

Optical Fiber Analyzer

NR-9200/NR-9200HR



Refractive index profile

Core and cladding geometry

Mode-field diameter at 1310 nm and 1550 nm

Complete automation

Optiwave OptiFiber software



Fiber-optic test,
measurement, monitoring
and automation solutions

EXFO

Fast and Accurate Fiber Characterization Performed in a Single Setup

Comprehensive Characterization at the Push of a Button

The NR-9200 and NR-9200HR Optical Fiber Analyzer units provide extensive and versatile characterization of the refractive index, geometry and mode-field profiles of optical fibers. These instruments use both the refracted near-field (RNF) and transmitted near-field (TNF) techniques. The RNF provides the refractive index profile (RIP) as well as geometrical parameters (core and cladding size, concentricity, etc.). The TNF produces the mode-field diameter (MFD) at 1310 nm and 1550 nm according to Petermann II and Gaussian definitions.



Single Setup Does It All

The NR-9200 and NR-9200HR Optical Fiber Analyzer units provide RIPs and MFD scans (3-D), as well as the numerical aperture and the alpha parameters of multimode fibers, the ring size of dispersion-shifted fibers and much more.

Optiwave's powerful computer-aided design software is optional on the standard configurations of the NR-9200 and NR-9200HR Optical Fiber Analyzers. This simulation software calculates other fiber parameters from measured or calculated RIPs such as:

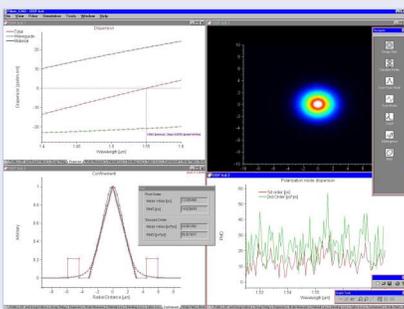
- Material and waveguide chromatic dispersion including λ_0 and D-slope parameters.
- The effective index of guided modes as a function of wavelength from which the cut-off wavelength and the near-field intensity profile are obtained as a function of wavelength.

The NR-9200HR High-Resolution Optical Fiber Analyzer delivers fast, accurate and easy-to-read results.

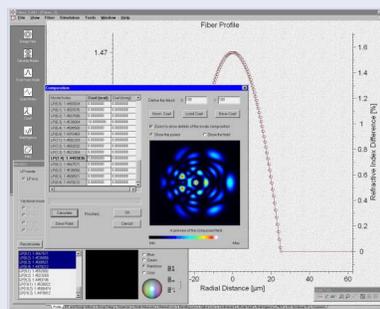
Fast and Easy to Use

Intuitive and easy to use, the NR-9200 and NR-9200HR Optical Fiber Analyzer units deliver quick and reliable measurement with their automatic fiber positioning and focusing procedure. Simply cleave and insert your sample; the bare fiber will be automatically centered, analyzed and measured quickly and efficiently.

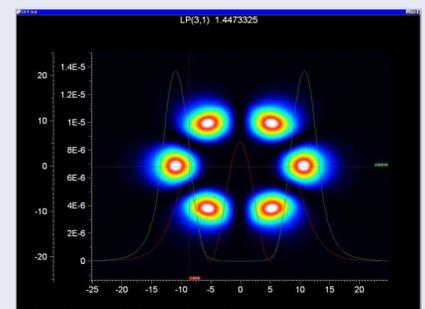
Optiwave OptiFiber



Fiber parameters calculation

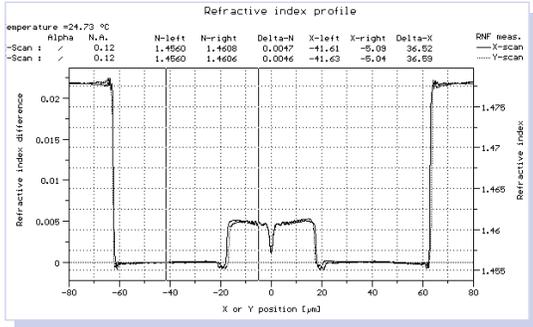


Modal analysis

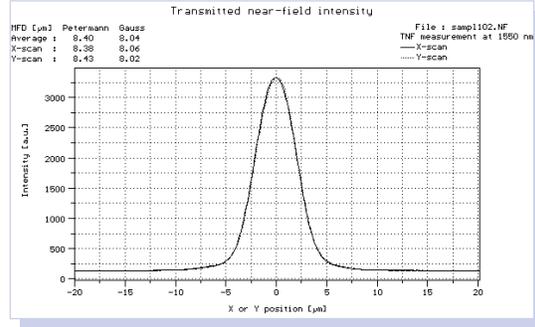


Propagation modes

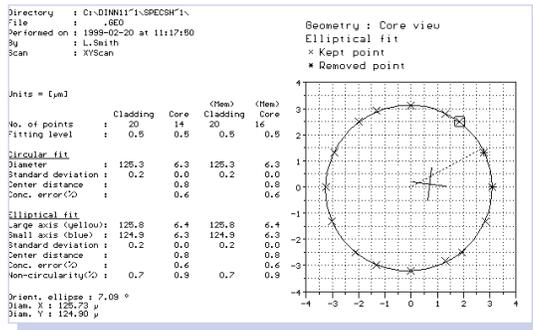
Testing Advanced Fibers? EXFO Has Answers



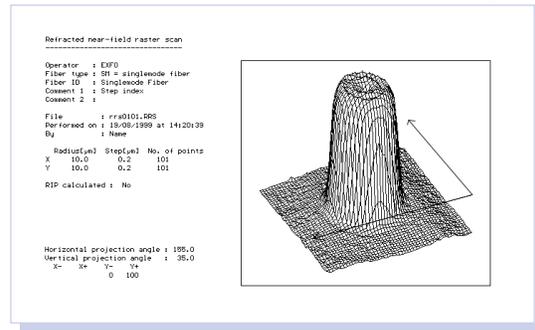
Refractive index profile (RIP) along the x- and y-axes



Typical set (x and y scans) of near-field intensity profiles with calculated MFD values according to both Petermann II and Gaussian definitions



Typical geometry measurement



3-D view of a typical RIP

Specifications¹

Description	NR-9200HR				NR-9200			
	Refractive index profile (RIP)	Mode-field diameter (MFD)	Geometry		Refractive index profile (RIP)	Mode-field diameter (MFD)	Geometry	
			Cladding	Core			Cladding	Core
Measurement technique	RNF ³	TNF ²		RNF ³	RNF ³	TNF ²		RNF ³
Measurement wavelength (nm)	655	1310/1550 ± 10	655		670	1310/1550 ± 10	670	
Spatial resolution (µm)	≤ 0.4	0.2	≤ 0.4		≤ 0.5	0.2	< 0.5	
RIP resolution	0.00005	—	—		0.0001	—	—	
Scan time (s) ¹ (typical)	10 (single scan)	5 (single scan)	45		10 (single scan)	5 (single scan)	45	
Calibration technique	certified multiple-step index reference fiber	certified reference fiber	certified reference fiber		certified multiple-step index reference fiber	certified reference fiber	certified reference fiber	
Repeatability ⁴ (2σ)	0.00012	0.2 µm			0.0002	0.2 µm		
Diameter (µm)	—	—	0.2	0.2	—	—	0.2	0.1
Non-circularity (%)	—	—	0.2	3	—	—	0.2	5
Concentricity error (µm)	—	—	0.3	0.3	—	—	0.4	0.4
Reproducibility ⁵ (2σ)	0.00015	0.5 µm			0.0004	0.5 µm		
Diameter (µm)	—	—	0.4	0.2	—	—	0.4	0.2
Non-circularity (%)	—	—	0.6	4	—	—	0.8	5
Concentricity error (µm)	—	—	0.4	0.4	—	—	0.6	0.6
Uncertainty	0.0008 (0.0005 typ.)	0.5 µm	0.5 µm ⁶	—	0.001	0.5 µm	0.5 µm ⁶	—

General Specifications

Ordering Information⁷

Fiber type	From 80 μm to 500 μm cladding	
Size (H x W x D)	21.9 cm x 53.0 cm x 52.2 cm (8 $\frac{5}{8}$ in x 20 $\frac{7}{8}$ in x 20 $\frac{1}{2}$ in)	
Weight	36 kg	(80 lb)
Temperature		
operating	20 °C to 25 °C	(68 °F to 77 °F)
storage	10 °C to 30 °C	(50 °F to 86 °F)
Relative humidity	0 % to 80 % non-condensing	
Rating	100-240 V, 50-60 Hz, 1 A max.	

Notes

- At any temperature, ± 1 °C inside the operating temperature range, following a 60-minute warmup with the NR-9200 installed on an anti-vibration table.
- In accordance with TIA/EIA-455-165A (FOTP-165) "Mode-Field Diameter Measurement by Near-Field Scanning Technique", TIA/EIA-455-191 (FOTP-191) "Measurement of Mode Field Diameter of Singlemode Optical Fiber", IEC 60793, and ITU Recommendation G.650.
- In accordance with TIA/EIA-455-44B (FOTP-44B) "Refractive Index Profile, Refracted Ray Method", IEC 60793, and ITU Recommendation G.651.
- Repetitive measurements on the same 9/125 μm singlemode fiber end in the same position, with a 50 % measuring duty cycle.
- Repetitive measurements on the same 9/125 μm singlemode fiber end removed and repositioned between each measurement, with a 50 % measuring duty cycle.
- On cladding diameter.
- All the GP-270-XX accessories are available separately.
- Other fiber holders available from 80 μm to 500 μm .
- Optiwave OptiFiber software to determine chromatic dispersion ($\Delta(\lambda)$, λ_0 , σ), cut-off wavelength (λ_c) and near-field intensity profile $I(x,y,\lambda)$ from a calculated or measured refractive index profile.

Laser Safety

21 CFR 1040.10 and 1040.11 IEC 60825-1:1993 + A1:1997 + A2:2001
CLASS 1M:

Part number	Description	Configurations and quantities	
		Standard	Complete
NR-9200/HR	Optical Fiber Analyzer	1	1
GP-270-01	Precision fiber cleaver	1	1
GP-270-128 ⁸	Fiber holder 128 μm	2	2
GP-270-03	Video monitor for fiber search	1	1
GP-270-04	Refractive index liquid (16 oz. bottle)	1	1
GP-270-05	Certified mode-field diameter reference fiber mounted in a GP-270-128	optional	1
GP-270-06	Certified mean-diameter and non-circularity reference fiber mounted in a GP-270-128	optional	1
GP-270-07	Certified multiple-step index reference fiber mounted in a GP-270-130	optional	1
GP-270-08	Measuring cell	2	2
GP-270-28	Measuring cell HR version	2	2
GP-270-09	Bare fiber adapter	1	1
GP-270-10	Diopter (measuring cell cover glass)	2	2
GP-270-30	Diopter (measuring cell cover glass) HR version	2	2
GP-270-11	Refractive index liquid dispenser	1	1
GP-270-12	NR-9200 application software	1	1
GP-270-13	Optiwave OptiFiber software ⁹	optional	1
GP-270-15	Technical support service	1	1

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EXFO is certified ISO 9001 and attests to the quality of these products. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. EXFO has made every effort to ensure that the information contained in this specification sheet is accurate. However, we accept no responsibility for any errors or omissions, and we reserve the right to modify design, characteristics and products at any time without obligation. Units of measurement in this document conform to SI standards and practices.

Contact EXFO for prices and availability or to obtain the phone number of your local EXFO distributor.

For the most recent version of this spec sheet, please go to the EXFO website at <http://www.exfo.com/support/techdocs.asp>
In case of discrepancy, the Web version takes precedence over any printed literature.

