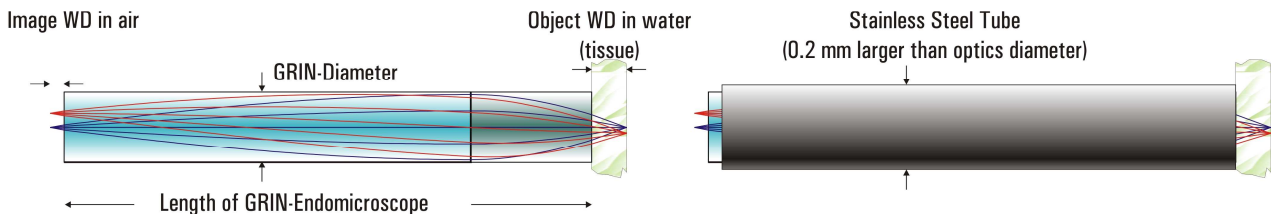


GRIN Needle Endoscopes

GRIN Needle Endoscopes are used for deep tissue imaging. They relay the micron-scale resolved image of the tissue over a longer length to a plane outside of the tissue at the other end of the needlescope. Most frequently they are used with multi-photon fluorescence imaging (Design Wavelength 860 nm) or with epi-fluorescence imaging (Design Wavelength 520 nm).

The Endoscopes are fabricated as GRIN-singlets with NA = 0.50 on both sides or as GRIN-doublets with an object NA of 0.5 and an image NA of 0.19. Working distances on object side are specified in water or tissue, on image side in air. The doublets are offered in different lengths resulting from adding 0.5 GRIN-pitches (periods) to the GRIN relay lens (NA = 0.19).



Product Code	Length (mm)	Working distance in water (μm) object side	Working distance in air (μm) image side	Design Wavelength (nm)	NA object side / image side	Magnification Image / Object	Singlet / Doublet
Diameter d: 0.5 mm							
NEM-050-06-00-520-S	2.19	60	0	520	0.50 / 0.50	1:1	S
NEM-050-25-10-860-S	1.86	250	100	860	0.50 / 0.50	1:1	S
NEM-050-06-08-520-DS	3.96	60	80	520	0.50 / 0.19	2.8 : 1	D
NEM-050-06-08-520-DM	10.06	60	80	520	0.50 / 0.19	2.8 : 1	D
NEM-050-06-08-520-DL	16.16	60	80	520	0.50 / 0.19	2.8 : 1	D
NEM-050-25-10-860-DS	3.76	250	100	860	0.50 / 0.19	2.6 : 1	D
NEM-050-25-10-860-DM	9.86	250	100	860	0.50 / 0.19	2.6 : 1	D
NEM-050-25-10-860-DL	15.97	250	100	860	0.50 / 0.19	2.6 : 1	D
Diameter d: 1.0 mm							
NEM-100-06-00-520-S	4.76	60	0	520	0.50 / 0.50	1:1	S
NEM-100-06-08-520-S	4.63	60	80	520	0.50 / 0.50	1:1	S
NEM-100-25-10-860-S	4.48	250	100	860	0.50 / 0.50	1:1	S
NEM-100-06-08-520-DS	8.33	60	80	520	0.50 / 0.19	2.7 : 1	D
NEM-100-06-08-520-DL	20.63	60	80	520	0.50 / 0.19	2.7 : 1	D
NEM-100-25-10-860-DS	8.16	250	100	860	0.50 / 0.19	2.6 : 1	D
NEM-100-25-10-860-DL	20.43	250	100	860	0.50 / 0.19	2.6 : 1	D

Notes:

- Diameters are sole GRIN-optics diameters
- Optionally the Endoscopes can be delivered in medical-grade stainless steel tubes (1.4301), with outer diameters of 0.70 mm for 0.5 mm optics and 1.2 mm for 1.0 mm optics. The tubes are mounted flush on the object side (tissue, high NA). On the image side, the optics sticks out of the tube by 200 – 500 μm . Please add -ST to the product code if desired.
- The lengths can have a tolerance of +/- 3 %.
- The lenses are non-coated. For customized projects, the lenses can be AR-coated.
- A side-viewing scope using microprisms may be also possible on a customized basis.

Order example:

NEM-050-06-08-520-DS
 | | | | | Relay pitch - Short (0.25 pitch) - Medium (0.75 pitch) - Long (1.25 pitch)
 | | | | | Singlet or Doublet
 | | | | | Design Wavelength (nm)
 | | | | | Working distance in air - image side
 | | | | | Working distance in water - objective side
 | | | | | Diameter: 0.5 mm
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NEM-100-06-08-520-DS
 | | | | | Relay pitch - Short (0.25 pitch) - Long (0.75 pitch)
 | | | | | Singlet or Doublet
 | | | | | Design Wavelength (nm)
 | | | | | Working distance in air - image side
 | | | | | Working distance in water - objective side
 | | | | | Diameter: 1.0 mm
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