NEUBRESCOPE NBX-8100

The Coded PSP-BOTDR for High Speed and High-Resolution measurement

The NBX-8100 is the all new *Brillouin Optical Time Domain Reflectometry* (BOTDR) based interrogator for strain/temperature measurements. Instruments uses several advanced technologies and achieves unprecedented resolution and high measurement accuracy in single-end fiber access configuration.

The *Phase-Shifted Pulse* (PSP) technology means to achieve 20 cm spatial resolution and considerably better measurements accuracy.

Moreover, the signal acquisition and processing allows one to obtain results for an arbitrary portion of the sensing fiber without processing preceding portion, what substantially improves the measurements performance by reducing overall measurement time. Currently, instrument can provide strain/temperature of 100 m section (within 5 km fiber) in less than 24 seconds.

The NBX-8100 can limit the Brillouin Gain scanning process in the specific range of measurement fiber what leads to minimum measurement time; the fastest is 24 seconds in a 100 m section of the total 5 km long fiber.

Main Features

Model	Maximum Distance	Best Resolution	Fastest Measure Time	Accuracy	Repeatability
NBX-8100	*10 km*	*20 cm*	*24 sec*	*5με / 0.25℃*	*4με / 0.2℃*

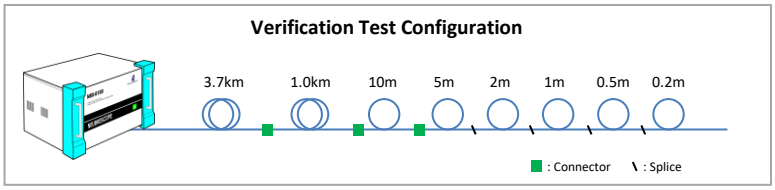
Higher Resolution

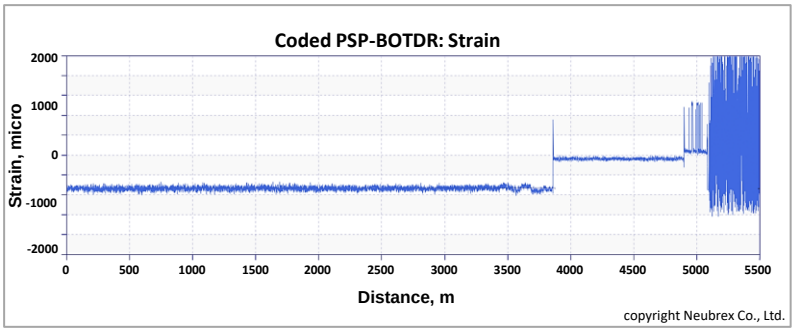
NBX-8100 is capable of measuring the strain/temperature along the fiber with the resolution up to 20 cm.

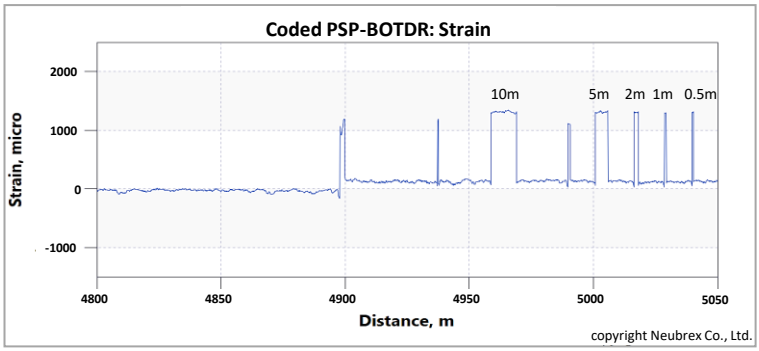
The resolution was tested by splicing the 3.7 km communication fiber to 1.0 km of standard sensing fiber and then to 200 m of test section, which included several FUT of varying lengths from 10 to 0.2 m.

Thus, 5 km distance range measurements were required, to detect FUT at the far-end of the fiber.

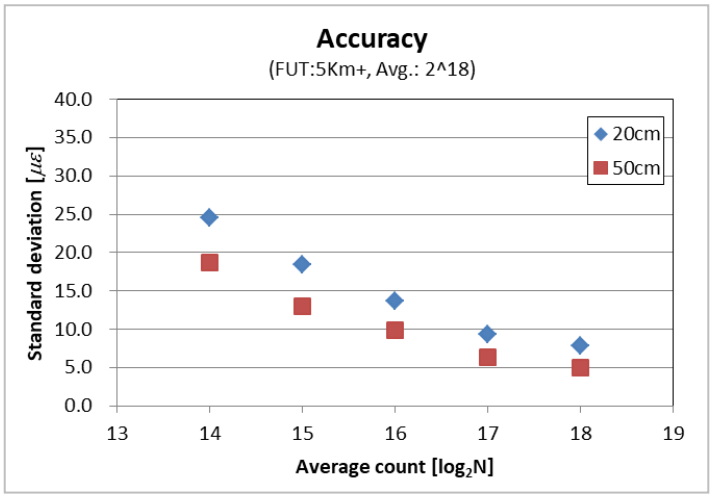
The results for zoomed in section between 4,800 to 5,050 m is shown.







High Accuracy

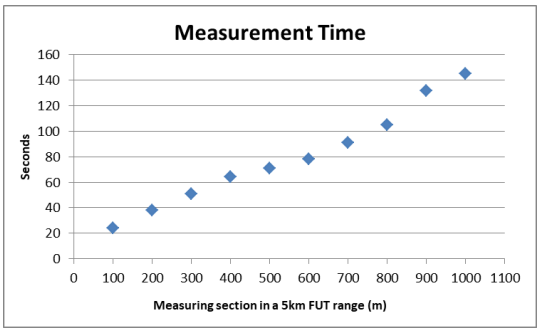


The high accuracy of NBX-8100 is clearly demonstrated during standard test in which 5 km fiber is kept at constant temperature and strain conditions. The UV coated single mode fiber was used during the test. The initial strain of FUT is measured and removed.

NBX-8100 achieves accuracy of 5 με for the 50 cm resolution and 8 με at 20 cm resolution. The values are based on the standard deviation (SD) of measurement value of 100 data points of 5 consecutive measurements.

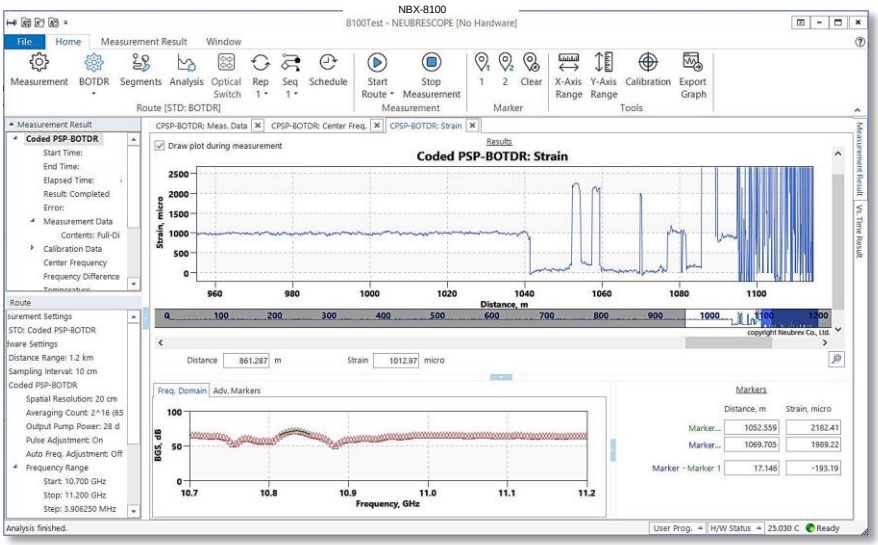
Faster Speed

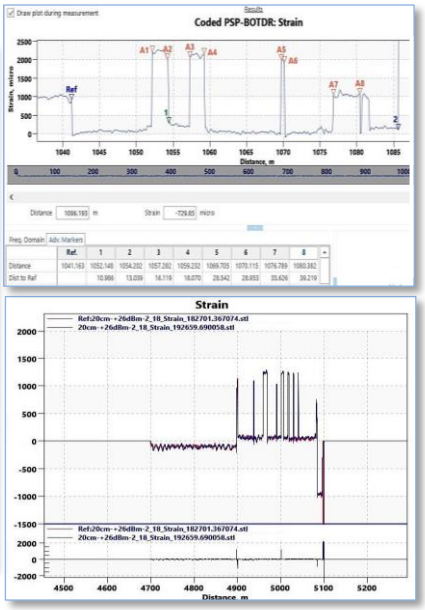
The signal acquisition and processing allows one to obtain results for an arbitrary portion of the sensing fiber, only, what substantially improves the measurements performance by reducing overall measurement time. Instrument can provide strain/temperature of 100 m section (within 5 km fiber) in less than 24 seconds.



Main Operational Functions

1. Display the measured data in Brillouin Gain Shift (BGS), Center Frequency, and Result Trace (in Strain or Temperature).
2. Simultaneously display at a single data point of measurement result in Amplitude value, Distance, and Brillouin Shifted Frequency.
3. Specify multiple Markers on the trace of result as for an analytical comparison purpose. The numbers of marked point can be up to 8.
4. The measured result can be compared with others by displaying the comparison Trace and the place of Difference. The numbers of comparison trace can be up to 10.
5. User can input a new value of Brillouin Center Frequency and then the measured results will be re-calculated and re-displayed.
6. Various measurement methods, such as Manual measurement, Repeat measurement, Sequence measurement, and Schedule measurement that can be performed according to the user's designation.
7. User can assign different fiber segments, in according to their optical characteristics or length, as one FUT set.
8. The open-architecture API allows user to extend the list and add support for any other format.

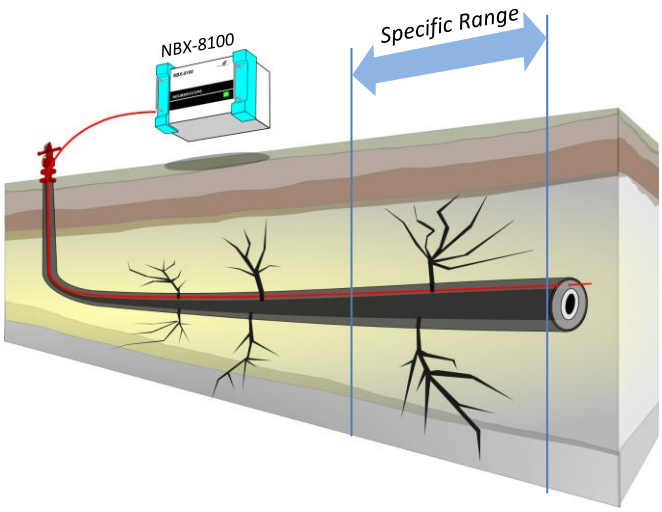


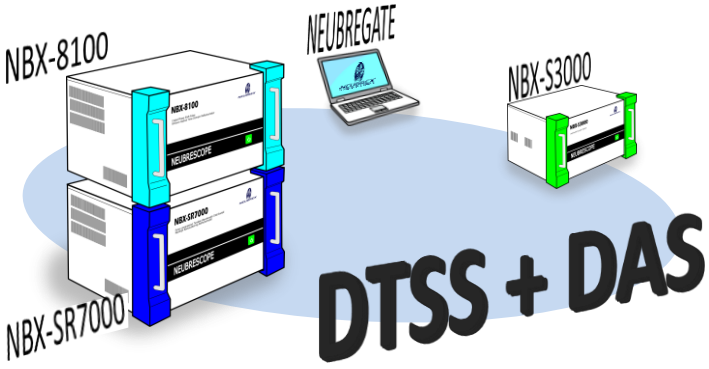


Application – Oil & Gas

The NBX-8100 is one of the best BOTDR from Neubrex for measuring the temperature and/or strain along whole fiber length and also in a given specific range in the well.

The maximum 10 km distance is covering depth of almost any well drilled today. 20 cm spatial resolution is able to provide the detail readouts.



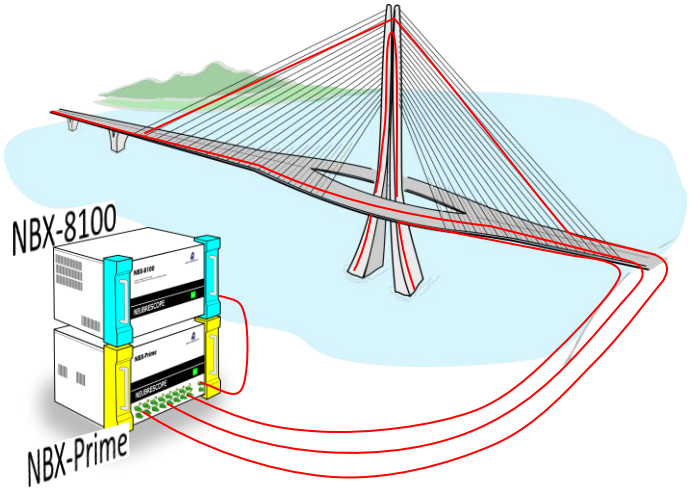


Combined with NEUBREX NBX-S3000 Acoustic interrogator, NBX-SR7000 Rayleigh TW-COTDR interrogator, and the NEUBREGATE analysis software; the high speed, high resolution, and high accuracy DTSS+DAS system is available now for Oil and Gas industry.

Application – Civil Engineering

The NBX-8100 is one of the best Brillouin Interrogators per its Spatial Resolution and Measurement Time for strain/temperature monitoring of civil engineering structures.

With NBX-Prime; the data processing engine with built-in 8 channels optical switch and NEUBREGATE analysis software, the NBX-8100, can sequentially measure multiple fibers of the structures.



Specifications

Model	NBX-8100	
Main Function	PSP-BOTDR	
Laser Wavelength	1550 ± 2 nm	
Distance Range	50m～3km (100m step)、3km～10km (1km step)	
Measurement Frequency Range	9 ~ 13 GHz	
Range of Strain Measurements	-4000με～+4000με (-0.4%～+0.4%)	
Range of Temperature Measurements	-100°C～200°C (fiber dependent)	
Frequency Scanning Interval	4MHz、8MHz、16MHz	
Readout Resolution	10 cm (default)	
Sampling Points	100,000 (default)	
Avarage Count Settings	2^5 ~ 2^{23} times (including Hardware Average Count 2^5 ~2^{16})	
Pulse Width	2ns	5ns
Spatial Resolution	20 cm	50 cm
Dynamic Range *1	4 dB	
Max. Measurement Distance *2	10 km	
Measurement Accuracy *3*4	5 με / 0.25°C	
Repeatability *3*4*5	4με / 0.2°C	
Measurement Time *6	< 60 seconds	
Fiber Connector	FC-APC / SC-APC (Factory option)	
Control Interface	Ethernet RJ-45 x1, USB 2.0 (type-A) x2	
Power Supply	AC 100~240 V, 50/60 Hz, 250 VA	
Laser Class	Class 1 (IEC60825-1 : 2001)	
Dimensions / Weight	approx. 450 (W) × 658 (D) × 295 (H) mm / 38 kg	
Operating Temperature	10 ~ 35 °C, RH 85% (no dew condensation)	
Storage Temperature	0 ~ 50 °C	

*1 Based on 2^{16} average cycles
*2 Based on average fiber loss of 0.3 dB/km using single mode fiber (UV-coated).
*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 The settings of 100 m measurement range, 2^{16} count settings, 2MHz frequency step excluding the time for Pulse Adjustment.

* The specifications above and accessories layout are subject to change without notice. (2019.05.14)

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