



# OZ Optics

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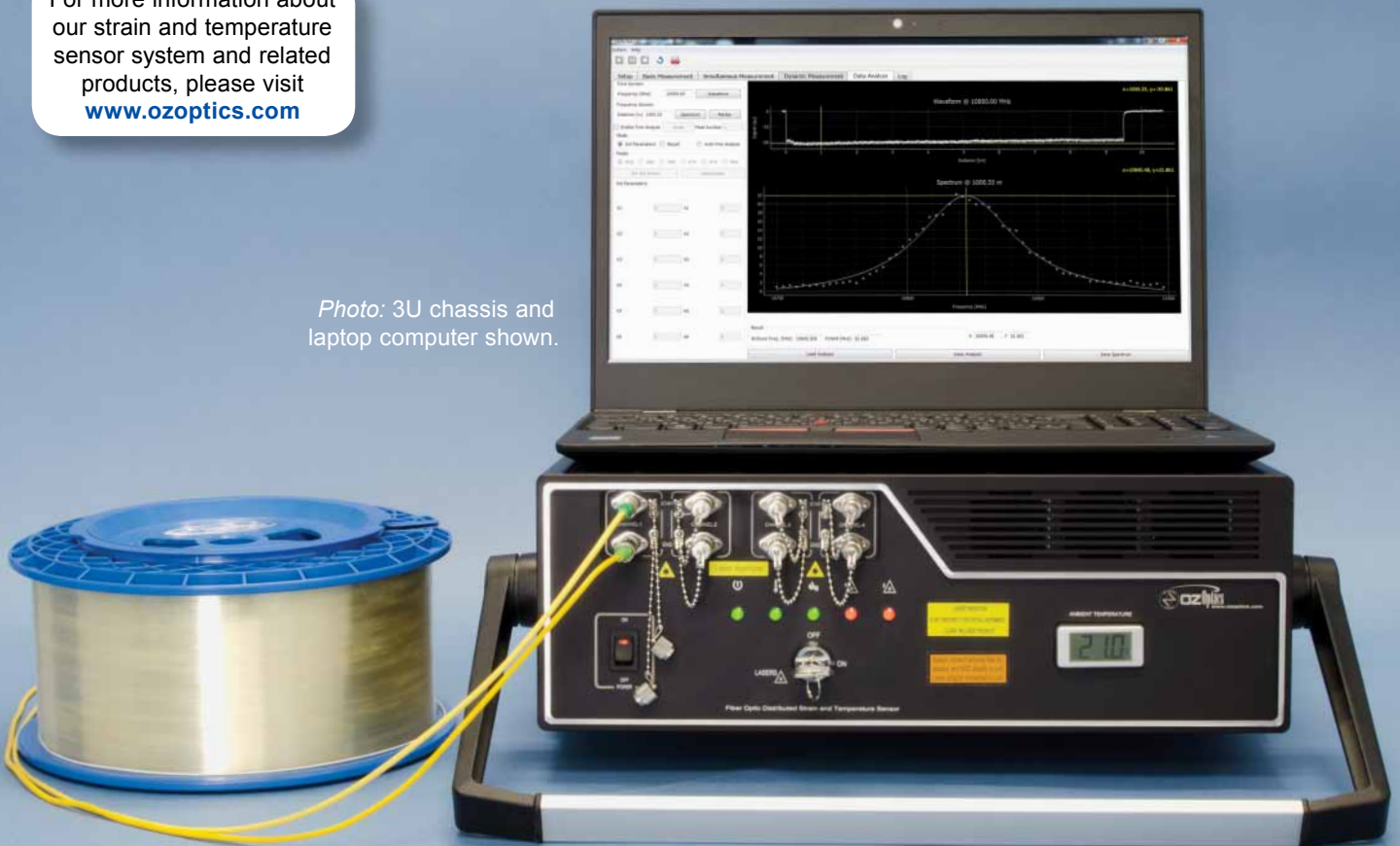
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## Fiber Optic Distributed Temperature Sensors (B-DTS)

Low-cost Brillouin BOTDA scattering version

For more information about our strain and temperature sensor system and related products, please visit [www.ozoptics.com](http://www.ozoptics.com)

Photo: 3U chassis and laptop computer shown.



### Features

- Fast measurement and dynamic measurement
- Uses standard telecom single mode fiber
- Good spatial resolution and long range
- Immune to attenuation changes

### Performance at a glance

- 1 m spatial resolution for 20 km fiber length
- $\pm 0.3$  °C temperature precision
- 100 km maximum sensing range

### Description

OZ Optics' Foresight™ family of fiber optic Brillouin distributed temperature sensors (B-DTS) are sophisticated optical sensor systems employing stimulated Brillouin scattering. Distributed sensing provides a direct method of measuring changes in temperature along the entire length of an optical fiber. Maximum sensing length utilizing Brillouin analysis is 100 km, a significant improvement over Raman based distributed temperature sensors.

## Oil and Gas applications



### Oil and Gas Pipeline Monitoring

- Pipeline leakage monitoring
- Up to 100 km sensing range per channel
- High spatial resolution supports localized measurement with long sensing range
- Short acquisition / response time



### Oil and Gas Well Monitoring

- Well integrity management
- Temperature, strain and pressure monitoring with proper sensing cable and installation
- Not sensitive to hydrogen which may change the attenuation of the fiber



### Refinery Efficiency Sensing

- Improve the efficiency of the refinery per distributed temperature profile
- Reduce downtime while ensuring safety levels
- Uses low cost telecom single mode fiber cable

## Utility and cable applications



### Overhead Power Line Monitoring

- Lightning strikes, icing and broken wires can be detected
- Up to 100 km sensing range per channel
- No additional components required along power line route
- Easy deployment



### Submarine Cable Monitoring

- Ongoing quality / status monitoring throughout the life of the cable
- No additional components required along the route

## Cryostat, and Fire applications



### Cryostat Temperature Sensing

- Able to measure temperatures as low as 25 K
- May use low cost telecom single mode fiber
- Up to 100 km sensing range per channel
- High spatial resolution with good temperature resolution / precision



### Building Fire Detection

- Fast, dynamic, and accurate temperature measurement
- Up to 100 km sensing range per channel
- May use low cost telecom single mode fiber cable

## Specifications

Model		Foresight™ Series		
Performances	Number of Channels	2 to 25 <sup>1</sup>		
	Sensor Configuration	Loop fiber, single end configuration is optional		
	Sensing Range	60 km	100 km	
	Spatial Resolution	1 m to 6 m <sup>2</sup>	1 m to 20 m	
	Spatial Step	as low as 5 cm		
	Temperature Range	-270 °C to +2100 °C (depending on cable material)		
	Temperature Resolution	0.005 °C <sup>3</sup>		
	Temperature Accuracy (2σ)	± 0.3 °C (Whole sensing range for BOTDA)		
	Dynamic Measurement	Optional		
	Fast Measurement	Optional		
	Averaging	1 to 65,000 scans		
	Measured Variables	Temperature, Brillouin spectrum		
	General	Communication & Connections	Ethernet port, USB	
Output Signals		Software alarms via TCP/IP, SPST, SSR relays (optional)		
Data Storage		Internal hard disc (128 GB or more)		
Data Format		Database, text files, MS Excel, bitmap plot		
Optical Connections		FC/APC <sup>4</sup>		
Laser Wavelength		1550 nm band		
Operating Temperature		0 °C to 40 °C, <85% RH, Non-condensing		
Power Supply		115 or 230 VAC; 50-60Hz; max 300W		
Dimensions (L x W x H)		3U Chassis	390 mm x 344 mm x 133 mm (not including computer) <sup>5</sup>	
Weight		3U Chassis	<12 kg (not including computer)	
Features	Measurement Modes	Manual, remote or automatic unattended measurements		
	Data Analysis	Measurement analysis, multiple trace comparison with respect to selectable baseline, measurement trends, graphical zoom		
	Alarm & Warnings	Automatic alarm triggering, configurable alarm settings (heat, threshold, etc.)		
	Remote Operation	Remote control, configuration and maintenance via TCP/IP		
	Watch Dog	Long term operation 24/7 guaranteed by automatic recovery and continuous self diagnostics		

<sup>1</sup> 2 channels or 4 channels are provided within the sensor unit. Additional channels can be added by using an external optical switch.

<sup>2</sup> Better spatial resolution is optional.

<sup>3</sup> This value is estimated/calculated from the uncertainty of laser beat frequency (5 kHz), and temperature and strain coefficients of fibers.

<sup>4</sup> Adaptors and patch cords are available for mating with other types of optical connectors.

<sup>5</sup> Dimensions do not include carrying handle. Air vents on sides of unit must not be obstructed.



## Related Products

### Fiber Optic Sensor Probes, Components, Termination Kits, and Training

OZ Optics offers a full spectrum of fiber optic sensor probes, components, termination kits and training. OZ Optics' standard fiber optic products have been used worldwide in high performance sensor and telecommunications applications since 1985. OZ Optics also offers specialty fiber optic sensor probes and custom cabling for high temperature applications and other hostile and corrosive environments. System integrators with experience in structural and pipeline monitoring will find that OZ Optics offers a complete suite of enabling products and services for installing and maintaining fiber optic systems. If you are planning a pipeline or structural monitoring project, please contact OZ Optics to learn more about our fiber optic solutions.

For more information about our strain and temperature sensor systems and related products, please visit [www.ozoptics.com](http://www.ozoptics.com).

### Ordering Information

#### Part Number Description: **BDTS-CT CO I-SR-MSR-AS-BOTDA-X-CH**

**CT** = Chassis Type of DSTS  
opto-electronics box  
3U = 3U chassis

**CO** = Computer Type  
L = Laptop (requires 3U chassis)  
R1U = 1U computer  
X = Customer supplier computer

**I** = Internal Interface between DAQ and computer  
T = Thunderbolt (requires 3U chassis)  
S = Standard

**SR** = Spatial Resolution (m)<sup>1</sup>  
1/10  
1/50

**CH** = Number of channels  
2CH = 2 built-in channels  
4CH = 4 built-in channels

**X** = Connector Type  
3A = FC/APC

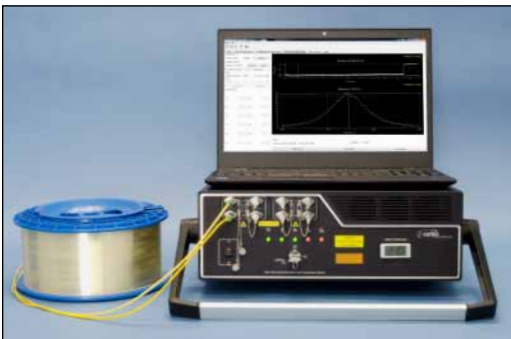
**AS** = Acquisition Speed<sup>3</sup>  
N = Normal  
H = High Speed

**MSR** = Maximum Sensing Range (km)<sup>1,2</sup>  
60  
100

For a field-ready unit, replace the chassis type, computer type, and computer interface with a single letter "F." Field ready units include a built-in computer, monitor, keyboard and mouse.

#### Notes:

1. Each BDTS can be configured for short haul operation, long haul operation or both. The configuration must be specified at the time of purchase. The spatial resolution indicates the best resolution at the maximum sensing range. If the BDTS is configured for both short-haul and long-haul measurements then two numbers will be listed indicating the resolutions and maximum sensing range for each operating mode. For example, suppose the BDTS unit needs to achieve 1 meter resolution over a 10 km range for short-haul applications, and 50 meter resolution over a 100 km range for long-haul applications. The part number will specify the spatial resolution (SR) as 1/50, and maximum sensing range (MSR) as 100.
2. Maximum sensing range is 60 km or 100 km for long haul operation.
3. The acquisition speed is described as normal or high speed. N and H are used respectively. The high-speed version is typically at least a factor of two faster than the normal-speed version during the acquisition of data.



#### 3U model with laptop computer

The 3U version of the BDTS comes with removable carrying handles. The user can easily replace the handles with tabs (sold separately) that will allow the unit to be installed in a standard 19-inch rack.



#### Field-ready model

A field-ready model is optional for our customers. Please contact OZ Optics for detailed information.

## Optional Accessories

Bar Code	Part Number	Description
48298	DSTS-TRAVEL-CASE-1U/3U	Optional aluminum carrying case for DSTS. Includes wheels and handle. Designed for checking on airplane. Approximate dimensions: 23.75 (H) x 22.5 (W) x 15 (D). {60.3 cm x 57.2 cm x 38.1 cm}.
48979	CI-1100-A2	Handheld Video Microscope kit for Fiber Optic Connector Inspection. The kit includes a 3.5" TFT LCD display with video probe, an AC power adapter with battery charger, and a rechargeable battery pack. It also includes one SC/FC PC female connector, one LC/PC female connector, one Universal 2.5 mm FC/PC male connector and one Universal 1.25 mm FC/PC male connector.
48980	CI-1100-A2-PT2-FS/APC/F	Tip for SC and FC APC type female (in receptacle) connector for CI-1100-A2 handheld microscope.
36939	HUXCLEANER-2.5	Receptacle fiber cleaner for FC, SC and ST types.
5336	Fiber-Connector-Cleaner-SA	Disposable Cletop reel type A optical fiber connector cleaner.
8122	SMJ-3A3A-1300/1550-9/125-3-1	1 meter long, 3 mm OD jacketed, 1300/1550 nm 9/125 $\mu$ m Corning SMF 28e fiber patchcord, terminated with angled FC/APC connectors on both ends.
11	PMPC-03	Flanged sleeve thru connector for polarization maintaining FC/PC connectors. Keyway width is 2.03/2.07 mm wide for 2.00 mm wide (Type R) key connectors.
19711	AA-200-11-9/125-3A3A	Universal connector with a male angle FC/APC connector at the input and a female angle FC/APC receptacle at the output end for SM 9/125 applications.
58975	DSTS-3U-19IN-RACK-MOUNT-KIT	Brackets with handles & hardware to convert 3U DSTS to 19" rack mountable version.

## Questionnaire

1. What is your application? Please describe briefly.
2. Are you looking for a BOTDA module (requires both ends of fiber to be connected to DSTS) or a BOTDR module (requires only one end of fiber to be connected to DSTS) or a COMBO unit with both BOTDA and BOTDR functions?
3. What are your resolution and precision requirements for temperature measurements?  
Resolution: \_\_\_\_\_  
Precision: \_\_\_\_\_
4. What are the highest and lowest temperatures you expect?
5. What are your resolution and precision requirements for strain measurements?  
Resolution: \_\_\_\_\_  
Precision: \_\_\_\_\_
6. What is the maximum strain to be measured?
7. What is the desired sensing range or fiber length in this application?
8. What spatial resolution do you desire?
9. Do you want to measure temperature, strain or both?
10. What is the desired data acquisition time?
11. Do you need fiber calibration / system design / project engineering service?
12. Where will the unit be housed?
13. Any additional information?

Please email [sales@ozoptics.com](mailto:sales@ozoptics.com) for our recommendation about your requirements.