

PC-Nikkor

35mm

f/2.8

**Nikon** INSTRUCTION MANUAL

E

## NOMENCLATURE

Preset ring alignment index

Preset ring

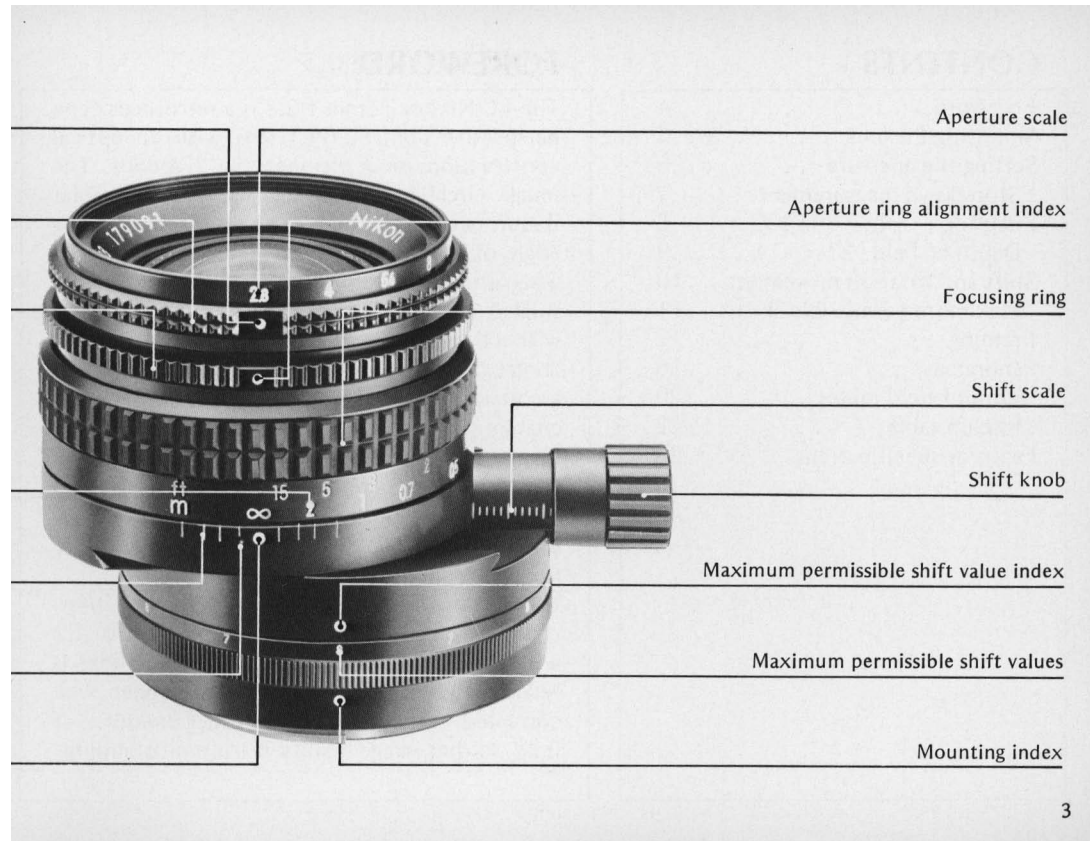
Aperture ring

Distance scale

Depth-of-field indicators

Infrared index

Distance scale index



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## FOREWORD

The PC-Nikkor 35mm f/2.8 is a retrofocus-type perspective control (PC) lens with an optical construction of 7 elements in 7 groups. The image circle of this lens is wider than regular 35mm wideangle lenses providing a covering angle of  $78^\circ$ ; thus image quality is insured even when the lens is shifted. The lens barrel can be shifted up to 11mm off-axis and rotated  $360^\circ$  with click-stops every  $30^\circ$  for complete image control. The PC-Nikkor is ideally suited for architectural and commercial photography, enabling the photographer to properly frame the subject without tilting or angling the camera—and the photographer has the added convenience of thru-the-lens viewing and metering for greater ease of operation. It is also possible to take panoramic shots.

If used with a Nikon camera having interchangeable focusing screens, the Type E or E2 with its etched horizontal and vertical lines is recommended. All aberrations have been well corrected, especially coma and curvature of field, so that image quality is truly outstanding.

## MOUNTING THE LENS

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The PC-Nikkor 35mm f/2.8 mounts on all Nikon and Nikkormat cameras. To mount the lens, position it in the camera's bayonet mount so that the mounting index dots on the lens and the camera are aligned. Then, grasp the milled surface of the mounting ring and twist the lens counterclockwise until it clicks and locks into place. (See "Stop-Down Measurement" on page 6 for metering procedures.)

To remove the lens from the camera body, press the lens release button on the camera and, keeping the button depressed, twist the lens clockwise.

To use the PC-Nikkor as a normal 35mm lens without using the perspective control feature, rotate the lens barrel so that the shift scale faces up. Then, if necessary, turn the milled shift knob until the distance scale index dot is aligned with the shift scale index dot.

## SETTING THE APERTURE



The PC-Nikkor is provided with a manual diaphragm operable from  $f/2.8$  to  $f/32$  and a spring-loaded preset ring to aid in setting the diaphragm quickly to the shooting aperture; a total of eight click-stop positions, at full-stop intervals, makes for precise placement of the preset ring. Also, identical sets of  $f$ /numbers are engraved on opposite sides of the front rim of the lens to facilitate operation when the lens is used inverted. To set the aperture, the following procedure is recommended: Press the preset ring toward the camera body and turn it until the  $f$ /number setting corresponding to the desired shooting aperture is aligned with the ring's index dot; then release the ring and it will spring outward and lock in place. Note that the preset ring, once set, limits the travel of the aperture ring so that the diaphragm can be set easily and quickly from the full aperture viewing position to the shooting aperture without the need for checking the scale during stop-down operation.

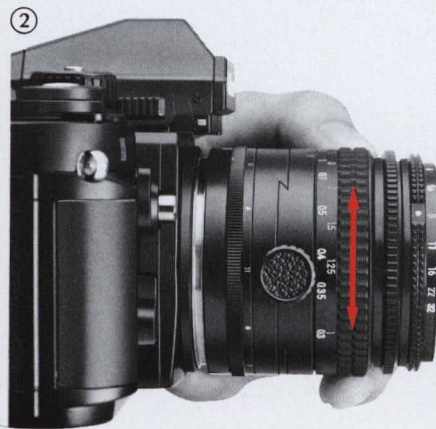
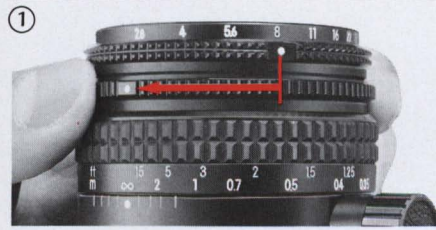
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### **Stopped-Down Measurement**

The PC-Nikkor lens must be stopped down to determine the exposure when used on TTL cameras. Because the finder image progressively becomes darker as the lens is stopped down, you should focus first before taking a meter reading.

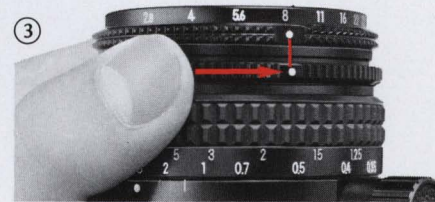
It is important to note that exposure measurement must be performed before the lens is shifted; should measurement be performed after shifting, erroneous meter readings may occur. With automatic exposure cameras, such as the Nikon F3, FE2 or FE use the camera's memory lock to retain the correct shutter speed before shifting the lens for the final picture composition. Since the Nikon EM doesn't have a memory lock, the correct exposure cannot be obtained while shifting.

## FOCUSING



The aperture and preset rings of the PC-Nikkor enable focusing at full aperture for the brightest viewfinder image, with rapid setting of the diaphragm to the preset shooting aperture. Having set the preset ring to the desired aperture setting, focus as follows: Turn the aperture ring to the f/2.8 setting to open the diaphragm fully for focusing (photo 1); then turn the focusing ring until the image on the focusing screen is in sharp focus (photo 2). Before releasing the shutter, turn the aperture ring until it contacts the preset ring and can no longer be turned—the diaphragm is now at the preset shooting aperture (photo 3).

**Note:** The Type E2 focusing screen is highly recommended for use with FA/FE2/FM3 Nikon cameras and the Type E for use with F/F2/F3/FE Nikon cameras. The vertical and horizontal lines etched on the screen help you to properly align the camera for proper perspective correction of the image.





### Depth of Field

Depth of field refers to the zone of acceptable focus extending in front of and behind the plane of sharpest focus. Within this zone, image blur is negligible and everything can be considered as being in sharp focus. To observe the depth of field with the PC-Nikkor lens, it is necessary to manually set the diaphragm to the required shooting aperture; for procedures, refer to "Setting the Aperture" on page 6.

Depth of field can also be determined by reading the color-coded depth-of-field indicators engraved on the lens barrel opposite the distance scale. Each pair of colored lines corresponds to an f/number of the same color engraved on the lens front rim. To find the depth of field at a particular aperture, focus the lens on the subject and then check the numbers on the distance scale opposite the colored lines that match the color of the preset shooting aperture setting.

When in doubt about depth of field for a critical shooting situation, refer to the tables on page 20 and 21 of this instruction manual.

### Recommended Focusing Screens

Various interchangeable focusing screens are available for F3- and F2-series cameras to suit any type of lens or picture-taking situation. Those which are recommended for use with your lens are listed below. For screens used with Nikon cameras other than F3- and F2-series cameras (e.g., Nikon FA, FE2, FM2 and FE), refer to the column for F3-series cameras. For the K2, B2 and E2 focusing screens, refer to the columns on the K, B and E screens, respectively. For details, also refer to the specific focusing screen's instruction sheet.

Camera \ Screen	A/L	B	C	D	E	G1	G2	G3	G4	H1	H2	H3	H4	J	K/P	M	R	T	U	
F3	●	○			○										○	●		○	●	
F2	●	○			○										○	●		○	●	

- = Excellent focusing
- = Acceptable focusing

The split-image rangefinder, microprism or cross-hair area is dim. Focus on the surrounding matte area.

- = Exposure measurement via stop-down method

Blank means not usable.

## SHIFT AND ROTATION MOVEMENT



The front part of the PC-Nikkor shifts up to 11mm from the center in a plane parallel to the film, and the whole lens mount rotates through a full 360°. By combining the parallel shift with the rotation movement of the lens, an infinite variety of adjustments can be made.

To shift the lens, turn the knurled shift knob. The knob should always be turned so that it is facing away from the direction in which the lens is to be shifted. The shift scale shows the degree of shift in millimeters. When the shift scale is facing upward, the lens can be shifted 11mm to the right of center. In order to shift the lens in other directions, simply rotate the whole lens mount, stopping at one of the 12 click-stop settings provided at 30° intervals, or choosing a desired intermediate position. By combining these two movements, the lens can be shifted up to 11mm from the center in any direction.

### Maximum Permissible Shift

Depending on the direction of shift, however, there is a maximum permissible shift, beyond which distortion and/or vignetting may occur in the picture corners, because the film format is rectangular while image area produced by the lens is circular. The amount of maximum permissible shift (7, 8 or 11) is indicated in millimeters at each click-stop on the lens barrel. The diagrams at right show the limits based on the direction of shift.

**Note:** When you use a Nikon polarizing filter in combination with a lens hood, vignetting will occur even at the maximum permissible amount of shift at each click-stop.

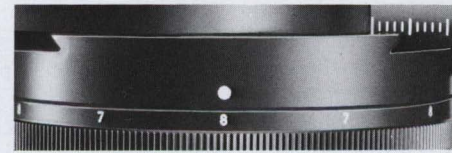


Diagram 1

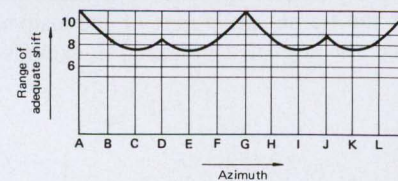
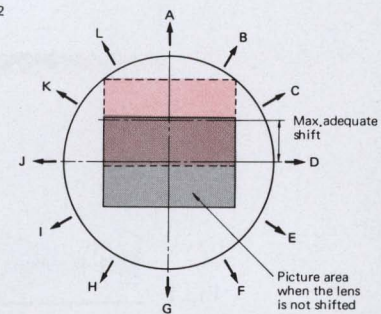


Diagram 2



## FRAMING

As long as the camera is held in a position parallel to the subject when shooting, it reproduces scenes more or less as the eye sees them, with no unpleasant perspective distortion. However, shooting from this position often produces unbalanced composition, since the camera is usually used close to ground level. Much unwanted foreground is included in the lower half of the frame, while part of the main subject, for instance the top of a building, is excluded (Fig. 1).

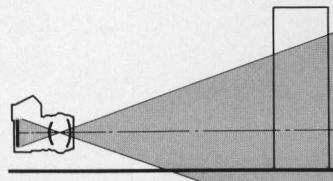
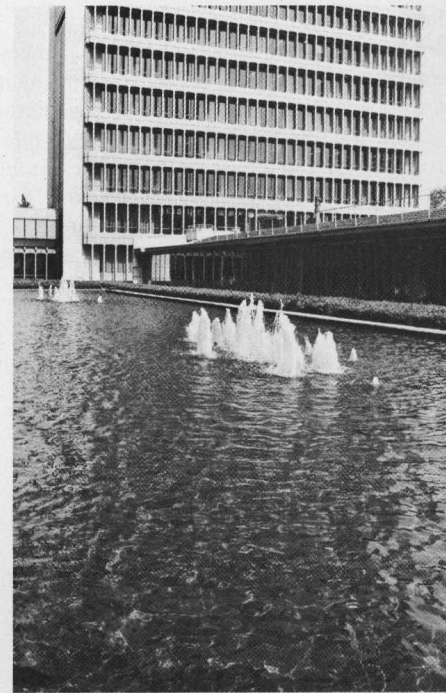


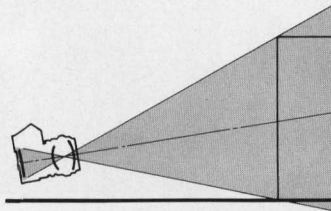
Fig.1



Inevitably, the camera must be tilted in order to include the top of the building and minimize the foreground (Fig. 2). But with the camera tilted, the plane of the film is no longer parallel to the subject, and because the image size varies according to subject distance, the nearer parts of the subject are reproduced on a scale larger than those farther away. The sides of the building appear to converge, as if the building were leaning back or falling. Similar distortion occurs in horizontal lines when photographing a long line of buildings at an angle.

Note: Meter with the camera aimed for the general final composition; this is shown by Fig. 2 on this page.

Fig.2



## FRAMING—continued

The PC-Nikkor's shift and rotation movements enable you to create balanced composition without tilting the camera, so that the film remains parallel to the plane of the subject (Fig. 3).

To photograph a tall building, hold the camera parallel to the plane of the building. Rotate the lens mount until the milled knob points downward, and sight the subject on the focusing screen. Now turn the milled knob until all of the building is visible and unwanted foreground area is trimmed away, checking to be sure that the adjustment is within the permissible shift area (see page 11).

If you must exceed the permissible shift adjustment in order to include all of the desired subject, try to compose the picture so that any peripheral distortion will occur in unimportant areas, such as sea, sky or earth. Use the same technique to make adjustments for horizontal and diagonal subjects.

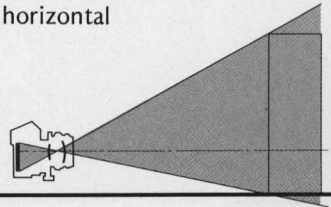
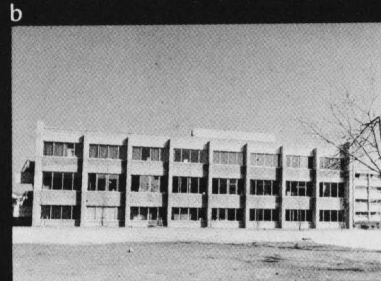


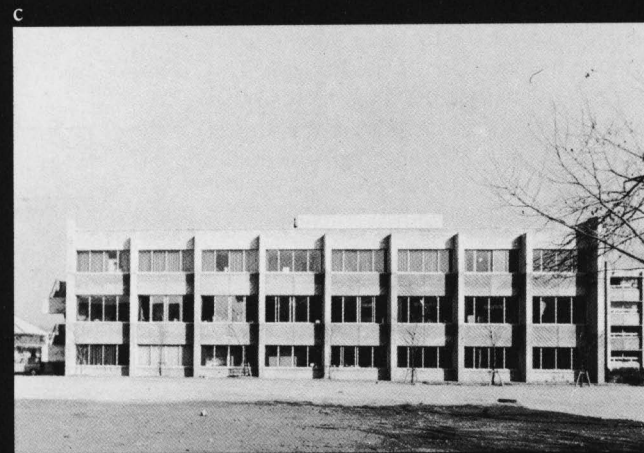
Fig. 3





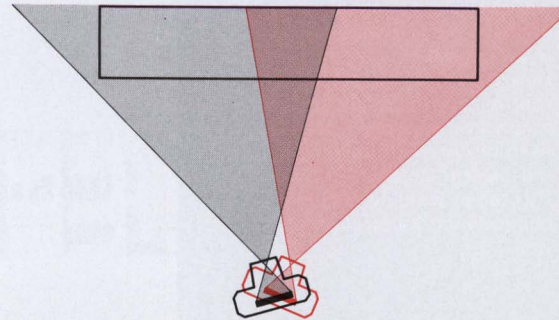
Getting around an obstacle

- a. Bush obstructs complete view of subject building.
- b. Convergence of horizontal lines when camera mounted with an ordinary lens is tilted sideways to avoid bush.
- c. Horizontal lines perspectively controlled with PC-Nikkor, by simply keeping camera parallel to front surface of building and shifting lens laterally. (If frame cuts top of building, rotate lens obliquely until subject is in full view.)

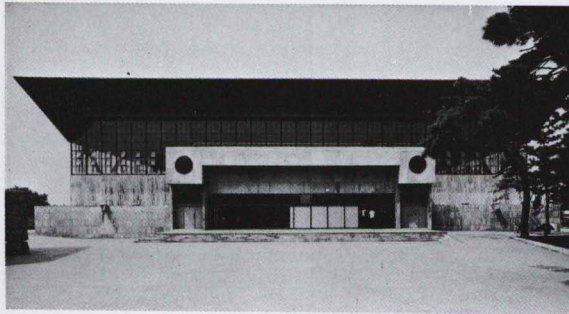


## PANORAMAS

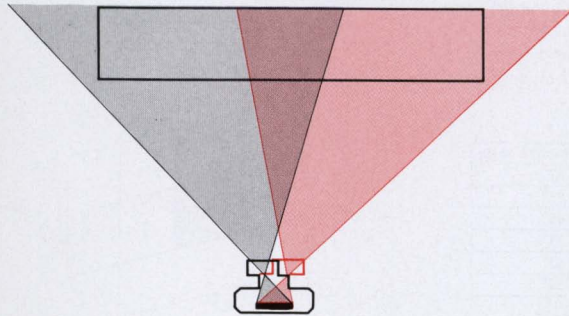
The shift movement of the PC-Nikkor can also be used for making panoramic pictures by joining exposures. Its advantage over the normal lens mounted on panoramic equipment is that it enables you to maintain exactly the same film plane in both exposures so that the finished photographs will match exactly. With the ordinary lens, the camera must be moved after the first exposure in order to take in a new arc of the horizon. This movement changes the film plane, so that vertical and horizontal lines in the subject make new and different angles with the film. As a result, no two photographs will ever match perfectly when joined.







To take panoramic shots, place the lens in normal position, shift scale facing upward, and operate the milled shift knob to shift the lens as far to the left as possible. Compose, focus, and shoot. Without moving the camera, wind the film advance lever to advance the film one frame, and rotate the lens mount through  $180^\circ$  so that the shift scale faces straight down. Now make the second exposure.



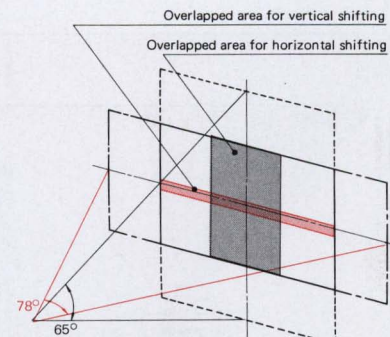
## PANORAMAS—continued

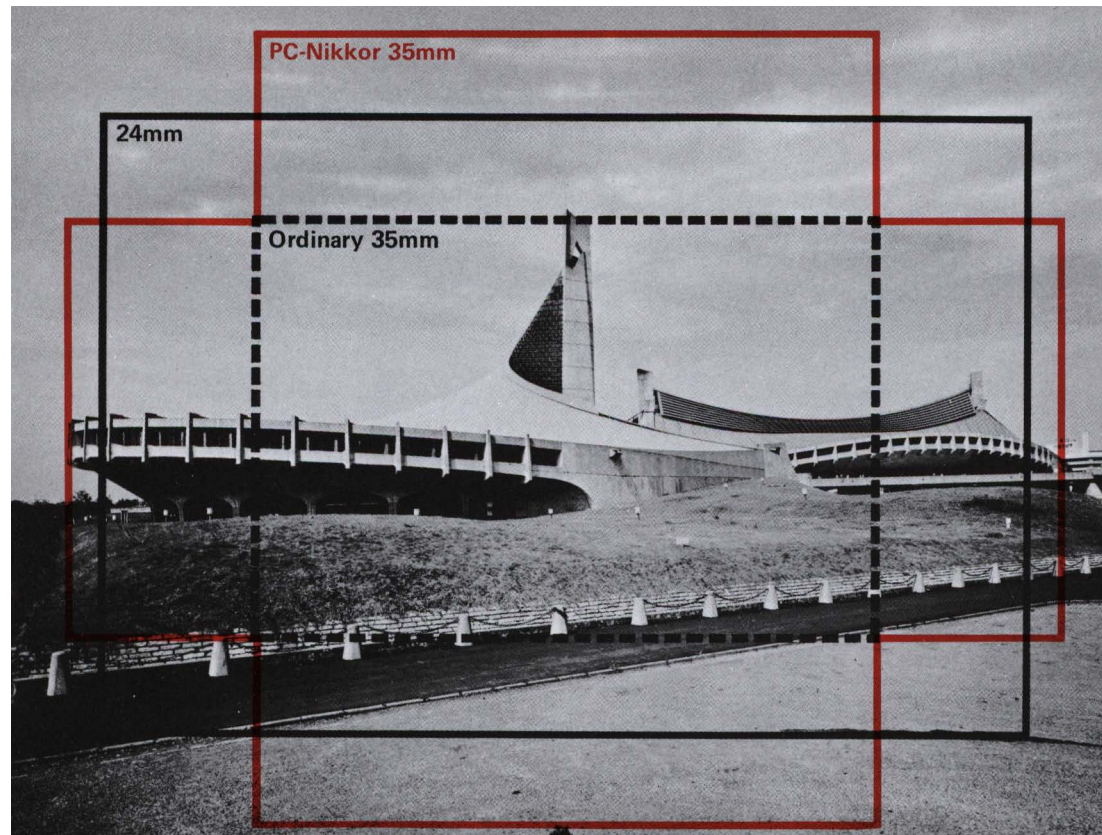
These two exposures together cover a horizontal angle of  $78^\circ$  without turning the camera,  $4^\circ$  more than the range of a 24mm wideangle lens, and with the added advantage of larger image size. The table below gives a comparison of the angles of various wideangle lenses and the PC-Nikkor panorama range. In making a vertical panorama, a  $65^\circ$  vertical angle can be covered using the extreme rise and fall shifts, with the camera still in the horizontal position. The overlapping area is least when two pictures are matched vertically.

**Caution:** Extreme care is necessary when taking panoramic shots to avoid camera movement, since even a slight movement between exposures will result in some distortion and photographs will not join exactly. For best results mount the camera on a tripod.

Nikkor lens		Horizontal picture angle	Vertical picture angle
20mm f/2.8		$84^\circ$	$62^\circ$
24mm f/2.8		$74^\circ$	$53^\circ$
28mm f/2		$64^\circ$	$45^\circ$
35mm f/1.4		$53^\circ$	$37^\circ$
35mm PC	Vertical connection	$53^\circ$	$65^\circ$
	Horizontal connection	$78^\circ$	$37^\circ$

When making enlargements, be sure that the negative is absolutely parallel to the easel to prevent distortions. All of the focusing adjustments on the enlarger should be maintained constant from one exposure to the next. When the prints are removed from the washer, insert them in a rotary dryer facing the same direction.





PC-Nikkor 35mm

24mm

Ordinary 35mm

## DEPTH-OF-FIELD TABLES

		(ft)							
$f/$ ft	2.8	4.0	5.6	8.0	11.0	16.0	22.0	32.0	Reproduction ratio
1.0	$11\frac{7}{8}-1\frac{1}{16}$	$11\frac{13}{16}-1\frac{1}{8}$	$11\frac{13}{16}-1\frac{3}{16}$	$11\frac{11}{16}-1\frac{1}{4}$	$11\frac{5}{8}-1\frac{3}{8}$	$11\frac{1}{2}-1\frac{9}{16}$	$11\frac{5}{16}-1\frac{3}{4}$	$11\frac{1}{16}-1\frac{3}{16}$	1/5.4
1.3	$1'2\frac{13}{16}-1'3\frac{3}{16}$	$1'2\frac{11}{16}-1'3\frac{1}{4}$	$1'2\frac{5}{8}-1'3\frac{3}{8}$	$1'2\frac{7}{16}-1'3\frac{9}{16}$	$1'2\frac{1}{4}-1'3\frac{3}{4}$	$1'2''-1'4\frac{3}{16}$	$1'1\frac{11}{16}-1'4\frac{11}{16}$	$1'1\frac{3}{16}-1'5\frac{11}{16}$	1/7.6
1.5	$1'5\frac{11}{16}-1'6\frac{5}{16}$	$1'5\frac{1}{2}-1'6\frac{7}{16}$	$1'5\frac{3}{8}-1'6\frac{5}{8}$	$1'5\frac{1}{8}-1'6\frac{15}{16}$	$1'4\frac{13}{16}-1'7\frac{5}{16}$	$1'4\frac{3}{8}-1'8\frac{1}{16}$	$1'3\frac{7}{8}-1'9''$	$1'3\frac{1}{16}-1'10\frac{7}{8}$	1/9.7
2.0	$1'11\frac{5}{16}-2\frac{11}{16}$	$1'11\frac{1}{16}-2'1''$	$1'10\frac{11}{16}-2'1\frac{7}{16}$	$1'10\frac{3}{16}-2'2\frac{1}{8}$	$1'9\frac{5}{8}-2'3''$	$1'8\frac{3}{4}-2'4\frac{3}{4}$	$1'7\frac{13}{16}-2'7\frac{3}{16}$	$1'6\frac{7}{16}-3\frac{9}{16}$	1/14
3.0	$2'10\frac{5}{16}-3'1\frac{7}{8}$	$2'9\frac{5}{8}-3'2\frac{3}{4}$	$2'8\frac{3}{4}-3'3\frac{15}{16}$	$2'7\frac{9}{16}-3'6''$	$2'6\frac{1}{4}-3'8\frac{7}{8}$	$2'4\frac{1}{4}-4'2\frac{13}{16}$	$2'2\frac{1}{4}-5\frac{3}{4}$	$1'11\frac{9}{16}-7'7\frac{11}{16}$	1/22
5.0	$4'6\frac{15}{16}-5'6\frac{1}{8}$	$4'5\frac{1}{16}-5'9\frac{3}{16}$	$4'2\frac{11}{16}-6'1\frac{13}{16}$	$3'11\frac{5}{8}-6'10\frac{1}{16}$	$3'8\frac{5}{16}-7'11\frac{5}{8}$	$3'3\frac{3}{4}-11'1''$	$2'11\frac{1}{2}-21'4\frac{3}{4}$	$2'6\frac{1}{4}-\infty$	1/39
15.0	11'5"-21'9"	10'5"-27'1"	9'3"-40'2"	8'-152'6"	6'10"-∞	5'6"-∞	4'6"-∞	3'6"-∞	1/124
∞	46'-∞	32'-∞	23'-∞	16'-∞	12'-∞	8'-∞	6'-∞	4'-∞	1/∞

		(m)							
$i/m$	2.8	4.0	5.6	8.0	11.0	16.0	22.0	32.0	Reproduction ratio
0.30	0.298–0.302	0.297–0.303	0.296–0.305	0.294–0.307	0.292–0.309	0.288–0.314	0.284–0.319	0.278–0.329	1/5.3
0.35	0.346–0.354	0.345–0.355	0.343–0.358	0.340–0.361	0.336–0.365	0.331–0.373	0.324–0.383	0.314–0.401	1/6.7
0.40	0.395–0.406	0.392–0.408	0.389–0.412	0.385–0.417	0.380–0.424	0.371–0.435	0.362–0.451	0.348–0.481	1/8.1
0.50	0.490–0.511	0.486–0.515	0.480–0.522	0.473–0.532	0.463–0.545	0.449–0.569	0.433–0.602	0.410–0.667	1/11
0.70	0.677–0.725	0.668–0.736	0.656–0.752	0.638–0.778	0.619–0.812	0.588–0.878	0.557–0.976	0.512–1.210	1/16
1.0	0.948–1.06	0.927–1.09	0.902–1.13	0.866–1.19	0.825–1.29	0.766–1.49	0.707–1.84	0.629–3.15	1/25
2.0	1.78–2.29	1.70–2.44	1.60–2.69	1.48–3.16	1.35–4.08	1.18–8.01	1.03–∞	0.86–∞	1/52
∞	14–∞	10–∞	7–∞	5–∞	4–∞	3–∞	2–∞	1–∞	1/∞

## CLOSE-UP TABLES

Unit: inch (cm)

Close-up attachments	Lens in normal position		
	Reproduction ratio	Subject field	Focused distance
Close-up Lens No.0	1/39—1/4.8	36.8×55.3—4.5×6.8 (93.6×140—11.5×17.2)	60.1—11.2 (153—28.5)
Close-up Lens No.1	1/19—1/4.3	17.6×26.3—4.0×6.0 (44.6×66.9—10.2×15.4)	31.2—10.6 (79.3—26.8)
Close-up Lens No.2	1/9.4—1/3.5	8.8×13.3—3.3×5.0 (22.4×33.7—8.4×12.7)	18.0—9.6 (45.7—24.3)
Close-up Lens No.1+No.2	1/6.3—1/3.0	5.9×8.9—2.9×4.3 (15.1×22.6—7.3×10.9)	13.8—9.0 (34.9—22.9)
E2 Ring	1/2.6—1/1.8	2.4×3.7—1.7×2.5 (6.2×9.3—4.2×6.3)	8.3—7.4 (21.1—18.7)
K Ring Set	1/6.2—1.5	5.9×8.8—0.64×0.96 (15.0×22.5—1.6×2.4)	13.2—7.1 (33.5—18.1)
PK Ring	1/4.5—1.6	4.3×6.4—0.61×0.91 (10.9×16.3—1.5×2.3)	10.8—7.2 (27.5—18.2)
Bellows Attachment PB-4, PB-5	1.2—5.1	0.80×1.2—0.18×0.28 (2.0×3.0—0.47×0.70)	6.9—11.6 (17.6—29.5)
Bellows Attachment PB-6	1.3—5.7	0.71×1.1—0.16×0.25 (1.8×2.7—0.42×0.63)	7.0—12.5 (17.8—31.7)
Micro-Copy Stand PB-6M	1.3—4.4	0.71×1.1—0.22×0.33 (1.8×2.7—0.55×0.83)	7.0—10.6 (17.8—26.9)
Extension Bellows PB-6E	1.3—7.0	0.71×1.1—0.14×0.20 (1.8×2.7—0.34×0.52)	7.0—21.4 (17.8—54.4)
Repro-Copy Outfit Model PF-2, 3, 4	1/21—1/5.5	19.5×29.3—5.2×7.7 (49.6×74.4—13.1×19.6)	33.6—11.8 (85.3—30.0)
PN Ring	1.5—1.6	0.65×0.98—0.58×0.87 (1.7×2.5—1.5×2.2)	7.1—7.3 (18.0—18.4)

Close-up attachments	Lens in reverse position		
	Reproduction ratio	Subject field	Focused distance
Bellows Attachment PB-4, PB-5	2.7—6.7	0.35×0.52—0.14×0.21 (0.88×1.3—0.36×0.54)	8.5—13.8 (21.5—34.9)
Bellows Attachment PB-6	2.4—5.5	0.39×0.58—0.17×0.26 (0.99×1.5—0.44×0.66)	8.1—12.1 (20.6—30.8)
Slide-Copy Adapter PS-4, PS-5	2.7—6.7	0.35×0.52—0.14×0.21 (0.88×1.3—0.36×0.54)	8.5—13.8 (21.5—34.9)
Slide-Copy Adapter PS-6	2.4—4.3	0.39×0.58—0.22×0.33 (0.99×1.5—0.56×0.84)	8.1—10.5 (20.6—26.6)
Micro-Copy Stand PB-6M	2.4—4.4	0.39×0.58—0.22×0.33 (0.99×1.5—0.55×0.83)	8.1—10.6 (20.6—26.9)
Extension Bellows PB-6E	2.4—11.8	0.39×0.58—0.08×0.12 (0.99×1.5—0.20×0.30)	8.1—21.0 (20.6—53.4)

## FEATURES/SPECIFICATIONS

**Focal length:** 35mm

**Maximum aperture:** f/2.8

**Lens construction:** 7 elements in 7 groups

**Picture angle:** 62°

**Covering power:** 78°

**Distance scale:** Graduated in meters and feet from 0.3m (1 ft) to infinity ( $\infty$ )

**Aperture scale:** f/2.8–f/32

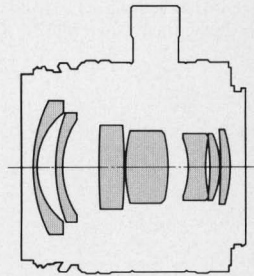
**Diaphragm:** Manual type with preset ring for convenience when setting the diaphragm to the shooting aperture

**Exposure measurement:** Stop-down method

**Lens rotation:** Lens optics rotate 360° for perspective control adjustments in any direction; click-stops provided at each 30° of rotation; maximum permissible shift values engraved at each click-stop position

**Lens shift:** Special mount enables up to 11mm off-center shift for perspective control; shift adjustments via milled knob at side of lens; shift scales provided with graduations at 1mm intervals

**Mount:** Nikon bayonet type



**Attachment size:** 52mm (P = 0.75mm)

**Dimensions:** Approx. 62mm x 61.5mm extension from flange; 66mm long (overall)

**Weight:** Approx. 320g

### Accessories

Supplied	Optional
52mm snap-on front lens cap	52mm screw-in lens hood HN-1
Rear lens cap LF-1	52mm screw-in filters
Hard lens case CL-34A	Lens pouch No. 61

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***Nikon***

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