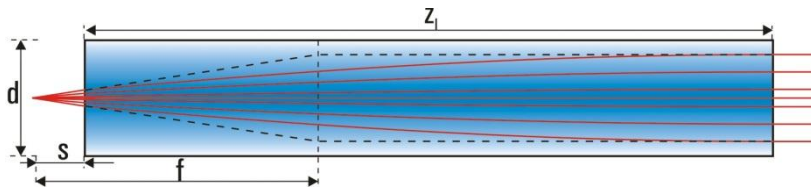


## GRIN Rod Lenses – Numerical Aperture 0.2 – for high-performance collimation

Diameter 1.00 mm:  
with optimized gradient index profile for compensation of higher-order spherical aberrations and better beam quality



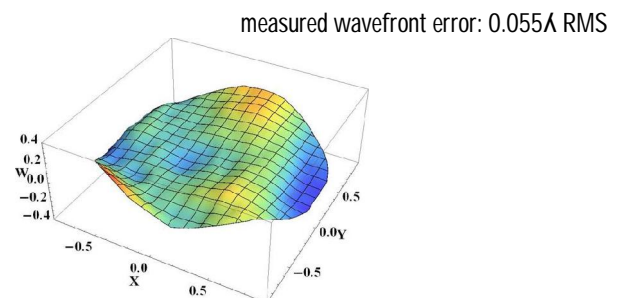
§ Working distance, design wavelength and lens length deviating from these standards on request  
§ 8° angled facet is available on request

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
Diameter d: 1.0 mm								
0.25	0	0.20	6.04	2.52	0.260	1.524	670	GT-LFRL-180-025-20-CC (670)
0.24	0.16	0.20	5.80	2.53	0.260	1.524	670	GT-LFRL-180-024-20-CC (670)
0.25	0	0.20	6.05	2.53	0.260	1.521	810	GT-LFRL-180-025-20-CC (810)
0.24	0.16	0.20	5.81	2.54	0.260	1.521	810	GT-LFRL-180-024-20-CC (810)
0.25	0	0.19	6.08	2.55	0.258	1.515	1310-1550	GT-LFRL-180-025-20-CC (1550)
0.24	0.16	0.19	5.84	2.56	0.258	1.515	1310-1550	GT-LFRL-180-024-20-CC (1550)

GT-CFRL-100-xxx-20-CC (xxxx) / all dimensions equivalent to standard GT-LFRL-100-xxx-20-CC (xxxx)

optimized GT-CFRL-100-xxx-20-CC (xxxx)

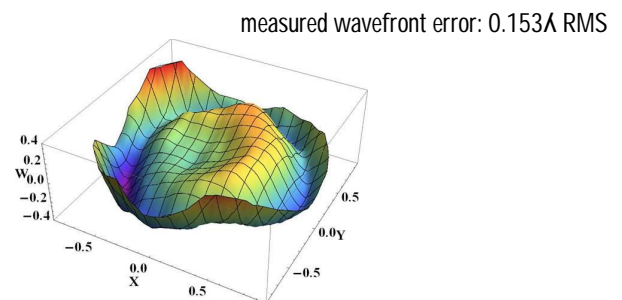
- Wavefront RMS @ 635 nm < 0.07
- diffraction limited properties
- higher order spherical aberrations are corrected
- for high-performance applications (e.g. collimators with  $M^2 < 1.1$ )



for comparison:

standard GT-LFRL-100-xxx-20-CC (xxxx)

- suitable for most common telecom applications
- Wavefront RMS @ 635 nm < 0.2
- residual aberration: higher order spherical aberrations



GRIN rod lenses are offered with antireflection coatings ( $R < 0.5\%$  for the design wavelength and incidence angles of  $0^\circ \dots 30^\circ$  corresponding to measurements on a reference substrate)

Coating Code: NC: no coating (reflection loss approx. 10%)  
C1:  $\lambda = 450 \dots 690$  nm  
C2:  $\lambda = 800 \dots 960$  nm  
C5:  $\lambda = 1310 \dots 1550$  nm

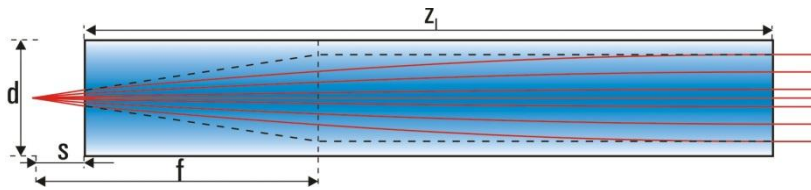
Variations due to modifications of the production process are possible.  
It is the user's responsibility to determine suitability for the user's purpose.

Tolerances:  
lens length  $z_l$ :  $\pm 5\%$  due to variations of the gradient constant  
working distance  $s$ :  $\pm 0.02$  mm  
diameter  $d$ :  $+0 / -0.01$  mm  
Please ask for tighter diameter tolerances

Surface quality:  
5 / 3 x 0.025; L 3 x 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.

## GRIN Rod Lenses – Numerical Aperture 0.2 – for high-performance collimation

Diameter 1.80 mm:  
with optimized gradient index profile for compensation of higher-order spherical aberrations and better beam quality



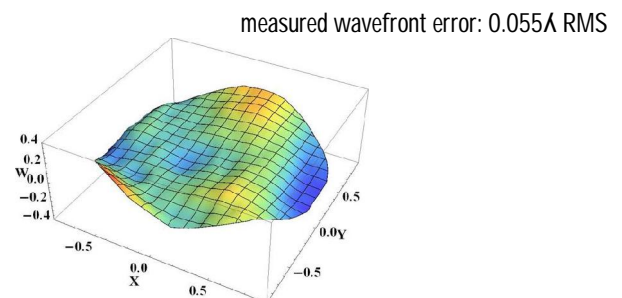
§ Working distance, design wavelength and lens length deviating from these standards on request  
§ 8° angled facet is available on request

Pitch P	Working distance s (mm)	Numerical Aperture NA	Lens length z <sub>l</sub> (mm)	Focal length f (mm)	Gradient constant g (mm <sup>-1</sup> )	Refractive index at the center of the profile n <sub>0</sub>	Wavelength λ (nm)	Product code
Diameter d: 1.8 mm								
0.25	0	0.19	11.06	4.62	0.142	1.524	670	GT-LFRL-180-025-20-CC (670)
0.24	0.28	0.19	10.63	4.63	0.142	1.524	670	GT-LFRL-180-024-20-CC (670)
0.25	0	0.19	11.08	4.64	0.142	1.521	810	GT-LFRL-180-025-20-CC (810)
0.24	0.28	0.19	10.65	4.65	0.142	1.521	810	GT-LFRL-180-024-20-CC (810)
0.25	0	0.19	11.13	4.68	0.141	1.515	1310-1550	GT-LFRL-180-025-20-CC (1550)
0.24	0.28	0.19	10.71	4.69	0.141	1.515	1310-1550	GT-LFRL-180-024-20-CC (1550)

GT-CFRL-180-xxx-20-CC (xxxx) / all dimensions equivalent to standard GT-LFRL-180-xxx-20-CC (xxxx)

optimized GT-CFRL-180-xxx-20-CC (xxxx)

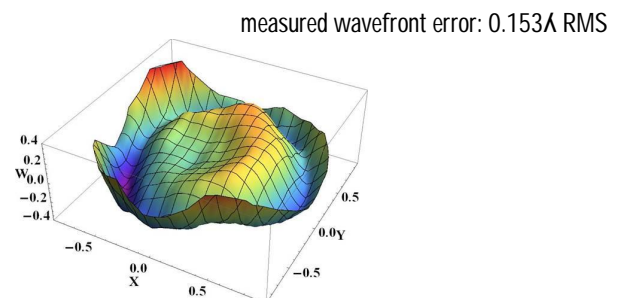
- Wavefront RMS @ 635 nm < 0.07
- diffraction limited properties
- higher order spherical aberrations are corrected
- for high-performance applications (e.g. collimators with M<sup>2</sup> < 1.1)



for comparison:

standard GT-LFRL-180-xxx-20-CC (xxxx)

- suitable for most common telecom applications
- Wavefront RMS @ 635 nm < 0.2
- residual aberration: higher order spherical aberrations



GRIN rod lenses are offered with antireflection coatings (R < 0.5 % for the design wavelength and incidence angles of 0° ... 30° corresponding to measurements on a reference substrate)

Coating Code: NC: no coating (reflection loss approx. 10 %)  
C1: λ = 450 ... 690 nm  
C2: λ = 800 ... 960 nm  
C5: λ = 1310 ... 1550 nm

Tolerances:  
lens length z: ± 5% due to variations of the gradient constant  
working distance s: ± 0.02 mm  
diameter d: + 0 / -0.01 mm  
Please ask for tighter diameter tolerances

Surface quality:  
5 / 3 x 0.025; L 3 x 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.

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