GIVE YOU A feel® When every point of the optical fiber is a sensor

Neural Optical Fiber Scope

NEUBRESCOPE NBX-6026 / NBX-6056

The Brillouin Backscattering Analyzer with patented Pulse-Pre-Pump technology that dedicates for distribution fiber optic Strain and/or Temperature measurement



Built-in operation controller and data analyzer

The **cm-grade** Spatial Resolution in **2cm** (NBX-6026) / **5cm** (NBX-6056)

Strain Repeatability: $7.5\mu\epsilon$ (NBX-6026) / $3\mu\epsilon$ (NBX-6056)

Temperature Repeatability: **0.35°C** (NBX-6026) / **0.15°C** (NBX-6056)

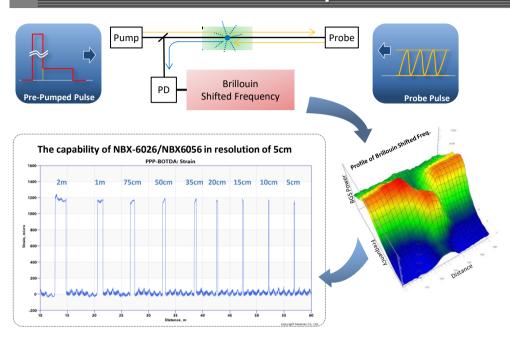
High Speed measurement up to **550 times/sec** (NBX-6056)







The Principle of PPP-BOTDA



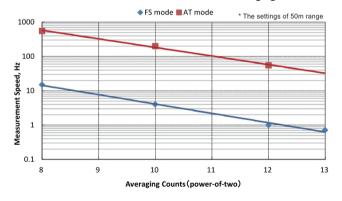
The patented pump laser control technology; the Pulse Pre-Pump (PPP) was conducted into the NBX-6026/NBX-6056 with the sophisticated design and state-of-art manufacturing.

By the pre-stimulated Brillouin effects in the sensing fiber, the NBX-6026/NBX-6056 has better gain response from the activated area of Strain or Temperature.

The measurement data resolution can be significantly improved to the level of 5 cm-order, and the measurement accuracy can be up to $7.5\mu\epsilon$ / $3\mu\epsilon$.

Capabilities

Relation between measurement and averaging counts



The NEUBRESCOPE NBX-6026/NBX-6056 offers two high speed measurement modes:

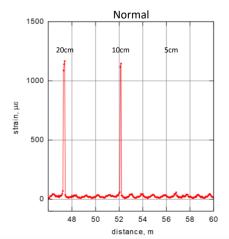
- Frequency Scanning (FS) Mode.
- Amplitude Transfer (AT) Mode.

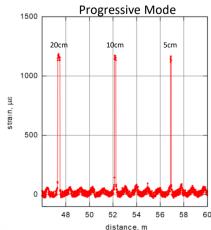
On the left the picture denotes the high speed measurement result of FS Mode and AT Mode. The test specimens is an aluminum plate in 100cm x 5cm size, and vibrated in 10Hz at one end of the plate.

As the result, the measurement speed is related with the length of fiber and the average counts. More details can be obtained by contact our representatives respectively.

The NBX-6026/NBX-6056 provides the Progress Mode that provides higher spatial resolution for the certain applications as required.

In progressive mode, high spatial resolution is achieved by specially designed pulse pre-pump scheme, resulting in signal power level higher by 1.5 dB than that of Normal measurement mode.





NEUE

Software and Operation User Interface

The NEUBRESCOPE software features redesigned User Interface, considerably improving user experience and productivity. The instrument is fully controlled via software by its Ethernet port. Moreover, software openarchitecture allows one to extend

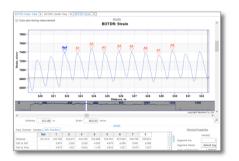
• Strain / Temperature waveform along with length of fiber.

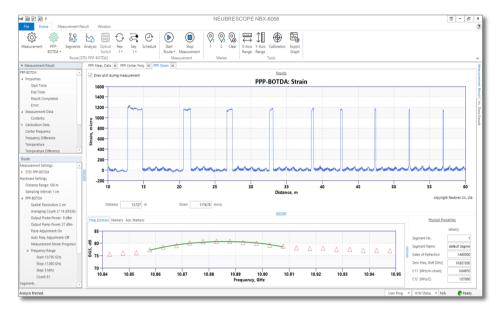
this list and add support for any

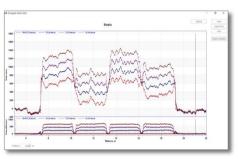
· Gain of Frequency Shift.

other format.

- Comparison in between of multiple given measured data.
- Advanced Marker for cross reference easily and quickly.









Configurations & Applications

PPP-BOTDA

- Double-ended (Loop) fiber access.
- · High resolution.
- · Good accuracy and repeatability.
- High-Speed Dynamic Stain Sensing:
 - Frequency Sweep (FS) mode.
 - Amplitude Transfer (AT) mode.













Specifications NBX-6026 / NBX-6056

Displaying Range	Management Mada					DDD DOTDA				
Displaying Range S25km S25km Measurement Freq. Range S25km S40,000 to +40,000 με (-3% to +4%)		PPP-BOTDA								
Measurement Freq. Range 9 ~ 13 GHz Measurement Strain Range -30,000 to +40,000 με (-3% to +4%) Freq. Scan Step 1, 2, 5, 10, 20, 50 MHz Readout Resolution Sampling Points Average Count NBX-6026* NBX-6026* Pulse Width (ns) 0.2 0.5 1 2 5 10 20.5 1 2 5 10 20.5 1 2 5 10 20.5 1 2 5 10 20 5 10 20 5 10 20 5 10 20 5 10 20 5 10 20 5 10 20 5 7 2										
Measurement Strain Range -30,000 to +40,000 με (-3% to +4%)		*								
Readout Resolution Scm (default), 1cm (minimum)		1 11								
Sampling Points Sampling										
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$										
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$\begin{array}{c ccccccccccccccccccccccccccccccccccc$										
Pulse Width (ns) 0.2 0.5 1 2 0.5 1 2 5 10 Spatial Resolution (cm) 2 5 10 20 5 10 20 50 100 Dynamic Range (dB) *1 0.5 1 1.5 3 1 1.5 3 3 6 Measurement Range (km) *2 0.5 1 2 5 1 2 5 10 20 Optical Budget *1*6 2 3 5 7 2 5 7 8 10 Measurement Accuracy *1*3*4 15με / 0.75°C 7.5με / 0.35°C 7.5με / 0.35°C 7 3 με / 0.3°C 0.3°C 0.3°C 0.15°C 0.3°C 0.15°C	Average Count	2 ³ to 2 ²³ (incl. Hardware Average Count 2 ¹⁶)								
Spatial Resolution (cm) 2 5 10 20 5 10 20 50 100 Dynamic Range (dB) *1 0.5 1 1.5 3 1 1.5 3 3 6 Measurement Range (km) *2 0.5 1 2 5 1 2 5 10 20 Optical Budget *1*6 2 3 5 7 2 5 7 8 10 Measurement Accuracy *1*3*4 15με / 0.75°C 7.5με / 0.35°C 7.5με / 0.75°C 3 με / 0.3°C 3 με / 0.3°C 0.3°C 0.3°C 0.3°C 0.3°C 0.3°C 0.15°C 0.15°C 0.35°C 0.35°C 0.35°C 0.15°C 0	Model	NBX-6026				NBX-6056				
Dynamic Range (dB) *1 0.5 1 1.5 3 1 1.5 3 3 6 Measurement Range (km) *2 0.5 1 2 5 1 2 5 10 20 Optical Budget *1*6 2 3 5 7 2 5 7 8 10 Measurement Accuracy *1*3*4 15με / 0.75°C 7.5με / 0.75°C 7.5με / 0.75°C 7.5με / 0.3°C 3 με / 0.3°C 0.3°C 0.3°C 0.15°C	Pulse Width (ns)	0.2	0.5	1	2	0.5	1	2	5	10
Measurement Range (km) *2 0.5 1 2 5 1 2 5 10 20 Optical Budget *1*6 2 3 5 7 2 5 7 8 10 Measurement Accuracy *1*3*4 15με / 0.75°C 7.5με / 0.35°C 0.75°C 7με / 0.3°C 0.3°C Repeatability *1*3*4*5 10με / 0.5°C 7.5με / 0.35°C 7.5με / 0.35°C 3 με / 0.15°C Measurement Time *7 (NBX-6026 Only) 10 sec (at Readout Resolution 5cm) 60 sec (at Readout Resolution 1cm) Frequency Sweep (FS) Mode**8 : < 15 Hz Amplitude Transfer (AT) Mode *9: < 550Hz	Spatial Resolution (cm)	2	5	10	20	5	10	20	50	100
Optical Budget *1*6 2 3 5 7 2 5 7 8 10 Measurement Accuracy *1*3*4 $15\mu\epsilon/0.75^{\circ}$ C $7.5\mu\epsilon/0.75^{\circ}$ C $15\mu\epsilon/0.75^{\circ}$ C $7.5\mu\epsilon/0.75^{\circ}$ C $7.5\mu\epsilon/0.75^{\circ}$ C $7.5\mu\epsilon/0.75^{\circ}$ C $3\mu\epsilon/0.75^{\circ}$ C Repeatability *1*3*4*5 $10\mu\epsilon/0.55^{\circ}$ C $7.5\mu\epsilon/0.75^{\circ}$ C $7.5\mu\epsilon/0.75^{\circ}$ C $3\mu\epsilon/0.75^{\circ}$ C Measurement Time *7 (NBX-6026 Only) $10 \sec$ (at Readout Resolution 5cm) 60 sec (at Readout Resolution 1cm) $-10 \sec$ (FS) Mode *8 : < 15 Hz Amplitude Transfer (AT) Mode *9: < 550Hz	Dynamic Range (dB) *1	0.5	1	1.5	3	1	1.5	3	3	6
Measurement Accuracy *1*3*4 $15\mu\epsilon$ / 0.75° C $7.5\mu\epsilon$ / 0.75° C $15\mu\epsilon$ / 0.75° C $7.5\mu\epsilon$ / 0.75° C $7.5\mu\epsilon$ / 0.75° C $7.5\mu\epsilon$ / 0.75° C $3\mu\epsilon$ / 0.35° CRepeatability *1*3*4*5 $10\mu\epsilon$ / 0.5° C $7.5\mu\epsilon$ / 0.35° C $3\mu\epsilon$ / 0.35° C 0.15° CMeasurement Time *7 (NBX-6026 Only) $10\sec$ (at Readout Resolution 5cm) 60 sec (at Readout Resolution 1cm)Frequency Sweep (FS) Mode*8 : < 15 Hz Amplitude Transfer (AT) Mode *9 : < 550Hz	Measurement Range (km) *2	0.5	1	2	5	1	2	5	10	20
Measurement Accuracy 0.75° C 0.35° C 0.75° C 0.35° C 0.15° CMeasurement Time *7 (NBX-6026 Only) $10 \text{ sec (at Readout Resolution 5cm)} \\ 60 \text{ sec (at Readout Resolution 1cm)}$ Frequency Sweep (FS) Mode*8 : < 15 Hz Amplitude Transfer (AT) Mode *9 : < 550Hz	Optical Budget *1 *6	2	3	5	7	2	5	7	8	10
Measurement Time *7 (NBX-6026 Only) High-Speed Measurement (NBX-6056 Only) Applicable Sensing Fiber Connector Type Input/output Interface O.5°C O.35°C O.35°C O.35°C O.35°C O.35°C O.35°C O.35°C O.35°C O.15°C O.15°C	Measurement Accuracy *1 *3 *4									
(NBX-6026 Only) High-Speed Measurement (NBX-6056 Only) Applicable Sensing Fiber Connector Type Frequency Sweep (FS) Mode*8 : < 15 Hz Amplitude Transfer (AT) Mode *9 : < 550Hz Single Mode Fiber FC/APC (factory default) Input/output Interface USB 2.0 x4, LAN x2, RGB x1 Power Supply AC100 ~ 240V, 50/60Hz, 250VA	Repeatability *1 *3 *4 *5									
Amplitude Transfer (AT) Mode *9: < 550Hz Applicable Sensing Fiber Single Mode Fiber Connector Type FC/APC (factory default) Input/output Interface USB 2.0 x4, LAN x2, RGB x1 Power Supply AC100 ~ 240V, 50/60Hz, 250VA						-				
Connector Type FC/APC (factory default) Input/output Interface USB 2.0 x4, LAN x2, RGB x1 Power Supply AC100 ~ 240V, 50/60Hz, 250VA		-								
Input/output Interface USB 2.0 x4, LAN x2, RGB x1 Power Supply AC100 ~ 240V, 50/60Hz, 250VA	Applicable Sensing Fiber	Single Mode Fiber								
Power Supply AC100 ~ 240V, 50/60Hz, 250VA	Connector Type	FC/APC (factory default)								
	Input/output Interface	USB 2.0 x4, LAN x2, RGB x1								
St. 4 (F66925 4, 2004)	Power Supply	AC100 ~ 240V, 50/60Hz, 250VA								
Laser Safety Class 1 (IEC60825-1 : 2001)	Laser Safety Class	Class 1 (IEC60825-1 : 2001)								
Dimensions / Weight approx. 456 (W) × 485 (D) × 286 (H) mm / 30 kg	Dimensions / Weight	approx. 456 (W) × 485 (D) × 286 (H) mm / 30 kg								
Operating Temperature 10~40 °C, Humidity below 85% (no dew condensation)	Operating Temperature	10∼40 °C, Humidity below 85% (no dew condensation)								
Storage Temperature 0 ~ 50 °C	Storage Temperature	0 ~ 50 °C								
Place of Production Japan	Place of Production	Japan								

- *1: Based on 2^15 average cycles by progressive measurement mode. *2: Based on average fiber loss of 0.3 dB/km using Single mode fiber.
- ${
 m *3:}\,$ 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, 2^14 count settings, 41 scanning steps excluding the time for Pulse Adjustment.
- *8: The settings of 50 m range, 2^8 count settings, 41 scanning steps in batch processing mode.

 *9: The settings of 50 m range, 2^8 count settings, 41 scanning step in batch processing mode.

 *1 to *7 are all based on a frequency scan step of 5 MHz and with Pulse Adjustment and Auto Frequency Adjustment on.

 $\ensuremath{^{*}}$ The specifications above and accessories layout are subject to change without notice. (20180618, A4)

Contact Address

Neubrex Co., Ltd.

Sakae-machi-dori 1-1-24, Chuo-ku, Kobe, Hyogo 650-0023, Japan Tel: +81-78-335-3510 Fax: +81-78-335-3515

