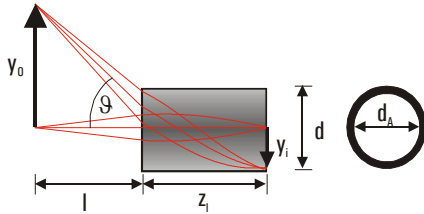


GRIN Objective Lenses for Endoscopy

- Gradient index lenses for endoscopic imaging optics
- Non-toxic silver-based glass material
- view angle $\vartheta = \pm 30^\circ$
- Plane surfaces, low chromatic aberration
- Combination with prisms and beam splitter cubes on request
- Aperture and field stops (black chromium coating ring on lens surface generated by photolithography) are available on request
- Certification: Biological safety – toxicology (EN ISO 10993-1)
- Design wavelength: 570 nm



Diameter d (mm)	Working distance l (mm)	Lens length ¹ z _i (mm)	Parax. Magnification M = y _o /y _i	Refractive index at the center of the profile n _o	Product code
2.0*	Infinity	4.79	--	1.635	GT-IFRL-200-inf-50-NC*
2.0	20	5.06	-10.78	1.635	GT-IFRL-200-020-50-NC
	10	5.33	-5.46	1.635	GT-IFRL-200-010-50-NC
	5	5.84	-2.86	1.635	GT-IFRL-200-005-50-NC
1.8*	Infinity	4.19	--	1.635	GT-IFRL-180-inf-50-NC*
1.8	20	4.40	-12.29	1.635	GT-IFRL-180-020-50-NC
	10	4.61	-6.21	1.635	GT-IFRL-180-010-50-NC
	5	5.01	-3.22	1.635	GT-IFRL-180-005-50-NC
1.0	Infinity	2.23	--	1.635	GT-IFRL-100-inf-50-NC
	20	2.29	-23.1	1.635	GT-IFRL-100-020-50-NC
	10	2.35	-11.58	1.635	GT-IFRL-100-010-50-NC
	5	2.46	-5.86	1.635	GT-IFRL-100-005-50-NC
0.85	Infinity	1.93	--	1.635	GT-IFRL-085-inf-50-NC
	10	2.02	-13.34	1.635	GT-IFRL-085-010-50-NC
	5	2.11	-6.73	1.635	GT-IFRL-085-005-50-NC
0.6	Infinity	1.32	--	1.635	GT-IFRL-060-inf-50-NC
	10	1.36	-19.48	1.635	GT-IFRL-060-010-50-NC
	5	1.40	-9.78	1.635	GT-IFRL-060-005-50-NC
0.5	Infinity	1.13	--	1.635	GT-IFRL-050-inf-50-NC
	10	1.16	-22.71	1.635	GT-IFRL-050-010-50-NC
	5	1.19	-11.39	1.635	GT-IFRL-050-005-50-NC
0.35	5	0.79	-16.9	1.635	GT-IFRL-035-005-50-NC
0.25	5	0.56	-23.63	1.635	GT-IFRL-025-005-50-NC

- Working distance and lens length deviating from these standards are available on request
- ZEMAX files can be [DOWNLOADED](#) from our website
- For tolerances, handling and storage see page 26

GRIN rod lenses are offered without antireflection coatings as standard. Antireflection coatings (R < 1.0 % for the design wavelength and incidence angles of 0 ... 30° corresponding to measurements on a reference substrate) can be offered:

Coating Code: NC: no coating (reflection loss approx. 12 %) - standard
C1: $\lambda = 450 \dots 690 \text{ nm}$

One - sided coatings are available on request.

Order example:

GT - IFRL - 100 - 010 - 50 - NC
GT GRINTECH
IFRL Imaging Focusing Rod Lens
100 Diameter: 0.25, 0.35, 0.5, 0.6, 0.85, 1.0, 1.8 or 2.0 mm
010 Working distance: 5, 10, 20 mm or infinity
50 NA: 0.50
NC Coating Code: NC or C1

Variations due to modifications of the production process are possible. It is the user's responsibility to determine suitability for the user's purpose.

Note: GRINTECH objective lenses can be combined with GRIN relay lenses to complete endoscopic imaging systems by gluing the optical surfaces directly together. Prisms to change the direction of view can also be glued directly on the front surface of the objective lens.

We are happy to advise you.

* Please note our partnership with Inscopix as our exclusive distributor for neuroscience applications in non-humans (see page 8).

Extension of Partnership

Brain Imaging – one of the most enabling applications of GRINTECH micro optics

Endomicroscopy using GRINTECH lenses and assemblies allows an *in-vivo* imaging access to deep tissue regions in the brain, especially in non-humans. It helps to understand disease formation and progression on a cellular level of the tissue.

We are pleased to inform that GRINTECH GmbH has expanded its strategic partnership with Inscopix Inc. beyond one-photon imaging to include exclusively serving customers on behalf of GRINTECH in two-photon imaging and across all non-human neuroscience research applications.

Inscopix offers innovative products and scientific consulting services for advancing neuroscience research and we are excited to be able to partner with Inscopix to serve a broader research community. Inscopix commits to continuing to support legacy GRINTECH customers with their microendoscope imaging needs across all neuroscience preclinical imaging applications. Inscopix Field Scientific Consultants and Inscopix's Support team will now be available to all legacy GRINTECH customers and to any customer interested in leveraging microendoscope imaging for their brain research, irrespective of whether the user or lab is a customer of Inscopix instrumentation. The expanded partnership aims to benefit GRINTECH customers and the broader Neuroscience research community with a dedicated neuroscience partner, enhanced scientific support and customer service, and volume-based pricing discounts.

Going forward, Inscopix will be your primary contact for ordering GRIN lenses for non-human Neuroscience research applications. If you have a one-time, custom GRIN lens order, Inscopix will work with GRINTECH to ensure that if Inscopix is unable to fulfill the order, GRINTECH will do so.

www.inscopix.com

For more information, please contact info@grintech.de

Tolerances / Handling Instructions

Tolerances:

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

Tolerances:	Surface quality:
lens length z: $\pm 5\%$ due to variations of the gradient constant	5 / 3 x 0.025; L 3 x 0.005; E 0
working distance s: ± 0.02 mm (only LFRL- and CFRL lens series)	(defined by DIN ISO 10110-7:2000-02).
diameter d: + 0 / -0.01 mm	The surface quality is defined within 90 % of the lens diameter.
- tighter diameter tolerances on request	Outside of this area defects are allowed.

Storage and Handling of Lenses

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.