

Everything you need to know about enlarging lenses.

Only a first class enlarging lens guarantees developing success.

To reproduce a photograph as a picture on paper requires two optical imaging processes: One to put the image onto the film and one to enlarge the image onto the paper. The second image reproduction process is no less important for the quality of the final result than the first. When selecting your enlarging lens, you therefore need to be just as critical as when you purchase your high-quality taking lens. In both cases, only the best can be good enough.

Modern cameras, films and processing methods provide a good basis for excellent photographs. Even though photographic equipment and materials already had a very high performance standard, over the past few years it has been possible to extend this standard even further – with visible results. This high quality level must also be maintained in the developing process.

In the transfer "chain" from the negative or transparency to the paper photograph, the most important quality link is the lens. It has to transfer the information contained in the film image onto paper – ideally without any loss at all. Although the laws of physics mean that this demand can only be met approximately, it still remains Rodenstock's objective in the development of new lenses.

Only a lens which has been designed specifically to meet the different demands (film size, enlarging factor, etc.) and which reproduces the image with as little loss as possible can guarantee convincing photographic results in the enlargement – with all the details which your high-quality taking lens has captured on the film.

Versatile range for all demands, enlarging units, film sizes and reproduction scales.

Rodenstock offers a product range which provides an optimal solution for any application: The breadth of the Rodenstock enlarging lens range begins with the 3 element model for the cost-conscious and ends with the high-power, apochromatically corrected 7 element lens.

Rodenstock has the suitable enlarging lens ...

- for the ambitious beginner in his or her darkroom as well as for the professional in the developing lab;
- for all enlargers from amateur models, professional enlargers and printers right up to professional vertical and horizontal cameras;
- for numerous film sizes from 8×11 mm (Minox) up to sheet film 24×30 cm (8×10") and larger processing sizes;
- for all reproduction scales from 1:1 for the manufacture of duplicates up to almost infinity for extremely big enlargements.

Right from the beginning highest quality is our highest priority.

The quality of an enlarging lens, normally termed its "sharpness", is expressed in its transfer performance (MTF = Modulation Transfer Function). This depends on the correction of a number of possible imaging errors such as spherical aberration, coma, astigmatism, field curvature, distortion and longitudinal or lateral colour error.



The sources of these defects can be found, for example, in the inevitable dispersion (colour splitting) of the glass, asymmetry

in the beam path with oblique incident light, but also in shape deviations in the lens areas or in errors of centration.

All imaging defects, whether physical in nature or resulting from production tolerances, are reduced to the lowest possible levels by Rodenstock at the development stage of the lens with a simulation of the imaging properties by high-performance mainframes and sophisticated computer programs. Of course, these limits are also dependent on the optical system selected: A sophisticated 6 or 7 element lens can be provided with better correction than a lens with only 3 elements.

Sophisticated production methods ensure a high quality standard in series production.

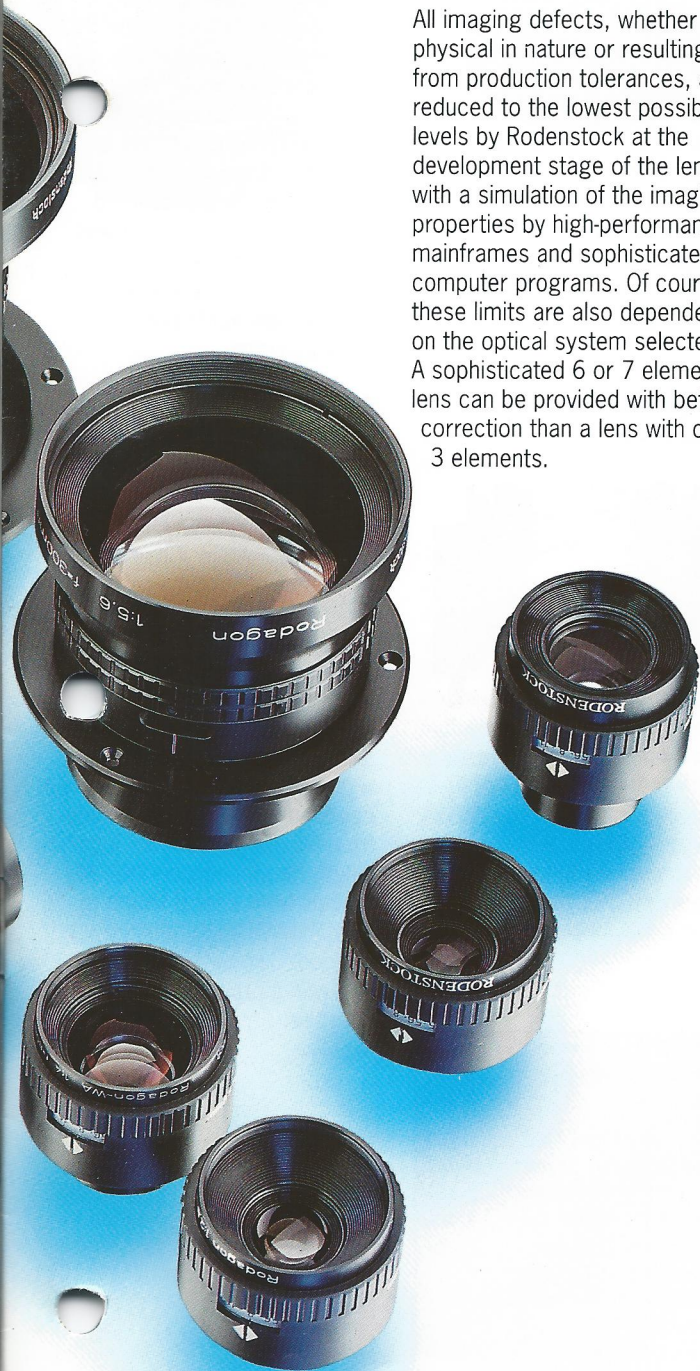
But all these efforts would be in vain if the theoretical quality achieved by the lens in the development phase were not maintained in series production. This second objective is reached with the sophisticated equipment used in the production facilities for the manufacture and assembly of the optical and mechanical components of Rodenstock lenses. Quality assurance is more than just the final inspection of the lens, it accompanies the production of a lens from its first design draft right up to the packaging of the lens and its delivery.

The Rodenstock name guarantees lens quality which the photographer and the printer can always rely on and which allows both to expect the best possible photographic results.

Rodenstock quality for the technically perfect reproduction of your creative acts as first-class photographs.

The efforts made by Rodenstock are reflected in a variety of quality features which offer practical benefits in the use of the lenses:

- All lenses are eminently suitable for photographs in black and white or colour.
- The reproduction quality is even over the entire film area – right up to the edges and the corners and not just in the picture centre.
- The high reproduction quality is maintained without visible loss even at high scale ranges.
- The high speed (as the full aperture is popularly called) allows problem-free focusing.
- The almost complete elimination of flare ensures high-contrast reproduction.
- The lack of vignetting at the working aperture (depending on the lens approx. 2 stops from the full aperture) guarantees a very uniform illumination distribution right up to the edges.
- Distortion is corrected so well that it is no longer visible in practice.
- The minimal focal length spread (well below 1%) means that the lenses can be used without problems in units with automatic focus or in printers.



The right lens for every task.

Rogonar The low-priced starter for the amateur dark room.



Rogonar 50 mm f/2.8

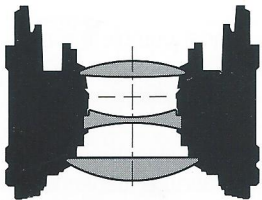
The Rogonar forms a solid base for the "first steps" in amateur developing. This lens is already a standard feature of many low-price enlarging units.

With 3 free elements the lens has a relatively simple optical design. But when used for a relatively small scale range and at a working aperture of 11, it still offers good results.

The high full aperture for a 3 element lens ensures simple and precise focusing.

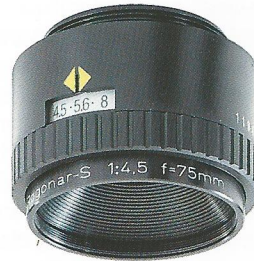
The Rogonar is available in two versions for 35 mm film or roll film formats up to 6x6 cm. Both versions have a click-stop diaphragm and an illuminated f-number scale.

Further important technical details can be found in the table on the rear cover.



Optical design: 3 elements/3 groups
(Rogonar 50 mm f/2.8)

Rogonar-S The lens with the optimal price performance ratio for standard prints.



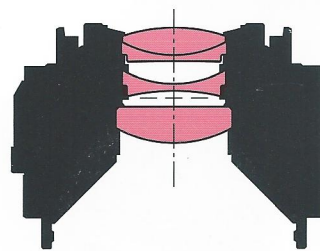
Rogonar-S 75 mm f/4.5

The universal lens Rogonar-S has a relatively simple optical design and so a very attractive price. But the very high performance capability of this lens make it ideal for the high requirements of demanding amateurs or professional developing labs. The main application area of the Rogonar-S is enlargement in the scale range required for photographs in the standard formats. In this range the lens with 4 elements in 3 groups provides high-quality results with only low light fall-off to the picture margin.

The recommended scale range can also offer some interesting possibilities for cropped enlargements.

Stopping down by 2 to 3 stops is recommended for optimal results.

The Rogonar-S can be supplied for use for all film sizes from Minox and pocket up to sheet film 9x12 cm (4x5"). It is equipped with a click-stop diaphragm which can be disabled on the models from 50 mm to 105 mm focal length for stepless control. All models from a focal length of 50 mm have an illuminated aperture display and are equipped with a practical pre-set aperture.

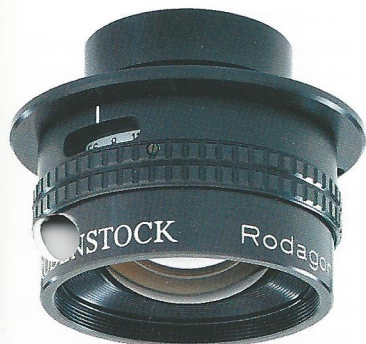


Optical design: 4 elements/3 groups
(Rogonar-S 50 mm f/2.8)

Rogonar (Focal length/ Aperture)	Maximum Film Size	Recomm. Scale Range
50 mm f/2.8	24x36 mm	2-8x
75 mm f/4.5	6x6 cm	2-6x

Rogonar-S (Focal length/ Aperture)	Maximum Film Size	Recomm. Scale Range
25 mm f/4.0	13x17 mm	10-30x
35 mm f/4.0	18x24 mm	10-30x
50 mm f/2.8	24x36 mm	2-10x
60 mm f/4.5	40x40 mm	2-10x
75 mm f/4.5	6x6 cm	2-10x
90 mm f/4.5	6x7 cm	2-8x
105 mm f/4.5	6x9 cm	2-8x
135 mm f/4.5	9x12 cm	2-6x
150 mm f/4.5	9x12 cm	2-6x

Rodagon
The all-round lens for professional quality in the developing lab.



Rodagon 150 mm f/5.6

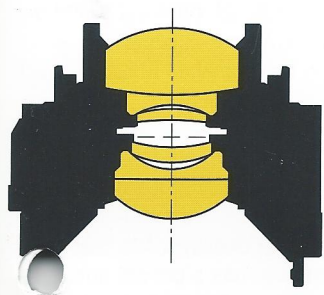
The lens type Rodagon, with brilliant reproduction over the whole scale range of conventional enlargers, has become the universal workhorse of both demanding amateurs and professionals in practical use.

The 6 element design guarantees the resolution of the finest details while maintaining a uniformly high contrast from the picture centre to the edges. As the lens is nearly independent with regard to scale, top quality is ensured from mini-prints right up to high enlargements.

The recommended working aperture is reached by stopping down by only 2 stops.

The Rodagon already meets the high demands of processing photography. A number of photographers use the models with shorter focal lengths in conjunction with suitable adapters together with reflex cameras for high-quality photos in extreme close-ups.

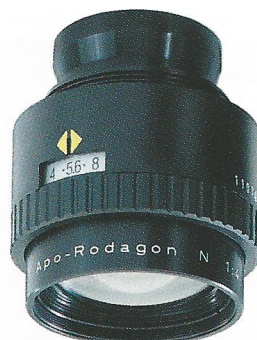
All Rodagon lenses are equipped with click-stop diaphragms which can be disabled for focal lengths from 50 mm to 135 mm and which are provided with a pre-set aperture.



Optical design: 6 elements/4 groups
(Rodagon 50 mm f/2.8)

Rodagon (Focal length/ Aperture)	Maximum Film Size	Recomm. Scale Range
28 mm f/4.0	18x24 mm	5-30x
35 mm f/4.0	18x24 mm	5-30x
50 mm f/2.8	24x36 mm	2-15x
60 mm f/4.0	40x40 mm	2-10x
80 mm f/4.0	6x7 cm	2-10x
105 mm f/5.6	6x9 cm	2-10x
135 mm f/5.6	9x12 cm	2-10x
150 mm f/5.6	9x12 cm	2-10x
180 mm f/5.6	13x18 cm	2-8x
210 mm f/5.6	13x18 cm	2-8x
270 mm f/5.6	18x24 cm	2-8x
300 mm f/5.6	18x24 cm	2-8x
360 mm f/6.3	24x30 cm	2-8x

Apo-Rodagon-N
The unbeatable lens for the highest demands.



Apo-Rodagon-N 105 mm f/4.0

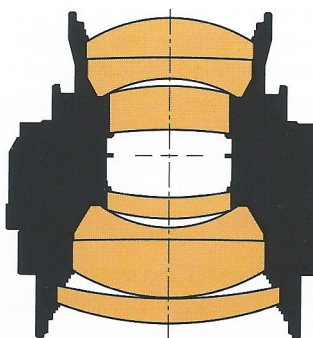
The apochromatically corrected high-performance lenses of the Apo-Rodagon-N series guarantee perfect results which will satisfy the highest demands.

The correction of the 7 element lenses (6 elements for focal length 50 mm) was given highest priority and so ensures the full elimination of irritating visible colour fringes on high-contrast borders. All monochromatic imaging errors have also been greatly reduced to give this lens type its unsurpassed image reproduction performance.

The advantages are clearly visible in both colour and black and white enlargements. The Apo-Rodagon-N is therefore the amateur's and professional's first choice whenever the very highest reproduction quality is required.

The optimal working aperture is reached by stopping down by only 1 to 2 stops.

All Apo-Rodagon-N models have a click-stop diaphragm and an illuminated aperture display. Up to focal length 150 mm they also offer a pre-set aperture and allow the click-stop to be disengaged for stepless control.

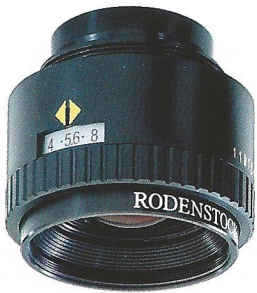


Optical design: 7 elements/5 groups
(Apo-Rodagon-N 105 mm f/4.0)

Apo-Rodagon-N (Focal length/ Aperture)	Maximum Film Size	Recomm. Scale Range
50 mm f/2.8	24x36 mm	2-20x
80 mm f/4.0	6x7 cm	2-15x
105 mm f/4.0	6x9 cm	2-15x
150 mm f/4.0	9x12 cm	2-15x

Lenses for special applications.

Rodagon-WA Professional quality with a clearly smaller projection distance.



Rodagon-WA 80 mm f/4.0

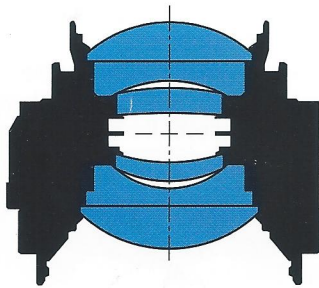
The Rodagon-WA has a shorter focal length and a large angle of view and achieves a 70% larger projection area than conventional enlarging lenses with standard focal lengths. It is therefore eminently suitable for section enlargements on units with short columns. Clumsy wall or floor projections can so be avoided.

Thanks to the shorter projection distance the negative carrier and the filter adjustment controls can still be operated easily when high enlargements are required.

The 6 element Rodagon-WA provides the same reproduction performance as the Rodagon lens type.

The recommended working aperture is reached by stopping down by 2 stops.

All Rodagon-WA models have click-stop rings and an illuminated f/stop display. The models from 40 to 80 mm focal length have a pre-setting diaphragm and allows the click-stops to be disabled for infinite adjustment.



Optical design: 6 elements/4 groups
(Rodagon-WA 80 mm f/4.0)

Rodagon-G The special lens for large scales.

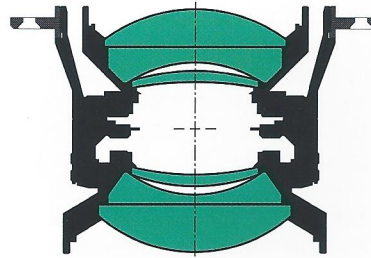


Rodagon-G 210 mm f/5.6

For wall-size multi-roll enlargements and poster formats the Rodagon-G is the best choice: It has been optimised for extremely large reproduction scales and surpasses the quality of all conventional enlarging lenses for these scales. The 50 mm lens, for example, provides its superiority from scales of around 15:1, while the Rodagon-G lenses with longer focal lengths demonstrate their class from scales of around 10:1 or 8:1 (see table).

At these reproduction scales focusing is often difficult due to the low projection illumination. The very high contrast of the 6 element lens – even at full aperture – makes focusing much easier with this lens.

All Rodagon-G models are equipped with click-stop diaphragms and illuminated aperture displays. The 50 mm lens also has a pre-set aperture and allows the click-stop to be disengaged for stepless control.



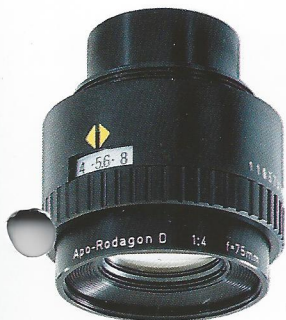
Optical design: 6 elements/4 groups
(Rodagon-G 210 mm f/5.6)

Rodagon-WA (Focal length/ Aperture)	Maximum Film Size	Recomm. Scale Range
40 mm f/4.0	24x36 mm	4-20x
60 mm f/4.0	6x6 cm	4-15x
80 mm f/4.0	6x9 cm	4-15x
120 mm f/4.0	9x12 cm	4-15x

Rodagon-G (Focal length/ Aperture)	Maximum Film Size	Recomm. Scale Range
50 mm f/2.8	24x36 mm	15-50x
105 mm f/5.6	6x9 cm	10-40x
150 mm f/5.6	9x12 cm	10-40x
210 mm f/5.6	13x18 cm	8-30x
240 mm f/5.6	13x18 cm	8-30x
300 mm f/5.6	18x24 cm	8-30x
360 mm f/6.8	18x24 cm	8-30x
480 mm f/8.4	24x30 cm	8-30x

Apo-Rodagon-D.
Duplication with practically
no loss in quality.

Practical features for
simple, fast and safe
operation increase
productivity.



Apo-Rodagon-D 75 mm f/4.0

Apo-Rodagon-D lenses are designed for the highest possible imaging quality at scales of 0.4x to 2.5x – for just those scales where even the best enlarging lenses begin to show their weak spots. They are therefore suitable for transparency duplication, the preparation of internegatives and – together with the Modular-Focus helical mount – for macro photography and scanners.

The 6-element, apochromatically corrected lenses feature high contrast and sharpness right up to the picture corners with practically no color fringes.

The optimum working aperture will depend on the reproduction scale and is between f/4.0 and f/5.6 (Apo-Rodagon-D 1x) and between f/5.6 – f/8.0 (Apo-Rodagon-D 2x). Both models are fitted with click-stop rings (which can be disabled) and pre-setting rings.

Although the performance of the optics is the most important property of a lens, additional features also provide a high degree of practical use. Such features make the user's work a lot easier, save time and money and, thanks to the increased operating safety, improve the quality of the results and increase productivity.

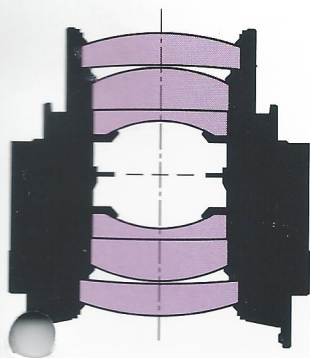
Rodenstock enlarging lenses are also characterised by their mechanical features which offer a number of useful properties to meet the demands of the enlarging lab.

• The click-stop diaphragm allows a fast and precise setting of a stop value even when the room is completely dark.

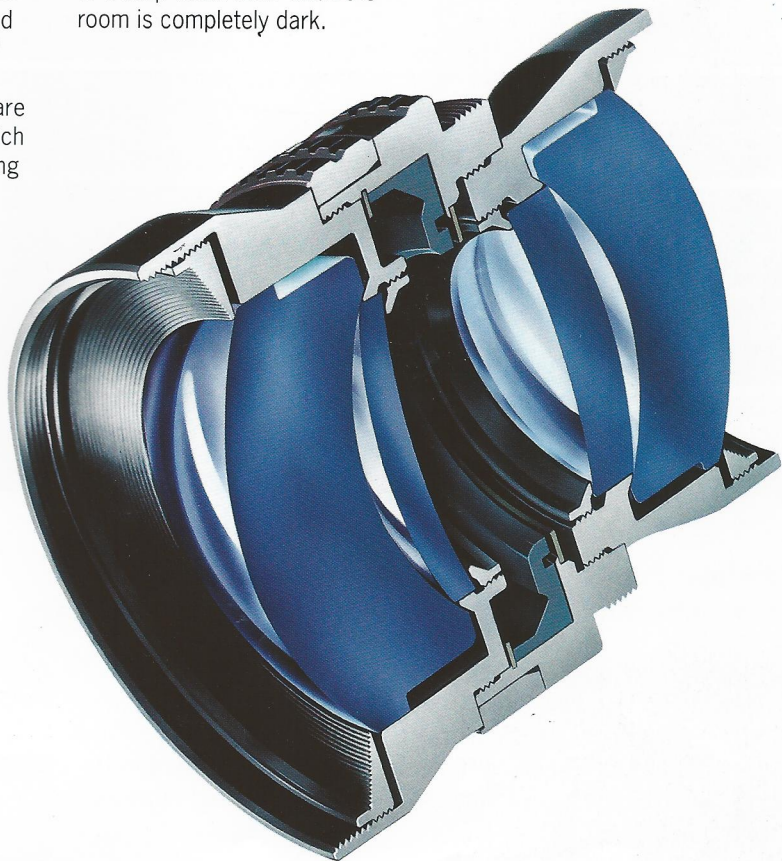
• The pre-set aperture makes it possible to set a working aperture which can be put into operation by simply turning the diaphragm to the stop after the picture has been composed and focused.

• The illuminated f-stop display shows the stop set without the room lighting having to be switched on.

• The infinite stop setting allows exact stopping down when analysers with pre-set exposure times are used.



Optical design: 6 elements/4 groups
 (Apo-Rodagon-D 75 mm f/4.0)



Apo-Rodagon-D (Aperture/focal length)	Maximum film size	Recommen- ded scale range
Apo-Rodagon-D 1x 75 mm f/4.0	6 x 6 cm	0.8x–1.2x
Apo-Rodagon-D 2x 75 mm f/4.5	6 x 7 cm	1.2x–2.5x Enlargement or 0.4x–0.8x miniaturisation

Technical Data

Optical Data

diaphragm design			
lowest aperture	pre-selection aperture	click-stop disable	illuminated stop display

Mechanical Data

lens	max. recommended film size	recommended scale (optimal)	lowest aperture	pre-selection aperture	click-stop disable	illuminated stop display	filter thread [mm]	flange focal length at ∞	overall length	maximum lens dia. \varnothing	screw thread [mm]	contact area to rear edge
Rogonar	50 mm f/2.8 75 mm f/4.5	24 x 36 mm 6 x 6 cm	2-8x (4x) 2-6x (4x)	16 16			- -	38.0 mm 63.1 mm	32.0 mm 32.0 mm	42.0 mm 42.0 mm	M 39 x 1/26" M 39 x 1/26"	6.5 mm 6.5 mm
Rogonar-S	25 mm f/4.0 35 mm f/4.0 50 mm f/2.8 60 mm f/4.5 75 mm f/4.5 90 mm f/4.5 105 mm f/4.5 135 mm f/4.5 150 mm f/4.5	13 x 17 mm 18 x 24 mm 24 x 36 mm 40 x 40 mm 6 x 6 cm 6 x 7 cm 6 x 9 cm 9 x 12 cm / 4 x 5" 9 x 12 cm / 4 x 5"	10-30x (20x) 10-30x (20x) 2-10x (4x) 2-10x (4x) 2-10x (4x) 2-8x (4x) 2-8x (4x) 2-6x (4x) 2-6x (4x)	16 16 16 22 22 22 22 32 32			M 30.5 x 0.5 M 30.5 x 0.5 M 40.5 x 0.5 M 40.5 x 0.5 M 40.5 x 0.5 M 40.5 x 0.5 M 40.5 x 0.5 M 52 x 0.75 M 52 x 0.75	23.0 mm 34.0 mm 47.0 mm 52.5 mm 65.5 mm 80.0 mm 95.0 mm 129.5 mm 138.0 mm	28.0 mm 28.0 mm 37.5 mm 36.5 mm 36.5 mm 36.5 mm 36.5 mm 38.0 mm 36.8 mm	40.5 mm 40.5 mm 50.0 mm 50.0 mm 50.0 mm 50.0 mm 50.0 mm 60.0 mm 60.0 mm	M 32.5 x 0.5* M 32.5 x 0.5* M 39 x 1/26" M 39 x 1/26" M 39 x 1/26" M 39 x 1/26" M 39 x 1/26" M 50 x 0.75 M 50 x 0.75	4.5 mm 4.5 mm 6.5 mm 5.9 mm 5.9 mm 5.9 mm 5.9 mm 11.3 mm 9.8 mm
Rodagon	28 mm f/4.0 35 mm f/4.0 50 mm f/2.8 60 mm f/4.0 80 mm f/4.0 105 mm f/5.6 135 mm f/5.6 150 mm f/5.6 180 mm f/5.6 210 mm f/5.6 240 mm f/5.6 300 mm f/5.6 360 mm f/6.3	18 x 24 mm 24 x 24 mm 24 x 36 mm 40 x 40 mm 6 x 7 cm 6 x 9 cm 9 x 12 cm / 4 x 5" 9 x 12 cm / 4 x 5" 13 x 18 cm / 5 x 7" 13 x 18 cm / 5 x 7" 18 x 24 cm / 8 x 10" 18 x 24 cm / 8 x 10" 24 x 30 cm / 10 x 12"	5-30x (20x) 5-30x (20x) 2-15x (10x) 2-10x (10x) 2-10x (6x) 2-10x (6x) 2-10x (6x) 2-10x (6x) 2-8x (5x) 2-8x (4x) 2-8x (4x) 2-8x (4x) 2-8x (2.5x)	16 16 16 22 22 32 32 45 45 45 45 45			M 30.5 x 0.5 M 30.5 x 0.5 M 40.5 x 0.5 M 40.5 x 0.5 M 40.5 x 0.5 M 40.5 x 0.5 M 40.5 x 0.5 M 52 x 0.75 M 58 x 0.75 M 67 x 0.75 M 77 x 0.75 M 86 x 1 M 95 x 1	27.7 mm 35.6 mm 43.5 mm 56.0 mm 74.7 mm 99.5 mm 128.0 mm 146.0 mm 177.0 mm 201.0 mm 230.0 mm 283.0 mm 300.0 mm	30.0 mm 32.5 mm 43.5 mm 41.0 mm 44.5 mm 41.0 mm 45.5 mm 49.8 mm 59.8 mm 67.2 mm 77.0 mm 93.0 mm 110.6 mm	40.5 mm 40.5 mm 50.0 mm 50.0 mm 50.0 mm 50.0 mm 50.0 mm 60.0 mm 60.0 mm 70.0 mm 80.0 mm 90.0 mm 100.0 mm	M 32.5 x 0.5* M 32.5 x 0.5* M 39 x 1/26" M 39 x 1/26" M 39 x 1/26" M 39 x 1/26" M 39 x 1/26" M 50 x 0.75 M 50 x 0.75 M 58 x 0.75 M 72 x 1 M 72 x 1 M 90 x 1	6.7 mm 9.0 mm 13.0 mm 10.0 mm 13.5 mm 10.5 mm 14.5 mm 20.1 mm 21.6 mm 28.1 mm 30.0 mm 8.5 mm 9.5 mm
Apo-Rodagon-N	50 mm f/2.8 80 mm f/4.0 105 mm f/4.0 150 mm f/4.0	24 x 36 mm 6 x 7 cm 6 x 9 cm 9 x 12 cm / 4 x 5"	2-20x (10x) 2-15x (10x) 2-15x (6x) 2-15x (6x)	16 22 22 32			M 40.5 x 0.5 M 40.5 x 0.5 M 40.5 x 0.5 M 67 x 0.75	46.0 mm 77.0 mm 99.1 mm 144.5 mm	46.5 mm 43.0 mm 54.3 mm 78.2 mm	50.0 mm 50.0 mm 50.0 mm 70.0 mm	M 39 x 1/26" M 39 x 1/26" M 39 x 1/26" M 50 x 0.75	15.7 mm 12.2 mm 18.0 mm 28.8 mm
Rodagon-WA	40 mm f/4.0 60 mm f/4.0 80 mm f/4.0 120 mm f/5.6	24 x 36 mm 6 x 6 cm 6 x 9 cm 9 x 12 cm / 4 x 5"	4-20x (10x) 4-15x (8x) 4-15x (8x) 4-15x (6x)	22 22 22 45			M 40.5 x 0.5 M 40.5 x 0.5 M 40.5 x 0.5 M 52 x 0.75	36.5 mm 55.5 mm 77.0 mm 116.4 mm	37.2 mm 41.0 mm 44.0 mm 59.0 mm	50.0 mm 50.0 mm 50.0 mm 60.0 mm	M 39 x 1/26" M 39 x 1/26" M 39 x 1/26" M 50 x 0.75	6.5 mm 10.0 mm 13.0 mm 26.6 mm
Rodagon-G	50 mm f/2.8 105 mm f/5.6 150 mm f/5.6 210 mm f/5.6 240 mm f/5.6 300 mm f/5.6 360 mm f/6.3 480 mm f/8.4	24 x 36 mm 6 x 9 cm 9 x 12 cm / 4 x 5" 13 x 18 cm / 5 x 7" 13 x 18 cm / 5 x 7" 18 x 24 cm / 8 x 10" 18 x 24 cm / 8 x 10" 24 x 30 cm / 10 x 12"	15-50x (25x) 10-40x (20x) 10-40x (20x) 8-30x (20x) 8-30x (20x) 8-30x (20x) 8-30x (20x) 8-30x (20x)	16 45 45 45 45 45 45 64			M 40.5 x 0.5 M 40.5 x 0.5 M 49 x 0.75 M 67 x 0.75 M 77 x 0.75 M 86 x 1 M 105 x 1 M 112 x 1.5	47.0 mm 100.3 mm 141.8 mm 179.5 mm 230.6 mm 253.3 mm 304.2 mm 412.0 mm	45.0 mm 38.0 mm 50.6 mm 65.9 mm 76.9 mm 93.5 mm 116.5 mm 146.8 mm	50.0 mm 60.0 mm 60.0 mm 74.5 mm 80.0 mm 93.5 mm 110.0 mm 115.0 mm	M 39 x 1/26" M 50 x 0.75 M 50 x 0.75 M 72 x 1 M 72 x 1 M 90 x 1 M 90 x 1 M 110 x 1	14.0 mm 14.3 mm 20.5 mm 8.5 mm 32.2 mm 11.5 mm 12.2 mm 17.7 mm
Apo-Rodagon-D	75 mm f/4.0 75 mm f/4.5	6 x 6 cm 6 x 7 cm	0.8-1.2x (1x) 1.2-2.5x (2x)	22 22			M 40.5 x 0.5 M 40.5 x 0.5	136.7 mm (at 1:1) 109.4 mm (at 1:2)	53.0 mm 43.0 mm	50.0 mm 50.0 mm	M 39 x 1/26" M 39 x 1/26"	18.7 mm 12.5 mm

* Adapter for M 39 x 1/26" supplied

Modular-Focus

Helical mount for focusing enlarging lenses

Thanks to their outstanding image reproduction, enlarging lenses are the real alternative for micro and macro photography. All that is needed for use with a camera is a helical mount as a focusing device.

For this purpose Rodenstock can offer the Modular-Focus with a straight-line connection. With a stroke of 25 mm this allows connection to almost all commercial 35 mm systems and video cameras with exchangeable lenses using commercial T2 adapters or C-Mounts. Detailed information can be found in our separate production information "Lenses for micro and macro photography".