



RODENSTOCK

# Lenses for Professional Photography



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The ideal lenses for adjustable  
large format and medium format  
technical cameras

## Lenses and applications

Even in the age of digital photography, the professional camera remains the dominant tool for advertising, still-life and building photographs:

The large formats of conventional photography still offer unsurpassed sharpness and an incomparable abundance of detail. Professional cameras allow perspective corrections and deliberate inclinations of the plane of best sharpness ("Scheimpflug plane") which is not possible with nonadjustable 35 mm or medium format cameras or (when using shift or perspective control lenses) only with great restrictions.

Rodenstock's range of lenses for professional photography therefore includes different lens types which are available in graduated focal lengths to meet practical requirements.

The standard lens for conventional professional photography should provide a medium to large image angle, high speed and best image quality. These demands are met by the Apo-Sironar available in the two versions "N" and "S". As a standard lens, it is used with a focal length which roughly corresponds to the diagonal of the format.

For large image scales from around 1:5 to 2:1, there is the special close-up lens Apo-Macro-Sironar. It is characterized by high speed and a wide image circle.

Whenever small rooms, wide spaces or short taking distances (architecture) make large field angles necessary, the wide-angle lenses of first choice are the Apo-Grandagon and the Grandagon-N with field angles of up to 120°.



## What the designation "Apo" means for the quality of your pictures

The quality designation "Apo" comes from graphic arts technology and is the abbreviation for "apochromatically corrected". In graphic arts this means that the lens will provide three congruent color separation negatives.

Generally, however, an Apo lens is understood to be one which has exceptionally good color correction – which has nothing to do with the color reproduction, but everything with the elimination of irritating color fringes. Color fringing is a typical problem of lenses with a long focal length. The fringes increase with the image field and are strongest at the edge of the picture.

## Only a large image circle provides your camera with large movements

In order to make optimum use of the decisive advantage of a large format camera, i. e. its wide range of movements, you need lenses with a large image circle and first-class image reproduction quality right up to the edge of the image circle. The most important camera movement is the parallel adjust-

ment to eliminate or reduce converging verticals. Especially for architectural photographs or for product shots it may be necessary to reduce convergence considerably. For this, the lens must have an image circle far beyond the size of the taking format. On page 12 is a chart which shows the range of movements for a focusing distance of infinity and the recommended working aperture for every lens. For shorter distances, e. g. for product shots, the image circle diameter will increase so that even larger adjustments can be realized.

## Depth of field versus diffraction – The optimum working aperture

Strictly speaking, sharp focusing is only possible in a subject plane; in front of or behind this plane, the sharpness is less. The area in which unsharpness is not yet recognizable is called "depth of field". The larger the image scale, the shallower the depth of field; but the more the lens is stopped down, the larger this again becomes.

Because large taking formats require long focal lengths which results in large scales, large format lenses have to be stopped down quite a lot in order to provide sufficient depth of field.

A certain amount of stopping down is also normally required to suppress the residual aberration which can never be corrected 100 %. But at low apertures diffraction increases – an unavoidable physical effect – so that the sharpness is visibly reduced. For this reason, you should never stop down any more than is absolutely necessary.

Under optimum circumstances lenses for the most popular large format 4×5" should be stopped down to f/22; smaller apertures may be necessary and permissible as well with larger formats (see chart below). If a great deal of depth of field is required, the aperture can be stopped down by one more stop without any substantial loss in sharpness. Rollfilm formats typically need working apertures around 8 to 16.

### Basic data for the correct comparison of the different film sizes

When comparing optimum working apertures of different taking formats, the different focal lengths (better: the different image scales), the different depths of field and the different diffraction must be taken into consideration if the comparison is to be correct.

Because the different taking formats have different "width to height" ratios, the corresponding format diagonal is used as the reference value.

The chart below shows focal lengths (from super wide-angle to long focal length) which have corresponding diagonal field angles and which have been rounded to standard values in comparison with very popular focal lengths for 35 mm photography.

The last column shows the corresponding optimum f-stop values with regard to depth of field and diffraction; the reference value here is aperture f/5.6 for the 35 mm format. These recommended values should only be exceeded in the interest of best possible overall sharpness when depth of field is much more important than good sharpness.

Format	Rounded analogue focal lengths [mm]							Best f-stop
	Short			Normal		Long		
24×36 mm	18	24	28	35	50	85	135	5.6
6×6 cm	30	40	50	65	90	150	250	11
6×7 cm	35	50	60	75	100	180	280	11 - 16
6×9 cm	45	55	65	105	135	210	360	16
9×12 cm / 4×5"	55	75	90	115	180	300	480	16 - 22
13×18 cm / 5×7"	90	115	155	200	249	420	600	22 - 32
18×24 cm / 8×10"	115	155	200	240	360	600	900	32 - 45

**The prefix "Apo" stands for the best possible correction of chromatic aberration and guarantees photos without color fringes**

# The lenses

## Apo-Sironar-N



**Apo-Sironar-N 150 mm f/5.6**

The Apo-Sironar-N is the all-round lens for the professional photographer. Typical applications are product shots of every kind, industrial subjects, landscape and city photography.

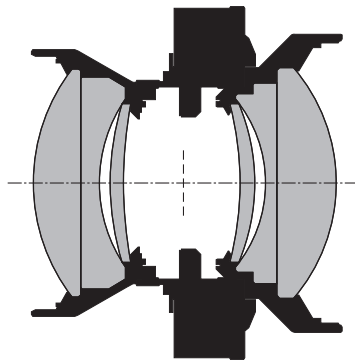
The Apo-Sironar-N equally provides an ideal longer focus lens with smaller formats. Monorail view cameras permit almost unlimited extension (especially with extension bellows). As a result optically problematic tele lens designs whose Barlow group tends to produce color fringes are no longer needed; their short back focal length only provides advantages for fixed cameras.

The six-element Apo-Sironar-N bears the "Apo" designation without restriction despite its very advantageous price. The field angle is 72°. The image circle diameter exceeds the diagonal of the recommended format by around 45 %; this gives the photographer considerable edge quality together with abundant shift and swing or tilt possibilities.

Apo-Sironar-N	Recommended format
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150 mm f/5.6	9×12 cm / 4×5"
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210 mm f/5.6	13×18 cm / 5×7"
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**Optical design:  
6 elements in 4 groups**

**Apo-Sironar-N: the photographer's  
powerfull "workhorse"**

## Apo-Sironar-S



**Apo-Sironar-S 240 mm f/5.6**

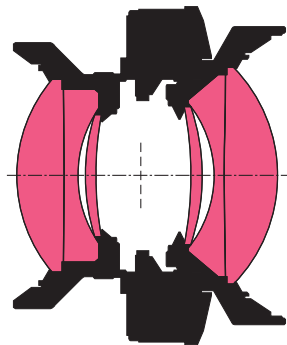
The Apo-Sironar-S is a lens for universal use which has been modified to provide the highest image reproduction quality. Like the Apo-Sironar-N its applications are almost unlimited. Its special strengths can be seen when complex, fine structures in the outer part of the image circle have to be reproduced.

Its field angle has been increased to 75° and so permit even more generous shifts. Therefore is the Apo-Sironar-S also the ideal standard lens for applications which require particularly large parallel shifts to correct the perspective. For instance, the Apo-Sironar-S 150 mm f/5.6 permits up to 10 mm more vertical or lateral shift than the equivalent Apo-Sironar-N lens.

As a result of the elimination of the secondary spectrum thanks to the use of ED glass materials with anomalous dispersion (ED = extra low dispersion), no visible color fringing occurs even at edges with extreme contrast. In addition, the light fall-off towards the image corners (vignetting) has been reduced for a more uniform illumination.

Thanks to this high optical performance in the edges of the field, the six-element Apo-Sironar-S can use f-stop 16 as its working aperture – a special advantage for outdoor shots due to the shorter exposure time this allows.

Apo-Sironar-N	Recommended format
100 mm f/5.6	6×9 cm
135 mm f/5.6	9×12 cm / 4×5"
150 mm f/5.6	9×12 cm / 4×5"
180 mm f/5.6	13×18 cm / 5×7"
210 mm f/5.6	13×18 cm / 5×7"
240 mm f/5.6	13×18 cm / 5×7"
300 mm f/5.6	18×24 cm / 8×10"
360 mm f/6.8	18×24 cm / 8×10"



**Optical design:  
6 elements in 4 groups**

**Apo-Sironar-S: the ultimate lens  
with extensive adjustment reserves**

## Apo-Macro-Sironar



**Apo-Macro-Sironar 120 mm f/5.6**

In the near area, at scales of around 1:1, the quality of lenses optimized for larger distances falls visibly from the usual standard of performance. And it is here that the Apo-Macro-Sironar-N lenses come into their own for imaging scales of 1:5 and greater.

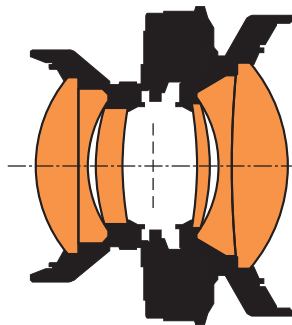
Incidentally, imaging scales of 1:5 or larger are required even in conventional table-top photography or studio photography: for example, 1:3 at a film size of 13×18 cm means the full format image reproduction of an object of approximately 40×50 cm in size.

The Apo-Macro-Sironar offers excellent imaging quality in conjunction with the wide freedom of movement required for large-format photography.

The Apo-Macro-Sironar provides exceptional results without any color fringes at a scale range from 1:5 to 2:1 without any need to adjust the lens individually. The focal lengths of 120 and 180 mm allow work with most cameras without any extra monorail extension even at a scale of 2:1.

### Apo-Macro-Sironar Recommended format

Apo-Macro-Sironar	Recommended format
120 mm f/5.6	9×12 cm / 4×5"
180 mm f/5.6	13×18 cm / 5×7"



**Optical design:  
6 elements in 4 groups**

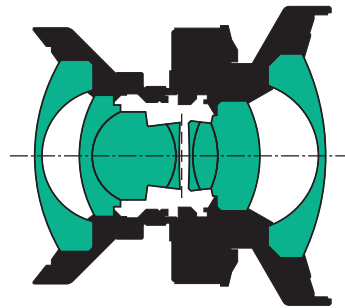
**Apo-Macro-Sironar: the best lens  
to make little things look great**

## Apo-Grandagon



**Apo-Grandagon 55 mm f/4.5**

Apo-Grandagon	Recommended format
35 mm f/4.5	6×9 cm
45 mm f/4.5	6×12 cm
55 mm f/4.5	9×12 cm / 4×5"



**Optical design:  
8 elements in 4 groups**

When large format cameras are used with roll film backs they require shorter focal length lenses. With focal lengths of 35, 45 and 55 mm, photography in close spaces or panoramic views in landscape photography becomes an effortless “dynamic enjoyment”.

The Apo-Grandagon super wide-angle lenses give you the freedom to find new and appealing views in product photography. But new standards in freedom of movement are also offered by these outstanding lenses with a useful field angle of 120° in architectural and industrial photography. The Apo-Grandagon 55 mm f/4.5 even allows photographs of, for example, wide open spaces on 4×5" sheet film which is most popular in demanding landscape photography.

New glass combinations (ED glasses) make possible apochromatic correction of super wide-angle lenses for the first time. This ensures there will be no color fringes even on high contrast building silhouettes. With values of less than 0.5 % distortion can be neglected.

The high maximum aperture makes adjustment easy. A large working aperture of 8-11 allows advantageous, shorter exposure times for outdoor motifs (with moving objects) or a lower flash power in the studio. For uniformly illuminated pictures without light fall-off according to the “cos<sup>4</sup> law” the use of the color-neutral Rodenstock Center Filters (see page 9) is recommended.

With the Rodenstock Focus-Mount, these lenses can be fitted to panoramic or shift cameras without bellows.

For checking the adaptation to different large format camera models we can provide you with special tables and instructions on request.

**Apo-Grandagon: freedom for architecture, landscape and studio**

## Grandagon-N

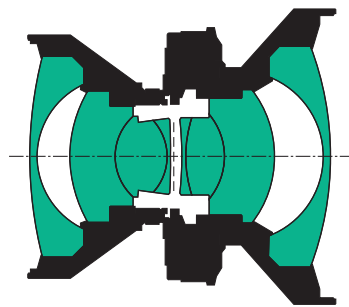


**Grandagon-N 90 mm f/6.8**

The Grandagon-N with its wide field angle of up to 105° can really display its strengths in wide photos in close conditions, e. g. in architecture or industrial photography or in panoramic views.

With the Grandagon-N all the problems which occur in connection with large field angles have been ideally taken care of: The distortion has been reduced to a small residual value; the light fall-off at the edge has been greatly reduced thanks to an optical trick ("pupil distortion" = the pupil diameter increases when viewing at an angle); the sharpness sets standards for this class of lens.

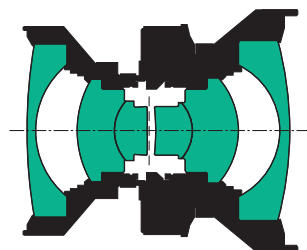
Grandagon-N	Recommended format
65 mm f/4.5	9×12 cm / 4×5"
75 mm f/4.5	9×12 cm / 4×5"
90 mm f/4.5	13×18 cm / 5×7"
90 mm f/6.8	9×12 cm / 4×5"



**Optical design f/4.5:  
8 elements in 4 groups**

The Grandagon-N is available in two versions: With the maximum aperture 4.5 in focal lengths 65 to 90 mm it has 8 elements and with the maximum aperture 6.8 in the focal length 90 mm it has 6 elements.

The eight element lenses offer not only a high maximum aperture, but also a field angle of 105°, an even more uniform illumination and distortion values of less than 1%. The six element lens is the cost-effective alternative that also impresses by its compactness which even allows the insertion into the Focus-Mount helical focuser for the use with bellowsless panoramic or shift cameras.



**Optical design f/6.8:  
6 elements in 4 groups**

The use of the neutral grey Rodenstock Center Filters (see next page) is recommended for critical motifs to make best use of the image circle without irritating light fall-off to the image corners.

**Grandagon-N: the "space expander" for situations where space is limited**

# Accessories

## Center Filter

Apo-Grandagon & Grandagon-N	Filter thread	Exp. correction f-stops / time
35 mm f/4.5	E 67/86	+2.5 5×
45 mm f/4.5	E 67/86	+2.5 5×
55 mm f/4.5	E 67/86	+2.5 5×
65 mm f/4.5	E 58/77	+1.5 3×
75 mm f/6.8	E 58/77	+1.5 3×
75 mm f/4.5	E 67/86	+1.5 3×
90 mm f/6.8	E 67/86	+1.5 3×
90 mm f/4.5	E 82/112	+1.5 3×
115 mm f/6.8	E 82/112	+1.5 3×
155 mm f/6.8	E 105/127	+1.5 3×



**Neutral grey Center Filter with vignetting-free mount**

For critical shots (e. g. with areas of uniform brightness towards the image corners) the physically inevitable light fall-off according to the "cos<sup>4</sup> law" can be eliminated by using the neutral grey Rodenstock Center Filters available for all Apo-Grandagon and Grandagon-N lenses (see table). A Center Filter should always be used if the image circle of a wide angle lens is used right up to the vicinity of the circumference.

Rodenstock Center Filters are concentric graduated neutral gray filters whose density decreases from the center up to the transparent rim. The fall in density compensates for practically all the light fall-off to the image edge from a working f-stop of 16. The exposure must be corrected by 1.5 or 2.5 stops. This corresponds to a correction of the exposure time by a factor of 3 or 5 respectively.

## Focus-Mount

Lens	Focusing range
Apo-Grandagon 35 mm f/4.5	∞ – 0.4 m ∞ – 1.5 ft
Apo-Grandagon 45 mm f/4.5	∞ – 0.6 m ∞ – 2.0 ft
Apo-Grandagon 55 mm f/4.5	∞ – 0.9 m ∞ – 3.0 ft
Grandagon-N 65 mm f/4.5	∞ – 0.8 m ∞ – 2.5 ft
Grandagon-N 75 mm f/4.5	∞ – 1.0 m ∞ – 3.5 ft
Grandagon-N 90 mm f/6.8	∞ – 1.3 m ∞ – 5.0 ft
Apo-Sironar-S 100 mm f/5.6	∞ – 1.8 m ∞ – 6.0 ft
Apo-Sironar-S 135 mm f/5.6	∞ – 3.0 m ∞ – 10 ft
Apo-Sironar-N/S 150 mm f/5.6	∞ – 3.5 m ∞ – 12 ft



**Grandagon-N 90 mm f/6.8 in Copal 0 and Focus-Mount**

Using large format lenses on cameras without bellows such as panoramic or shift cameras requires the use of a focusing facility. The Focus-Mount can be combined with all Rodenstock lenses in shutter size 0. Existing lenses can be installed at a later date.

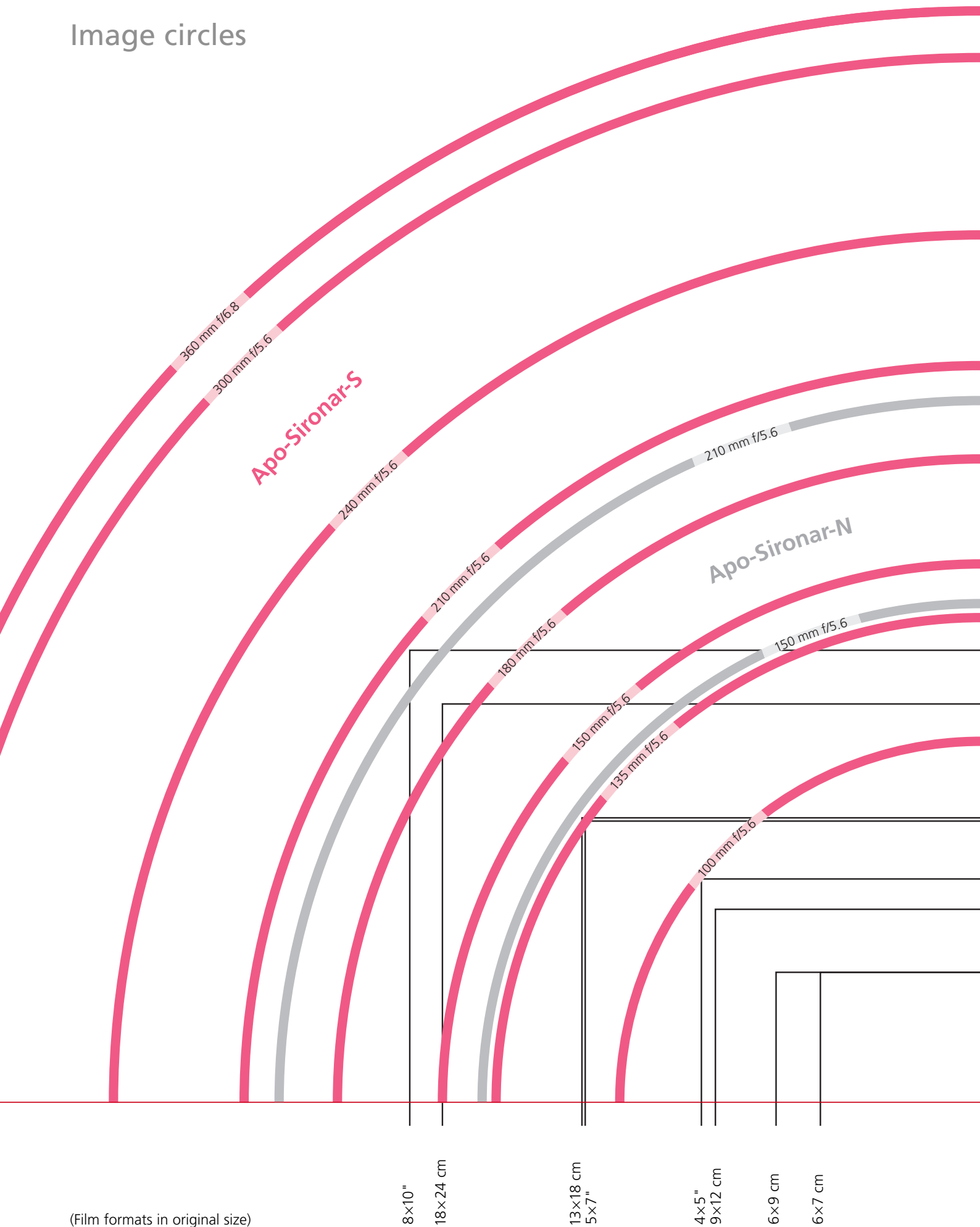
The Focus-Mount ensures precise focusing and the non-rotating lens mount means that all operating elements and scales of the shutter remain in the same position. The lenses which can be used as well as their focusing ranges can be found in the table.

More information on applications and adaption are available on request (for the address please see last page) for the case that the manufacturer of your camera cannot help you.

**Center Filter: for even illumination**

**Focus-Mount: makes it possible to use excellent Rodenstock lenses with shift and panorama cameras**

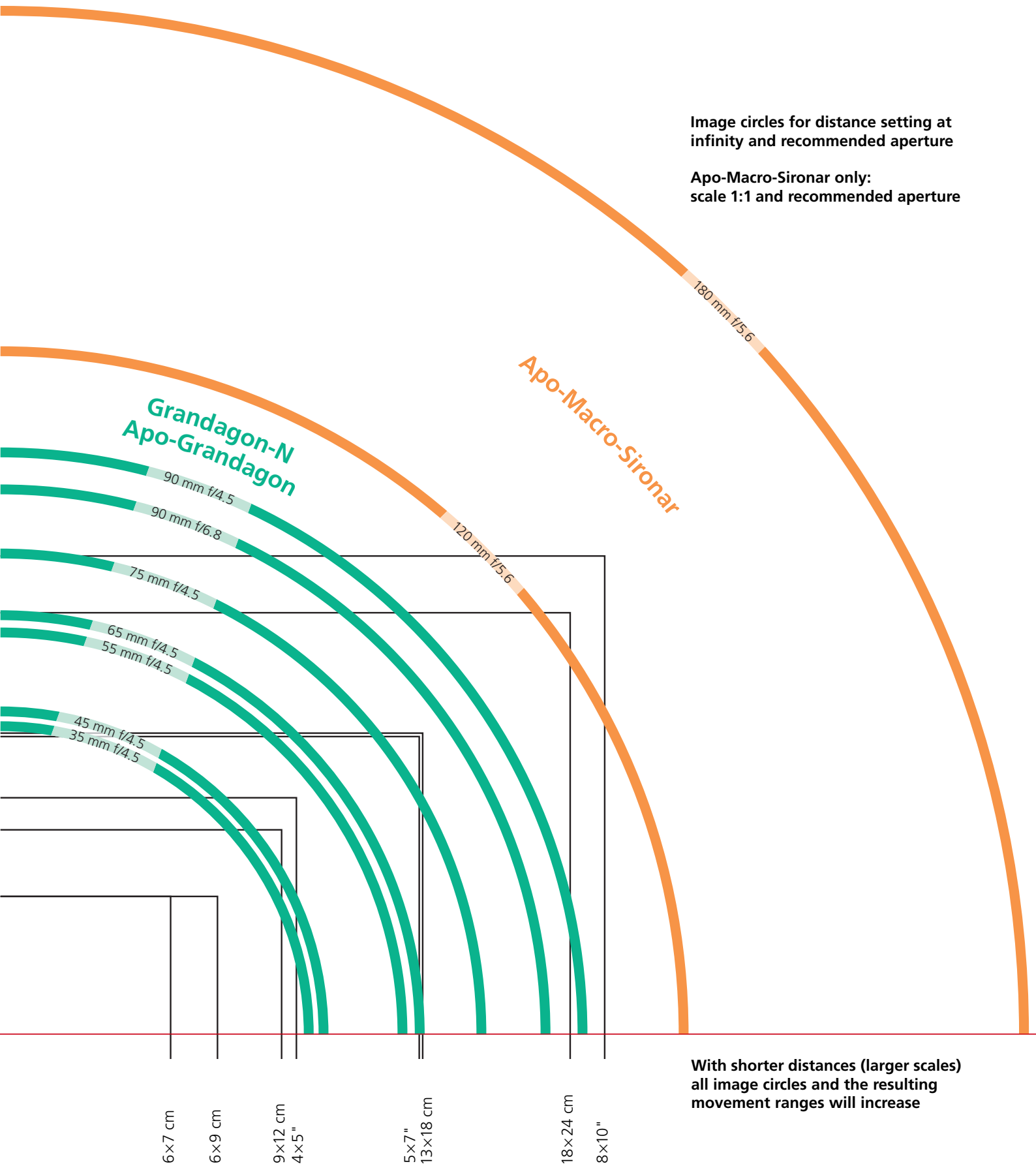
# Image circles



(Film formats in original size)

Image circles for distance setting at infinity and recommended aperture

Apo-Macro-Sironar only:  
scale 1:1 and recommended aperture



With shorter distances (larger scales) all image circles and the resulting movement ranges will increase

# Working apertures, image angles/circles, movement ranges

**Lens**      **Work- ing f-stop**    **Image angle**    **Image circle diameter**    **Movement range [mm] at infinity with landscape format and recommended f-stop**

## Apo-Sironar-N

				6×7 cm	6×9 cm	6×12 cm	9×12 cm	4×5 inch	13×18 cm	5×7 inch	18×24 cm	8×10 inch
150 mm f/5.6	16-22	72°	214 mm	↑73→69	↑69→59	↑63→46	↑49→41	↑40→36	↑3→2	↑4→3		
210 mm f/5.6	22-32	72°	301 mm	↑119→114	↑116→104	↑111→91	↑98→88	↑90→83	↑63→52	↑64→53	↑11→8	

## Apo-Sironar-S

100 mm f/5.6	11-22	75°	155 mm	↑41→38	↑36→28	↑24→13	↑11→8	↑1→1				
135 mm f/5.6	11-22	75°	208 mm	↑70→66	↑66→56	↑59→43	↑45→38	↑37→32				
150 mm f/5.6	11-22	75°	231 mm	↑82→78	↑79→68	↑72→55	↑59→51	↑51→45	↑16→12	↑17→13		
180 mm f/5.6	16-32	75°	276 mm	↑105→101	↑103→91	↑98→78	↑84→74	↑76→69	↑47→38	↑48→39		
210 mm f/5.6	16-32	75°	316 mm	↑126→121	↑124→112	↑119→98	↑106→95	↑98→90	↑72→60	↑73→61	↑22→17	↑3→2
240 mm f/5.6	16-32	75°	372 mm	↑155→150	↑153→140	↑149→127	↑135→124	↑128→120	↑104→90	↑105→91	↑60→50	↑43→36
300 mm f/5.6	22-45	75°	448 mm	↑193→188	↑192→179	↑189→165	↑175→163	↑168→159	↑146→130	↑147→131	↑106→91	↑90→79
360 mm f/6.8	22-45	68°	468 mm	↑203→198	↑202→188	↑199→175	↑185→173	↑178→169	↑157→140	↑157→141	↑118→102	↑102→90

## Apo-Grandagon

35 mm f/4.5	8-11	120°	125 mm	↑24→22	↑16→12							
45 mm f/4.5	8-11	110°	131 mm	↑28→25	↑20→15	↑4→2						
55 mm f/4.5	8-11	110°	163 mm	↑46→42	↑40→32	↑30→19	↑17→13	↑7→6				

## Grandagon-N

65 mm f/4.5	16-22	105°	170 mm	↑50→46	↑45→36	↑35→23	↑21→17	↑12→10				
75 mm f/4.5	16-22	105°	195 mm	↑63→59	↑59→49	↑51→36	↑37→31	↑29→25				
90 mm f/4.5	16-22	105°	236 mm	↑85→80	↑81→70	↑75→58	↑62→53	↑54→48	↑20→15	↑21→16		
90 mm f/6.8	22-32	102°	221 mm	↑77→73	↑73→63	↑67→50	↑53→45	↑45→39	↑9→7	↑10→7		

**Lens**      **Image scale**    **Work- ing f-stop**    **Image angle**    **Image circle diameter**    **Movement range [mm] at given scale with landscape format and recommended f-stop**

## Apo-Macro-Sironar

120 mm f/5.6	1:5	8-11	70°	201 mm	↑66→62	↑62→52	↑55→39	↑41→34	↑33→28			
	1:1	8-11	60°	277 mm	↑106→101	↑103→92	↑98→79	↑85→75	↑77→70	↑48→39	↑49→39	
	2:1	8-11	55°	374 mm	↑156→151	↑154→141	↑150→128	↑136→125	↑129→121	↑105→91	↑106→92	↑61→51    ↑44→37
180 mm f/5.6	1:5	16-22	70°	302 mm	↑119→114	↑116→104	↑112→91	↑98→88	↑90→83	↑63→52	↑64→53	↑12→9
	1:1	16-22	60°	415 mm	↑177→171	↑174→161	↑171→148	↑158→146	↑150→142	↑128→113	↑129→113	↑87→73    ↑70→61
	2:1	16-22	55°	562 mm	↑251→245	↑249→235	↑247→222	↑234→221	↑226→217	↑207→189	↑207→189	↑171→152    ↑156→141

# Technical data of the lenses and shutters

Lens	Max. recommended film size	Smallest aperture						Push-on mount Ø	Filter thread	Rear barrel Ø	Flange focal length *)	Overall length	Weight w/Copal
		Copal 0	Copal Press 0	Rollei Electronic 0	Copal 1	Copal Press 1	Rollei Electronic 1						
<b>Apo-Sironar-N</b>													
150 mm f/5.6	9×12 cm / 4×5 in.	64	45	64			64	51 mm	M 49×0.75	42 mm	142 mm	51 mm	220 g
210 mm f/5.6	13×18 cm / 5×7 in.				64	64	64	70 mm	M 67×0.75	60 mm	200 mm	66 mm	440 g
<b>Apo-Sironar-S</b>													
100 mm f/5.6	6×9 cm	45	32	45				51 mm	M 49×0.75	31,5 mm	99 mm	42.6 mm	190 g
135 mm f/5.6	9×12 cm / 4×5 in.	64	45	64				51 mm	M 49×0.75	48 mm	132 mm	47.5 mm	240 g
150 mm f/5.6	9×12 cm / 4×5 in.	64	45	64				51 mm	M 49×0.75	51 mm	147 mm	51.5 mm	250 g
180 mm f/5.6	13×18 cm / 5×7 in.				64	45	64	70 mm	M 67×0.75	60 mm	177 mm	60.5 mm	410 g
210 mm f/5.6	13×18 cm / 5×7 in.				64	64	64	75 mm	M 72×0.75	65 mm	202 mm	69.5 mm	490 g
240 mm f/5.6	13×18 cm / 5×7 in.						64	90 mm	M 86×1	80 mm	230 mm	82 mm	980 g
300 mm f/5.6	18×24 cm / 8×10 in.						64	105 mm	M 100×1	80 mm	277 mm	98.5 mm	1210 g
360 mm f/6.8	18×24 cm / 8×10 in.						64	117 mm	M 112×1.5	80 mm	330 mm	120 mm	1560 g
<b>Apo-Grandagon</b>													
35 mm f/4.5	6×9 cm	22	22	22				70 mm	M 67×0.75	60 mm	43.2 mm	55.7 mm	300 g
45 mm f/4.5	9×12 cm	32	32	32				70 mm	M 67×0.75	60 mm	55.5 mm	65.3 mm	350 g
55 mm f/4.5	9×12 cm / 4×5 in.	45	45	45				70 mm	M 67×0.75	60 mm	67.6 mm	69.8 mm	400 g
<b>Grandagon-N</b>													
65 mm f/4.5	9×12 cm / 4×5 in.	45	32	45				60 mm	M 58×0.75	51 mm	70 mm	63.5 mm	330 g
75 mm f/4.5	9×12 cm / 4×5 in.	45	32	45				70 mm	M 67×0.75	60 mm	82 mm	73.5 mm	440 g
90 mm f/4.5	13×18 cm / 5×7 in.				45	32	45	85 mm	M 82×0.75	70 mm	98 mm	88.5 mm	700 g
90 mm f/6.8	9×12 cm / 4×5 in.	45	32	45				70 mm	M 67×0.75	60 mm	94 mm	78.5 mm	460 g
<b>Apo-Macro-Sironar</b>													
120 mm f/5.6	9×12 cm / 4×5 in.	64	45	64				51 mm	M 49×0.75	40,5 mm	235.6 mm	43.8 mm	220 g
180 mm f/5.6	9×12 cm / 4×5 in.				64	45	64	70 mm	M 67×0.75	54 mm	356.5 mm	61.2 mm	410 g

\*) With Copal and for scale 1:∞, Apo-Macro-Sironar for scale 1:1

Shutter	Shutter speeds range	Manual cocking					Screw thread	Lens board opening	Lens board thickness	Accessories required
		Self cocking	Mechanical	Electronic	X-synchronised	Smallest f-stop increments				
Copal 0	B, T, 1/500 s ... 1 s	•	•	•			M 32.5×0.5	34.8 mm	1.5 mm ... 4.0 mm	
Copal 1	B, T, 1/400 s ... 1 s	•	•	•			M 39×0.75	41.8 mm	1.5 mm ... 3.0 mm	
Copal 3	B, 1/125 s ... 1 s	•	•	•			M 62×0.75	65.3 mm	1.5 mm ... 5.0 mm	
Copal Press 0	B, 1/125 s ... 1 s		•	•	•		M 32.5×0.5	34.8 mm	1.5 mm ... 3.0 mm	
Copal Press 1	B, 1/125 s ... 1 s		•	•	•		M 39×0.75	41.8 mm	1.5 mm ... 2.0 mm	
Rollei Electronic 0	B, 1/500 s ... 30 s			•	•	1/10	M 39×0.75	41.8 mm	1.5 mm ... 3.0 mm	Control Unit
Rollei Electronic 1	B, 1/300 s ... 30 s			•	•	1/10	M 39×0.75	41.8 mm	1.5 mm ... 3.0 mm	Control Unit

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