



**OZ Optics**

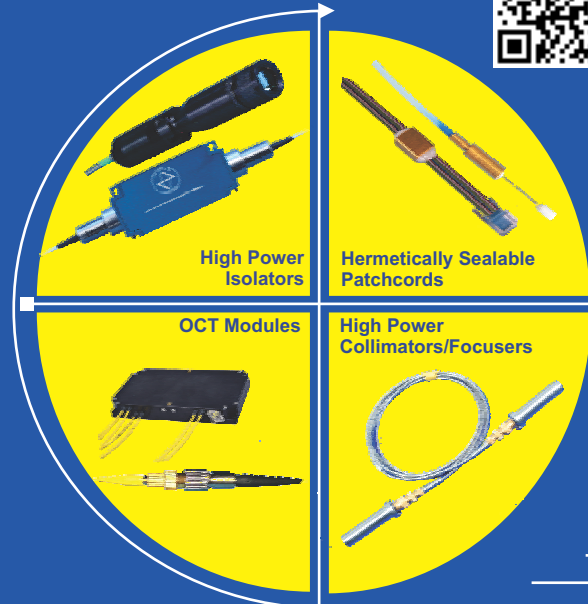
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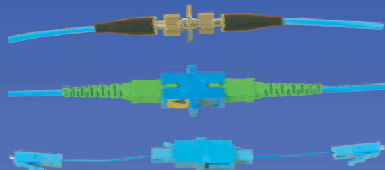


# FIBER OPTIC COMPONENTS

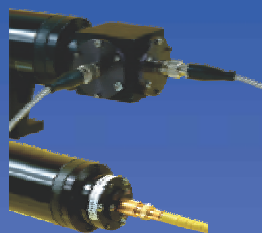
## Short Form Catalog



Polarization Maintaining, High Power Fiber Optic Components, Laser & Laser Diode to Fiber Delivery Components, Fiber Optic Attenuators, Fiber Optic Components for Optoelectronic Packaging  
Patent Numbers: USA 7058275, 7095931, 7295731, 7431513 and Chinese 1672073



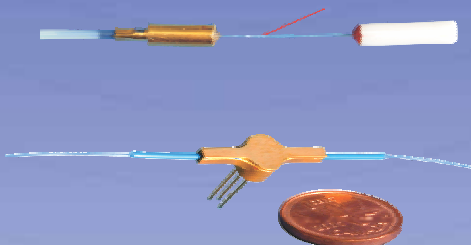
**Polarization Maintaining Patchcords**



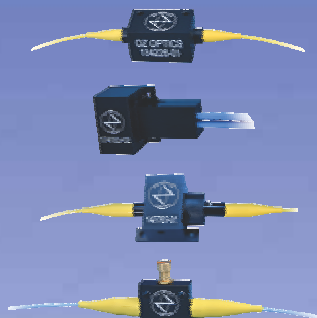
**High Power Laser to Fiber Delivery Systems**



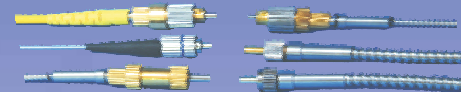
**Polarization Maintaining Splitters/Combiners**



**High Power Directional Taps & Power Monitors**



**Attenuators**



**High Power/Temperature Patchcords & Connectors**



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# Polarization Maintaining Fiber Optic Components

1



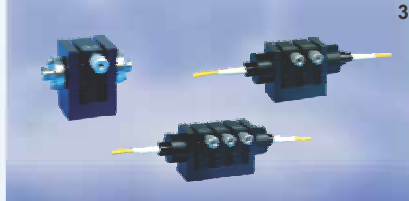
**Polarization Maintaining Patchcords**  
Up to 30 dB Polarization Extinction Ratios  
<0.3 dB IL, up to -60 dB Backreflection  
Ultra, Angled FC/PC, SC, LC, MU, ST, E2000

2



**PM Fiber Optic Switch**  
Repeatability <math>\pm 0.05\text{ dB}</math>  
1x2 Miniature Reliable Switching Mechanism  
Low Loss <math>< 0.6\text{ dB}</math>, High ER > 20 dB

3



**Polarization Rotators / Analyzers**  
Greater than 30 dB Extinction Ratios  
-40, -50, -60 dB Backreflection Levels 1 dB IL  
Fiber-Fiber and Fiber-Photodiode Versions

4



**Polarization Maintaining Fused Couplers**  
Low Cost, Miniature Size  
50/50 to 99/1 Splitting Ratios  
Ideal for Taps for Power Monitoring

5



**All Fiber Polarization Controllers (Manual)**  
Compact Size, Easy-to-use  
No Intrinsic Insertion Losses or Return Losses  
Works with any Singlemode Fiber

6



**Telcordia Qualified In-Line Optical Taps/Monitors**  
400 nm to 2000 nm Wavelength Versions  
High Sensitivity, Large Dynamic Range

7



**Fiber Pigtailed Polarizers**  
Up to 30 dB Extinction Ratios  
0.6 dB Insertion Loss, Low Cost, Compact  
-40, -50, -60 dB Backreflection Levels

8



**Polarization Maintaining Splitters**  
Splits Polarized Light into 2 PM or SM Fibers  
0.6 dB IL, -40, -50, -60 dB Backreflection  
1x2 and 2x2 Versions available

9



**Polarizing Splitters / Combiners**  
Splits Light into Two Polarizations  
0.6 dB IL, -40, -50, -60 dB Backreflection  
1x2 and 2x2 Versions available

10



**Polarization Dependent Loss Emulator**  
0.05 dB to 1 dB Polarization Dependent Loss  
Fixed or Manually Variable PDL  
Broad Wavelength Range, Compact, and Low Cost

11



**PM Fiber Circulators**  
0.7 dB Typical Insertion Loss  
532 nm to 2000 nm Wavelength Range  
Up to 30 dB Extinction Ratios

12



**Faraday Mirrors and Rotators**  
Used in EDFA, Tunable Lasers, Etc.  
0.7 dB Typical Insertion Loss  
-40, -50, -60 dB Backreflection

13



**Differential Polarization Delay Lines**  
Varies the Delay Between Two Polarizations  
 $\pm 50\text{ ps}$  Delay, 0.003 ps Resolution  
<math>< 1.2\text{ dB}</math> Losses over the Delay Range

14



**Polarization Measurement Systems**  
Includes Source, Meter and Master PM Patchcord  
Measures up to 40 dB ER and Polarization Angle  
Simultaneously  
FC, SC, LC, E2000 or Custom Connectors & Ferrules

15



**Electrically Driven Polarization Controllers**  
Continuous Control of Polarization  
No Insertion Losses or Return Losses  
> 50 Hz Response Speed



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# Laser & Laser Diode to Fiber Delivery Components

16



**Laser to Fiber Couplers**  
 > 60% Coupling Efficiency for SMF & PMF  
 Low / High Power Versions up to 100 W  
 180 nm to 3000 nm Wavelengths

17



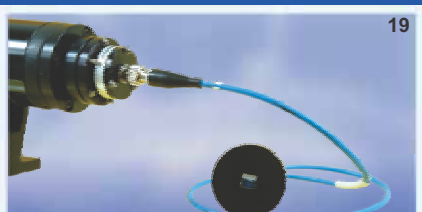
**Laser to Fiber Couplers with Adjustable Focus**  
 > 80% Coupling Efficiency for SMF & PMF  
 SMF, MMF & PMF Versions  
 0.1 Micron Resolution in Focus Adjustment

18



**Adjustable Fiber Collimators/Focusers/Connectors**  
 Use for Adjustable Focusers and Couplers  
 Super & Angled FC/PC, and SMA905 Connectors  
 SMF, MMF & PMF Versions

19



**Delivery Systems for Flow Visualization**  
 Uniform Intensity Along the Line  
 < 1 mm Linewidths, 10° to 60° Fan Angles  
 Cross Targets also available

20



**Red/Green/Blue WDM Combiners**  
 Combine Red, Green and Blue Sources with Low Loss  
 Singlemode, Multimode and PM Fiber Versions  
 High Power Handling, 2 to 6 Wavelength Versions

21




**Receptacle Style Collimators/Focusers**  
 0.2 mm to > 15 mm Beam Diameters  
 180 nm to 3000 nm Wavelengths  
 Achromatic Collimators available

22



**Pigtail Style Collimators/Focusers**  
 As Small As 2µm Spot Sizes, up to 5 W Power  
 Up to -60 dB Backreflection SMF, PMF & MMF  
 1.6 mm, 2.5 mm, 4 mm and 8 mm OD Housing

23



**U-Bracket with Removable Optics**  
 As Good As 0.6 dB Insertion Loss  
 -40, -50, -60 dB Backreflection  
 Use with A/O Modulators, Bulk Optics

24




**Variable Optical Delay Lines**  
 Motor Driven Version is available  
 Over 300 ps Delay Range, < 1 dB IL  
 As Fine As 0.003 ps Resolution

25



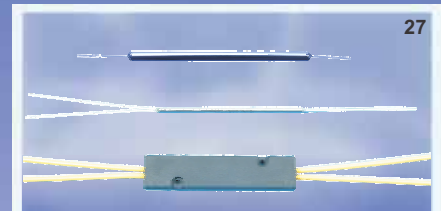
**OEM Laser Diode to Fiber Couplers**  
 375 nm to 1625 nm Wavelengths  
 Up to 80% Coupling Efficiency into SMF & PMF  
 PC Board Mountable, Reusable Optics

26




**Turnkey OEM Laser Diode Sources**  
 Wavelength Range: 375 nm to 2000 nm  
 Externally Modulatable  
 Red, Green, Blue Combiner Versions available

27



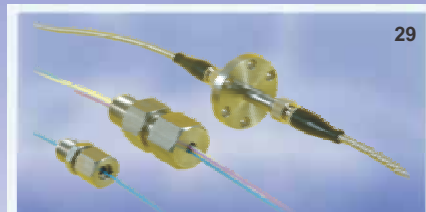
**Fused Fiber Optic Couplers**  
 1x2, 2x2 and 1xN Couplers available  
 SM, MM, and PM Fibers  
 400 nm to 1550 nm Wavelengths

28



**Fiber to Photodiode Couplers**  
 >70% Coupling Efficiency, SMF, MMF & PMF  
 -40 dB, -50 dB, -60 dB Backreflection  
 Low Cost, Rugged and Compact Size

29



**Vacuum Feedthroughs**  
 Singlemode and Multimode Versions  
 Easy to Install and Use, Compact and Rugged  
 Gas Leak Rate 10<sup>-8</sup> scc/sec

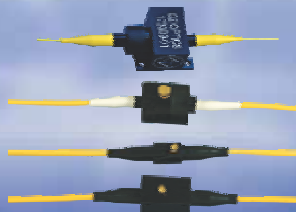
30



**Alignment Kits & Tools**  
 Polarization Tool Aligns Polarization in Seconds  
 Alignment Kit Simplifies Laser to Fiber Coupling  
 Video/DVD Demonstrates the Coupling Process

# Fiber Optic Attenuators

31



**Inline Variable Attenuators**  
0.6 dB to 80 dB Attenuation Range SMF, PMF & MMF  
Up to 2 W Power, Flat Wavelength Response  
< 0.01 dB PDL, Meets Telcordia Specifications

32




**Reflective Style Variable Attenuators**  
0.8 dB to 60 dB Attenuation Range  
0.01 dB Resolution, SMF & MMF Versions  
-40 dB, -50 dB, -60 dB Backreflection

33



**Plug Type Fixed Attenuators**  
< -50 dB Backreflection, SMF & MMF  
-1 dB to -25 dB Attenuation, 1300 & 1550 nm only  
Low Cost, Rugged and Compact Size

34



**Electrically Controlled Attenuators**  
0.6 dB to 60 dB Attenuation Range SMF, PMF & MMF  
Maintains Attenuation with Power Off, up to 2 W Power  
Low Cost, High Speed, Rugged and Compact Size

35



**Reflective Style Motor Driven Attenuators**  
0.8 dB - 60 dB Attenuation Range  
Up to 2 W Power Handling SMF, PMF & MMF  
High Speed, Rugged and Compact Size

36



**OEM Motor Driven Variable Attenuators**  
0.6 dB to 60 dB Attenuation Range SMF, PMF & MMF  
Maintains Attenuation with Power Off, up to 2 W  
Low Cost, High Speed, Rugged and Compact Size

37



**Digital Variable Attenuators**  
0.01 dB Resolution, Fast Response Time  
0.6 dB to 60 dB Attenuation Range  
Computer / USB Port / Battery Option

38



**Air Gap Variable Attenuators**  
Very Compact Size  
Patch Panel Mountable  
FC/PC and ST Connector Styles

39



**Fiber Optic Shutters**  
Up to 100 W Optical Power SMF, PMF & MMF  
Fast Response Time  
Ideal for Safety Interlocks

40



**Loopback Style Fixed Attenuators**  
Mode Independent Attenuation  
Rugged, Compact Housing  
SMF & MMF Versions

41



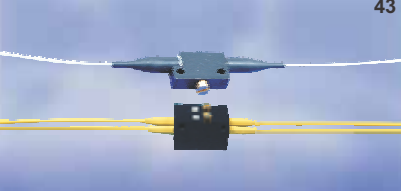
**Attenuating Fiber Patchcords**  
Up to 2 Watts Power Handling, Low PDL  
SM, PM Fiber Versions  
Very Low Cost, Small Size

42




**Removable Neutral Density Attenuators**  
Mode Independent Attenuation  
Pigtail and Receptacle Styles  
SMF, MMF & PMF Versions

43




**Miniature Single/Multi-Channel Variable Attenuators**  
Less than 5 mm Thick Per Channel  
Ideal for High Density Fiber Networks  
High Power Handling, Low Loss, PDL and WDL

44



**MEMS Variable Attenuators**  
Compact and Inexpensive  
Single Channel to up to 40 Channel Versions  
Low Loss, Large Attenuation Range

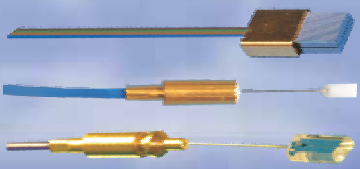
45



**Fiber Optic Terminators**  
Designed to Kill Backreflection in Unused Ends  
50 dB Return Loss, 1300/1550 SM Fiber Only  
Ultra, FC/PC and SC Connectors

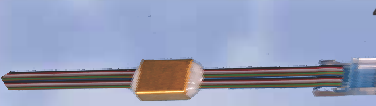
# Fiber Optic Connectors, Patchcords and Components for Optoelectronic Packaging

46



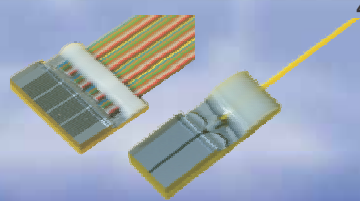
**Hermetically Sealable Patchcords with Metal Solder (Single/Multi Channel)**  
Meets Telcordia Specifications, up to 16 Channels  
SMF, MMF & PMF Versions  
Customer Specific OEM designs

47



**Hermetically Sealable Patchcords with Glass Solder (Single/Multi Channel)**  
No Metalization Required, up to 16 Channels  
Meets Telcordia Specifications SMF, MMF & PMF  
Customer Specific OEM Designs

48




**Fiber Pigtailed V-Groove Arrays**  
Up to 48 Fibers in a Single Array  
127, 250, 400 and 500 Micron Spacings  
SM, MM, and PM Fibers

49



**Tapered/Lensed Fibers**  
As Small As 2.5 Micron Spot Sizes  
Circular and Oval Spot Profiles  
Custom OEM Designs, Metalized Versions

50



**Metalized Fibers**  
SMF, MMF & PMF Versions  
Ideal for Hermetic Component Packaging  
Cleaved Fiber Endfaces, Masked Regions

51



**V-Groove Substrates**  
Up to 48 Fiber Substrates  
Better than 0.5 Micron Accuracy  
Use with Either UV or Thermal Epoxies

52



**Glass Solder Preforms**  
Solders Glass Directly to Metal  
Ideal for Hermetic Sealing, Device Packaging  
Circular and Oval Preform Shapes

53



**Hermetic Patchcords with Built-in Optical Taps**  
Allows In-Line Monitoring Inside Devices  
Wide Wavelength Range, Automatable  
SM, PM Fiber Versions

54




**Fiber Optic Ferrules**  
Glass, Zirconia, and Kovar Metal Ferrules  
Cylindrical and Rectangular Shapes  
Custom Shapes and Hole Sizes

55



**PM Fiber Pigtailed V-Groove Assemblies**  
Up to 24 Fibers in Single Array  
High Extinction Ratio  
127, 250, 400, 500 Micron Spacings

56



**Dual Fiber Pigtailed Assemblies**  
SM, MM, and PM Fiber Versions  
PM Stress Rods Aligned to  $\pm 0.5$  Degrees  
Miniature Size Ideal for Packaging

57



**Universal Connectors/Hybrid Patchcords**  
Less than 0.5 dB Insertion Loss  
Ultra, Super, Angled FC/PC, LC, SC, ST & SMA  
Low Cost, Rugged and Compact Size

58



**Sleeve Thru Adaptors**  
Available for FC, ST, SMA, SC and LC, MM  
Less than 0.3 dB Insertion Losses  
Patch Panel Mountable, Duplex Styles

59



**Bulkhead Receptacles**  
Available for FC, LC, ST, SMA, SC, Angled  
FC/PC, Angled AT&T-ST and Angled SC  
Designed for Free Space Use, Compact Size

60



**Bare Fiber Adaptors with Magnetic Clip**  
Very Easy to Hold Bare Fibers  
FC, ST, LC, SC, SMA, E2000, MU available  
80 micron – 1000 micron hole sizes

# High Power Fiber Optic Components

61



**High Power Patchcords and Connectors**  
Able to Transmit over 100 W of Optical Power  
Operating Wavelengths from 180 nm to 2000 nm  
PMF, SMF, and MMF High Power AR Coatings

62



**High Power Collimators/Focusers**  
Up to 100 Watts CW Power Handling  
Available for 180 nm to 2000 nm Wavelengths  
Receptacle and Pigtailed Versions

63



**High Power Fiber Pigtailed Isolators**  
Low Insertion Loss, up to 100 Watts  
1064 nm Fiber-to-Fiber and Fiber-to-Air Versions  
Polarization Independent, High Isolation

64



**High Power Directional Taps/Power Monitors**  
Up to 10 Watts Power Handling  
SM, PM and Specialty Fiber Versions  
Available for 320 nm to 2000 nm

65



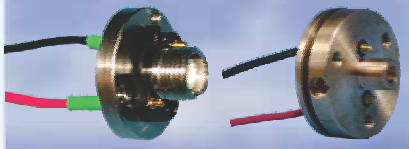
**High Power Fiber Optic Shutters with Safety Interlocks**  
Up to 100 Watts Power Handling  
Fiber-Fiber and Source-Fiber Versions  
Available for 180 nm to 2000 nm Wavelengths

66




**High Power Mode Field Adapters**  
High Power Handling  
Adapts and Conserves Modal Content  
Custom Designs available

67



**High Power Bulkhead Receptacles/Sleeve Thru Adaptors with Safety Interlocks**  
High Power Handling  
Contact, Temperature, Proximity Sensors  
Fiber to Air and Fiber to Fiber Versions

68




**High Power Wavelength Division Multiplexer**  
0.8 dB Insertion Losses, 65 dB Isolation  
Up to 2 Watt Power Handling  
-40 dB, -50 dB, -60 dB Backreflection

69



**High Power Free Space Splitters Fiber to Fiber Version**  
Up to 100 Watts Power Handling  
Available Wavelengths from 400 nm to 2000 nm  
MM, SM, PM Fiber Versions

70



**High Power Free Space Splitters Source to Fiber Type**  
Up to 100 Watts Power Handling  
Available Wavelengths from 400 nm to 2000 nm  
MM, SM, PM Fiber Versions

71



**Pin Gauges for Fiber OD Measurements**  
Easy-to-use, Low Cost  
124-128 micron Gauges available  
Individual or 5-in-One Gauges

72




**Connectors**  
FC, SMA, SC, LC, MU, E2000 Versions  
Angled or Ultra FC/PC Versions  
Singlemode or Multimode Versions

73




**Mechanical Bare Fiber Adapters**  
Use to Hold Bare Fibers  
FC, ST Versions available  
80-1000 micron

74



**Fiber Optic Fixed Filters**  
400 nm to 1600 nm Wavelengths, SMF & PMF  
-40 dB, -50 dB, -60 dB Backreflection  
Filters can be Fixed or Removable

75



**Polarization Insensitive Tunable Filter**  
Manual and Electrically Controlled Versions  
50 nm Range, As Low As 0.4 nm Line Widths  
< 0.35 dB Polarization Dependent Losses

# Miscellaneous Fiber Optic Components

76



### Planar Light Circuit Splitter (PLCS)

Polarization and Singlemode Fiber Versions  
Broad Bandwidth  
1x2, 1x4, 1x8, 1x16, 1x32 available

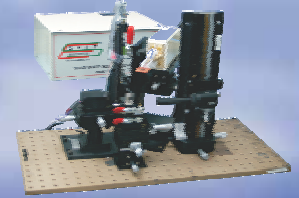
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### Laser Diode Power Combiners

Up to 45% Coupling from Each Diode  
-40, -50, -60 dB Backreflection SMF, PMF & MMF  
Can Combine Equal / Different Wavelengths

78



### Soldering Station Inductive System

Used for Hermetic Sealing  
Easy-to-use  
Custom Jigs are available

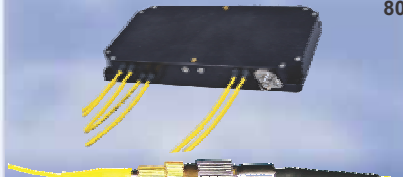
79



### Polarization Measurement System for V-Grooves

Measures Polarization Angle to +/- 0.5 Degrees  
Measures Extinction Ratios up to 40 dB  
Measures Relative Power (650 Hz Sample Rate)

80



### OCT Module/Components

Complete Module or Separate Components  
Such as Broadband Isolators, Sources,  
Attenuators, Collimators, Fused Splitters, Delay Lines

81



### Power Meter with Smart Detector Heads

85 dB Dynamic Range, Fast Response Time  
440-1700 nm Wavelengths, Built-in Attenuator  
Dual Detector Head Capability, USB Port

82



### 2000 nm Components

Fiber Pigtailed Sources  
Isolators, Attenuators  
Fused Splitters, Collimators

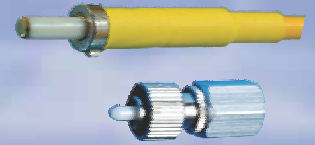
83



### Pen & Pocket Size Fault Locators

Detect Breaks in Fiber Optic Cables  
Use as an End-to-End Fiber Identifier, 635 nm  
Up to 10 mW, Low Cost

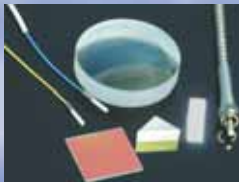
84



### High Power Antireflection (AR) and Highly Reflective (HR) Coated Fiber Ends

HR, R>98%, AR < 0.3%  
350 nm to 2000 nm Wavelength Coatings  
SMF, MMF & PMF Versions

85



### High Power Optical Coatings

High Power AR, Beamsplitter, Dichroic Coatings on  
Fibers, Micro Optics, Lenses, Plates, Prisms etc.  
Low Temperature High Abrasion Resistant Coatings

86



### OZPEN CO<sub>2</sub> Cleaning Unit for High Power Components

Designed to Clean Small Surfaces  
Superior to Other Cleaning Methods  
Quick Dry and Solvent-Free Cleaning Process

87



### Connector Video Microscope

Easy-to-use  
Up to 400x Magnification  
LC, FC, SC, E2000 or Other Custom Connectors

88



### Connector Cleaning Unit

Easy-to-use  
Low Cost  
2.5 mm, 1.25 mm, Custom Design Connectors

89



### Fiber Optic Educational Kits

Teaches Basics of Fiber Optics  
Easy-to-use, Affordable  
Wide Range of Labs available

90



### Fiber Optic Termination Kits

For FC, LC, ST, SMA or SC Connectors  
Contains all the Necessary Polishing Films,  
Tools, Epoxies and Accessories



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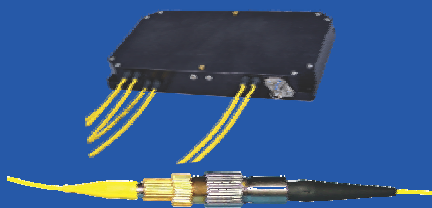
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**OCT Modules and Components**



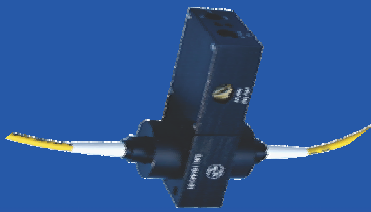
**2000 nm Components**



**Bare Fiber Adaptors with Magnetic Clip**



**OZPEN CO<sub>2</sub> Cleaning Unit for High Power Components**



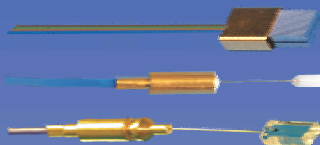
**High Power Fiber Optic Shutters with Safety Interlocks**



**High Power Mode Field Adapters**



**Vacuum Feedthroughs**



**Hermetic Feedthroughs**



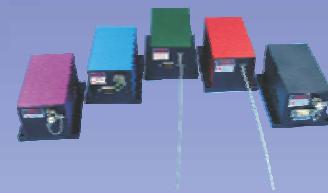
**PM Fiber Pigtailed V-Groove Assemblies**



**Bulkhead Receptacles**



**Pin Gauges for Fiber OD Measurements**



**Turnkey OEM Laser Diode Sources**



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