

ZEISS

PHOTO LENSES



CARL ZEISS / JENA



Fashion Plate
Colour Gravure Print taken and reproduced with
ZEISS TESSAR

ZEISS

PHOTO LENSES



Ref: Ph 267/I

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General Survey of the Zeiss Objectives together with their Accessories and their Principal Ranges of Application.

Detailed Particulars will be found on p. 7 (et seq.)

	Further in this Catalogue Page	Particulars in separate list
Tessar F/4.5, the most popular high-grade all-round photo lens of great rapidity: The short foci for pocket cameras, kinemato-graph cameras and stereo cameras; The intermediate foci for hand cameras, in-cluding folding cameras as well as focal plane and reflex cameras; The long foci for portraits and groups with stand and studio cameras, also for aircraft and special work.	8, 17	
Tessar F/6.3, a rapid all-round lens: The short foci for pocket and stereo cameras; The intermediate foci mainly for folding cameras; The long foci for taking portraits and special group photographs with stand and studio cameras.	8, 16	
Tessar F/3.5, an exceptionally rapid all-round objective: The short foci mainly for pocket cameras, stereo cameras and kinematograph cameras; The intermediate foci primarily for focal plane cameras and for hand cameras; The long foci for taking portraits with studio and stand cameras.	9, 17	Ph 274

The Double Protar and Sets of Convertible Protars

with component Protar lenses capable of independent use as long-focus lenses, rapid all-round convertible sets for folding cameras especially stand cameras with long extension.

Further in this Catalogue Page	Particulars in separate list
10, 19	
10, 19	

Tessar F/2.7 and Triotar F/3 and 3.5 respectively,

being very rapid lenses comprising a field of moderately wide angle and hence of special value where the large initial aperture of the lens is a matter of chief importance:

The short foci for pocket cameras and kinematograph cameras;

The long foci mainly for focal plane cameras and reflex cameras.

12, 18
12, 18

Tessar F/5, $f=50$ cm and

Tessar F/5, $f=70$ cm,

Rapid lenses for portraits and groups as well as for aerial photography and special purposes.

13, 18
13, 18

Triplet F/4.8, $f=50$ cm and

Triplet F/5 $f=70$ cm,

Rapid lenses for portraits as well as aerial photography and special purposes.

13, 18
13, 18

Protar F/18,

for wide-angle work with folding cameras and stand cameras.

14, 18

Tele Tessar F/6.3,

being a special long-focus objective for obtaining large figures; adapted for a wide range of uses on cameras having an extension of about three fifths of the focal length of the Tele Tessar, especially adapted for cinematograph cameras and all kinds of hand cameras.

12, 13, 14,	Ph 239, 255
17, 29, 30	

Magnar F/10, $f=45$ cm,

being a special long-focus objective for obtaining large figures in the photograph, available for use with 12×9 -cm (quarter plate) cameras with an extension of about 15 cm (6 in.).

14, 29, 30	Ph 255
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Tele Attachment

for obtaining large scale figures at long ranges, available for use with any camera from which the objective with its mount or shutter may be readily detached.

Further in this Catalogue Page	Particulars in separate list
14, 29, 30	Ph 255

**Distars and
Proxars,**

attachable front lenses for use with photographic objectives for respectively lengthening and shortening the focal length.

21	Ph 209
22	Ph 263

Yellow Glass Screens,

filters for neutralising the difference between the colour impression upon the eye and upon the isochromatic plate.

26

Ducar and A-Ducar Filters,

being filters for taking colour photographs on autochrome and Agfa plates, with slightly spherical surfaces for correcting the effect upon of the thickness of the plate.

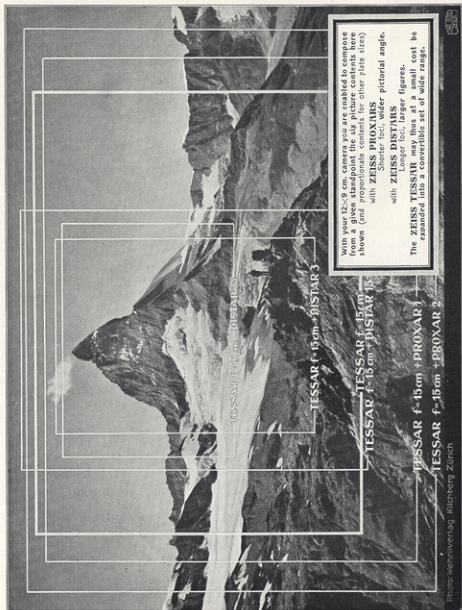
27

Apo Planars**Apo Tessars****Reversing Prisms****Reversing Mirrors****Revolving Collars****Filter Cells****R Yellow Filters****R Colour Filters****Focusing Microscope****Focusing magnifiers**

Optical
Equipment
for
Process Work

20

in pre-
paration

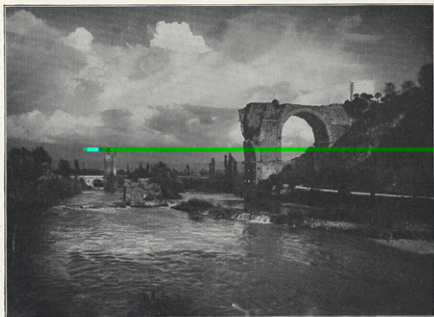


With your 12x9 cm. camera you are enabled to compose from a given standpoint the six picture contents here shown (and proportionate contents for other plate sizes) with **ZEISS PROXARs**
Shorter foci, wider pictorial angle.
with **ZEISS DISTARs**
Longer foci, larger figures.

The **ZEISS TESSAR** may thus at a small cost be expanded into a convertible set of wide range.

TESSAR f=15 cm + DISTAR 3
TESSAR f=15 cm + PROXAR 1
TESSAR f=15 cm + DISTAR 2
TESSAR f=15 cm + DISTAR 15
TESSAR f=15 cm + DISTAR 10

Photo-Wechselverlag, Klichéberg Zürich



A Storm brewing at Terni, Italy. — Photo taken with a Zeiss Tessar.

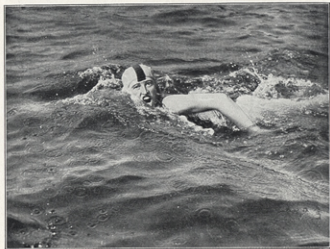
On the Choice of a Suitable Lens

1. Universal Lenses

In nearly every case amateurs no less than professional photographers about to choose a lens require it to satisfy a more than one particular purpose. The lens in question should be available for a wide range of uses, actual and prospective. It should enable its owner to take instantaneous photographs of every kind, including records of sporting events, pictures of small living creatures, portraits, groups, landscapes of every description, both in summer and in winter, seascapes and mountain views. Also, he may wish to be prepared for taking photographs from aircraft, and to take pictures of architecture as well as interiors and even pictures in natural colours. Occasionally he may wish to use his lens for enlarging and projecting pictures on the screen. Finally he may desire to be able to use his lens as the positive member in the event of his adding a tele-photo negative attachment at some later date. The lenses described in the succeeding paragraphs possess within varying ranges the qualities of all-round lenses and should accordingly receive first consideration. Each of them has some special characteristic which renders it more particularly adapted for one main purpose, so that in every case it is practicable to arrive at a definite choice of the most suitable all-round lens.

Tessars F/4.5 and F/6.3. These are rapid lenses giving, over a large angle, exquisitely sharp and brilliant pictures, in consequence of which negatives obtained with them admit of being considerably enlarged. The Tessar is not of the symmetrical type, and consequently no attempt was made in its inception to render the front and back lenses even roughly adapted for independent use. The Tessar was computed with the sole aim of making the performance of the doublet as a whole as perfect as possible without a thought of ever separating its components. It will be readily appreciated that this restriction of the resources of the objective left the computer far greater freedom in the choice of the incidental elements, such as the curvatures of the lenses and the kinds of glass which could be employed, than would have been possible were the front and back lenses required to be available for independent use within certain limits. In consequence of this simplification of the problem and the wider scope of available elements of construction the objective embodies an exceptionally high degree of correction in a comparatively simple combination made up of four lenses, two of which are cemented.

The Tessar is therefore pre-eminently the lens for hand-cameras with single extension. In the course of recent years it has more and more taken the place of symmetrical and semi-symmetrical lenses in cameras with double extension, thanks to the introduction of our **Distars** and **Proxars**. These are single front lens attachments whose curvatures are so computed as to more or less extend or shorten the focal length of the objective. They furnish accordingly a means of rendering the Tessar available for expansion into a convertible set of a wide range of foci. In this way the Tessar has become available for a wide range



Reduced reproduction of a photo taken on a 15×10 cm (6×4 in.) plate with Tessar F/4.5, $f=18$ cm. — Photo by Mudrack, Dresden.

of uses on hand-cameras with single extension and to a still greater extent on cameras with double extension (For further particulars see pp. 21–25).

The choice between Tessar F/4.5 and Tessar F/6.3 is determined by the following considerations. Tessar F/4.5 is twice as rapid as Tessar F/6.3. The latter, however, embraces a wider angle than Tessar F/4.5 working at the same stop (see columns 3, pp. 16, 17). — It is, however, a complete error to ascribe to one or the other type superiority in the matter of depth of focus. When stopped down to F/6.3, the Tessar F/4.5 has the same rapidity and hence exactly the same depth of focus as the Tessar F/6.3 or, for the matter of that, any other lens of similar relative aperture and focal length.

Where rapidity is more important than any other quality possessors of a sufficiently steady camera fitted with a front or shutter admitting of the attachment of the somewhat heavier Tessar F/4.5 will do well to let their choice fall on this lens. Preference may, however, be given to Tessar F/6.3 where it is more important that the camera should be as compact and light as possible and where incidentally a lens with a slightly shorter focus, i. e. a larger field of view, is required, also where the question of price becomes a matter of primary consideration.

Tessar F/3.5. This objective is a recently computed type which falls well within the category of all-round lenses in the matter of qualities of the field of view. This series should not be confused with the older Special Tessar F/3.5 for cinematograph work, which continues to be included in this list, viz. on page 17. The Universal Tessar F/3.5 is at present made with focal lengths such as are used on hand-cameras. In the quality and range of its performance it is comparable to the Tessar F/4.5, assuming both lenses to be stopped down in like manner; its rapidity, however, at full aperture is 65 per cent greater than that of the latter. At this large aperture the lens covers the plate uniformly and with beautiful definition. In order to secure the depth of focus obtained with the Tessar F/4.5 or Tessar F/6.3 it is only necessary to stop the lens down to the respective aperture of either lens.

Photos taken with Tessar F/3.5 will bear enlargement to a very considerable extent, provided, of course, that the negative is sharply focused and otherwise good. At full aperture Tessar F/3.5 covers with sufficient sharpness a plate embracing a picture angle of 55° and hence the 10.5 cm and 12 cm foci of the series may be recommended for use on 9×6 cm ($3\frac{1}{2} \times 2\frac{1}{2}$ in.) and lenses of 13.5 cm and 15 cm focus for use on 12×9 cm ($4\frac{1}{4} \times 3\frac{1}{4}$ in.) cameras. With small stops the lens covers an image circle of 65° .

The great rapidity of the Tessars F/3.5, associated as it is with the fine qualities of the less rapid high-class lenses, renders these lenses pre-eminently adapted for taking pictures which necessarily demand an extremely short exposure, for example sports and press photographs, portraits, or exposures made in a bad light or with colour screen plates, where a lens of smaller rapidity would need an unduly prolonged exposure.

Our various front-lens attachments and filters may be used with the new Tessar F/3.5 to the same extent as with Tessars F/4.5 and F/6.3.

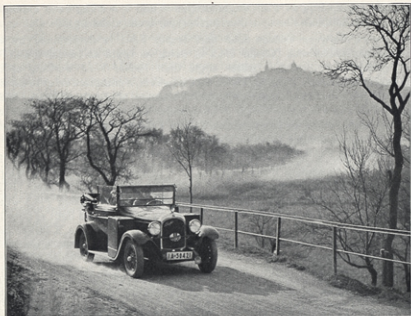


Photo taken with Tessar F/3.5, $f=13.5$ cm at full aperture F/3.5. Exposure $\frac{1}{200}$ Sec.
Season: End of February.

Further particulars respecting the use of Tessar F/3.5 as a hand-camera lens may be found in our separate list Ph 274.

The Double Protar has relative apertures of F/6.3, F/7 and F/7.7, according as it is made up of two Protar Lenses of the same or of different focus. Its most rapid combinations accordingly come very near to the Tessar F/6.3. It possesses, moreover, the advantage of being made up of components which may be used independently as long-focus lenses and which give sharp images at F/12.5. In many cases they are rapid enough for snapshots, and there is the further advantage that as a rule their components have different focal lengths*).

Those who wish to be able to secure the best composition of the picture, whatever the subject, and who insist on a faultless perspective and at the same time wish to take snapshots cannot do better than provide themselves with a good camera of the selected size with double or treble extension, and furnish it with a Double Protar made up of two component lenses of dissimilar foci together with a Compur shutter. The Double Protar may then at the time of purchase or on any subsequent occasion be expanded into a veritable universal equipment by adding Protar Lenses of neighbouring focal lengths and supplementing the resulting Convertible Protar Set by a wide-angle lens proper, say a Protar F/18 and, for long range work, a telephoto attachment, together

* Column 1 on page 19.

with suitable yellow glass screens. Such an outfit will enable its owner to secure the most perfect results under the widest possible range of circumstances (see p. 19, lower portion of table).

2. Special Lenses

In certain cases the all-round lenses described in the preceding section can be employed with fair results for specialised purposes. Obviously, however, photographic lenses, like all tools which are capable of highly developed specialisation for particular purposes, may have *one* or the other quality specially developed at the expense of others which do not affect the given purpose. Thus, it may be a decided advantage in one case specially to increase the rapidity, in another to extend the covering power, in a third to shorten the camera extension by the employment of the telephotographic principle, or in a fourth case to simplify the construction of the objective in order to reduce its weight or its price.



Relay Runners. Taken with Tessar F/2.7 at 3 a.m. in ordinary street light (arc lamps).
Photograph by W. Hoepfner, Hanover.

a) Special Lenses with a Wide Range of Uses

This group includes three series of lenses embracing a field which is not so extensive as that of the preceding all-round lenses proper. On the other hand, some of the lenses of this group are considerably more rapid than the all-round lenses and others furnish a means of shortening the camera extension on the tele-photographic principle. At the same time the size of the field of view and the other properties of the lenses as well as the focal lengths in which they are made are yet such as to cover a comparatively wide range of uses. They occupy, in fact, an intermediate position between the all-round lenses proper and the special lenses in a narrower sense. They comprise the following series:

The Tessar F/2.7, like other Tessars, is made up of four lenses with six surfaces only in contact with air. At full aperture it is nearly three times as rapid as the universal Tessar F/4.5 and capable of embracing a field of 45° to 50° . Though its construction is simple, considering its large aperture ratio and large field angle, the quality of the photographic image satisfies all requirements which arise *when extreme rapidity is a matter of paramount necessity*. The shorter focal lengths of these new lenses are primarily adapted for *cinematograph cameras*, while the intermediate and longer foci serve as extremely rapid snapshot lenses for *hand-cameras operated in a poor light by experienced amateurs*. Above all, they meet the requirements of *sports and press photographers*. The Tessar F/2.7 is likely to prove particularly successful for taking with short exposure *colour screen photographs of children and animals* as well as for snapshots in artificial light. (For detailed information see our booklet P 258.)

The Triotar F/3.5 (including short-focus lenses of relative aperture F/3) have a rapidity intermediate between the Universal Tessar F/4.5 and Tessar F/2.7. The size of the useful field of view of the lens is about the same as that of the Tessar F/2.7, and its range of uses is likewise comparable to that of the Tessar F/2.7, as indicated above, though naturally the rapidity is rather less in view of its smaller relative aperture. On the other hand, its price is less thanks to its simpler formula and the smaller diameter of the lenses. (For detailed information see our booklet P 258.)

The Tele Tessar F/6.3 has a quality peculiar to the so-called telephotographic lenses in that the focal length is considerably longer than the required camera extension. Thus a quarter-plate folding camera with an extension of six inches can be fitted with a Tele-Tessar of a focal length of 25 cm (10 in.), whereas the focal length of a standard lens, such as a Tessar, may not exceed 15 cm (6 in.). In consequence of this property the Tele-Tessar working with the same camera extension and at the same distance from the object as the standard lens furnishes figures in the picture which are three-fifths as large again, whilst the width of the scene which it is able to include in the picture is two-fifths less. Its covering power conforms to these conditions (see columns 2 and 3 on page 17). — Its greatest rapidity is the same as that of Tessar F/6.3 and half that of Tessar F/4.5. It defines beautifully sharp and

uniform up to the edge. Its great length notwithstanding, the lighting of the marginal portions of the field is likewise uniform, thanks to the large diameter of the back-lens. The Tele-Tessar is therefore of special value as a means of taking with the hand camera snapshots showing large figures in the picture. It serves admirably for photographing small living creatures and shy or moving animals, as well as for taking portraits. More especially, when fitted to a reflex camera, it overcomes the special difficulties of sport and press photographers, in that these frequently have to contend with inconveniently distant objects and hence are compelled to work with long-focus lenses. It is likewise to be recommended to portrait photographers for outdoor use away from the studio, who are thereby provided with a conveniently portable outfit including a sufficiently rapid long-focus (A few further particulars respecting the Tele-Tessar will be found on pages 29 and 30 and in our separate pamphlet Ph 239.)

b) Special Lenses of a Narrower Range of Uses

The lenses coming within this category may be grouped in accordance with the special purposes for which they are intended. We recommend accordingly the following grouping:

For **Cinematograph Cameras**, apart from the short-focus lenses of the Tessars F/4.5 and, for occasional use when photographing from a great distance, the Tele-Tessar F/6.3, more especially the following lenses:

Tessars F/2.7 of short focal length

Tessars F/3.5 of short focal length

Triolars F/3 or F/3.5 of short focal length

Of these the lenses of 4 cm and 5 cm focus have established themselves for use with standard film cameras and the 1.5 cm, 2 cm and 2.5 cm foci with the small film amateur cameras.

For **Portraiture**, apart from long-focus Tessars F/6.3 and F/4.5 and Tele-Tessars,

Long-focus Tessars F/3.5,

Tessars F/5, $f = 50$ cm and $f = 70$ cm,

Triplets F/4.8, $f = 50$ cm and F/5, $f = 70$ cm.

The last named four lenses are lower in price than the corresponding Tessar F/4.5. In the case of Tessar F/5 this is achieved at the cost of rapidity, and in that of the Triplet also at that of the field of view (see columns 2 and 3 on page 18). The Triplet, which is made up of three lenses has thus a smaller field of view than the Tessar, which has four lenses, but its field suffices where the lens is mainly required for taking portrait with large heads or single figures.

For **Aerial Photography**, apart from long-focus Tessars F/4.5,

Tessars F/5, $f = 50$ cm and $f = 70$ cm,

Triplets F/4.8, $f = 50$ cm and F/5, $f = 70$ cm.

For **wide-angle architectural photographs and interiors**, apart from the Double Protars, more especially

the short-focus Protar F/18.

For **Process Work**, apart from the long-focus Protar F/18 and Tessar F/6.3, (the latter for occasional use), primarily the

Apochromatic Planars and Apochromatic Tessars.

For **Tele Photography**, apart from Protar Lenses,

Tele Tessars F/6.3,

Magnars F/10 and

Telephoto Combinations (see pages 29 and 30 of this Catalogue).

Choice of a Suitable Focal Length

The size of the plate or film having been decided upon, there only remain a few foci from which to choose. For all ordinary purposes it is a useful rule to make the focal length equal to the diagonal of the plate. Thus in the case of a quarter-plate the diagonal is $5\frac{1}{2}$ inches, and by the given rule the required lens should have a focal length of $5\frac{1}{2}$ inches. In this case therefore the length of the plate is to the focus as 4 is to 5, and a similar ratio obtains between the width of the scene showing on the plate and its distance from the camera. For example, at a distance of five yards, a scene four yards wide will appear on the plate; whilst at ten yards the plate will show a scene 8 yards wide, and at thousand yards a scene 800 yards wide.

This rule, "*Focus equal to diagonal*", cannot always be adhered to. Portraits, groups and photographs of small living creatures are best taken with long-focus-lenses to secure a good pictorial effect. The studio cameras, field cameras and reflex cameras generally used for these purposes are sufficiently large to admit of being fitted with lenses of the required size. On the other hand, in many cases, especially when photographing buildings, machinery, and interiors, it is necessary to employ lenses embracing a very wide angle, in which case the focal length of the required lens becomes very much shorter than would follow from the rule.

The subjoined Tables of Lenses giving the plate sizes for the various series of lenses and their focal lengths have been arranged in accordance with the principles here outlined. The scheduled plate sizes do not by any means exhaust the resources of the respective lenses. In the majority of cases the limits of uniform sharpness extend beyond the figures given, even when the lenses are used with large stops. To indicate how far these plate limits may

be extended the diameter of the largest sharply defined image circle which is obtainable with small stops is given in a separate column of the tables on pp. 16 to 19.

As regards the exactness of the focal lengths, as stated in the tables, the reader need scarcely be reminded that it is quite immaterial to the user as to whether the focal length conforms to the reputed value within a fraction or not, nor is it practicable in manufacture invariably to conform with meticulous precision to the scheduled values. We have therefore for some years ceased to state the focal lengths in terms of millimetres as this would tend to suggest a higher degree of exactness than actually obtains, while the mounts themselves have engraved upon them the focal lengths in terms of centimetres.

Zeiss Lens Mounts

The Zeiss Lens Mounts are fitted with Iris Diaphragms, and the Apochromatic Tessars and the Apochromatic Planars, are provided, as a rule, also with Sliding Diaphragms.



Standard Mount N for Travelling and large Stand Cameras with bellows extension.



Compur or Compound Lens Shutter Mount for folding Cameras and Cameras for time and instantaneous exposure.



Focusing Mount A for collapsible and other hand-cameras with fixed extension.

Mount A protrudes into the camera and has a focusing device for near and far.



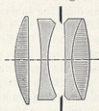
Sunk Mount B for Reflex and Collapsible folding cameras with variable extension.

Mount B protrudes into the camera but has no focusing device for near and far.

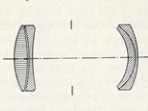
Zeiss Lenses are supplied completely mounted only, i. e. either in one of the above mounts or in conjunction with a lens shutter, as it is only under these conditions that we can vouch for their good performance.

Types of Zeiss Lenses

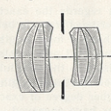
represented diagrammatically in actual size for a focal length of 10 cm. (4 in.)



Tessar F/4.5

likewise F/2.7, F/3.5, F/6.3,
F/9—F/15

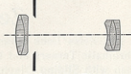
Tele Tessar F/6.3

Double Protar F/7
likewise F/6.3 or F/7.7

Protar Lens F/12.5



Protar F/18



Magnar F/10

Table of Zeiss Objectives

giving focal lengths, sharply covered plate sizes, and size of mounts

Focal length	Plate size for which recommended	Diameter of Circle of confusion in small stops	in Standard "N" Mount	in sunk "B" Mount	in focusing "A" Mount	with "Compur" or "Compound" Shutter	Tube No. ¹⁾ for
cm. | in.	in.	in.					Mounts | Comp. N B A | Shutter

Tessar F/6.3

Rapid Universal Lens for Amateur and Professional Photographers

5.5	2 1/4	1 1/2 x 1	3	Fodiremo	—	—	Fondirse	*	00	Cooa
6.5	2 1/2	2 x 1	3	Fodissemus	—	Fodrum	Foggiati	*	00	Cooa
7.5	3	2 1/2 x 2	4	Fodissent	Foliolum	Foedabam	Foggiatore	*	I	Cooa
9	3 1/2	3 x 2 1/2	5	Fodit	Folier	Foedabam	Foggiava	*†	I	Cooa
10.5	4	3 x 2 1/2	6	Foltrisch	Foluz	Foluzes	Folyoca	*†	I	Cooa
12	4 1/2	3 1/2 x 2 1/2	6 1/2	Foditis	Foliosa	Foedabis	Foggier	*†	I	Co
13.5	5	4 x 4	8	Foditur	Foliosame	Foedabor	Foggiess	*†	II	Co
15	6	5 x 4	8 1/2	Fodivano	Folioses	Foedae	Foggiolla	*†	II	Co*
16.5	6 1/2	5 1/2 x 3 1/2	9	Fodoli	Foliosim	Foedamus	Foggun	*†	III	C ¹
18	7	6 1/2 x 4 1/2	10	Fodorum	Foliosior	Foedandi	Fogless		IV	IV
21	8 1/2	7 1/2 x 5	12 1/2	Fodrai	Foliosum	Foedandos	Foglia		IV	IV
25	10	8 x 5	15	Fodrammo	—	—	Fogliamo		VI	VI
30	12	8 1/2 x 6 1/2	17 1/2	Fodrando	—	—	Fogliasti		X	X
36	14	9 x 7	21	Fodrarium	—	—	Fogliatura		X	X
50	20	12 x 10	28	Fodrati	—	—	—		XIV	—
60	24	15 x 12	33 1/2	Fodravano	—	—	—		XV	—

¹⁾ Respecting the corresponding Distars, Proxars, Yellow Glass Screens, and Ducars see pp. 24, 27 and 28.²⁾ In Compur shutter, also 1=13 cm.: "Foggiemo".³⁾ These Tessars are likewise available for use as paired lenses in Mounts or shutters.⁴⁾ These Tessars may also be supplied in Iso shutters, which automatically rewind when released for exposure and which are a little lower in price than the Compur shutters.

Focal length		Plane size for which recommended	Diameter of Circle covered with small stops	in Standard "N" Mount	in sunk "B" Mount	in focusing "A" Mount	with "Compur" or "Compound" Shutter	Tube No. ¹⁾ for	
cm.	in.	in.	in.					Mounts	Shutter
C o d e w o r d s								N B A	Comp.

Tessar F/4.5

Extra Rapid Universal Lens for Amateur and Professional Photographers

4	1 1/4	1 1/4	1 1/4	2	Fodicari	—	—	—	00	—
5.5	2 1/4	1 1/4	1 1/4	2 1/2	Fodicar	—	Follicetur	Fondeado ²⁾	00	Cooa
6.5	2 1/2	2 1/2	2 1/2	3	Fodicassem	Foliforme	Folleatos	Fogbank ²⁾	I	Cooa
7.5	3 1/4	2 1/2	1 1/4	3 1/2	Fodicat	Foliga	Fodico	Fogbell ²⁾	I	Cooa
9	3 3/4	3 1/2	2 1/2	4	Fodicatior	Foligno	Fodiebat	Fogdog ²⁾	I	Co
10.5	4 1/4	3 1/2	2 1/2	5	Fodicatis	Folilet	Fodiemus	Fogeler ²⁾	II	Co*)
12	4 3/4	3 3/4	2 1/2	5 1/2	Fodicato	Folimort	Fodienda	Foggage ²⁾	II	Coo
13.5	5 1/4	5 1/4	4	6	Fodicatum	Folinaha	Fodiendus	Foggetta ²⁾	IV	III
15	6 1/4	5 1/4	4	7	Fodicatura	Folio	Fodiens	Foggettino ²⁾	IV	IV
16.5	6 3/4	5 3/4	3 1/2	8	Fodicavere	Folioing	Fodientem	Foggia	VI	VI
18	7 1/4	6 1/4	4 1/2	8 1/2	Fodicavi	Foliolado	Fodientia	Foggiammo	VI	VI
21	8 1/4	7 1/4	5	10 1/2	Fodicem	Foliolas	Fodina	Foggiane	VII	VII
25	10	8 1/2	5	12 1/2	Fodicemur	Foliolate	Fodinarmum	Foggiarano	X	X
30	12	8 3/4	6 1/2	14 1/2	Fodicent	Foliote	Fodinis	Fondeara	XII	XII
36	14	9 1/4	7	17	Fodicentur	—	—	—	XIV	—
40	16	10 3/4	8	20	Fodicere	—	—	—	XV	—
50	20	12 1/2	10	24	Fodicet	—	—	—	XVI	—

Tessar F/3.5†

Extra Rapid Universal Objective for Amateur and Professional Photographers

7 ²⁾	2 3/4	2 3/4	1 1/2	3 1/2	—	—	—	—	—	—
8.5 ²⁾	3 1/4	2 3/4	2 1/2	3 3/4	—	—	—	—	—	—
10.5	4 1/4	3 3/4	2 1/2	5	Foracaria	Foragida	For	Forabilium	IV	III
12	4 3/4	3 3/4	2 1/2	5 1/2	Foracasen	Foragidos	Foraba	Forabos	IV	IV
13.5	5 1/4	5 1/4	4	6	Foradado	Foraginem	Forabile	Forabunt	VI	VI
15	6 1/4	5 1/4	4	7	Foradar	Foraging	Forabilia	Foracad	VI	VI
16.5	6 3/4	5 3/4	3 1/2	8	Foraged	Foragini	Forabilior	Foracamos	VII	VII
21	8 1/4	7 1/4	5	10 1/2	Foragers	Forago	Forabilis	Foracando	X	X
25	10	8 1/2	5	12 1/2	Folderols	—	—	—	XII	—
30	12	8 3/4	6 1/2	14 1/2	Folding	—	—	—	XIV	—

Teletessar F/6.3

Rapid Special Long-focus Objective for Use with Short Camera Extensions

12	4 1/4	2 3/4	1 1/2	3 3/4	Foralite	Forame	Fopling	Foramente	Co	Co
18	7 1/4	3 3/4	2 1/2	5	Fondait	Fondare	Fondatate	Fondation	III _T	III _T
25	10	5 1/4	4	6 1/2	Fondament	Fondarano	Fondateur	Fondator	VI _T	VI _T
32	12 1/2	5 3/4	3 1/2	8 1/4	Fondan	Fondasses	Fondatie	Fondatore	VII _T	VII _T
40	16	7 3/4	5	10 1/2	Fondante	Fondasim	—	Fondatoris	X _T	X _T

Tessar F/3.5

Rapid Short-focus Lenses for Cinematograph Work

2.8 [†]	1 1/4	1 1/4	1 1/4	1 3/4	Forandi	—	Forandoru	—	—	—
3.5 [†]	1 3/8	1 1/4	1 1/4	2	Folcemmo	—	Folcire	—	00	—
4	1 1/2	1 1/2	1 1/2	2 1/4	Fondilo	—	Fongate	—	00	—
5	2	1 3/8	1 1/4	2 1/2	Folcenti	Follares	Folciremmo	—	I	—
7.5	3	1 3/4	1 1/2	2 3/4	Folcette	Follaria	Folciuto	—	I	—

¹⁾ Respecting the corresponding Distars, Protars, Yellow Glass Screens and Ducars, see pp. 24, 27 and 28.²⁾ These Tessars are likewise available for use as paired stereo lenses in mounts or shutters.³⁾ In preparation.⁴⁾ Hitherto only made in special mounts for certain stereo cameras.[†] Apart from the focal lengths for hand-cameras the Tessars F/3.5 are made with focal length, of 2.8 cm. and 3.5 cm. for standard film and are of a new type embracing a larger image angles whereas for the longer cinematograph foci, viz. 4 cm., 5 cm. and 7.5 cm. the older type has been retained in view of its suitable qualities for these longer foci.

Focal length	Plate size for which recommended	Diameter of Circle covered with small stops	in Standard "N" Mount	in sunk "B" Mount	in focusing "A" Mount	with "Compur" or "Compound" Shutter	Tube No. ¹⁾ for
cm. | in.	in.	in.					Mount N | Comp. Shutter

Tessar F/2.7

An Extremely Rapid Lens.

1.5	—	—	Fontanella	—	—	—	00	—
2*	—	—	—	—	—	—	—	—
2.5	1	—	Fontanaria	—	Fontecica	—	00	—
3.5	1	—	Fontaneros	—	Fontelo	—	Coo	—
4	1	—	Fontanesia	Fontanol	Fonteiora	Foolsam	I	—
5	2	—	Fontanetta	Fontanone	Fontema	Foolscap	I	—
8	3 1/2	2 1/2	Fontaneus	Fontanorum	Fontenier	Fooltrap	III	III
10	4	2 1/2	Fontange	Fontanosi	Fontezinha	Fontezuela	IV	IV
12	4 3/4	2 1/2	Fontania	Fontanosol	Footballs	Footland	VI	VI
14.5	5 3/4	2 1/2	Footman	Footmark	Footmuff	Footnote	VII ^T	VII ^T
16.5	6 1/2	5/4	Fontaniere	Fontanum	Fonthill	Footbase	X	X

Triotar F/3 and F/3.5

Rapid Lenses for Kinematograph and Focal Plane Cameras.

1.5	—	—	Fontibus ²⁾	—	—	—	00	—
2*	—	—	—	—	—	—	—	—
2.5	1	—	Fonticina ²⁾	—	Fool	—	00	—
3.5	1	—	Fonticulis	—	Foolborn	—	00	—
4	1	—	Fonticolor	—	Foolduck	—	00	—
5	2	—	Fonticule	Fontyn	Fooled	Footbench	I	—
7.5	3	2 1/2	Fonticulum	Fontielle	Fooleries	Footblower	II	II
10	4	2 1/2	Fontigena	Fooda	Foolhen	Footboard	III	III
12	4 3/4	2 1/2	Fontigenel	Foodful	Foolified	Footbridge	IV	IV
15	6	3 1/2	Fontigenis	Foodless	Fooling	Footcloth	VI	VI
18	7	5/4	Fontinal	Foodplant	Foolish	Footcope	VII	VII
21	8 1/2	5 1/2	Fontinales	Foodstuff	Foolkiller	Footed	X	X

Tessar F/5

Rapid Lenses for Portraiture, Groups and Aerial Photographs.

50	20	12	10	16 1/2	Fongees	—	—	—	XV	—
70	28	16	12	21 3/4	Fongoons	—	—	—	XVII	—

Triplet F/4.8

Rapid Lens for Portraits and Aerial Photography.

50	20	7 1/2	5	10	Fonger	—	—	—	XV	—
70	28	9	7	12 3/4	Fongerai ³⁾	—	—	—	XVII	—

Protar F/18

Wide-angle Lens for Panoramic Views, Architecture and Interiors.

4	1 1/2	2 1/2	1 1/2	4	Foedent	—	—	—	Coo	—
6	2 1/2	3 1/2	2 1/2	6	Foederabo	—	—	—	Coo	—
8.5	3 1/2	4 1/2	3 1/2	8 1/2	Foederamus	Folkfree	—	—	Co	—
11	4 1/2	6 1/2	4 1/2	11	Foederans	Folking	—	—	Co	—
14	5 1/2	7 1/2	5	14	Foederat	Folkland	—	—	C ₁	—
18	7	8 1/2	6 1/2	16	Foederatio	Folklore	—	—	C ₁	—
21	8 1/2	10	8	21 1/2	Foederem	Folkloric	—	—	C ₁	—
27	10 1/2	12	10	26 1/2	Foederent	Folkmoor	—	—	III	—

¹⁾ Respecting the corresponding yellow Glass screens and Ducars see pp. 27 and 28.²⁾ Relative aperture F/3.³⁾ Relative aperture F/5.⁴⁾ Special Lens for certain small-film kinematograph cameras.



Focal length	Rel.	Plate	Diameter of	in Standard	with "Compur"	without	Tube No. 1)
Front Lens	F/	size for	Circle co-	"N"	or "Compound"	tube-	for
Back Lens		which	vered with	Mount	Shutter	mounts*)	
whole		recom-	small stops				
System		ended					
inches		in.	In.				
Code words							MOUNTS N and B
							Comp. Shutter

Protar Lens F/12.5

Single Lens with Front Stop for Landscapes and Portraits.

18 cm. = 7 in.	12.5	6 1/4 x 4 1/4	9	Foeneos	Folle	Foetal	I	Co
22 " = 8 3/4 "	"	7 x 5	11 1/2 "	Foeniculi	Folleam	Foetam	II	Co
29 " = 11 1/2 "	"	8 1/4 x 6 1/4	15	Foenile	Folleant	Foetebas	III	III
35 " = 14 "	"	10 x 8	18	Foenilium	Folleare	Foetebimus	IV	IV
41 " = 16 "	"	12 x 10	21	Foenisex	Folleata	Foetebos	VIII	VIII
48 " = 19 "	"	14 x 11	24 1/2 "	Foenoris	Folleatir	Foetebunt	VIII	VIII
59 " = 23 "	"	15 x 12	30	Foenus	Fonghi	Foetemus	X	X
69 " = 27 "	"	18 x 14	35	Foesne	Fongia	Foetendos	XII	XII

*) Like the lenses of our other series, Protar Lenses are not supplied without tube-mounts. They require to be adapted by us to a Zeiss mount or a lens shutter, and fitted by us, as it is only in this way that we can accept responsibility for the good performance of the lenses. The cost of adapting the lens to an existing objective varies according to circumstances.

Double Protar F/6.3 to F/7.7

Rapid Universal Objective made up of two Protar Lenses.

7	7	4	6.3	3 1/2 x 2 1/2	6 3/4	Foelens	Fogonero	—	I	Co
8 1/2	7	4 1/2	7	4 1/2 x 3 1/2	7	Foetenti	Fogones	—	II	Co
11 1/2	7	5	7.7	4 1/2 x 3 1/2	8	Foelere	Fogonillo	—	III	III
8 1/2	8 1/2	5	6.3	4 1/2 x 3 1/2	8	Foetescit	Fogos	—	III	Co
11 1/2	8 1/2	5 3/4	7	5 x 4	9	Foetescunt	Fogisidade	—	III	III
14	8 1/2	6	7.7	5 1/2 x 4	10	Foetet	Fogring	—	IV	IV
11 1/2	11 1/2	6 1/2	6.3	6 1/2 x 4 1/2	10 1/2	Foetida	Fogsmoke	—	III	III
14	11 1/2	7 1/2	7	7 x 5	11 1/2	Foetidabo	Fogueado	—	IV	IV
16	11 1/2	8	7.7	7 1/2 x 5	12 1/2	Foetidans	Fogueamos	—	VIII	VIII
14	14	8	6.3	7 1/2 x 5	12	Foetidem	Foguease	—	IV	IV
16	14	8 1/2	7	8 x 5	13 1/2	Foetidor	Fogueen	—	VIII	VIII
19	14	9 1/2	7.7	8 1/2 x 6 1/2	14	Foetor	Foguero	—	VIII	VIII
16	16	9 1/2	6.3	8 1/2 x 6 1/2	14	Foetoribus	Fohismus	—	VIII	VIII
19	16	10 1/2	7	9 x 7	16	Foetosi	Foile	—	VIII	VIII
23	16	11	7.7	9 x 7	17 1/2	Foetosorum	Fongiez	—	X	X
19	19	11	6.3	9 x 7	17 1/2	Foetosos	Follebas	—	VIII	VIII
23	19	12 1/2	7	9 x 7	19	Foetutina	Fongiform	—	X	X
27	19	13	7.7	10 x 8	20 1/2	Fofinho	Fongipore	—	XII	XII
23	23	13 1/2	6.3	10 x 8	21 1/2	Fofos	Fonica	—	X	X
27	23	14 1/2	7	12 x 10	23	Fog	Fonico	—	XII	XII
27	27	16	6.3	12 x 10	25	Fogaban	Fonil	—	XII	XII

Selected Convertible Protar Sets.

Protar Set	Plate Size in.	Available Focal Lengths in cm.						Standard Mount N	Compur or Compound Shutter	Tube Numb. for	
		Components			Doublet					N Mount	Comp.
Bo	5×4	29	22	18	14.5	13	11.5	Foliatim	Foliatume	III	III
C	7½×5	35	29	22	18.5	15.5	14.5	Foliatoria	Folichom	IV	IV
D	9×7	48	41	35 29	26	23.5	22 20 18.5	Foliorum	Follicula	VIII	VIII

Usual Accessories to the Protar Sets.

Protar Set	Wide Angle Protar F/18 (see p. 18)	Telephoto Attachment (see pp. 29 and 31)	Yellow Glasses (see p. 26)	
Bo	Foederamus	Folaria	5x (light)	10x (dense)
C	Foederans	Folaria	Folette	Folgaz
D	Foederal	Folatre	Folga	Folgazano
			Folgado	Folidandra

1) Respecting the appropriate filters see p. 27.

Equipment for Process Work

Separate booklet P 259 containing detailed particulars in preparation

The subjoined table furnishes the first listed particulars of our new Apo Tessars with enlarged angle of view and relative aperture F/9. The plate sizes covered satisfy the most exacting requirement as regards sharpness of definition, such as result with the lenses used with stops at F/22 to F/32.

The Apo Tessars are superbly corrected with respect to all those qualities which affect their performance as process lenses, while the less important residual errors are reduced to an inconsiderable amount. In the Apo Planars, which comprise six lenses and eight exposed surfaces (as against the four lenses and six exposed surfaces of the Apo Tessar) the greater number of available elements for correction provides a means of carrying the optical correction still further.

In certain particular cases the Apo Planar is therefore slightly superior to the Apo Tessar for extremely fine work, especially for copying coloured originals. For this reason we have continued to include the Apo Planars in our list. It should, however, be understood that this degree of superiority is practically appreciable only in extremely fine work carried out with most meticulous care and under the most exacting conditions throughout the process and the equipment used. In the great majority of cases the new Apo Tessar with its enlarged angle is not likely to be surpassed by the Apo Planar.

The Protars F/18 formerly listed and recommended for process work of a simple order have not been included in the present table as the demand for them has almost ceased in the course of the last few years. Moreover, in view of the enlarged angle of the Apo Tessars the Protars F/18 have lost the significance which they formerly held in exceptional cases.

Particulars of reversing systems, revolving collars, troughs and filters for use with the new Apo Tessars will be furnished on application. For the present these are supplied in the sizes provided for the older lenses.

Process Lens in N Mount	Re-lative Aperture	Focal Length f cm. in.	Sharply covered size of plate						Codeword
			Scale						
			1:1		1:2		1:10		
			cm.	in.	cm.	in.	cm.	in.	
Apo-Tessar	F/9	30 12	30×40	15×12	24×30	13×9	18×21	9×7	Forandos
	F/9	45 18	45×60	25×18	35×40	15×12	24×30	13×9	Foramini
	F/9	60 24	60×80	30×24	45×60	25×18	35×40	15×12	Foraminoso
	F/9	75 30	75×100	40×30	60×70	30×20	40×55	20×16	Foraneo
	F/9	90 36	90×120	48×36	70×85	36×24	50×65	25×18	Foranol
	F/9	120 48	120×150	60×48	90×120	48×36	70×85	36×24	Forantis
Apo-Planar	F/7.5	41 16½	35×45	18×14	26×35	15×12	22×24	10×8	Foculabunt
	F/9	59 23	45×55	25×18	35×45	18×13	24×30	13×9	Foculamini
	F/10	80 31½	65×75	30×24	45×60	25×18	30×40	15×12	Foculamur
	F/10	105 41½	75×85	36×30	65×70	30×24	40×50	20×16	Foculans
	F/12.5	130 51	90×100	40×30	70×80	36×24	45×60	25×18	Foculantia
	F/12.5	170 67	120×150	60×48	90×100	40×30	60×75	30×24	Foculare

Focusing Microscope: Magnifying 28× for fine process work.

Codeword: *Fodaturum*

Focusing Lens A mounted in sliding tube for amateurs, professional photographers, and pro- cess workers, 6 or 10×	Magnification	Focal Length		Diameter		Codeword
		cm.	in.	mm.	in.	
	6×	4	1½	21	0.8	Fodaveras
	10×	2.5	1	11	0.4	Fodavero

CARL ZEISS
JENATESSAR 1:4.5 $f=13.5\text{cm}$ + PROXAR 3/IICARL ZEISS
JENATESSAR 1:4.5 $f=13.5\text{cm}$ TESSAR 1:4.5 $f=13.5\text{cm}$ + DISTAR 3.5/II

Comparison Photographs taken from one standpoint in a church (reduced reproductions).

Tessars F/4.5 and F/6.3 combined with Distars and Proxars to form wide-ranged Convertible Sets

The Distars are single-lens components of small *diverging* power (see Table p. 25). When placed in front of the camera lens they increase its focal length and the camera extension necessary. They thus add to the potentialities of



camera lenses, especially those of an unsymmetrical type, since these, from their very nature, are only adapted for use on cameras with fixed extension in that their components are not corrected independently for use as long-focus lenses. In particular, in conjunction with the Tessars

the Distars form wide-ranged sets of convertible lenses. The lens curvatures of the Distars, when these are used in combination with an anastigmatic lens, notably with a Tessar, ensure a uniformly good image within a large field of view, and a moderate degree of stopping down suffices in order to obtain with a Tessar+Distar combination the requisite quality of sharpness for portraits, animated street scenes, landscapes, architecture, etc. — Over separate components of strictly symmetrical or hemisymmetrical objectives the Tessar+Distar combination has the following advantages:

It affords greater freedom in the choice of focal lengths: Symmetrical objectives furnish only *one* long focus, the *two* component lenses being alike; the front and back lenses of semisymmetrical objectives furnish *two* different long-focus lenses, whereas the Distars impart to the Tessars a range of as many as *five* focal lengths to choose from.

There is less distortion at the edge of the image field: All component lenses of symmetrical and semisymmetrical objectives are subject, as every user of these knows, to an appreciable amount of distortion, which becomes very disturbing when buildings are being photographed. This distortion is barrel-shaped' when the lenses are behind the stop and 'cushion-shaped' when they are in front. When on the contrary, the focus is lengthened by appending a Distar to the front of a Tessar the barrel-shaped distortion is so slight that it does spoil even the effect of wide-angle pictures of buildings.

The Camera extension is shortened: The back lens of symmetrical and semisymmetrical objectives focused for distance requires the camera extension to be fully one-tenth longer than the focal length f , whereas with the 'Distar+Tessar' combination it is only roughly equal to f . For example, with a focus 25.5 cm. the camera extension for the combination is 25.5 cm., whereas for the required equivalent back lens it is 29 cm. The result is that the camera becomes available for taking nearer objects, than would be practicable under otherwise similar conditions (see Table of Distars on p. 25).

Changes can be made with greater ease: In order to obtain a longer focus a Distar is simply slipped upon the front mount of the Tessar after the manner of a yellow filter. To realise the convenience of this one need only recall the changes which have to be gone through in order to transfer the front lens component of a semisymmetrical objective to the rear of the shutter diaphragm of a roll-film camera with double extension.

Facilities for making up a convertible set: An existing Tessar may at any time after its initial acquisition be supplemented by one or several Distars to form a set of convertible lenses.

PROXARS are lenses of small *converging* power. (see table on p. 25). When attached in front of a Tessar, they produce an effect opposite to that of the Distars in that they shorten the focal length. Thus, Tessar F/4.5, $f=13.5$ cm. has its focal length reduced to about 13 cm., 12.5 cm., 12 cm., or 11.5 cm. according to the converging effect of the Proxar appended to it. *The range of uses of the Tessar is thereby widely extended in a twofold direction, viz:*

For obtaining large figures of near objects: Hand cameras with a barely sufficient extension and fitted with a standard camera lens, such as a Tessar, cannot, as a rule, be focused upon objects nearer than two yards, or in the case of small cameras nearer than $1\frac{1}{2}$ yards, or possibly one yard, whether this be accomplished by bodily displacing the lens carrier on the baseboard or with the focusing lens mount of folding cameras. By attaching a Proxar to the front of the Tessar a camera with an ordinary focusing range of two yards can be made to take objects within distances ranging from 2 up to 1 yard, $\frac{2}{3}$ to $\frac{1}{2}$ and $\frac{1}{2}$ to $\frac{1}{3}$ yard, as the case may be.

For taking wide-angle photographs at moderate and great distances, say from 2 yds. to ∞ : When taking photographs in a room or in the street or even in the open country or on the mountains the amateur often finds it impossible to include in the picture all the objects he desires unless he move the camera stand and this is not always possible. A Proxar slipped upon the Tessar at once overcomes the difficulty in that it shortens the focal length of the Tessar and thereby enlarges the content of the picture on the plate. The extent to which this is done depends upon the power of the Proxar and may gathered from the illustrations on pp. 6 and 21. Further particulars respecting the Proxars will be found on p. 25 and on the notes supplied with the Proxars (see p. 25).

The illustrations on pp. 6 and 21 show the extent to which the scope of a Tessar may be extended with the aid of a few inexpensive Proxars and Distars, which may be added at any time. From the particulars respecting the camera extensions given in the lists on p. 25 the following inferences are to be drawn:

With *collapsible cameras having a fixed extension* the Distars may scarcely ever be used for taking pictures at short ranges, whereas the Proxars may be so used, excepting wide-angle pictures at distances exceeding 2 yds., for the obvious reason that cameras of this kind cannot have their extension shortened and can only be set either way for distance within the limits of the helical focusing mount.

In the case of *cameras with single baseboard extension* the Distars may be used within a restricted range only, while fullest use can generally be made of the Proxars in the two ways explained above.

Cameras with double extension admit of Proxars and Distars being used throughout their entire range of application.

The Distars and Proxars are made in the sizes specified below (Vertical column 1). They are adapted for use with Tessars as well as other photographic lenses. When ordering Distars and Proxars for use with an existing lens the photographic dealer should be furnished with the whole of the inscription engraved on the lens mount, the outside diameter of its front lens mount, and the range of the camera extension measured from the lens stop to the ground glass focusing screen.

For Objectives having an outside diameter of mm.	Distars and Proxars				Tessar				
	Distar	Codeword	Proxar	Codeword	F/	f =	in Mount N B A	in Comp. Shutter	
									D ¹⁾
21.0	1/21 2/21	Forainer Forainol	1/21 2/21	Foraida Forain	e. g. adapted for	4.5 4.5 4.5 6.3 6.3 6.3 6.3	5.5 6.5 7.5 5.5 6.5 7.5 9 10.5	— — — — — — — —	00a 00a 00a 00a 00a 00a 00a 00a
27.0	2/C ₀ 3/C ₀ 3.5/C ₀	Fodiam Fodiamus Fodiatris	0.5/C ₀ 1/C ₀ 1.5/C ₀ 2/C ₀	Fopa Fopake Fopali Fopalos	e. g. adapted for	4.5 6.3 6.3	9 12 13.5	I I —	0/I 0/I 0
28.5	2/C ₀ * 3/C ₀ * 3.5/C ₀ *	Fodica Fodicabam Fodicabant	0.5/C ₀ * 1/C ₀ * 1.5/C ₀ * 2/C ₀ *	Fopalu Fopalys Fopama Fopame	e. g. adapted for	4.5 6.3	10.5 15	— —	0/I 0
30.0	2.5/C _{0a} 3.5/C _{0a} 4.5/C _{0a}	Fodicantor Fodicare Fodicarent	0.5/C _{0a} 1/C _{0a} 1.5/C _{0a} 2/C _{0a}	Fopamir Fopamol Fopamus Fopanai	e. g. adapted for	4.5	12	—	0a
32.0	1.5/II 2.5/II 3/II	Fodicabare Fodicabis Fodicabo	0.5/II 1/II 1.5/II 2/II	Fopanal Fopaname Fopansi Fopanea	e. g. adapted for	4.5 4.5 6.3 6.3 6.3	10.5 12 13.5 15 16.5	II II II II —	— — — — 1
37.0	1.5/III 2/III 2.5/III 3/III 3.5/III	Fommeling Fodicabunt Forametti Fodicamini Fodicamur	0.5/III 1/III 1.5/III 2/III	Fopanei Fopania Fopanide Fopanifi	e. g. adapted for	4.5 6.3	13.5 16.5	— III	1/III —
42.0	1.5/IV 2/IV 2.5/IV 3/IV 3.5/IV	Fomitale Fodicanda Fomitibus Fodicandis Fodicandum	0.5/IV 1/IV 1.5/IV 2/IV	Fopanigu Fopaniko Fopanire Fopanita	e. g. adapted for	4.5 4.5 6.3 6.3	13.5 15 18 ³⁾ 21 ⁴⁾	IV IV IV IV	— 2/IV 2/IV 2/IV
51.0	1/VI 1.5/VI 2/VI 2.5/VI 3/VI	Fomitum Fodicans Fonacion Fodicantem Fodicanti	0.5/VI 1/VI 1.5/VI	Fopanivo Fopanizu Fopanoare	e. g. adapted for	4.5 4.5	16.5 18	VI VI	2/VI 2/VI
57.0	1/VII 1.5/VII 2/VII 2.5/VII	Fomiter Fomiturus Fonasum Fonazione	0.5/VII 1/VII	Fopano Fopanoam	e. g. adapted for	4.5	21	VII	3/VII

¹⁾ Strength of lens in dioptres.²⁾ Size notation of lens.³⁾ Of the Distars 1.5/IV up to 3/IV at the outside only are to be recommended.⁴⁾ Of the Distars 1.5/IV up to 2.5/IV at the outside only are to be recommended.

The subjoined tables show approximately the focal length f_c cm. which results from the combination of a Distar (or Proxar) of a power D with a photo objective of a focal length of f cm. They also state the camera extension K which should be available in order that it may be possible to focus the objective + Distar (or Proxar) combination to the distances stated in the table.

Further useful particulars respecting the changes in the scale of the picture effected by the Distars and Proxars are given in the small cards supplied with the Distars and Proxars and will be sent to enquirers on application. These cards are small enough to be accommodated as a rule, in the cases provided with the Distars and Proxars.

DISTARS

D → 1				1.5				2				2.5				3				3.5				4.5			
when set to		K*		K*		K*		K*		K*		K*		K*		K*		K*		K*		K*		K*		K*	
→ ∞		2 m.		∞		2 m.		∞		2 m.		∞		2 m.		∞		2 m.		∞		2 m.		∞		2 m.	
f	f _c			f _c				f _c				f _c				f _c				f _c				f _c			
cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.
9	—	—	—	—	—	—	—	10	10	10.5	—	—	—	11	11	12	12	12.5	—	—	—	—	—	—	—	—	—
10.5	—	—	—	12.5	12	13	13	13	13	14	14	14	15	15	15	16	16	16	17.5	—	—	—	—	—	—	—	—
12	—	—	—	14	13.5	14.5	15	14.5	15.5	15.5	15.5	15.5	17	17	17	18.5	18.5	18.5	20.5	21.5	22	25	—	—	—	—	—
13.5	—	—	—	17.5	17	19	18.5	18.5	20.5	20.5	20.5	22.5	23	22.5	23	25.5	25	25.5	29	—	—	—	—	—	—	—	—
15	—	—	—	19	19	21	20.5	20.5	23	23.5	23.5	26.5	26	26	26	30	30	30	35	—	—	—	—	—	—	—	—
16.5	20	20	22	22	24.5	24.5	24.5	28	28	28	28	32	32	32	32.5	38.5	37.5	38.5	47	—	—	—	—	—	—	—	—
18	22.5	22	25	25	25	28.5	28	28	32	32	32	32.5	38.5	37.5	38.5	47	—	—	—	—	—	—	—	—	—	—	—
21	26	26	30	30	30	35.5	34	35.5	42.5	42	43	54	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

PROXARS

D → 0.5										1									
when set to		K*		K*		K*		K*		K*		K*		K*		K*		K*	
→ ∞		2 m.		1 m.		50 cm.		40 cm.		30 cm.		20 cm.		∞		2 m.		1 m.	
f	f _c			f _c				f _c				f _c		f _c		f _c		f _c	
cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.
9	8.25	7.8	8.3	8.5	9.5	10	11	14	8	7.5	7.8	8.3	9	9.5	10.5	13	—	—	—
10.5	10.25	9.5	10.5	11	12.5	13.5	15	20.5	10	9	9.5	10.5	11.5	12.5	14	18.5	—	—	—
12	11	10.5	11	12	13.5	15	17	24.5	10.5	10	10.5	11	13	13.5	15.5	22	—	—	—
13.5	13	12.5	13.5	14.5	17	19	22.5	—	12.5	11.5	12.5	13.5	16	17.5	20.5	32	—	—	—
15	14.5	13.5	15	16	19.5	21.5	26.5	—	13.5	12.5	13.5	14.5	17.5	19.5	23.5	—	—	—	—
16.5	15.5	15	16.5	18	22.5	25.5	33	—	14.5	14.5	15	16.5	20	22.5	28	—	—	—	—
18	17	16.5	18	20	25.5	29	38	—	16	15	16.5	18	22.5	25.5	33	—	—	—	—
21	19.5	18.5	20.5	23	30.5	36.5	54	—	18	16.5	18.5	20.5	26.5	31	42.5	—	—	—	—

D → 1.5										2									
when set to		K*		K*		K*		K*		K*		K*		K*		K*		K*	
→ ∞		2 m.		1 m.		50 cm.		40 cm.		30 cm.		20 cm.		∞		2 m.		1 m.	
f	f _c			f _c				f _c				f _c		f _c		f _c		f _c	
cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.
9	7.75	7.3	7.5	7.8	8.5	9	10	12.3	7.5	7	7.3	7.5	8.3	8.8	9.5	11.5	—	—	—
10.5	9.5	8.5	9	9.5	11	11.5	13	17	9	8.5	9	9.5	10.5	11	12.5	16	—	—	—
12	10	9.5	10	10.5	12	13	14.5	20	9.5	9	9.5	10	11.5	12	13.5	18	—	—	—
13.5	12	11	11.5	12.5	14.5	16	18.5	28	11	10.5	11	12	13.5	14.5	17	24.5	—	—	—
15	12.5	11.5	12.5	13.5	16	17.5	20.5	32.5	12	11	11.5	12.5	14.5	16	18.5	28.5	—	—	—
16.5	14	13	14	15	18	20	24.5	—	13	12	13	14	17	18.5	22.5	—	—	—	—
18	14.5	14	15	16.5	20	22.5	28	—	13.5	13	13.5	15	18	19.5	24	—	—	—	—
21	16	15	16.5	18.5	23	26.5	34.5	—	15	14	15	17	20.5	24	29.5	—	—	—	—

Further details respecting our Distars and Proxars will be found in our leaflets Ph 209 and Ph 263, which we shall be pleased to furnish on application.

* Exact focusing should be obtained with the ground glass screen and the lens set to its working aperture.



Unmagnified reproduction of a photograph taken with a camera pointed vertically downward on a 12×9-cm. plate with Tessar F/4.5, $f=13.5$ cm. supplemented by a Proxar 2/III, the focal length being thereby extended to $f_c=11$ cm. Tessar stopped to F/12.5; resulting rel. aperture F/10. Distance 17 cm. (5½ in.); double camera extension 30 cm. *Pyrameis Cardui* "Painted Lady", natural width 52 mm., taken therefore in 1½ nat. size.

Yellow Glass Screens

It is a well known fact that photographic plates and films do not render the intensity values of different colours in the same way as they are seen by the eye. Their predominant response to ultra-violet, violet, and blue light is in many cases inadequately balanced by the isochromatisation of the sensitive coating. Our yellow glass screens serve to balance the excess on the side of the short-wave rays more completely. They are prepared with great exactness so as not to affect adversely the high optical qualities of our objectives. The material of which they are made is a special kind of yellow glass which is impervious to ultra-violet but transmits violet and blue rays sparingly and the other coloured rays of longer wave-lengths almost with undiminished intensity. This material is entirely different from the common yellow glass screens which are still largely sold and which transmit more short-waved light and less long-waved light than is done by our glass, and hence are inferior in a twofold sense.

Our yellow glass screens are supplied in two degrees of density, respectively listed as 'light' and 'dark'. The 'light' glass prolongs the time of exposure required for normal isochromatic plates and films in an average light about five times. They generally suffice for landscapes without snow, especially for

distant views and for photographing from aircraft. The 'dark' variety is preferable for taking photographs in the mountains, snow landscapes and other views of vividly coloured scenes or objects.

Our yellow glass screens are mounted in two ways to suit the mount of the lenses with which they are to be used, viz, either in such a manner that they may be pushed into the hood of the lens mount (with velvet lining, as shown below) or so that they may be slipped over the outer rim of the hood, the ring being sprung to retain it in position, as show in the annexed figure. The latter kind should be given preference wherever practicable.



Yellow Glass Screen
to slip on

To slip over				To slip in			
Lens Mount No.	outside diameter of the hood	Retarding about		Lens Mount No.	inside diameter of the hood	Retarding about	
		5 times Codeword	10 times Codeword			5 times Codeword	10 times Codeword
—	16 mm.	<i>Foramina</i>	<i>Foraminata</i>	oo	17.5 mm.	<i>Foldnet</i>	<i>Folgaras</i>
C ^{oo}	19.2 "	<i>Follebise</i>	<i>Follegio</i>	P ^{oo}	18 "	<i>Folderaar</i>	<i>Fomenting</i>
C ^{oa}	21 "	<i>Follebita</i>	<i>Folleiro</i>	I	23.5 "	<i>Folego</i>	<i>Folgaria</i>
C ^{oo*}	24 "	<i>Folla</i>	<i>Foment</i>	II	28.5 "	<i>Folera</i>	<i>Folgaron</i>
C ^o	27 "	<i>Follebo</i>	<i>Folleme</i>				
C ^{o*}	28.5 "	<i>Follebunt</i>	<i>Follemos</i>	III	33.5 "	<i>Folette</i>	<i>Folgaz</i>
C ^{oa}	30 "	<i>Folleg</i>	<i>Follenda</i>	IV	38.5 "	<i>Folga</i>	<i>Folgazano</i>
B	31 "	<i>Fonomi</i>	<i>Fononu</i>	VI	47 "	<i>Folgabais</i>	<i>Folgazel</i>
P ^o	31.5 "	<i>Follamente</i>	<i>Fomentar</i>	VII	53 "	<i>Folgado</i>	<i>Folidandra</i>
C ⁱ	32 "	<i>Fonda</i>	<i>Fondable</i>	VIII			
III _T	37 "	<i>Fonsa</i>	<i>Fonsadera</i>	X	65 "	<i>Follendir</i>	<i>Follendos</i>
IV	42 "	<i>Fogaria</i>	<i>Fogarizeis</i>	—	—	—	—
VI _T	51 "	<i>Fonsado</i>	<i>Fonsario</i>	XII	80 "	<i>Fondaccio</i>	<i>Fondaco</i>
VII _T	57 "	<i>Fonsoir</i>	<i>Fontab</i>	—	—	—	—
X _T	69 "	<i>Fontaine</i>	<i>Fontala</i>	—	—	—	—

When ordering Filters for Zeiss lenses purchased on a previous occasion the manufacturing number engraved on the mount should be stated in every instance since the diameters of the lens mounts frequently deviate from the standard gauges to suit the dimensions of shutters and cameras.

Ducars for Autochrome Plates

A-Ducars for Agfa Colour Screen Plates



Slip-in Ducar Filters

In these filters the purely chromatic effect required to rectify the colour values is associated with a very slightly diverging effect. The latter is such that a Ducar slipped upon the front of the objective shifts the plane of the sharp image back exactly by the thickness of the plate into the plane of the photographic coating at the back of the colour screen plate. This does away with the necessity when taking colour photographs of appending special devices to the camera, the focusing scale, the dark slide, or the ground glass focusing screen. All that is needed is to

defer putting in the Ducar until the image has been focused on the ordinary ground glass focusing screen having its dull side facing the objective. This has the incidental advantage that, during the act of focusing, the picture is seen in its natural colours. The Ducars are mounted to slip over or into the lens hood, as described on page 27 at the side of the illustration. When ordering a Ducar, the focal length f of the objective should be taken into account as well as the diameter of the mount.

Ducars to slip over suitable for a lens of which the focal length is = f (cm.), and of which the sun-shade has the outer diameter D_u (mm.)				Ducars to slip in suitable for a lens of which the focal length is = f (cm.), and of which the sun-shade has the inner diameter D_i (mm.)			
Description Tube / F No.	D_u mm.	for Autochrome plates Ducar Codeword	for Agfa Colour plates A-Ducar Codeword	Description Tube / F No.	D_i mm.	for Autochrome plates Ducar Codeword	for Agfa Colour plates A-Ducar Codeword
P/ 6.5	21	Fondava	Fonder	I/ 6.5	23.5	Folgorano	Fonderal
P/ 7.5	30	Fondazi	Fonderom	C/ 6.5	18	Folhoso	Fonderia
C _a / 7.5	21	Foliabo	Fondeur	I/ 7.5	23.5	Folgorata	Fondest
B/ 7.5	31	Fondea	Fondeva	II/ 7.5	28.5	Footrule	Footsore
P/ 9	31.5	Follezza	Fondia	III/ 8	33.5	Footfall	Fothanded
III/10	37	Footfast	Foothill	I/ 9	23.5	Folgorino	Fondevir
IV/10	42	Footfight	Foothold	C/ 9	18	Foliabamos	Fondeza
P/10.5	31.5	Foliacion	Fondig	II/10.5	28.5	Footstall	Footstep
B/10.5	31	Fondeen	Fondill	I/12	23.5	Folguin	Fondire
C/10.5	28.5	Foltissimo	Fondime	II/12	28.5	Folgura	Fondle
C/12	30	Foltado	Fondoir	II/13.5	28.5	Folhado	Fondon
IV/12	42	Footgear	Footing	III/13.5	33.5	Follastro	Fondose
VI/12	51	Footgeld	Footiron	IV/13.5	38.5	Folhame	Fondre
C/13.5	27	Foliages	Fondria	II/15	28.5	Folharia	Fondsa
VII/14.5	57	Footglove	Footkey	III/15	33.5	Foliamos	Fondsen
C/15	28.5	Foliaguda	Fonduk	IV/15	38.5	Folhea	Fondua
VI/15	51	Footgnaw	Footless	II/16.5	28.5	Foliance	Fondule
X/16.5	69	Footguard	Footliker	III/16.5	33.5	Folheador	Fondusi
VII/18	57	Footgrain	Footlevel	VI/16.5	47	Folhearas	Fonebo
T/18	37	Footpace	Footplate	IV/18	38.5	Folhease	Fonet
X/21	69	Foothald	Footline	VI/18	47	Folheatura	Fonetir
T/25	51	Footpad	Footplow	IV/21	38.5	Folheca	Fonfara
T/32	57	Footpage	Footpost	VII/21	53	Folhenda	Fonfone
T/40	69	Footpicker	Footpote				

*) The Ducars and A-Ducars are suitable for use with other objectives, provided their focal lengths do not differ by more than 3 per cent from the focal lengths of the Tessar Lenses as here stated.

When ordering Ducars for lenses purchased on a previous occasion it is advisable to quote the factory number as well as all other inscriptions on the lens mount. Lenses not of our make should be sent for adaptation of the filter, in which case there may be an additional charge for the adaptation

Telephotographic Objectives

The term "telephotographic lens" has been applied to a species of optical combinations in which the image formed by a converging front component is magnified, before it can fall on the ground glass screen, by a diverging back component situated a considerable distance from the converging lens. As a result of this mode of forming the ultimate image the camera becomes shorter — under certain circumstances very much shorter — than the focal length of the image-forming combination. By reason of these conditions *telephotographic combinations furnish larger figures in the picture than doublets of the short standard type*, such as the Tessars, *other things and the camera extension, being equal*. The extent to which this procedure of shortening the resulting camera extension is pushed obviously determines the degree of concessions which must be made in other respects, such as in the matter of rapidity, the size of the field of view, the weight and length of the combination, etc. This is particularly the case where the front and back components, instead of being mutually fixed, as in a standard objective with an invariable focal length, are required to be separated by a variable distance as a means of varying the resultant focal length of the combination within wide limits. In compound telephotographic objectives this has been accomplished ever since their inception by fully independently correcting the converging and diverging members, employing as the converging member a photographic doublet, such as a Tessar or Double Protar.

We make three distinct types of telephoto combinations. Enumerated in the order in which they were brought out, they are the following: —

The **Telephoto Combinations**, consisting of a standard objective (e.g. a Tessar, Double Protar, etc.) and a *Tele Negative*, the latter being joined to the positive member by means of a *Tele Tube* of invariable length (Nos. I, Ia, Ib), or of variable length (Nos. II, III, IV).

The **Magnar F/10**, for use only as an inseparable whole with greatly shortened camera extension.

The **Tele Tessar F/6.3**, for use only as an inseparable whole with moderately shortened camera extension.

The following tables and descriptive notes may serve to compare the performances and data of the above types of telephoto lenses with those of the Tessar F/4.5, which we have selected as a typical representative of the standard doublet, and it is further assumed that the camera is of quarter-plate size.

12×9-cm. camera lenses	Tessar	Tele-Tessar	Magnar	Telephoto Combination (Tube No. I | Tube No. II)	
Focal length f =	15 cm.	25 cm.	45 cm.	50 cm.	90 cm.*
Extension (Camera front to focusing screen) A =	15 "	15 "	15 "	15 "	30 "
Relative aperture F/	F/4.5	F/6.3	F/10	F/30	F/54 *
Comparative rapidities (F/4.5 being taken as 100)	100	50	20	2	0.7 *
Angular extent 2w of objects appearing on the 12×9-cm. plate	Diagonal 15 cm. Long side 12 cm.	53° 43.5°	33.5° 27°	19° 15°	17° 13.5°
Extent of objects shown on the long side of the plate	at 100 metres at 3 metres	80 m. 2.3 "	48 m. 1.3 "	26.5 m. 0.7 "	24 m. 0.6 "
Size in picture of a house 10 metres high, at 100 metres	1.5 cm.	2.5 cm.	4.5 cm.	5 cm.	9 cm.*
Size in picture of head 25 cm. high at 3 metres	1.3 "	2.3 "	4.4 "	5 "	10.7 "

*) Variable within wide limits.

The Tele Tessar F/6.3

does not differ in the manner in which it is used from any ordinary camera lens in N, B, or A mount or fitted to a Compur shutter. The particulars given on page 29 show that the Tele Tessar is not primarily an instrument designed for taking photographs from a distance. Thanks to its rapidity and long focus it is more especially adapted *for photographing small living creatures, and larger animals, for taking portraits, and for the use of press and sports photographers.* Full particulars will be found on pp. 12 and 17.

The Magnar F/10

is a forerunner of the Tele Tessar. It resembles the latter and differs from the older Telephoto Combinations (then alone in use) in that its positive and negative members are not corrected independently and therefore form a good image only within a very small range of variation in the distance between the two members and the camera extension. The sufficiency of its rapidity for hand-camera work and its long focus coupled with a short camera extension (see p. 29) mark it as specially adapted *for photographing animals in the wild state, for taking detail photographs from aircraft,* as well as for photographing small living creatures and for taking portraits showing exceptionally large heads or figures, in every case *with the hand-camera.* We make only one size and type of mount of this objective, viz:

Magnar F/10, $f=45$ cm. in focusing mount for 12×9 cm. (quarterplate) folding camera with about 6 in. extension. *Foiselle*
in Comp. Shutter for cameras with baseboard extension of about 6 in. *Fontanal*

Telephoto Combinations

These are formed by screwing a standard camera lens, such as a Tessar, Double Protar, etc., together with its N, B or A mount or its Compur shutter*) to the front end of a "Tele Tube" to the back end of which the appropriate "Tele Negative" is fitted by us. The resulting Telephoto Combination screws into the lens ring, which remains attached to the camera front. According to the camera extension the focal length of the primary lens increases thereby from about $3\frac{1}{2}$ to $8\times$, and hence the figures in the picture are similarly enlarged (see Synopsis on page 32, below). This combination is therefore primarily adapted *for photographing very distant objects, for taking details of architecture and landscapes,* and such like. Moreover, where the camera extension is variable, it admits of its focal length being varied within wide limits. — In order to ensure that the combination as a whole may give good definition, the front component should be stopped down to at least F/9. This will cause the resulting rapidity to diminish to F/30 or even less, and hence, generally speaking, the combination is available for time exposures only.

Tele Tubes Nos. I, Ia, and Ib, are intended for lenses in "A" mounts, that is to say folding cameras with fixed extension. The magnification V due to the tele-combination as compared with the camera lens alone is then invariable, being as a rule

*) Assuming that the lens with its shutter may be unscrewed or unlocked from the camera.

3 to 4x. The telephoto combination is focused for near and distant objects by means of the scale of distances appended to the "A" mount of the front component in the same manner as when photographing in the ordinary way.

Tele Tubes Nos. II, III and IV are intended for objectives in standard or "B" mounts or shutters, i. e. for cameras with variable extension. They are provided with a focusing screw having a scale which reads the value in millimetres of the interval Δ occurring in the annexed tables. This enables the operator to set the combination, with any camera extension which he may be using, to the required magnification V and the distance of the object.

The **Tele Negatives**, consisting of two cemented lenses are made with focal lengths of $f=4\frac{1}{2}$ cm. ($1\frac{1}{2}$ inch.), 6 cm. ($2\frac{1}{2}$ inch.), $7\frac{1}{2}$ cm. (3 inch.), 10 cm. (4 inch.). The focal length of the *Tele Negative* should preferably not be less than about one third that of the camera lens.

The **Telephoto Supplement**, consisting of the Tele Tube and the Tele Negative, requires to be accurately adjusted to suit each individual camera lens in order that the front and back screw threads may fit exactly and that the negative lens may be fixed at a proper position within the tube. For this purpose it is advisable to send the lens to the works for adaptation. At the very least the whole of the inscription engraved on the objective should be quoted.

Tele Tubes

Tube No.	Tube Length variable		Suitable for					
			Tele Negative	in Tube of size No.**)		Camera Lens		
	by mm.	for ex. for Δ^*	f_2 cm.	A Mount	N, B Mount Comp.	Tessar F/4.5 f_1 cm.	Tessar F/6.3 f_1 cm.	Double Prot. f_1 cm.
I	—	—	$4\frac{1}{2}$ a 6	up to IV	—	up to 15	up to 18	—
Ia	—	—	6 " $7\frac{1}{2}$	" VII	—	16.5 " 21	—	—
Ib	—	—	$7\frac{1}{2}$ " 10	" XII	—	25 " 30	—	—
II	12	5 to 17 or 10 to 22	$4\frac{1}{2}$ a 6	—	up to VI	up to 18	up to 18	29/22
III	20	5 to 25 or 10 to 30	6 " $7\frac{1}{2}$	—	" VIII	" 21	" 21	35/35
IV	32	10 to 42	10	—	" XII	" 30	" 36	69/59

*) According to limits imposed by the camera extension and the Tele Negative (see two tables at the bottom of page 32). **) See two last columns on pp. 16—19).

Usual Supplements for Hand Cameras

Size of Camera	For		Fixed Camera Extension		Variable Camera Extension	
	Focal Length of Lens cm.		Lens in 'A' mount Tele Attachment		Lens in 'N' or 'B' mount, or in Comp.* Tele Attachment	
			Tube/Negative	Codeword	Tube/Negative	Codeword
6x9	10.5 and 12		I / $4\frac{1}{2}$	Foladina	II / $4\frac{1}{2}$	Folaga
9x12	13.5 " 15		I / 6	Foland	II / 6	Folaria
10x15	16.5 " 18		Ia / 6	Folaro	II / 6	Folaria
13x18	18 " 21		Ia / $7\frac{1}{2}$	Folatrant	III / $7\frac{1}{2}$	Folatree

*) Assuming that the camera lens together with shutter in use may be unscrewed or unlocked from the camera.

Optical Interval Δ^*), Camera Extension K^{}), Prolongation B of Exposure.**

The magnification V being given: $\Delta = f_2 : V$; $K = (V-1) f_2$; $B = V^2$.

Tele Negative $f_2 \rightarrow$		$4\frac{1}{2}$ cm.		6 cm.		$7\frac{1}{2}$ cm.		10 cm.	
V	B	Δ mm.	K cm.	Δ mm.	K cm.	Δ mm.	K cm.	Δ mm.	K cm.
3	9	15	9	20	12	25	15	33.3	20
$3\frac{1}{2}$	12	13	11.5	17	15	21.5	19	28.6	25
4	16	11.3	13.5	15	18	19	22.5	25	30
$4\frac{1}{2}$	20	10	16	13.5	21	16.5	26	22.2	35
5	25	9	18	12	24	15	30	20	40
6	36	7.5	22.5	10	30	12.5	37	16.7	50
7	49	6.5	27	8.5	36	11	45	14.3	60
8	64	5.5	31.5	7.5	42	9.5	52	12.5	70

^{*} To be set by the scale on Tubes Nos. II, III and IV. ^{**} The value of K is reckoned from the centre of the Tele Negative. In Tubes Nos. I, Ia, Ib and II the latter is situated approximately in the plane of the screw collar but in the case of Tubes Nos. III and IV it is placed towards the interior of the camera 4 to 10 cm. from the screw collar, so as to obtain a better balance of the weight. In the cases of Tubes Nos. III and IV the requisite camera extension will accordingly be greater by this amount than the values of K stated in the table.

Diameter in centimetres of the Image attainable in the Tele Combinations.

Anastigmatic Front Component f_1 e. g. Tessar, Double Protar)		\rightarrow 9		10.5	12	13.5	12	13.5	15	16.5	18	18	21	25	30
Tele Negative $f_2 \rightarrow$		$4\frac{1}{2}$ cm.		6 cm.		$7\frac{1}{2}$ cm.		10 cm.							
Set to Δ^*)	K = 9 cm.	9	—	—	—	—	—	—	—	—	—	—	—	—	—
	K = 12 "	11.5	11.5	11	10.5	12.5	12	11.5	11	11	—	—	—	—	—
	K = 15 "	14	14	14	13	15	14.5	14	13	13	13	—	—	—	—
	K = 18 "	17	17	16	15	17	16.5	16	15	15	15.5	10.5	—	—	—
	K = 21 "	19.5	18.5	18.5	17	20	19.5	18	17.5	17	18	12	—	—	—
	K = 24 "	21.5	21	21	19.5	22.5	21.5	21	20	19	20	13.5	23	21	—
	K = 27 "	24	23.5	23	21.5	26	24.5	23	21.5	21	23	15	25.5	23	—
	K = 30 "	26.5	26.5	25.5	23.5	27.5	26.5	25.5	23.5	23	25.5	17	27.5	25.5	—
	K = 36 "	30	29	28	26	33	31.5	30	28	27	30.5	20	33	30.5	—
	K = 42 "	—	—	—	—	38	36	34.5	33.5	31.5	35.5	23	40	35.5	—
	K = 48 "	—	—	—	—	43	41	39	36.5	35	40	26	43.5	39	—
	K = 54 "	—	—	—	—	—	45.5	43	40.5	39	44	29.5	49.5	44	—
	K = 60 "	—	—	—	—	—	50	49.5	44.5	43.5	49	33	55	49.5	—

^{*} See the preceding table. ^{**} These image circles are attainable by stopping the front lens down to about $F/25$. When larger stops are employed (it is not advisable to exceed $F/9$) the diameter of the image circle increases, but the circle within which the definition is perfectly sharp diminishes.



CARL ZEISS JENA

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GRIES

Price List No. 5

CARL ZEISS - JENA

Photographic Lenses and Accessories

Effective July 10th, 1930

Series	Focal Length		For	In	In	In	In	Tube	No.
	cm.	in.	Cameras	Standard Mount N	Sunk Mount B	Focusing Mount A	Comp. Shutter	Mount N.B.A.	Comp. Shutter
Biotar F/1.4	2	$\frac{3}{4}$	1x 1	\$ 61.50	.....	\$70.00	.....	.....	.....
	2.5	1	1x 1	61.50	.....	70.00	.....	Coo*	.....
	4	1 $\frac{1}{2}$	1x 1	82.00	.....	92.50	.....	IV	.....
	5	2	1x 1	98.50	.....	109.00	.....	IV	.....
	7	2 $\frac{1}{2}$	1x 1	154.00	.....	.....	.....	IV	.....
Tessar F/2.7	1.5	$\frac{5}{8}$	1x 1	37.00	.....	.....	.....	00	.....
	2.5	1	1x 1	37.00	.....	45.50	.....	00	.....
	3.5	1 $\frac{1}{2}$	1x 1	41.00	.....	51.50	.....	Coo	.....
	4	1 $\frac{1}{2}$	1x 1	41.00	\$ 43.50	51.50	.....	I	.....
	5	2	1x 1	45.50	47.50	55.50	.....	I	.....
	8	3 $\frac{1}{2}$	1x 1	53.50	55.50	63.50	\$72.00	III	III
	12	4 $\frac{1}{2}$	2x 3	74.00	78.00	90.50	100.00	VI	VI
	14.5	5 $\frac{1}{2}$	2x 3	90.50	94.50	111.00	116.00	VIIr	VIIr
Triotar F/3	16.5	6 $\frac{1}{2}$	4 x 5	107.00	113.00	137.50	132.00	X	X
	2.5	1	1x 1	20.50	.....	.....	.....	00	.....
Triotar F/3.5	3.5	1 $\frac{1}{2}$	1x 1	20.50	.....	31.00	.....	00	.....
	4	1 $\frac{1}{2}$	1x 1	20.50	23.00	31.00	.....	00	.....
	5	2	1x 1	23.00	25.00	33.00	.....	I	.....
	7.5	3	1x 1	27.00	29.00	37.00	.....	II	.....
	10	4	2x 3	33.00	35.00	43.50	51.50	III	III
	12	4 $\frac{1}{2}$	2x 3	37.00	39.00	47.50	59.00	IV	IV
	15	6	2x 3	47.50	51.50	64.00	73.00	VI	VI
	18	7	4 x 5	61.50	66.00	82.00	84.00	VII	VII
Tessar F/3.5	21	8 $\frac{1}{2}$	3x 5	78.00	84.00	109.00	103.00	X	X
	2.8	1 $\frac{1}{2}$	1x 1	33.00	.....	.....	.....	00	.....
	3.5	1 $\frac{1}{2}$	1x 1	33.00	.....	43.50	.....	00	.....
	4	1 $\frac{1}{2}$	1x 1	33.00	.....	43.50	.....	00	.....
	5	2	1x 1	33.00	.....	43.50	41.50	I	.....
	7.5	3	1x 1	33.00	.....	43.50	41.50	I	.....
	10.5	4 $\frac{1}{2}$	2x 3	45.50	47.50	55.50	57.00	IV	III
	12	4 $\frac{1}{2}$	2x 3	51.50	53.50	61.50	65.00	IV	IV
	13.5	5 $\frac{1}{2}$	4 x 5	57.50	61.50	74.00	75.50	VI	VI
	15	6	4 x 5	66.00	70.00	82.00	83.50	VI	VI
Tessar F/4.5	16.5	6 $\frac{1}{2}$	3x 5	76.00	80.00	96.50	.....	VII	VII
	21	8 $\frac{1}{2}$	5 x 7	123.00	129.50	154.00	138.00	X	X
	25	10	5 x 8	156.00	164.00	197.00	177.00	XII	XII
	30	12	6x 8	197.00	.....	.....	.....	XIV	.....
	4	1 $\frac{1}{2}$	1x 1	23.00	.....	33.50	.....	00	.....
	5.5	2 $\frac{1}{2}$	1x 1	23.00	25.00	33.50	31.50	00	Cooa
	6.5	2 $\frac{1}{2}$	1x 2	23.00	25.00	33.50	31.50	I	Cooa
	7.5	3	1x 2	23.00	25.00	33.50	31.50	I	Cooa
Tessar F/4.5	9	3 $\frac{1}{2}$	2x 3	23.00	25.00	33.50	31.50	I	Co
	10.5	4 $\frac{1}{2}$	2x 3	23.00	25.00	33.50	31.50	II	Co*
	12	4 $\frac{1}{2}$	2x 3	24.50	26.50	34.50	33.50	II	Coa
	13.5	5 $\frac{1}{2}$	4 x 5	27.00	29.00	37.00	38.50	IV	III
	15	6	4 x 5	31.00	32.50	41.00	44.50	IV	IV
	16.5	6 $\frac{1}{2}$	3x 5	39.00	43.50	55.50	57.00	VI	VI
	18	7	4x 6	51.50	55.50	68.00	70.00	VI	VI
	21	8 $\frac{1}{2}$	5 x 7	82.00	86.50	102.50	94.50	VII	VII
	25	10	5 x 8	113.00	119.00	144.00	128.00	X	X
	30	12	6x 8	164.00	173.00	205.00	186.00	XII	XII
	36	14	7 x 9	216.00	.....	.....	.....	XIV	.....
	40	16	8 x 10	267.00	.....	.....	.....	XV	.....
	50	20	10 x 12	410.00	.....	.....	.....	XVI	.....

Matching lenses for stereoscopic work is \$4.00 for each pair

Series	Focal length		For	In	In	In	In	Tube No.	
	cm.	in.	Cameras	Standard Mount N	Sunk Mount B	Focusing Mount A	Comp. Shutter	Mount N.B.A.	Comp. Shutter
Tessar F/6.3	5.5	2 $\frac{1}{4}$	1 $\frac{1}{2}$ x 1 $\frac{3}{4}$ "	\$ 23.00	.....	\$33.50	.....	00	Cooa
	7.5	3	2 $\frac{1}{2}$ x 2 $\frac{3}{4}$ "	23.00	.....	33.50	\$32.00	I	Cooa
	9	3 $\frac{1}{2}$	2 $\frac{1}{2}$ x 3 $\frac{1}{4}$ "	23.00	\$ 25.00	33.50	32.00	I	Cooa
	10.5	4	2 $\frac{1}{2}$ x 3 $\frac{1}{2}$ "	23.00	25.00	33.50	32.00	I	Cooa
	12	4 $\frac{1}{2}$	2 $\frac{1}{2}$ x 3 $\frac{3}{4}$ "	24.50	26.50	35.00	33.50	I	Co
	13.5	5 $\frac{1}{4}$	3 $\frac{1}{4}$ x 4 $\frac{1}{4}$ "	27.00	29.00	37.00	37.00	II	Co
	15	6	4 x 5 "	30.50	32.50	41.00	39.50	II	Co*
	16.5	6 $\frac{1}{2}$	3 $\frac{1}{2}$ x 5 $\frac{1}{2}$ "	35.00	37.00	45.50	47.00	III	C ₁
	18	7	4 $\frac{1}{2}$ x 6 $\frac{1}{2}$ "	41.00	43.50	51.50	55.00	IV	IV
	21	8 $\frac{1}{2}$	5 x 7 $\frac{1}{2}$ "	53.50	55.50	64.00	57.50	IV	IV
	25	10	5 x 8 "	74.00	78.00	90.50	91.00	VI	VI
	30	12	6 $\frac{1}{2}$ x 8 $\frac{1}{2}$ "	123.00	.....	.....	138.00	X	X
Dagor F/6.8 F/7.7 *	36	14	7 x 9 "	164.00	.....	.....	178.50	X	X
	50	20	10 x 12 "	267.00	.....	.....	.....	XIV	.....
	60	24	12 x 15 "	370.00	.....	.....	.....	XV	.....
	18	7	5 x 7 "	51.50	.....	.....	62.00	III	III
	21	8 $\frac{1}{2}$	5 x 8 "	72.00	.....	.....	85.50	IV	IV
	24	9 $\frac{1}{2}$	6 $\frac{1}{2}$ x 8 $\frac{1}{2}$ "	82.00	.....	.....	100.00	VI	VI
Tessar F/5 Tessar F/5 Triplet F/4.8 Triplet F/5	30	12	8 x 10 "	113.00	.....	.....	125.00	VII	VII
	36*	14	10 x 12 "	146.00	.....	.....	158.00	VIII	VIII
	50	20	10 x 12 "	310.00	.....	.....	.....	XV	.....
	70	28	12 x 16 "	575.00	.....	.....	.....	XVII	.....
W.A. Protar F/18	50	20	5 x 7 $\frac{1}{2}$ "	225.00	.....	.....	.....	XV	.....
	70	28	7 x 9 "	410.00	.....	.....	.....	XVII	.....
	4	1 $\frac{1}{2}$	1 $\frac{1}{2}$ x 2 $\frac{1}{2}$ "	25.00	.....	.....	.....	Coo	.....
	6	2 $\frac{1}{2}$	2 $\frac{1}{2}$ x 3 $\frac{1}{2}$ "	25.00	.....	.....	.....	Coo	.....
	8.5	3 $\frac{1}{2}$	3 $\frac{1}{2}$ x 4 $\frac{1}{2}$ "	27.00	.....	.....	.....	Co	.....
	11	4 $\frac{1}{2}$	4 $\frac{1}{2}$ x 6 $\frac{1}{2}$ "	29.00	.....	.....	.....	Co	.....
	14	5 $\frac{1}{2}$	5 x 7 $\frac{1}{2}$ "	31.00	.....	.....	.....	C ₁	.....
	18	7	6 $\frac{1}{2}$ x 8 $\frac{1}{2}$ "	39.00	.....	.....	.....	C ₁	.....
W.A. Dagor F/9	21	8 $\frac{1}{2}$	8 x 10 "	47.50	.....	.....	.....	C ₁	.....
	27	10 $\frac{1}{2}$	10 x 12 "	61.50	.....	.....	.....	III	.....
	7 $\frac{1}{2}$	3	3 $\frac{1}{2}$ x 4 $\frac{1}{2}$ "	31.00	.....	.....	.....	I	.....
	10	4	3 $\frac{1}{2}$ x 5 $\frac{1}{2}$ "	33.00	.....	.....	.....	I	.....
	12 $\frac{1}{2}$	5	5 x 7 "	35.00	.....	.....	.....	II	.....
	15	6	6 $\frac{1}{2}$ x 8 $\frac{1}{2}$ "	37.00	.....	.....	.....	III	.....
Extreme W.A. Hypergon F/22	18	7	7 x 9 "	45.50	.....	.....	.....	IV	.....
	21	8 $\frac{1}{2}$	8 x 10 "	55.50	.....	.....	.....	IV	.....
	24	9 $\frac{1}{2}$	10 x 12 "	64.00	.....	.....	.....	VI	.....
	6	2 $\frac{1}{2}$	5 x 7 "	In Special Mount			103.00	.....	.....
Tele-Tessar F/6.3	7.5	3	8 x 10 "				113.00	.....	.....
	12	4 $\frac{1}{2}$	12 x 16 "				145.00	.....	.....
	12	4 $\frac{1}{2}$	1 $\frac{1}{2}$ x 2 $\frac{1}{2}$ "	\$ 57.50	\$ 59.50	\$ 68.00	72.50	Co	Co
	18	7 $\frac{1}{2}$	2 $\frac{1}{2}$ x 4 $\frac{1}{2}$ "	66.00	68.00	76.00	82.00	IIIr	IIIr
	25	9 $\frac{1}{2}$	4 x 5 "	82.00	84.00	94.50	100.00	VIr	VIr
	32	12 $\frac{1}{2}$	3 $\frac{1}{2}$ x 5 $\frac{1}{2}$ "	107.00	111.00	123.00	123.00	VIIr	VIIr
	40	15 $\frac{1}{2}$	5 x 7 "	140.00	144.00	.....	156.00	Xr	Xr

Tele Negative			Tube Mount		Telephoto Attachment (1)		
f = 3	cm.	= 1 $\frac{1}{4}$ in.	\$ 14.50	I	\$ 8.50	f = I / 4 $\frac{1}{2}$ cm.	= 1 $\frac{1}{2}$ in. \$27.00
f = 4 $\frac{1}{2}$	"	= 1 $\frac{3}{4}$ "	16.50	Ia	10.00	f = II / 4 $\frac{1}{2}$ "	= 1 $\frac{3}{4}$ " 33.00
f = 6	"	= 2 $\frac{1}{8}$ "	22.50	II	14.50	f = I / 6 "	= 2 $\frac{1}{8}$ " 35.00
f = 7 $\frac{1}{2}$	"	= 3 "	33.00	III	22.50	f = II / 6 "	= 2 $\frac{1}{8}$ " 39.00
f = 10	"	= 4 "	62.50	IV	45.00	f = Ia / 6 "	= 2 $\frac{1}{8}$ " 35.00
						f = III / 6 "	= 2 $\frac{1}{8}$ " 48.50
						f = Ia / 7 $\frac{1}{2}$ "	= 3 " 46.00
						f = III / 7 $\frac{1}{2}$ "	= 3 " 58.50

Magnar F/10=45 cm. (18 inches) \$72.50

(1) Including the usual cost of adaptation.

Series	No.	Focal length		For Cameras	In Standard Mount N	Cells Only	In Comp Shutter	Tube No.	
		cm.	in.					Mt. N	Comp.
Protar F/12.5	1	18	7	4½ x 6½	\$ 33.00	\$ 25.00	\$ 45.50	I	Co
	2	22	8½	5 x 7	35.00	27.00	47.50	II	Co
	3	29	11½	6½ x 8½	41.00	33.00	56.00	III	III
	4	35	14	8 x 10	50.00	41.00	67.50	IV	IV
	5	41	16	10 x 12	68.00	57.50	84.00	VIII	VIII
	6	48	19	11 x 14	84.00	74.00	101.00	VIII	VIII
	7	59	23	12 x 15	117.00	107.00	138.00	X	X
	8	69	27	14 x 18	148.00	136.00	177.00	XII	XII
Double Protar F/6.3 to F/7.7	1.1	7 / 7in.	4	3½ x 2½	58.00	.....	70.50	I	Co
	2.1	8½ / 7	4½	3½ x 4½	60.00	.....	72.50	II	Co
	3.1	11½ / 7	5	3½ x 4½	66.00	.....	80.50	III	III
	2.2	8½ / 8½	5	3½ x 4½	62.00	.....	74.50	II	Co
	3.2	11½ / 8½	5½	4 x 5	68.00	.....	82.50	III	III
	4.2	14 / 8½	6	4 x 5½	77.00	.....	94.00	IV	IV
	3.3	11½ / 11½	6½	4½ x 6½	74.00	.....	88.50	III	III
	4.3	14 / 11½	7	5 x 7	83.00	.....	100.00	IV	IV
	5.3	16 / 11½	8	5 x 7½	101.00	.....	117.00	VIII	VIII
	4.4	14 / 14	8	5 x 7½	91.00	.....	109.00	IV	IV
	5.4	16 / 14	8½	5 x 8	109.00	.....	125.00	VIII	VIII
	6.4	19 / 14	9½	6½ x 8½	125.00	.....	142.00	VIII	VIII
	5.5	16 / 16	9	6½ x 8½	125.50	.....	142.00	VIII	VIII
	6.5	19 / 16	10½	7 x 9	141.50	.....	158.00	VIII	VIII
	7.5	23 / 16	11	7 x 9	174.50	.....	195.00	X	X
	6.6	19 / 19	11	7 x 9	158.00	.....	175.00	VIII	VIII
	7.6	23 / 19	12½	7 x 9	191.00	.....	211.00	X	X
	8.6	27 / 19	13	8 x 10	222.00	.....	250.00	XII	XII
	7.7	23 / 23	13½	8 x 10	224.00	.....	244.00	X	X
	8.7	27 / 23	14½	10 x 12	255.00	.....	283.00	XII	XII
	8.8	27 / 27	16	10 x 12	284.00	.....	312.00	XII	XII
	Set of Protars B. No. 1, 2, 3, In case				4 x 5	93.00	108.00	III
Set of Protars C. No. 2, 3, 4, In case				5 x 7	110.00	.....	127.00	IV	IV
Set of Protars D. No. 3, 4, 5, 6, In case				7 x 9	215.00	.....	232.00	VIII	VIII

In Standard Mount N					In Standard Mount N					
Series	Focal length		With Iris Diaphragm	Waterhouse Stops	Series	Focal length		With Iris Diaphragm	Waterhouse Stops	
	cm.	in.				cm.	in.			
Apo-Tessar F/9	30	12	\$123.00	\$ 7.00	Apo-Planar F/7.5	41	16½	\$328.00	\$ 7.50	
	45	18	165.00	7.50		F/9	59	23½	370.00	10.00
	60	23	267.00	10.00		F/10	80	31½	700.00	14.00
	75	30	410.00	14.00		F/10	105	41½	1110.00	15.00
	90	36	615.00	15.00		F/12.5	130	51	1230.00	20.00
	120	46	1128.00	20.00		F/12.5	170	67½	2870.00	23.00
	180	71	1435.00	23.00						

Magnifiers				Prism		Mirror and Color Filter Trough	Revolving Collar		
				No.			No.		
Focusing Microscope	28x	\$26.50		2	\$ 51.50	Prices upon application	3	\$ 18.75	
" Magnifier with clamp collar	6x	10.00		3	82.00		4	21.50	
" " " "	10x	10.00		4	113.00		5	22.50	
" " " sliding sleeve	6x	6.00		5	164.00		6	25.00	
Tripod for Magnifier		2.00		6	246.00		8	31.00	
Sliding Sleeve		.50		7	307.50		9	33.00	
Ring Holder with Handle		1.50		8	574.00				
Zeiss Stereoscope f = 15 cm. (6 in.)								\$32.00	
" " f = 10 cm. (4 in.)								32.00	
" " f = 15 and 10 cm. (6 and 4 in.)								36.00	

Each lens is furnished with lens cap and flange and those fitted in shutter also have a cable release. Focusing scale (Price \$.50) is not included in price of lens.

Yellow Filters		L.=about 5x D.=about 10x	Sun Shades	Flanges	Lens Caps	N Standard Mount	B Sunk Mount	A Focusing Mount	C Comp. Shutter
Old	Designation New								
(1)						(3)	(3)	(3)	(3)
Coo	19.2 mm	\$4.00							
Cooa	21 ..								
Coo*	24 ..								
Co	27 ..								
Co*	28.5 ..	5.00	\$1.50	\$.75	\$.35	\$10.00	\$12.50	\$20.00	\$22.50
Coa	30 ..								
B	31 ..								
Po	31.5 ..								
Cl	32 ..		1.75	1.00	.40			22.00	26.00
IIIr	37 ..								
IVr	42 ..								
VIr	51 ..								
VIIr	57 ..	12.50	3.00	1.50	.50	12.50	17.50	31.00	32.00
Xr	69 ..								
		18.50	4.00	2.00	.50	12.50	20.00	41.00	33.00
(2)									
00	17.5 i ..	4.00	1.50	.75	.35	10.00	12.50	20.00	22.50
Poo	18 i ..	4.00							
I	23.5 i ..	5.00							
II	28.5 i ..	5.00							
III	33.5 i ..	6.00	1.75	1.00	.40			22.50	26.00
IV	38.5 i ..	6.50							
VI	47 i ..	8.50							
VII	53 i ..	12.50							
VIII	53 i ..	12.50	3.00	1.50	.50	12.50	17.50	31.00	32.00
X	65 i ..	18.50							
XII	80 i ..	25.00							
XIV	102 i ..								
			4.50	2.25	.60	15.00	22.50	54.00	40.00
				3.00	.75	25.00			

Distar Lenses (1)			Proxar Lenses (1)			Ducar Filters			
Designation Old	New	Price \$	Designation Old	New	Price \$	Specify whether for autochrome or Agfa color plates			
						Design.(1)	\$	Design.(2)	\$
	1 x21			1 x21		P / 6.5	4.50	I/ 6.5	4.50
	2 x21			2 x21		P / 7.5		C/ 6.5	
	1 x24			1 x24		Ca / 7.5		I/ 7.5	
	2 x24			2 x24		B / 7.5		II/ 7.5	
2 /Co	2 x27	3.50	0.5/Co	0.5x27		P / 9	5.00	III/ 8	5.00
3 /Co	3 x27		1 /Co	1 x27		III /10		I / 9	
3.5/Co	3.5x27		1.5/Co	1.5x27		IV /10		C / 9	
2 /Co*	2 x28.5		2 /Co	2 x27		P /10.5		II/10.5	
3 /Co*	3 x28.5		0.5/Co*	0.5x28.5		B /10.5	4.50	I/12	4.50
3.5/Co*	3.5x28.5		1 /Co*	1 x28.5		C /10.5		II/12	
2.5/Coa	2.5x30		1.5/Co*	1.5x28.5		10.5x32		II/13.5	
3.5/Coa	3.5x30		2 /Co*	2 x28.5		C /12		III/13.5	
4.5/Coa	4.5x30		0.5/Coa	0.5x30	4.50	IV /12	6.50	IV/13.5	6.50
1.5/ II	1.5x32		1.5/Coa	1.5x30		VI /12		II/15	
2.5/ II	2.5x32		2 /Coa	2 x30		12x32		III/15	
3 / II	3 x32		0.5/II	0.5x32		C /13.5		IV/15	
1.5/III	1.5x37	4.00	1 /II	1 x32		VII/14.5	12.50	II/16.5	4.50
2 /III	2 x37		1.5/II	1.5x32		C /15		III/16.5	
2.5/III	2.5x37		2 /II	2 x32		VI /15		VI/16.5	
3 /III	3 x37		0.5/III	0.5x37		VII/18		IV/18	
3.5/III	3.5x37	4.50	1 /III	1 x37		X /16.5	16.50	VI/18	8.50
1.5/IV	1.5x42		1.5/III	1.5x37		T /18		IV/21	
2 /IV	2 x42		2 /III	2 x37		X /21		VII/21	
2.5/IV	2.5x42		0.5/IV	0.5x42		T /25			
3 /IV	3 x42		1 /IV	1 x42	5.00	T /32	16.50		
3.5/IV	3.5x42		1.5/IV	1.5x42		T /40			
1 /VI	1 x51		2 /IV	2 x42					
1.5/VI	1.5x51		0.5/VI	0.5x51					
2 /VI	2 x51	5.00	1 /VI	1 x51	5.00				
2.5/VI	2.5x51		1.5/VI	1.5x51					
3 /VI	3 x51		0.5/VII	0.5x57					
1 /VII	1 x57		1 /VII	1 x57					
1.5/VII	1.5x57	6.50			6.50				
2 /VII	2 x57								
2.5/VII	2.5x57								
1 /X	1 x69								
1.5/X	1.5x69	10.50							
2 /X	2 x69								

(1) Slips over tube of given diameter
(2) Slips in tube of given diameter
(3) Fitting charge for our lenses to
Mount or Shutter \$3.00 to \$5.00
Extra case for Filters,
Distars, Proxars or Ducars \$.50
Focusing Scale \$.50