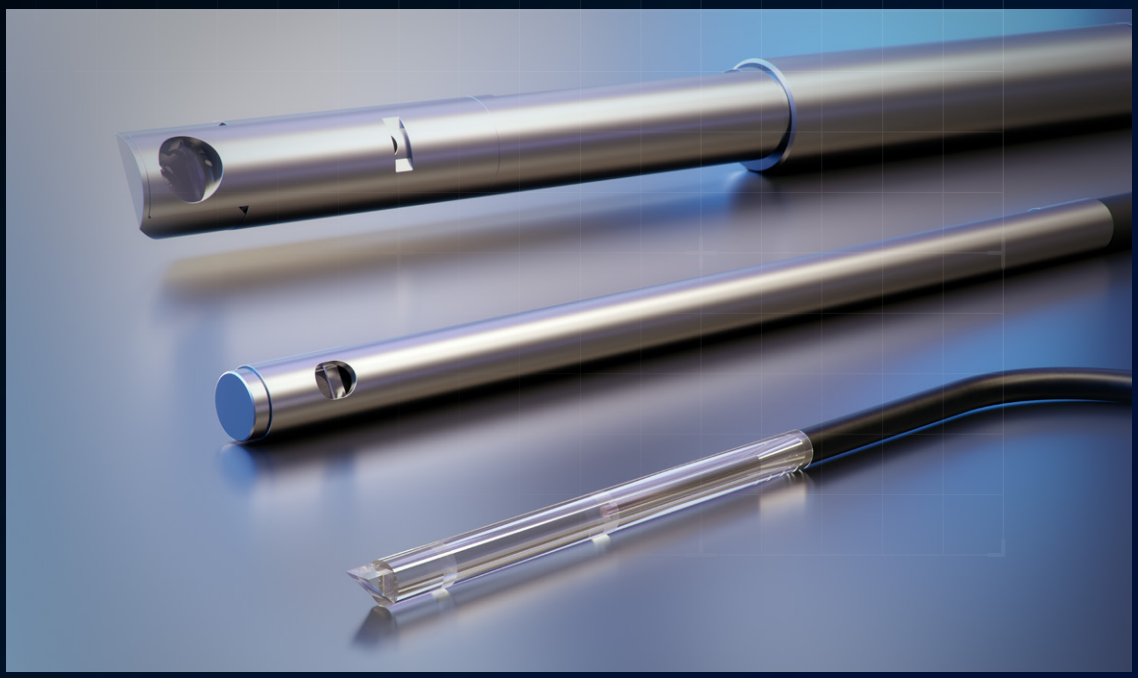
GRINTECH

Gradient Index Optics

Fiber-Optic Modules



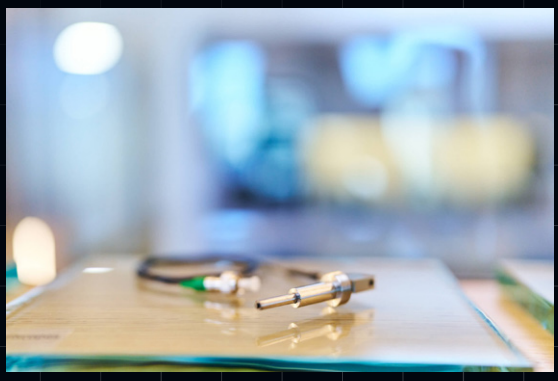
www.grintech.de

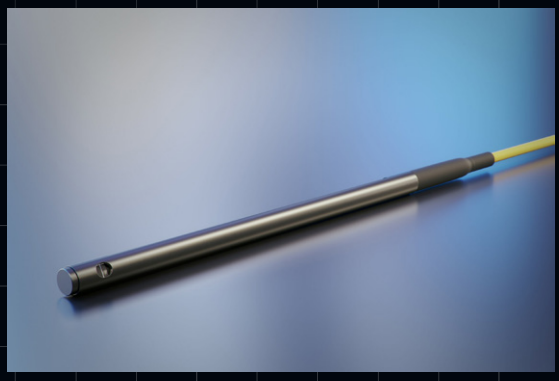
Precision for every application

Due to their **plano-optical end-faces**, GRIN lenses are often combined with other plano-optical components, such as prisms, optical fibers and beam splitters, to form fiber-optic modules for **optical non-contact sensor technology** and **biophotonics**.

- **Measurement principles** include **white light interferometry, OCT, or the confocal chromatic concept** (exclusive to Micro-Epsilon Messtechnik) and various **spectroscopy methods**
- In accordance with the customer's specifications, we develop optical and mechanical designs that are perfectly adapted to the application
- Spot sizes, working distances, numerical apertures, as well as specifically scaled chromatic aberration are typical parameters that we design according to your specifications.
- In addition to GRIN lenses, optical concepts also include refractive spherical and aspherical as well as diffractive elements.
- Our services include optical design including tolerance analysis, mechanical design, optics and mechanical production, assembly, qualification of the modules, as well as application and climate tests

We invite you to to send us your needs to info@grintech.de. Please see a selection of questions on following pages which typically arise to develop a project.





Coating Options

GRIN rod lenses are produced without antireflection coatings as standard. Antireflection coatings (for incidence angles of 0° – 30° corresponding to measurements on a reference substrate) can be offered for several GRIN lens geometries, except on GRIN relay lenses

Coating Code:

NC: no coating (reflection loss approx. 12%) – standard

C1: λ = 400 ... 700 nm, R < 1.0%

C2: λ = 800 ... 1000 nm, R < 0.5%

C5: λ = 1310 ... 1550 nm, R < 0.5%

One-sided coatings are available on request, as well as custom beam splitter coatings (special reflectivity, dichroic or polarizing). Variations due to modifications of the production process are possible. It is the user's responsibility to determine suitability for the user's purpose.

Please note our partnership with Inscopix as our exclusive distributor for the field of neuroscience applications in non-humans. If you wish to order GRIN lenses of this brochure for these applications, please visit www.inscopix.com or contact order.inscopix@bruker.com.

Tolerances and Handling Instructions

For of our single lenses we have the following fabrication tolerances and quality criteria:

Tolerances

- Lens length z_i: ± 5% due to variations of the gradient constant
- Working distance s: ± 0.02 mm (only LFRL- and CFRL lens series)
- Diameter d: +0 / -0.01 mm
- Tighter diameter tolerances on request

Surface quality

- 5 / 3 × 0.025; L 3 × 0.005; E 0 (defined by DIN ISO 10110-7:2000-02).
- The surface quality is defined within 90% of the lens diameter. Outside of this area defects are allowed.

Storage

GRIN lenses and lens systems should be stored in a dry environment. For short term storage, the plastic box or foam packing in which the lenses are shipped will provide adequate storage. Recommended storage temperature: -20 °C – 80 °C.

Storage boxes should ensure that the lenses do not touch each other to prevent chipping and scratches. Best is to use the original box.

Handling

Lenses should be carefully handled with plastic tweezers, preferably those with a tapered end. Lenses should be picked up out of their individual compartments by firmly holding each on its side cylinder surface (not the polished ends). Especially small sized lenses may stick to the lens box material and can be lost during removal.

Cleaning

If it is necessary to clean the lens surfaces due some dust or other contaminant which may impair the optical performance. GRINTECH generally recommends the use of ethyl alcohol as a cleaning solvent, maybe combined with some smooth lintfree lens cleaning tissue.

Acetone may also be used, but it should be pure enough, otherwise it might leave some residue on the lens surface.

Customization – GRIN Fiber Optic Modules

In addition to our standard products, GRINTECH offers fiber optic probes and assemblies according to customer specifications. Please ask us and let us know your requirements as detailed as possible (the closer we know your specifications the better we can advise you).

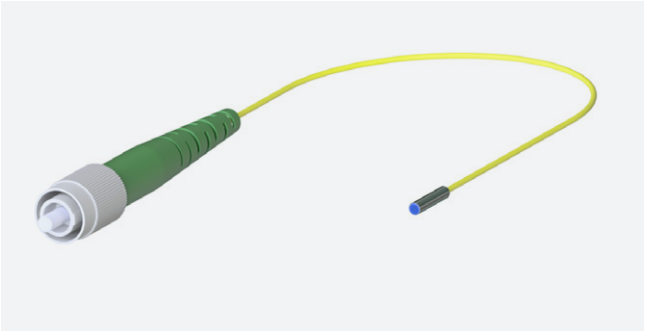
Applications

- Focusing Probes
- Collimators
- Fiber Coupling
- Fiber optical sensors

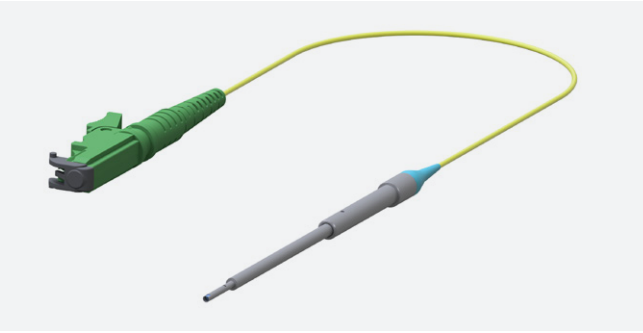
For the optical and mechanical design and the quotation we need at least the following information:

- Fiber type: single mode (SM), polarization maintaining (PM), multimode (MM), or special fiber.
  Please specify operating wavelength (for SM, PM), core size and numerical aperture (for MM)
- Fiber Length
- Connector: FC/PC, FC/APC , E2000, F3000, ST, SMA or other (please specify)
- Design wavelength
- Diameter of the optical components: 0.5, 1.0 or 1.8 mm
- Housing of the optical part: none or stainless steel tube (please specify outer diameter and length of tubing)
- Focusing probe: please specify working distance / Spot size (diameter @1/e²)
- Collimating probe: please specify beam diameter (@1/e²)
- Further information or specification: For example: prism for side firing, 8° angled facet for reducing back reflections, AR coating, etc.
- Quantity

Examples of typical configurations



GRIN-Lens Ø 1.80 mm connected to optical fiber in a stainless steel tube of 2 mm diameter, with FC/APC connector



Fiber-optic probe with 1.2 mm stainless steel tip, with E2000 connector

Fiber-optic assembly of 1.0 mm GRIN-lens with 90° prism, mounted in 1.2 mm stainless steel tube, fiber in 0.9 mm tubing with FC-connector

Customization – GRIN Biophotonic Probes – OCT/ Focussing Probes

In addition to our standard products, GRINTECH offers fiber optic assemblies according to customer specifications. Please ask us and let us know your requirements as detailed as possible (the closer we know your specifications the better we can advise you).

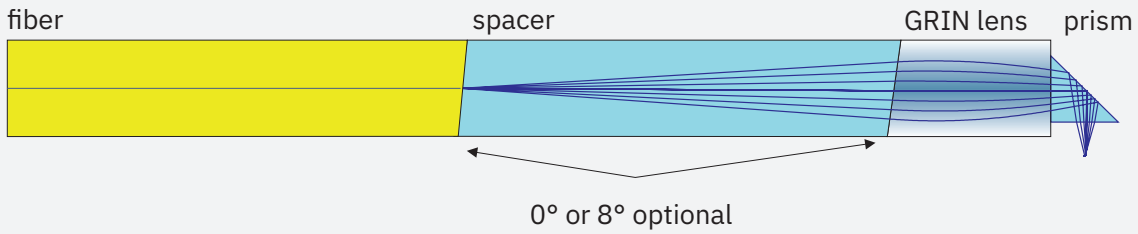
Applications

- OCT / Focusing Probes

For the optical and mechanical design and the quotation we need at least the following information:

- Fiber type: single mode, polarization maintaining, or special fiber. Please specify operating wavelength (for SM, PM)
- Fiber Length
- Connector: FC/PC, FC/APC or other (please specify)
- Design wavelength
- Diameter of the optical components: 0.5, 1.0 or 1.8 mm
- Working distance/ Spot size: For spot size please specify diameter @1/e²
- Housing of the optical part: none or stainless steel tube (please specify outer diameter and length of tubing)
- Collimating probe: please specify beam diameter @1/e²
- Further information or specification or example: prism for side firing, 8° angled facet for reducing back reflections, AR coating
- Quantity

Typical Configurations:



Example of a typical GRIN fiber optic assembly with 90° deflection.

GRINTECH

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