

Give you a feel[®]
When every point of the optical fiber is a sensor

Neural Optical Fiber Scope
NEUBRESCOPE *NBX-S4200 series, 2 channel*

Optical Fiber Distributed Acoustic Sensing and Acquisition System for DAS / DVS



Interrogation range: 1km ~ 120km

Measuring spatial resolution: 1.0m~50m

Gauge length: 0.2m~25m

Frequency range: 0.1Hz ~ 10kHz

Interrogate rate: 500 ~ 20k times per second

2 fiber optical channels for measurement



Key Features

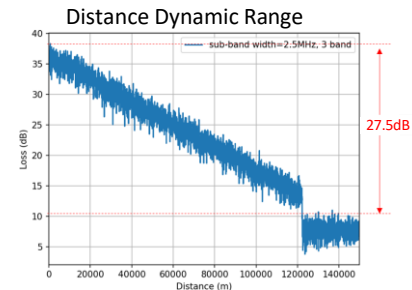
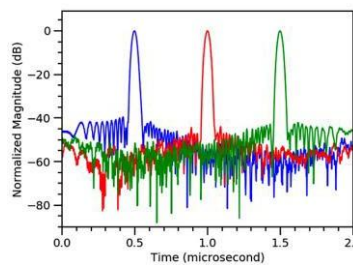
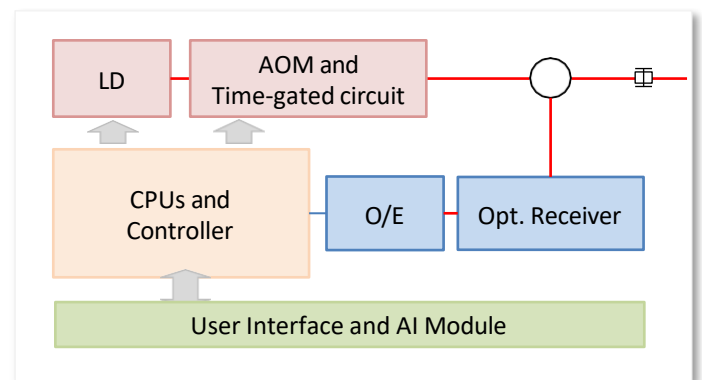
- The 120km Interrogation distance in fiber optic acoustic sensing and acquisition.
- For the main sensing features of Vibration and Acoustic sensing.
- Spatial resolution as high as 10 m, total fiber interrogation range is up to 120km.
- Fastest interrogating speed is 20k times per second.

Distributed Acoustic Sensing System

The NBX-S4200 Series has the leading technology of Distributed acoustic sensing (DAS) interrogator for the dynamic strains or sound waves measurement in the distributed optical fiber.

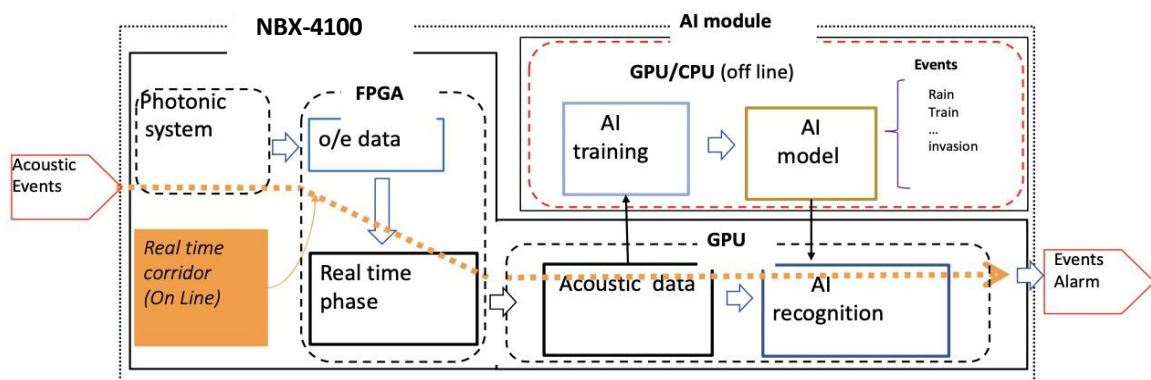
Thanks to the new and realized Time-gated digital optical frequency domain reflectometry (TGD-OFDR) technology. By measuring the phase or amplitude changes of the scattered light, the NBX-S4200 ensures sufficiently high signal-noise ratio for scattered light detection, suppress its deterioration along the sensing fiber, and, moreover, perform high-speed processing within milliseconds. The outcome leads the NBX-S4200 can detect sound waves at an 120 km fiber distance range with spatial resolution value of 10 m in real time interrogating.

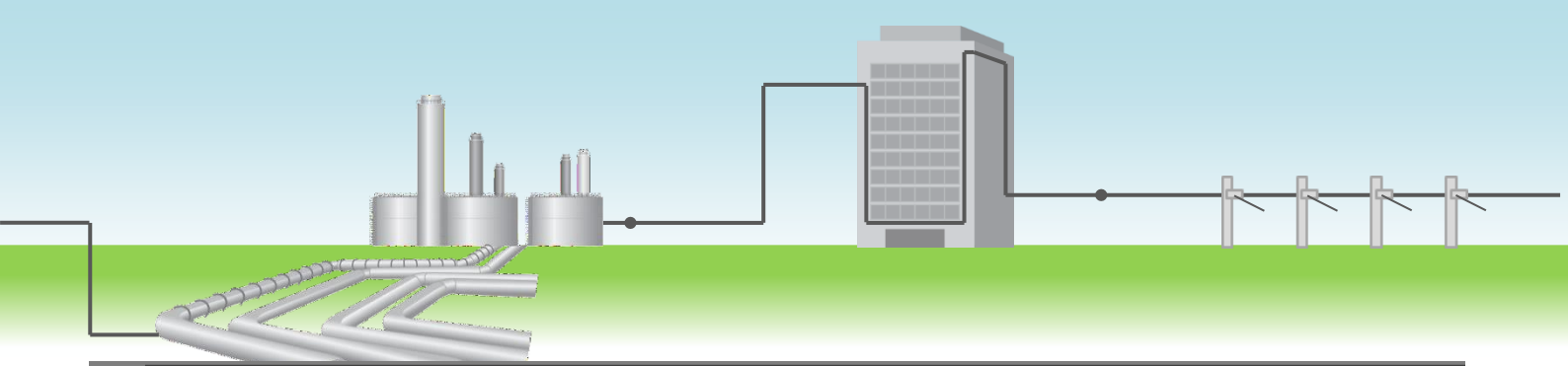
The NBX-S4200 has been tested in the field in various applications, from earthquake detection and submarine cable sensing to oil and gas industry applications. All obtained results confirmed effectiveness of the method and performance, surpassing, in conventional SM fiber, other commercially available interrogators.



User Interface and AI Module

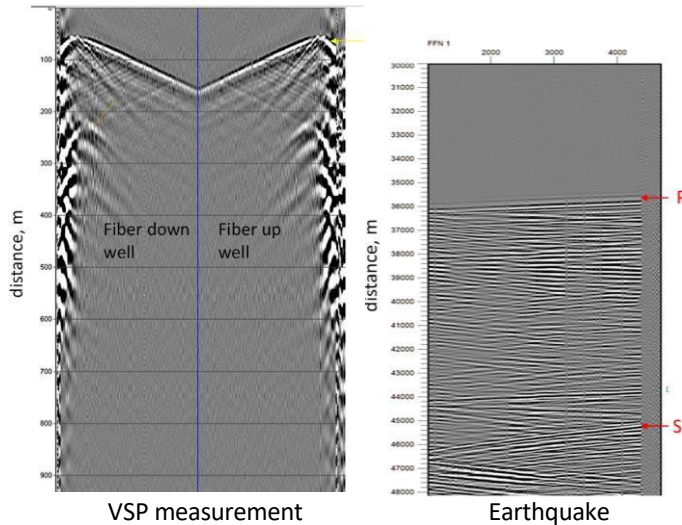
For the field control and application, the signal acquired by the NBX-S4200 interrogator unit can be automatically processed and used in events detection and a monitoring system. This requires a separate module for machine learning algorithm training, as well as the real time DAS monitoring system. There are cases in which the AI module is executed in the acquisition mode (during signal acquisition) and some in the post-processing mode. The figure shows the overall scheme of automatic even



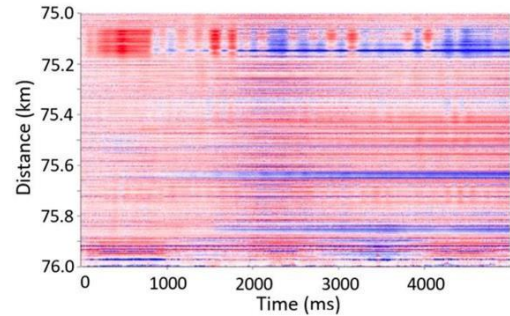


Application Examples

Example 1: VSP and earthquakes detection

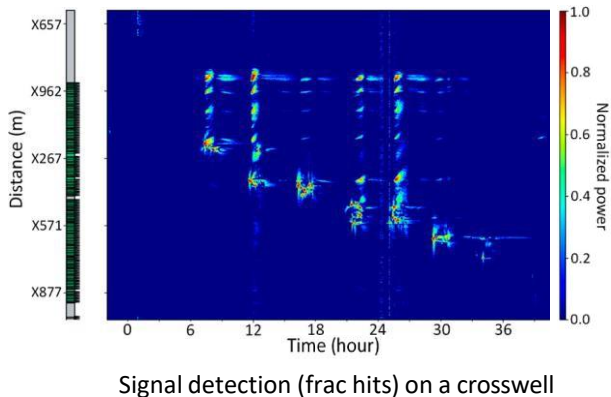


Example 2: Long distance-range submarine cable

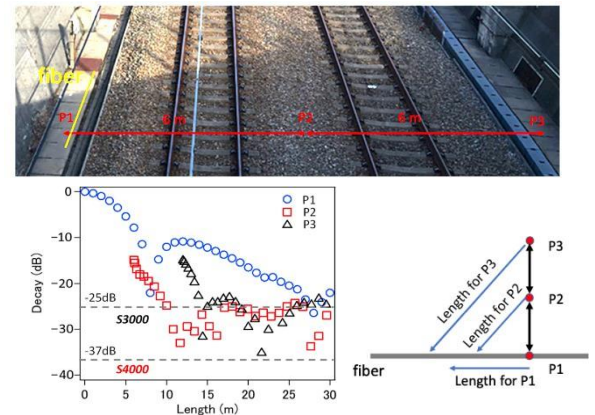


- Cable Type: Submarine Fiberoptic Cable
- Sampling rate : 0.5 kS/s
- Spatial resolution : 1.6 m
- Gauge length : 2 m.
- Measure range : 80 km.

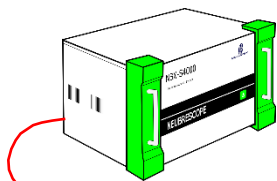
Example 3: Hydraulic Fracture Hits Detection



Example 4: Intrusion detection by Dark Fibers



Configurations & Applications



DAS for Acoustic Sensing

- Phase and Amplitude acoustic sensing
- High spatial resolution.
- Good accuracy and repeatability.
- High-Speed dynamic seismic sensing.

DVS for Vibration Sensing

- Amplitude and Intensity vibration sensing
- High spatial resolution.
- Quick responding time.



Specifications NBX-S4200 series

Function	Property					
General Function	Optical Fiber Distributed Acoustic Acquisition System、TGD-OFDR					
Laser wavelength	1550 ± 2 nm (Linewidth < 0.1kHz)					
Interrogation Range	1km ~ 120 km					
Finest Spatial Resolution	1.0 m					
Spatial Sampling Interval	0.2 m					
Gauge Length	0.2 m					
Number of Sampling points	600,000 (maximum)					
Interrogation Rate ^{*2}	500Sps~20KSps (Real time data process)					
Frequency Range	0.1Hz~ 10kHz					
Chirp Pulse width	2 microseconds					
Spatial Resolution ^{*3}	1m	2m	5m	10m	20m	50m
Distance Dynamic Range ^{*3}	16.0dB	20.0dB	23.5dB	24.0dB	25.5dB	27.5dB
Measurable distance ^{*1}	80km	100km	115km	120km	120km	120km
Output data	Strain rate (με/s)					
Sensitivity ^{*4*5}	10pε/(Hz) ^{0.5}					
File format	HDF5 or SEG Y					
Internal Store	4 TB					
Inbuilt loss analysis	TGD-OFDR					
Input-output fiber	Single mode optical fiber					
Fiber connector	SC/APC (Factory default) , E2000/APC(Factory option)					
Applicable fiber ^{*6}	Single mode optical fiber / Multi mode optical fiber (GI type)					
Power supply	AC 100~240 V 50/60 Hz 350 VA					
Laser class	Class 1 (IEC60825-1 : 2001)					
Dimensions / Weight	approx. 450(W) × 685(D) × 295(H) mm / 30 kg					
Operating temperature	10 ~ 40 ° C, Humidity below 85 % (no dew condensation)					
Storage temperature	0 ~ 50 ° C					
Place of production	Japan					

For the detail of Anti-Vibration Bench and other models, please contact us.

*1 Based on average fiber loss of 0.20 dB/km, output power of +22dBm using single mode fiber (UV-coated).

*2 This does not include post processing.

*3 Resolution of the DAS signal can be changed (increased/decreased) after data is acquired.

This is the data post-processing step.

*4 Based on the measurement of strain free, UV coated fiber at 100Hz.

*5 Based on the measurement of strain free, UV coated fiber and in constant temperature environment.

*6 Based on the SMF/MMF conversion code provided by NEUBREX in MMF measurement.

* Specifications are subject to change without notice.

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