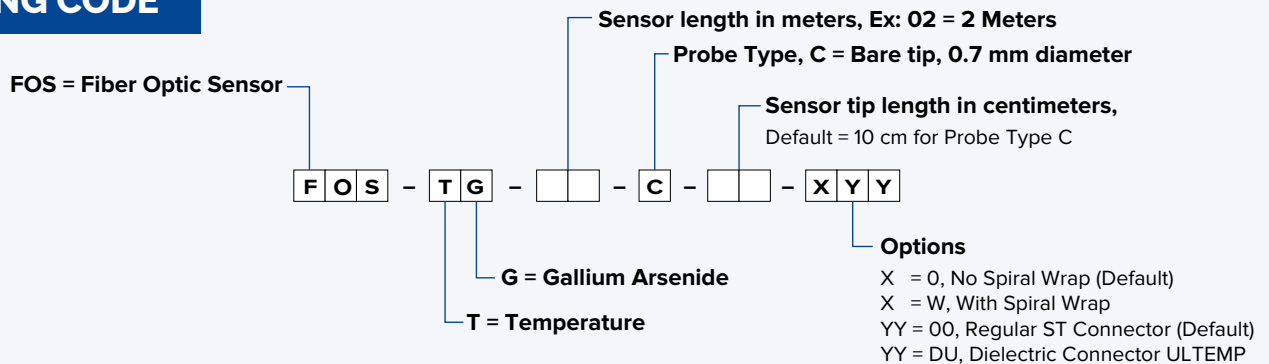
- Sensors do not require any recalibration
- No shift over time, high stability
- Optional spiral wrap
- Robust fiber optic temperature sensor

- Available in different cables and sheath options
- Customizable according to customer specific applications
- Suitable for OEM-type applications

## TECHNICAL SPECIFICATIONS

Temperature range	-200 °C to +250 °C
Temperature range (Optional Range extensions)	Down to 4 °K / Up to +85 °C
Repeatability	0.2 °C
Accuracy absolute temperature	+/- 0.8 °C
Accuracy relative temperature	+/- 0.2 °C
Probe sheathing material	Teflon Coated, with Polyimide protection for sensor tip
Connector	Stainless Alloy / Optional - Dielectric
Response time	Up to 0.2 Sec
Probe sensitive area - Diameter	0.7 mm
Protective Tube - Diameter	Teflon / 1.4 mm
Longevity	Probe accuracy & repeatability constant over time

## ORDERING CODE



### Rugged Monitoring Services

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### About Rugged Monitoring

Industry leading team of fiber optic experts with 100+ years of combined experience committed to delivering customizable solutions for challenging applications. We offer a range of reliable, high performance, customizable sensors and monitoring solutions that are immune to external influence.

## Lsens-P Fiber Optic Temperature Sensor

- Small tip Polyimide, protected
- Outstanding repeatability with high flexibility
- Complete immunity to RFI, EMI, NMR and microwave radiation
- Does not require recalibration or complex inputs to operate
- Cryogenic temperature range available ( as low as 4 °Kelvin )

A multiple use fiber optic temperature sensor for measurement in a wide range of demanding applications, where immunity to electromagnetic fields is mandatory.

## Product Summary

A multiuse fiber optic temperature sensor designed for a wide range of applications, especially for the use in demanding applications. The sensor offers complete immunity to RFI, EMI, NMR and microwave radiation. The standard temperature sensor has a response time of 0.2 s. With a standard deviation of +/-0.2 °C it allows precise and repeatable measurements. The coating of the temperature sensor is made of PTFE, and the fiber tip has 0.3 mm x 0.3 mm area with a Polyimide coating. The fiber optic probe consists of a PTFE protected glass fiber and a GaAs-crystal (Gallium Arsenide) at the sensor tip. It is totally free of metal and is immune to external fields. Therefore, the probes are explicitly suitable for use in large temperature ranges as well as in aggressive operating environments. The sensor length can be from several meters to 1 kilometer in length without impacting the accuracy of the measurement result. Other sensor lengths and connector types are available upon request.

## Applications

- Electric Vehicle and Battery Testing
- High voltage environments
- Nuclear and hazardous environments
- Medical applications
- Chemical and Process Industries
- RF and Microwave drying applications
- Cryogenic and vacuum environment available ( Optional )

## Benefits

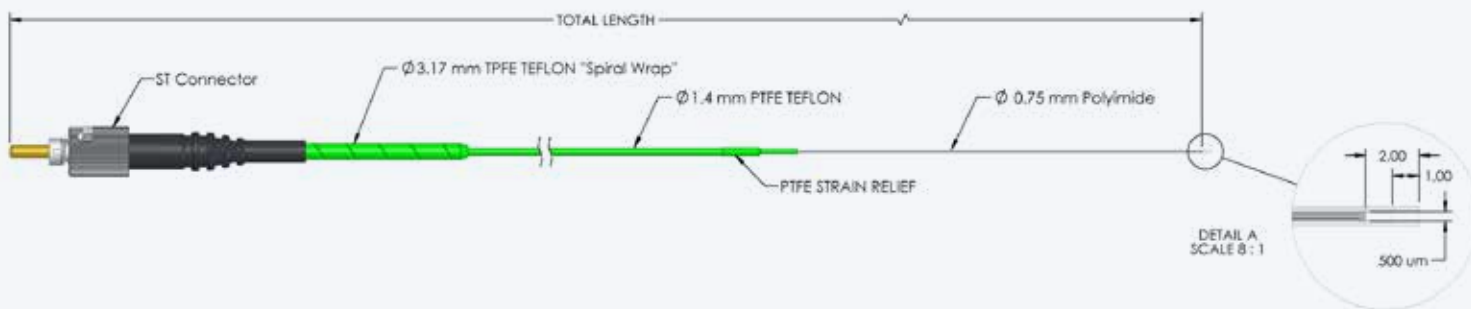
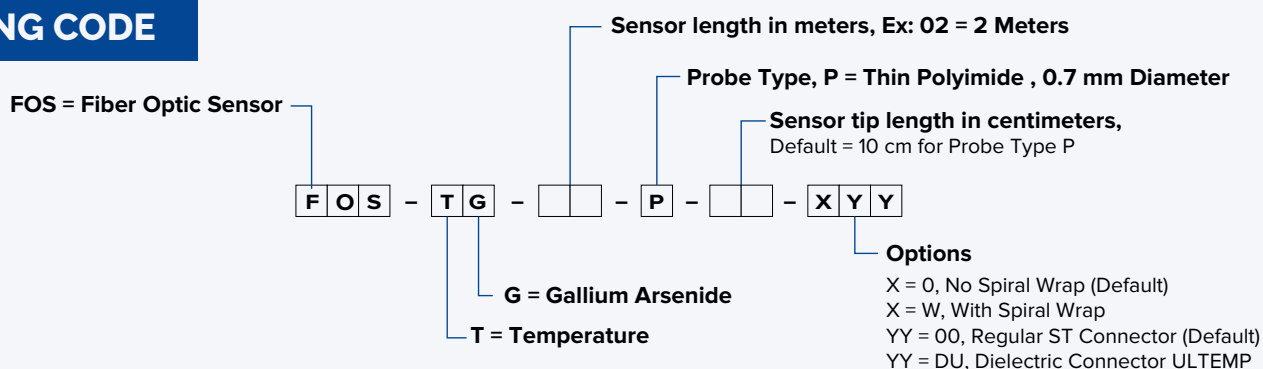
- Sensors do not require any recalibration
- No shift over time, high stability
- Optional spiral wrap
- Robust fiber optic temperature sensor

- Available in different cables and sheath options
- Customizable according to customer specific applications
- Suitable for OEM-type applications

## TECHNICAL SPECIFICATIONS

Temperature range	-200 °C to +250 °C
Temperature range ( <i>Optional Range extensions</i> )	Down to 4 °K / Up to +300 °C
Repeatability	0.2 °C
Accuracy absolute temperature	+/- 0.8 °C
Accuracy relative temperature	+/- 0.2 °C
Probe sheathing material	Teflon Coated, with Polyimide protection for sensor tip
Connector	Stainless Alloy / Optional - Dielectric
Response time	Up to 0.2 Sec
Probe sensitive area - Diameter	0.7 mm
Protective Tube - Diameter	Teflon / 1.4 mm
Longevity	Probe accuracy & repeatability constant over time

## ORDERING CODE



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## Lsens-R Fiber Optic Temperature Sensor

- Industrial use with rigid polyimide tip, 1.7 mm diameter
- Rugged tip ideal for industrial application
- Complete immunity to EMI/RFI/lightning
- High vibration environments

**Recommended for hostile environment where it is exposed to high vibration and immunity to electric fields is mandatory**

## Product Summary

A multiuse fiber optic temperature sensor designed for a wide range of applications, especially for the use in demanding applications. The sensor offers complete immunity to RFI, EMI, NMR and microwave radiation. The standard temperature sensor has a response time of 0.2 s. With a standard deviation of  $\pm 0.2$  °C it allows for precise and repeatable measurements. The coating of the temperature sensor is made of PTFE, and the fiber tip has a diameter of 1.7 mm with Rugged Polyimide coating and has a stainless steel ST-connector. For mechanical stability and applications e.g. in oil special protective coatings and hoses are available. The fiber optic probe consists of a PTFE protected glass fiber and a GaAs-crystal (Gallium Arsenide) at the sensor tip. It is totally free of metal and immune to external fields, therefore probes are explicitly suitable for the use in high temperature ranges as well as in aggressive operating environments. The sensor cable can be from several meters to kilometers long without influencing the accuracy of the measurement result. Other sensor lengths and connector types are available upon request.

## Applications

- Industrial process control and monitoring applications
- High voltage environments
- Harsh and Hazardous environments
- Temperature measurements conducted in confined spaces, hazardous or strong EMI/RFI/MRI environments
- Wood drying industry

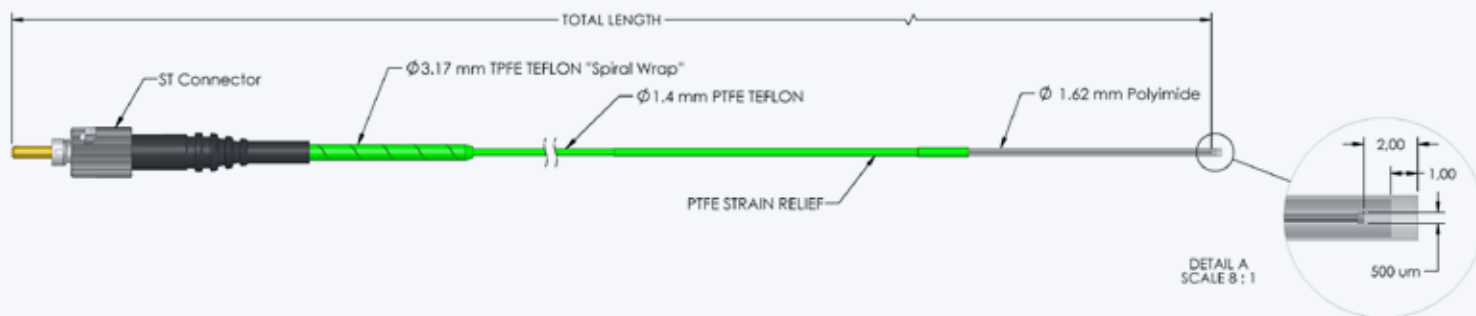
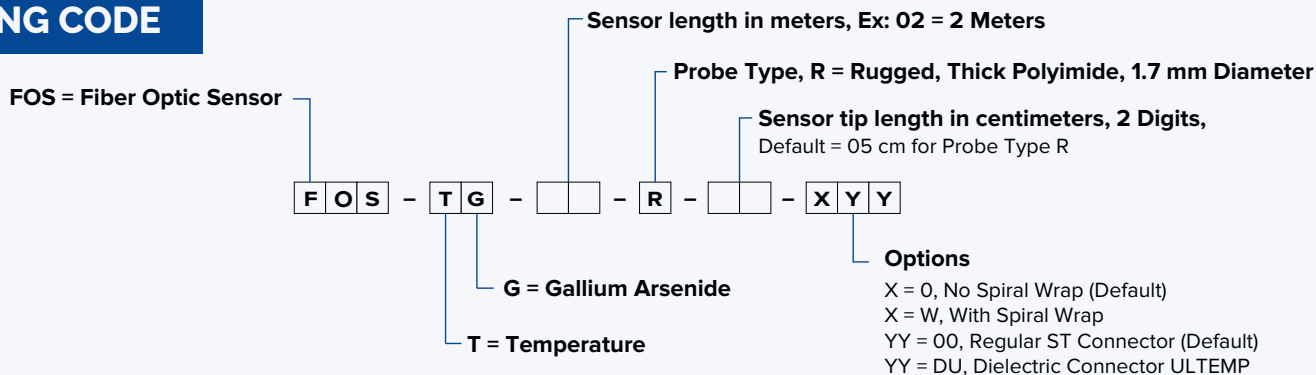
## Benefits

- Sensors do not require any recalibration
- No shift over time, high stability
- Robust packaging
- Each sensor comes with a complete test certification
- Robust fiber optic temperature sensor
- Available in different cables and sheath options
- Customizable according to customer specific applications
- Suitable for OEM-type applications.

## TECHNICAL SPECIFICATIONS

Temperature range	-200 °C to +250 °C
Temperature range ( <i>Optional Range extensions</i> )	Down to 4 °K / Up to +300 °C
Repeatability	0.2 °C
Accuracy absolute temperature	+/- 0.8 °C
Accuracy relative temperature	+/- 0.2 °C
Probe sheathing material	Teflon Coated, Rugged Polyimide protection for sensor tip
Connector	Stainless Alloy / Optional - Dielectric
Response time	Up to 0.2 Sec
Probe sensitive area - Diameter	1.7 mm Diameter
Longevity	Probe accuracy & repeatability constant over time

## ORDERING CODE



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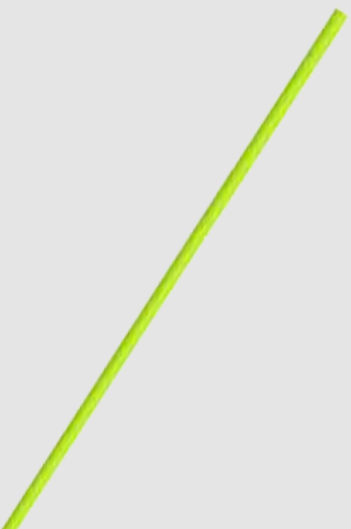


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# Lsens-T Fiber Optic Temperature Sensor



- PTFE protected
- Outstanding repeatability with high flexibility
- Complete immunity to RFI, EMI, NMR and microwave radiation
- Does not require recalibration or complex input to operate
- Liquid proof and withstands aggressive chemical solutions

**A multiuse fiber optic temperature sensor for measurement in a wide range of demanding applications where immunity to electromagnetic fields and explosion proof requirements are mandatory.**

## Product Summary

A multiuse fiber optic temperature sensor designed for a wide range of applications, especially for the use in R&D and industrial applications. The sensor offers complete immunity to RFI, EMI, NMR, Corrosive and microwave radiation making it the best choice for all demanding applications. The standard temperature sensor has a response time of 0.2 s. With a standard deviation of +/-0.2 °C it allows precise and repeatable measurements. The coating of the temperature sensor is made of PTFE, while the fiber tip has a diameter of 1.1mm and has a stainless steel ST-connector. For mechanical stability and applications e.g. in oil special protective coatings and hoses are available. The fiber optic probe consists of a PTFE protected glass fiber and a GaAs-crystal (Gallium Arsenide) at the sensor tip. It is totally free of metal and immune to external fields, therefore probes are explicitly suitable for use in high temperature ranges as well as in aggressive operating environments. The sensor cable can be from several meters to kilometers long without influencing the accuracy of the measurement result. Other sensor lengths and connector types are available upon request.

## Applications

- Magnetic, RF and Microwave environments
- High voltage environments
- Nuclear and hazardous environments
- Medical applications
- Aggressive Chemical environments
- Sterilization applications
- RF and microwave drying applications

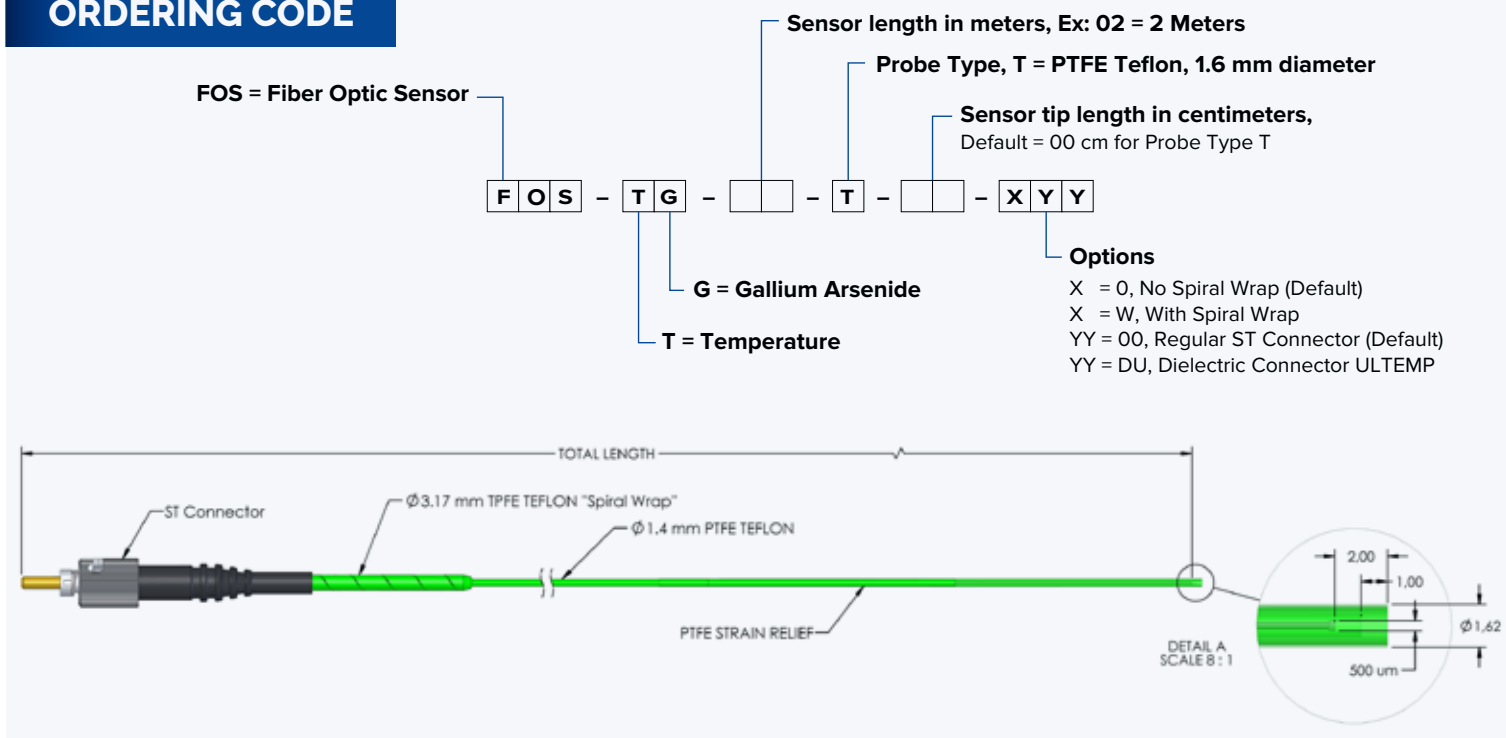
## Benefits

- Sensors do not require any recalibration
- No shift over time, high stability
- Optional spiral wrap
- Robust fiber optic temperature sensor
- Available in different cables and sheath options
- Customizable according to customer specific applications
- Suitable for OEM-type applications.

## TECHNICAL SPECIFICATIONS

Temperature range	-200 °C to +250 °C
Temperature range ( <i>Optional Range extensions</i> )	Down to 4 °K / Up to +300 °C
Repeatability	0.2 °C
Accuracy absolute temperature	+/- 0.8 °C
Accuracy relative temperature	+/- 0.2 °C
Probe sheathing material	Teflon Coated
Connector	Stainless Alloy / Optional - Dielectric
Response time	Up to 0.2 Sec
Probe sensitive area - Diameter	1.6 mm

## ORDERING CODE



### Rugged Monitoring Services

Rugged Monitoring provides customization of sensors, monitors & software. In addition we offer on-site commissioning services, maintenance contracts and technical support to all customers worldwide.



### About Rugged Monitoring

Industry leading team of fiber optic experts with 100+ years of combined experience committed to delivering customizable solutions for challenging applications. We offer a range of reliable, high performance, customizable sensors and monitoring solutions that are immune to external influence.

## **MONITOR**

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L201

T301

## L201 - Rugged Fiber Optic Temperature Monitor



- Rugged, Compact Design
- 2 to 8 Channels, Expandable
- Plug and Play
- Best in class EMI, ESD Immunity
- Software designed to be interfaced with other testing platforms

**Rugged design, designed for reliability, multichannel fiber optic temperature monitor for Industrial and Laboratory applications.**


### Product Summary


The Rugged Monitoring L201 is a compact design, designed for reliability to operate in extreme EMI, RFI, Microwave and high voltage environments. The L201 Fiber optic monitor combines reliability and user friendly interface in the monitor and software. It is a multi-channel fiber optic temperature monitor with precision measurement for Industrial and Laboratory applications. The L201 has a measuring range from -271 °C to +300 °C. The system offers complete immunity to RFI, EMI, microwave radiation, and High Voltages making it an optimal choice for environments where the limitations of conventional temperature sensors/ monitors impact usage in extreme conditions. The system is based on proven GaAs technology and designed for Plug and Play operation.


The L201 is designed to collect data and easy to integrate into existing systems through serial communication like RS-485 or analog outputs like 0-10 V / 4-20 mA. The L201 monitor comes with Rugged Connect software which is designed with the needs of Test platform or Industrial Process monitoring integration needs. It has the data integration capability of multiple test platforms. Rugged Connect software is designed to collect data from 6 systems simultaneously.


Plug and Play functionality provides the flexibility to interchange sensors without the inconvenience/ concerns of calibration. Industry standard drivers available for a quick and easy connect to most popular laboratories softwares. There is a dedicated team for application specific customizations for fiber optic sensors, monitor configuration and software integration to simplify the data collection of testing and monitoring applications.

Drivers :

  
 USB

  
 LABVIEW

  
 MATLAB

  
 PYTHON



# Applications

- Electric Vehicle and Battery Testing
- Medical Equipment testing (MRI, PETSCAN, NMR)
- Commercial Grade Microwave Radiation
- Industrial process control and monitoring applications
- Chemical and Process Industries
- Food and Beverage Processes
- Wood drying industry

## Benefits

- Sensors do not require any recalibration
- No shift over time, high stability and repeatability
- Robust packaging
- Each Monitor comes with a complete NIST calibration certificate
- Software designed for integration into test platforms
- Robust datalogging and Analytics
- Customizable according to customer specific applications
- Suitable for OEM-type applications.

## TECHNICAL SPECIFICATIONS

Measurement Range	-80 °C to +300 °C (cryogenic 4 °K range optional)
Measurement range ( <i>Optional Range extensions</i> )	Down to 4 °K / Up to +300 °C
Resolution	0.1°C
Accuracy	±1.0 °C (+/- 0.2 °C in relative temperature)
Number of Channels	2 - 8 Channels
Logging	1 sec interval on USB
Config port	USB (to use with Rugged connect windows software)
Max # of Channels	Expandable to 256 Channels, Daisy chain up to 32 units (via Modbus)
Serial port	RS-485 (RS-232 optional converter) with Modbus
Power	5 Volts USB powered
Battery	Optional Battery Module available
Memory	MicroSD external memory slot (up to 2 TB)
Analog output module	Fully configurable 0-10 V / 4-20 mA optional module available
Dimensions	4.92" x 7" x 2.72" 12.5 cm x 18 cm x 6.9 cm
Scan rate	200 ms / channel
Operating temp	-40 to 72 °C
Storage temp	-40 to 85 °C
Humidity	95% Non Condensing

## ORDERING CODE



**L201 = Lab Instrument, 201 Series**

L 2 0 1 - [ ] [ ]

Number of Channels,  
Ex: 08 = 8 Channels (Available 02, 04, 06, 08)



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### About Rugged Monitoring

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## T301- Rugged Fiber Optic Temperature Monitor



- Rugged, Compact Design
- 4 to 24 Channels, Expandable
- Plug and Play, No field calibration
- Best in class EMI, ESD Immunity
- 8 Programmable relays, Form - C
- Software designed to be interfaced with other testing platforms

**Rugged design, designed for reliability, multichannel fiber optic temperature monitor for Industrial and Laboratory applications.**

## Product Summary

Drivers :



USB



LABVIEW



MATLAB



PYTHON

The Rugged Monitoring T301 is a multi-channel fiber optic temperature monitor with precision measurement for Industrial and Laboratory applications. The T301 Fiber optic monitor combines compact form factor and user friendly interface in the monitor and software. It is designed to operate reliably in extreme EMI, RFI, Microwave and high voltage environments. The T301 has a measuring range from -271 °C to +300 °C. The system offers complete immunity to RFI, EMI, Chemical, microwave radiation, and high voltages making it an optimal choice for environments where the limitations of conventional temperature sensors / monitors impact usage in extreme conditions. The system is based on proven zero-drift GaAs technology and designed for Plug and Play operation.

The T301 is designed to collect data and to easily intergrate into existing systems through serial communication like RS-485 or Gigabit Optical Ethernet. The T301 monitor comes with Rugged Connect software which is designed with the needs of Test Platform or Industrial Process monitoring integration needs. It has the data integration capability of multiple test platforms. Rugged Connect software is designed to collect data from 256 channels simultaneously. Plug and Play functionality provides the flexibility to interchange sensors without the inconvenience / concerns of calibration. Rugged Monitoring has a dedicated team for application specific customizations for fiber optic sensors, monitor configuration and software integration to simplify the data collection of testing and monitoring applications.

# Applications

- Transformer Hot Spot monitoring
- Industrial process control and monitoring
- Electric Vehicle and Battery Testing
- Medical Equipment testing (MRI, PETSCAN, NMR)
- Commercial Grade Microwave Radiation
- Food and Beverage Processes

## Benefits

- No shift over time, high stability
- Robust packaging
- Each Monitor comes with a complete NIST calibration Certificate
- Software designed for integration into test platforms
- Robust datalogging and Analytics
- Customizable according to customer specific applications
- Suitable for OEM-type applications.

## TECHNICAL SPECIFICATIONS

Measurement Range	-80 °C to +300 °C (cryogenic 4 °K range optional)
Measurement range ( <i>Optional Range extensions</i> )	Down to to 2 °K / Up to +300 °C
Resolution	0.1 °C
Accuracy	±1.0 °C (±0.2 °C in relative temperature)
Scan rate	200 ms / channel
Memory	MicroSD external memory slot (Up to 2 TB)
Logging	10 years at 10 sec interval rate (8 GB)
Serial Part	RS-485 with Modbus
Connectivity	Gigabit, Optical Ethernet
Analog Outputs	8 fully configurable 0-10 V / 4-20 mA optional module available
Max # of Channels	256 Channels, Daisy chain up to 32 units (with Modbus)
Memory	4 or 8 GB, Industrial Grade micro-SD
Relays	8 Programmable Form-C Relays (5A) plus 1 system fault relay
Operating temp	-40 to 72 °C
Storage temp	-40 to 85 °C
Number of Channels	4 - 24 channels
Dimensions	10.5" x 7.4" x 2.8" 26.7W x 18.7D x 7.2H cm
Humidity	95% Non Condensing

## ORDERING CODE



Number of Channels  
Ex: 08 = 8 Channels

T 3 0 1 -

Ethernet Protocols  
0 = No Ethernet  
1 = Ethernet Board RJ45  
2 = Ethernet Board RJ45 & SFP

Number of Analog Outputs  
0 = No Analog Outputs  
8 = 8 Analog Outputs

Memory Size  
0 = None  
4 = 4 GB  
8 = 8 GB

Number of Relays  
0 = No Relays  
8 = 8 Relays



### Rugged Monitoring Services

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