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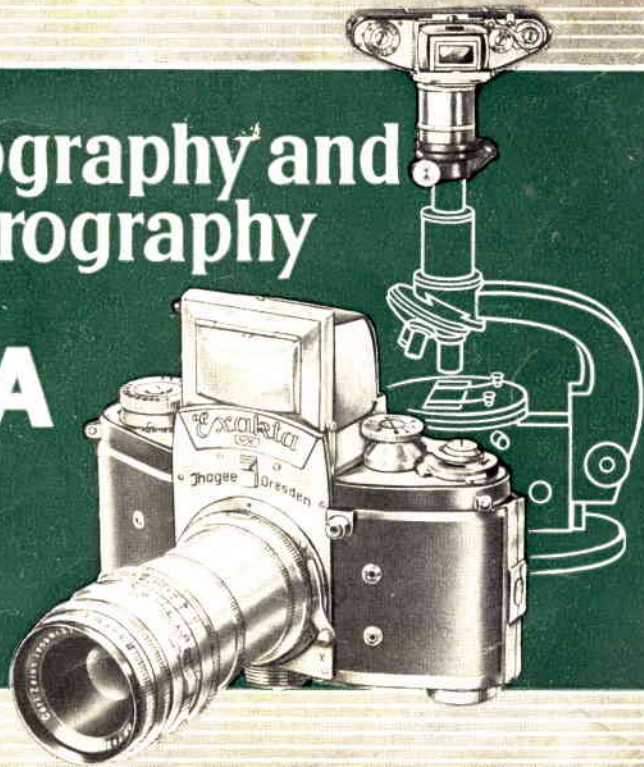
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Macrophotography and Photomicrography

with the

EXAKTA



Instructions for Close ups and Photomicrography

with

EXAKTA VX

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The Extensions and the Micro-Adapters of the EXAKTA VX can be used with all models, Kine-Exakta and with the EXA 24/36 mm.

Close-ups

Because the EXAKTA VX is a single-lens reflex camera close-ups can be taken with it simply and easily. In accordance with optical laws the imaged distance (= distance between lens and film plane) increases, when the subject distance (= distance between lens and subject) decreases. Consequently, when focusing on a subject at a short distance from the camera, the distance between lens and film plane must be larger than attained by the helical focusing mount of the lens. Then extensions (bayonet rings and extension tubes) must be used. They are fitted in appropriate combinations, between lens and camera body (Ill. 1). It is a characteristic of the single-lens reflex camera that there is no need for special optical attachments for focusing at short distances; the



Illustration 1

ground-glass is used at all times for controlling of sharpness, depth of field, as well as for composing of the intended picture. The ground-glass image and the final picture are by necessity always identical, and parallax, which often can not be eliminated at short distances, never exists with the EXAKTA VX.

The Two-in-One Adapter Ring (Illustration 2)

For the minimum extension increase of 5 mm a Two-in-One Adapter Ring is available. It is made as one piece. It goes into the camera after the lens is removed from the camera and it is inserted into its front bayonet. The red dots on the lens mount and on the front part of the Two-in-One Ring should be opposite each other. By a short turning to the right the lens locks into the stop-lever, which catches with a click. To free the lens from its connection with the Two-in-One Ring, press the little release button of the adapter and turn the lens to the left, until the red dots are opposite each other again; then the lens can be removed from the adapter bayonet. It is done the same way as removing the lens from the camera. — Inserting the Two-in-One Adapter Ring into the camera is done the same way as when attaching the lens alone. When the red dots on the camera and on the back part of the Two-in-One Ring are opposite each other, turn the adapter to the left, until the little lever on the camera snaps into position.



Illustration 2

The male and female Bayonet Adapter Rings and the Extension Tubes (Illustration 3 a—d)

The next extension increase is of 10 mm and is attained by the Pair of Bayonet Adapter Rings screwed together (Illustration 3 a). Its handling is the same as that of the Two-in-One Adapter Ring. The Pair of Bayonet Adapter Rings differ from the Two-in-One Ring only in that, that they can be separated.

In order to get more extension increase additional Tubes must be screwed between the adapters. These Extension Tubes are supplied in 3 lengths: 5 mm (Illustration 3 b), 15 mm (Illustration 3 c), and 30 mm (Illustration 3 d). They are sold in complete sets together with the Pair of Bayonet Adapter Rings. The Two-in-One Adapter Ring is supplied singly.



Illustration 3

The possible Extensions

Two-in-One Ring, Pair of Bayonet Adapter Rings and Extension Tubes are as follows:

Extension of mm	Attainable with				
	Two-in-One Ring 5 mm	Pair of Bayonet Adapter Rings 10 mm	Tubes		
			5 mm	15 mm	30 mm
5	+				
10		+			
15		+	+		
20	+	+	+		
25		+		+	
30		+	+	+	
35	+	+	+	+	
40		+			+
45		+	+		+
50	+	+	+		+
55		+		+	+
60		+	+	+	+
65	+	+	+	+	+

This table can be extended to one's liking by adding more tubes.—When using the Two-in-One Ring and a Pair of Bayonet Adapter Rings simultaneously, it is possible to attach the Two-in-One Ring to the back ring as well as to the front ring of the Pair of Bayonet Adapter Rings.

The Counterring of the male Bayonet Ring (Illustration 4)

The male Bayonet ring has a Counterring serving the following purpose: When using the Pair of Bayonet Adapter Rings and the Extension Tubes the lens is often turned around its axis so that the lens-scales are difficult to read. This can be avoided as follows: Turn loose the ring of the combination that is screwed into the male Bayonet ring, until the lens-scales are in the normal position, whereas the other parts must remain screwed together tightly. Then screw the Counterring of the back Bayonet ring tightly towards the extension tube next to it, the whole combination is now secured against any unintentional distortion. When the back Bayonet ring is inserted into the bayonet mount of the camera, the Counterring has to be screwed towards the Bayonet ring till it stops. To remove the entire combination of tubes and bayonet-rings from the camera, the Counterring must be screwed on tightly. When removing the whole combination, the Counterring must be grasped simultaneously with the male adapter.

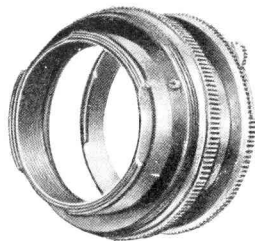


Illustration 4

The following Tables

contain all data for close-ups with lenses of 50, 58, 100, and 135 mm focal length and facilitate the selection of the extension increases. The tables give calculated values which may differ a little from the real values because of the admissible tolerances of the focal distances of the lenses. However these small differences can be neglected when applying the tables to any kind of regular work. The figures of the tables are for the lens set at infinity (∞). Intermediate values are found by focusing at shorter distances (means lower figures in meters). By adding tubes you will get more enlargements on the negatives, according to the length of extension.

Extension Increase

i. e. the total length of the bayonet rings and tubes

- of the same length as the focal distance = pictures 1:1 on the negative
- of double length of the focal distance = double magnification on the negative
- of triple length of the focal distance = three times magnification on the negative
- of quadruple length of the focal distance = four times magnification on the negative
- of quintuple length of the focal distance = five times magnification on the negative, etc.

The following is an explanation of the tables:

Subject distance = distance from subject to lens

(about lens diaphragm plane) Illustration 5

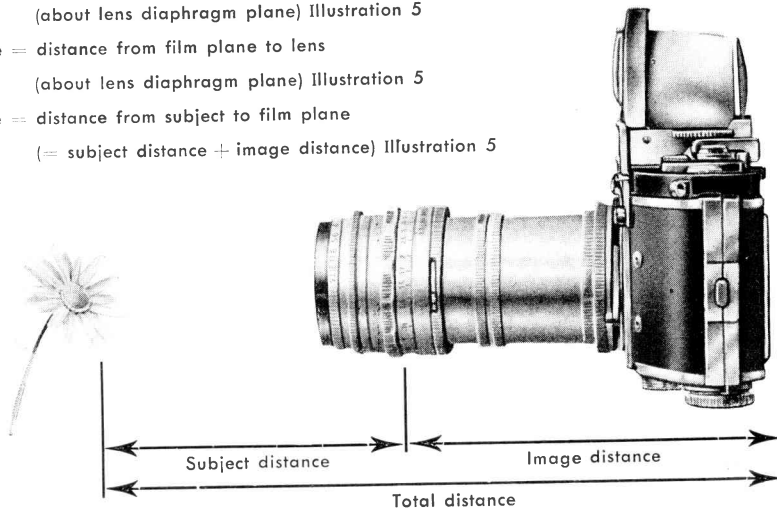
Image distance = distance from film plane to lens

(about lens diaphragm plane) Illustration 5

Total distance = distance from subject to film plane

(= subject distance + image distance) Illustration 5

Illustration 5



Scale of reproduction = ratio of subject to image

e. g. 1 : 1 = 1,0 means: subject and image are of same size.

1 : 2 = 0,5 means: the image is half as large only as the subject.

2 : 1 = 2,0 means: double size of image = two times-enlargement.

Picture size of the subject

means, how much of length and height of the subject is covered by the film. Here, partly, round figures in millimeters are quoted.

Exposure factor

The diaphragm figures of the lens are applicable for focusing at infinity only. They are not valid for close-up focusing. Therefore the exposure time for a certain diaphragm opening must be multiplied by an exposure factor corresponding to the extension increase. When focusing at short distance with the lens helical focusing mount alone there is a small exposure increase only that can be overlooked, but with longer extensions it has to be calculated according to the following formula:

$$\text{exposure increase} = \left(\frac{\text{image distance}}{\text{focal distance}} \right)^2$$

Example: Extension increase with the Pair of Bayonet Adapter Rings and all 3 tubes (= 60 mm). Length of the image distance = lens focal distance e. g. $f = 50 \text{ mm} + \text{extension increase e. g. } 60 \text{ mm} = 110 \text{ mm}$.

The focal distance is 50 mm in length. $110 : 50 = 2,2$.

$2,2 \cdot 2,2 = 4,84$. Thus, in this case, the exposure factor is 4,8, in other words the normal exposure time must be multiplied practically by 5.

Increases of extension can also be used with other lenses not yet mentioned. For a certain scale of reproduction you will attain, when using a wide angle lens, a shorter subject distance, and with a long focus lens, a longer subject distance than with a normal lens. Both cases are possible in practice. Focusing is done on the ground glass image as always. Tables for close-ups with special lenses up to $f = 400$ focal distance are available and will be sent on request free of charge.

Close-ups with great magnifications of the subject require relatively long image distances and short subject distances. Our lenses are, however, corrected for the reverse ratio, that is long subject distance and short image distance. Therefore, we recommend for closeups with magnifications of more than 2,5 times, to use the lens in reverse position i. e. with its back turned towards the subject and the front facing the film. We supply adapting rings with which to screw the lens on the front extension tube. When using the lens this way, there is no possibility of helical focusing, therefore, critical focusing is done by slight changes of the camera position.

For taking pictures with over 5 times magnifications we recommend the Zeiss Microtars. As special lenses for macro-photos, they must, of course *not* be attached *inversely*.

Tables for close-ups with focal distance lenses of 50 mm and 58 mm

For lens focal distance of 50 mm							For lens focal distance of 58 mm					
Extension increase	Subject distance	Image distance	Total distance	Scale of reproduction	Picture size of the subject	Exposure factor	Subject distance	Image distance	Total distance	Scale of reproduction	Picture size of the subject	Exposure factor
mm	mm	mm	mm		mm		mm	mm	mm		mm	
0	∞	50	∞	different	variable	1,0	∞	58	∞	different	variable	1,0
5	550	55	605	0,1	240×360	1,2	731	63	794	0,09	267×400	1,2
10	300	60	360	0,2	120×180	1,4	394	68	462	0,17	141×212	1,4
15	217	65	282	0,3	80×120	1,7	282	73	355	0,26	92×138	1,6
20	175	70	245	0,4	60×90	2,0	226	78	304	0,35	69×103	1,8
25	150	75	225	0,5	48×72	2,3	192	83	275	0,43	56×84	2,1
30	133	80	213	0,6	40×60	2,6	170	88	258	0,52	46×69	2,3
35	121	85	206	0,7	34×51	2,9	154	93	247	0,60	40×60	2,6
40	113	90	203	0,8	30×45	3,2	142	98	240	0,69	35×52	2,9
45	106	95	201	0,9	27×40	3,6	133	103	236	0,78	31×46	3,2
50	100	100	200	1,0	24×36	4,0	125	108	233	0,86	28×42	3,5
55	95	105	200	1,1	22×33	4,4	119	113	232	0,95	25×40	3,8
60	92	110	202	1,2	20×30	4,8	114	118	232	1,03	23×35	4,1
70	86	120	206	1,4	17×26	5,8	106	128	234	1,21	20×30	4,9
80	81	130	211	1,6	15×23	6,8	100	138	238	1,38	17×26	5,7
90	78	140	218	1,8	13×20	7,8	95	148	243	1,55	15×23	6,5
100	75	150	225	2,0	12×18	9,0	92	158	250	1,72	14×21	7,4
110	73	160	233	2,2	11×16	10,2	89	168	257	1,90	13×19	8,4
120	71	170	241	2,4	10×15	11,6	86	178	264	2,07	12×17	9,4
130	69	180	249	2,6	9×14	13,0	84	188	272	2,24	11×16	10,5
140	68	190	258	2,8	9×13	14,4	82	198	280	2,41	10×15	11,7
150	67	200	267	3,0	8×12	16,0	80	208	288	2,60	9×14	12,9
160	66	210	276	3,2	8×11	17,6	79	218	297	2,76	9×13	13,8
170	65	220	285	3,4	8×11	19,4	78	228	306	2,92	8×12	15,5
180	64	230	294	3,6	7×10	21,2	77	238	315	3,09	8×12	16,8
190	63	240	303	3,8	6×9	23,0	76	248	324	3,26	7×11	18,3
200	63	250	313	4,0	6×9	25,0	75	258	333	3,44	7×10	19,8

Tables for close-ups with focal distance lenses of 100 mm and 135 mm

For lens focal distance of 100 mm							For lens focal distance of 135 mm					
Extension increase	Subject distance	Image distance	Total distance	Scale of reproduction	Picture size of the subject	Exposure factor	Subject distance	Image distance	Total distance	Scale of reproduction	Picture size of the subject	Exposure factor
mm	mm	mm	mm		mm		mm	mm	mm		mm	
0	∞	100	∞	different	variable	1,0	∞	135	∞	different	variable	1,0
5	2100	105	2205	0,05	480×720	1,1	3780	140	3920	0,04	600×900	1,1
10	1100	110	1210	0,10	240×360	1,2	1958	145	2103	0,07	343×514	1,2
15	767	115	882	0,15	160×240	1,3	1350	150	1500	0,11	218×327	1,2
20	600	120	720	0,20	120×180	1,4	1046	155	1201	0,15	160×240	1,3
25	500	125	625	0,25	96×144	1,6	864	160	1024	0,19	126×189	1,4
30	433	130	563	0,30	80×120	1,7	742	165	908	0,22	109×164	1,5
35	386	135	521	0,35	69×103	1,8	656	170	826	0,26	92×138	1,6
40	350	140	490	0,40	60×90	2,0	591	175	766	0,30	80×120	1,7
45	322	145	467	0,45	53×80	2,1	540	180	720	0,33	73×109	1,8
50	300	150	450	0,50	48×72	2,3	500	185	685	0,37	65×97	1,9
55	282	155	437	0,55	44×65	2,4	466	190	656	0,41	59×88	2,0
60	267	160	427	0,60	40×60	2,6	439	195	634	0,44	55×82	2,1
70	243	170	413	0,70	34×51	2,9	395	205	600	0,52	46×69	2,3
80	225	180	405	0,80	30×45	3,2	363	215	578	0,59	41×61	2,5
90	211	190	401	0,90	27×40	3,6	338	225	563	0,67	36×54	2,8
100	200	200	400	1,00	24×36	4,0	317	235	552	0,74	32×49	3,0
110	191	210	401	1,10	22×33	4,4	301	245	546	0,82	29×44	3,3
120	183	220	403	1,20	20×30	4,8	287	255	542	0,89	27×40	3,6
130	177	230	407	1,30	18×27	5,3	275	265	540	0,96	25×38	3,9
140	171	240	411	1,40	17×26	5,8	265	275	540	1,04	23×35	4,2
150	167	250	417	1,50	16×24	6,3	257	285	542	1,11	21×32	4,5
160	163	260	423	1,60	15×23	6,8	249	295	544	1,18	20×30	4,8
170	159	270	429	1,70	14×21	7,3	242	305	547	1,26	19×29	5,1
180	156	280	436	1,80	13×20	7,8	236	315	551	1,33	18×27	5,4
190	153	290	443	1,90	13×19	8,4	231	325	556	1,41	17×26	5,8
200	150	300	450	2,00	12×18	9,0	226	335	561	1,48	16×25	6,2

Reproductions of DIN charts with the EXAKTA VX

Chart	Lens f = 50 mm		Lens f = 58 mm	
	Extension increase	Subject distance cm	Extension increase	Subject distance cm
DIN A 0 (84,1 × 118,9 cm)	without	189	without	217
DIN A 1 (59,4 × 84,1 cm)	without	141	without	158
DIN A 2 (42,0 × 59,4 cm)	without	103	without	115
DIN A 3 (29,7 × 42,0 cm)	without	72	without	82
DIN A 4 (21,0 × 29,7 cm)	Two-in-One-Ring	52	Two-in-One-Ring	57
DIN A 5 (14,8 × 21,0 cm)	Two-in-One-Ring	39	Two-in-One-Ring	42
DIN A 6 (10,5 × 14,8 cm)	Pair of Bayon. Adapt. Rings	29	Pair of Bayon. Adapt. Rings	32
DIN A 7 (7,4 × 10,5 cm)	Pair of Bayonet Adapter Rings + Tube 5 mm . .	21,5	Pair of Bayonet Adapter Rings + Tube 5 mm . .	23
DIN A 8 (5,2 × 7,4 cm)	Pair of Bayonet Adapter Rings, Two-in-One-Ring + Tube 5 mm	16,5	Pair of Bayonet Adapter Rings + Tube 15 mm .	18
DIN A 9 (3,7 × 5,2 cm)	Pair of Bayon. Adapt. Rings + Tubes 5 and 15 mm .	13	Pair of Bayon. Adapt. Rings, Two-in-One Adapt. Ring + Tubes 5 and 15 mm .	14,5
DIN A10 (2,6 × 3,7 cm)	Pair of Bayon. Adapt. Rings + Tubes 5 and 30 mm .	11	Pair of Bayon. Adapt. Rings + Tubes 5 and 30 mm .	11,5
Critical focusing by lens helical focusing				

Reproductions of DIN charts with the EXAKTA VX

Chart	Lens f = 50 mm		Lens f = 58 mm	
	Extension increase	Subject distance cm	Extension increase	Subject distance cm
DIN A 0 (84,1×118,9 cm)	without	189	without	217
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DIN A 3 (29,7× 42,0 cm)	without	72	without	82
DIN A 4 (21,0× 29,7 cm)	Two-in-One-Ring	52	Two-in-One-Ring	57
DIN A 5 (14,8× 21,0 cm)	Two-in-One-Ring	39	Two-in-One-Ring	42
DIN A 6 (10,5× 14,8 cm)	Pair of Bayon. Adapt. Rings	29	Pair of Bayon. Adapt. Rings	32
DIN A 7 (7,4× 10,5 cm)	Pair of Bayonet Adapter Rings + Tube 5 mm . .	21,5	Pair of Bayonet Adapter Rings + Tube 5 mm . .	23
DIN A 8 (5,2× 7,4 cm)	Pair of Bayonet Adapter Rings, Two-in-One-Ring + Tube 5 mm	16,5	Pair of Bayonet Adapter Rings + Tube 15 mm .	18
DIN A 9 (3,7× 5,2 cm)	Pair of Bayon. Adapt. Rings + Tubes 5 and 15 mm .	13	Pair of Bayon. Adapt. Rings, Two-in-One Adapt. Ring + Tubes 5 and 15 mm .	14,5
DIN A10 (2,6× 3,7 cm)	Pair of Bayon. Adapt. Rings + Tubes 5 and 30 mm .	11	Pair of Bayon. Adapt. Rings + Tubes 5 and 30 mm .	11,5
Critical focusing by lens helical focusing				

Photomicrographs

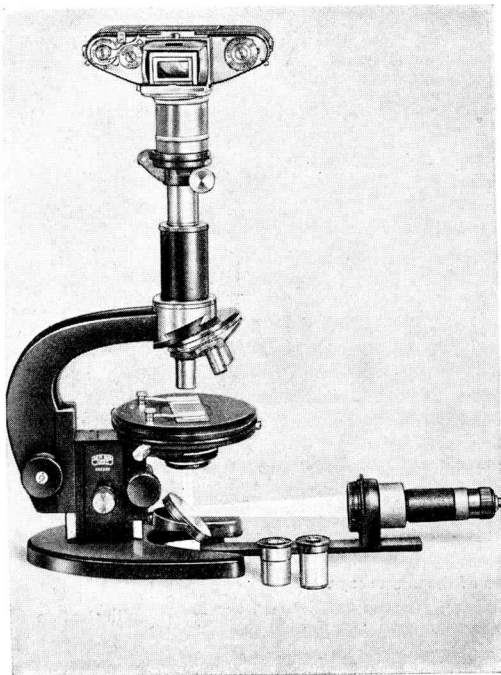
The single-lens reflex camera EXAKTA VX opens also — similarly to close-ups — the large field of Photomicrography, by simple and inexpensive accessories. The reflex image serves for focusing and observing the microscopic picture. You observe it until you press the shutter release button.

The two Microscope Attachments (Illustrations 6 and 9)

connect the EXAKTA VX to any microscope. The camera can be adapted with one of the two attachments to the ocular tube of the microscope which has the standard outside diameter of about 25 mm. Microphotographs are taken with the optical system of the microscope and not with the camera lens.



Illustration 6



Microscope Attachment

Type 1

(with hinged clamp) (Illustration 6)

The camera is fixed to the top part of the attachment: The bayonet ring is put into the camera-bayonet in the same way as a lens. To attach the combination of camera and attachment to the microscope, remove first the ocular from the microscope tube. Camera and attachment tilted up are put on the tube—see Illustration 7—, the ocular is replaced and, by a slight turn of the clamping screw, the microscope-attachment

Illustration 7

is fastened to the microscope tube. Then the camera is tilted up and the microscope-attachment bolted up (Illustration 8). By means of the hinged clamp the camera can always be tilted to the side, when photographic work is being suspended (Illustration 7) for exchanging oculars or when subject observation should continue.

Microscope Attachment

Type 2

(in Quick-Change-Mount) (Illustration 9)

Top and bottom parts of this attachment can be separated by loosening the quick-

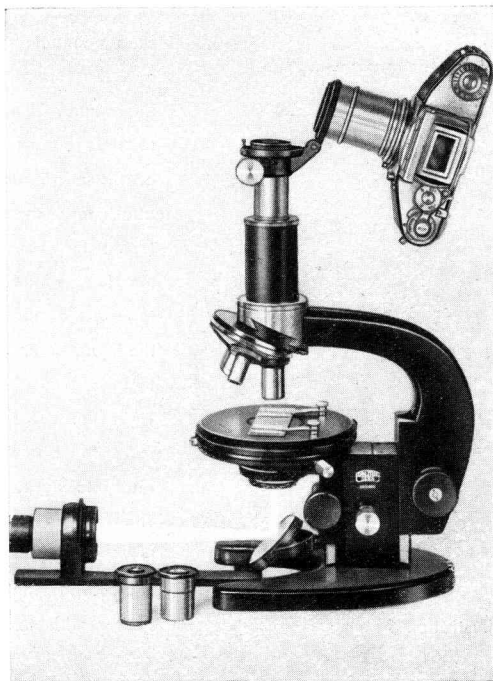


Illustration 8

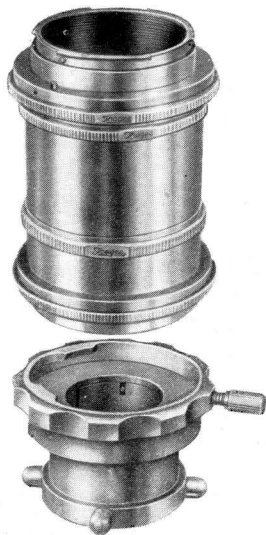


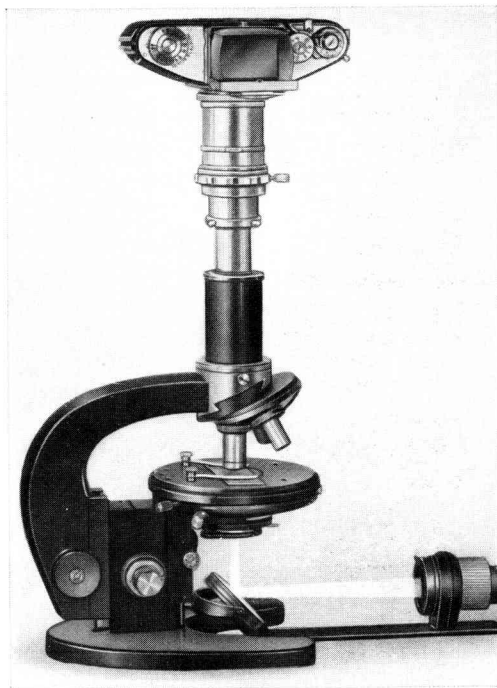
Illustration 9

change-mount: The indented screw is slightly screwed out and the top part of the microscope attachment lifted out of the mount. The top part is attachable by its bayonet ring to the camera as usual. Then, after removing the ocular of the microscope, push the bottom part of the microscope-attachment over the ocular tube, replace the ocular and fasten the bottom part on the notch-ring by turning it to the left, whereby the grip-border must be held fast. The top part of the micro-attachment with the camera is put into the quick-change-mount: First place the cone under the two latches, then the opposite side slides into position. Tight the set screw, and make the top part in the mount safe to operate. Illustration 10 shows the combination ready to work.

The top part cone of type 2 of our microscope-attachment is also adaptable to the latest Zeiss microscopes. On these microscopes the tube is removable and the EXAKTA VX together with the top part of the micro-attachment is placed

into the switch mount of the tube support of the microscope. It is possible to take so-called "Lupen" Pictures — with the microscope objective alone. The Zeiss Microtars are especially qualified for this purpose, Illustration 11. We regret that it is impossible to give here technical instructions for taking photomicrographs. This field is so large that it will be of no use picking out a few points only. We rather recommend to consult one of the many books about this subject.

Illustration 10





Special focusing glasses

(Illustration 12)

The possibility of instantaneously interchanging the focusing glasses of the EXAKTA VX is of great advantage for taking micro- and "Lupen" pictures. You can use, instead of the regular groundglass, the special glasses described below. Although it is desirable to compose the image on a groundglass, the sharpness must be determined through the clear centre spot by focusing into the air. In taking "Lupen" photos

Illustration 11

a fully clear glass proves to be indispensable. The ground glass of the reflex finderhood is stationary and not easily removable, therefore it is recommended to purchase an additional complete reflex finderhood with the desired glass. With the Eyelevel Prism Attachment however the ground glass can be changed and consequently special glasses alone are available for it.

The following special glasses are offered:

- a) Reflex Finderhood with ground glass and clear center spot of 3 to 10 mm diameter (both with hairline cross in the clear spot),
- b) Reflex Finderhood with focusing glass completely clear and cross hairlines,
- c) Ground glasses for Eyelevel Prism with clear center spot of 3 to 10 mm diameter (both with hairline cross in the clear center spot),
- d) completely clear glasses with cross hairlines.

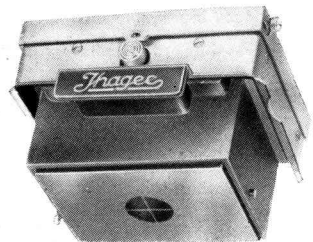
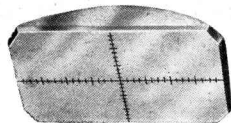
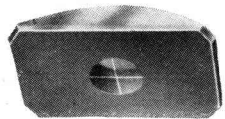


Illustration 12



The focusing systems with clear center spot or completely clear are also practical for endoscopic pictures in medical photography. The cross hairlines avoid, at all times, the unwanted continuation accommodation by the eye. In Photomicrography correct focusing is attained, when both cross hairlines and image appear to be sharp simultaneously. When moving the eye over the clear spot to and fro, cross hairlines and image must not shift each against the other, if in sharp focus. The same should happen when taking "Lupen" pictures. Other special types of focusing glasses can be supplied according to specifications (f. i. with etched rectangles, cm or mm graduation etc.).

Please write to our "Service Department"!

Scientific View-Finder (Illustration 13 and 14)

The supplementary magnifying lens in the Finderhood of the EXAKTA VX does not always meet the great optical requirements of critical focusing in close-up and micro-work. Therefore the "Scientific View-Finder" was designed for the special field of Macrography and Photomicrography. It can be inserted into the EXAKTA VX instead of the Finderhood or Eyelevel Prism, and makes possible to focus and examine the reflected image with one of the highly corrected EXAKTA VX normal and Special lenses. The lens is, as the illustration shows, set in the bayonet mount of the Scientific View-Finder. Focused at infinity, it shows a magnified and evenly sharp reflected image without distortion or aberration.

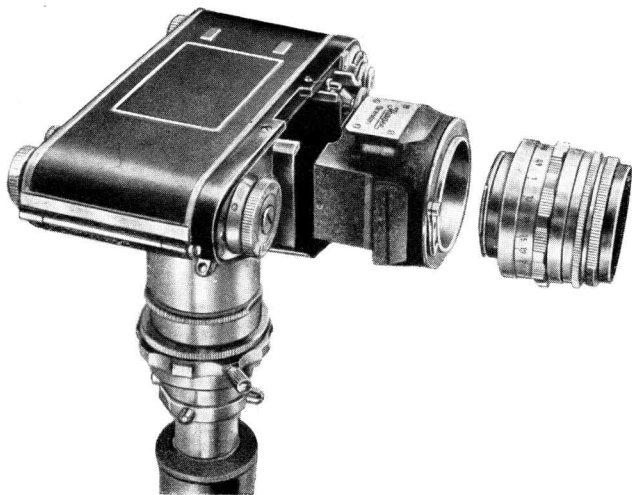


Illustration 13

Normal and special ground or clear focusing glasses may be used in the Scientific View-Finder (see preceding section). With a partially or fully clear focusing glass, the image is easily and quickly visible. The normal or longfocus lenses used as critical magnifier permit to examine the whole area of the reflected image, whereas with a 40 mm picture taking lens the range of vision is somewhat limited so that you will see the middle part of the image only.

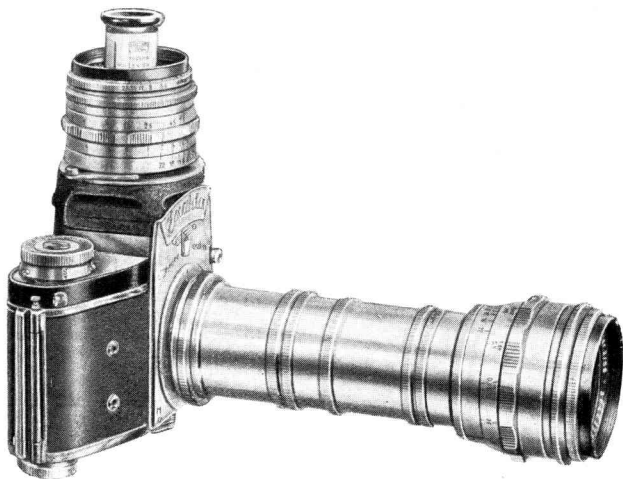


Illustration 14

The Scientific View-Finder is all the more practical as the normal lens of the EXAKTA VX is not used for taking Photomicrographs, thus being free for serving as magnifier. For the reflex-image magnifications possible with the different lenses see the following table. Additional magnifications can be obtained, when holding a small pocket telescope as supplementary focusing help over the Scientific View-Finder (e. g. the Zeiss Tellup giving a 2,5 times magnification). The total magnification results from multiplying the lens magnification with that of the pocket telescope.

Magnification

Lens with 40 mm focal distance	7,0 times	with Tellup	17,5 times
Lens with 50 mm focal distance	5,4 times	with Tellup	13,5 times
Lens with 58 mm focal distance	4,9 times	with Tellup	12,3 times
Lens with 75 mm focal distance	3,8 times	with Tellup	9,5 times
Lens with 100 mm focal distance	2,8 times	with Tellup	7,0 times
Lens with 135 mm focal distance	2,1 times	with Tellup	5,3 times

Do you know:

Macrophotography and Photomicrography may also be done with the new **IHAGEE Multicombination** (called: Vielzweck). You will find further details in the special print on this gear. Besides the following prints will inform you about this line of working:

“Macrophotography – Photomicrography“

as well as the EXAKTA manual by Werner Wurst, “EXAKTA Kleinbild-Fotografie“, published by Wilhelm Knapp Verlag, Halle.



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