Carl Zeiss Jena

Photo-Objectives Hand-Cameras

CARL ZEISS, JENA

Photographic Objectives

Palmos Cameras

1907

P. 104

The following firms have acquired licenses and enjoy the right, in common with ourselves, of manufacturing any of the photographic objectives covered by our patents:

Bausch & Lomb Optical Co., Rochester N.Y., U. S. A. and New-York-City, U. S. A.;

F. Koristka, Milan, Via G. Revere 2;

E. Krauss, Paris, 21 and 23, Rue Albouy;

Ross Ltd., London W. 111, New Bond Street.

These firms are supplied by us with all the data required for the production of these lenses as made in our own works (curvatures, thicknesses and distances of lenses, and description of glass material used), and are thus in a position to make Zeiss-Objectives exactly equal in quality to those of our own manufacture.

CARL ZEISS
JENA

Three Colour Printing by Fr. Richter, Leipzig. Neg. by Nicola Perscheid, Berlin.

Photograph and Reproduction by a
Zeiss-Objective.

In addition to this **General Catalogue,** those interested in photography may also obtain copies of any of the following supplementary publications, gratis and post-free on application:

Photographic Objectives and Palmos Cameras (short list).
Minimum-Palmos 6×9 cm.
Minimum-Palmos 9×12 and 9×18 cm, $3^1/_4 \times 4^1/_4$ and 4×5 in.
"Directions for Use" separately.
Universal-Palmos 9×12 cm.
Stereo-Palmos 9×12 cm.
Hints on the Selection of Zeiss-Objectives, by Dr. P. Rudolph, 1906.
Telephotographic Tube-mounts for Hand and Stand Cameras.
Equipment (optical) for Reproduction Establishments.
The Verant, the Double Verant and the Verant Stereoscope.

We shall also be pleased to forward on application copies of our **Catalogues** relating to:

Microscopes and Microscopical Accessories.
Photo-micrographic Apparatus.
Macro- and Micro-projection Apparatus.
Optical Measuring Instruments.
Zeiss-Field-Glasses and Teleplasts.
Stand Telescopes.
Stereoscopic Telemeters.
Astronomical Objectives and Telescope Mountings.

CONTENTS.

Preface.

The last edition of the **Catalogue** of our **Photographic Department** under the direction of our scientific collaborator, Dr. P. Rudolph, is dated 1904, since when this branch of our industry has developed in many directions.

The range of **metal cameras** has been extended so as to meet every requirement of the amateur, of the explorer and the artist, and of the sporting and the professional photographer. To the already widely known 9×12 cm, 9×18 cm, and 4×5 in. Minimum-Palmos hand cameras we have added the **Universal Palmos 9×12 cm, the Stereo-Palmos 9×12 cm and the Minimum-Palmos 6×9 cm**. The last-mentioned has been provided with what is known as a self-capping safety shutter, i. e., a focal plane shutter whose slit remains closed during the act of winding up.

All our cameras are adapted for Premo pack films, and for the 9×12 cm size we have introduced the **Zeiss Pack-Slide** which admits of the daylight changing of flat films and provides for the separate treatment of each exposure.

The Verant, already brought to notice in the last edition of this catalogue, having met with approbation, we have also constructed similar apparatus for viewing stereoscopic pictures — **the Double Verant** and **the Verant-Stereoscope** — which convey a perfectly natural impression in respect of both perspective and plasticity.

The Tessar 1:6.3, introduced in 1902, has become so great a favourite, that this year we felt induced to put upon the market a second series of Tessars of even greater rapidity, namely **Series I^{c}, embracing Tessars 1:3.5 and 1:4.5.** These new objectives form suitable substitutes for several sizes of the Planars and Unars. Since, moreover, Tessar 1:6.3 and Protar 1:9 so closely approximated to Series II^{a}, embracing Protar 1:8, we have dropped the latter series from the catalogue. Irrespective of their excellent spherical correction, the objectives of Series I^{c} are also so perfectly corrected chromatically, as to be suitable for **three colour photography from nature** in addition to their ordinary purposes.

Concurrently with the better correction of the modern objective the demands as to the homogeneity of the raw glass used in the production of objectives, light-filter cells, and prisms have grown to such an extent, that we have often found ourselves unable to procure suitable glass for prisms of large dimensions. Latterly we have therefore fallen back on **metal mirrors** as a substitute for the larger prisms.

The new item, the **Zeiss Special Tele-Objective,** is intended for photographing isolated figures from exceptional distances. For taking pictures of mountain scenery and of coloured objects the new **light filters of yellow glass,** which absorb the blue rays to a degree highly favourable for this class of work, commend themselves.

Improvements in plant and manufacturing processes have enabled our **prices** remaining substantially the same, the upward tendency in the price of raw materials generally within recent years notwithstanding. The advance in the prices of light-filter cells was solely due to an improved method of mounting, which facilitates greater convenience in working and an easier cleaning of the glass surfaces.

The construction of **Tele-negatives** has undergone simplification, whereby it became possible to reduce the prices of the numbers most frequently in demand.

The prices of the Double Protars have also been slightly reduced by an amount equal to the difference between the economy in manufacture of the optical parts and the increased cost in future of the tube-mounts due to the advance in the price of raw material.

The fact of our being able, nevertheless, to make a reduction on the Double-Protars and to offer the Protar-lenses of Series VII, as well as our other objectives, at the old prices, is due to the introduction of improved conditions in their manufacture. For the information of our business friends we have included in the present edition the prices of tube mounts which are not, it is to be understood, separate articles of commerce as such.

Jena, September 1907.

Carl Zeiss.

Objective Mounts.

The whole of the photographic objectives specified in this catalogue are kept in stock, fitted in the two forms of mount which can be specially recommended for universal purposes, namely,

1001

The Standard Mount with Iris-diaphragm

for Stand Cameras with variable Extension.

1003

Special Mount A with Focussing Adjustment and Iris-diaphragm

for Stand Cameras with fixed Extension, the objective projecting inwards through the camera front.

If specially so ordered, we also supply the smaller sizes of objectives fitted in

1004

Special Mount B with Iris-diaphragm,

the objective projecting inwards through the camera front.

An objective mount consists essentially of three parts:

1. **a tube mount,** being a short tube with inside screw threads at both ends, an outer screw thread on one end, and a diaphragm arrangement;

2. the **castings** in which the lens components are lodged, fitted with threads for screwing into the tube mount, and

3. the **objective flange** by means of which the objective is secured to the camera front.

It is an essential condition that the several screws be well centred in relation to each other, as well as the lenses in relation to the screws, and also that the lens distances be maintained exactly in accordance with directions. If these requirements are not fully met, the objective is bound to manifest some flaw in its efficiency, for which reason it is very necessary that each objective, before being sent out, should be carefully tested as to its general capacity.

The **metal for the mounts** employed by us is either brass or a light alloy of alluminium. The latter is principally made use of in connection with the smaller objectives for hand cameras, where slight weight is a desideratum. With reasonably careful usage the durability of our alloy of aluminium is fully assured.

With the smaller objectives we employ **vulcanite** as **material for the laminae** of the iris-diaphragm, thereby evading the inconvenience arising from metallic laminae becoming rusty or bright through friction. When, however, the objectives are required for **projection** with electric light or sunlight, vulcanite laminae would be too vulnerable, and it would therefore be advisable in such a case to order an objective with an **iris-diaphragm made of steel laminae,** which latter we supply at short notice and without extra charge.

Tube mounts in themselves are not separate articles of commerce, and are therefore supplied only in conjunction with the corresponding lenses. **If in an exceptional case we consent to take back a tube mount,** it has depreciated in value by the amount of the cost of adaptation to the lens mounts and the testing of the objective, and only a comparatively small credit can therefore be granted.

Standard Mounts with Iris-Diaphragm.

Tube Mount No.	Tube Mount with Objective Flange[1] $	Objective Flange separately $	Credit in exceptional case on return of a Tube Mount $	Re-mounting an Objective per Lens $	External Diameter of Mount (Sunshade) mm	in.	Length of Mount mm	in.	Diameter of the largest Iris-aperture mm	in.	Diameter of Screw joint mm	in.	Adapted for Objectives having a lens-diameter of mm	in.
0	5.50	0.50	3.50	2.00	19.3	0.76	16	0.63	10	0.39	20.5	0.81	to 12	to 0.47
00	5.50	0.50	3.50	2.00	19.3	0.76	9	0.35	10	0.39	20.5	0.81	to 12	to 0.47
I	5.50	0.50	3.50	2.00	27.0	1.06	16	0.63	16	0.63	28	1.10	7—13	0.28—0.51
II	5.50	0.50	3.50	2.00	32.0	1.26	16	0.63	21	0.83	34	1.34	15—20	0.59—0.79
III	6.00	1.00	3.50	2.00	36.8	1.45	23	0.91	23	0.91	39	1.54	21—25	0.83—0.98
IV_1	6.00	1.00	4.00	2.00	41.8	1.64	33	1.30	29	1.14	44	1.73	23—31	0.91—1.22
IV_2	6.00	1.00	4.00	2.00	41.8	1.64	23	0.91	29	1.14	44	1.73	31	1.22
V	6.00	1.00	4.00	2.00	46.9	1.84	35	1.38	30	1.18	50	1.97	36	1.42
VI_1	6.50	1.00	4.00	2.00	50.9	2	40	1.57	35	1.38	56	2.20	42	1.65
VI_2	6.50	1.00	4.00	2.00	50.9	2	30	1.18	35	1.38	56	2.20	42	1.65
VII_2	7.50	1.50	5.00	2.50	56.9	2.23	35	1.38	40	1.58	60	2.36	42—46	1.65—1.81
VIII	7.50	1.50	5.00	2.50	56.9	2.23	52	2.05	40	1.58	60	2.36	42—46	1.65—1.81
IX_1	11.00	1.50	8.00	3.50	63.5	2.50	50	1.97	44	1.73	66	2.60	to 52	to 2.05
IX_2	11.00	1.50	8.00	3.50	63.5	2.50	68	2.68	44	1.73	66	2.60	to 54	to 2.13
X_1	12.00	1.50	8.50	4.00	69.0	2.72	60	2.36	50	1.97	76	2.99	to 54	to 2.13
X_2	12.00	1.50	8.50	4.00	69.0	2.72	45	1.77	50	1.97	76	2.99	to 61	to 2.40
XI	14.00	2.00	10.50	4.50	74.0	2.91	64	2.52	52	2.05	76	2.99	to 61	to 2.40
XII_1	16.50	2.00	12.50	5.50	84.5	3.32	74	2.91	58	2.28	90	3.54	to 61	to 2.40
XII_2	16.50	2.00	12.50	5.50	84.5	3.32	55	2.17	58	2.28	90	3.54	to 61	to 2.40
XIII	20.00	2.00	16.00	6.50	97.5	3.84	86	3.39	66	2.60	103	4.06	to 71	to 2.80
XIV	24.00	2.50	19.50	7.50	106.5	4.20	86	3.39	72	2.83	112	4.41	to 82	to 3.23
XV_1	27.00	3.00	22.50	9.00	115.5	4.55	104	4.10	83.5	3.29	121	4.76	to 94	to 3.70
XV_2	26.00	3.00	21.50	9.00	115.5	4.55	72	2.83	83.5	3.29	121	4.76	to 94	to 3.70
XVI	39.50	3.50	34.00	11.00	127.5	5.02	100	3.94	90	3.54	133	5.24	to 120	to 4.72
$XVII_1$	65.00	5.00	56.00	14.50	153.5	6.05	146	5.75	110	4.33	160	6.30	to 135	to 5.32
$XVII_2$	63.00	5.00	54.00	14.50	153.5	6.05	100	3.94	110	4.33	160	6.30	to 135	to 5.32
XVIII	111.50	7.50	99.00	21.50	182.0	7.17	180	7.09	132	5.20	188	7.40	to 145	to 5.71

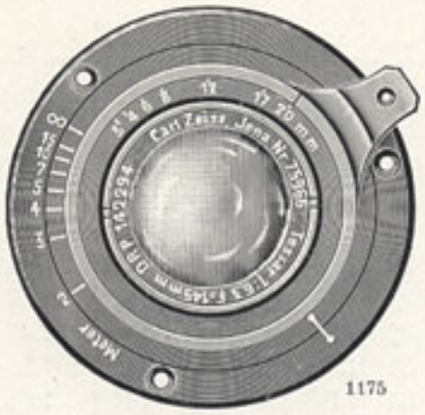
[1] Existing lenses must be forwarded to our works for adaptation and adjustment, subject to an additional charge.

Special Mount A.

Special Mount A is constructed for **hand cameras with fixed extension,** in which the instantaneous shutter is fitted either directly behind the objective, or immediately in front of the sensitive plate. It is provided with an iris-diaphragm and an attachmant by means of which the distance between objective and sensitive plate can be regulated, so as to bring the picture into sharp focus.

The divisions of the scale marked 3, 4, 6, 8, 12, 17 mm &c., refer to the iris-diaphragm, the figures expressing in millimetres the various diameters of the iris-aperture which may be obtained by setting the index on the outer rotating ring.

The scale marked metres 2, 3, 4, 5 . . . ∞, refers to the focussing appliance, which is used by turning the index, before exposing the plate, by the knob of the lever projecting beyond the mount to



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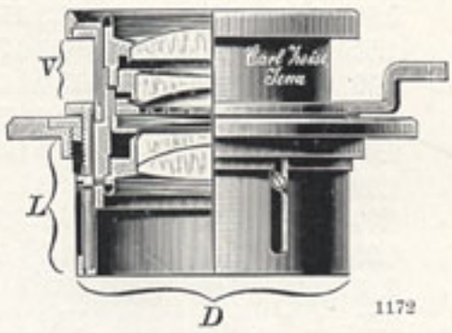

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the division of the scale which corresponds to the estimated distance of the object from the front of the objective. The infinity mark (∞) applies to a very distant object.

L represents the length of that portion of the mount which projects into the camera, *D* the external diameter of the mount, and *V* the maximum movement of the objective in relation to the sensitive plate.

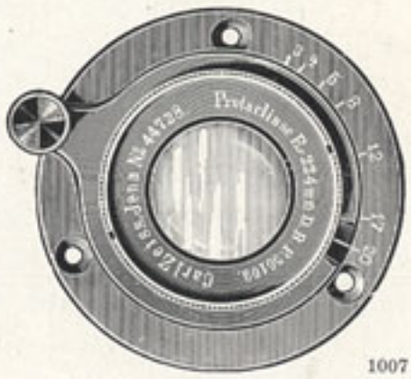
The objective is attached to the camera front by the flange, pierced with screw holes, seen in the illustration. The camera extension should be so adjusted, that when the scale is set to ∞, a very distant object would be sharply reproduced on the sensitive plate.

Special Mount A — Descriptive No.	*D* External Diameter of Mount mm	in.	*L* Length of Mount mm	in	*V* Maximum Movement mm	in.	Largest Iris-aperture mm	in.	Corresponding to Objectives in Standard Mount	**Additional cost of Objective** fitted with Special Mount A $	Codeword	Cost of re-mounting an old objective in Special Mount *A* $
A I	35	1.38	14.5	0.57	9	0.35	14	0.55	0 and 1	**3.50**	*Aspeadas*	**12.50**
A II	40.5	1.60	21	0.83	16	0.63	20	0.79	II	**3.50**	*Aspearian*	**12.50**
A III	45	1.77	25	0.98	20	0.79	23	0.91	III	**3.50**	*Aspectandi*	**13.00**
A IV_1	50	1.97	33.5	1.32	25	0.98	28	1.10	IV_1	**5.50**	*Aspectos*	**16.00**
A IV_2	50	1.97	23.5	0.93	13	0.51	28	1.10	IV_2	**4.50**	*Aspellunt*	**15.00**
A V	55	2.17	38-43	1.50-1.69	30	1.18	30	1.18	V	**5.50**	*Aspendios*	**16.00**

Special Mount B.

If the objective is to be fitted to a camera with adjustable bellows extension (one which folds up into the shape of a compact case and is provided with a focal-plane shutter, such as our Stereo-Palmos 9×12 cm, for instance), it is of advantage to be able to fix the objective so that the greater part of it project inwards into the bellows.

Special Mount *B* resembles Special Mount *A* in external appearance but is **without** the focussing adjustment. The irisdiaphragm is adjusted by means of a lever, the figures 3, 4, 6, 8, 12, 17 mm &c., indicating the diameter of the iris-aperture in millimetres.



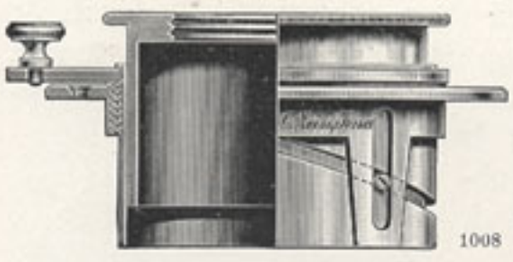
1007

Special Mount B	External Diameter of the Mount		Average length of part of Mount projecting into the Camera		Largest Iris-aperture		Corresponding to Objectives in Standard Mount	Codeword
	mm	in.	mm	in.	mm	in.		
B I	31.5	1.24	16.5	0.65	14	0.55	0 and I	*Asperecer*
B II	36	1.42	16	0.63	20	0.79	II	*Asperella*
B III	41	1.61	23	0.91	23	0.91	III	*Aspergemmo*
B IV_1	46	1.81	33	1.30	28	1.10	IV_1	*Aspergeras*
B IV_2	46	1.81	22	0.87	28	1.10	IV_2	*Aspergine*
B V	51.4	2.03	34	1.34	30	1.18	V	*Asperitudo*

Objectives in Special Mount *B* are supplied at the same price as those in Standard Mounts, the prices of Special Mount *B* being the same as those of corresponding sizes of the Standard Mount.

Focussing Collar.

The objective focussing collar serves as a focussing appliance for cameras with fixed extension, and its application will therefore be generally restricted to short-focus objectives in Standard Mounts or in Special Mount *B*.



1008

The collar is fastened by small screws, like any ordinary objective flange, to the front board of the camera, which has a corresponding hole cut out, and the objective itself is screwed into the thread of the collar. The lever with knob on the periphery of the collar serves for the purpose of focussing the object. In this operation the objective itself is not rotated.

No.	Diameter		Length of Collar		Maximum Movement		Adapted for Tube Mount	Focussing Collar			
								without scale		with scale	
	mm	in.	mm	in.	mm	in.	No.	Codeword	Price $	Codeword	Price $
1	50	1.97	22	0.87	16	0.63	III	*Asteggio*	**4.50**	*Astenica*	**5.50**
2	55	2.17	23.5	0.93	16	0.63	IV	*Asteismos*	**4.50**	*Astenses*	**5.50**

Graduation of the Apertures of Iris-Diaphragms according to their diameter expressed in millimetres.

Originally we graduated the various iris-apertures obtainable by means of the scale on the tube of the lens mount according to the relative apertures (expressed in fractional foci), corresponding to the stop used.

When, however, in view of the objective combinations of Series VII[a] (the Protar-sets) and the various shutters we found it necessary to devise a system of numbers, which should be immediately applicable to objectives of varying focal length, we departed from that system of graduation and adopted a scale, each interval of which corresponds to a variation of one millimetre in the diameter of the Iris-aperture. On this scale half-centimetres and centimetres are distinguished by longer strokes, and only the 3, 4, 6, 8, 12, 17,

24 mm divisions are denoted by corresponding figures. We have given prominence to this series of numbers, since, **the squares of two consecutive numbers being related as 1:2, the exposures corresponding to these stops must be as 2:1, no matter what the focal length of the objective may be.**

1009

Millimetric Iris-Scale on Standard Mount IV.

The index shows the iris-aperture adjusted to 15.6 mm.

As a means of assisting in quickly determining the **relative aperture** at which the objective is working, or in deciding on any relative aperture required for a given objective, we have published tables showing the mutual relation between the diameter of the stop, expressed in millimetres, and the relative aperture of any particular objective. Copies of these tables, worked out both in accordance with the system of graduation of the *Royal Photogr. Society of Gt. Britain* and the system introduced by *Dr. P. Rudolph,* are always at the disposal of our customers.

The Relative Aperture of a Lens Stop. By the relative aperture of a stop — in relation to an objective — we understand the ratio of the diameter D of the effective pencil of parallel rays entering the objective at a given diaphragm-aperture, to the equivalent focal length F of the objective, viz: $D:F$.

The methods to be adopted to accurately determine D may be found in any good textbook of photographic optics. If, however, it be merely a question of arriving at an approximate result, it is sufficient to measure the diameter of the circle of light seen, after adjustment of the stop, when looking from the front lens through the objective. D is therefore also called the "apparent diameter" of the aperture of the stop. This apparent diameter is with all existing double objectives always greater than the actual diameter d of the diaphragm-aperture, and that by amounts varying widely, according to the type of construction and the largest effective relative aperture of the objective. If, therefore, one should propose to measure and describe the stops in terms of the ratio $d:F$ — an error still frequently prevailing — a comparison on this basis of the conditions of luminosity obtaining with given stops in objectives of different series and of a variety of types would be quite misleading.

The System of Stops of the Royal Photogr. Society of Gt. Britain (U. S. Nos). According to this system the relative apertures $\frac{D}{F} = 1:\frac{F}{D}$ are graduated in 1:64, 1:45.2, 1:32, 1:22.6, 1:16, 1:11.3, 1:8, 1:5.6, 1:4 . . . . $= 1:\lambda$.

In this, as in all other existing systems, the squares of two successive numbers are in the ratio of 1:2, and since the squares of the apertures are directly related to the corresponding rapidities and inversely as the periods of exposure, this series possesses the elements of convenience, inasmuch as

> any one stop causes the objective to work with double the rapidity of the preceding (smaller) and half the rapidity of the succeeding (larger) stop,

or, in other words,

> any one stop demands half the exposure required by the preceding (smaller) and double the exposure demanded by the succeeding (larger) stop.

For convenience in the use of this series of stops integral numbers, related to each other exactly as the corresponding relative exposures *(E)*, have been assigned to the relative apertures. This assignment is made in such a manner that the relative aperture **1:4 has been taken as the standard unit of the period of exposure.** There thus results the following system:

Relative Aperture of Stop $1:\lambda$	**Relative Exposure** (Corresponding No. of stop) U. S. No. $E=\left(\frac{\lambda}{4}\right)^2$	**Relative Aperture** of stop $1:\lambda$	**Relative Exposure** (Corresponding No. of stop) U. S. No. $E=\left(\frac{\lambda}{4}\right)^2$
1:64	256	1:11.3	8
1:45.2	128	1:8	4
1:32	64	1:5.6	2
1:22.6	32	1:4	1
1:16	16	1:2.8	$^1/_2$

The tables of stops (in which, in the case of numbers above 10, the values of the diameters of the stops are given in millimetres, and in half-millimetres for numbers under 10) accompany each objective supplied by us.

Dr. P. Rudolph's System of Stops. In the system described above the relative aperture 1:4 has been taken as the starting point, though without any substantial reason, and the other relative apertures have been derived from it in accordance with the requirement that the next smaller demands double the exposure of the preceding larger aperture. Others have proposed a system based on 1:100, and composed of the series 1:100, 1:71.5, 1:50, 1:36, 1:25, 1:18, 1:12.5, 1:9, 1:6.3, 1:4.5, 1:3.2. In this system 1:50 is the smallest aperture which may be considered in connection with fine work, and 1:3.2 may be regarded as the largest still practically useful aperture.

Objection may also be raised against the U. S. Nos. of the Royal Photogr. Society of Gt. Britain on the ground of the smaller apertures being denoted by higher numbers, whereas it would appear to be much more rational to distinguish small apertures by correspondingly small numbers. Since with large apertures the periods of exposure must represent but minute fractions of a second, which, in the absence of suitable instruments, cannot be determined with any approach to accuracy (no reliance can be placed on the data regarding speed which are given on instantaneous shutters), it will be readily appreciated that even a merely fairly satisfactory comparison of periods of exposure is impossible in such cases. When, however, the apertures are small, the exposures amount to several seconds, perhaps even to a minute or more; then it becomes easy to make a satisfactory comparison of the exposure required for different stops. The numbers of the stops corresponding to small apertures are, therefore, those which interest us chiefly from a practical point of view, and since it is more convenient to operate with small numbers, it is obviously desirable to reserve these for assignment to small apertures. If it were proposed that in this series the numbers of the stops should advance directly as the periods of exposure, it would become necessary to use fractional values in numbering the large apertures, which, practially considered, would be of doubtful value. The demand for integral numbers for the sake of convenience will, however, be met, if the numbers of the stops are made to advance in the same ratio as the corresponding rapidities, and it only remains to remember that the rapidities due to two stops (their relative rapidity) are inversely related as the corresponding relative exposures.

As it may be assumed as already stated, that a stop yielding a relative aperture of 1:50 is the smallest which may still be considered useful in connection with fine work, the stop corresponding to relative aperture 1:50 has been adopted in this system as the standard unit of the relative rapidity *L*. Accordingly we obtain the following series of numbered stops:

Relative Aperture of Stop $1:\lambda$	**Relative Rapidity** (corresponding No. of stop) $L=\left(\frac{50}{\lambda}\right)^2$	**Relative Aperture** of Stop $1:\lambda$	**Relative Rapidity** (corresponding No. of stop) $L=\left(\frac{50}{\lambda}\right)^2$
1:50	1	1:9	32
1:36	2	1:6.3	64
1:25	4	1:4.5	128
1:18	8	1:3.2	256
1:12.5	16		

In this system the exposures corresponding to the stops are inversely related — other things being equal — as the numbers by which they are distinguished. Thus, let stop No. 2 require an exposure of 4 seconds, then, other things being equal, stop No. 8 will demand an exposure of 1 second only.

Tables of stops arranged on this system (in which, in the case of numbers above 10, the values of the diameters of the apertures of the stops are rounded off in millimetres, and in half-millimetres for numbers under 10) accompany each objective supplied by us.

The Various Types of our Photographic Objectives.

The whole of our photographic objectives are new constructions, based on Dr. P. Rudolph's computations. The story of their evolution up to 1899 is fully told in M. von Rohr's work: **Theorie und Geschichte des photographischen Objektivs.** As, however, various misconceptions have nevertheless been disseminated, we will now accentuate the main points.

The Protar (Anastigmat) of the year 1890 is among all known systems the first objective in which spherical correction for a large aperture is combined with anastigmatic flatness of field. It also supplies absolutely the first example of a union of great rapidity and sharp definition over a field of large angular extent.

The objective in question is of the unsymmetrical type, but soon after Dr. Rudolph extended his principle of anastigmatic correction likewise to symmetrical objectives, in the construction of a single objective composed of three cemented elements with frontal diaphragm. This construction embodied both rapidity and anastigmatic flatness of field, and was intended for the formation of convertible sets of objectives. The mathematical computations were completed by November 1891, and the first specimen of the new type was ready as early as December 1891, being sent to our then representative in Berlin, for thorough practical test. The further development of our unsymmetrical objectives, however, fully absorbed the resources of our works for the time being, so that it was not until early in 1893 that a patent for the "Satz-Objective" (Convertible Objective) was applied for. It then transpired that Goerz, of Berlin, had anticipated us in Germany, and we could merely claim priority of use in respect of his "Double Anastigmat". Nevertheless the details of our objective were first made known

by the publication of our British Patent Specification of April 22, 1893, in the British Journal of Photography. Goerz's specification was not published in Germany till May 5, 1893, and was not submitted in England till June 2, 1893. Whilst the formation of convertible sets of objectives had been our main object throughout — which was also the ruling idea in our quadruple Protar-lens of Series VII, issued in 1895 —, Goerz solely contemplated the use of his "Double Anastigmat" in the capacity a symmetrical doublet. The idea of convertible sets was only taken up by Goerz very recently namely, the Pantar-lens, which was placed on the market in 1906.

The Protars and Double Protars were followed by the Planar, the Unar and the Tessar, all of them possessing anastigmatic flatness of field and great rapidity. Like the Protars, the Unar and the Tessar are unsymmetrical combinations, composed of only four lenses. They form effective rapid objective systems and yield an image of remarkable orthoscopic excellence. In this respect they are, for instance, superior to all ***rapid*** *symmetrical objectives which, though strictly orthoscopic in the reproduction of natural objects full size, generally display appreciable distortion of straight lines in the case of reductions and enlargements, which are most frequently in question.*[1]

With the present edition of this catalogue the Unar drops out of the list.

The Planar, Series I[a], supplies objectives peculiarly adapted for certain special classes of work particularly those demanding the special precision and sharpness so indispensably required in line reproduction, enlargements, and reductions to a very small scale. The Planars possess the capacity of producing such sharply defined pictures at a large relative aperture as cannot be obtained with any other existing type of objective.

The Tessar, notwithstanding its simple form, manifests such perfect correction of all aberrations, that no other existing objective can supply the same rapidity, combined with an image of equal sharpness, flatness, orthoscopic excellence, and brilliance of illumination. It practically covers the entire field of amateur and professional photography. Tessars 1:3.5 and 1:4.5 serve for portraiture, instantaneous and kinematographic work, enlargements, and projection, Tessar 1:6.3 of Series II[b], for hand cameras and the universal purposes of the amateur and explorer, as well as of the professional photographer, while Tessars 1:10 of Series VIII meets every requirement of the reproduction establishments for the purposes of photogravure, heliotype, and three-colour process work.

[1] Dr. E. Wandersleb, Jena: Über die Verzeichnungsfehler photographischer Objektive. Zeitschrift für Instrumentenkunde, 1907.

The Protars are objectives of exceptional universality of application, and the selection, guided by particular requirements, should be from either the unsymmetrical doublets, Series III^a and V, the Protar-lenses of Series VII, or the symmetrical or hemisymmetrical, Double Protars of Series VII^a, which are formed by a combination of two of the former.

The unsymmetrical doublets, the Protars comprised in Series III^a and V, belong to the class of rapid wide-angle objectives, i. e., they possess an anastigmatically flat field of great angular extent in comparison to their relative aperture. One and the same objective of this type is thus equally suitable for instantaneous photography and for pictures involving an extremely wide angle. Hence the universality of application peculiar to these objectives lies mainly in the fact of it being practicable to use one and the same objective, **employing plates of different sizes,** with the best results for a variety of purposes (portraits, snapshots, groups, architecture and interiors).

The Double Protars are composed of two Protar-lenses of Series VII which, when used separately, may be recommended for all kinds of work in which, for the better rendering of perspective, the focus must necessarily be long in comparison to the size of the plate used. According to the choice of the combination — whether one of two components of similar or of dissimilar focus — a range of two or three foci is obtained, the Double Protar possessing the shortest focus and the greatest rapidity, whilst the single components will have the greater focal length with correspondingly reduced rapidity. The pith of the matter is, that the one pair of Protar-lenses gives the choice of different foci, thereby facilitating the taking of a large variety of pictures (portraits, landscapes, instantaneous photographs and architectural views) **upon the same size of plate.** Having a large relative aperture (great relative rapidity) and an anastigmatically flat field of proportionately wide angular extent, the Double Protars may, at the same time, be said to combine, in a certain, though less pronounced, degree, the universality of the unsymmetrical doublets.

Full information regarding the choice of a suitable objective is contained in Dr. Rudolph's pamphlet "Hints on the Selection of Zeiss-Objectives", copies of which we shall be glad to supply gratis and post-free on application.

The Planar.[1]

1897 1011

The Planar was put on the market in August 1897, under the heading of Series I[a].

The introduction of the Planar marks an important advance in the path of improvement of photographic objectives, in as far as it furnished the first proof of the feasibility of producing, by comparatively simple means, an anastigmatically flat field simultaneously with the correction of spherical aberrations, sufficiently perfect even for low microscopic enlargements. The means employed are simple, because of the considerably wider range of choice in various classes of glass than was available at the time of construction of earlier types of anastigmatic doublets, owing to the difficulty of compensating the opposite refractive indices of the crown and flint glasses then in use.

Detailed particulars of the Planar type of objective are given in the German Patent Specification.

The Tessar.[2]

1902 1093

The Tessar belongs to the type of unsymmetrical doublets and consists of four lenses, separated by the diaphragm into two pairs, one of the latter being formed by two separate lenses, while the other is composed of two lenses cemented together. The air-lens intervening between one of the pairs takes the form of a collective lens, thus having dispersive effect, while the cemented surface of the other pair has collective effect. This opposite refractive action of the adjoining lens surfaces of the components of a doublet is being utilised as a means of correction in order to promote anastigmatic flatness of field.

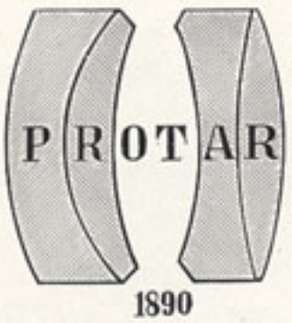
The Tessar is patented and was put upon the market in December 1902, in the first instance as Series II[b], with the rel. Ap. 1:6.3. Series I[c], embracing Tessars 1:3.5 and 1:4.5, followed in the spring of 1907.

[1] Carl Zeiss, Jena: German Patent Specification No. 92313, Nov. 14, 1896, and *Eder*'s „Jahrbuch f. Photographie", 1898, p. 79.

Dr. P. Rudolph, Jena: Brit. Patent Specification No. 27635 of 1896, published in the British Journal of Photography, 1897, p. 424.

Dr. M. von Rohr, Jena: „Über das Planar, ein neues Objektiv aus der optischen Werkstätte von *Carl Zeiss* in Jena; a paper read in Brunswick before the 1897 „Naturforscherversammlung" and published in *Eder*'s „Jahrbuch für Photogr.", 1898, vol. XII, pp. 70—78.

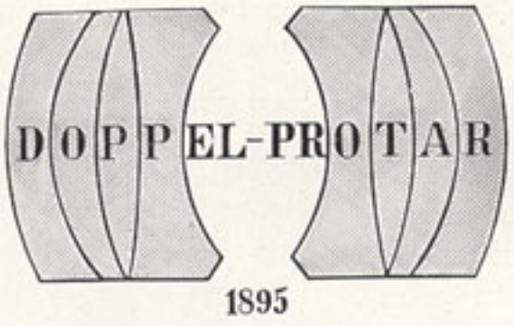
[2] Carl Zeiss, Jena: German Patent Specification No. 142294, 1902.



1013

The Protars.[1]

The objectives of this category date from the year 1889, and they were the first instance of the solution of the problem of combining rapidity with anastigmatic flatness of field. A number of series of objectives of this type were formerly constructed, which were adapted for a great variety of purposes. These were, Series I, having a relative aperture of 1:4.5, Series II, r. a. 1:6.3, Series II^a, r. a. 1:8, Series III, r. a. 1:7.2, Series III^a, r. a. 1:9, Series IV, r. a. 1:12.5, and Series V, r. a. 1:18. Series I, II, II^a, III and IV have since been displaced by other series of objectives and are now no longer made.



1014

Protar-Lenses and Double Protars.[2]

These lenses were first offered for sale early in 1895, under the descriptive designation of „Anastigmatlinsen". The Protar-lenses of Series VII, composed of four elements, serve the same purposes, but in a more perfect manner, as the Anastigmatic Convertible Lenses[3], composed of three elements and made by us in 1891 in accordance with Dr. Rudolph's computations, which were placed upon the market in 1893, under the headings of Series VI and Series VI^a (since discontinued).

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[1] Carl Zeiss, Jena: German Patent Specification No. 56109, of April 3, 1890.

Dr. P. Rudolph, Jena: „Über den Astigmatismus photographischer Linsen", published in *Eder*'s „Jahrbuch für Photographie", 1891, pp. 225 et seq., and 1893, pp. 221 et seq.

Dr. P. Rudolph, Jena: „Die Zeiss-Anastigmate", published in „Photographisches Wochenblatt", Berlin 1892, Nos. 18—21.

[2] Dr. P. Rudolph, Jena: British Patent Specification of Nov. 17, 1894, No. 19509, published in the British Journal of Photography, July 28, 1894, p. 829.

[3] Dr. P. Rudolph, Jena: British Patent Specification of April 22, 1893, No. 4672, published in the British Journal of Photography, May 26, 1893, p. 331.

Dr. P. Rudolph, Jena: „Die Zeiss-Anastigmate und deren Verwendbarkeit", published in „Photogr. Korrespondenz", Vienna, 1893, pp. 512 et seq.

Remarks

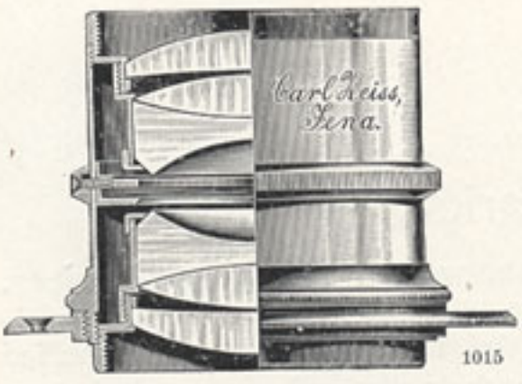
respecting the particulars contained in the lists of prices.

The objectives comprised in the various series are specified in the lists of prices, together with their distinctive numerical data.

The sizes of plates recommended indicate the extent of the sharply covered image area and, in the absence of special remarks, they may be assumed to apply to very distant objects. The estimate of the sharpness of definition, where not otherwise stated, is based on the assumption that instantaneous photographs and landscape views are in question and that in **such cases** the pictures obtained will be sufficiently sharp to the margin. When, however, the requirements regarding sharpness are less exacting, it will often be found possible to use plates even larger than the sizes given in the columns of the tables. Where particular importance is attached to uniform illumination from centre to margin, it is advisable to reduce, by the adoption of specially small stops, the gradual decrease of light from the centre towards the margin which, according to wellknown mathematical laws, ensues with large diaphragm apertures, owing to the effects of stopping near the edges of a lens.

In estimating the covering power, the amount of depth of definition has been disregarded, the depth depending, apart from any possibly existing curvature of the image, exclusively upon the degree of stopping, as well as on the focal length of the objective and the distance of the principal object. **Depth cannot, in fact, form any special facture in the correction of a lens.**

The particulars placed under the heading "Diameter of Image with small stops" apply to adjustments upon distant objects and represent the guaranteed minimum values obtainable with the objectives in question. With small stops an image of the diameter given, and sufficiently sharp for most purposes, can always be obtained.



1015

Series Ia.

The Planar.

The Planars of Series Ia, with the exception of Nos. 1—5, which yield their best results in reductions and enlargements, are of strictly symmetrical construction. These objectives are rapid and excel in precise definition, combined with a satisfactory degree of anastigmatic flatness over a field of relatively large angular extent. The relative apertures are 1:4.5 and 1:6.3, the available field embracing an angle of 62° and 72° resp.

Series and No.	Planar in Standard Mount with Iris-diaphragm: Codeword	Price £	Diameter of Lenses in.	Equivalent Focus mm	Equivalent Focus in.	Extension in.	Largest relative aperture	Size of Plate recommended (Reduction) from in. × in.	Size of Plate recommended (Reduction) to in. × in.	Diameter of Image with small stops in.	Standard Mount No.
Planar for Microscopical Enlargements and Reductions.											
Ia, 1	*Ablabera*	**36.00**	5/16	20	3/4	0.63	1:4.5	1/2 × 1/2	11/16 × 11/16	1	00
Ia, 2	*Ablacion*	**36.00**	5/16	35	1 3/8	1.18	1:4.5	7/8 × 7/8	1 3/16 × 1 3/16	1 3/4	00
Ia, 3	*Ablactabas*	**36.00**	15/32	50	2	1.65	1:4.5	1 1/8 × 1 1/8	1 3/4 × 1 3/4	2 1/2	0
Ia, 4	*Ablactando*	**43.50**	11/16	75	3	2.56	1:4.5	1 5/8 × 1 5/8	2 3/8 × 2 3/8	3 3/4	II
Ia, 5	*Ablactemur*	**43.50**	1	100	4	3.43	1:4.5	2 3/8 × 2 3/8	3 1/8 × 3 3/8	5	III
Apo-Planar for Instantaneous and Three-colour Photography.											
Ia, 22	*Ablocate*	**39.50**	1/2	72	2 7/8	2.56	1:6.3	2 × 2	2 3/8 × 3 1/2	4 9/16	0
Ia, 23	*Ablocken*	**43.50**	3/4	110	4 5/16	4.10	1:6.3	2 1/2 × 3 1/2	3 1/2 × 4 3/4	6 1/2	II
Ia, 24	*Abloesung*	**45.00**	7/8	133	5 1/4	4.84	1:6.3	3 1/8 × 4	4 × 5 1/8	7 1/2	II
Ia, 24a	*Ablohnen*	**47.00**	15/16	142	5 5/8	5.08	1:6.3	3 1/2 × 4 3/4	4 3/4 × 6 1/4	8 1/2	II
Ia, 25	*Abloom*	**50.50**	1	152	6	5.51	1:6.3	4 × 5	5 1/8 × 6 3/4	9 1/2	III
Ia, 26	*Abluchsen*	**79.50**	1 3/8	206	8 1/8	7.52	1:6.3	5 × 7	6 1/4 × 8 1/4	11	V
Ia, 28	*Abludemus*	**137.00**	2	305	12	10.83	1:6.3	6 1/2 × 8 1/2	8 1/4 × 10 1/4	15	IX1

When ordering by wire, it is sufficient to quote the ***Codeword.***

By ***„Extension"*** *is understood the distance of the sharp picture from the face of the camera front, the objective being focussed for very distant objects.*

The single components of the Planar (front and back combination resp.) do not give sufficiently sharp views of landscape, except, with very small stops.

For Apochromat-Planars for Three-colour Printing see under Series VIII.

Special Applications
of Series Ia.

Instantaneous Photography. For the purpose of securing records of the consecutive motions of moving objects all the objectives of this series are suitable, and the final selection may eventually be guided by reference to the smaller sizes of the plates recommended in the tabular list of prices.

For snapshots of street scenes and *genre* pictures the larger sizes of plates can, as a rule, be used, and the objective would require stopping down to about 1 : 6 to 1 : 9, according to its focal length and the required depth of definition.

Kinematographic Pictures. Nos. 1 to 4 are the most suitable objectives for these purposes, the particular selection depending on the size of the film to be covered, in regard to which the first column with reference to plates in the preceding table should be consulted.

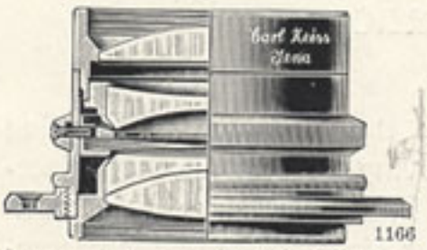
Enlargements and Projections. The smaller sizes of the Planar are adapted in an exceptional degree for photographic enlargements and optical projections. For moderate enlargements (up to about × 6) we recommend all the numbers of Series Ia, but for greater enlargements (up to × 100) Nos. 1 to 5 are preferable. The latter, therefore, take first place for photo-micrographic work and micro-projections. When working with Nos 1 to 5, care should be taken that the side of the mount bearing the distinctive designation "Planar 1 : 4.5, f = . . . mm", is turned towards the object to be enlarged; with the other numbers it is immaterial how the objective is screwed on.

Planars Nos. 1, 2 and 3 are fitted with the British screw thread (the Royal Mikroscopical Society's screw).

Reductions. In addition to enlargements, the smaller sizes of the Planar — especially Nos. 1 to 5 — are also well adapted for extreme reductions, such as communications for transmission by carrier pigeons. With Nos. 1 to 5 the mount must be screwed in so that the end bearing the words "Planar 1 : 4.5, f = mm" faces the focussing screen and the end inscribed "Série Ia, No. . . ." points in the direction of the object to be reduced.

Nos. 22 to 28 (foci ranging between 72 to 305 mm = $2^{7}/_{8}$ to 12 in.) are apochromatically corrected. Hence they can be highly recommended, in addition to instantaneous photography, for **photography in natural colours.**

For Three-colour Printing and for delicate Line Reproduction our Planars with reduced secondary spectrum, Series VIII, may justly be described as the best objectives known.



Standard Mount with Iris-Diaphragm.

Series Ic.

Tessars 1:3.5 and 1:4.5.[1]

For simplicity of construction and superiority in sharpness of definition and brilliancy of the image the objectives of this series can be strongly recommended for portraits, projection, cinematographic work, and instantaneous photography. Being chromatically corrected to great perfection, they also merit primary consideration in questions of three-colour photography from nature.

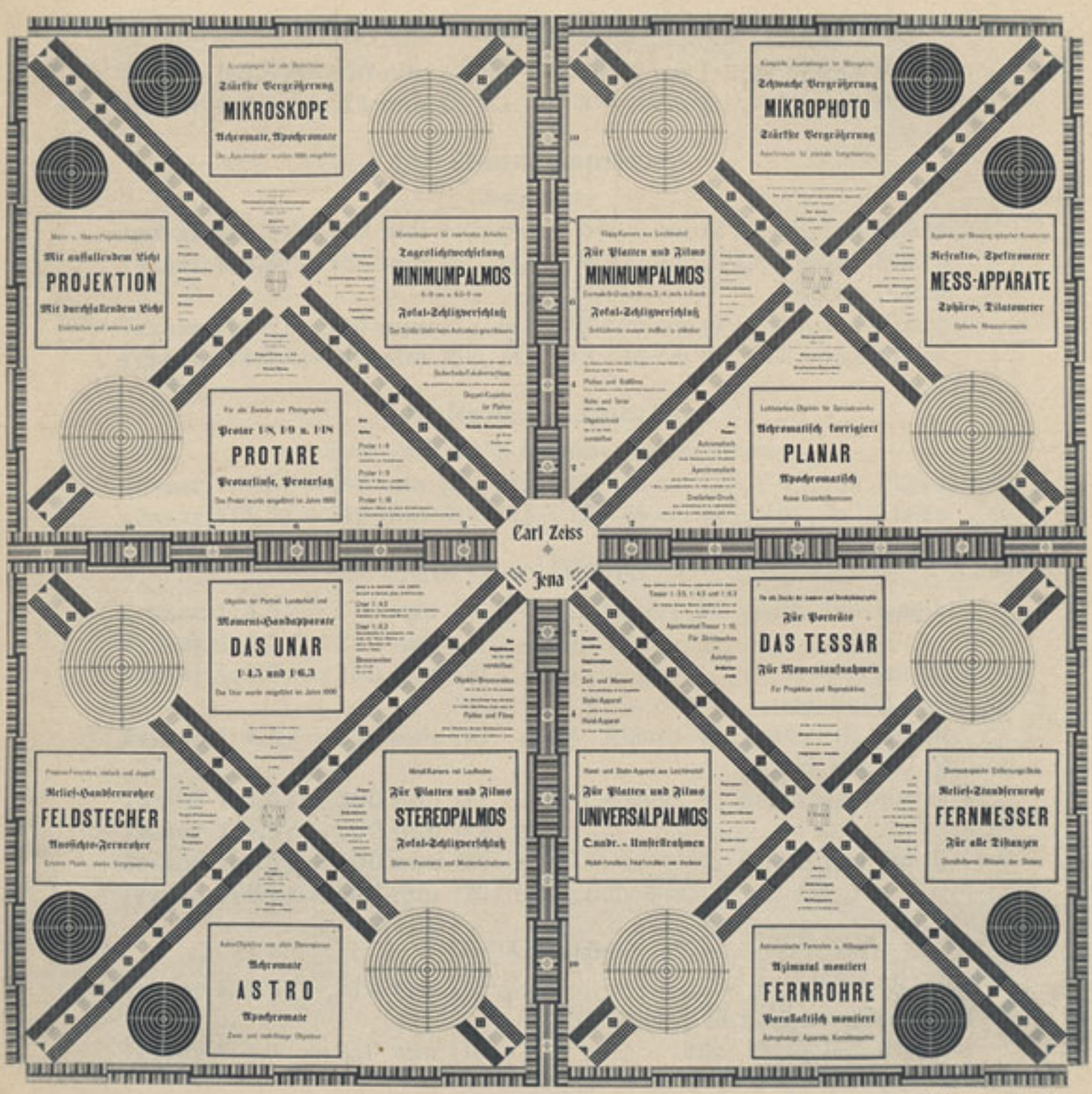
The appended copy of our test plate bears testimony to the sharpness of definition obtained.

Series and No.	Objective in Standard Mount: Codeword	Price $	Diameter of Lenses in.	Equivalent Focus mm	Equivalent Focus in.	Extension in.	Size of Plate recommended cm × cm	Size of Plate recommended in. × in.	Diameter of Sharp Image with small stops in.	Standard Mount No.
Tessar 1:3.5 for Cinematographic Work and Portraiture.										
Ic, 1	*Adecenar*	**29.00**	9/16	50	2	1.58	1.8×2.4	3/4×3/4	1 3/8	I
Ic, 1a	*Adeceno*	**36.00**	13/16	75	3	2.48	3×3	1 1/4×1 1/4	2 1/8	II
Ic, 6	*Adedebant*	**108.00**	2 3/8	210	8 1/4	6.69	6×9	2 1/2×3 1/2	5 15/16	X_1
Ic, 7	*Adedendum*	**144.00**	2 7/8	250	10	7.87	9×12	3 1/2×4 3/4	7 1/8	XII_1
Ic, 8	*Adederent*	**180.00**	3 3/8	300	12	9.45	12×16	4 3/4×6 1/2	8 1/4	XIV_1
Tessar 1:4.5 for Portraiture and Instantaneous Photography.										
Ic, 13	*Adedisti*	**36.00**	1	112	4 1/2	3.98	6×9	2 1/2×3 1/2	5 1/2	II
Ic, 15	*Adefaghi*	**47.00**	1 1/4	150	6	5.32	9×12	3 1/2×4 3/4	7 1/8	IV_2
Ic, 15a	*Adefagia*	**57.50**	1 9/16	180	7	6.26	12×16	4 3/4×6 1/2	8 5/8	VI_2
Ic, 16	*Adefesios*	**72.00**	1 7/8	210	8 1/4	7.32	13×18	5×7	10 1/4	VII
Ic, 17	*Adegerant*	**115.50**	2 3/16	250	10	8.62	13×21	5×8	12 1/4	X_2
Ic, 18	*Adegistis*	**162.00**	2 5/8	300	12	10.24	16×21	6 1/2×8 1/2	14 5/8	XII_2
Ic, 19	*Adehesadas*	**252.00**	3 1/2	400	16	13.78	18×24	7×9	19 5/8	XV_2
Ic, 20	*Adehesais*	**360.00**	4 3/8	500	20	17.32	24×30	10×12	24	$XVII_2$

A range of Tessars 1 : 4.5 in Special-Mount A in focussing adjustment, suitable for folding cameras with focal plane shutters, is specified on page 42.

[1] Dr. E. Wandersleb: „Das neue Tessar 1:4.5", published in „Photographische Korrespondenz", Vienna, March 1907.

CARL ZEISS, JENA



Reduction 1 : 17.

TESSAR 1 : 4. 5 f = 210 mm. Serie Ic. Nr. 16.

Diaphragma 1 : 4. 5.

CARL ZEISS JENA

Series Ic.

We should recommend:

for Cinematographic Work

Tessar 1:3.5*f*= 50 mm	(2 in.)	2× 2 cm ($^3/_4$× $^3/_4$ in.) Plates
Tessar 1:3.5*f*= 75 mm	(3 in.)	3× 3 cm ($1^1/_4$×$1^1/_4$ in.) Plates

for Hand Cameras

Snapshots

Tessar 1:4.5*f*=112 mm	($4^1/_2$ in.)	6× 9 cm ($2^1/_2$×$3^1/_2$ in.) Plates
Tessar 1:4.5*f*=150 mm	(6 in.)	9×12 cm ($3^1/_2$×$4^3/_4$ in.) Plates
		4×5 in. Plates
Tessar 1:4.5*f*=180 mm	(7 in.)	12×16 cm ($4^3/_4$×$6^1/_2$ in.) Plates
Tessar 1:4.5*f*=210 mm	($8^1/_4$ in.)	13×18 cm (5 ×7 in.) Plates

for Reflex Cameras

and Stand Cameras for Instantaneous Photography

Tessar 1:4.5*f*=180 mm	(7 in.)	9×12 cm ($3^1/_2$×$4^3/_4$ in.) Plates
Tessar 1:4.5*f*=210 mm	($8^1/_4$ in.)	12×16 cm ($4^3/_4$×$6^1/_2$ in.) Plates

for Portraiture

Tessar 1:3.5*f*=210 mm	($8^1/_4$ in.)	Cartes de Visite, full length
Tessar 1:4.5*f*=210 mm	($8^1/_4$ in.)	" " " " "
Tessar 1:3.5*f*=250 mm	(10 in.)	" " " $^1/_3$ length and Busts
Tessar 1:4.5*f*=250 mm	(10 in.)	Cartes de Visite, $^1/_3$ length and Busts
Tessar 1:3.5*f*=300 mm	(12 in.)	Cabinets, $^1/_2$ length and Demies
Tessar 1:4.5*f*=300 mm	(12 in.)	" $^1/_2$ " " "
Tessar 1:4.5*f*=400 mm	(16 in.)	" $^1/_3$ length and Busts
Tessar 1:4.5*f*=500 mm	(20 in.)	Boudoirs, $^1/_3$ " " "

for Groups

Tessar 1:4.5*f*=210 mm	($8^1/_4$ in.)	. . . 12×16 to 13×18 cm ($4^3/_4$×$6^1/_2$ to 5×7 in.) Plates
Tessar 1:4.5*f*=250 mm	(10 in.)	. . . . 13×18 to 16×21 cm (5×7 to $6^1/_2$×$8^1/_2$ in.) Plates
Tessar 1:4.5*f*=300 mm	(12 in.)	. . . . 16×21 to 18×24 cm ($6^1/_2$×$8^1/_2$ to 7×9 in.) Plates
Tessar 1:4.5*f*=400 mm	(16 in.)	. . . . 18×24 to 21×26 cm (7×9 to 8×10 in.) Plates
Tessar 1:4.5*f*=500 mm	(20 in.)	. . . . 24×30 to 28×36 cm (10×12 to 12×15 in.) Plates

Series II[b].

Tessar 1:6.3.

The nature of its construction and its effectiveness constitute Tessar 1:6.3 the ideal universal objective for the amateur and the photographer of incidents of sport. It possesses the same degree of rapidity as the Double-Protar of Series VII[a], but certain distinctive features will ensure its preference in particular cases. The Double-Protar holds a unique position by virtue of its twofold universality, the universality of a rapid objective having a large available field, and the universality due to its character of a component of sets of objectives giving a range of two or three foci. As, however, it consists of eight elements, its price ranges higher than that of an objective comprising but a small number of components. The Tessar 1:6.3 disposes of only a single form of universality, for, although it has great rapidity and an effective field of considerable angular extent, it does not lend itself to the formation of convertible sets of objectives. On the other hand, its construction is of a very much simpler nature and its price considerably lower. For those reasons the smaller sizes of the Tessar are preferable in connection with hand **cameras having fixed extension,** as these, in any case, do not afford scope for the utilisation of the advantages conferred by the choice of several foci. **Tessar 1:6.3,** *moreover, yields* ***uniform precision and sharpness*** from centre to margin in so exceptional a degree, that negatives produced by it can subsequently be greatly enlarged. This special feature is the property of all Tessars alike — Tessars 1:3.5, 1:4.5, 1:6.3 and 1:10 — as is illustrated in an instructive manner by the heliotype copy of our test plate, which was produced by the agency of Tessar 1:4.5, $f = 210$ mm ($8/^{1}_{4}$ in.).

Its chromatic correction being very perfect, Tessar 1:6.3 can also be applied with good results to three-colour photography from nature.

For all reproduction processes, including **three-colour printing,** the **Apochromat-Tessar,** Series VIII, stands unrivalled.

The smaller sizes of Tessar 1:6.3, up to $f = 210$ mm, are suitable for taking **snapshots** with **hand cameras,** and the sizes of plates recommended in the table are applicable to this kind of work. The larger numbers should be used for portraits, groups, and landscapes, also for photographs required for industrial purposes and for reproduction.

For the above purposes plates of the sizes indicated are fully covered, even with large apertures, in fact, plates of considerably larger dimensions may be employed in cases where no particular importance is attached to the rendering of perspective in the most natural manner possible.

Series II^{b}.

Tessar 1:6.3

in Standard Mount with Iris-Diaphragm.

1048

Series and No.	Tessar 1:6.3 in Standard Mount Codeword	Price £	Diameter of Lenses in.	Equivalent Focus mm	Equivalent Focus in.	Extension in.	Size of Plate recommended from in × in.	Size of Plate recommended to in × in.	Diameter of Image with small stops in.	Approx. Diameter of illuminated circular area in.	Standard Mount No.
II^{b}, 0	*Adescabit*	**25.50**	1/4	40	1 9/16	1.26	1×1	1 9/16×1 9/16	2 3/8	2 3/4	00
II^{b}, 1	*Adescammo*	**27.00**	3/8	56	2 3/16	1.89	1 3/8×1 3/8	2 3/8×2 3/8	3 3/8	4	00
II^{b}, 1^{a}	*Adescando*	**29.00**	1/2	75	3	2.56	1 3/4×1 3/4	2 1/2×3 1/2	4 1/2	5 5/16	I
II^{b}, 2	*Adescantis*	**29.00**	9/16	84	3 5/16	2.87	2×2	2 1/2×3 1/2	5 1/8	6	I
II^{b}, 3	*Adescarent*	**32.50**	3/4	112	4 3/8	4.10	2 1/2×3 1/2	3 1/8×4	6 3/4	7 7/8	I
II^{b}, 4	*Adescassi*	**34.50**	7/8	136	5 3/8	4.84	3 1/2×4 3/4	4×5	7 7/8	9 1/2	II
II^{b}, 5	*Adescaturo*	**36.00**	15/16	150	5 15/16	5.28	3 1/2×4 3/4	4 3/8×5 1/2	8 1/4	9 7/8	II
II^{b}, 5^{a}	*Adeschero*	**50.50**	1 1/4	180	7 1/8	6.50	4 3/4×6 1/2	5×7	10 1/4	11 7/8	IV$_{2}$
II^{b}, 6	*Adesco*	**61.50**	1 3/8	210	8 1/4	7.52	5×7	5×8	12 1/4	14 1/8	IV$_{1}$
II^{b}, 7	*Adesivo*	**83.00**	1 5/8	255	10	9.26	5×8	6 1/2×8 1/2	15	17 3/8	VII
II^{b}, 8	*Adesmie*	**122.50**	2	305	12	10.83	6 1/2×8 1/2	7×9	17 3/8	19 3/4	IX$_{1}$
II^{b}, 9	*Adesurae*	**158.50**	2 3/8	365	14 3/8	—	7×9	8×10	20 7/8	23 5/8	XI
II^{b}, 10	*Adesurarum*	**252.00**	3 1/4	490	19 1/4	—	10×12	13 3/4×17 3/4	27 7/8	30 3/4	XIV
II^{b}, 11	*Adesuries*	**324.00**	3 11/16	590	23 1/4	—	12×16	16×20	33 1/2	36 5/8	XV

For Single Portraits the following deserve special notice:
Tessar 1:6.3, f = 210 mm (8 1/4 in.) for full-length Cartes de Visite.
Tessar 1:6.3, f = 255 mm (10 in.) for Cartes de Visite 1/3 length, also Busts.
Tessar 1:6.3, f = 305 mm (12 in.) for Cabinets up to 1/2 length, Demies.
Tessar 1:6.3, f = 365 mm (14 3/8 in.) for Cabinets up to 1/3 length, Busts.

For Landscape Work an objective of comparatively long focus should be selected.

The adjustment of a pair of objectives required to form a stereoscopic pair is subject to an additional charge of £ **0·8·0.**

A range of Tessars in Special Mount *A* with focussing adjustment, suitable for folding cameras with focal plane shutters, is specified on page 42.

1022
Standard Mount with Iris-Diaphragm.

Series III[a].

Protar 1:9.

This objective has a field of good anastigmatic flatness; its angle of view extends to about 97° and the aperture of the objective is in the proportion of 1:9 of the equivalent focus.

Protar 1:9 is thus an **instantaneous** and, at the same time, a **wide-angle objective.**

The smaller objectives of this series are specially suitable for both **stereoscopic cameras** and **hand cameras,** and are also greatly appreciated as wide-angle lenses for landscape views, interiors, and architectural details.

As a suitable outfit for **hand cameras** we should suggest for

6× 9 cm (2⅜×3½ in.)	plates, an objective having an equivalent focus	= 95 mm (3¾ in.)
9×12 „ (3½×4¾ in.)		= 120 or 150 mm (4¾ or 6 in.)
13×18 „ (5 ×7 in.)		= 172 or 196 mm (6¾ or 7¾ in.)

For **Stand Cameras** we recommend for

13×18 cm (5×7 in.)	plates, an objective having an equivalent focus	= 172 or 196 mm (6¾ or 7¾ in.)
18×14 „ (7×9½ in.)		= 272 or 317 mm (10¾ or 12½ in.)

The longer foci of Series III[a] can be recommended for **large portraits, large groups,** and for **reproductions.**

Series and No.	Protar 1:9 in Standard Mount — Codeword	Price $	Diameter of Lenses in.	Equivalent Focus mm	Equivalent Focus in.	Extension in.	Size of Plate covered at 1:9 in. × in.	Size of Plate covered at 1:12.5 in. × in.	Diameter of sharp Image with small stops ∡ 90° in.	Standard Mount No.
III[a], 0	*Afrodina*	**21.50**	⅜	75	3	2.68	2½×2½	2⅜×3⅛	6	I
III[a], 00	*Afroepen*	**21.50**	½	95	3¾	3.39	3⅛×3⅛	3⅛×4	7½	II
III[a], 1	*Afroffelen*	**23.50**	⅝	120	4¾	4.33	3⅛×4	3½×4¾	9½	II
III[a], 2	*Afrogala*	**27.00**	¾	150	6	5.43	3½×4¾	4¾×6	11⅞	III
III[a], 3	*Afrollende*	**32.50**	⅞	172	6¾	6.18	4¾×6	5⅛×7	13⅜	III
III[a], 4	*Afronatro*	**36.00**	1	196	7¾	7.13	5×7	5⅛×8¼	15⅜	III
III[a], 5	*Afronding*	**47.00**	1¼	230	9	8.11	6×8	6¼×8¼	18⅛	IV[1] & IV[2]
III[a], 6	*Afrontaban*	**57.50**	1⅜	272	10¹¹/₁₆	9.69	6½×8½	7×9½	21¼	V
III[a], 7	*Afrontar*	**72.00**	1⅜	317	12½	11.50	7×9	8¼×10⅝	24¾	VII

For the preparation of stereoscopic views and similar purposes pairs of objectives are adjusted, if specially ordered, to the **same focus, exactly similar camera extension, and the same working aperture,** subject to a charge of **Dollars 3.00** in addition to the list prices.

Series V.

Protar 1:18.

A Wide-angle Objective for Architecture, Interiors, and Photogrammetric Work, also for Reproduction.

Standard mount with Iris-Diaphragm.

The smaller numbers of Protar 1:18 (as far as No. 7, $f = 315$ mm) embrace an angle of over 110°, and are, therefore, wide-angle objectives in the fullest sense of the term. Their aperture 1:18 renders them sufficiently rapid for most kinds of outdoor instantaneous photography in sunlight, whilst their orthoscopically excellent definition fits them equally well for photogrammetric purposes also. For wide angle views, properly speaking, a camera stand will generally be found indispensable, and, in order to guard against disturbing causes affecting perspective, care should be taken to make sure that the bottom of the camera is perfectly horizontal and that the focussing screen and the camera front are parallel to each other and strictly perpendicular to the former. Nos. 2 or 3 are best adapted for 13×18 cm (5×7 in.), Nos. 3 or 4 for 18×24 cm (7×9½ in.), and No. 5 for 24×30 cm (9½×12 in.) plates.

The larger numbers of the series (from Nos. 7ª, $f = 390$ mm (15⅜ in.), to the end of the list) have a field of about 90° and are more particularly intended for purposes of reproduction. Within the limit of about 60° the field possesses a satisfactory degree of anastigmatic flatness.

Series and No.	Protar 1:18 in Standard Mount Codeword	Price £	Diameter of Lenses in.	Equivalent Focus mm	Equivalent Focus in.	Extension in.	Size of Plate covered at 1:18 in. × in.	Size of Plate covered at 1:36 in. × in.	Diameter of sharp Field with small stops in.	Standard Mount No.
V, 0	*Agrodromo*	**23.00**	1/8	40	1 9/16	1.38	1 3/4 × 2 1/2	2 3/8 × 3 1/8	4	00
V, 00	*Agrolle*	**23.00**	5/16	62	2 7/16	2.20	2 1/2 × 3 1/8	3 1/8 × 4	5 11/16	00
V, 1	*Agrologo*	**23.00**	5/16	86	3 3/8	3.11	3 1/2 × 4 3/4	4 3/4 × 6	8 5/8	I
V, 2	*Agromane*	**23.00**	3/8	112	4 7/16	4.10	4 3/4 × 6	5 1/8 × 7	11	I
V, 3	*Agromyze*	**29.00**	7/16	141	5 1/2	5.20	5 × 7	6 1/4 × 8 1/4	14 1/8	II
V, 4	*Agronomico*	**36.00**	9/16	182	7 3/16	6.77	6 1/2 × 8 1/2	7 7/8 × 10 1/4	15 3/4	II
V, 5	*Agronomo*	**45.00**	11/16	212	8 3/8	7.95	8 × 10	9 1/2 × 11 7/8	21 1/4	II
V, 6	*Agropyron*	**56.00**	13/16	265	10 3/8	9.96	10 × 12	10 1/4 × 13 3/4	26 3/4	II
V, 7	*Agrosae*	**66.50**	15/16	315	12 3/8	11.61	10 × 13 3/4	11 7/8 × 15 3/4	31 1/2	II
V, 7ª	*Agrosos*	**88.50**	1	390	15 3/8	14.45	12 × 16	15 3/4 × 19 3/4	33 1/2	III
V, 8	*Agrostemma*	**88.50**	1	460	18 1/8	16.89	12 × 16	15 3/4 × 19 3/4	33 1/8	III
V, 9	*Agrostideo*	**129.50**	1 3/8	632	24 7/8	23.46	16 × 20	23 5/8 × 27 1/2	45 5/8	VI
V, 10	*Agrotera*	**255.50**	2 1/8	947	37 1/4	35.28	20 × 24	31 1/2 × 35 3/8	68 1/8	X_1

Series VII and VII[a].

Protar-Lenses and Double-Protars.

1026

1027

Standard Mount with Iris-Diaphragm.

The Protar-lens is distinguished by anastigmatic flatness of field of a high order and is, therefore, well adapted for wide-angle **instantaneous photography** outdoors under favourable conditions of light, also for **landscape views** and large **portraits** and **groups**.

Like all landscape objectives, the Protar-lens, when used singly, slightly distorts straight lines near the margin of the picture. This defect does not, however, declare itself, except with angles of unusual width, so that, for instance, the amount of distortion produced by an objective of 285 mm focus (No. 3 on list) on a 13×18 cm plate is scarcely noticeable, even in the case of architectural details.

The **Double-Protar, Series VII[a],** composed of two Protar-lenses, meets the requirements of orthoscopy in an equally complete measure as any existing symmetrical objectives[1]. It is, furthermore, practically immaterial whether the Double-Protar is composed of two Protar-lenses of similar or of dissimilar focus, with, however, this difference, that the Double-Protar comprising two lenses of similar focus possesses the advantage of having a larger relative aperture (hence greater rapidity) than two lenses of different focus, while, on the other hand, the latter provide a range of three foci, whereas the former combination is restricted to two.

By virtue of their large relative aperture and their anastigmatically flat field of great angular extent, **the Double-Protars fall under the heading of rapid anastigmatic universal objectives.** They are, therefore, adapted for **all branches of instantaneous photography** — from single objects to wide-angle street scenes — as also for **groups, architecture, panoramic landscape views, reproduction, photogrammetry** and **enlargements.** Furthermore

[1] Dr. E. Wandersleb, Jena: „Über die Verzeichnungsfehler photographischer Objektive", published in the „Zeitschrift für Instrumentenkunde", 1907. Reprints of this article are available.

the two separate elements of the Double-Protar being, as already stated, rapid single objectives exceptional efficiency, possessing considerably longer foci than the double combinations, the utilisation of these single objectives supplies facilities for the production of portraits and groups containing large figures, as well as landscape views from a great distance, in short, any kind of photograph requiring an objective of comparatively long focus.

The Double-Protar thus contains in itself **universality of application** in a measure never before realised in any other form of objective[1].

An assortment of more than two Protar-lenses of different focal length constitutes a Protar-set, i. e., a set of objectives whose several elements, used by themselves, provide excellent single objectives and which, when combined in pairs, form the Double-Protar.

We supply these single objectives of Series VII separately, so as to afford every facility for the gradual acquisition of Double-Protars, or of assorted sets of these objectives (see "Protar-Sets").

For the preparation of stereoscopic views and similar purposes two objectives are paired, if specially ordered, subject to a charge of Dollars 3.00 in addition to list prices. Each has then the ***same focus, exactly similar camera extension, and the same working aperture.*** *On this basis the pairing of two objectives of Series VII[a], so that the single elements can be used for stereoscopic work as well as their combinations, entails an additional charge of Dollars 6.00.*

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[1] Dr. P. Rudolph, Jena: „Der neue Satz-Anastigmat 1 : 6.3 der Firma Carl Zeiss" published in Eder's „Jahrbuch", 1896, pp. 216 et seq.

Series VII and VII[a]. Protar-Lenses and Double-Protars.

Series and No.	Codeword	in Standard Mount with Iris: Price with Tube $	Price without Mount $	Diameter of Lenses in.	Equivalent Focus mm	Equivalent Focus in.	Combination of Protar-lenses, Series VII: Front Lens Focus mm	Front Lens Focus in.	Back Lens Focus mm	Back Lens Focus in.	Largest rel. Aperture	Size of Plate recommended in. × in	Standard Mount No.
Protar-Lenses.													
VII, 0	*Aprobada*	**32.50**	**27.00**	0.43	100	4	—	—	100	4	1 : 11	$2^1/_2 \times 3^1/_2$	0
VII, 00	*Aprobando*	**32.50**	**27.00**	0.55	135	$5^5/_{16}$	—	—	135	$5^5/_{16}$	1 : 11	$2^3/_8 \times 4$	I
VII, 000	*Aprobare*	**32.50**	**27.00**	0.71	170	$6^3/_4$	—	—	170	$6^{11}/_{16}$	1 : 11	$3^1/_2 \times 4^3/_4$	II
VII, 1	*Aproches*	**27.00**	**21.50**	0.63	183	$7^1/_4$	—	—	183	$7^3/_{16}$	1 : 12.5	$4^3/_4 \times 6$	I
VII, 2	*Aproctome*	**30.50**	**25.50**	0.79	224	$8^7/_8$	—	—	224	$8^7/_8$	1 : 12.5	5×7	II
VII, 3	*Aprontamos*	**36.00**	**30.50**	0.93	285	$11^1/_4$	—	—	285	$11^3/_{16}$	1 : 12.5	$6^1/_2 \times 8^1/_2$	III
VII, 4	*Aprontas*	**43.50**	**37.00**	1.22	350	$13^3/_4$	—	—	350	$13^3/_4$	1 : 12.5	$8^1/_2 \times 10^1/_2$	IV_1
VII, 5	*Apronto*	**56.00**	**49.50**	1.42	412	$16^1/_4$	—	—	412	$16^3/_{16}$	1 : 12.5	10×12	VI
VII, 6	*Apropiado*	**77.50**	**70.00**	1.65	480	$18^7/_8$	—	—	480	$18^7/_8$	1 : 12.5	$11^1/_2 \times 13^1/_2$	VIII
VII, 7	*Apropiar*	**99.00**	**87.00**	2.01	590	$23^1/_4$	—	—	590	$23^1/_4$	1 : 12.5	12×16	X_1
VII, 8	*Apropieis*	**129.50**	**113.50**	2.40	690	$27^1/_8$	—	—	690	$27^1/_8$	1 : 12.5	$13^1/_2 \times 15^1/_2$	XII_1
VII, 9	*Apropio*	**180.00**	**160.50**	2.80	782	$30^3/_4$	—	—	782	$30^3/_4$	1 : 12.5	$15^1/_2 \times 18^1/_2$	XIII
VII, 10	*Aprovechar*	**234.00**	**210.50**	3.23	862	34	—	—	862	34	1 : 12.5	16×20	XIV
VII, 11	*Aproximar*	**306.00**	**279.00**	3.70	1000	$39^3/_8$	—	—	1000	$39^3/_8$	1 : 12.5	$18^1/_2 \times 22^1/_2$	XV
Double-Protars.													
VII[a], 0	*Appoderava*	**59.50**	—	0.43	61	$2^3/_8$	100	4	100	4	1 : 6.3	$1^1/_2 \times 1^1/_2$	0
VII[a], 00	*Appodiando*	**59.50**	—	0.55	82	$3^1/_4$	135	$5^5/_{16}$	135	$5^5/_{16}$	1 : 6.3	2×2	I
VII[a], 000	*Appodierai*	**59.50**	—	0.71	102	4	170	$6^3/_4$	170	$6^3/_4$	1 : 6.3	$2^1/_2 \times 2^1/_2$	II
VII[a], 1	*Appoggiare*	**48.50**	—	0.63	105	$4^1/_8$	183	$7^1/_4$	183	$7^1/_4$	1 : 6.3	$2^3/_4 \times 4$	I
VII[a], 2	*Appoggio*	**52.50**	—	0.79	115	$4^1/_2$	224	$8^7/_8$	183	$7^1/_4$	1 : 7.0	$3^1/_2 \times 4^3/_4$	II
VII[a], 3	*Appointing*	**57.50**	—	0.98	127	5	285	$11^1/_4$	183	$7^1/_4$	1 : 7.7	4×5	III
VII[a], 4	*Appollaia*	**56.00**	—	0.79	128	5	224	$8^7/_8$	224	$8^7/_8$	1 : 6.3	4×5	II
VII[a], 5	*Appomicio*	**61.50**	—	0.98	143	$5^5/_8$	285	$11^1/_4$	224	$8^7/_8$	1 : 7.0	$4^3/_4 \times 6$	III
VII[a], 6	*Apponendo*	**68.50**	—	1.22	156	$6^1/_8$	350	$13^3/_4$	224	$8^7/_8$	1 : 7.7	5×6	IV_1
VII[a], 7	*Apponeva*	**66.50**	—	0.98	163	$6^3/_8$	285	$11^1/_4$	285	$11^1/_4$	1 : 6.3	$5 \times 6^1/_2$	III
VII[a], 8	*Appongo*	**73.50**	—	1.22	179	7	350	$13^3/_4$	285	$11^1/_4$	1 : 7.0	5×7	IV_1
VII[a], 9	*Apponitur*	**86.00**	—	1.42	192	$7^1/_2$	412	$16^1/_4$	285	$11^1/_4$	1 : 7.7	$5 \times 8^1/_2$	VI
VII[a], 10	*Appoppando*	**80.50**	—	1.22	200	$7^7/_8$	350	$13^3/_4$	350	$13^3/_4$	1 : 6.3	$5 \times 8^1/_2$	IV_1
VII[a], 11	*Appoppassi*	**93.00**	—	1.42	216	$8^1/_2$	412	$16^1/_4$	350	$13^3/_4$	1 : 7.0	$6^1/_2 \times 8^1/_2$	VI
VII[a], 12	*Appoppava*	**114.50**	—	1.65	232	$9^1/_8$	480	$18^7/_8$	350	$13^3/_4$	1 : 7.7	$6^1/_2 \times 8^1/_2$	VIII
VII[a], 13	*Apporre*	**105.00**	—	1.42	235	$9^1/_4$	412	$16^1/_4$	412	$16^1/_4$	1 : 6.3	$6^1/_2 \times 8^1/_2$	VI
VII[a], 14	*Apporrecti*	**127.00**	—	1.65	254	10	480	$18^7/_8$	412	$16^1/_4$	1 : 7.0	7×9	VIII
VII[a], 15	*Apporrommi*	**148.50**	—	2.01	277	$10^7/_8$	590	$23^1/_4$	412	$16^1/_4$	1 : 7.7	7×9	X_1
VII[a], 16	*Apportais*	**147.50**	—	1.65	275	$10^{13}/_{16}$	480	$18^7/_8$	480	$18^7/_8$	1 : 6.3	7×9	VIII
VII[a], 17	*Apportando*	**169.00**	—	2.01	303	$11^7/_8$	590	$23^1/_4$	480	$18^7/_8$	1 : 7.0	$8^1/_2 \times 10$	X_1
VII[a], 18	*Apportava*	**199.50**	—	2.40	324	$12^3/_4$	690	$27^1/_8$	480	$18^7/_8$	1 : 7.7	$8^1/_2 \times 10$	XII_1
VII[a], 19	*Apportes*	**186.00**	—	2.01	337	$13^1/_4$	590	$23^1/_4$	590	$23^1/_4$	1 : 6.3	$8^1/_2 \times 10$	X_1
VII[a], 20	*Apportollo*	**217.00**	—	2.40	364	$14^3/_8$	690	$27^1/_8$	590	$23^1/_4$	1 : 7.0	10×12	XII_1
VII[a], 22	*Apposable*	**243.00**	—	2.40	395	$15^1/_2$	690	$27^1/_8$	690	$27^1/_8$	1 : 6.3	10×12	XII_1
VII[a], 25	*Apposcit*	**340.50**	—	2.80	465	$18^1/_4$	782	$30^3/_4$	782	$30^3/_4$	1 : 6.3	10×12	XIII
VII[a], 28	*Appositivo*	**444.50**	—	3.23	515	$20^1/_4$	862	34	862	34	1 : 6.3	11×13	XIV
VII[a], 30	*Apposolo*	**585.00**	—	3.70	595	$23^3/_8$	1000	$39^3/_8$	1000	$39^3/_8$	1 : 6.3	12×16	XV

I1.

II1.

III1.

I2.

II2.

III2.

I3.

II3.

III3.

The Double Protar, Series VII[a], as a Convertible Objective.
(3 Foci.)

For explanation see next page.

The Double Protar as a Convertible Objective.

Each series (1, 2, 3) of the pictures I, II and III, on the plate on the preceding page, was taken from the same position.

Series 1 was taken with the shortest focus, i. e., with the Double-Protar. The front lens was then screwed off and series 2 taken with the back lens alone, i. e., with a single Protar-lens of Series VII. Series III was taken after screwing off the back lens and substituting the front lens.

The combination used was a Double-Protar composed of two successive numbers in the list of Protar-lenses of Series VII, constituting a Double-Protar with relative aperture 1 : 7, the three foci of which gave the proportion

Double-Protar : Back Lens : Front Lens = 1 : 1.6 : 2.

Picture I demonstrates that, from the position selected and for the size of plate used, the shortest focus yielded a most complete and really satisfactory photograph (No. 1). Pictures II and III resp. prove that the intermediate focus (No. 2) — that of the back-lens — and the longest focus (No. 3), obtained by putting the front-lens **into the place of the back-lens,** were preferable for the work in hand.

Protar-Sets.

Formed by a Combination of Protar-lenses, Series VII.

1029

With the aid of the table relating to Series VII^a, combinations of suitable single objectives of Series VII can readily be selected which, **though consisting of but a small number of elements, will provide a considerable range of rapid objectives of various foci.** As they all belong to Series VII and VII^a, resp., they naturally possess the highest working capacity. We regularly stock the sets specified under the headings C and D, but we are also prepared to supply other combinations at reasonable notice.

Each of the Sets C and D consists of:

1. A tube (Standard Mount IV_1 and VIII resp.), provided with an iris-diaphragm and a screw-thread fitting the screw of the mounts.
2. Three and four Protar-lenses, Series VII, resp., with their focal lengths engraved upon the mounts.
3. A hood, which screws into the front of the tube when using the single lens, for shutting off reflected light.
4. A case to contain the set complete.
5. An objective flange to fasten **to the camera** front with screws.

When one of the Protar-lenses is to be used singly, it is screwed in at the end of the mount nearest the flange, the hood being screwed in at the opposite end (the front of the mount). When two lenses are to be combined so as to form a Double-Protar, the second lens is substituted for the hood, and whenever lenses of dissimilar focus are employed, that having the longer focus should be in front, as in this way the largest possible aperture is obtained in the combination in question.

Protar-Set C for 13×18 cm. (5×7 in.) Plates,

Consisting of Protar-Lenses, Series VII, Nos. 2, 3 and 4.
Price, incl. Case: **Dollars 101.00.** Codeword: *Azobenzol.*
Size of Case: 6×6×8 cm = $2^3/_8 \times 2^3/_8 \times 3^1/_8$ in.

Series and No.	Combination of Front | Back Lens Focus mm	mm	Combined Focus mm	in.	Largest effective relative aperture 1:	Angle corresp. to a 5×7 in. Plate	Size of Plate sharply covered at full aperture in.×in.	at 1:12.5 in.×in.	at 1:25 in.×in.	Diameter of Image corresp. to an angle of 80° in.
VII, 4	—	350	350	$13^3/_4$	12.5	35°	—	$8^1/_2 \times 10^1/_2$	$11^1/_2 \times 13^1/_2$	—
VII, 3	—	285	285	$11^1/_4$	12.5	43°	—	$6^1/_2 \times 8^1/_2$	10×12	—
VII, 2	—	224	224	$8^3/_4$	12.5	53°	—	5×7	8×10	—
VII,[a] 8	350	285	179	7	7	64°	5×7	$6^1/_2 \times 8^1/_2$	7×9	$11^7/_8$
VII[a], 6	350	224	156	$6^1/_8$	7.7	71°	5×6	6×8	$6^1/_2 \times 8^1/_2$	$10^1/_4$
VII[a], 5	285	224	143	$5^5/_8$	7	76°	$4^3/_4 \times 6$	$5 \times 8^1/_4$	$5 \times 8^1/_4$	$9^1/_2$

If it be desired to supplement this set by a typically wide-angle objective, we suggest the addition of Protar 1:18, f = 112 mm ($4^7/_{16}$ in.), Series V, No. 2, the price of which is **Dollars 23.00.** This objective covers a 5×7 in. plate, and embraces an angle of 90°.

Protar-Set D for 18×24 cm. (7×9 in.) Plates,

Consisting of Protar-Lenses, Series VII, Nos. 3, 4, 5 and 6.
Price, incl. Case: **Dollars 197.50.** Codeword: *Azogabas.*
Size of Case: 8×8×14 cm = $3^1/_8 \times 3^1/_8 \times 5^1/_2$ in.

Series and No.	Combination of Front | Back Lens Focus mm	mm	Combined Focus mm	in.	Largest effective relative aperture 1:	Angle corresp. to an 7×9 in. Plate	Size of Plate sharply covered at full aperture in.×in.	at 1:12.5 in.×in.	at 1:25 in.×in.	Diameter of Image corresp. to an angle of 80° in.
VII, 6	—	480	480	$18^7/_8$	12.5	34°	—	$11^1/_2 \times 13^1/_2$	$13^1/_2 \times 15^1/_2$	—
VII, 5	—	412	412	$16^1/_4$	12.5	40°	—	10×12	12×15	—
VII, 4	—	350	350	$13^3/_4$	12.5	46°	—	$8^1/_2 \times 10^1/_2$	$11^1/_2 \times 13^1/_2$	—
VII, 3	—	285	285	$11^1/_4$	12.5	55°	—	$6^1/_2 \times 8^1/_2$	10×12	—
VII[a], 14	480	412	254	10	7	61°	7×9	$9^1/_2 \times 11^7/_8$	10×12	$16^7/_8$
VII[a], 12	480	350	232	$9^1/_8$	7.7	66°	$6^1/_2 \times 8^1/_2$	9×11	10×12	$15^3/_8$
VII[a], 11	412	350	216	$8^1/_2$	7	69°	$6^1/_2 \times 8^1/_2$	8×10	9×11	$14^1/_8$
VII[a], 9	412	285	192	$7^1/_2$	7.7	76°	$5 \times 8^1/_2$	7×9	$7 \times 9^1/_2$	$12^1/_2$
VII[a], 8	350	285	179	7	7	80°	5×7	$6^1/_2 \times 8^1/_2$	$7 \times 9^1/_2$	$11^7/_8$

If it be desired to supplement this set by a typically wide-angle objective, we suggest the addition of Protar 1:18, f = 141 mm ($5^1/_2$ in.), Series V, No. 3, the price of which is **Dollars 29.00.** This objective covers an 18×24 cm (7×9 in.) plate, while embracing an angle of $93^1/_2$°.

Cases for combinations other than those specified under C and D not being kept in stock, we reserve to ourselves the right of modifying the prices according to requirements in each special case.

Tables
of Stops and Foci for Protar-Sets.

As a convenient means of finding the required amount of stopping down and the resultant equivalent foci of the objective combinations we have compiled tables, a copy of which may be pasted upon the lens cap. These tables are available for those of our Protar-lenses of Series VII which are regularly stocked in Standard Mounts II, III, IV_1, VI, VIII, X_1, and XII_1.

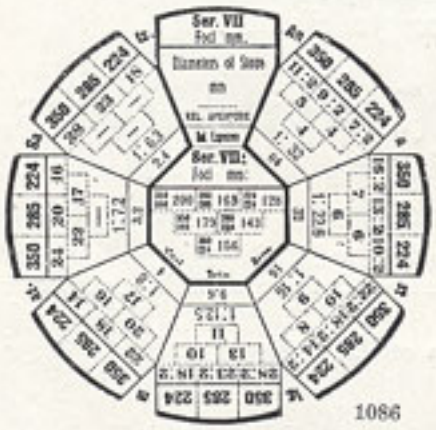


Table of Stops for Protar-Set C,

13 × 18 cm (5 × 7 in.).

Each table gives the diameters of the stops for three, or four, Protar-lenses of Series VII, as also for their combinations. Thus, for instance, the table supplied with the cap of Standard Mount IV_1 contains the necessary data for the Protar-lenses of Series VII having a focal length of 350, 285, and 224 mm resp., and also for their combinations in the form of Double Protars, Series VII[a]. These tables are arranged in the form of rosettes, as shown in the appended illustration.

The central division is in the shape of an octagon, the sides of which form the bases of eight sectors into which the circumference of the outer circle is divided. One of the sections shows the headings relating to the numerical data in the remaining seven. Thus the outermost circle of figures contains the focal lengths of the 350, 285, and 224 mm lenses of Series VII; the next three circular rows show the diameters of the stops for the combination of any two of these single lenses; the fifth row indicates the relative apertures corresponding to the diameters of the stops shown in the several sections, and the sixth row denotes the corresponding rapidities or the numbers of the stops. The central space contains the continuation of the numerical data supplied in the sections by giving the foci resulting from the combination of any two single lenses into a double objective, a

Double Protar of Series VII[a]. The combinations are specified in the same sequence in which the diameters of the corresponding stops are given in the sections.

Accordingly, when working at the relative aperture 1:16,

22: 2 = 11 mm would be the requisite stop for combination . . . . . $\frac{350}{350} = 200$ mm,

14 : 2 = 9 mm „ „ „ „ „ „ „ $\frac{285}{285} = 163$ mm,

13 : 2 = 7 mm „ „ „ „ „ „ „ $\frac{224}{224} = 128$ mm,

9 mm „ „ „ „ „ „ „ $\frac{350}{285} = 179$ mm.

Furthermore, the order of arrangement of the diameters of stops in the sections enables one to find the required diameters at once, if it be only remembered that the first row of figures applies to the combination of two similar foci, the second to the combination of two consecutive numbers, the third to that of one number with an alternate one.

There only remains to explain the reason why the diameters of the stops for the relative apertures 1:45.2 to 1:16 incl., which appear in the outer row, have been expressed by fractional numbers, with the denominator 2. The explanation is, that the numerator of the fractions denotes the diameter of the stop applicable to each separate number of Series VII when used as a single objective; if, for instance, it be intended to work with a single lens at the relative aperture 1:45.2, the iris-diaphragm of Protar-lens, Series VII, No. 4, $f = 350$ mm, should be set to 8 mm, that of Protar-lens, Series VII, No. 3, $f = 285$ mm, to 6.5 mm, that of Protar-lens, Series VII, No. 2, $f = 224$ mm, to 5 mm, and so on.

For Hand Cameras with Focal-plane Shutters and Fixed Extension

1049

we recommend Objectives
in
Special Mount A
with Iris-diaphragm and Focussing Adjustment.

	Series and No.	Objective in Special Mount A: Codeword	Price $	Diameter of Lenses in.	Equivalent Focus mm	Equivalent Focus in.	Approx. Extension in.	Size of Plate recommended in. × in.	Size of Plate recommended in. × in.	Special Mount A No.
Planar 1:6.3	Ia, 22	*Abolboda*	**43.50**	1/2	72	2 7/8	3.03	2×2	2 1/2 × 3 1/2	A, 0
	Ia, 23	*Abolebit*	**47.00**	3/4	110	4 5/16	4.49	2 1/2 × 3 1/2	3 1/2 × 4 3/4	A, II
	Ia, 24	*Abolefeci*	**48.50**	7/8	133	5 1/4	5.51	3×4	4 1/2 × 6	A, II
	Ia, 24a	*Abolendi*	**50.50**	15/16	142	5 5/8	5.91	3 1/2 × 4 3/4	4 3/4 × 6	A, II
	Ia, 25	*Aboletote*	**55.00**	1	152	6	6.34	4×5	5 × 6 1/4	A, III
	Ia, 26	*Abolevimus*	**84.50**	1 3/8	206	8 1/8	8.66	5 × 6 1/4	5 × 8 1/4	A, V
Tessar 1:4.5	Ic, 13	*Adehesaron*	**39.50**	1	112	4 3/8	4.49	2 1/2 × 3 1/2	3×4	A, II
	Ic, 15	*Adeheso*	**51.00**	1 1/4	150	5 15/16	5.98	3×4	3 1/2 × 4 3/4	A, IV2
	Ic, 15a	*Adelaar*	**65.00**	1 9/16	180	7 1/8	7.48	4 × 5 1/2	4 3/4 × 6 1/4	A, VI2
	Ic, 16	*Adelanto*	**79.50**	1 7/8	210	8 1/4	8.54	4 3/4 × 6 1/4	5×7	A, VII
Tessar 1:6.3	IIb, 1a	*Adhospito*	**32.50**	1/2	75	3	3.03	2 1/2 × 2 1/2	2 1/2 × 3 1/2	A, I
	IIb, 2	*Adiabatic*	**32.50**	9/16	84	3 5/16	3.43	2 1/2 × 3	3×4	A, I
	IIb, 3	*Adiabenos*	**36.00**	3/4	112	4 3/8	4.53	2 1/2 × 3 1/2	3 1/2 × 4 3/4	A, I
	IIb, 4	*Adiacente*	**38.00**	7/8	136	5 3/8	5.47	3 1/2 × 4 3/4	4 × 5 1/2	A, II
	IIb, 5	*Adiactinic*	**39.50**	15/16	150	5 15/16	6.02	3 1/2 × 4 3/4	4 3/4 × 6	A, II
	IIb, 5a	*Adiaforia*	**55.00**	1 1/4	180	7 1/8	7.20	4 3/4 × 6 1/4	5 × 8 1/4	A, IV2
	IIb, 6	*Adiafrosis*	**66.50**	1 3/8	210	8 1/4	8.43	5×7	6 1/4 × 8 1/4	A, IV1
Protar 1:9	IIIa, 00	*Acrosaurus*	**25.50**	1/2	95	3 3/4	3.86	2 1/2 × 3	3×4	A, II
	IIIa, 1	*Acrospermo*	**27.00**	1/2	120	4 3/4	4.76	3×4	3 1/2 × 4 3/4	A, II
	IIIa, 2	*Acrostiche*	**30.50**	3/4	150	6	5.91	3 1/2 × 4 3/4	4 3/4 × 6	A, II
	IIIa, 3	*Acrostide*	**36.00**	7/8	172	6 3/4	6.89	4 3/4 × 6	5×7	A, III
	IIIa, 4	*Acrostole*	**39.50**	1	196	7 3/4	7.80	5×7	5 × 8 1/4	A, III
	IIIa, 5	*Acrostomos*	**52.50**	1 1/4	230	9	9.06	5 × 8 1/4	6 1/4 × 8 1/4	A, IV1
	IIIa, 6	*Acrotarse*	**63.00**	1 3/8	272	10 11/16	11.10	6 1/4 × 8 1/4	7 × 9/1/2	A, V
Double-Protar	VIIa, 0	*Approbate*	**63.00**	7/16	61	2 3/8	2.60	1 1/2 × 1 1/2	2 × 2 1/2	A, I
	VIIa, 00	*Approccio*	**63.00**	9/16	82	3 1/4	3.43	2×2	3×4	A, I
	VIIa, 000	*Approchant*	**63.00**	11/16	102	4	4.21	2 1/2 × 2 1/2	3 1/2 × 4 1/2	A, II
	VIIa, 1	*Approdammo*	**52.50**	5/8	105	4 1/8	4.33	2 3/4 × 4	3 1/2 × 4 3/4	A, I
	VIIa, 4	*Approdassi*	**59.50**	3/4	128	5	5.20	3×4	4×5	A, II
	VIIa, 5	*Approdo*	**65.00**	1	143	5 5/8	5.94	3 1/2 × 4 3/4	4 3/4 × 6	A, III
	VIIa, 7	*Approompt*	**70.00**	1	163	6 3/8	6.73	4×5	5 × 6 1/4	A, III
	VIIa, 8	*Appronamur*	**79.00**	1 1/4	179	7	7.40	4 3/4 × 6 1/4	5×7	A, IV1
	VIIa, 10	*Approof*	**86.00**	1 1/4	200	7 7/8	8.43	5×7	6 1/4 × 8 1/4	A, IV1

Leather Cases

for Photographic Objectives in Standard Mount.

The smaller sizes of the objectives specified in the foregoing tables are sent out in plain cardboard boxes, but in cases where durability is a special desideratum, we recommend the purchase of one of the cases specified below. These are made in our own book-binding department and are covered with shagreen leather.

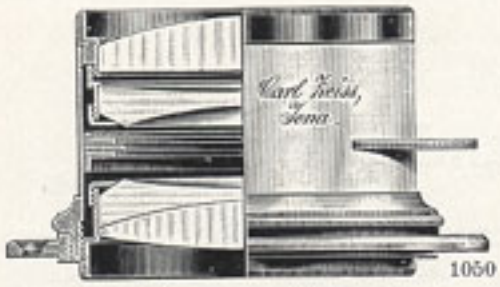
No. of Tube-Mount	0-II	III	IV_1-V	VI, VII	VIII, IX_1	IX_2,	X_1-XI	XII_1, XII_2	XIII	XIV	XV	XVII
Price: $	0.50	0.50	1.00	1.00	1.00	1.50	1.50	1.50	2.00	2.00	2.00	2.50

Cases other than above are made to order, at reasonable rates.

In ordering one of the above-mentioned stock patterns, please quote Series and No. of the objective, form of diaphragm (whether rotating or iris), and the number engraved on the objective flange (the number of the tube-mount).

Series VIII.

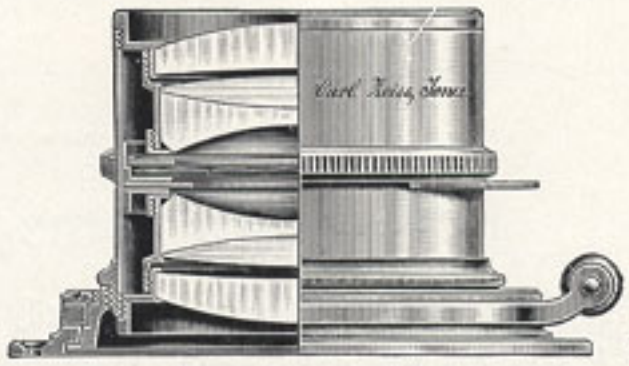
Objectives for Reproduction.



1050

Apochromat-Tessar

with Rotating Sliding Diaphragm.



1036

Apochromat-Planar

with Rotating Sliding Diaphragm, Iris-diaphragm, and Revolving Collar.

The objectives grouped under Series VIII — "Apochromat-Tessar" and "Apochromat-Planar" — are so particularly well corrected chromatically, as to be always preferable to other objectives for Line and Half-tone, as well as for **Colour-printing** Processes.

Series and No.	Objective in Standard Mount with rotating sliding diaphragm: Code-word	Price $	Diameter of Lenses in.	Equivalent Focus approx. mm	Equivalent Focus approx. in.	Rel. Aperture	Size of Plate covered in full-size reproductions in.×in.	Nature of Work
Apochromat-Tessar.								
VIII, 0	*Areado*	**108.00**	1 3/8	320	12 5/8	1:9	10×12	Stop giving sufficient precision for 1:12.5 Half-tone 1:18 Line Details
VIII, 1	*Areales*	**144.00**	2	460	18 1/8	1:10	14×18	
VIII, 2	*Areatoris*	**234.00**	2 13/16	640	25 1/8	1:10	20×24	
VIII, 3	*Arecomici*	**342.00**	3 1/4	840	33	1:10.5	27 1/2×31 1/2	
VIII, 4	*Arefacio*	**540.00**	3 11/16	1170	46	1:12.5	31 1/2×35 1/2	1:15 Half-tone 1:30 Line Details
VIII, 5	*Arefied*	**1260.00**	4 3/4	1800	70 7/8	1:15	47×59	
Apochromat-Planar.								
VIII, 11	*Aremetis*	**295.50**	2 1/2	417	16 3/8	1:7.2	14×18	Stop giving sufficient precision for 1:9 Half-tone 1:12.5 Line Details 1:12.5 Half-tone 1:18 Line Details
VIII, 12a	*Aremorici*	**432.00**	3 5/16	590	23 1/4	1:7.2	18×22	
VIII, 12b	*Arenaceo*	**324.00**	2 7/8	590	23 1/4	1:9	18×22	
VIII, 13	*Arencaba*	**612.00**	3 5/16	800	31 1/2	1:10	25 1/2×30	
VIII, 14	*Arencar*	**972.00**	4 1/4	1050	41 3/8	1:10	30×33	
VIII, 15	*Arendoulo*	**1080.00**	4 1/4	1300	51 3/16	1:12.5	35 1/2×39 1/2	1:15 Half-tone 1:25 Line Details

The prices include a set of four stops with round apertures, those having other forms of openings being charged extra. If desired, we also supply the objective fitted with a combined sliding and iris-diaphragm at a special rate. In that case we generally add a set of four sliding stops with square openings.

Reversing Prisms and Mirrors.

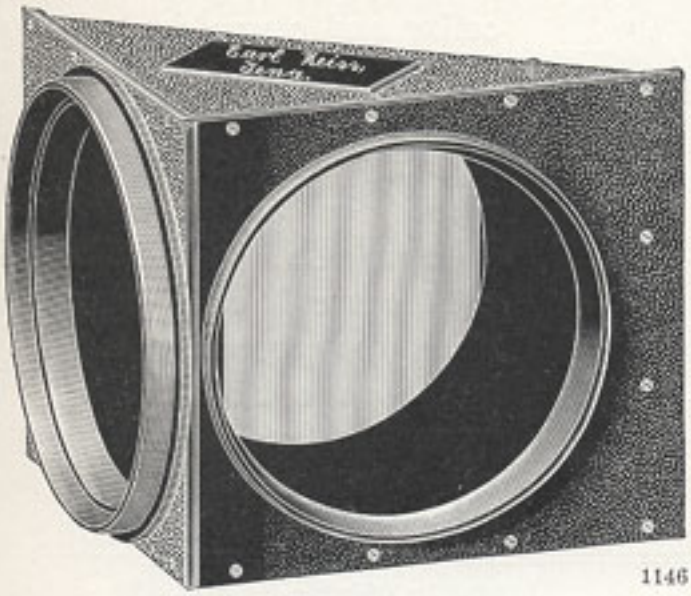
Our prisms are made of carefully annealed and colourless crown glass and ground accurately rectangular; their reflecting surface is silvered.

The prism is screwed directly to the hood of the objective mount by its (light-metal) casing in sufficiently close proximity to the front lens so as to ensure utilisation of its entire capacity.

As it is often found impossible to procure faultless raw material for large prisms, we can only regularly stock prisms measuring up to 75 mm (3 in.). In consequence of the very perfect correction of modern reproduction objectives, the demands as to homogeneity

and freedom from strain of the raw glass have become most exacting, lest the perfect correction of the objective be stultified. For this reason we have recourse to metal mirrors, ground accurately plane, where larger dimensions are in question.

Metal Reversing Mirrors. Though possessing good general durability, metal mirrors must nevertheless be carefully guarded against external influences, such as acid vapours, extreme moisture, &c.



1146

Glass Prism in light-metal casing

1147

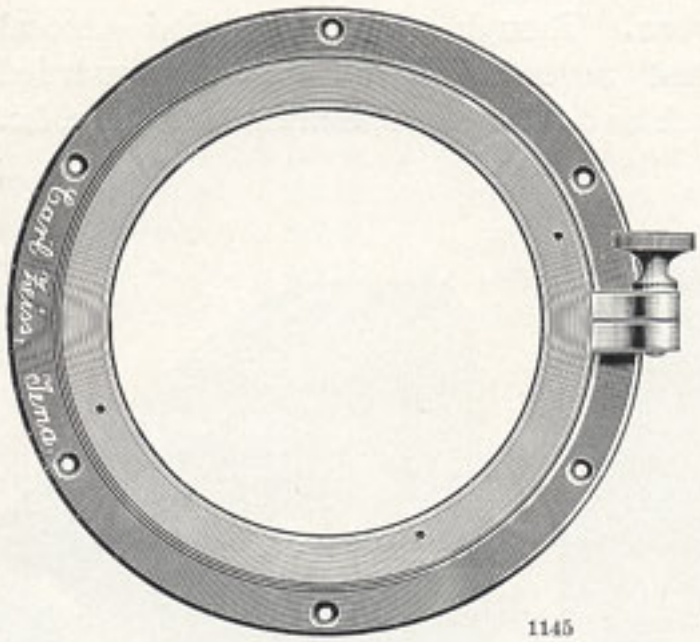
Metal Mirror

They are fitted in casings of light metal, which facilitate exact centring and adjustment of the mirror in relation to the objective. With complete outfits supplied by us we guarantee careful centring.

Our prisms and mirrors command an effective angle of about 30°.

No.		Codeword	Price	Dimensions of Non-reflecting Surfaces and Diameters resp.		Screws into Revolving Collar	Adapted for Objectives not exceeding in size
			$	mm	in.	No.	
Prism	2	*Apricare*	**34.50**	35	$1^{5}/_{8}$	3	**Protar** 1:18, f=315 mm
„	3	*Apricassi*	**43.50**	46	$1^{13}/_{16}$	4	„ 1:18, f=460 and 390 mm
„	4	*Apricatos*	**75.50**	60	$2^{3}/_{8}$	5	„ 1:18, f=632 and **Apo-Tessar**, f=460 mm
„	5	*Apricemus*	**122.50**	75	3	6	**Protar** 1:18, f=947 and **Apo-Planar**, f=417 mm
Mirror	6	*Aprire*	**129.50**	80×115	$3^{1}/_{8}$×$4^{1}/_{2}$	9	**Apo-Tessar**, f=640 and **Apo-Planar**, f=590 mm
„	7	*Aprirono*	**205.50**	100×140	4×$5^{1}/_{2}$	9a	**Apo-Tessar**, f=840 and **Apo-Planar**, f=800 mm
„	8	*Apriscamos*	**299.50**	120×170	$4^{3}/_{4}$×$6^{3}/_{4}$	10	**Apo-Tessar**, f=1170 and **Apo-Planar**, f=1300 mm
„	9	*Aprisco*	**439.50**	140×200	$5^{1}/_{2}$×$7^{7}/_{8}$	11	**Apo-Tessar**, f=1800 mm

Revolving Collars.



1145

To ensure exactness and comfort in working with a reversing system attached to an objective, the use of an adapter with revolving collar and clamp is indispensable. By means of such an adapter the objective, together with its prism or mirror, can be rotated on its own axis, as required, and secured by the clamp when the proper relation has been established between the prism and the object to be copied.

No.	Codeword	Price $	Adapted for Objectives not exceeding in size
1	*Adreamt*	**10.00**	**Protar** 1:18, f = 315 mm
2	*Adrectaria*	**11.00**	**Protar** 1:18, f = 390 „ and 460 mm
3	*Adremigabo*	**12.50**	**Protar** 1:18, f = 632 „
4	*Adremigas*	**14.50**	**Apo-Tessar** 1:10, f = 460 mm
5	*Adreptam*	**17.50**	**Apo-Planar** 1:7.2, f = 417 „
6	*Adressais*	**20.00**	**Apo-Tessar** 1:10, f = 640 „ **Apo-Planar** 1:9, f = 590 „
8	*Adriacam*	**27.00**	**Apo-Planar** 1:7.2, f = 590 „ **Apo-Planar** 1:10, f = 800 „
9	*Adriacus*	**29.00**	**Apo-Tessar** 1:10.5, f = 840 „
9a	*Adriana*	**36.00**	**Apo-Tessar** 1:12.5, f = 1170 „
10	*Adriatico*	**57.50**	**Apo-Tessar** 1:15, f = 1800 „
11	*Adrift*	**90.00**	**Mirror** No. 9

In the absence of special instructions we adopt the following sequence:

For small prisms: **Revolving Collar, Objective, Prism;**

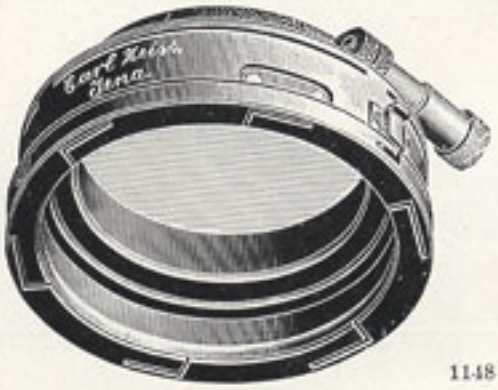
For the larger dimensions and when light-filter cells are to be used:

Revolving Collar, Reversing System, Objective.

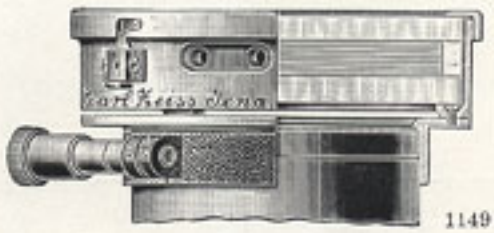
Light-Filter Cells.

The cells serving as receptacles for coloured fluids consist of two plano-parallel glass discs, united by a glass annulet, so as to form a glass vessel whose circular ends can be closed by two stoppers. The whole, contained in a brass mount, is slipped on the front of the objective mount and clamped tight. The glass discs are readily removed from the mount for purposes of cleaning.

The cells must be made with the same great care as the objective, the prism, or the mirror, lest the sharpness of the image be impaired. It is of particular importance that the discs be ground accurately plano-parallel and be carefully polished, and that the raw material employed be free from striae and strain. This explains the apparently high prices. Cells made of plate glass could certainly be sold at considerably lower figures, but such are not adapted for delicate work, since they would render the sharpness of definition of the objective completely illusory.



1148



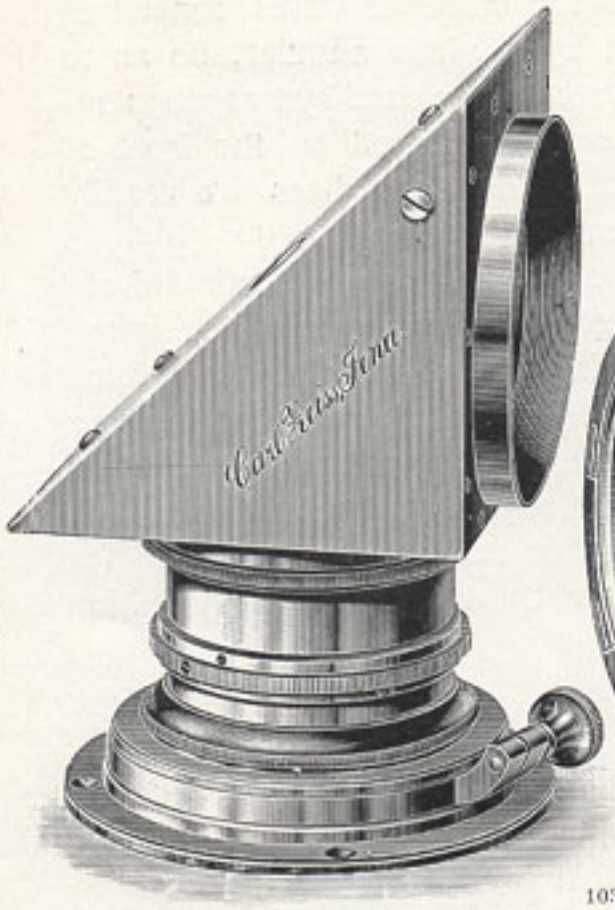
1149

No.	Codeword	Price	Diameter of the Glass Discs		Free Aperture		Adapted for Objectives not exceeding the size of
		£	mm	in.	mm	in.	
1	*Avorio*	**57.50**	60	$2^3/_8$	52	2	**Protar** 1:18, f = 632 mm
2	*Avortero*	**83.00**	80	$3^1/_8$	70	$2^3/_4$	**Apo-Tessar** 1:10, f = 460 „
2a	*Avorterunt*	**115.50**	95	$3^3/_4$	83	$3^1/_4$	„ 1:10, f = 640 „
3	*Avortissem*	**155.00**	110	$4^3/_8$	98	$3^7/_8$	„ 1:10, f = 640 „
3a	*Avortistis*	**209.00**	124	$4^7/_8$	110	$4^3/_8$	„ 1:10.5, f = 840 „
4	*Avouched*	**288.00**	140	$5^1/_2$	126	5	„ 1:12.5, f = 1170 „

We are unable to guarantee accurate centring in relation to existing components, unless the latter are sent to our works for adaptation.

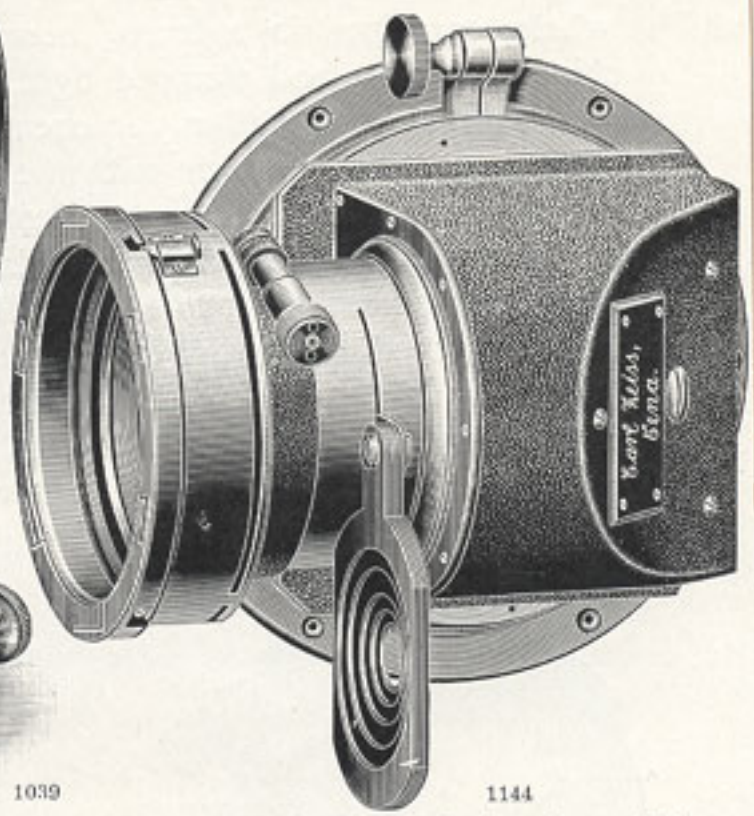
CARL ZEISS JENA

Complete Sets of Appliances
for Reproduction Establishments.



1039

Prism, Objective, Revolving Collar.



1144

Light-filter Cell, Objective, Mirror, Revolving Collar.

No.	Codeword	Price £	Objective			Reversing System No.	Revolving Collar No.	Light-filter Cell No.	Codeword	Price £
Sequence: Prism, Objective, Revolving Collar.										
1	*Avvoca*	**111.00**	**Protar**	1:18	315 mm	**Prism** 2	1			
2	*Avvocano*	**133.50**	„	1:18	390 „	„ 2	2			
3	*Avvocaria*	**142.50**	„	1:18	460 „	„ 3	2			
4	*Avvocatore*	**218.00**	„	1:18	632 „	„ 4	3			
5	*Avvocavi*	**395.50**	„	1:18	947 „	„ 5	5			
Sequence: Objective, Reversing System, Revolving Collar.										
6	*Avvolgere*	**165.50**	**Apo-Tessar**	1:9	320 mm	**Prism** 3	4			
7	*Avvolgessi*	**237.00**	„	1:10	460 „	„ 4	5			
8	*Avvolgeva*	**392.50**	„	1:10	640 „	**Mirror** 6	9			
9	*Avvolgiamo*	**583.50**	„	1:10.5	840 „	„ 7	9a			
10	*Avvolgo*	**896.50**	„	1:12.5	1170 „	„ 8	10			
11	*Avvolpina*	**1789.50**	„	1:15	1800 „	„ 9	11			
12	*Avvolsero*	**437.50**	**Apo-Planar**	1:7	417 „	**Prism** 5	6			
13	*Avvolsi*	**482.50**	„	1:9	590 „	**Mirror** 6	9			
14	*Avvolta*	**860.50**	„	1:10	800 „	„ 7	9a			

Supplemented by three light-filter cells to slip on front of objective mount.

1	*Avvoltando*	**338.50**
2	*Avvoltato*	**485.50**
2a	*Avvolterai*	**738.00**
3a	*Avvoltiate*	**1209.50**
4	*Avvoltossi*	**1760.50**
—	—	—
2	*Awaked*	**686.00**
3	*Awanting*	**947.00**
3a	*Awash*	**1487.00**

Focussing Glasses.

1041

Focussing Glass A
× 6, 3/4 full size.

Focussing Glass A. Magnification × 6, × 10, or × 16. It is used for sharply focussing the image on the ground-glass screen (× 6 and × 10 magnification), and the examination of negatives required for reproduction (× 10 or × 16 magnification).

Directions. — The milled clamping ring *a* is screwed upwards and the lens placed upon the ground-glass screen and sharply focussed by screwing the cell in or out by means of the projecting upper edge. When the correct adjustment has been found, the milled ring *a* is tightened up again.

Focussing Glass B. Magnification × 6. This glass serves for general purposes both with reflected and transmitted light. According to requirements Focussing Glass B is placed either into the tripod stand, provided with a screw holdfast, or into the spring cylinder or into the socket holder with handle. In the latter case it forms a useful reading glass.

1156

Focussing Glass B
× 6.

1154

Tripod Stand.

1155

Spring Cylinder.

1157

Socket Holder with Handle.

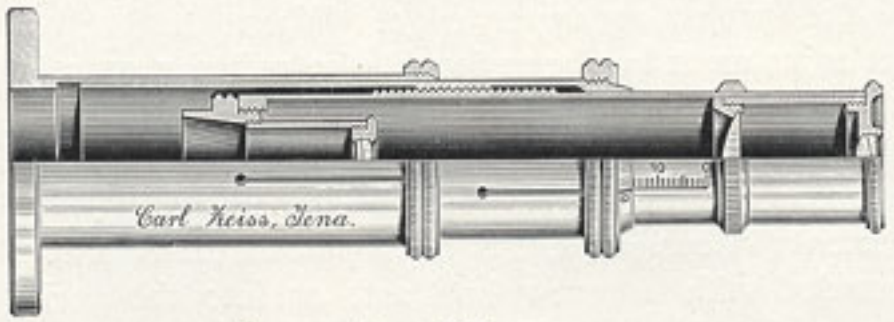
Magnification	Diameter of Lenses mm	Diameter of Lenses in.	Focus mm	Focus in.	Focussing Glass A Codeword	Focussing Glass A Price $	Focussing Glass B Codeword	Focussing Glass B Price $
× 6	21	13/16	42	1 5/8	*Atoladico*	**9.50**	*Atoll*	**6.50**
× 10	11	7/16	25	1	*Atoleimado*	**9.50**	—	—
× 16	9	5/16	15	9/16	*Atoleiro*	**9.50**	—	—

Accessories to Focussing Glass B.

Tripod Stand	Codeword: *Atome*	Price: $	**1.00**
Spring Cylinder	„ *Atometto*	„ „	**1.00**
Socket Holder with Handle	„ *Atomico*	„ „	**1.00**

Focussing Microscopes.

In many cases it is found that the simple focussing glass fails to satisfy the requirements of copying processes. Sometimes the magnification is insufficient, or inconvenience may be experienced in using the lens owing to the necessity of having to bring the eye close to the object under examination. The **Focussing Microscope**



1042

Focussing Microscope
(about $^1/_2$ full size).

remedies both defects, as it has a magnifying power equal to about 28 diameters and allows of the eye being kept at a convenient distance from the image under examination.

This focussing microscope is an almost indispensable requisite for the finer classes of half-tone and other autotype process work, in which it is necessary that the distance of the ruled screen from the negative plate should be accurately maintained over the entire surface of the plate and which demand, in order to ensure precision, a careful adjustment of the half tone dot. The microscope will also render good service by affording ease and comfort in the examination of half-tone negatives.

Price of Focussing Microscope: **Dollars 23.50.**
Codeword: *Aluminico.*

Tele-photographic Objectives.

The tele-photographic objective consists of[1]

1. the **positive element** (a photographic objective) and
2. the **negative element** (a dispersive lens).

The negative element invariably has a shorter focus than the positive element.

These two optical elements are screwed into the ends of the **tele-photographic tube-mount,** which is longitudinally adjustable. By varying the length of the tube the focal length of the system can be varied within very wide limits.

The characteristic construction of the tele-objective invests it with the following three important features:

1. The tele-objective affords an extraordinarily wide range of foci.
2. The camera extensions being equally short in both cases, the tele-objective yields a more natural perspective than the ordinary photographic objective where large figures (portraits, &c.) are concerned, the size of the images being equal.
3. The required camera extension is very small in proportion to the resulting equivalent focus of the tele-objective and amounts, in fact, to only a fraction of the focal length when the tele-objective is focussed for very distant objects. This fraction is approximately expressed by the formula:

$$\frac{\text{Focus of tele-negative}}{\text{Focus of tele-positive}} = \frac{1}{\gamma}.$$

The tele-objective is thus eminently suitable for taking **large portraits, views of distant landscapes,** and **architectural details.**

In regard to correction the tele-objectives are somewhat inferior to any well-corrected photographic objective of ordinary construction Tele-objectives are not so rapid, yield less brilliant and finely defined pictures, and afford only a restricted field (cover small plates only).

The **magnification** γ is a factor which exercises great influence on the quality and extent of the area of the field sharply covered. With otherwise equal conditions as to equivalent focus, relative aperture and identical positive elements in different tele-objectives, the area of the field and of the sharp image will generally decrease (the plate covered be smaller) in proportion to any increase in the amount of γ that may be selected.

[1] For the sake of brevity the component elements of the tele-photographic objective will hereafter be referred to as the "tele-positive" and the "tele-negative" resp.

Positive Components

of Tele-Objectives.

1048

For Tele-Tube-Mounts III and IV, as also for Tele-Adapter II.

1049

For Tele-Adapter I.

For architecture and landscape photography, in which it is imperative that there shall be no distortion of straight lines near the margin of a picture, a rapid photographic double objective should be employed, such as will be found in our Series I^a, I^c, II^b, III^a or VII^a.

Tele-Negative,

adapted for combination with photographic objectives.

Our tele-negative possesses a large diameter of the lenses in comparison to its focal length, the former being approximately one half of the latter. Any tele-combination of which it is a component possesses, therefore, a comparatively large field of view. As, again, spherical and chromatic aberrations are thoroughly eliminated, the negative component here brought to notice guarantees the good optical and photographic capacity of any combination, providing the positive element itself is well corrected.

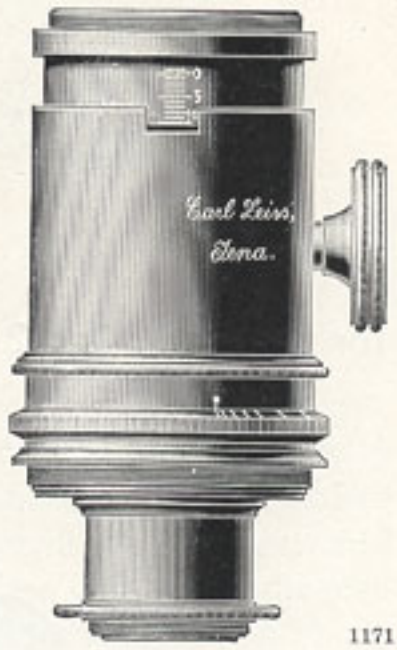
1174

Tele-negative No. 3, $f = -60$ mm (full size).

If a photographic double objective supply the positive element, the tele-negative should be screwed into the tube-mount with its engraved edge nearest to the double objective.

No.	Tele-negative Codeword	Price $	Diameter of Lenses mm	Diameter of Lenses in.	Focus mm	Focus in.	Adapted for Tube-mount
1	*Anegaban*	**12.50**	15	$^5/_8$	27	$1^1/_{16}$	III
2	*Anegadas*	**14.50**	24	$^{15}/_{16}$	45	$1^3/_4$	I, II, III
3	*Anegares*	**18.00**	30	$1^3/_{16}$	60	$2^3/_8$	I, II, III
4	*Anegase*	**30.50**	37	$1^7/_{16}$	75	3	III, IV
5	*Anegaseis*	**54.00**	50	2	100	4	IV
6	*Anegazione*	**79.50**	63	$2^1/_2$	125	5	IV, V

Tele-Tube-Mounts.



1171

Tele-tube-mounts III and IV are fitted with a rack and pinion movement, so as to facilitate variations of length. The short build of the mount gives an absolute guaranty of the thorough rigidity of the entire photographic system. The tube is provided with a millimetric scale, on which variations in its length may be read off in millimetres; the tube is at its shortest length when the index points to 0. By the aid of the millimetre scale the **resulting focal length of any tele-objective combination** corresponding to a given tube length can be accurately determined.

The positive element screws into the movable inner tube at the front of the mount, either directly or by the interposition of an adapter tube, the negative element being attached, also by means of an adapter, at the opposite end (that bearing the flange thread).

The adapter tubes, if supplied as parts of a given combination, are so adjusted, that when the tube-mount is in its shortest position (adjusted to 0) the tele-objective acts as a telescopic system. The millimetre scale on the tube thus indicates the optical interval △ of the tele-objective.

Tele-tube-mounts III and IV are constructed as described above. They apply generally to stand cameras with long bellows extension and mainly to plates above the 9×12 cm ($3^1/_2 \times 4^3/_4$ in.) size.

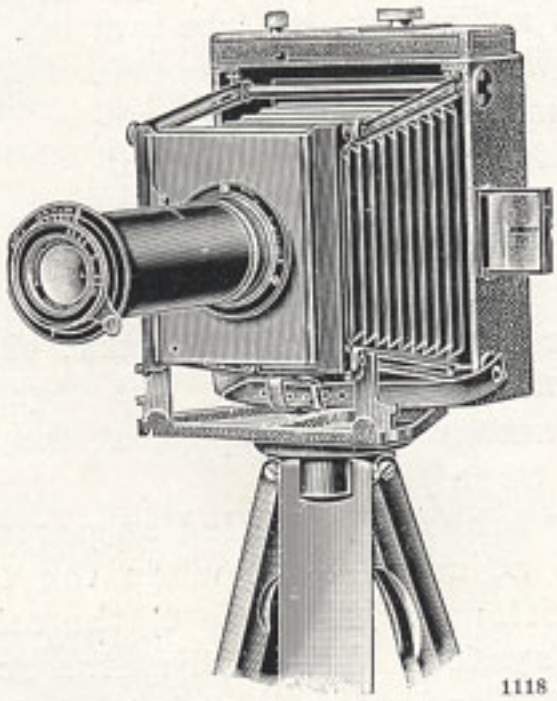
If the positive element be provided with a diaphragm, as is generally the case with photographic objectives, it is not absolutely necessary that the tele-tube-mount should also be fitted with an iris-diaphragm.

No.	Description	Without Iris-diaphragm		Fitted with Iris-diaphragm		Diameter of Tube		Length of Tube		Variable Extension of Tube	
		Codeword	Price $	Codeword	Price $	mm	in.	mm	in.	mm	in.
1	Tele-tube-mount III	*Atufarias*	**21.50**	*Atufaste*	**25.50**	49	$1^{15}/_{16}$	76	3	20	$^3/_4$
2	Tele-tube-mount IV	*Atufaron*	**48.50**	*Atulhado*	**54.00**	82	$3^1/_4$	113	$4^1/_2$	30	$1^1/_8$

The extra cost of adaptation amounts to about **2.00 — 3.50 Dollars.**

Tele-Adapters

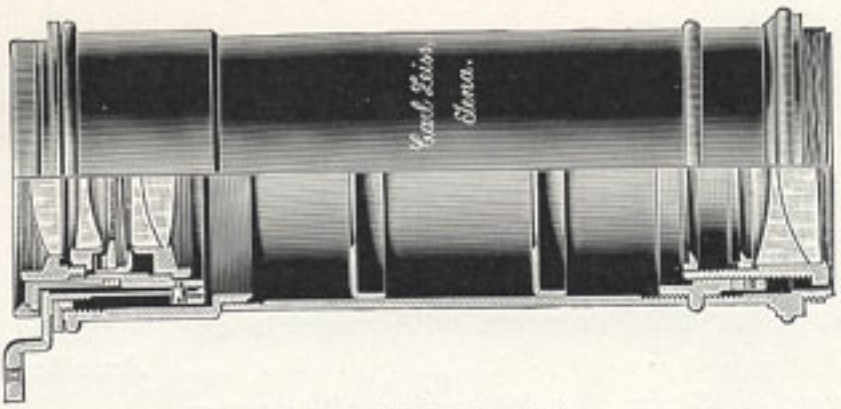
for 6×9 and 9×12 cm and 3¼×4¼ and 4×5 in. Cameras.



1118

Minimum-Palmos 9×12 cm with Tele-Adapter I, Base Board, and Stand.

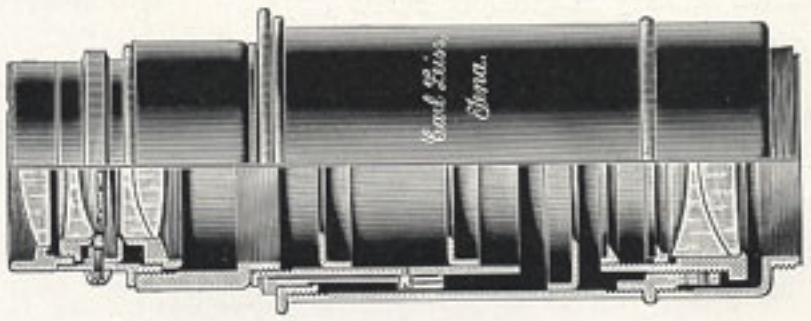
The rapid photographic objective (a double objective) belonging to the camera can be conveniently applied to the uses of the positive element of a tele-objective combination by the medium of our tele-adapters I or II.



1177

Tele-Adapter I
for Objectives in Special Mount A.

Tele-Adapter I consists of a metal tube not variable in length, lacquered black both inside and out, and fitted on the inside with several fixed diaphragms, which cut off detrimental light reflected from the sides of the tube. The negative element is to be screwed into the end bearing the screw thread, the other end being intended to receive the Zeiss objective of the hand camera contained in the Special Mount A. The length of the tube is adjusted corresponding to the extension of the camera in question, and the focussing adjustment of Special Mount A is immediately available with the resulting tele-objective combination for focussing the image in accordance with the estimated distance.



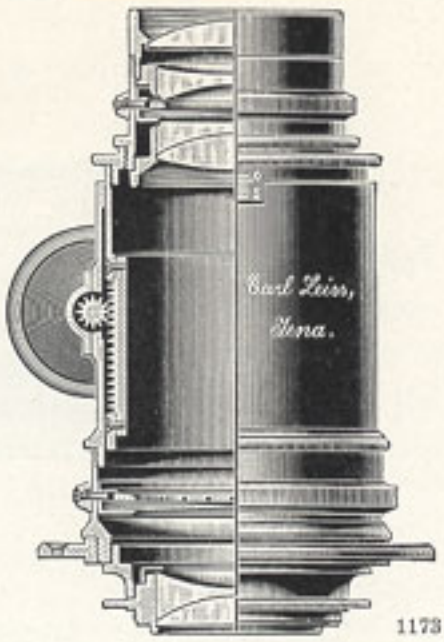
1176

Tele-Adapter II
for Objectives in Standard Mount.

Tele-Adapter II differs from the preceding merely in the matter of the tube being variable in length, namely to the amount of 12 mm. In connection with this feature a short focussing sleeve with a scale ranging from 5 to 17 mm, on which the variations of length may be read off, is fitted at the end where the objective in Standard Mount is screwed on. As the figures 5 to 17 denote the optical interval $\triangle$ of the tele-objective, the distance of the objective from the negative element is regulated accordingly.

Those further interested in the subject are referred to our special prospectus relating to Tele-Adapters and Accessory Appliances.

Complete Tele-Objective Combinations.



1173

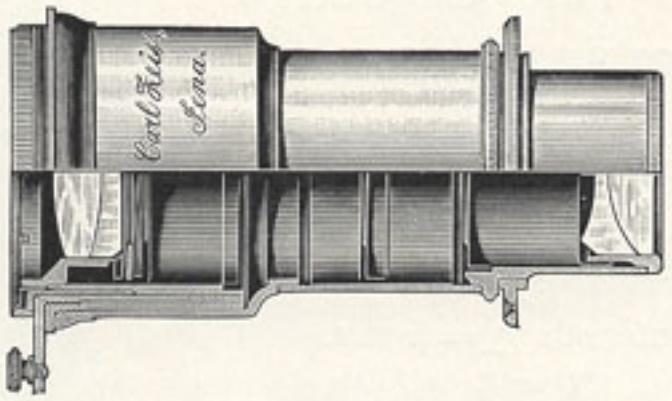
Tele-Objective consisting of
Tele-tube Mount III, Tessar 1:6.3, $f = 150$ mm
and Tele-negative $f = -60$ mm,
Optical Interval: $\triangle = 5$ mm.

Resulting Focus $= \frac{150 \times 60}{5}$ mm $= 1800$ mm.

Codeword	Price ℳ	Positive Element: Series and No.	Positive Element: Focus mm	Positive Element: Focus in.	Negative Element: Focus mm	Negative Element: Focus in.	Magnification γ	Size of Plate covered in. × in.	Nature of Work
For 8×10 to 13×18 cm Plates									
Tele-tube-Mount III with Iris		**in Standard Mount**						Camera Extension 30 cm = 11.8 in.	
Attenetevi	**92.00**	Ic, 15	150	6	60	2 3/8	2.5	5×7	
Attenevamo	**81.00**	IIb, 5	150	6	60	2 3/8	2.5	5×7	
Attenodite	**95.50**	IIb, 5a	180	7 1/8	60	2 3/8	3.1	5×7	
Attentabo	**119.00**	IIb, 6	210	8 1/4	75	3	2.8	5×7	
Attentat	**122.50**	VIIa, 8	179	7	60	2 3/8	3.1	5×7	
Attentezza	**142.50**	VIIa, 10	200	7 7/8	75	3	2.7	5×7	Landscapes and Architectural Details
Tele-adapter I		**in Special Mount A**						Camera Extension 15 cm = 5.91 in.	
Attentioni	**61.50**	IIb, 4	136	5 3/8	45	1 3/4	3.0	3 1/8×4	
Attently	**78.00**	Ic, 5	150	6	60	2 3/8	2.5	3 1/8×4	
Attentorum	**66.50**	IIb, 5	150	6	60	2 3/8	2.5	3 1/8×4	
Tele-adapter II		**in Standard Mount**							
Attenuammo	**61.50**	IIb, 4	136	5 3/8	45	1 3/4	3.0	3 1/8×4	
Attenuates	**77.50**	Ib, 15	150	6	60	2 3/8	2.5	3 1/8×4	
Attenuava	**66.50**	IIb, 5	150	6	60	2 3/8	2.5	3 1/8×4	
Attenzione	**108.00**	VIIa, 8	179	7	60	2 3/8	3.1	3 1/8×4	
For Plates 16×21 cm and upwards									
Tele-tube-Mount IV with Iris		**in Standard Mount**						Camera Extension 40 cm = 15.75 in.	Architecture and and Landscape
Atterentem	**273.50**	Ic, 18	300	11 3/4	100	4	3.0	7×9 1/2	
Attergammo	**234.00**	IIb, 8	305	12	100	4	3.0	7×9 1/2	

A short delay is unavoidable in the execution of orders for complete tele-combinations. — Existing parts to be utilised must be forwarded to us for adaptation.

Tele-objectives in conjunction with Tube-mount IV work with greater rapidity, under similar conditions as to focal length, than tele-objectives in Tubes I, II, and III. They also provide, by equal magnification, for larger object distances and shorter camera extension.



1151

The Zeiss Special Tele-Objective.

The **light-gathering power** of the tele-combination just described suffices for free-hand exposures in bright sunlight only, so that one is most generally restricted to exposures on the stand, which means **time exposures.** In taking photographs of high mountain scenery, architecture, &c., this limitation would not be felt irksome; when, however, such objects as **animals in natural freedom, balloons,** and **portraits** are in question, the said tele-combinations are apt to be found wanting. The **Zeiss Special Tele-Objective** is qualified to fill this gap in respect of objects of the latter category. It possesses greater rapidity and yields satisfactory definition even at its full aperture. In point of construction it differs from the other combinations in so far as its positive element cannot be used separately as a photographic objective, and in the combination as a whole being corrected only for the one focal length exclusively employed.

The Special Tele-objective 1:14, f=45 cm (17$^3/_4$ in.), will just barely cover a 9×12 cm plate, but by stopping down its covering power will be rendered amply sufficient. For architectural work the tele-combination formed in conjunction with a photographic double objective is certainly preferable.

Zeiss Special Tele-Objective 1:14 f=45 cm (17$^3/_4$ in.,) lens diameter 32 mm (1$^1/_4$ in.), with iris-diaphragm and a fitting for adjustment to the distance of the object.
Codeword: *Ansfried* . . . . . **Dollars 69.00.**

Goergen's Central Shutter, fitted to slip on the front of the objective mount, aperture 60 mm (2$^3/_8$ in.). Codeword: *Ansiaron* . **Dollars 8.50.**

Zeiss Special Tele-Camera 9×12 cm, with focal plane shutter and Zeiss Special Tele-Objective 1:10, *f*=80 cm (31½ in.), for animal photography from somewhat great distances . . . . . **Dollars 324.00.**

While no extra expense is incurred when purchasing a new Minimum Palmos 9×12 cm, subsequent adaptation to a camera of the Special tele-objective is charged for at 3.50 Dollars, unless the special objective mount is already fitted to unscrew. The cost of adaption to a Stereo-Palmos 9×12 cm is 3.50 Dollars.

Coloured Screens.

With a view to moderating the pronounced unnatural contrasts produced in the negative by differences in colour and variations of intensity, coloured glass discs are applied in front of the objective. Yellow is the colour most generally employed and we supply glasses of that shade in three different tints, viz: light, medium, and dark. In comparison to the period of exposure demanded when working without them, these screens necessitate a prolongation of that period 5, 10 and 15 times respectively. If specially desired, we are also prepared to supply screens of other colours at prices but slightly in excess of those charged for the yellow screens recommended.

The material employed in the manufacture of these screens being carefully selected coloured plate glass, the sharpness of definition essential in landscape photography will not be prejudiced by the interposition of these glasses.

The screen discs are mounted in a brass rim, lined with velvet, by means of which they can be inserted into the front of the lens mount.

Coloured Screen to insert into front of lens mount Codeword **hell (light) mittel (medium) dunkel (dark)**	Price $	Adapted for Objectives in Standard Mount No.	
Antacids	**1.00**	0	
Antaeus	**2.00**	I	
Antagoge	**2.00**	II	
Antagonize	**2.00**	III	Larger sizes
Antagoras	**2.50**	IV	to order and
Antalcidas	**2.50**	V and Tele-positive 1	at special rates.
Antalkali	**3.00**	VI	
Antamilla	**3.50**	VII and VIII	
Antandros	**3.50**	IX to XI	

In ordering coloured screens the number of the objective mount and the description of the objective should be given.

1109

Yellow Glass Light-Filters

for Landscape Photography.

Our yellow glass screens prolong the period of exposure rather greatly in proportion to the modification of the action of blue, while our experience with **yellow glass light-filters** has demonstrated that they exert an absorbing effect, even by moderately prolonged exposure, which is absolutely essential in photographing objects displaying an excess of blue tones, in order that the tone of the shading in the negative may correspond with the values of luminosity optically presented in the object.

The glass discs are free from strain and deleterious striae, and they are so carefully ground and so well centred, that these light-filters can be recommended even in the presence of exacting demands as to sharpness of definition. The high cost of raw material and the extra labour involved — the discs have to be cut from large slabs and have to be as accurately ground and polished as the lenses of an objective — necessitate correspondingly higher prices than those charged for yellow screens of plate glass.

Application of the Light filters. In contradistinction to colour photography the yellow glass light-filters are designed for the production of **ordinary photographs.** They are to be recommended for copying coloured pictures, for landscapes embodying dark patches of trees and light buildings, for landscapes with distant view, and for mountain scenery and winter landscapes.

The use of orthochromatic plates is taken for granted.

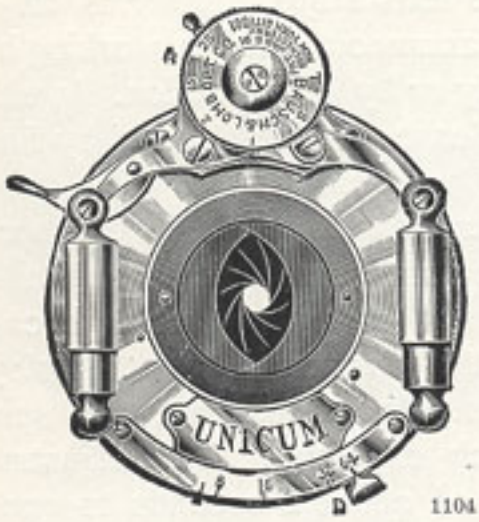
For Objectives in Standard Mount No.	Five-Times Ordinary Time of Exposure		Ten-Times Ordinary Time of Exposure	
	Codeword	$	Codeword	$
0	*Antealtar*	**3.00**	*Antelogium*	**3.50**
I	*Anteantier*	**3.50**	*Antelucano*	**4.00**
II	*Antecalvo*	**4.00**	*Antemetic*	**4.50**
III	*Antecas*	**5.00**	*Antemurale*	**5.00**
IV	*Antecedo*	**5.50**	*Antenarios*	**6.00**
V and Tele-positive 1	*Antecessim*	**6.50**	*Antenati*	**7.00**
VI	*Antecoger*	**7.50**	*Antenifero*	**8.00**
VII and VIII	*Antecristo*	**8.00**	*Antennula*	**9.00**
IX	*Antedico*	**11.00**	*Antenumber*	**12.00**

Yellow Glass Light-filters are set in velvet-lined brass rims, and are inserted into the mount of the front lens of the objective.

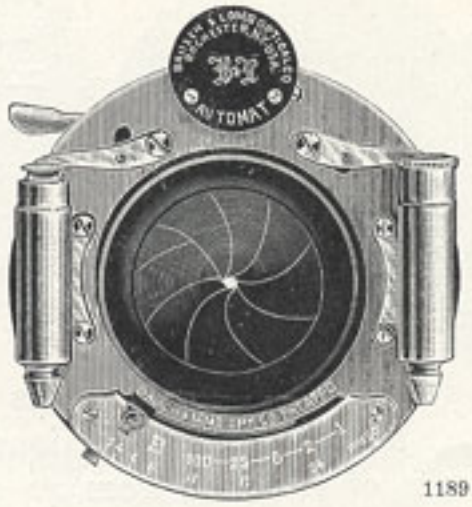
Filters of larger dimensions at correspondingly higher rates.

In ordering glass light-filters the description of the objective and the number of its tube mount should be given.

Bausch & Lomb's Shutters.



1104



1189

The productions of this reputable American Firm, of Rochester, N. Y., have acquired great popularity within the last few years. The Shutters work reliably and noiselessly and are adapted for both instantaneous and time exposures.

An iris-diaphragm is situated behind the shutter laminae, so that this type of shutter may be fitted to advantage between the component lenses of a double objective in substitution for another form of diaphragm fitting.

No.	Largest diameter of iris-aperture		Unicum		Automat	
	mm	in.	Codeword	Price $	Codeword	Price $
1	22	7/8	*Aushau*	**7.50**	*Ausholzen*	**8.50**
2	28	1 1/8	*Aushecken*	**11.00**	*Aushusten*	**14.50**
3	35	1 3/8	*Aushieb*	**16.00**	*Ausiten*	**17.50**

[1] These prices apply to the simultaneous purchase of an objective without its tube mount. It is advisable to let us effect the necessary adaptation, as otherwise we cannot accept responsibility for any eventual defect in the working of the objective.

The Compound Shutter,

by Friedrich Deckel, Munich.

1167

The Compound Shutter is fitted with an iris-diaphragm and is mounted in the plane of the lens stops. It forms an adjustable instantaneous shutter, working both automatically or by spring action. In either case the release can be effected by finger pressure or pneumatically.

When used automatically, the spring need not be compressed, the speed in that case not being adjustable **mechanically.**

When the shutter is to be employed as an adjustable mechanism, the spring must be compressed previously to each exposure. The adjustment admits of variation from an exposure of about 2 seconds to one of about $^1/_{250}$ second.

The mechanical aids producing either automatical or spring action are entirely distinct.

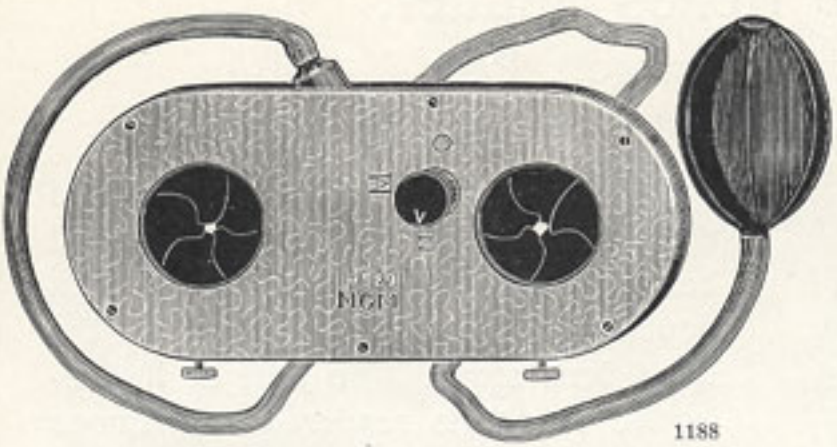
This shutter affords a fourfold facility of application, viz: **prolonged time exposure, limited time exposure, automatic instantaneous exposure,** and **instantaneous exposure under speeds adjustable from 1 to $^1/_{250}$ second.** The data given as to speed cannot, however, be absolutely guaranteed.

No.	Codeword	Price $	Diameter of Largest Aperture mm	in.
0	*Ausonius*	**12.50**	21	$^{13}/_{16}$
1	*Auspex*	**14.50**	25	1
2	*Auspicalis*	**16.50**	32	$1^1/_4$
2[a]	*Auspicate*	**16.50**	36	$1^3/_8$
3	*Auspicium*	**20.00**	42	$1^5/_8$
4	*Ausprahlen*	**21.50**	52	2
Stereo 0	*Ausrammeln*	**21.50**	21	Distance optional between 60 and 85 and 70 and 85 mm resp.
Stereo 1	*Ausrede*	**27.00**	25	

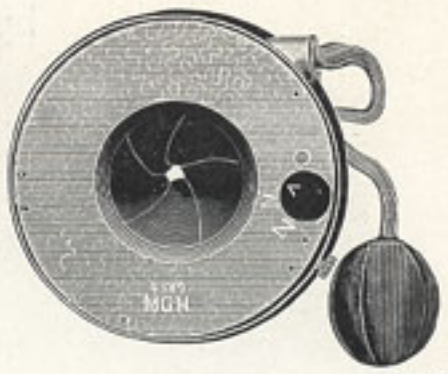
[1] These rates also include adaptation to a Zeiss-objective purchased at the same time without the tube mount. It is advisable to let us effect the adaptation, as otherwise we cannot accept responsibility for any eventual defect in the working of the objective.

The Central Shutter,

by Max Goergen, Munich.



1188



1190

This shutter, which acts with exceptional smoothness and without the least vibration, is recommended for attachment to the front of the objective mount. It is in special request with tele-objectives and with objectives in Special Mounts A, hence also with our **Minimum-Palmos** Cameras.

It is well adapted for time exposures and for instantaneous exposures at varying speeds, down to about $^1/_{20}$ second. It acts automatically, i. e., **without spring action,** and the release is effected pneumatically.

No.	Price incl. Adaptation		Adaptation only	Diameter of Largest Aperture		Attached by a collar to the front of the mounts of objectives not exceeding the size of
	Codeword	$	$	mm	in.	
I	*Bufalinas*	**5.00**	**1.00**	30	$1^1/_8$	Tessar 1:6.3 112 mm
II	*Bufalino*	**5.50**	**1.00**	35	$1^3/_8$	Tessar 1:6.3 150 mm
III	*Buffaloes*	**6.00**	**1.00**	40	$1^9/_{16}$	Tessar 1:6.3 180 mm
IV	*Buffammo*	**6.00**	**1.00**	45	$1^3/_4$	Tessar 1:4.5 180 mm
V	*Buffelkalf*	**6.50**	**1.00**	50	2	Tessar 1:4.5 210 mm
VI	*Bufferemo*	**7.50**	**1.00**	60	$2^3/_8$	Tessar 1:4.5 250 mm
VII	*Bufferesti*	**8.50**	**1.50**	70	$2^3/_4$	Tessar 1:4.5 300 mm
Stereo I	*Bufanda*	**11.00**	**2.00**	30	$1^1/_8$	Tessar 1:6.3 f = 130 mm
Stereo III	*Buffasse*	**12.50**	**2.00**	40	$1^9/_{16}$	Tessar 1:4.5 f = 150 mm

The Koilos Shutter,

by W. Kenngott, Paris.

1170

This sector shutter is provided with an iris-diaphragm and is mounted between the component lenses of a double objective in the plane of the usual lens stops. The tube of the objective mount is rendered superfluous by it.

The shutter is supplied with an air brake, and according to the claims of the maker its speed can be varied between 1 and $^1/_{300}$ second. Time exposures of any desired duration can also be made. The release is effected either pneumatically by pressing a rubber ball, or by finger pressure.

The shutter is both of neat appearance and substantial in make, and its dimensions are very small in comparison with other types.

No.	Codeword	Price[1]	Diameter of Largest Aperture		Clear Diameter of Tube		Diameter of Shutter Casing	
		£	mm	in.	mm	in.	mm	in.
1	*Akodon*	**12.50**	19	$^3/_4$	27.2	$1^1/_{16}$	55.5	$2^3/_{16}$
2	*Akoluth*	**14.50**	25	1	34.5	$1^3/_8$	64	$2^1/_2$
3	*Akoniet*	**17.50**	32	$1^1/_4$	43	$1^{11}/_{16}$	80	$3^1/_8$
4	*Akouan*	**21.50**	42	$1^5/_8$	55	$2^1/_8$	100	4

[1] The prices also include adaptation to a Zeiss-objective purchased at the same time without a tube mount. If the adaptation be entrusted to a third party, we cannot accept responsibility for any eventual defect in the action of the objective.

The Linhof Shutter,

by Val. Linhof, Munich.

This shutter is fitted between the component lenses of an objective. In addition to rapid instantaneous exposures (down to about $^1/_{300}$ second with the smaller numbers) time exposures of any desired duration can also be made. The speed of instantaneous exposures is adjustable mechanically. Release either pneumatically or by finger pressure.

1106

No.	Diameter of iris-aperture		Shutter with iris; Casing of		Price [1] incl. adaptation
			Brass	**Aluminium**	
	mm	in.	Codeword	Codeword	$
0	17	$^{11}/_{16}$	*Axedinis*	*Axiladas*	**14.50**
1[a]	20	$^3/_4$	*Axeman*	*Axilares*	**14.50**
1	25	1	*Axial*	*Axileo*	**15.00**
2	32	$1^1/_4$	*Axicorne*	*Axillary*	**17.50**
3	38	$1^1/_2$	*Axiculo*	*Axinite*	**19.50**
4	44	$1^3/_4$	*Axieros*	*Axinopalpe*	**20.50**
5	51	2	*Axifere*	*Axinotome*	**21.50**
6	60	$2^3/_8$	*Axifugo*	*Axiochus*	**25.00**
7	70	$2^3/_4$	*Axigraphe*	*Axiomatico*	**29.00**

[1] It is advisable to let us effect the requisite adaptation; if entrusted to a third party, we cannot accept responsibility for any eventual defect in the action of the objective. The prices apply to objectives purchased at the same time without the tube mount.

Palmos Cameras.

All our cameras are made of a light metal, and are thus less liable to wear out rapidly.

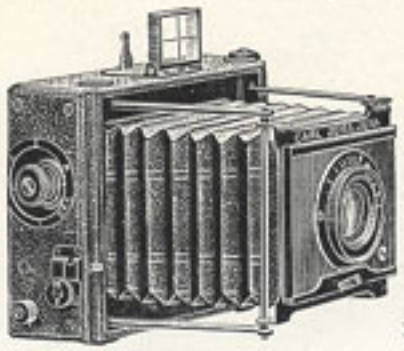
The various models have all been designed with a view to lasting value, independence of the fluctuations in the "fashion" of cameras, handiness, most varied applicability, and reliability of action, besides being quickly made ready for exposure. Models in which these requirements were sacrificed in favour of exaggerated compactness and extreme reduction of weight have never found acceptance with us.

Another feature common to all Palmos cameras is that the various existing types of dark slides can be used alternately without producing focal differences. Thus dry plates, flat films, roll films, packfilms, as well as single films in the Zeiss Pack-Slide, may all be utilised at the option of the operator. Facilities exist throughout for focussing on the ground-glass screen, in addition to which all cameras are provided with distance scales, by means of which a sharp focus may be adjusted in accordance with the estimated distances of objects.

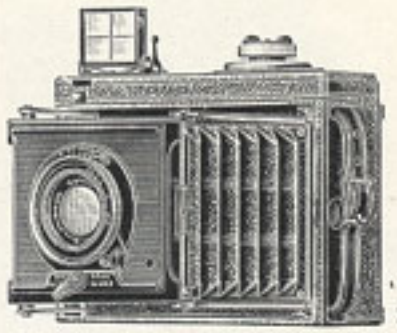
The Minimum and the Stereo-Palmos are equipped with permanent adjustable focal-plane shutters, but the Universal Palmos may be had without.

Our **focal-plane shutters** excel in convenience of manipulation and reliability of action.

The Minimum-Palmos.



1150

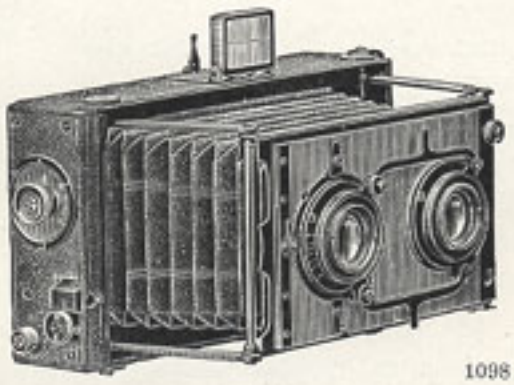


1141

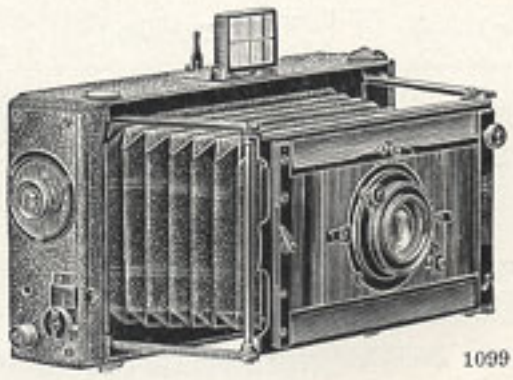
Ready for Exposure.

Minimum-Palmos 9×12 cm, $3^1/_4 \times 4^1/_4$ in., and 4×5 in.

Minimum-Palmos 6×9 or 6.5×9 cm.



1098



1099

Minimum-Palmos 9×18 cm.

9×9+9×9 cm Stereo. **9×18 cm Panoram.**

The **Minimum-Palmos** is a hand camera constructed of **light metal,** with folding front, a focussing objective mount, and focal-plane shutter. It can be equipped with the **most rapid objectives,** the folds of the bellows preventing the effects of reflected light which is always to be apprehended in the case of non-corrugated bellows.

The width of the slit of the shutter is adjustable from the outside and any existing adjustment can always be read on an external scale.

Dry plates, flat films, and roll films being in the same register as the focussing screen, their alternate use is entirely optional.

The **Minimum-Palmos** constitutes a camera for the tourist, as well as for the purposes of the amateur and the professional photographer. It serves for portraits, groups, landscapes, and the taking of moving and of very distant objects (the latter by means of a Tele-adapter). Though primarily designed for free-hand exposure, it is also most suitable for time exposures on a stand. For reproduction, interiors, enlargements, architectural details, &c., it would be advisable to select a stand camera with greatly variable bellows extension, such as the Universal-Palmos 9×12 cm.

The Minimum-Palmos

Focal-plane Shutter fitted for Time Exposure.

Prices of Various Outfits.

6×9 cm* or 6.5×9 cm		9×12 cm or $3^1/_4 \times 4^1/_4$ in.		4×5 in.		9×18 cm Panoram and Stereo 9×9+9×9 cm	
Codeword	Price $	Codeword	Price $	Codeword	Price $	Codeword	Price $

with 3 Double Dark Slides, Leather Case I, and

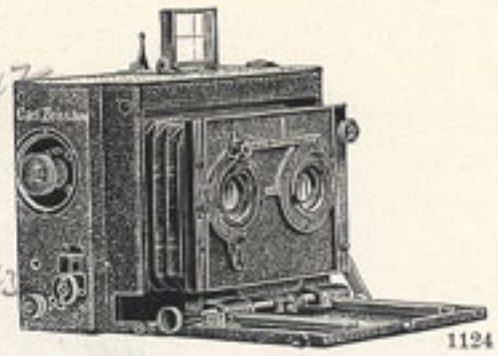
Tessar 1:6.3 f = **112 mm**		**Tessar** 1:6.3 f = **150 mm**		**Tessar** 1:6.3 f = **150 mm**		**2 Tessars** 1:6.3 f = **136 mm**[1]	
Brocaum	**96.50**	*Broccatino*	**102.50**	*Brocchi*	**107.50**	*Brocchinie*	**161.50**

* **Minimum-Palmos 6×9 and 6.5×9 cm resp.** is fitted with a focal-plane safety shutter. The slit remains closed during the operation of winding and is not formed in the width to which it has been set till shortly after the release has been effected. Hence when working with roll or pack films, the draw slide need not be inserted while the shutter mechanism is being wound up.

For details of accessories and their prices see page 74.

[1] One of the two Tessars 1:6.3 f = 136 mm, adjusted as a stereoscopic pair of objectives, is employed for panoramic purposes. The price above includes Doll. 6.00, the value of the coupling of the iris-diaphragms and of the focussing gear.

The Stereo-Palmos 9×12 cm, 3,543×4,743



primarily designed for taking

Stereoscopic Views, each of the 6×9 cm size, 2,362×3,543

is ordinarily equipped with 2 Tessars 1:6.3, $f=84$ mm. It also admits of amplification, so as to form an apparatus for universal purposes. In that capacity it facilitates the taking of

9×12 cm Panoramic Pictures

by means of one of the stereoscopic objectives and

the most rapid Instantaneous Photographs of 9×12 cm size

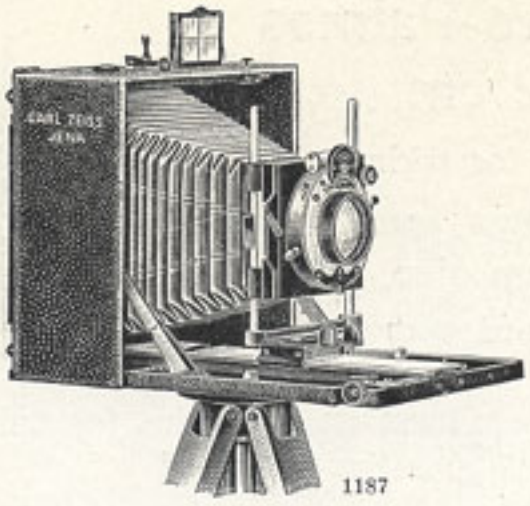
can be taken by the aid of a third rapid objective of greater focal length, such as Tessar 1:6.3, $f=150$ mm.

The camera is made of light metal, and when folded, it forms a compact closed casket. By means of a rack and pinion movement the camera front is extensible on the falling base board from about 6 to 15 cm. The camera is equipped with a focal-plane shutter adapted for both time and instantaneous exposures, the width of the slit being readily regulated and read off from the outside.

Exposures may be made free-handedly or, if need be, on a stand, and the shape of the pictures, whether vertical or horizontal, is quite immaterial.

All having the same register, Palmos double dark slides, roll-holders, pack-film slides, adapters for flat films, and Palmos adapters for the Zeiss Pack Slide can be used alternatively.

	Codeword	Price £
Stereo-Palmos 9×12 cm with focal-plane shutter adapted for instantaneous and time exposure	*Bestechbar*	54.00
Objective Panel for Stereograms, opening for objective 31.5 mm, base 59.5 mm, incl. stereo-partition and iris connecting bar	*Besteck*	3.50
2 Tessars 1:6.3, $f=84$ mm, in Special Mount *B*, Stereoscopically paired	*Besteeksel*	60.50
Objective Panel for a single objective, opening 36 mm . .	*Bestelhuis*	3.50
3 Double Dark Slides	*Bestemaat*	14.00
Leather Case I	*Bestibus*	5.50
Equipment for Stereo and Panoramic Pictures	*Bestiaccia*	141.00
Tessar 1:6.3 $f=150$ mm, in Special Mount *B*	*Bestiagem*	36.00
Equipment for Stereo, Panoram, and Instantaneous Exposures	*Bestiarian*	177.00



1187

The Universal Palmos 9×12 cm

is suitable for all classes of work on the stand, besides being a commodious hand camera. It is made of

Light Metal,

thus giving every guaranty of reliability in use.

When folded, the Universal Palmos forms a compact closed-up casket.

It is **square in build, and is provided with a reversible back for vertical and horizontal pictures; Palmos double dark slides, roll holders, pack-film slides, adapters for flat films, and adapters for the Zeiss Pack Slide** may be used indiscriminately **without fear of focal differences arising.**

The **camera extension** ranges to about 35 cm, so that objectives up to a focal length of 30 cm can be employed. On the other hand, the extension can be adjusted sufficiently short to admit of the application of an objective having a focal length of even 8 cm only.

With **objectives of comparatively long focus** the **fine adjustment** is effected by means of a precise rack and pinion movement.

When **objectives of a focal length of less** than 12 cm are in question it is advisable to drop the falling base of the camera entirely and to substitute the short base runner supplied. In this way the projection of the base into the field of the 9×12 cm plate is obviated. The fine adjustment is effected by means of the focussing adjustment on Special Mount *A*, in which the wide-angle objective should be mounted.

The **approximate focussing** of the image is effected in both cases by the movement of the objective front on the base, the automatic clamping action of the slide being rendered inoperative by pressing the projecting cheeks inwards.

Provision for the displacement of the objective is made on a very ample scale. Either the entire forepart of the camera connected with the bellows is moved, or, after loosening a catch, the objective panel alone.

The objective panel is entirely removable, as is necessary for the purpose of exchange for a second panel equipped with a different objective.

Universal-Palmos	Codeword	Price £
Universal-Palmos 9×12 cm	*Buncombe*	47.00
Double-Protar 1:7, f = 143 mm, with Compound Shutter	*Bunogenia*	75.50
3 Double Dark Slides	*Bundesrath*	14.00
Leather Case I	*Bupaeda*	6.00
Universal-Palmos Set	*Bunyon*	142.50
Adapter for a Wide-angle Objective	*Bundriem*	2.00
Protar 1:18, f = 86 mm, in Special Mount A, incl. objective panel	*Bundsmann*	27.50
Supplemental Equipment for Wide-angle Work	*Buniadis*	29.00

For further details and prices see page 76.

Dark Slides and Adapters.

The Palmos Double Dark Slide is made of black wood, and its vulcanite shutter can be entirely withdrawn. It either takes dry plates or flat films, which latter are inserted into the slide by means of our **film carriers** (of aluminium), the register being the same for both.

The Palmos Roll Holder is both light and compact, and is in register with the Palmos double dark slide. Its manipulation is simple and commodious. The serial number of the roll film should be in the centre of the illuminated field.

The Palmos Pack-film Adapter is designed for the Premo pack-film of the Kodak Co. and facilitates a convenient means of the daylight changing of cut films (up to 12 in a pack). This adapter, again, is in register with the Palmos double dark slide.

The Adapters for simple Sheet Metal Slides are combined with a ground-glass screen, which automatically bounds into register immediately the slide is removed.

The Palmos Adapters for the Zeiss Pack Slide, also, are provided with a ground glass screen. The Zeiss pack slide itself is a single dark slide, made of paper, which is supplied by dealers ready loaded with a film. This new item supplies a convenient means of the daylight changing of flat films and provides for the separate treatment of each exposure. The compactness and lightness of the article ensure convenience and success in working.

For prices see pages 74 to 76.

The Zeiss Pack Slide.

The Zeiss Pack Slide is a thin single dark slide, absolutely light-tight, made of black paper, whose draw shutter envelopes the film. It facilitates daylight changing, combined with the separate treatment of each exposure.

The Zeiss Pack Slide, ready loaded with a film, may be obtained from any dealer in photographic requisites.

It is placed in the camera in the position required for exposing the film by means of a special adapter, provided with a ground-glass screen.

With the pack slide removed, the screen is in the focal plane of the objective, so that the image can be sharply focussed on the screen previous to the introduction of the slide.

Films in the Zeiss Pack Slide.

Loaded with	Codeword	Price per packet for 6 Exposures $	Codeword	Price per packet for 12 Exposures $
Austin Edwards' Films	*Backboards*	1.00	*Backgabel*	1.50
Agfa Cut Films	*Backbone*	1.00	*Backgeld*	1.50
Perorto „Green Seal" Films (orthochromatic and for instant. exposures	*Backenbart*	1.00	*Backhecht*	2.00
Vogel-Obernetter Silvereosin Films. About 8 days' notice required, as the pack slide must always be newly filled	*Backenmaus*	1.00	*Backhitze*	2.00
Palmos Adapter 9×12 with ground-glass screen . . .	*Backened*	5.50		
Fitting the Adapter to a Palmos camera of older construction	*Backening*	1.00		

Fitting the Adapter to cameras of other makers is charged for according to the extent of alteration required.

Films in the Zeiss Pack Slide are always supplied without legal warranty of any kind, expressed or implied, and cannot be exchanged.

The Firm of Otto Perutz, Dry Plate Manufactory, Munich, supplies orthochromatic films in Zeiss Pack Slides direct.

Palmos Cameras and Accessories.

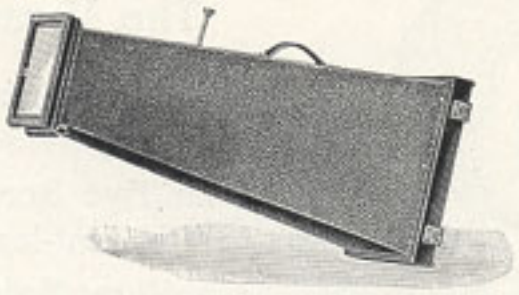
	Codeword	Price $
Minimum-Palmos 6×9 cm or 6.5×9 cm, slit closed in winding shutter, time exposure	*Broached*	45.00
Double Dark Slide 6×9 cm	*Basaltite*	3.50
„ „ „ 6.5×9 cm	*Basaltkeil*	3.50
Cut Film Carrier 6×9 cm, to insert in double dark slide	*Blancardo*	0.50
„ „ „ 6.5×9 cm, „ „ „ „ „ „	*Blanchir*	0.50
Roll Holder 6×9 cm	*Bollaba*	12.00
Adapter for Metal Dark Slides 6×9 cm	*Blechhaube*	7.50
Sheet Metal Dark Slide 6×9 cm	*Blechfeuer*	0.50
Pack-Film Adapter for Premo Pack Films 6×9 cm . .	*Bakbeest*	6.00
Tessar 1:6.3 f=112 mm in Special Mount *A*	*Adiabenos*	36.00
„ 1:4.5 f=112 mm „ „ „ „	*Adehesaron*	39.50
Tele-Adapter I for Tessar 1:6.3 f=112 mm, in unscrewable Special Mount *A*, with Tele-negative, f=45 mm. For Landscape and Architecture	*Anscheines*	23.50
Leather Case I, extra stout leather, fitted for Minimum Palmos 6×9 cm or 6.5×9 cm with 3 double dark slides	*Brodeuse*	5.00
The same, to carry 6 double dark slides	*Brodiglia*	6.50
Leather Case II, thin leather with cardboard and cloth insertion, fitted for Minimum Palmos 6×9 or 6.5×9 cm with 6 double dark slides	*Brocanteur*	5.00
Minimum-Palmos 9×12 cm or $3^1/_4$×$4^1/_4$ in.	*Broadly*	43.50
Double Dark Slide 9×12 cm	*Broggling*	5.00
„ „ „ $3^1/_4$×$4^1/_4$ in.	*Brogliava*	5.00
Cut Film Carrier 9×12 cm, to insert in double dark slide	*Blamons*	0.50
„ „ „ $3^1/_4$×$4^1/_4$ in.	*Blandation*	0.50
Roll Holder 9×12 cm	*Brons*	14.00
Adapter for Zeiss Pack Slides 9×12 cm	*Bakery*	5.50
Adapter for Metal Dark Slides 9×12 cm	*Blechleist*	7.50
Sheet Metal Dark Slide 9×12 cm	*Blechlampe*	0.50
Adapter for Metal Dark Slides $3^1/_4$×$4^1/_4$ in.	*Bleekende*	7.50
Sheet Metal Dark Slide $3^1/_4$×$4^1/_4$ in.	*Bleekerin*	0.50
Pack-Film Adapter for Premo Pack Films 9×12 cm, Zeiss manufacture	*Bakblik*	7.50
Pack-Film Adapter for Premo Pack Films $3^1/_4$×$4^1/_4$ in. Kodak make	*Bakchides*	4.50
Tessar 1:6.3 f=136 mm in Special Mount *A*	*Adiacente*	38.00
„ 1:6.3 f=150 mm „ „ „ „	*Adiactinic*	39.50
„ 1:4.5 f=150 mm „ „ „ „	*Adeheso*	51.00
Tele-Adapter I with Tele-negative, f=60 mm. For landscape and architecture	*Anseatiche*	27.00

Palmos Cameras and Accessories	Codeword	Price $
Zeiss Special Tele-Objective 1:14 f = 45 mm, lens diameter 32 mm, with iris-diaphragm and sharp focussing attachment, just covering a 9×12 cm plate. For snapshots of moving objects	*Ansfried*	69.00
Leather Case I, extra stout leather, fitted for Minimum Palmos 9×12 cm or 3¼×4¼ in. with 3 double dark slides	*Brodolosa*	5.50
The same to accommodate 6 double dark slides	*Brodone*	7.50
Leather Case II, thin leather with cardboard and cloth insertion, fitted for camera and 6 double dark slides	*Brutely*	6.00
Minimum-Palmos 4×5 in.	*Broadside*	47.00
Double Dark Slide 4×5 in.	*Broidery*	5.00
Cut Film Carrier 4×5 in., to insert in double dark slide	*Blandezas*	0.50
Adapter for Metal Dark Slides 4×5 in.	*Bleekgroen*	8.00
Sheet Metal Dark Slide 4×5 in.	*Bleekheid*	0.50
Roll Holder 4×5 in.	*Bronstig*	15.00
Pack-Film Adapter for Premo Pack Films 4×5 in. Kodak make	*Bakenstok*	4.50
Tessar 1:6.3 f = 150 mm in Special Mount *A*	*Adiactinic*	39.50
„ 1:4.5 f = 150 mm „ „ „ „	*Adeheso*	51.00
Tele-Adapter I with Tele-negative, f = 60 mm. For landscape and architecture	*Anseatiche*	27.00
Leather Case I, extra stout leather, fitted for Minimum Palmos 4×5 in. with 3 double dark slides	*Broederkus*	6.00
The same to accommodate 6 double dark slides	*Broeibak*	8.00
Leather Case II, thin leather with cardboard and cloth insertion, fitted for Minimum Palmos 4×5 in. with 3 double dark slides	*Brutalidad*	5.00
The same to accommodate 6 double dark slides	*Brutescis*	6.50
Minimum-Palmos 9×18 cm for Stereo and Panoram	*Bronzify*	52.50
Double Dark Slide 9×18 cm	*Broileth*	6.00
Cut Film Carrier 9×18 cm, to insert in double-dark slide	*Blandices*	0.50
Adapter for Metal Dark Slides 9×18 cm	*Bleekloon*	9.00
Sheet Metal Dark Slide 9×18 cm.	*Bleekster*	0.50
Roll Holder 9×18 cm	*Bronsttijd*	20.00
Tessar 1:6.3 f = 136 mm, in Special Mount *A*	*Adiacente*	38.00
Stereoscopic Pairing of two Tessars	—	3.00
Coupling Bars for Diaphragms and Focussing Gear	—	6.00
Leather Case I, extra stout leather, fitted for Minimum Palmos 9×18 cm with 3 double dark slides	*Broekeloos*	7.50
The same to accommodate 6 double dark slides	*Broekgalg*	9.50
Leather Case II, thin leather with cardboard and cloth insertion for Minimum Palmos 9×18 cm and 6 double dark slides	*Bruteness*	7.50

Palmos Cameras and Accessories	Codeword	Price $
Stereo-Palmos 9×12 cm, with focal-plane shutter. Dark Slides, &c., as for Minimum Palmos 9×12 cm.	*Bestechbar*	54.00
2 Tessars 1:6.3, *f*=84 mm, in Special Mount *B* and stereoscopically paired	*Besteeksel*	60.50
Objective Panel for stereo-exposures, diameter of openings 31.5 mm, base 59.5 mm, with stereo-partition and iris coupling bar	*Besteck*	3.50
Objective Panel for a single objective, diameter of opening 36 mm, available for Tessar 1:6.3, *f*=84 mm and *f*=150 mm	*Bestelhuis*	3.50
Tessar 1:6.3 *f*=150 mm, in Special Mount *B*	*Bestiagem*	36.00
Tele-Adapter II for Tessar 1:6.3 *f*=150 mm in unscrewable Special Mount *B*, incl. Tele-negative, *f*=60 mm	*Bestiasse*	30.50
Objective Panel with opening for tele-adapter II	*Bestiating*	3.50
Leather Case I, extra stout leather, fitted for Stereo-Palmos 9×12 cm with 3 double dark slides	*Bestibus*	5.50
Leather Case II, leather with cardboard and cloth insertion, fitted for Stereo-Palmos 9×12 cm with 3 double dark slides	*Besteria*	4.50
Universal-Palmos 9×12 cm Dark Slides, &c., as for Minimum Palmos 9×12 cm.	*Buncombe*	47.00
Double-Protar 1:7 *f*=143 mm	*Appomicio*	61.50
Compound Shutter, 24 mm Aperture	*Auspex*	14.50
Tele-Adapter II with Tele-negative, *f*=60 mm	*Ansellia*	30.50
Zeiss Special Tele-Objective 1:14 *f*=45 cm, 15 cm extension, for instantaneous exposures	*Ansfried*	69.00
Protar 1:18 *f*=86 mm, in Special Mount *A*	*Agruma*	26.50
Runner Adapter for the wide-angle objective	*Bundriem*	2.00
Objective Planel for Protar 1:18, *f*=86 mm	*Buoyed*	1.00
Slit Shutter to attach to the after part of Universal Palmos 9×12 cm	*Bunzingval*	21.50
Leather Case I, extra stout leather, fitted for Universal-Palmos 9×12 cm with 3 double dark slides	*Bupaeda*	6.00
Leather Case II, leather with cardboard and cloth insertion, fitted for Universal Palmos 9×12 cm with 3 double dark slides	*Bupariti*	5.00
Walking Stick Tripod of brass tubing	*Bustaribus*	9.00
Wooden Tripod, specially light, but rigid	*Busticetum*	4.50

Portable Enlarging Apparatus.

This enlarging apparatus consists of an elongated conical wooden box, covered with keratol. The negative or diapositive to be enlarged is inserted at the narrow end, the positive paper or dry plate on which the enlargement is to be made being placed in the opposite larger opening. Between the two a photographic objective is fitted to a board which divides the interior into two light-tight compartments.



1055

The arrangement is such, that a sharply defined enlarged image of the original negative is projected upon the positive paper or dry plate employed.

The length of the apparatus being a fixed quantity, the scale of enlargement cannot be varied. But if, for instance, the apparatus be constructed for the twofold enlargement of a 9×12 cm plate, it admits of enlargement of 4×5 cm originals to 8×10 cm, 6×9 to 12×18, 9×12 to 18×24.

Maximum Size of Negative cm×cm	Negative of Maximum Size enlarged to cm×cm	Scale of Enlargement	Optical Equipment	Codeword	Price $
6×8 ($2^3/_8$×$3^1/_8$ in.) (will take 6×9)	18×24 (7×$9^1/_2$ in.)	3-fold	**Aplanatic Objective** **Protar** $^1/_9$ f = 95 mm **Without Objective**	*Bergader* *Bergamota* *Bergauf*	**27.00** **38.00** **16.50**
9×12 ($3^1/_2$×$4^3/_4$ in.)	18×24 (7×$9^1/_2$ in.)	2-fold	**Aplanatic Objective** **Protar** $^1/_9$ f = 120 mm **Without Objective**	*Bergbild* *Bergbote* *Bergdorp*	**30.50** **43.50** **20.00**
9×12 ($3^1/_2$×$4^3/_4$ in.)	30×40 ($11^7/_8$×$15^3/_4$ in.)	3.3-fold	**Aplanatic Objective** **Protar** $^1/_9$ f = 120 mm **Without Objective**	*Bergeisen* *Bergeron* *Bergfels*	**34.50** **47.00** **23.50**

The adaptation of any other objective of **suitable** focus is undertaken at suitable rates.

The Verant.

The Verant, introduced by us in 1903 at the suggestion of Professor Gullstrand, is an instrument for the examination of photographs which were taken with objectives having a focal length considerably shorter than the distance of distinct vision (25 cm = about 10 in.). Given a judicious choice (in respect of focal length) of the Verant-lens, the Verant will present the image to view under the same angle as that under which it was originally projected by the objective, and thus an impression true to nature will be conveyed.

130

The Verant consists of:

The **Verant-lens** with an eye cap,

an **Eye Screen** into which the Verant-lens is screwed,

a **View Holder** adapted for vertical and horizontal pictures,

a **Focussing Slide,** and

a **Wire Framework** by means of which the movable components — the eye screen, the view holder, and the focussing slide — are assembled.

The **Verant Magnifier** consists of a Verant-lens with eye cap joined to a handle. It is applied to the same purposes as the Verant, but its successful use depends on its being held before the eye in appropriate relation to the picture, which demands a certain facility

1180

to be acquired by practice. By virtue of its command of a large and sharp field of view the lens answers admirably the purposes of a reading glass.

When using the Verant or the Verant Magnifier it is essential to remember that the lens must be held close to the eye.

Complete Equipment for Viewing Pictures mounted on Cards.

Item	Codeword	Price $
Verant 11 cm for 9 × 12 cm views taken with objectives of from 9 to 13 cm focal length	*Veramente*	11.00
Verant 15 cm for 9×12 cm views taken with objectives of from 13 to 17 cm focal length	*Vératrate*	11.00
Verant-Magnifier 11 cm, used for the same purposes as the corresponding Verant	*Verbosity*	6.00
Verant-Magnifier 15 cm, corresponding to the 15 cm Verant	*Verbraemen*	6.50

Components and Supplemental Accessories.

Item	Codeword	Price $
Eye Screen with Verant-lens 11 cm	*Verbrodden*	5.00
„ „ „ „ „ 15 cm	*Verbruik*	5.50
Verant-lens 11 cm, to screw into the magnifier handle .	*Verbuergt*	4.00
Verant-lens 15 cm, to screw into the magnifier handle .	*Verbummelt*	4.50
Eye Cap	*Verbo*	1.00
Focussing Slide for the 11 cm Verant	*Vercellae*	1.00
„ „ „ „ 15 cm „	*Verdaccia*	1.00
Light-diffusing Screen to slide into the view holder of the Verant for examining 9 × 12 cm Diapositives . . .	*Verberar*	0.50
Holder for 9×12 cm mounted paper copies and diapositives	*Verbanus*	1.00
Sheet-metal Frames for unmounted paper copies, to insert into the view holder	*Verbessert*	0.50
Handle Part of Verant-Magnifier	*Verdastro*	1.00

Verant-lenses 11 and 15 cm being of similar dimension and fitted with the same size of screw, the one eye cap and the same handle will fit both. For use on the Verant they require, however, focussing slides of different length, but otherwise interchangeable.

Detailed lists and descriptions of the Verant are supplied gratis on application.

Apparatus for the Examination of Stereoscopic Views.

Stereoscopic pictures are expected to convey an idea of the relative distribution in space and the corporeal dimensions of the objects represented, and according to a recently arisen demand the plasticity should be of a normal character, i. e., in true perspective. In order to satisfy this condition, it is essential that the **exposure** should be made with objectives separated by the same distance as that between the centre of the pupils of the observer's eyes, and that in **viewing** them the pictures should be separated by the same distance as originally existed between the photographic objectives. Hence the objectives must lie about 60 mm apart on the objective panel of the stereo-camera, from which it follows that normally the width of a stereogram may not exceed 6 cm, and that the largest permissible size of the single picture ought not to exceed 6×9 cm.

In order to command an angle of view of adequate extent with a plate of such small dimensions, the objective employed should be of short focal length, one of 9 cm being near the outside limit.

But to convey an impression of true natural perspective which, besides normal plasticity, is indispensably required in order to produce a completely natural effect, the eye must be situated at the same distance from the positive at which the objective was from the negative at the moment of the exposure, and therefore the pictures should be viewed from a distance of about 9 cm. As, however, a normal eye would not at this distance see the details of a picture clearly defined, the help of a magnifier becomes necessary.

Ordinary magnifiers command too small an angle of view to allow, under the given limitations, of the details within the area of a 6×9 cm plate being viewed with anything approaching satisfactory sharpness. The case differs with **Verant-lenses,** which amply meet the requirements.

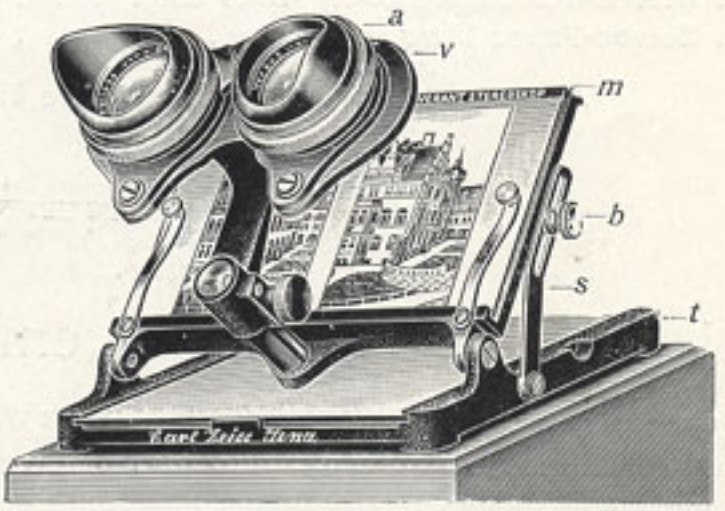
In the **Double Verant** we possess a theoretically perfect stereoscopic viewing apparatus, which facilitates an entirely natural effect for the reason that each single picture is viewed as if from its centre of projection and that the image base is automatically assimilated to the inter-pupillary distance of the observer. A detailed description of the apparatus may be obtained gratis on application. The prices are specified farther down.

In the **Zeiss Verant Stereoscope** the lens base is not altered simultaneously with the variation of the picture base, whereby more convenient manipulation and greater stability of the instrument has been attained. The possibility, however, exists of making the centre of projection of each picture coincide with the centre of rotation of

the eye by pasting each picture on a separate mount and laying the two stereoscopic pictures on the holder at the requisite distance from each other. In mounting the two pictures on one card a picture base of about 60 mm should be adopted. The difference arising in the case of observers of other inter-pupillary distances will only be disclosed in particularly close scrutiny.

The Verant Stereoscope is equipped with a pair of Verant-lenses, f = 9 cm, and is primarily intended for viewing 6 × 9 cm pictures, that is, stereoscopic pictures taken with a 9 × 12 cm camera, the Zeiss Stereo-Palmos 9 × 12 cm, for instance, and with objectives of approximately 9 cm focal length. Larger pictures and those taken under other conditions may also be examined, but the advantage of natural effect will naturally be lost in a certain degree.

The **Verant Stereoscope** consists of three parts: the table *t*, the view holder *m*, and the lens carrier *v*.



1168

The view holder is rotatable on its longitudinal axis, and can be fixed at any inclination between the horizontal and vertical positions in relation to the table by means of the slotted guide *s* and the clamping screw *b*.

The carrier of the Verant-lenses can be moved on a metal rod projecting at right angles from the view holder and clamped in any position, so that the picture can be sharply focussed to the observer's eye.

Adjustment of the Verant-lenses to the inter-pupillary distance of the observer is effected by means of the milled ring *a*.

The illustration represents the apparatus set up on its case as a support in a position convenient for an observer sitting at the table. To stow the instrument in its case the view holder is clamped in a horizontal position and the lens carrier secured in the closest possible proximity to the view holder.

The uniform illumination of diapositives is effected by the agency of the light-diffussing screen of the view holder and the celluloid plate of the table, which can be moved forward after releasing a catch on the left of the table. The diapositive may also be held towards the sky. For that purpose the view holder is adjusted vertical to, or

after removing the celluloid plate entirely out of the way, parallel to the table.

If the condition of the observer's eyes necessitates the use of spectacles, it is expedient to remove the eye caps from the Verant-lenses. A better plan would be to insert special glasses, supplied by us, into the mounts of the Verant-lenses, when the eyes will be unimpeded and the caps can be retained.

	Codeword	Price $
Double Verant, 7 cm focal length, with sheet metal frames for 5×5 cm views and light-diffusing screen for diapositives	*Voadura*	**32.50**
Double Verant, 9 cm focal length, with sheet metal frames for 5×8 cm views and light-diffusing screen for diapositives	*Vocero*	**32.50**
Verant-Stereoscope, 9 cm focal length, in case	*Veredictos*	**27.00**
Assortment of 10 Stereoscopic Views 6×9+6×9 cm, stowed in case (8 mounted paper copies and 2 diapositives[1])	*Vererbung*	**3.00**
1 Stereo-diapositive 6×9+6×9 cm	*Veretillo*	**1.00**
1 Stereo-Paper View, mounted	*Verewigen*	**0.20**

Assortments of Views for the Double Verant at moderate rates.

Nature of Glasses employed by us.

We use exclusively silicate glasses whose permanency and power of resistance to external influences have been amply tested in the course of many years. We carefully select our raw material and make a point of rejecting glasses exhibiting objectionable flaws or showing signs of tension. We even endeavour to avoid, as far as possible, small bubbles and impurities in the glass, although such are really mere æsthetic defects. We would, however, remark that the peculiar and very advanced optical quality of our objectives necessitates in their manufacture the use of glasses possessing qualities which formerly were not available. Some of these glasses are required to have a very high refractive power and yet a low dispersion, others again must combine high dispersion with low refractive power. In glasses possessing such exceptional qualities it is **almost impossible to entirely exclude the presence of small bubbles and granules,** their production involving such extraordinary technical difficulties, that small æsthetic blemishes of this nature are really unavoidable. As every practical optician knows, defects of this kind do not affect the quality of the lenses, the only effect of their presence being an insignificantly small loss of light. Since it does not lie in our power to obviate such defects, we **cannot** regard their presence as a legitimate cause of complaint.

The Optical Testing of our Objectives.

Although our manufacturing methods alone are a sufficient guaranty of a high degree of uniformity in the quality of all our productions, an additional safeguard is provided by the most exhaustive tests to which all our photo-optical appliances are subjected in our photographic laboratory before they are declared fit for the market. The methods of testing vary according to the nature of the lenses and the purposes for which they are intended. Objectives for landscape, instantaneous and group photography are examined by means of the **test-screen** proposed by Dr. *Rudolph,*[1] while copying lenses are criticised through the medium of an object showing particularly fine and crisp details.

For the demonstration of the comperative qualities of two objectives with reference to a third, and for the comparison of the merits of different individual lenses, we employ the **test-object for gauging depth of definition** recommended by Dr. *P. Rudolph* and described in various journals[2]. We execute these latter tests only on special application, subject to a charge equivalent to our actual expenses in connection therewith. The same applies to test photographs of landscape and instantaneous views, groups and portraits taken to special order.

Complaints.

Our methods of manufacture and our rigorous system of tests are such as to almost entirely exclude complaints. Nevertheless, any complaints will command our best attention, since we are well aware that errors are possible even in the best-regulated establishments. On the other hand, in cases where complaints prove utterly unfounded, we reserve to ourselves the right of charging for the time lost and the expenses incurred in investigating them.

[1] Dr. *P. Rudolph:* „Die Zeiss-Anastigmate". „Photographisches Wochenblatt", Berlin 1892, Nos. 18—21.

[2] Dr. *P. Rudolph:* „Über eine neue Methode zur bildlichen Darstellung der Leistungsfähigkeit photographischer Objektive". „Atelier des Photographen", Halle 1894, p. 102 and

— —: „Ein neues Probeobjekt zur bildlichen Darstellung etc." „Eders Jahrbuch", 1895, p. 145.