OPTICAL BACKSCATTER REFLECTOMETER™
(Model OBR 4600)

The Luna OBR 4600 offers unbeatable testing and troubleshooting capabilities now at unprecedented measurement speeds.

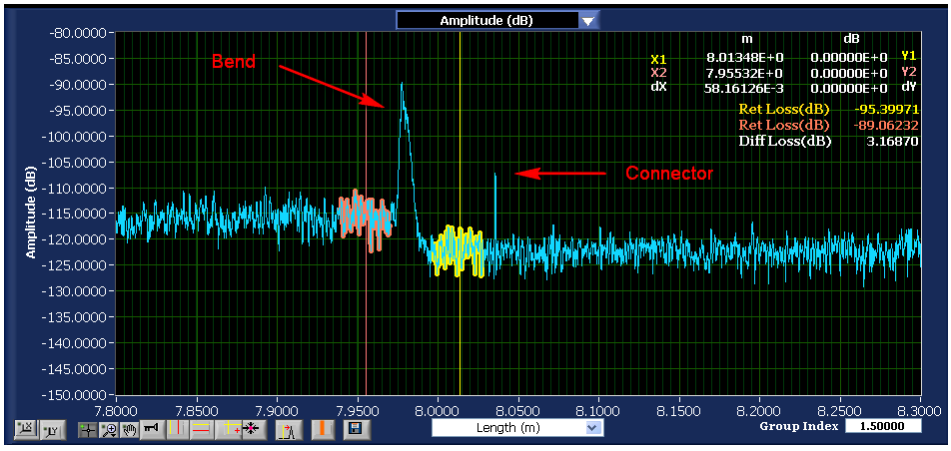
KEY FEATURES AND PRODUCT HIGHLIGHTS

- **Easily locate, identify and troubleshoot macro-bends, splices, connectors and breaks**
- **Locate Insertion Loss points at every point in the network or assembly – eliminate cut-back**
- **Look inside components to evaluate each interface for RL and IL**
- **Measure 30 m with 10 µm resolution in less than 7 seconds**
- **Continuously measure a 1 m segment at up to 3 Hz**
- **Test and troubleshoot short-run networks (< 2 km)**
- **Automate pass/fail verification of fiber assemblies**
- **Monitor distributed temperature and strain profiles along network or inside a component or module**

The Luna **OBR 4600** is part of Luna's award winning Optical Backscatter Reflectometer™ product line. Designed for component and short-run network testing and troubleshooting, the OBR 4600 enables ultra-high resolution reflectometry with backscatter-level sensitivity. With spatial resolution as fine as 10 microns, zero dead-zone, options for integrated temperature and strain sensing and extended device mode, the OBR 4600 offers the ultimate in fiber diagnostics.

MEASUREMENT PERFORMANCE HIGHLIGHTS

- **-130 dB sensitivity**
- **70 dB dynamic range**
- **2 kilometer length range with no dead-zone**
- **< 0.05 dB insertion loss resolution**



LUNA

OBR 4600

PARAMETER	SPECIFICATION	UNITS
Maximum Device Length:		
Standard Mode	30 or 70	meters
Long Range Mode[12]	2000	meters
Spatial Resolution (two-point)[1]:		
	10 µm over 30 meters	
	20 µm over 70 meters	
	1 mm over 2 km	
Dead Zone:		
	Equals 2-pt spatial resolution	
Wavelength Range[2]:		
	1270-1340 or 1525-1610	nm
Wavelength:		
Resolution (max)	0.02	pm
Accuracy[3]	±1.5	pm
Integrated Return Loss Characteristics:		
Dynamic range[4]	70	dB
Total range	0 to -125	dB
Sensitivity	-130	dB
Resolution[5]	±0.05	dB
Accuracy[5]	±0.10	dB
Integrated Insertion Loss Characteristics:		
Dynamic range[6]	18	dB
Resolution[5]	±0.05	dB
Accuracy[5]	±0.10	dB
Group Delay:		
Accuracy	1.0	ps
Distributed Sensing[7,12,13]:		
Spatial Resolution[8]	±1.0	cm
Temperature Resolution[9]	±0.1	C
Strain Resolution[9]	±1.0	µstrain

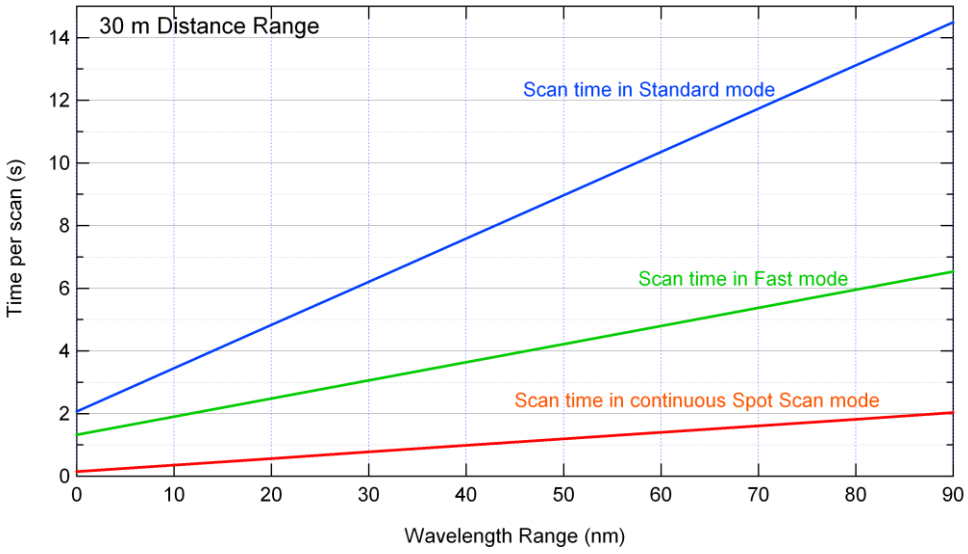
Measurement Timing[10]	**Standard**	**Fast[11]**	**Spot Scan[11]**	
5 nm scan time	3	1.6	0.3	s
Time vs. wavelength range	2.1 s+0.14 s/nm	1.3 s+0.06 s/nm	0.15 s+0.02 s /nm	-
Long Range (2 km) Scan Time		20		s

Specifications are for single-mode operation.
For multimode operation, specifications are nominal.

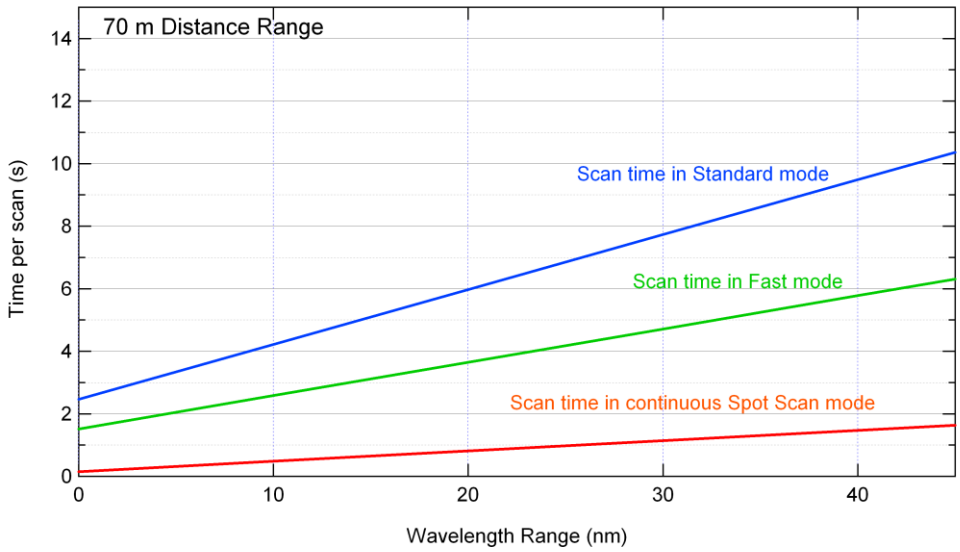
1 Over entire length range.
2 Ranges are nominal.
3 Accuracy maintained by an internal NIST-traceable HCN gas cell.
4 For the 2000 m option, return loss dynamic range is 60 dB.
5 With integration width of 0.5 m
6 The insertion loss dynamic range is the one-way loss that can be suffered before the scatter level of standard SMF (~ -100 dB/mm) is lower than the noise floor (~ -118 dB/mm).
7 Distributed sensing uses Rayleigh spectral shift method and is relative to reference scan.
8 Spatial resolutions listed are ideal to get the temperature and strain resolutions listed; they are not minimums or maximums.
9 Temperature and strain resolutions are calculated from spectral shift of Rayleigh scatter using 1 GHz = 0.8 C= 6.58 µStrain. [Othonos and K. Kalli, Fiber Bragg Gratings (Artech House, Boston, 1999)].
10 Combined scan and analysis time in high-resolution mode. Times are for 30 m scan mode.
11 Times are with laser tuning speed set at 100 nm/s.
12 Extended range mode and distributed sensing are upgrade options
13 Maximum standard sensing length is 70m. Limited sensing is available in extended range mode. Contact your Luna representative for more information.

CLASS 1 LASER PRODUCT

MEASUREMENT TIMING INFORMATION



Time per scan vs. scan wavelength range for 30 m scans in standard operating, fast scanning and continuous spot scanning modes.



Time per scan vs. scan wavelength range for 70 m scans in standard operating, fast scanning and continuous spot scanning modes.

Wavelength Range (nm)	Spot Scan Rate (Hz) 30 m mode	Spot Scan Rate (Hz) 70 m mode
5	3.7	2.9
10	2.7	2.0
20	1.8	1.2
40	0.9	0.6
80	0.5	-

Scan repetition rates at various scan wavelength ranges for continuous spot scanning in 30 m and 70 m modes of operation. Rates are for laser tuning speed set to 100 nm/s.

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Extended Range Spot Scan Interrogation[1]

The Extended Range Interrogation capability is available on the OBR 4600 with purchase of the extended range mode and spot scan mode. To perform strain and temperature measurements, the distributed sensing option is required in addition to the above. This capability extends strain and temperature measurements up to a range of 2 km for applications located in a benign vibration environment.

APPLICATIONS

- **Evaluating spools of Fiber Bragg Gratings**
- **Evaluating optical networks and devices**
- **Strain and temperature at a distance**

PARAMETER	SPECIFICATION	UNITS
Maximum Range	2,000	meters
Spot Scan Size	80	meters
Maximum Wavelength Range	3.2	nm
Time Per Scan	6.5	seconds
2-pt Spatial Resolution	0.25	mm
Wavelength Accuracy[2]	± 5.0 + 12*ΔT	pm
Strain Range[3]	± 1,250	µStrain
Strain Accuracy[2,5]	± 4.1 + 9.9*ΔT	µStrain
Temperature Range[3,4]	± 175	°C
Temperature Accuracy[2,5]	± 0.5 + 1.2*ΔT	°C
Minimum Gage Length[6]	3	cm
Minimum Sensor Spacing	0.6	mm

1 Extended range sensing works best with a low net change in accumulated strain between the unit and the sensing region.
2 Internal wavelength calibration using a NIST-traceable HCN gas cell occurs upon instrument configuration, but may drift with temperature. Wavelength offset measured at 1550nm. Thermal drift, ΔT, in degrees Celcius.
3 Based on maximum wavelength range of 3.2 nm.
4 Actual temperature range will be limited by the sensing fiber used.
5 Temperature accuracies are calculated from the wavelength accuracy using the spectral shift of Rayleigh scatter, 1 GHz = 0.8 °C = 6.58 µε. [Othonos and K. Kalli, Fiber Bragg Gratings (Artech House, Boston, 1999)].
6 Larger gage lengths may be required to meet noise specifications in the presence of vibration.

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