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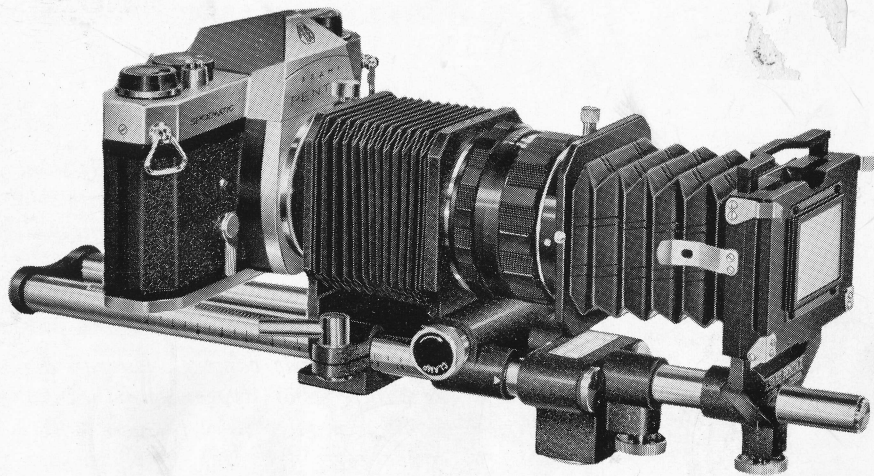
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ASAHI PENTAX



BELLWS II SLIDE COPIER

NOTES

The Asahi Pentax cameras are identically same as the Honeywell Pentax cameras which are sold in the U.S.A. and Mexico through Honeywell Inc. This operating manual therefore applies also to the Honeywell Pentax cameras without any modification.

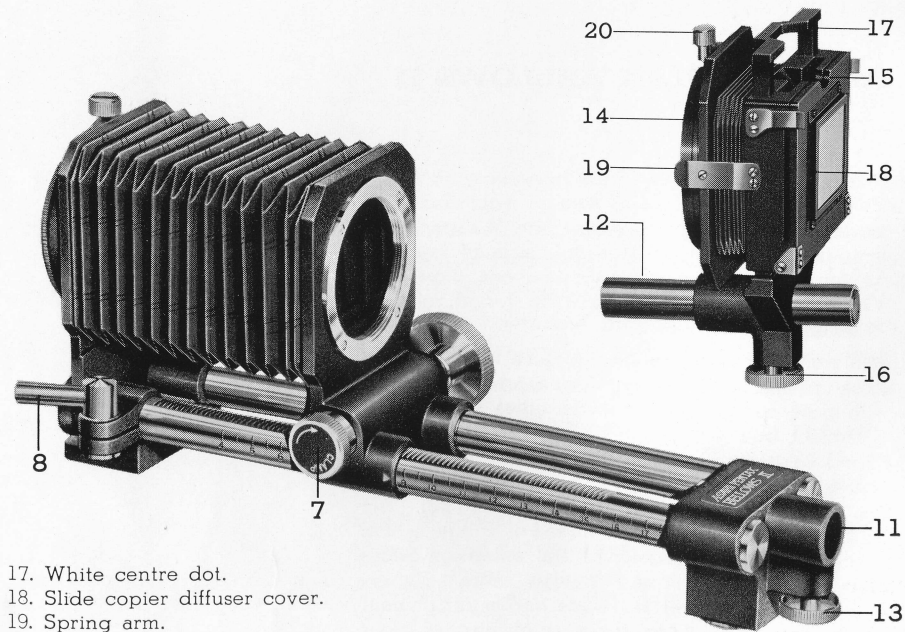
If you own a Spotmatic camera, you can disregard the exposure factors appearing in the latter portion of this manual. Since the Spotmatic's integral meter correctly reads your exposures through the taking lens (no matter what lens you use) and through whatever accessories you use on the lens or between the lens and the camera body, no exposure adjustments are required.

ASAHI PENTAX BELLOWS II

With this bellows unit inserted between your Asahi Pentax camera body and one of your Takumar lenses, you can take close-ups and macro-photographs continuously at a wide range of magnifications. The range of magnifications, however, varies depending upon the focal length of the lens used.

While this unit enables you to take such extreme close-ups and macro-photographs as are unattainable with close-up lenses or extension tubes, the distance of subject that can be closed up when this unit is folded to its shortest width is not more than the distance of subject that can be closed up with the Asahi Pentax extension tubes #1 and #3. (The thickness of this unit when folded is 37mm, which is the combined thickness of the extension tubes #1 and #3.)

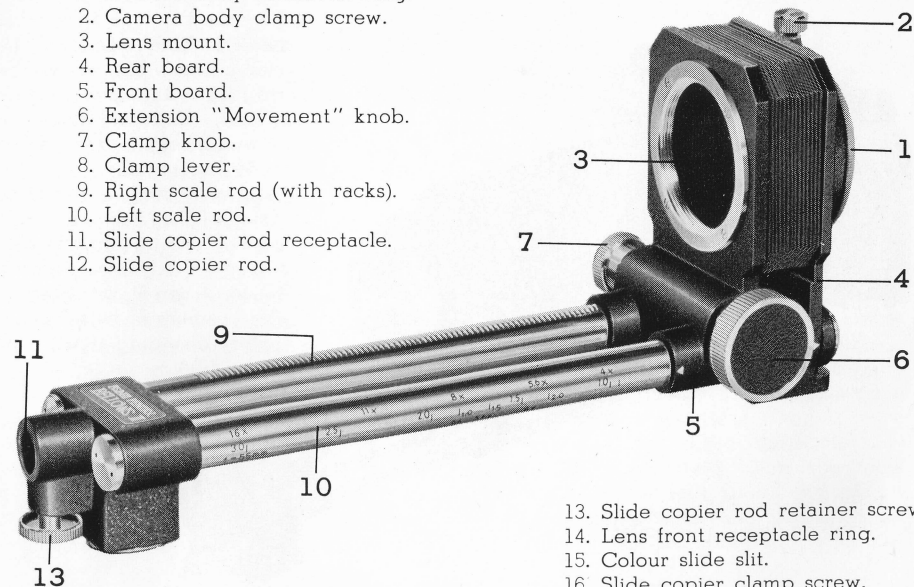
Available for this unit is a slide copier attachment which enables you to make duplicates of your colour slides.



- 17. White centre dot.
- 18. Slide copier diffuser cover.
- 19. Spring arm.
- 20. Lens clamp screw.

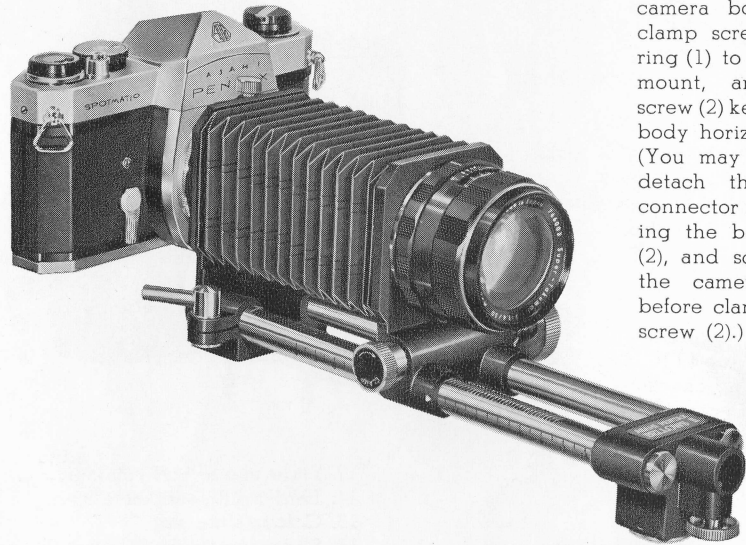
Description of Operating Parts.

- 1. Camera body connector ring.
- 2. Camera body clamp screw.
- 3. Lens mount.
- 4. Rear board.
- 5. Front board.
- 6. Extension "Movement" knob.
- 7. Clamp knob.
- 8. Clamp lever.
- 9. Right scale rod (with racks).
- 10. Left scale rod.
- 11. Slide copier rod receptacle.
- 12. Slide copier rod.



- 13. Slide copier rod retainer screw.
- 14. Lens front receptacle ring.
- 15. Colour slide slit.
- 16. Slide copier clamp screw.

Operation of Bellows II



1. Remove the lens from your camera body. Loosen the clamp screw (2), screw the ring (1) to the camera's lens mount, and tighten the screw (2) keeping the camera body horizontal.
(You may find it easier to detach the camera body connector ring (1) by loosening the body clamp screw (2), and screw this ring to the camera's lens mount before clamping it with the screw (2).)

2. Screw the lens to the lens mount (3). Loosen the clamp lever (8), pull the rear board (4) attached to your camera body to the end of the scale rods, and fasten the lever (8).
3. Loosen the clamp knob (7), and move the bellows back and forth by rotating the extension "Movement" knob (6). On the right hand scale rod there are engraved numbers from 4 to 18. These numbers represent the "Bellows Length" which is given in centimeters. These numbers are used when using the tables starting on page 18. The other left scale rod (10) has a calibration engraved for exposure factors and magnifications from 1.0 (life size) up to 3.0 for the focal length of 55mm. Note that on this left scale rod, you also find a red-coloured calibration marked in the opposite direction for

exposure factors and magnifications from 1.0 up to 3.0 for use with the 55mm lens when the front board (5) is extended to the farther end of the scale rods, such as when using the slide copier unit.

4. Looking through the viewfinder of your camera, extend the bellows by turning the "Movement" knob, and when your subject is in sharp focus, or when you have reached the desired magnification, stop the bellows movement, and tighten the clamp knob (7).
5. To be positively sure that your subject is in sharp focus, turn the distance scale ring of your lens.
6. Look at either one of the scale rods (9, 10), depending upon the focal length of the lens used, and obtain the exposure factor and magnification figures. The left scale rod is for the

focal length of 100mm. For the focal lengths other than 55mm and 100mm, refer to the tables of data appearing elsewhere in this manual.

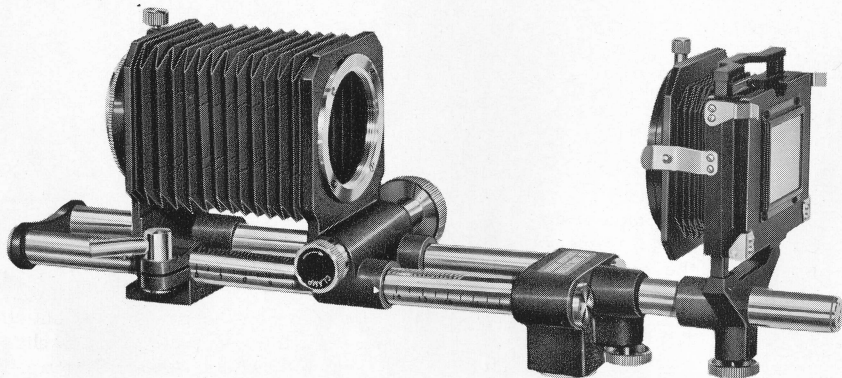
7. Remember that the depth of field is extremely shallow in close-up and macro-photography. Close down your diaphragm to obtain sufficient depth of field, and use a rigid tripod to avoid camera movement.
8. When using an exposure meter, point your meter as close to the subject as possible, to avoid unwanted light hitting your meter cell. Multiply the meter reading by the exposure factor. (If your meter gives a reading of $f/5.6$ at $1/125$, the actual exposure should be $f/5.6$ at $1/60$ if the given exposure factor is 2.)
9. The automatic diaphragm of the Auto-

or Super-Takumar lenses does not operate automatically with this bellows unit. Compose and focus with the diaphragm fully open, and manually close it down before releasing shutter.



Operation of Slide Copier

1. Insert the slide copier rod (12) into the receptacle (11), and tighten the clamp screw (16).



- The copier rod can be detached from the copier unit. When inserting it into the copier base, keep its flat side down, place the side marked 1.0 to the diffuser cover side, and the side marked 1.5 to the lens side. The lens side of the rod should be inserted into the receptacle (11).
2. Loosen the clamp knob (7) and lever (8), and move the bellows portion to the forward end of the scale rods. Tighten the clamp knob (7).
 3. Release the spring arms (19), pull out the lens front receptacle ring (14), attach it to the front frame of the lens, and tighten the lens clamp screw (20).
 4. Insert your colour slide into the slit (15).
 5. Look at the red calibration on the left scale rod. Back up your camera, and

- stop at the desired magnification. Tighten the clamp lever (8).
6. For composing and focusing your colour slide, loosen the slide copier clamp screw (16), and move the copier portion back and forth.
 7. You can move the slide copier portion up and down along the central frame, for proper cropping of your colour slides. To keep the copier unit co-axial with the taking lens, bring the top of the unit up or down to the white centre dot (17).
 8. The two red scales (1.0 & 1.5) on the slide copier retainer rod (12) are approximate guide of magnification when duplicating your colour slides.* When the rear board (4) is extended as far as the red scale 1.5, this slide copier rod should also be stopped down at its red calibration 1.5.

*The basic focal point of object upon which these two scales of magnification are made is the plane where the film strips are to be placed, (refer to 9 below), and not the position of the colour slide plane, for the width of colour slides differs from one manufacturer to another without standardization. Therefore, when duplicating your colour slides, retain the slide copier rod (12) with the clamp screw (16) with a gap of about 3mm between the 1.5 scale line and the edge of the copier rod receptacle (11), and the scales of magnification will apply without substantial deviation.

9. If you wish to duplicate unmounted film strips, pull down the diffuser cover (18), place your film strip on the square aperture of the copier unit with its emulsion side out, and push back the diffuser cover (18).



Cigarettes closed-up with an Asahi Pentax SV and Bellows II.

Use Diffused Light

When duplicating colour slides with your slide copier, do not point your lens directly against the source of light. Try to point your lens directly against evenly diffused light, or against a plane surface evenly illuminated from an angle of about 45°.

Correction of Over- or Under-exposure

If you are duplicating over- or under-exposed colour slides, you can correct them by under- or over-exposing these slides.

Blanket Exposures

When duplicating colour slides, it is recommended that you give blanket exposures: if your meter reads 1/8 sec. at the lens aperture of f/11, take one picture at this exposure setting, another

at the same shutter speed at between f/11 and f/16, and the other at the same speed at between f/11 and f/8.

Close-Up and Macrophotography

With the standard lens on your Asahi Pentax, you can take photographs as close as 18 inches (45cm) from the lens. Photographs of subjects closer than this minimum distance can be easily taken with your camera by use of the extension tubes or bellows unit inserted between the lens and the camera body, thus extending the lens forward from the camera body.

The object distance for copying to a given scale is given in the equation:-

$$u = \frac{F(M+1)}{M}$$

where u = Distance of object from lens

F = Focal length of lens

M = Scale of reproduction

The scale of reproduction is always the ratio of image size/object size. If the image is smaller than the object, the scale of reproduction will be a reduction. For instance, if the object is four times as large as the image, the scale of reproduction is 0.25, or 1/4, or 1:4. If the image is larger than the object, the scale of reproduction is greater than 1, and represents a magnification. For instance, if the image is twice as large as the object, this is expressed as magnification 2:1, or 2/1, or 2.

Example: The object distance for copying on a scale of 0.5 (a reduction of 1:2)

with a 55mm lens is:

$$\frac{55(0.5+1)}{0.5} = 165\text{mm}$$

The extension of the lens beyond the infinity setting is given by the equation:-

$$d = FM$$

Where d = Focusing extension beyond infinity setting

F = Focal length of lens

M = Scale of reproduction

For example, when copying on a scale of 0.5 with a 55mm lens, the focusing extension beyond the infinity setting is:-

$$55\text{mm} \times 0.5 = 27.5\text{mm}$$

At such close quarters, the object distance is measured from the front node of the lens. For a single lens, this is approximately one-third the actual thickness of the lens behind the front surface. In practice, it is not possible to guarantee

sharp focus from calculation and measurement. The final adjustment is done by inspecting the image on the ground glass of the camera.

The scale of reproduction at any object distance can be found from the equation:-

$$M = \frac{F}{u - F}$$

Where M = Scale of reproduction

F = Focal length of lens

u = Object distance from lens

So for an object 220mm away from a 55mm lens, the scale reproduction is:-

$$\frac{55}{220 - 55} = 0.33 \text{ or } 1:3$$

i.e., the image is one-third the size of the object.

The scale of reproduction obtainable with the camera lens fully extended with

extension tubes and/or bellows unit is:-

$$M = \frac{d}{F}$$

Where M = Scale of reproduction

d = Focusing extension beyond infinity setting

F = Focal length of lens

If your PENTAX lens is extended with the bellows unit by 55mm, the same length as the focal length of the lens, the scale of reproduction will be 1:1, which is a life-size reproduction.

DEPTH OF FIELD. As the camera gets closer to the subject, the zone of sharpness shrinks closer and closer to the actual focused distance. The effect can be compensated for—up to a point—by stopping down the lens, but at close distance a very narrow zone of sharp focus must be accepted as inevi-

table. As the depth of field decreases, depth of focus increases.

EXPOSURE. Where the camera extension is increased (by bellows or extension tubes), the marked lens aperture has to be increased in proportion to increased lens-film distance, requiring extra exposure. In addition, a further exposure increase is necessary with near shots because the shadow areas become more important when they are seen close at hand.

When comparatively long camera extensions are used for taking close-ups, the relative lens aperture (f number) must be multiplied by a correction factor to give the correct value for calculating exposure. This correction factor depends on the scale of reproduction.

THE SUBJECTS. Subjects for close-up photography must be as nearly as possible in one plane if they are to be sharp because the depth of field at short distances is very small. On the other hand, the depth of focus increases and the image on the ground glass changes only very slowly from sharp to unsharp during focusing.

(The foregoing paragraphs are excerpts from The Focal Encyclopedia of Photography, pages 196 - 198, published by the FOCAL PRESS, London, U.K. Some sentences were modified to suit this booklet.)



Super-Takumar 50mm f/1.4

(Distance scale set at infinity)

Bellows length			Subject size		Film-to-subject distance		Magnification	Exposure factor
	cm	inch	cm	inch	cm	inch		
Minimum	3.73	1.47	3.2×4.9	1.26×1.93	19.9	7.83	0.74	× 2.5
	5.0	1.97	2.4×3.6	0.94×1.42	19.4	7.64	1.0	× 3.0
	7.0	2.76	1.7×2.6	0.67×1.02	20.0	7.87	1.4	× 4.0
	9.1	3.52	1.3×2.0	0.51×0.79	21.2	8.35	1.8	× 5.5
	11.1	4.37	1.1×1.6	0.43×0.63	22.7	8.94	2.2	× 7.0
	13.1	5.16	0.9×1.4	0.35×0.55	24.4	9.60	2.6	× 8.5
	15.1	5.95	0.8×1.2	0.31×0.47	26.1	10.28	3.0	×10.5
	17.1	6.73	0.7×1.1	0.28×0.43	27.9	10.98	3.4	×12.5
Maximum	18.03	7.10	0.7×1.0	0.28×0.39	28.8	11.34	3.58	×13.0

Super-Takumar 55mm f/1.8

(Distance scale set at infinity)

Bellows length			Subject size		Film-to-subject distance		Magnification	Exposure factor
	cm	inch	cm	inch	cm	inch		
Minimum	3.73	1.47	3.7×5.5	1.46×2.17	22.9	9.02	0.66	× 2.5
	5.70	2.24	2.4×3.6	0.94×1.42	21.9	8.62	1.0	× 4.0
	8.0	3.15	1.7×2.6	0.67×1.02	22.6	8.90	1.4	× 5.5
	10.2	4.02	1.3×2.0	0.51×0.79	23.9	9.41	1.8	× 7.5
	12.5	4.92	1.1×1.6	0.43×0.63	25.6	10.08	2.2	× 9.5
	14.8	5.83	0.9×1.4	0.35×0.55	27.5	10.83	2.6	×12.0
	17.0	6.69	0.8×1.2	0.31×0.47	29.5	11.61	3.0	×15.0
	18.03	7.10	0.8×1.1	0.31×0.43	30.4	11.97	3.17	×16.0
Maximum								

Super-Takumar 35mm f/3.5

(Distance scale set at infinity)

Bellows length			Subject size		Film-to-subject distance		Magnification	Exposure factor
	cm	inch	cm	inch	cm	inch		
Minimum	3.73	1.47	2.3×3.4	0.91×1.34	14.9	5.87	1.05	× 3.0
	4.9	1.93	1.7×2.6	0.67×1.02	14.1	5.55	1.4	× 4.5
	6.3	2.48	1.3×2.0	0.51×0.79	15.0	5.91	1.8	× 5.5
	7.7	3.03	1.1×1.6	0.43×0.63	16.0	6.30	2.2	× 7.0
	9.1	3.58	0.9×1.4	0.35×0.55	17.2	6.77	2.6	× 9.0
	10.5	4.13	0.8×1.2	0.31×0.47	18.4	7.24	3.0	×11.0
	11.9	4.69	0.7×1.1	0.28×0.43	19.6	7.72	3.4	×13.0
	13.3	5.24	0.6×0.9	0.24×0.35	20.9	8.23	3.8	×15.0
	14.7	5.79	0.6×0.9	0.24×0.35	22.3	8.78	4.2	×17.5
	16.1	6.34	0.5×0.8	0.20×0.31	23.6	9.30	4.6	×20.0
	17.5	6.89	0.5×0.7	0.20×0.28	24.9	9.80	5.0	×23.0
	18.03	7.10	0.5×0.7	0.20×0.28	26.8	10.47	5.15	×24.0
Maximum								

Super-Takumar 85mm f/1.9

(Distance scale set at infinity)

Bellows length			Subject size		Film-to-subject distance		Magnification	Exposure factor
Minimum	cm	inch	cm	inch	cm	inch		
	3.73	1.47	5.5×8.2	2.16×3.22	39.6	15.56	0.44	× 2.5
	5.1	2.00	4.0×6.0	1.57×2.36	35.7	14.03	0.6	× 3
	6.8	2.67	3.0×4.5	1.18×1.77	33.9	13.32	0.8	× 4
	8.5	3.34	2.4×3.6	0.94×1.42	33.5	13.17	1.0	× 5.5
	10.2	4.01	2.0×3.0	0.79×1.18	33.8	13.28	1.2	× 6.5
	11.9	4.68	1.7×2.6	0.67×1.02	34.5	13.56	1.4	× 8
	13.6	5.35	1.5×2.3	0.59×0.90	35.4	13.91	1.6	× 9.5
	15.3	6.01	1.3×2.0	0.51×0.79	36.5	14.35	1.8	× 11
	17.0	6.68	1.2×1.8	0.47×0.71	37.7	14.82	2.0	× 13
Maximum	18.03	7.09	1.1×1.7	0.43×0.67	38.5	15.13	2.12	× 14

Super-Takumar 105mm f/2.8

(Distance scale set at infinity)

Bellows length			Subject size		Film-to-subject distance		Magnification	Exposure factor
Minimum	cm	inch	cm	inch	cm	inch		
	3.73	1.47	6.8×10.1	2.68×3.98	55.3	21.77	0.36	× 2.5
	6.3	2.48	4.0× 6.0	1.57×2.36	45.8	18.03	0.6	× 3.5
	10.5	4.13	2.4× 3.6	0.94×1.42	43.0	16.93	1.0	× 6.0
	14.7	5.79	1.7× 2.6	0.67×1.02	44.2	17.40	1.4	× 9.5
Maximum	16.8	6.61	1.5× 2.3	0.59×0.91	45.4	17.87	1.6	×11.5
	18.03	7.10	1.4× 2.1	0.55×0.83	46.2	18.19	1.72	×12.5

Super-Takumar 135mm f/3.5

(Distance scale set at infinity)

Bellows length			Subject size		Film-to-subject distance		Magnification	Exposure factor
	cm	inch	cm	inch	cm	inch		
Minimum	3.73	1.47	8.7×13.0	3.43×5.12	80.7	31.77	0.28	× 2.0
	5.4	2.13	6.0× 9.0	2.36×3.54	67.3	26.50	0.4	× 2.5
	10.8	4.25	3.0× 4.5	1.18×1.77	55.8	21.97	0.8	× 5.5
	13.5	5.32	2.4× 3.6	0.94×1.42	55.1	21.70	1.0	× 7.0
	16.2	6.38	2.0× 3.0	0.79×1.18	55.6	21.89	1.2	× 9.0
Maximum	18.03	7.10	1.8× 2.7	0.71×1.06	56.3	22.17	1.34	×10.0

Bellows-Takumar 100mm f/4

Bellows length			Subject size		Film-to-subject distance		Magnification	Exposure factor
	cm	inch	cm	inch	cm	inch		
Minimum	3.8	1.50	—	—	∞	∞	—	×1.0
	5.8	2.28	12.0×18.0	4.72×7.09	72.0	28.35	0.2	×1.5
	9.8	3.86	4.0× 6.0	1.57×2.36	42.8	16.85	0.6	×3.0
	13.8	5.43	2.4× 3.6	0.94×1.42	40.1	15.79	1.0	×4.5
	17.8	7.01	1.7× 2.6	0.67×1.02	41.2	16.22	1.4	×7.0
Maximum	18.03	7.10	1.7× 2.5	0.67×0.98	41.4	16.30	1.42	×7.0

Macro-Takumar 50mm f/4

(Distance scale set at infinity)

Bellows length			Subject size		Film-to-subject distance		Magnification	Exposure factor
	cm	inch	cm	inch	cm	inch		
Minimum	3.73	1.47	3.3×5.0	1.30×0.20	21.3	8.39	0.72	× 3.0
	5.2	2.05	2.4×3.6	0.94×1.42	20.8	8.19	1.0	× 4.5
	7.2	2.83	1.7×2.6	0.67×1.02	21.3	8.39	1.4	× 6.5
	9.3	3.66	1.3×2.0	0.51×0.79	22.6	8.90	1.8	× 9.0
	11.4	4.49	1.1×1.6	0.34×0.63	24.1	9.49	2.2	×11.5
	13.4	5.28	0.9×1.4	0.35×0.55	25.8	10.16	2.6	×14.5
	15.5	6.10	0.8×1.2	0.31×0.47	27.6	10.87	3.0	×18.0
	17.5	6.89	0.7×1.1	0.28×0.43	29.5	11.61	3.4	×22.0
Maximum	18.03	7.10	0.7×1.0	0.28×0.39	29.9	11.77	3.49	×23.0

NOTES



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