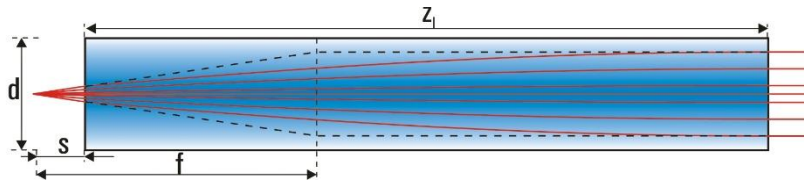


## GRIN Rod Lenses – Numerical Aperture 0.2



Gradient index lenses for fiber coupling and beam shaping of laser diodes

Diameter (mm)	Pitch P	Working distance s (mm)	Numerical Aperture NA	Lens length $z_l$ (mm)	Focal length f (mm)	Gradient constant $g$ (mm <sup>-1</sup> )	Refractive index at the center of the profile $n_0$	Wavelength $\lambda$ (nm)	Product code
0.50	0.25	0	0.20	3.05	1.28	0.515	1.524	670	GT-LFRL-050-025-20-NC (670)
	0.25	0	0.20	3.06	1.28	0.513	1.521	810	GT-LFRL-050-025-20-NC (810)
	0.25	0	0.20	3.07	1.29	0.511	1.515	1550	GT-LFRL-050-025-20-NC (1550)
	0.24	0.09 - 0.07*	0.20	2.94	1.28	0.515 - 0.511*	1.524 - 1.515*	670 - 1550	GT-LFRL-050-024-20-NC
1.00	0.25	0	0.20	6.12	2.56	0.257	1.524	670	GT-LFRL-100-025-20-NC (670)
	0.25	0	0.20	6.13	2.57	0.256	1.521	810	GT-LFRL-100-025-20-NC (810)
	0.25	0	0.20	6.16	2.59	0.255	1.515	1550	GT-LFRL-100-025-20-NC (1550)
	0.24	0.18 - 0.15*	0.20	5.89	2.57	0.257 - 0.255*	1.524 - 1.515*	670 - 1550	GT-LFRL-100-024-20-NC
1.80	0.25	0	0.20	11.15	4.66	0.141	1.524	670	GT-LFRL-180-025-20-NC (670)
	0.25	0	0.20	11.17	4.68	0.140	1.521	810	GT-LFRL-180-025-20-NC (810)
	0.25	0	0.20	11.22	4.72	0.139	1.515	1550	GT-LFRL-180-025-20-NC (1550)
	0.24	0.31 - 0.26	0.20	10.74	4.68	0.141 - 0.139*	1.524 - 1.515*	670 - 1550	GT-LFRL-180-024-20-NC

\*: depending on wavelength

- Working distance, design wavelength and lens length deviating from these standards are available on request
- other diameters (0.25 mm and 0.35 mm) 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  $0 \dots 10^\circ$  corresponding to measurements on a reference substrate) can be offered:

Coating Code: NC: no coating (reflection loss approx. 12%) - standard  
 C1:  $\lambda = 450 \dots 690$  nm  
 C2:  $\lambda = 800 \dots 1000$  nm  
 C5:  $\lambda = 1310 \dots 1550$  nm

One - sided coatings are available on request.

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

Order example:

GT - LFRL - 100 - 025 - 20 - NC - (670)	
GT	GRINTECH
LFRL	Focusing Rod Lens
100	Diameter: 0.5, 1.0, 1.8 mm
025	Pitch: 0.25 or 0.24
20	NA: 0.20
NC	Coating Code: NC, C1, C2 or C5
(670)	Design Wavelength

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

## Tolerances / Handling Instructions

### Tolerances:

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

<b>Tolerances:</b>	<b>Surface quality:</b>
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: $\pm 0.02$ 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:  $-20^{\circ}\text{C}$  -  $80^{\circ}\text{C}$ .

**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.