

## Specifications NBX-5000

Function	BOTDR				
Laser Wavelength	1550 ±2 nm				
Distance Range	50 m, 100 m, 250 m, 500 m, 1 km, 2.5 km, 5 km, 10 km, 27 km				
Measurement Frequency Range	9~13 GHz				
Range of Strain Measurement	-30,000 to +40,000 $\mu\epsilon$ (-3 % to +4 %)				
Measurement Frequency Scan Step	1, 2, 5, 10, 20, 50 MHz				
Readout Resolution	5 cm (minimum)				
Sampling Points	600,000 (default)				
Average Count Settings	$2^5 \sim 2^{23}$ times (inc. Hardware Average Count $2^{16}$ )				
Pulse Width	5 ns	10 ns	20 ns	50 ns	100 ns
Spatial Resolution	50 cm	1 m	2 m	5 m	10 m
Dynamic Range <sup>(1)</sup>	2 dB	5 dB	8 dB	10 dB	13 dB
Max. Measurement Distance <sup>(2)</sup>	5 km	15 km	20 km	27 km	27 km
Optical Budget <sup>(1)(6)</sup>	4 dB	7 dB	10 dB	12 dB	15 dB
Measurement Accuracy <sup>(3)(4)</sup>	50 $\mu\epsilon$ / 2.5 °C	30 $\mu\epsilon$ / 1.5 °C			
Repeatability <sup>(3)(4)(5)</sup>	20 $\mu\epsilon$ / 1.0 °C				
Measurement Time <sup>(7)</sup>	5 second (minimum)				
Signal Terminal	Input-Output Fiber	Single mode optical fiber			
	Fiber Connector	FC-APC / SC-APC (factory option)			
Suitable Fiber	Single mode optical fiber				
Remort Control Interface	TCP/IP / GPIB (factory option)				
Power Supply	AC100 ~ 240V 50/60Hz 250VA				
Dimensions / Weight	approx. 456 (W) × 485 (D) × 286 (H) mm / 30 kg				
Operating Temperature	10~35 °C, Humidity below 85 % (no dew condensation)				
Storage Temperature	0~50 °C				
Place of Production	Japan				

(1) Based on  $2^{15}$  average cycles.

(2) Based on average fiber loss of 0.3 dB/km using Single mode fiber.

(3) Based on the measurement of strain free, UV coated fiber.

(4) Based on the measurement of strain free, UV coated fiber and in constant temperature environment.

(5) The maximum standard deviation of measurement value in 5 consecutive measurements for 100 consecutive points.

(6) Within the allowable range adjusted by the optical power excluding the case of nonlinear phenomena.

(7) The settings of 50 m distance range,  $2^8$ - $2^{14}$  count settings, 41 scanning steps excluding the time for Pulse Adjustment.

(1)-(6) are all based on a frequency scan step of 5 MHz and with Pulse Adjustment and Auto Frequency Adjustment on.

\* Specifications are subject to change without notice.

### Contact Address

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**Give you a feel<sup>®</sup>**  
When every point of the optical fiber is a sensor

## Neural Optical Fiber Scope **NEUBRESCOPE NBX-5000**

**NEW**

Single-end technology (BOTDR) to measure strain and / or temperature

Now operated from  
laptop computer  
for easy in-the-field use

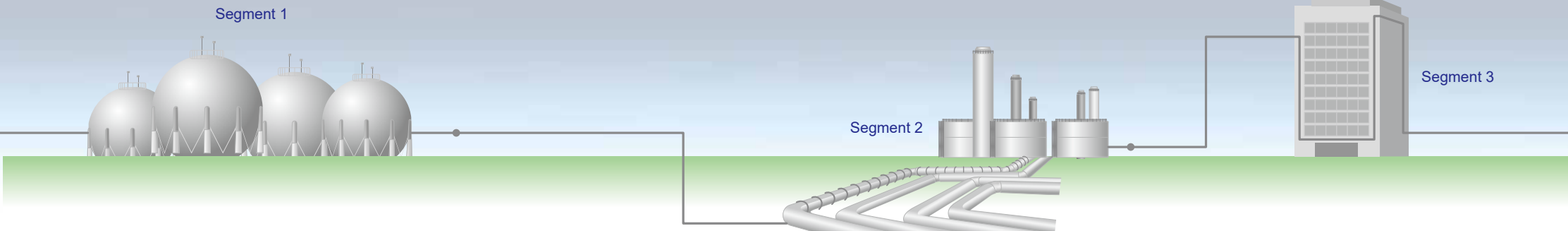


Spatial resolution: **50 cm** / Sampling resolution: **5 cm**

Repeatability of strain measurement: **20  $\mu\epsilon$**

Repeatability of temperature measurement: **1.0 °C**

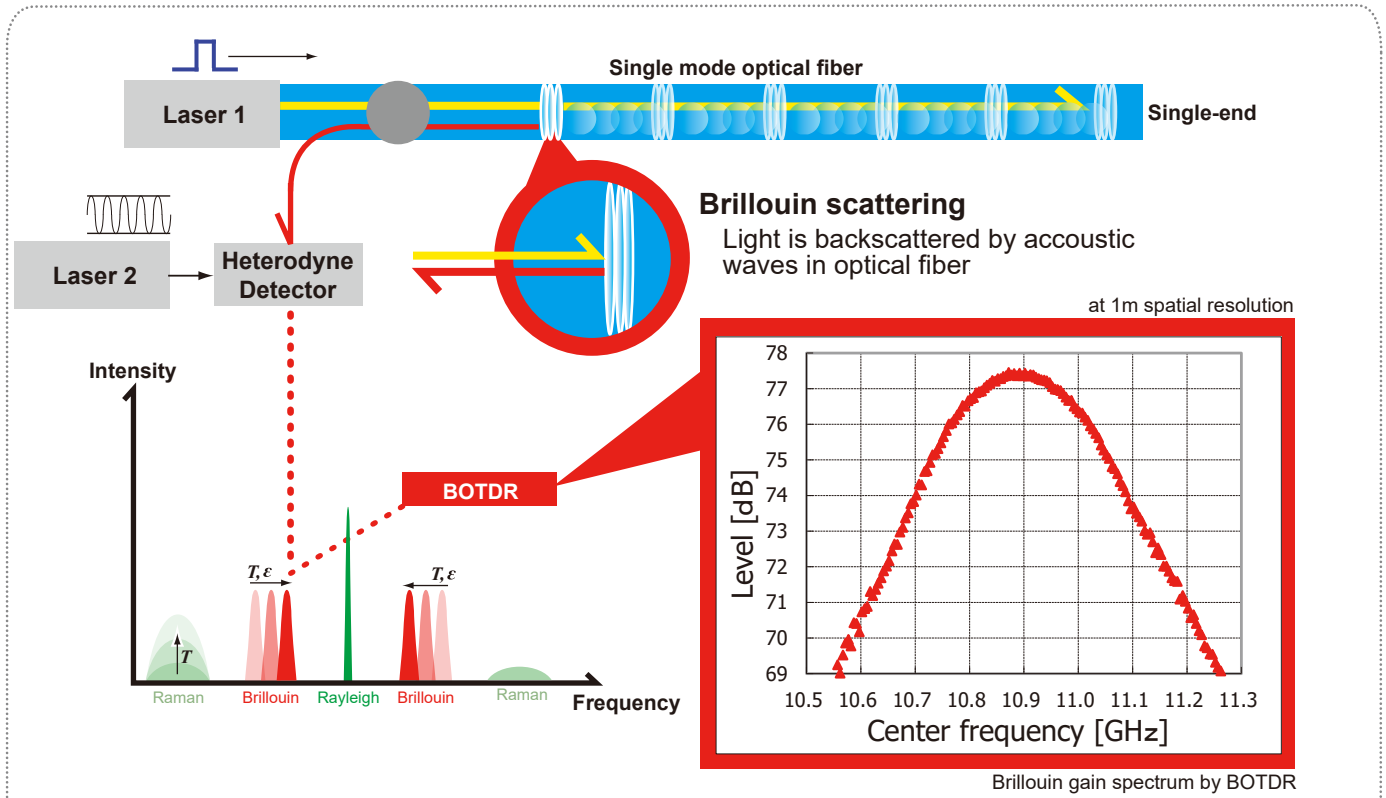




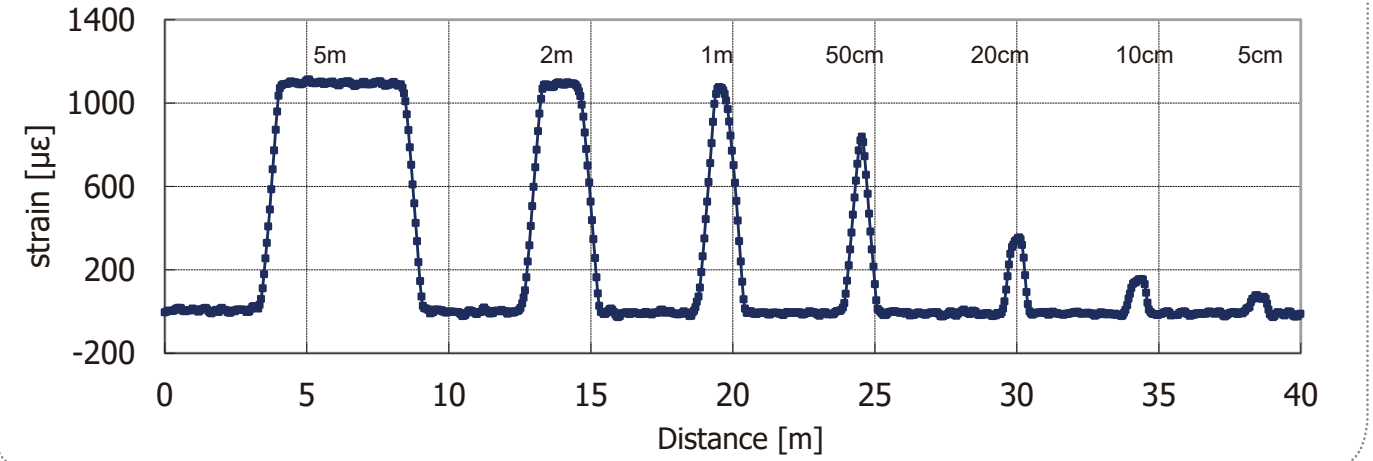
## Key features

- High cost/performance Brillouin Optical Time Domain Reflectometry (BOTDR)
- Measurement of strain and / or temperature at each point in any single mode optical fiber
- Long distance measurement up to 25 km

## Principles of BOTDR

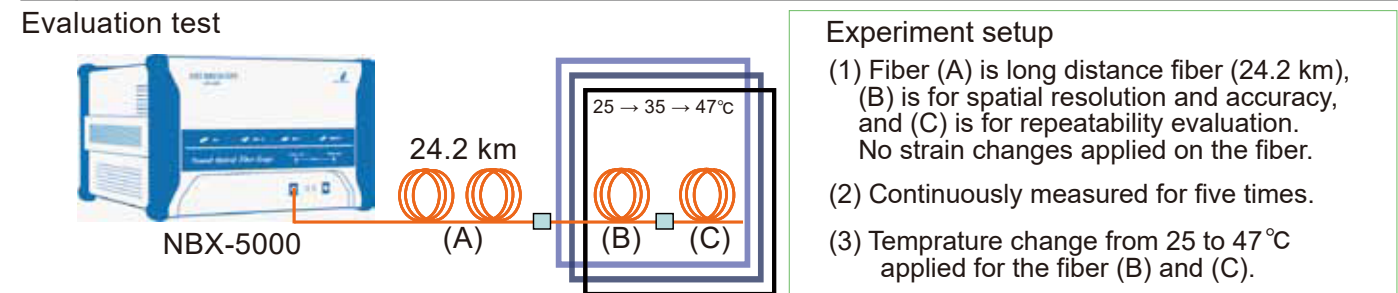


Example of strain distribution measured in spatial resolution and accuracy test fiber with resolution of 1 m

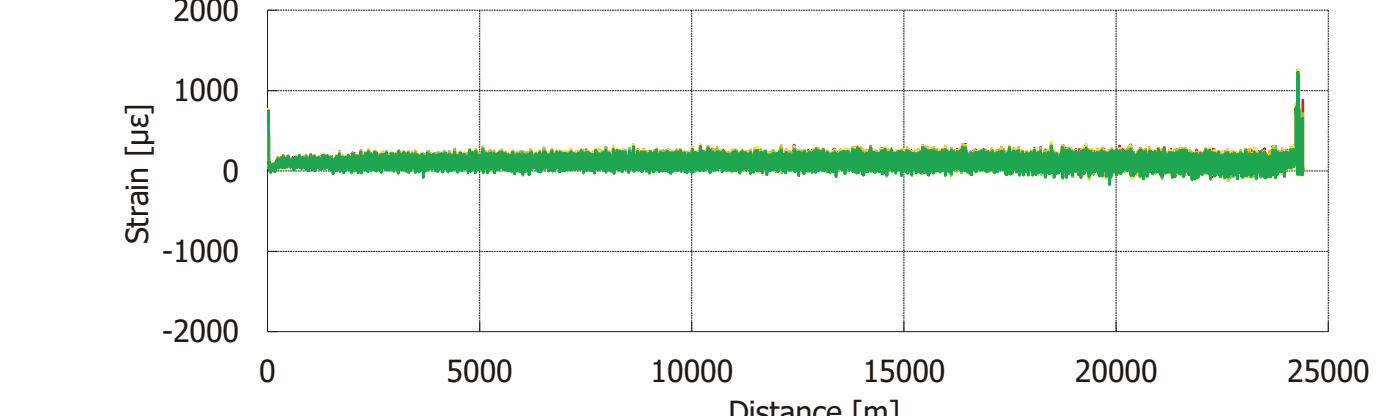


The NBX-5000 sensing system uses Brillouin backscattering phenomena, which employs single-end technology for long distance up to 25 km of Brillouin Optical Time Domain Reflectometry (BOTDR). It provides, in standard single-mode fiber, frequency shifts due to strain/temperature changes. Dynamic sensing (rates up to 200Hz) is also optionally available (NBX-5000A).

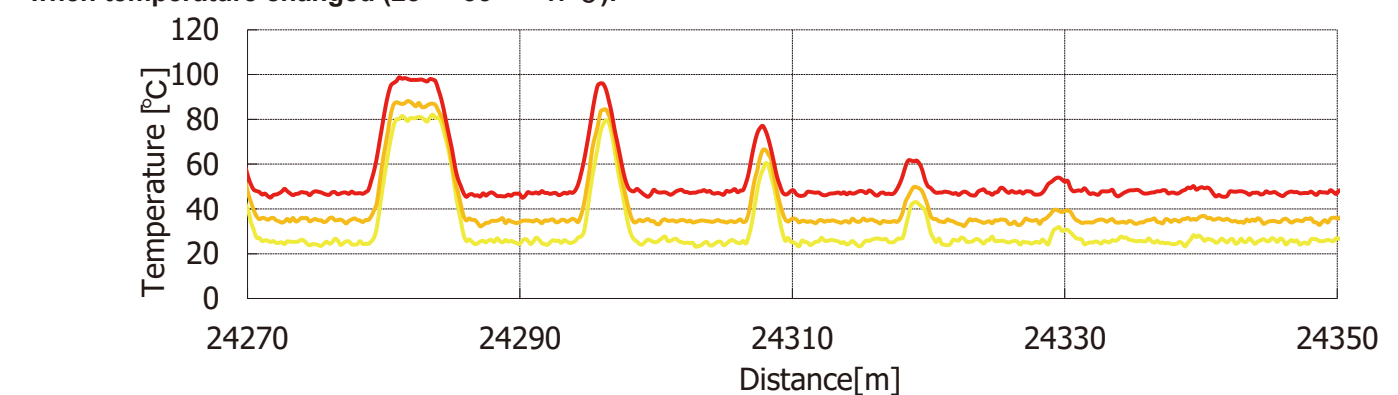
## Long Distance Measurement



Strain distribution (overlaid for five times) for the fiber (A), (B) and (C) with 2 m resolution



Temperature distribution for (B) using spatial resolution and accuracy test fiber (same fiber used in the left page) when temperature changed (25 → 35 → 47°C).



## Accuracy and Repeatability

Measured strain distribution (overlaid for five times) for the fiber (B) and (C) (left) at the same temperature, and strain difference (right) for the fiber (C) at the same condition.

