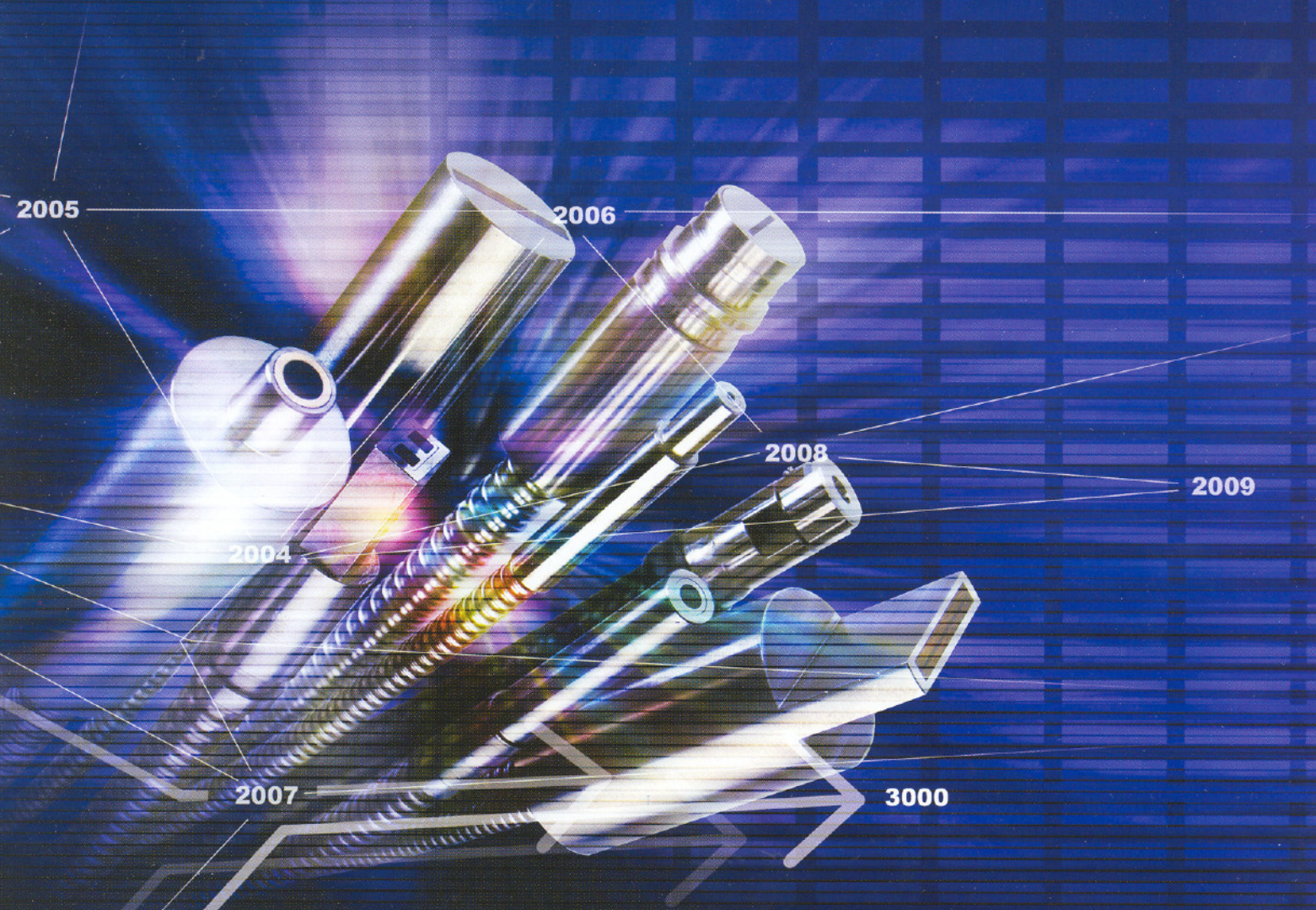


Fiber-Optics Image & Energy



*Harmony of Image and Energy
Fujikura's Optical Fiber Solutions*

High-density optical energy transmission

Large Core Fiber

- Fine Optical Permeation over a wide region (DUV ~ NIR).
- Excellent performance in Laser Welding Machines and in the Laser Surgery Field where High Power Optical Energy is required.
 - High Mechanical Strength allows easy handling.
 - Various Terminal Assemblies are available to suit customer specific requirements.

Silica based fiber with a very large core diameter permits High-density Optical Energy Transmission.

Applications

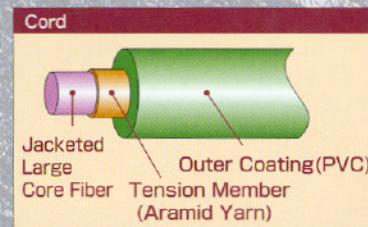
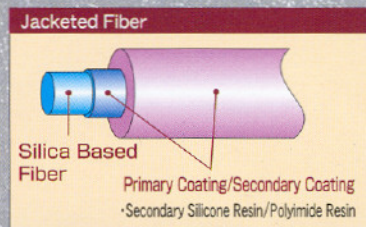
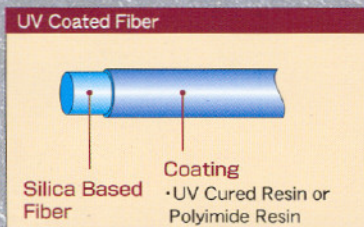
- UV spot curing
- High Power Laser Optic Transmission
- Radiation Resistance • Spectrum Analyser
- Laser Surgery • Temperature Measurement
- Ultra-Violet Light Guiding • Fluorescent Analysis
- Light Guide Illumination

Laser Connector

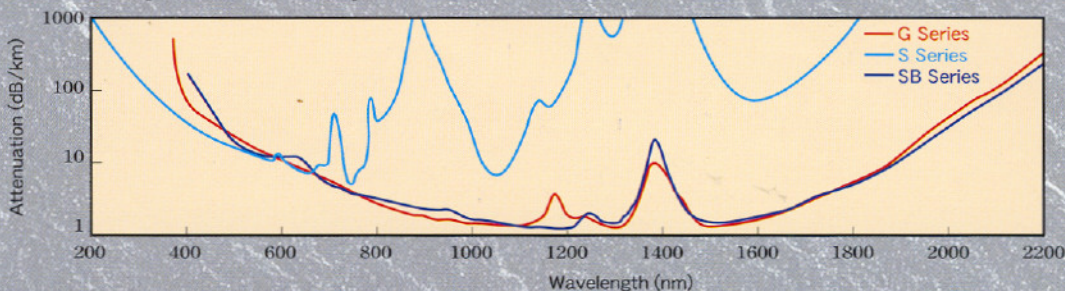
SMA Connector

FC Connector

Structure



Loss Spectrum Graph



Main Specifications

Specifications for Jacketed Fiber

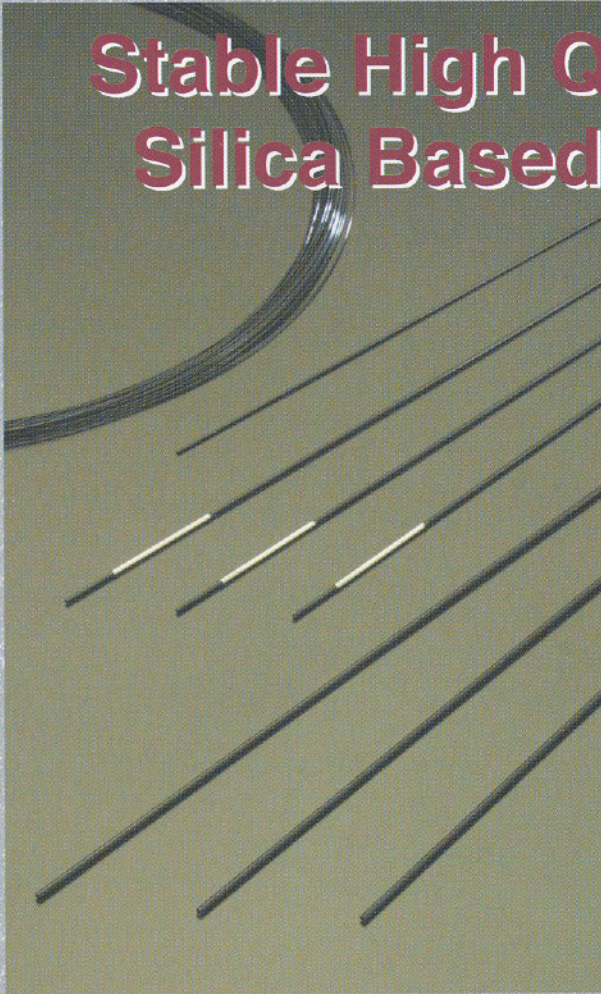
*1: Minimum Bending Radius in Storage

Series	Item No.	Refractive Index Profile	Core Material/Cladding Material	Core Diameter μm	Clad Diameter μm	Coating Material	Coating Diameter mm	(1*) Minimum Bending Radius, mm	Numerical Aperture	Attenuation dB/km	Applicable Region
S	S.200/220	Step Index	Pure Silica Glass (High OH)/Fluorine Doped Silica Glass	200	220	Silicone/Polyimide	0.9	44	Standard : 0.22	≤ 200 at 300nm	UV~VIS
	S.400/440			400	440		1.1	88			
	S.600/660			600	660		1.4	132			
	S.800/880			800	880		1.7	176			
SB	S.200/220B	Step Index	Pure Silica Glass (Low OH)/Fluorine Doped Silica Glass	200	220	Silicone/Polyimide	0.9	44	Standard : 0.22	≤ 10 at 850nm	VIS~NIR
	S.400/440B			400	440		1.1	88			
	S.600/660B			600	660		1.4	132			
	S.800/880B			800	880		1.7	176			
G	G.200/250	Graded Index	Ge Doped Silica Glass/Pure Silica Glass	200	250	Silicone/Polyimide	0.9	50	Standard : 0.21	≤ 10 at 850nm	VIS~NIR
	G.400/500			400	500		1.1	100			
	G.600/750			600	750		1.4	150			
	G.800/1000			800	1000		1.7	200			

• Other size (Core Diameter, Cladding Diameter), non-standard NA Fiber are available.
 • PFA,ETFE, FEP, Jacketed Fiber and Hard Polymer Cladding Fiber (HPCF) are also available.

Image Fiber

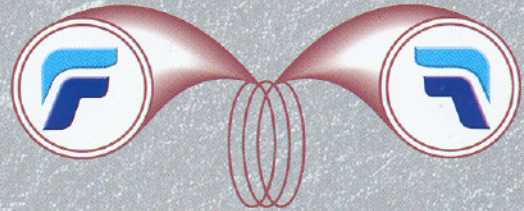
Stable High Quality Silica Based Fiber



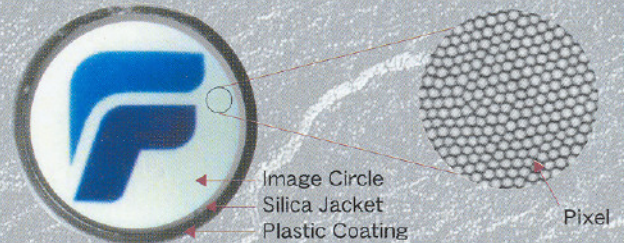
Coated Fiber and Twisted Fiber

- A Large Number of cores in one fiber enable an image at one end to be transmitted to the other end.
- Mainly used as Image Transmission Equipment for Endoscopes
- Ultra Thin Diameter, High Quality Image, Excellent Performance for Optical Transmission, Colour Reappearance, Durability and Flexibility of Silica Based Fiber.
- Ultra Thin Type: FIGH Series, Thin Type: FIG series, Radiation Resistant Type: FIGR Series

Basic Concept



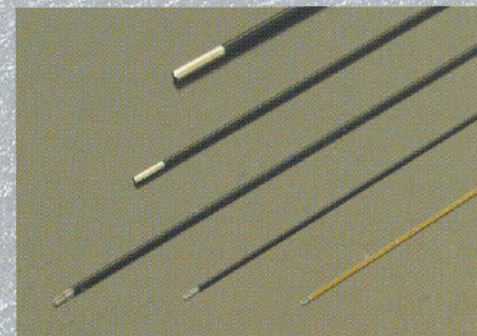
Cross Section Structure



Main Specifications

FIGH Series S Type

Item No.	FIGH-016-160S	FIGH-03-215S	FIGH-06-300S	FIGH-10-350S
Number of Pixels (Nominal)	1,600	3,000	6,000	10,000
Image Circle Diameter (μm)	140	190	270	325
Fiber Diameter (μm)	160	215	300	350
Coating Diameter (μm)	210	285	400	450
Minimum Bending Radius (mm)	20	25	30	35
Coating Material (*2)	Silicone Resin (Black)			
Lattice Defect (%)	<0.1			
Uncircularity (%)	<5			



Objective Lens Assembly

FIGH Series N Type

Item No.	FIGH-10-500N	FIGH-15-600N	FIGH-30-850N	FIGH-50-1100N	FIGH-70-1300N	FIGH-100-1500N
Pixels (Nominal)	10,000	15,000	30,000	50,000	70,000	100,000
Image Circle Diameter (μm)	460	550	790	1,025	1,200	1,400
Fiber Diameter (μm)	500	600	850	1,100	1,300	1,500
Coating Diameter (μm)	600	700	950	1,200	1,450	1,700
Minimum Bending Radius (mm)	50	60	90	110	150	200
Coating Material (*2)	Silicone Resin (Black)					
Lattice Defect (%)	<0.1					
Uncircularity (%)	<5					

*2: Urethane Acrylate Resin, Epoxy Acrylate Resin and Polyimide Resin are also available.

Assembled Products

- We have various types of products assembled with fused silica based optical fiber.
- Fiber Bundles for Energy Transmission and Fiber Scopes for Image Transmission especially can be supplied as per customer-required specifications.
- A wide variety of connectors are also available.

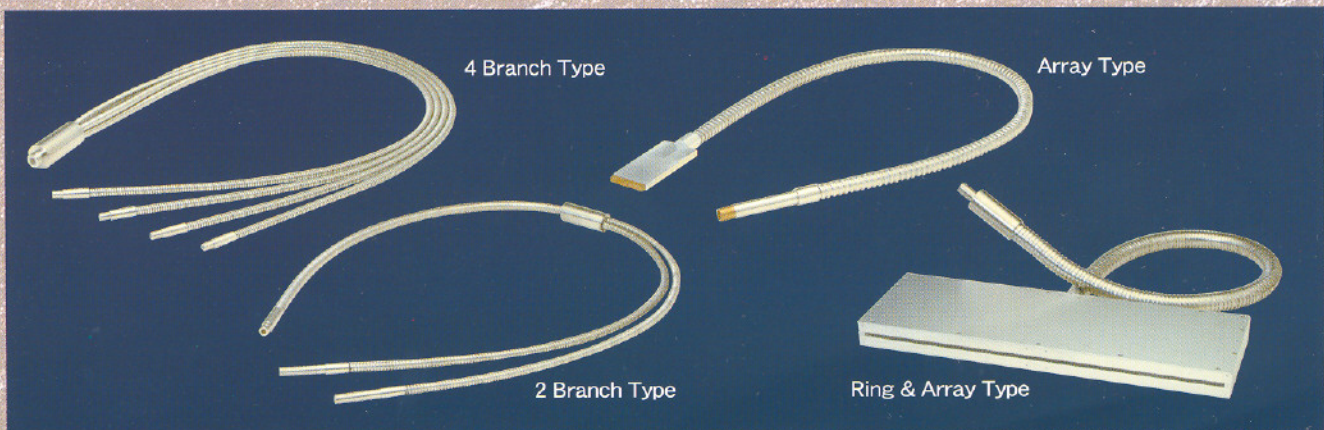
Fiber Bundle

Flexible to
Transmission
wavelength, the
Shape of the Fiber
bundle and the Fiber
termination.



- A thin fiber diameter "200 μm "(*3) enables the user to bend the bundle easily.
 - Plenty of light is available through lots of bundled fibers.
 - The cross section of the bundle can be assembled in accordance with the required application.
- *3: Other sizes are also available.

Example of Major Assembly

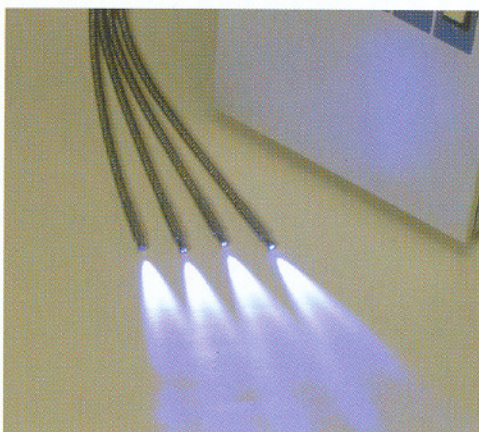


Example of Terminal Assembly



Applications

UV Spot Cured Bundle (Semiconductor, LCD, Optical Pick Up)



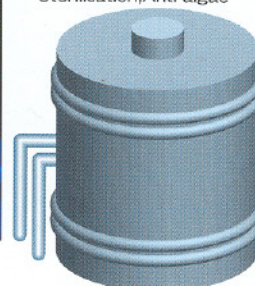
UV Rays Guide Bundle for Environmental Purification

Anti Dirt, Water Purification, Air Purification, Deodorization and Antibacterial.
Various Applications by combination of Fiber Bundle and Optical Catalysis are expected.

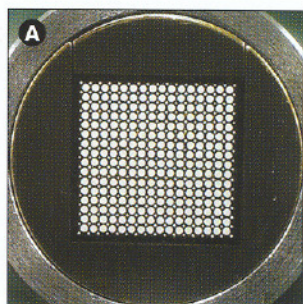


Laboratory Air Purification, Deodorization, Antibacterial

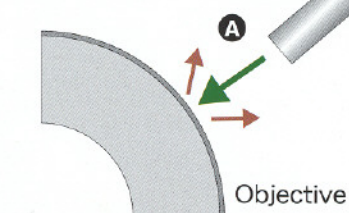
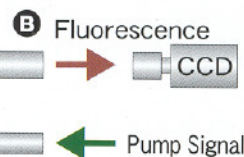
Water Tank
Water Purification, Sterilisation, Anti algae



Spectrum and Fluorescence Analysis (Chemical and Biological Research)

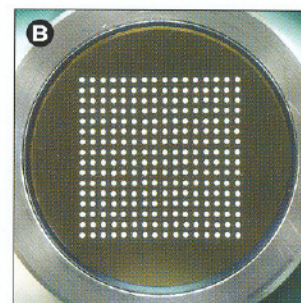


Example of Two Dimensional Fluorescence Analysis



Objective

Example of two dimensionally arranged fibers at both ends of the bundle.
Two Dimensional Data is easily obtained for fluorescent analysis



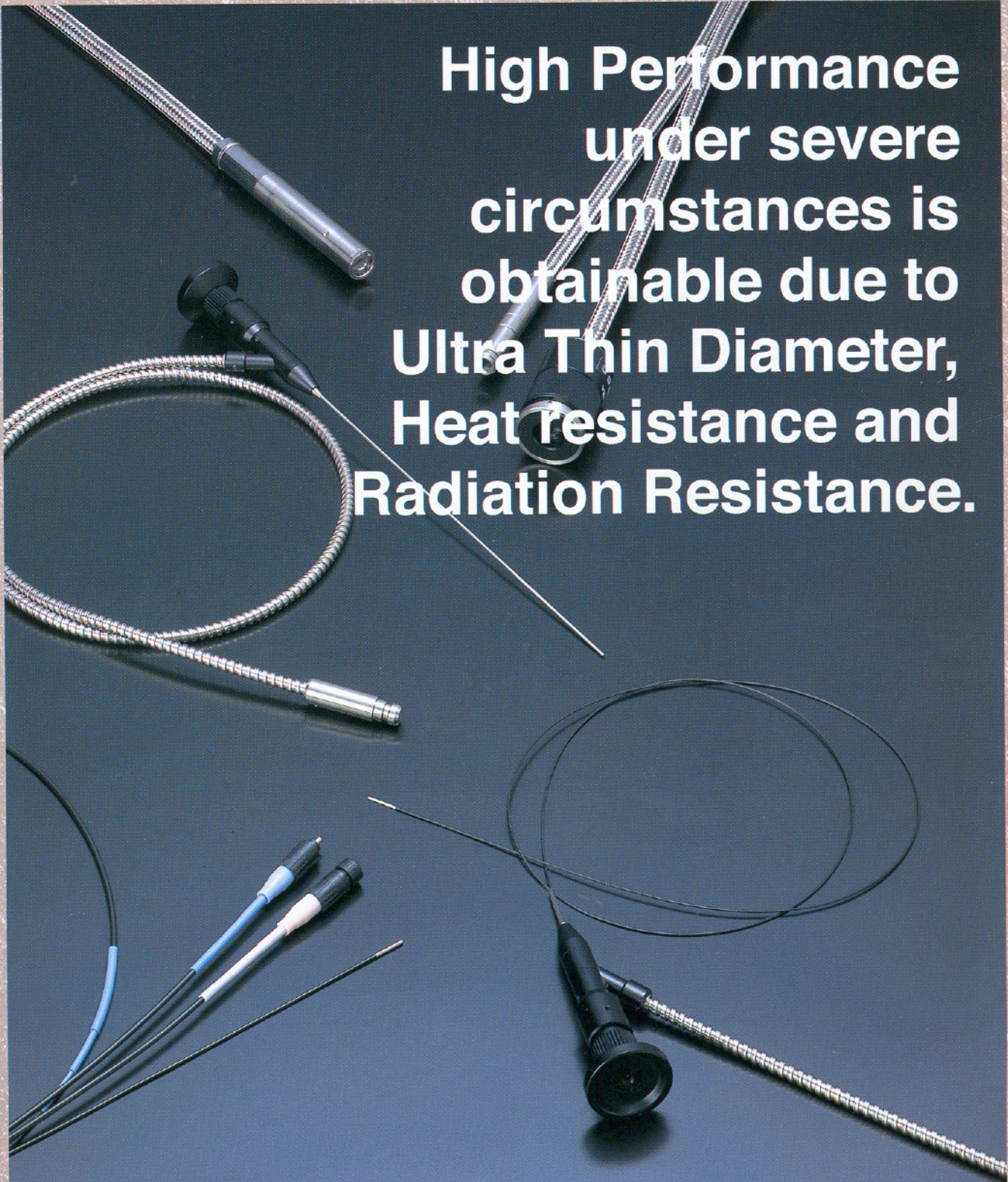
Excimer Laser Transmission etc.

Semiconductor Stepper with Excimer Laser [KrF, ArF]
Radiation Temperature Measurement and Image Processing etc.



Fiber Scope

We design and manufacture assembled/semi-assembled fiber scopes as per application and specification requirements.



**High Performance
under severe
circumstances is
obtainable due to
Ultra Thin Diameter,
Heat resistance and
Radiation Resistance.**

■Products

- Heat Resistant Fiber Scope for Boiler Inspection
- Radiation Resistant Fiber Scope
- Ultra Thin Fiber Scope (\leq dia 1 mm is also available)
- Image Fiber with Objective Lens (SELFOC® etc.)



Other optical fiber products where drawing and assembling technology are applied.

Capillary Tubing Excellent Performance in a Wide Variety of Applications.

- High purity, Excellent Optical transmission, Heat Resistance and Chemical Resistance is obtainable by using High Quality Silica Glass.
- A wide range of outer diameters ($80\mu\text{m}\sim 6\text{mm}$) are available. The inside diameter can be customized (Minimum diameter is 90% of outer diameter).
- Long lengths are available, also one of several types of plastic coating be selected.
- High grade capillary tubing with excellent transmittance in vacuum ultraviolet rays range and high resistance against Excimer Laser is available by doping of special material.

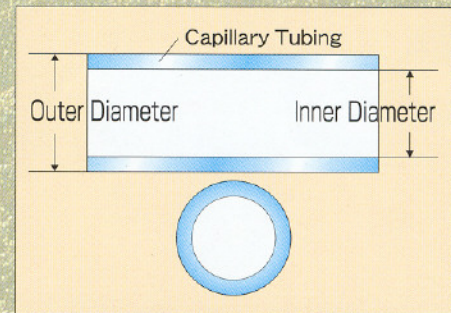
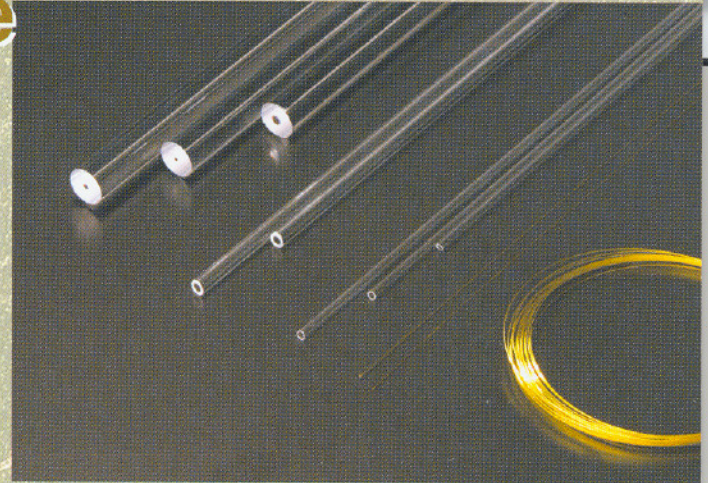
Product Example

[Product Example 1]

- Outer Diameter $\phi 6\text{mm}$
- Inner diameter $\phi 0.5\text{mm}$
- Coating NONE
- Length 80mm
- Terminal Assembly Polished on both ends

[Product Example2] (with coating)

- Outer Diameter $\phi 200\mu\text{m}$
- Inner diameter $\phi 50\mu\text{m}$
- Coating Polyimide Resin
- Coating Diameter $230\mu\text{m}$
- Length 100m or longer
- Packing Reel



Cross Section of Capillary Tubing

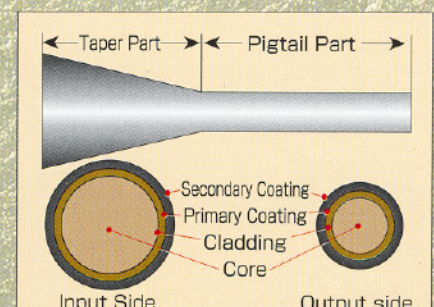
Tapered Fiber

- Light Concentrating without using Lenses and Mirrors
- The lighting route is free to move
- High Efficiency, Low Coupling Loss

Product Example

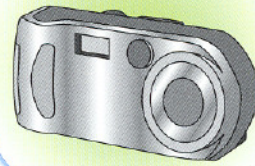
- Input Side: Core Diameter/Cladding Diameter= $2\text{mm}/2.12\text{mm}$
- Output Side: Core Diameter/Cladding Diameter= $1\text{mm}/1.06\text{mm}$
- Core/Cladding=Pure Silica Glass/Fluorine Doped Silica Glass
- NA=0.22
- Primary Coating Material : Urethane Acrylate Resin
- Secondary Coating Material : Polyolefin Resin

High Efficiency Light Concentrating and Free Lighting Route

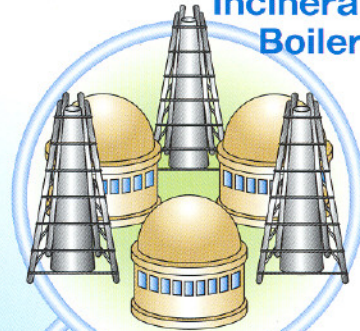


Tapered fiber Structure

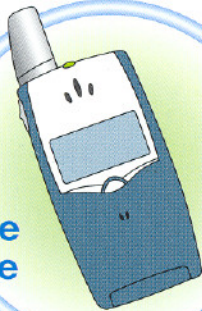
**Digital Camera
Optical Equipment**



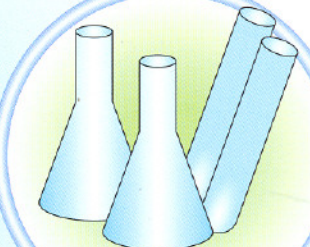
**Electric Power Plant
Incinerator
Boiler**



**Mobile
Phone**

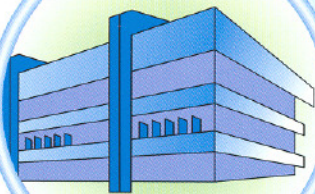


Fujikura's Optical fiber
Solutions are used in a variety
of fields and applications. We
continuously develop products
that are useful for new fields
within society.



**Analysis
Research Center**

Production Line



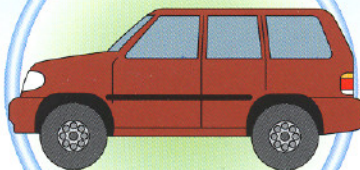
**Hospital
Medical Center**



**Flat Display
(Personal Computer, Television etc.)**



Automobile



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