The Nikon system of photography

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RIKOR CAMERAS

EHRENREICH PHOTO-OPTICAL INDUSTRIES, INC.



finest optical lenses in the world market, and is the world leader in both quality and variety. Nikkor lenses are tailormade and practically meet all photographic requirements. There are about 30 different types of Nikkor lenses to be used with the Nikon F and their range of focal lengths extends from 7,5 to 1,200mm covering the most demanded focal lengths and being rationally proportioned. They cover normal, wideangle, telephoto, zoom, close-up and specially designed lenses such as: Micro-Nikkor Auto, Medical-Nikkor Auto, Fish-eye-Nikkor, PC-Nikkor and other lenses which are supplied only by Nikon. The special lenses have extraordinary applications and greatly contribute to the incomparable versatility of the Nikon F as an unique system camera. The Nikon camera and the Nikkor lenses are interdependent. The Nikon camera will fully exhibit its capabilities only when used with a Nikkor lens. Not only does it fit mechanically to the camera mount, but it is optically compatible with the camera. Therefore, when a Nikon F camera is sold, we emphasize that Nikkor lenses be recommended.

Thorough Servicing Network



Nikon is service-minded and has an extensive after-servicing network. Nikon possesses servicing centers in U.S.A. and Switzerland. Repairers dispatched from agents are trained in Japan so thorough after-servicing can be performed. Nikon technical experts stationed at the servicing centers are periodically dispatched to Nikon agents for technical training and advice to assist the agents in performing their complete aftercare. Moreover, technical experts from Nikon's main office are sent overseas for new technical advice and keeping the repair technicians up-to-date. Therefore, full assurance is given so complete after-care can be received no matter when and where a Nikon is purchased. Selling a Nikon will free you of any difficulties that may be encountered at a later date. Nikon is willing to serve and assist their customers so they will always remain satisfied customers.

Conclusion

There are numerous models of cameras and many a noted or unnoted still camera manufacturer. Practically every year a new model is introduced by these manufacturers. Nevertheless, Nikon has remained unchanged and boasts supremacy in all aspects of quality, durability and versatility.

The following are other distinctive characteristics found in the Nikon F system :

- 1. 3 Interchangeable Viewfinders...The eye-level finder, eyelevel finder with a built-in meter (Photomic-T), and the waist-level finder.
- 2. 100% Viewfield Area...The Nikon F is the only camera that takes the exact picture you are looking at through the viewfinder. This may sound strange, but actually other cameras don't. The viewfinder shows 100% of the picture field to be registered on the film.
- 3. 14 Interchangeable Focusing Screens.
- 4. Precision Shutter...In conjunction with the titanium foil shutter curtain, it ensures higher accuracy and longer life.
- 5. Most Versatile Flash Synch Control...Permits use of almost all flash bulbs with wide range of time-lag adjustment for flash synchronization.
- 6. Depth of Field Preview Control...Allows the photographer to observe the depth of field at taking aperture.
- 7. Convenient Mirror Lock.
- 8. Camera Back...Interchangeable with a motor back which converts the Nikon into a sequence shooting camera with automatic fire power.
- 9. Fully Automatic Diaphragm...Allows metering, focusing and composing with the lens fully opened without darkening the viewfinder.
- 10. Fast and Easy Handling...All related controls are grouped in most convenient positions for fast and easy handling.





SPECIFICATION :

Nikon F

35mm single lens reflex camera.

Picture size: $24mm \times 36mm$ (1 in. $\times 1\frac{1}{2}$ in.).

Interchangeable Eye-Level finder with penta-prism supplied as standard equipment.

Interchangeable type A focusing screen supplied as standard fitment. Vibration-free, automatic instant return mirror which can be placed in locked up position.

Focal plane shutter using ball bearing and titanium foil curtain.

Built-in calibrated self-timer.

Flash synchronization for all speeds up to 1/1000 sec., with provisions for electronic flash up to 1/60 sec.

Press button type depth of field preview control.

Instant reopening automatic diaphragm, closes to preselected "taking" aperture at instant of exposure : automatically reopens to full aperture.

Bayonet lens mount.

Self-resetting type exposure counter. Film winding by single stroke lever which also cocks the shutter and operates the exposure counter.

Rapid film rewinding crank which folds down when not in use.

Detachable camera back which is interchangeable with Motor Drive Back. Fixed take-up spool.

Tripod socket in body casting

Accepts Model 3 Nikon exposure meter, ASA ratings from 6 to 4,000.

Dimensions: $147 \text{ mm} \times 98 \text{ mm} \times 101 \text{ mm}$ with 50mm f/1.4 lens.

Weight: body without lens 685g (1.5 1bs.), body with 50 mm f/1.4 lens 1,010g (2.2 1bs.).

Nikon F Photomic-T

With exception of the following, all other specifications remain exactly the same as in Nikon F.

Interchangeable Photomic-T finder supplied as standard equipment.

Film speeds range from ASA 25 to 6,400.

 $\begin{array}{l} \text{Dimensions: } 147mm \times 103mm \times 101mm \\ \text{with } 50mm \ f/1.4 \ \text{lens.} \end{array}$

Weight: body without lens 830 g (1.8 lbs.), body with 50mm f/1.4 lens 1,155 g (2.5 lbs.).



Nikon F is a System Camera

The Nikon F is a system camera that has established its fame as the greatest camera system ever made for 35 mm photography. When you sell a Nikon, you are selling a camera system. The Nikon F can be stripped down further than any other SLR camera. You can detach the lens, viewfinder (viewfinder/meter), focusing screen and the camera back, and you will have what is called the basic or main body. Through different combinations of these detachable parts and interchangeable lenses to the basic body, you can compose a camera system for any photographic purpose and provide the answer to any photographic requirement. It has been said that no one camera can do every job, but the Nikon comes closer to this ideal than any other 35 mm camera system. No matter what kind of photography your customers may specialize in, you will always fulfill their requirements when recommending the Nikon F.

Same Body but Never Obsolete

Since the introduction of the Nikon F in 1959, no model changes have been made by Nikon. During the years, practically all manufacturers of 35 mm SLR cameras have replaced their models and have come up with new ones. Nikon has remained basically unchanged and still uses the same body. The fact that Nikon does not introduce new camera models every year or two is a tribute to the soundness of the instrument's basic design. There are countless varieties of equipment and accessories at one's command to use on the Nikon F regardless of when it has been obtained. Viewfinders. meters, focusing screens, and lenses can be changed but the camera body remains the same. Consequently, all interchangeable parts and accessories are not obsoleted, and newly marketed components can be readily utilized. This factor will enable you to convince your customers that it's the best in terms of holding long-time value.

Selling a Nikon is not a One-Shot Transaction

Selling a Nikon camera with the greatest system means that you are selling a merchandise having immeasurable potential sales. It is almost sure that your customer will come back for various equipment, accessories and attachments for the Nikon as he will for his return ticket. For example, your customers

will come back for filters or a telephoto lens, eventually to be followed by close-up equipment or a wideangle lens, and so on which they will require for expanding their camera versatility. It may be hard to believe, but in some cases sales of Nikon cameras can also be performed by first selling lenses to your customers. For example, if a customer requires a special type of lens offered only by Nikon for specific purposes, he will be compelled to purchase a Nikon camera body. Once he purchases the body, it is quite evident that he will want to utilize it for other general purposes, and thus, will come back to purchase a normal lens and other necessities. In a matter of time, you will be surprised to find the customer surrounded by much Nikon equipment.

Incomparable Dependability Makes Nikon the World's Busiest Camera

Nikon is the busiest and hardest working camera in the world. The reason is very simple: incomparable dependability. The fact that it is being used by nearly all professional photographers throughout the world verifies its business. It has substantially fulfilled the exacting requirement of professional photographers for the period of seven years without any model changes and is always present where news and sports events exist. Nikon F's capacity to operate with motor drive demonstrates the built-in durability of the system. In fact, Nikon F is the one and only 35 mm SLR camera that has been designed with a motor drive in mind from the beginning. Nikon is the most experienced manufacturer of the motor drive system as it actually began its utilization on the Nikon S2 (35 mm rangefinder model) in 1957. All over the world, people who know cameras rely on the precision, craftsmanship and reliability of Nikon. Undoubtedly, you must have seen a countless number of photos taken by Nikon in extremely cold, hot and humid temperatures such as; African Safaritours, Antarctic expeditions and jungle explorations, and vital news events which do not allow misses, etc. These facts verify the dependability of the Nikon F proving to you that it is the most trouble-free and busiest camera produced today.

Nikon Offers Tailor-Made Nikkor Lenses

The lens is the most important component of a camera and the number of lenses a camera accepts determines, to a great extent, its versatility. Nikon offers the widest variety of the

NIKON F BODY

GENERAL INTRODUCTION FEATURES

GENERAL INTRODUCTION

The Nikon F is a 35 mm single lens reflex precision camera. It inherits numerous proven features of the Nikon S-series rangefinder model, and also incorporates abundant outstanding mechanisms and advantages which have been originated and developed for the most advanced single lens reflex. These unique features and functions originated by Nikon include:

Inherited from Nikon S-series rangefinder model :

- 1. Crank-type film rewinding lever.
- 2. Film advance lever enabling winding in a single sweep or several short strokes.
- 3. Titanium foil shutter curtain.
- 4. Shutter mechanism utilizing ball bearing and steel friction balls.
- 5. Color-coded flash synchronization system.
- 6. Synchronization terminal accepting cordless flash.
- 7. Regular camera back that is interchangeable with Motor Drive back.

Specially originated for Nikon F:

- 1. Interchangeable through-the-lens meter/finder system.
- 2. Depth of field preview control.
- 3. Mirror lock-up.
- 4. Interchangeable viewfinders and focusing screens.
- 5. Exposure meter coupled to both shutter speed and diaphragm aperture through the meter coupling prong.
- 6. Color-coded depth of field scale on Nikkor lenses.

The camera body is composed of 918 pieces. These parts are precisely designed, processed, finished and assembled and are subject to strict inspections to bring out the matchless performance of the Nikon F camera.









NAMES OF VARIOUS PORTIONS

- 1. Automatic Exposure Counter
- 2. Film Load Reminder
- 3. Winding Lever
- 4. Shutter Release Button
- 5. A-R Ring
- 6. Shutter Dial
- 7. Synchro Selector Ring
- 8. Synchro Indicator
- 9. Focusing Screen
- 10. Accessory Shoe
- 11. Rewind Crank
- 12. Flash Terminal
- 13. Lens-Lock Release Button
- 14. Mirror Lock
- 15. Self-Timer
- 16. Depth of Field Preview Control Button
- 17. Viewfinder
- 18. Finder Eyepiece Window
- 19. Finder Release Button
- 20. Film Guide Rails
- 21. Shutter Curtain
- 22. Flash Contact
- 23. Film Speed Reminder
- 24. Camera Back Key Lock



FEATURES

1 VIEWFINDERS

The Nikon F features an interchangeable finder system. It is equipped with an Eye-Level viewfinder as standard equipment. The ingeniously designed Photomic-T viewfinder incorporates a through-the-lens exposure meter cross-coupled to shutter speed and diaphraam aperture and when attached to the Nikon F camera body, the combination is called the Nikon F Photomic-T. The Photomic-T viewfinder accepts the attachable Angle Finder which permits it to be used as a Waist-Level viewfinder. The Waist-Level viewfinder features a flipup magnifying glass for pin-point focusing. Each viewfinder can be removed from the camera body by pressing the button on the back of the camera. The Eye-Level and Photomic-T viewfinders (including the earlier "Photomic" finder) have a pentagonal roof prism giving the photographer a laterally unreversed finder image. The prism is plated with silver instead of aluminum and offers maximum brightness.



2 VIEWFIELD AREA

It is believed that a single lens reflex camera takes the exact picture you are looking at through the viewfinder. However, this is not true except in the Nikon F. In all other SLR cameras, the viewfield is masked down to 95%, 92%, 90% or even down to 80% of the negative area. Nikon overcame many difficulties in design and construction to develop this indispensable feature. This is something which other manufacturers have not yet done. Nikon is the only SLR camera which allows you to take the exact picture you are looking at through the viewfinder. The viewfinder shows 100% of the picture area to be registered on the film, and permits precise framing and orientation of the subject field to be covered. It has been designed so the film area of 24×36 mm (1" $\times 11/2$ ") can be utilized to full extent. This is a distinct advantage in scientific work and also in precise reproduction work. It is to be remembered that the picture frame is hidden up to 10% by the cardboard color slide mount.

3 FINDER EYEPIECE OF EYE-LEVEL OR PHOTOMIC-T FINDER

The magnification of the image in the Eye-Level or Photomic-T finder is about $0.75 \times$ (at infinity) to $0.9 \times$ (at the closest distance) when using normal lens of f= 50 mm. The eyepiece of the finder creates a virtual image of the subject formed on the screen in front of the observer at the distance of about 1 meter (-1 diopter). This distance of 1 meter is the average distance that a person peeping through an opening is apt to accommodate his eyes to. For those who wear glasses when photographing, the high eyepoint of 18 mm from the finder eyepiece window enables convenient viewing of the entire viewfield.

Eyepiece correction lenses are available which can be attached to the eyepiece of the viewfinder. Refer to Accessory Section, for particulars.

4 FOCUSING SCREEN

Nikon has focusing screens, designated A to H. Types G and H include four screens each, so that Nikon actually offers a selection of fourteen screens. Any of the screens may be used with any of the three interchangeable finders. No single screen, or two, or even three, can be expected to provide optimum viewing condition for all the lenses, or for all the photographic situations. Selective use of these screens gives added flexibility for more ease and accuracy in viewing through the viewfinder. Each has its own characteristic composition and pattern offering an advantage in some specific applications. As standard equipment, the camera is equipped with a Type-A screen which has a split-image rangefinder at the center consisting of two wedge-type prisms. Of all the cameras on the market today, Nikon offers the largest prism refracting angle of 10 degrees which provides the highest focusing accuracy available. For details, please see "Focusing Screens" of Accessory Section.



Nikon F Sales Manual

5 SHUTTER DIAL

Shutter speeds : 1, 1/2, 1/4, 1/8, 1/15, 1/30, 1/60, 1/125, 1/250, 1/500, 1/1000 sec., Bulb and Time.

The shutter speeds are marked large and clear with fluorescent paint, and evenly spaced on a black background. They are color-coded to match the colors on the synchronization selector. 1/60 sec. is colored red to show the maximum electronic flash speed setting. The higher speeds are colored green. The shutter speed dial is click-stopped and turns a full 360 degrees in either direction (this does not apply to Photomic series viewfinders). The dial does not rotate while the shutter is being wound or released. In the recessed center of the shutter speed dial is a black dot which rotates as the shutter is wound and lines up with the set speed at the nine o'clock position. When the shutter is released, it jumps back a short distance to the seven o'clock position. By noting the position of this dot, one can check whether the shutter is wound or not. A pin is provided on the top of the dial for direct mating to the Photomic series finder or Nikon slip-on exposure meter Model 3.

There is no "T" (Time) setting on the Photomic series viewfinders and for Time exposures, the "B-2" setting on the shutter speed selector will have to be used. In this case, the Nikon Auto-Stop Cable Release is recommended.





6 SHUTTER RELEASE BUTTON

The shutter release button is designed to be released by a pressure up to approximately 500 grams, with a 1.5-2 mm stroke, giving just an appropriate depression not too light nor too heavy. The ring at the base of the shutter release button is threaded for the Nikon Cable Release. Around the release button there is a ring finger guard, which also serves as the A-R ring. The ring being set at "A", advances the film and when set at "R", rewinds the film. A red dot on the shutter release button revolves exactly 360 degrees while the film is advanced one frame. This feature may be helpful in rewinding just one frame of the film for making a double exposure or enabling the user to stop rewinding the film before the tongue disappears into the film cassette.



7 SHUTTER CURTAIN

When the shutter button is pressed, the mirror lifts up and the aperture diaphragm, coupled to this mirror action, is closed down from its fully opened position to the preselected taking aperture. Immediately after the shutter is activated, the raised mirror returns to precise focus-viewing position and the diaphragm reopens instantly and automatically. All of these integrated actions are performed quietly with uniform and high accuracy; at the shutter speed of 1/1000 sec., only 100 milli-seconds are required to perform this action. The remarkably fast action of the shutter mechanism restricts darkening of the finder field to only a fraction of a second so the photographer's viewing is hardly hindered. The running of the shutter curtain in the camera takes only about 14 milli-seconds for full aperture of the frame. The shutter curtain fully opens at the shutter speed of 1/60 sec., permitting use of an electronic flash unit at this speed.

Nikon was first to have their camera shutter curtain made of pure titanium foil. It is far superior to rubberized fabric or stainless steel. Titanium foil possesses

July, 1966

Nikon F Photomic-T

B-5

such characteristics as high heat resistance, low heat conductivity, small thermal dilatation, high tensile strength with minimum elongation, high fatigue strength with good bending properties, strong corrosion resistance and non-magnetization. Thus, the shutter mechanism ensures safety against scorching from sunlight, invariably correct operation and durability, and freedom from corrosion by humidity. It is evident that the use of titanium foil for the Nikon shutter curtain contributes greatly to the dependability of Nikon F.

Quality control tests on the shutter are conducted up to 100,000 cycles. A precision ball bearing, specially designed for the Nikon F, is incorporated on the main shaft as well as fifty small balls on the shutter mechanism. This ensures further smooth and non-friction operation of highest accuracy and long life.



8 FLASH SYNCHRONIZATION

The Nikon F is designed to synchronize completely to all shutter speeds, with provision for electronic flash up to 1/60 sec. By raising and rotating the synchro selector ring located around the shutter speed dial (when the Photomic series finder is being used, it should be removed), the switch-in-time can be adjusted so FP type flash bulbs will synchronize to all shutter speeds. It also provides a wider range of shutter speed usable for other type of flash bulbs than most focal plane cameras offer.

SYNCHRO-SELECTOR

The synchro-selector can be switched to four positions and thereby shutter speed relations can be clearly distinguished with the color-coded markings appearing in the selector window.

When using FP class bulbs, select the color markings that match the colored numbers on the shutter speed dial. When green colored shutter speeds from 1/125 to 1/1000 sec. are used, the synchro-selector should be set at the green dot. For red colored 1/60 sec., the red dot, and for white colored speeds of 1/30 sec. and





lower, the white dot with the red F marking should be used. When using M and MF type bulbs, reference should be made to the chart below, as the usable maximum speed will differ according to the size and type of bulb. For synchronization with an electronic flash, the selector should be set at FX as shown in the chart. The selector is independent of the shutter mechanism so when flash is not used, the selector can be set at any of the four positions.

FLASH TERMINAL AND CONTACT

Since the switch-in-time can be adjusted with the selector, there is only one camera flash terminal located on the chamfered forward edge on the right side of the camera. The terminal accepts the snap-in plug cord for Nikon BC-6 flash and also the standard European type terminal cords. Additional flash contact in the accessory shoe is for the Nikon cordless flash unit BC-7 (and the earlier model BC-5 and BC-4). For flash units other than BC-7, it is necessary to use the Flash Unit Coupler for mounting the flash onto the camera.

Take caution not to touch the synchro contact near the rewind crank when using an electronic flash to avoid a slight electric shock !



9 EXPOSURE COUNTER AND FILM LOAD REMINDER

Both indicators are located in the hub of the winding lever. The exposure counter automatically indicates the number of frames exposed, and is numbered at intervals of 5 with index pointers for each frame. It automatically resets to two frames before "O" when the camera back is removed. Opposite the exposure counter is the film load reminder for 20 or 36 exposures. It is manually set by the small pin.



10 WINDING LEVER

The winding lever is designed with a 136 degree stroke which is convenient to manipulate with ease. It simultaneously winds the shutter, advances the film and operates the exposure counter. Winding can be done with a single sweep; it can also be performed with several short strokes when preferred. A built-in locking device prevents the shutter from being released unless it is fully cocked. The lever is designed so that it flies back when released but doesn't hit the camera body. A clearance angle of 15 degrees for the thumb makes it easy to advance the film for the next exposure. The lever is milled along the thumb-grip perimeter for non-slip winding. The separation between the thumb-grip and the finder eyepiece is such that there is no question of the forehead impeding the lever, when the user wishes to operate the camera continuously without moving the eve from the viewfinder.



11 REWIND CRANK

Originated by Nikon to enable rapid rewinding of the film, and fits flush into the rewind knob when not in use. A red dot on the top of the shutter release button rotates while the film is being wound. It stops rotation when the tongue of the film detaches from the take-up spool. The rewind knob accepts on its base the Fish-eye Finder or the Supplementary Viewfinder for 21 mm Nikkor. An insulated contact for the Nikon Cordless BC-7 flash unit is on the base of the rewind knob. The discontinued BC-5 and BC-4 flash units attach to this insulated contact through use of a Flash Unit Coupler. The Nikon flash unit BC-6 also fits into the base of the rewind knob but is connected to the flash terminal located on the camera side by a cord.



12 SELF-TIMER

The built-in self-timer trips the shutter in 3, 6 or 10 seconds (indicated by three dots) or any intermediate time delay, with exception of up to 3 seconds delay. Independent of the shutter release mechanism, the self-timer can be set before or after winding the shutter. In this way, the delay can be left on "ready" for use at any time. If you decide not to use the self-timer after it has been wound, use the shutter button. Then, turn off the self-timer by depressing the self-timer button to avoid unnecessary exposure of a film.



13 DEPTH OF FIELD PREVIEW CONTROL

In addition to the color-coded depth of field scale provided on each interchangeable lens, another outstanding feature is the depth of field preview button which is located on the left side of the camera front scutcheon for convenient usage. When you press the button, the lens is stopped down to the "preset" aperture for examining the depth of field and is independent from the shutter mechanism. Previewing of depth of field thus becomes possible for the first time with the introduction of the Nikon F camera. It also serves as a check of the normal operation of the automatic diaphragm in the lens.



14 INSTANT RETURN AUTOMATIC MIRROR

When the shutter button is pressed, the mirror lifts up and the aperture diaphragm, coupled to this mirror action, closes down from its fully opened position to the preselected "taking" aperture. At the instant of exposure, the mirror flips down to precise focus-viewing position. The mirror action is vibration-free as it uses a patented brake.

15 MIRROR LOCK

The mirror $(36.1 \times 28.2 \text{ mm})$ can be locked "up" out of the lens-to-film path by turning the small ridged button in an upward motion towards the red dot on the left side of the camera scutcheon, and releasing the shutter. This permits the use of 21mm wideangle Nikkor and Fish-eye Nikkor lenses which fit deep into the camera body, and shooting with the Motor Drive at the speed of 4 frames per second in consecutive reproduction and photomicrography and also astrophotography. To return the mirror to its original focusing and viewing position, turn the lock button downward until the black dot on the button meets the black dot on the camera body. This should be done after the shutter is released. Otherwise, the mirror will not return to its original position.



16 LENS-LOCK RELEASE BUTTON

The lens-lock release button is located on the right side of the camera scutcheon. The locking device is secure and attaching and removing can be promptly performed with ease. To remove the lens from the camera body, press the button and turn the lens by its grip in the direction of the button (clockwise) until the dot on the lens ring is lined up with its corresponding dot on the scutcheon.



Nikon F Sales Manual

17 LENS MOUNT FLANGE

The broad lens mount flange - 44 mm in diameter inside the bayonet tabs - minimizes vignetting at the corners of the picture, even when a very large aperture or extra long focus lens is used. A specially treated and hard-wearing steel is used on the lens mount flange and together with the precise construction and machining, it ensures secure seating and correct alignment of the lens. This broad lens mount flange results in almost unlimited freedom as new lenses are developed by Nikon.

18 CAMERA CHAMBER

Effective dead blacking is used throughout the chamber, and the inner sides, including the rear side of the mirror, are ridged to minimize internal reflection of light. The mirror housing is large enough to accept a lens of large aperture or long focus without causing any vignetting on the viewfield.

19 FILM FLATNESS MAINTENANCE STRUCTURE

Large aperture lenses (high-speed lenses) are used as standard lens on Nikon cameras. These lenses possess a very shallow depth of field so the tolerance permissible for film flatness becomes very subtle. Special considerations have been given to the maintenance of film flatness to compensate for the very shallow depths of focus. Two sets of film guide rails having their surfaces ground to a mirror finish are positioned with the inner rails being slightly lower than the outer. The outer rails come into contact with an oversized pressure plate. The film pressure plate is precisely finished with a diamond-pointed tool so that a superior flatness is assured, and the special black anodizing ensures utmost surface hardness. The film is brought under the takeup spool so that the film perforations engage easily and firmly into the sprockets. The slit in the take-up spool has a small lug which catches the film securely. These film guide rails sustained by the pressure plate function to maintain an unmatched flatness of the film plane and smooth film advancing with no danger of scratching the film.



20 FILM SPEED REMINDER

The film speed reminder dial is on the left hand end of the base plate. Indicated settings are "E" (Empty); ASA from 10 to 400; and two index points - black for black-and-white film, red for color film.



21 INDICATION OF FILM PLANE

The position of the film plane is not indicated, but it coincides with the top line of the serial number engraved on the top plate of the camera, a distance of 46.5 mm from the lens mount surface.



Film Plane Position

22 CAMERA BACK

The camera back can be locked or removed with a single key lock. A turn of the single key lock towards indicated positions, locks and relocks the camera back at both ends. The precise and sturdy construction enables proper and secure fitting and due to overlapping of fitting portions, it becomes dust-proof. The camera back is completely removable for loading and can be replaced with the Nikon Motor Drive Back (Model F 36 or F 250).



23 TRIPOD SOCKET

Tripod socket (1/4" threaded) is located in the center of the camera body for maintaining stability. It is an integral part of the camera body with steady and firm construction, and eliminates possible damages on the camera bottom caused by the body weight pressure.



24 FINISH

The exterior of the camera is finished in handsome satin chrome metal and black leatherette. The satin chrome finish gives a graceful and dignified appearance as well as being sturdy so scratches do not mark easily. Anodized black finish camera (the satin chrome portion being finished in black) with less imposing appearance is also available.



RIKOR LENSES

EHRENREICH PHOTO-OPTICAL INDUSTRIES, INC.

NIKKOR LENSES

GENERAL INTRODUCTION NORMAL LENSES WIDEANGLE LENSES TELEPHOTO LENSES NIKKOR 400mm, 600mm, 800mm & 1,200mm REFLEX-NIKKOR TELEPHOTO LENSES WITH N-F ADAPTER TUBE NIKKOR AUTO ZOOM LENSES LENSES FOR CLOSE-UPS SPECIAL EFFECT LENSES

GENERAL INTRODUCTION

Nippon Kogaku K. K., or Japan Optical Co., Ltd. (literally translated) is the manufacturer of Nikon cameras and Nikkor lenses. Founded in 1917, Nippon Kogaku is the oldest established manufacturer of the most comprehensive line of optical instruments in Japan.

Prior to World War II, its products included binoculars, astronomical telescopes, microscopes and optical measuring instruments; numerous types of observation, aiming, rangefinding and photographic apparatuses and lenses.

In 1935, the production of 35 mm photographic camera lenses was commenced on a commercial basis. These early Nikkor lenses were designed with a screw thread mount for high quality cameras, domestic and foreign.

Nippon Kogaku introduced its own line of cameras, the Model I in 1948 and Model M in 1949. In 1950, the famous Nikon S-series was introduced. The new Nikkor lenses with bayonet mount equipped on this rangefinder-coupled 35 mm camera, soon gained an esteemed international recognition as the symbol of excellence in lenses. Paralleling the production of these incomparable 35 mm photographic lenses, other lenses were also developed. These included the Cine-Nikkor lenses for 8 mm and 16 mm movie cameras, Pro-Nikkor for professional 35 mm projectors, the Apo-Nikkor for photo-engraving, and many others.

When the Nikon F was perfected in 1959, a new group of Nikkor lenses was developed with the F-mount to meet the mechanical design characteristic of the single lens reflex camera: inside mirror placed between the lens and film. Presently, more than 30 different types of these lenses have been developed in order that this single lens reflex camera could be utilized to its ultimate capabilities.

WHY NIKKOR LENSES ARE SUPERIOR

Nippon Kogaku was the postwar international pioneer for Japan's photographic industry: Nikkor lenses were the first to be internationally recognized as superior to anything on the market.

Basic policy: Unless a Nikkor lens can meet Nikon's standards, it is not marketed.

Quality control : Strict quality control results in minimum deviation in the uniformity of production.

Major lens characteristics : High definition, faster speed, and better color rendition.

Rugged construction: Nikkor lens mounts are ruggedly constructed to provide heavy-duty, lifetime use. Large mount diameter guarantees less vignetting, more secure fitting, greater strength and versatility for any lens arrangements.

Comprehensive lens system : Only Nikon offers such a

complete range of lenses of every focal length, plus special lenses for every photographic purpose for 35 mm cameras.

1 DESIGNATIONS OF THE ENGRAVED RING ON THE MOUNT



1/Code letter following "Nikkor"

P or H, for example, inscribed after "Nikkor" indicates the number of the constituent lens elements. They are the initial letters of Latin or Greek words as follows:

Т	for	3	Tres	(Latin)
Q	for	4	Quatuor	(")
Ρ	for	5	Pente	(Greek)
Н	for	6	Hex	(")
S	for	7	Septem	(Latin)
0	for	8	Octo	(")
Ν	for	9	Novem	(")

For example, Nikkor-P means that the lens consists of five lens elements, such as Nikkor-P Auto 1:2.5 f = 105mm.

- 2 The lens having the inscription "Auto" indicates that it is equipped with an automatic aperture diaphragm.
- 3 The lenses designed for special purposes are distinguished by the names preceding "Nikkor". For example :

Fish-eye-Nikkor	(Covering 180° picture angle)
PC-Nikkor	(Perspective control)
Micro-Nikkor	(Primarily designed for micro-
	copy and macro-photo as well)
Zoom-Nikkor	(With variable focal length)
Reflex-Nikkor	(Including reflecting surfaces
	catadioptric)
EL Nikkor	(llood for onlarging equipment)

EL-Nikkor (Used for enlarging equipment) 4/1:1.4, for example, indicates that the maximum aperture ratio of the lens is f/1.4, f1.4 or F1.4.

5/f = 50 mm or f = 1,000 mm, for example, indicates the nominal focal length of the lenses.

6/The serial number of the lens is preceded by "No.".

2 MECHANICAL FEATURES OF F-MOUNT NIKKOR

Automatic Aperture Diaphragm

In addition to the superb optical performance of the Nikkor lenses in F-mount, its most important characteristic is its aperture diaphragm. This diaphragm remains fully open at all times. By depressing the shutter release button, it automatically stops down to the pre-selected aperture only while the shutter is being operated and returns to the fully open position immediately after the shutter has been released. The lenses equipped with such an automatic aperture diaphragm are designated as "Auto." When the lens is removed from the camera, the aperture scale, providing a great convenience when using the extension ring, bellows focusing attachment, etc.

Functional Styling

Predominantly black styling accented with bands of mat satin chrome is aesthetically fluent, while serving a functional purpose. On every wideangle and normal focal length lens, there is a mat satin chrome band with a milled surface forward of the aperture setting ring, by which the lens can be gripped when being interchanged. This eliminates the problem of where to hold a lens when exchanging it; the user will not be tempted to use the focusing ring jammed against infinity for this purpose.

Meter Coupling Prong

Every automatic lens has a prong on the top of the aperture setting ring which couples to any Photomic series or slip-on exposure meter. Automatic lenses without prongs are : 200-600 mm zoom, 400 mm f/4.5, 600 mm f/5.6, and 800 mm f/8.

Scales and Indicators

The graduation on the aperture scale are equidistantly spaced and permits the use of intermediate settings. Most lenses are equipped with a front and thread diameter of 52 mm (attachment size) to permit utilization without an adapter of almost all Nikon filters and accessories for each lens. The majority of the distance scales on the focusing ring are graduated in both feet and meters; others, either in feet or meters. Instead of the usual depth of field indications, the Nikkor lenses use a color-coded depth of field scale. This outstanding feature enables easy and rapid reading of the depth of field for each aperture ratio.

3 LENS MOUNT

The rear section of the lens which attaches to the camera is usually referred to as "lens mount." Nikkor lenses feature a three tab internal bayonet lens mount. This design enables any F-mount Nikkor interchangeable lens to be attached to the camera rapidly and simply by a 1/6 counterclockwise turn, after aperture dot (which is recessed for ease of handling in minimum lighting conditions) on the lens mount is aligned with the dot on the camera scutcheon. With the aperture dot at top center position, a spring-loaded pin on the flange clicks into place in a slit on the lens mount.

To remove the lens, press the large chrome button in a

finger guard on the right-hand side of the camera scutcheon, turn the lens clockwise, and detach it. The chrome button retracts the locating pin, allowing the lens to be turned out of the bayonet fitting.

Nikkor interchangeable lenses with F-mounts permit direct attachment. Other Nikkor lenses require the use of the Focusing Unit for focusing. This unit is commonly used for the long focus lenses : 400 mm, 600 mm, 800 mm and 1,200 mm. 180 mm, 250 mm, 350 mm and 500 mm lenses which have originally been designed for the rangefinder-coupled Nikon S-series are equipped with a similar bayonet lens mount : "S-mount" or "Nmount." These mounts require the use of the "N-F Adapter," an intermediate tube, to attach to the Nikon F. To distinguish the lenses with the F-mount from those with the S- or N-mount, the former has a black or white dot as the lens exchanging mark, while the latter a red or pink dot.

4 TECHNICAL TERMS

Necessary terms used for explaining the features, characteristics, uses, and other pertinent details of the lens are explained below as briefly as possible.



1/FOCAL LENGTH

The focal length is the fundamental and most important factor by which almost all characteristics of the photographic lenses are determined, such as size of the image reproduced on the film, picture angle which covers area of the subject to be photographed, brightness of the image on the film plane, depth of field, etc. The light rays which come from a point at the infinity distance, run parallel along the optical axis of lens and converge to a point called "focal point" after passing through the lens. The distance from the rear surface of the last lens in a lens system is referred to as the "back focus" and is not the focal length in its strict sense. The focal length is the distance from the principal point to the focal point. There are principal (H and H') and focal points (F and F') both on the object and image sides of each lens. Therefore, the lens has both focal lengths on the object and image sides. In most camera lenses the principal point does not coincide with the center of the lens system, especially in a telephoto or retrofocus lens where it is located far away from the center.

Furthermore, some special lenses are designed to have their principal points crossed; which means, the first is located on the image side and the second on the object side, thus contributing to reducing the space occupied in the photographing work.

2/FLANGE FOCAL DISTANCE

The flange focal distance (FFD), sometimes called the "flange back," is a distance of the focal plane of the lens from the mechanical rear end surface which, when the lens is mounted on the camera body, thrusts against a front surface of the camera body. Thus, it determines the position of the lens correctly seated on the camera, depending upon the mechanical design of the camera (46.5 mm in the Nikon F). FFD is important in assembling, fitting and testing the lens as an important member of the photographic apparatus.

3/SPEED AND F-NUMBER OF LENS

Brightness of the image produced or "speed" of lens is indicated in general by an aperture ratio for the fully opened aperture; that is, the ratio, D/f, represents the aperture in diameter to the focal length of the lens. With the focal length (f) constant the larger the aperture (D), the greater the aperture ratio (D/f). In other words, the image obtained is brighter.

The f-number is the reciprocal of the aperture ratio, f/D, and is expressed, for example, as 1: 2.8, f/2.8, f/2.

In a Reflex-Nikkor, the lens speed value or image brightness cannot simply be expressed by the aperture ratio, but by an equivalent f-number value, because the crosssection of light bundles entering it is doughnut-shaped (except at the focal point). This value is calculated by comparing the effective ring area of the mirror which corresponds to the disk-shaped opening area of the ordinary lens.

The f-numbers are marked (see table below) so that each consecutive marking or "stop" denotes a halving of the next larger and doubling of the next smaller aperture (i.e., of the amount of light admitted by the lens). For example, the image obtained at the f-number f/4 will be half as bright as that obtained at the f-number f/2.8.

f-numbers	1	1.4	2	2.8	4	5.6	8	11	16	22	32	45	64	
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In certain lenses however, the maximum aperture is different from figures in this system.

As a result, for any given scene, there are various combinations of f-numbers and shutter speeds which yield the same total amount of light that passes through the lens. Each combination, called "light value" or "exposure value," provides flexibility in the adjustment of exposure, depending upon the desirable f-number or shutter speed. Light passing through the lens system is slightly reduced by the absorption and reflection occurring within the lens system. The f-numbers indicate the amount of light striking the outer lens surface. T-stops (transmission-stops) indicate the amount of light actually passing through the lens. Therefore, T-stops are a more accurate indication of the amount of light to which the film is exposed. T-stops are always higher than the corresponding f-numbers of the same aperture on the same lens. Differences in depth of field values derived from T-stops and from f-numbers are negligible. **4**/**PICTURE ANGLE**

The subject area which the lens can cover with a proper sharpness of image is expressed by an angle at the image side principal point subtended by the diagonal (43.2 mm) of the picture frame (24×36 mm), when the lens is focused to infinity. See table below. When the lens is screwed outward for focusing to closer objects as in close-up photography, the picture angle decreases. The lens, in most cases, cannot normally be used for a format larger than 24×36 mm, because brightness and sharpness on the outside is reduced.



Focal length (mm)	21	28	35	50	55	58	85	105	135	180	200	250	300	350	400	500	600	800	1,000	1,200
Diagonal direction	92°	74°	62°	46 °	43°	41°	28° 30′	23° 20′	18°	13°30′	12°20′	10°	8°10′	7 °	6°10′	5°	4°10′	3°	2° 30 ′	2 °
Horizontal direction	81°	64°	53°	39°	36°10′	34° 30′	23° 50′	19° 30′	15°	11°30′	10° 20′	8°10′	6° 50′	6°	5°10′	4°10′	3° 30′	2°30	2 °	1°40′
Vertical direction	60 °	45 °	37°	26°	24° 40′	23° 20′	16°	13°	10°	7° 30 ′	6° 50′	5°30′	4° 30 ′	4 °	3° 30′	2°50 ′	2°20′	1°40	1°20 ′	1°10′



5/OBJECT DISTANCE, IMAGE DISTANCE AND REPRODUCTION RATIO

The object distance is theoretically defined as a distance from the first principal plane of the lens to the focused object plane, and the image distance from the second principal plane to the image plane on the film. However, the distance engraved on the lens barrel does not represent the object distance, but a distance from the object to the image plane : the sum of the object and image distances, plus the distance between the first and second principal planes.

The following relation will be established between the focal length of the lens (f), object distance (a) and image distance (b) :

$$1/a + 1/b = 1/f$$

The reproduction ratio or magnification (β)—the proportion of the image (y') to that of the object size (y)—is equal to the ratio of the image to object distance, as shown by:

$$\beta = \frac{\gamma'}{\gamma} = \frac{b}{a}$$

Consequently, the following relations will be obtained :

$$a = f\left(1 + \frac{1}{\beta}\right)$$
$$b = f(1 + \beta)$$



6/INFRA-RED MARKINGS

All Nikkor lenses have a red dot or line near the black or white index provided for reading the distance scale on the focusing ring. When taking infra-red pictures using an infra-red film, a sharp image will be obtained at a position slightly farther away as compared with the image produced by visible light. Therefore, this image plane displacement can be corrected by shifting the distance read on the black or white index to the red dot or the red line when the image is brought into sharp focus. The longer the focal length, the greater is the displacement or shift. In the normal or wideangle lens, however, when stopped down to f/8 or more, the correction will not be required, as it is covered by the depth of field at such a small aperture.



L-4

7 / DEPTH OF FIELD

Almost all objects or scenes to be photographed are three-dimensional. Areas further away from the object plane on which the lens is focused, produce progressive blurring of images. This blur is usually expressed in terms of the diameter of the circle of confusion. If this blur remains within the given limit, the image will appear sharp enough to the observing eye. The limit within which the image is produced permissibly sharp is called "depth of field."

Considering that the picture is to be enlarged in 35 mm photography and the distance at which the enlarged picture is observed, the permissible diameter of the circle of confusion is usually taken as small as 1/30 mm for all the Nikkor lenses. The depth of field, divided into the front (nearer to the lens) and rear (further from the lens) depths, is calculated by the following formulae:

Front (nearer) depth =
$$\frac{d.F.a^2}{f^2 + d.F.a}$$

Rear (further) depth =
$$\frac{d.F.a^2}{f^2 - d.F}$$

Where

F = f - number

f=focal length of lens

- a = distance of the object focused
- d=permissible diameter of circle of confusion.
- Hence: The more the lens is stopped down, the greater the depth. The shorter the tocal length, the f-number being the same, the greater the depth. The depth is greater in the rear than in the front. The further the distance of object, the greater the depth.

Pamphlets of depth of field tables indicated in either feet or meters are available on request.

The object distance at a certain aperture of lens where depth of field on the farther side reaches the distance of infinity, is called a "hyper focal length." In this case, the nearer side depth of field becomes one half of this hyper focal length. Therefore, when the lens is focused to such a distance for a particular f-number, every object located within the range from infinity to this distance will be photographed sharp enough or included in the depth of field. In snap-shooting, especially with a lens of shorter focal length, it may be convenient to stop down the aperture to such a degree.





Aperture diaphragm Focal length	1.4	2	2.8	4	5.6	8	11	16
21 mm				3.3	2.4	1.7	1.2	0.8
28 mm				6.1	4.4	3.1	2.2	1.5
35 mm			13.9	9.7	6.9	4.9	3.5	2.4
50 mm	57.1	39.9	28.5	19.9	14.3	10.0	7.3	5.0

Hyper Focal Lengths of Wideangle and Normal Lenses (Unit: meter)

8/ABERRATIONS OF LENS

It is essential for the photographic lens to provide sharp, correctly formed images on the film plane. For this purpose, the lens must be capable of gathering the light rays originated from every point on the object plane, which is vertical to the optical axis of the lens, exactly to a point on the film plane. Correspondingly, it must produce the exact shape of image to that of the object over the whole picture field : reproduction ratio must remain constant over the entire effective range of picture angles. However, in practice, it is not possible to attain such an ideal result : the light rays in each bundle will be scattered in the neighborhood of the ideal point that is generally termed as the "aberrations of lens." For convenience in designing the lens, aberrations are classified into chromatic aberrations; spherical aberrations; coma; astigmatism; curvature of image plane and distortion (see table below). The lens cannot completely be free from all the aberrations: the optical performance of lens is mainly determined by the residual amounts of various aberrations. The lens is designated as being "correct" when its aberrations are properly corrected to the purpose of the lens.

ABERRATIONS

. . .

Spherical aberration

When light rays from an object point on the axis of a lens or mirrored surface pass through or are reflected, the rays at various circular zones of the surface around the axis become focused at different points along the axis. This defect is the 'spherical aberration' which blurs the image at the picture center.

Coma

The images produced from an object point off the axis after passing through or being reflected on the different zones of a lens or a mirror, will vary in size and be superpositioned at the focus, resulting in an unsymmetrical image blur. This aberration arising from a variation in size with zone is referred to as a `coma.'

Astigmatism

Even in a narrow pencil of light, object points off axis are imaged as two sharp lines at right angles to each other and at different locations. This defect is called ``astigmatism." The line foci corresponding to object points distributed in a plane normal to the axis are located on two curved meridional and sagittal surfaces.

Curvature of image field

In general, this surface is a curved one, conjugate to a plane, in object surface. If the image is to be projected on a plane (photographic film or paper), it will be impossible to simultaneously obtain a sharp image of the entire object plane. This is true even when the astigmatism is eliminated, that is, the two astigmatic surfaces are brought into coincidence on a common surface.

Distortion

If the image magnification is not the same over the entire image field but varies radially outward from the center, the resultant shape of the image will be distorted. If the magnification increases outward, a square object is imaged in the shape of a pincushion. If it decreases, the image of square has laterally bulging sides and the distortion is said to be `barrel-shaped.'

Chromatic aberrations

Since the refractive index of any optical glass depends on the wave length or color of the light, all properties of a lens will vary with wave length. The change in focal length of the lens and the location of its image plane, leads to defects called `chromatic aberrations.'

Longitudinal chromatism is a variation in location of the image plane with change in wave length. It produces the image point surrounded by different colors which result in a blurred image in black and white pictures.

Lateral chromatism is a variation in image size or magnification with wave length. This aberration does not appear at axial image points but toward the surrounding area, proportional to the distance from the center of the image field. Cannot be improved by stopping down the aperture. Distortion is determined by the location of aperture diabhragm.

EFFECT BY STOPPING

DOWN THE APERTURE

By stopping down the

aperture, the aberration

will be greatly lessened.

but this may cause

displacement of focus.

Improved by stopping

down the aperture.

The coma is determin-

ed by the location of

the aperture diaphra-

Cannot be improved by

stopping down the

aperture. The location

of aperture diaphragm

has an influence on the

degree of astigmatism.

Same as above.

am.

Cannot be improved by stopping down. For correction, a lens system consisting of at least a pair of compensating lenses is required. These lenses are made of different types of glasses in respect to their refractive index and color dispersion.







Object



9/TYPES OF LENS

To correct the aberrations within proper limits, the photographic lens should consist at least of three components. Among an unlimited number of combinations of different glass types and curvatures, there are only a few considered suitable for the correction of aberrations. No matter how long the focal length and how large the aperture ratio may be, lenses may be grouped into several types. Some are named after their inventor (e.g. Petzval type), others after the number of elements constituting the lens (e.g. Triplet) or after the established brand name given to the typical lens of a group.

On the other hand, some types of lens have to be designed within certain restrictions. For example, the telephoto type is of the lens system with the distance from the outermost lens surface to the focal plane intentionally shortened than the focal length (the distance between the second principal plane H' and the focal plane F') in its true sense. This convenient type is therefore adopted for a number of long-focus lenses on the market. If the length of a lens system should be further shortened in respect to its focal length, it is a common practice to add at least a reflecting mirror surface (called "catadioptric") to the lens elements, such as in the Reflex Nikkor.

Conversely, if the lens is designed to have an especially longer free distance from the innermost lens surface to the focal plane than its focal length, for the reason of a limited behind-the-lens space in the single-lens reflex camera, the requirement will be met by the so-called "retrofocal" type. The Nikkor 28 mm f/3.5 and 35 mm f/2.5 are of this type. This type is advantageously applied to wideangle lenses for the single-lens reflex camera. This type of lens may also be named "inverted telephoto" type.





10 / RESOLUTION OF PHOTOGRAPHIC LENSES One sometimes requests the calculation results of the aberrations as the criteria for the picture quality of photographic lenses. However, it is known among lens designers that there are many other factors that are taken into consideration in determining the optical performance of lens. Therefore, the judgment based only



on the calculation results will be often erroneous, especially in designing photographic lenses of large aperture such as the Nikkor 50 mm f/1.4 or f/2. Some of the calculated aberrations cannot be reliable for positive judgment of the sharpness of the image the lens produces and aberration data may be useful only for reference.

It is more accurate to express the quality of the lens quantitatively by resolution: in terms of their ability to separate the lines of different thickness marked on the test chart. Hence, the greater the number of lines a lens can separate, the higher will be its resolution. This resolution which also involves the diffraction of light which affects the sharpness of image as the lens is stopped down to smaller aperture, is regarded as a reliable criterion in judging a particular lens.

However, in comparing lenses such resolutions offer many problems. It is difficult to test various lenses strictly under the same conditions and different test results may be obtained by different persons at different times. Measurement and determination of the resolving power are governed by numerous factors such as:

- * Form or shape of testing marks.
- * Contrast of marks shown on the test chart.
- * Illumination of the test chart.
- * Whether the test mark images are observed in the air or projected on a screen or photographed.
- Criterion discriminating resolved from unresolved test mark.
- * Sight of inspector who judges the focused plane.
- * Aperture ratio of lens chosen in the measurement.
- * Reproduction ratio of image chosen in the measurement.
- * Tolerance limit allowed in determining resolution.
- * Sharpest image plane chosen ††.
- * Fineness of emulsion grain of film used for photographing.
- * Thickness of emulsion layer.
- * Length of exposure time in photographing the test chart.
- * Method of development of film negative.
- * Actual position of film plane on the camera used.

†† Since the sharpest image point may shift as the aperture of the lens is changed, and the sharpest plane does not coincide with the most extremely contrasting position, it is by no means an easy matter to determine the definite plane to be adopted. Furthermore, whether we are to give priority to the central, marginal or intermediate area of the image field is a question which should be answered in view of the circumstances under which the lens is to be used.

Thus, different lens makers have their own standards with regard to each of the above points. Hence, Nikon tests and measures not only its own lenses but lenses made by other makers for comparison purposes. However, Nikon (and other reputable makers) does not release these results because, as mentioned above, each maker has its own standards and these may not be accepted by other makers. Moreover, the quantitative expression of resolving power does not necessarily determine the quality of the actual picture taken. There are other essential factors to be considered in determining the lens image quality; some have not yet been calculated or are beyond present scientific measurement. Inspections of Nikkor lenses are carried out on the basis of such resolutions, as well as of the qualitative faculty of reproducing not only circular dots, lines, concentric circles, etc., but three-dimensional subjects. In addition, tests are conducted on the "Modulation Transfer Function "which expresses the contrast transferring characteristic of lens in relation to the resolution.



Optimum aperture of lens

Most photographic lenses do not show the highest sharpness at fully opened aperture due to their residual aberrations. This is because in the lens designing, the larger the aperture, the more difficult it is to correct the aberrations. Consequently, a higher quality of picture should be obtained as the lens is stopped down. But, on the other hand, as the aperture is stopped down, sharpness will decrease due to the increasing diffraction of light. This tendency is more conspicuous at the central part than at the circumferential image area. Therefore, if the sharpest image is to be attained with a particular lens, the lens should be used at its optimum f-number and, generally, stopped down three or four stops from the maximum opening. For example, with the Nikkor 50 mm f/1.4 or f/2 at f/4~f/5.6 or f/5.6~f/8, respectively.

Focus distance and resolution

Generally, camera lenses are corrected primarily for the "infinity" distance, the range mostly used for general purpose. Therefore, if they are employed for taking close-ups, a slight reduction of sharpness cannot be avoided. Hence, to meet the requirement by close-ups specialists, Nikon produces special lenses such as Micro-Nikkor Auto 55 mm f/3.5 and Medical-Nikkor Auto 200 mm f/5.6. The former is designed to provide excellent definition at a reproduction ratio of 1/10 or 1/15 even with a large aperture, as well as excellent correction of distortion.



11/FLARE AND GHOST

The light falling on the lens surface causes "flares" which reduce image contrast and cause fogging of the picture to some degree. Such flares cannot be avoided in some large aperture lens systems containing a series of lens elements. An intense light included within the picture angle of the lens will be prominently reflected on the surfaces of the lens elements inside while passing through the lens system. This will produce not only serious flares but will also yield a strange, bright light called a "ghost" at unexpected positions on the picture. The same phenomena can be caused by light reflection on the internal surfaces or edges of the lens barrel which can be prevented to a certain extent by the use of a lens hood. Consequently, taking picture "against-thelight" should be avoided as far as possible. However, in pioneering the field of high speed lenses, Nikon technological superiority has resulted in lenses which minimize these defects to the lowest level in all high speed lenses produced today.

12/COATING

Glass surfaces in contact with the air will reflect light by as much as 4% to 5% of the incident light. Hence, if light passes through a number of glass surfaces, a definite amount of light will be scattered by reflection before it reaches the film plane. This will result in reduced transmission of light and is liable to produce flares, thus reducing the contrast of the picture. As the number of air-to-glass surfaces in the lens system is increased, the seriousness of such effects of the reflection is also intensified.

"Coating" serves to reduce such detrimental reflections to approximately 1%. Today, the surfaces of all photographic lens are coated. By "coating," the lens surfaces are covered with a thin layer-1/4 of the wave length of light -of a substance (magnesium fluoride, for example) that is of a refractive index smaller than that of the glass. The thickness of the layer is varied and determined by the type or use of the lens. The blue, magenta or amber tints of lenses are caused by the thickness of the coating. Furthermore, most layers of coating help protect the surface of the lens because of their stable chemical properties.

13/DIFFRACTION OF LIGHT BY DIAPHRAGM

Images of a bright light in the distance often break forth into light flashes especially in night photography. This may be attributed to the diffraction phenomenon caused by the polygon-shaped opening of the diaphragm blades of the aperture. The number of flashes is the same as that of the blades, or doubled in the case of the blades in odd numbers. When the aperture is opened to its maximum range and assumes a circular form, flashes will be eliminated. Also, in some cases, a bright ring a halation ring—will appear around the image of light even though anti-halation film is used.

14 / PERSPECTIVE

In order to make a drawing look realistic, the artist must follow rules of "perspective". The most important rule of perspective is that things appear smaller in proportion to their distance from the eye.

In photography, where three-dimensional subjects or scenes are reduced to two on the film, the same rule applies. Otherwise, one would receive an unnatural





impression or feeling about the picture.

It can easily be proven that, in photography, the proportion in which the image decreases with the distance of the subject varies with the focal length of the lens used. Moreover, if the distance for observing the photograph taken with this lens is equal to the focal length, the picture should look like the actual scene. Thus if a picture is taken with a lens whose focal length is longer than the observing distance, the image of a distant subject appears too big and the observer gets the feeling that the picture is too flat.

On the contrary, if a picture is taken using a lens whose focal length is shorter than the observing distance, the picture will give the viewer too deep a feeling, because the image of a distant subject looks too small as compared with a nearer subject.

Since the human eye usually observes photographs at the distance of distinct vision (about 25cm), a lens whose focal length is greater than 25cm must give too flat an impression. On the other hand, a lens of shorter focal length must give too deep an impression—an exaggerated perspective so to speak.

Of course, we must not forget that the picture or negative taken with the lens of short focal length, as is generally the case with 35mm photography, is enlarged and then observed. Therefore, the negative, provided it is taken with the "normal" focal length lens, for example, with the lens of a focal length of 50mm, must give a natural perspective impression, so far as it is enlarged 5 times and observed at the distance of distinct vision, that is, 25cm.

In relation to perspective, there is another important point to consider. Sometimes, the shooting direction of the camera is tilted, as when a high building is photographed from a point quite close to its base, with the camera tilted upward. Conversely, a photographer standing on the top of a building, takes picture of other buildings nearby with the camera pointed downward. The resultant picture will naturally show the top of the building narrower or wider than the bottom, respectively, due to the effect of the perspective.

But, why give such a photograph an unnatural impression, even if the degree of the narrowing or widening is not remarkably large? This may be attributed to the fact we are accustomed, when looking the building directly with our eyes, to correct such inclination of the vertical lines of the building in our brain. All buildings, except the Tower of Pisa, must stand exactly vertical.

Therefore, there is a basic fact, for getting the picture giving a natural impression, neither to use the camera tilted upward or downward, but, to keep it horizontal as far as possible. No need to say that this rule is to be followed for all cases where any noticeable high or low level subjects (for example, mountains, towers, statues, etc.) come into the picture, unless any unnatural expression should be intentionally given to the picture composition.

However, on the other hand, when considering the requirement of covering the whole height of area desired to be included within the picture field, strict observance of the rule, that is, to keep the camera in the exactly horizontal position, is not always possible, because the photographer must often retreat backward, to properly increase the distance of the camera from the subject in question, which may sometimes involve inconvenience, or even danger.

There are specifically designed cameras for many uses, to solve such problems-special camera for professionals, such as photographers specialized in taking picture of architectural structures or others. In these cameras, a device is incorporated that enables a variable shift of the lens at right angles to the optical axis (not only up or down but also horizontally, right and left). This prevents the convergence of the lines, when the subject surface stands parallel to the lens and the film plane. One might think that, by this shifting, the perspective could be changed or eliminated.* Actually, it is not. The fact is that, it is only avoided and, owing to the movement of the lens parallel to the film plane, the picture field coverage is shifted or extended in the direction of the shifting of the lens, which makes it possible to cover the whole desired range of the subject, with the camera being kept parallel to the subject surface. The designation "PC"-Perspective Control-given to the Nikkor lens equipped with such a shifting device, should be understood in the sense above mentioned.

^a If there were no or little degree of perspective presented, all the subjects, far or near, reproduced on the drawing, would look the same in size, or all the parallel lines would appear parallel, instead of converging as in true perspective. This so-called "isometric" arrangement was actually adopted in ancient times by Chinese and Japanese artists. Often clouds or foliage were used to crop the lines before they extended far enough to cause the building to appear warped.

In optics, such isometric perspective is also possible by the use of the "telecentric" optical design.

We encounter the telecentric optical system in such an instrument as the contour projector which is used for accurate measurement of the object with its enlarged image projected on the screen wherein, owing to the telecentric design of the optical system of the projector, the magnification error caused by out-of-focusing is minimized. Of course, in general photography the use of such isometric telecentric perspective is meaningless.

NORMAL LENSES

For a normal lens used for general purpose picture taking, the focal length is made equal to the diagonal of the picture area; that is, about 50mm or 2 inches for a picture frame 24 mm \times 36 mm (1 in. \times 1.5 in.) in 35mm photography. The picture angle is about 45°, which corresponds to the normal viewing angle of the human eye. This lens is a standard equipment on Nikon cameras.

It offers high speed and, in terms of perspective and depth of field, it is intermediate between wideangle and telephoto lenses. Two normal Nikkor lenses of different apertures are available: f/1.4 and f/2. The 55 mm f/3.5 Micro-Nikkor Auto may also be classified as a normal lens in view of its focal length and is actually being used as a general purpose lens. Nevertheless, it has been referred to in the section of "Lenses for Close-Ups" because it is primarily designed as a close-up lens.

50 mm f/1.4 Nikkor-S Auto

Over fifteen years ago Nikon was first to offer a 50 mm lens with an f/1.4 aperture, and since then, this aperture has been accepted as the world-wide standard for 35 mm photography.

The large aperture, f/1.4, provides great advantages in the photography under adverse lighting condition when a flash cannot be utilized, and is also suited for available light photography effect. The finder image is bright and, as it has a shallow depth of field, focusing becomes very easy.

In addition, its incomparable quality, well-balanced design and compactness have made it one of the most popular standard choice of all the 35 mm camera lenses. As a normal lens, the focal length of 50 mm is suitable for general purpose such as portraiture, landscape and indoor sport photography.

Despite the large aperture of this lens, astigmatic aberration and curvature of the image field are corrected to a high degree. When the aperture is set at f/2, a slight flare existing at f/1.4 decreases to bring about a better contrast, and at f/2.8 or above, it is completely eliminated and a sharp image can be obtained.

Code	No.	111	001
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Mount :	F-bayonet mount
Aperture diaphragm :	Automatic Click-stops to f/16
Meter coupling prong:	Integrated in lens
Picture angle :	46°
Distance scale :	Graduated both in feet and meters up
	to 2 ft and 0.6m
Attachment size :	Screw-in diameter 52mm (P=0.75
	mm); slip-on outer diameter 54mm
Filter :	52mm screw-in
Lens hood:	52mm snap-on (111601) or 52mm
	screw-in (111651)
Dimensions :	67.0mm (dia.)×47.5mm (25/8" dia.
	×17/8″)
Weight :	300g (10 1/2 oz)

Supplied with 52 mm snap-on front cap (101810) in plastic case (111770).

Leather case (111701) with rear cap type F (111831) is available on order.

58mm f/1.4 Nikkor-S Auto (Discontinued)

Accessories are the same as for the above lens.





50 mm f/2 Nikkor-H Auto

This lens is the handiest and most versatile of all Nikkor interchangeable lenses. It weighs only 200 g. Various aberrations are corrected to a high degree. Flares are non-existant even with the lens fully opened. It also possesses a thorough high resolution and an outstanding color rendition. Besides general photography, it excels in special uses, including close-ups, in conjunction with a variety of attachments or accessories.

50 mm f/2 Nikkor-S Auto (Discontinued)

Accessories are the same as for the above lens.

Code No. 111006

Mount :	F-bayonet mount
Aperture diaphragm:	Automatic Click-stops to f/16
Meter coupling prong :	Integrated in lens
Picture angle :	46°
Distance scale:	Graduated both in feet and meters
	up to 2 ft and 0.6 m
Attachment size :	Screw-in diameter 52 mm (P=0.75
	mm);slip-on outer diameter 54 mm
Filter :	52 mm screw-in
Lens hood :	52 mm snap-on (111603) or 52 mm
	screw-in (111651)
Dimensions :	61.3 mm (dia.) × 37.4 mm (2 13/32"
	dia.×115/32″)
Weight:	200 g (7 oz)

Supplied with 52 mm snap-on front cap (101810) in plastic case (111770).

Leather case (111702) with rear cap type F (111831) is available on order.


55 mm f/1.2 Nikkor-S Auto

A new normal lens. The brightest among Nikkor Auto lenses, inherits the traditional high resolution characteristics. Despite the large aperture of f/1.2, various aberrations are corrected to the highest degree. Ordinarily, the existing flare amount increases as the lens aperture becomes larger. However, in this lens, flares are minimized so a sharp image of good contrast can be obtained even at full aperture. The brightness of the screen image and the shallow depth of field enable precise focusing. Suited for general photography and also highly efficient for indoor and night color photography without flash.

Code	No.	11	1008	3
	-			-

Mount :	F-bayonet mount
Aperture diaphragm :	Automatic Click-stops to f/16
Meter coupling prong :	Integrated in lens
Picture angle :	43°
Distance scale :	Graduated both in feet and meters up to
	2 ft and 0.6 m
Attachment size :	Screw-in diameter 52 mm (P=0.75 mm);
	slip-on outer diameter 54 mm
Filter :	52 mm screw-in
Lens hood :	52 mm snap-on (111604)
Dimensions :	73.5 mm (dia.) \times 58.3 mm (2 7/8" dia. \times
	2 5/16")
Weight :	425 g (15 oz)

Supplied with 52 mm snap-on front cap (101810) in plastic case (111770).

Leather case (111732) with rear cap type F (111831) is available on order.



WIDEANGLE LENSES

The wideangle lens has a shorter focal length than the normal lens and, as a result, it covers a picture angle wider than approximately 60°. It enables photographing a widely extended scene from a close proximity or within a confined area. Hence, it can be effectively utilized in photographing architectural exteriors and interiors. Moreover, the wideangle lens is convenient for instant candid work where exact focusing is not always possible. Its great depth of field resulting from short focal length compensates, to a great degree, for inexact focusing. Another remarkable effect that can be achieved by the wideangle lens is exaggeration of perspective : a nearer subject will appear larger than usual in the ultimate picture. Such exaggeration may sometimes result in a distorted impression, depending upon the subject and viewing angle, and it gives a peculiar, interesting effect which cannot be attained otherwise.

21mm f/4 Nikkor-O

Despite the extra wide angle, this lens assures high definition all over the picture field without vignetting; astigmatism is especially well-corrected and distortion is reduced to within 1%. Hence, it is especially suited for photographing an extended landscape, architectural interior, etc. or for intentionally exaggerated perspective. It gives such a great depth of field that even at full aperture all the subjects from infinity to 2 meters (about 6 ft) are included within the range of sharpness when the lens is focused to 4 meters (about 12 ft). Owing to its symmetrical design, the high definition of the lens is maintained for close distance photography. With the Bellows Focusing Attachment, this lens can produce an image larger than natural size.

Mirror in the camera must be kept in flip-up position because of the deep-seated mount of the lens, and the Supplementary Viewfinder should be used on the camera shoe.

There are two discontinued types of Supplementary Viewfinders. One has a bakelite base and the other requires the Flash Unit Coupler to attach the finder to the camera.

Mount :	F-bayonet mount
Aperture diaphragm :	Non-automatic Click-stops to f/16
Meter coupling prong:	Not integrated in lens
Picture angle:	92°
Distance scale:	Graduated either in feet or meters up
	to 3 ft or 0.9m
Attachment size :	Screw-in diameter 52mm (P=0.75
	mm);slip-on outer diameter 54mm
Filter :	52mm screw-in
Lens hood:	52mm screw-in (111653)
Dimensions :	60.0mm(dia.)×16.5mm (2 3/8" dia.
	imes21/32") exclusive of internal lens
	extension
Weight :	150 g (5 1/2 oz) lens only
	Supplementary Viewfinder weighs 40g (1 1/2 oz)
Supplied with 52mm snap-o	n front cap (101810),

Supplementary Viewfinder (111305) and rear cap type 3F (111833) in leather case (111711).



28 mm f/3.5 Nikkor-H Auto

Among lenses in the Nikkor Auto group, this lens provides the largest picture angle. Although the lens is of the retrofocus type, coma and distortion are greatly minimized. Precisely corrected spherical aberration of the lens causes no displacement of the focus, which is liable to occur as the aperture is stopped down. Even fully open, it gives a strong contrast and brilliancy. This makes it excellent for panoramic landscapes, snapshots, and architectural and interior photography.

Note: Filter or hood attached on the lens causes slight vignetting in the corners of picture field, when the lens is used with full opening. Stopping down two steps is necessary to eliminate such vignetting.

Mount :

Aperture diaphragm : Meter coupling prong : Picture angle : Distance scale :

Attachment size :

Filter : Lens hood : Dimensions :

Weight :

Supplied with 52 mm snap-on front cap (101810) in plastic case 111770).

 $\times 121/32''$)

220 g (8 oz)

F-bayonet mount

Integrated in lens

to 2 ft and 0.6 m

52 mm screw-in

52mm screw-in (111655)

74°

Automatic Click-stops to f/16

Graduated both in feet and meters up

Screw-in diameter 52mm (P=0.75

61.3mm (dia.) × 41.8mm (2 13/32" dia.

mm); slip-on outer diameter 54mm

Leather case (111702) with rear cap type F (111831) is available on order.



35mm f/2.8 Nikkor-S Auto

This standard high speed wideangle lens facilitates focusing and allows interior photography under adverse lighting conditions. Its 12-inch minimum focusing distance is twice as close as other Nikkor wideangle lenses. Spherical aberration, which can result from a large aperture, is minimized. Because of its moderate wideangle coverage and great depth of field, it is a standard choice for landscapes, snapshots, architecture, etc.

Mount :	E-bayonat mount
Aperture diaphragm :	Automatic Click stops to f/16
Meter coupling propa	Integrated in long
Picture angle :	
ricture angle.	02
Distance scale:	Graduated both in feet and meters up
	to 1 ft and 0.3m
Attachment size :	Screw-in diameter 52 mm (P=0.75
	mm); slip-on outer diameter 54 mm
Filter :	52 mm screw-in
Lens hood:	52mm screw-in (111657)
Dimensions :	61.3 mm (dia.) × 45.5 mm (2 13/32"
	dia. ×1 25/32")
Weight :	200g (7 oz)

Supplied with 52 mm snap-on front cap (101810) in plastic case (111770).

Leather case (111701) with rear cap type F (111831) is available on order.



35 mm f/2 Nikkor-O Auto

A high speed lens of f/2 aperture with a 35mm focal length that is the most popular among wideangle lenses. This lens is of the retro-focus type, similar to the 35 mm f/2.8 Nikkor-S Auto. Its unique optical designing eliminates various aberrations, particularly the coma aberration, to extreme extents, thus, assuring a sharp picture of high contrast even at full aperture. The fallout of brightness at picture corners rates the smallest among similar lenses. The f/2 brightness is excellent for snapshots, indoor photography and 'instant' candid works under poor light conditions.

F-bayonet mount
Automatic Click-stops to f/16
Integrated in lens
62°
Graduated both in feet and meters up to
1 ft and 0.3 m
Screw-in diameter 52 mm (P=0.75 mm);
slip-on outer diameter 54 mm
52 mm screw-in
52 mm screw-in (111657)
63.3 mm (dia.) \times 61.0 mm (2 1/2" dia. \times
2 3/8")
280 g (9.9 oz)

Supplied with 52 mm snap-on front cap (101810) in plastic case (111770).

Leather case (111701) with rear cap type F (111831) is available on order.



TELEPHOTO LENSES

A telephoto or long focus lens has a longer focal length and provides a larger image than normal lenses, giving a close-up image of a distant subject. Another characteristic of the telephoto lens is production of flat composition. This results from far objects appearing enlarged while near object do not appear proportionately large. In contrast with the wideangle lens, the telephoto covers a smaller field of view and a shallower depth of field. Owing to this shallowness, the ultimate picture assumes a relief-like quality resulting from the lack of sharpness of the out-of-focus areas.

Applications : News, sports, stage performances, animals, etc.

The Nikkor telephoto lenses are divided into 6 subgroups: 1 Provided with automtatic diaphragm (signified "Auto-"

- 85 mm, 105 mm, 135 mm, 200 mm and 300 mm).
- 2 Used with the Focusing Unit (400 mm, 600 mm, 800 mm, and 1,200 mm).
- 3 Designed as catadioptric system (combination of lens and mirror elements-500 mm and 1,000 mm).
- 4 Requiring the N-F Adapter Tube for attaching to the Nikon F (180 mm, 250 mm, 350 mm and 500 mm).
- 5 Telephoto Zoom Auto (85-250 mm and 200-600 mm). These are described in the "Nikkor Auto Zoom Lenses" section.
- 6 Special purpose telephoto lenses: Nikkor 135 mm f/4 with Bellows and Medical-Nikkor Auto 200 mm f/5.6. These are described in the section of "Lenses for Close-Ups".

85mm f/1.8 Nikkor-H Auto

The f/1.8 aperture of this lens, largest among Nikkor telephoto lenses, permits photographing under poor lighting conditions. The moderately long focal length gives the lens a better perspective for portraiture, stage photography and photo-journalism. It provides a high resolution and good contrast even when the aperture diaphragm is fully opened.

Mount :	F-bayonet mount
Aperture diaphragm:	Automatic Click-stops to f/22
Meter coupling prong:	Integrated in lens
Picture angle:	28°30′
Distance scale :	Graduated both in feet and meters up
	to 3.5 ft and 1 m
Attachment size :	Screw-in diameter 52 mm (P=0.75
	mm); slip-on outer diameter 54 mm
Filter :	52 mm screw-in
Lens hood :	52 mm screw-in (111661)
Dimensions :	72.0 mm (dia.) × 62.0 mm (2 27/32"
	dia.×2 7/16")
Weight :	430 g (15 oz)

Supplied with 52 mm snap-on front cap (101810) in plastic case (111770).

Leather case (111721) with rear cap type F (111831) is available on order.



105 mm f/2.5 Nikkor-P Auto

This is the most popular long focus lens for moderate telephoto effects combined with high speed. It is a comparatively bright, highly versatile telephoto lens possessing about double the focal distance and one-half the viewing field of a normal lens. Although it does not possess the telescopic effects of the 135 mm telephoto lens, naturalness is retained in the perspective portraiture. This lens is very convenient for indoor and stage photography. It is also excellent for night photographing and candid portraiture. Because it has the features of both the 85mm and 135 mm telephoto lenses, it can be substituted for either of these lenses.

Mount :	F-bayonet mount
Aperture diaphragm :	Automatic Click-stops to f/22
	(Intermediate click-stop between f/2.5
	and f/4 indicates f/2.8)
Meter coupling prong:	Integrated in lens
Picture angle:	23° 20′
Distance scale:	Graduated both in feet and meters
	up to 4 ft and 1.2m
Attachment size :	Screw-in diameter 52 mm (P=0.75
	mm); slip-on outer diameter 54 mm
Filter :	52 mm screw-in
Lens hood:	52 mm snap-on (111605)
	52 mm screw-in (111665) is also
	available on order
Dimensions :	66.0 mm (dia.) × 64.5 mm (2 19/32"
	dia.×217/32″)
Weight :	370 g (13 oz)

Supplied with 52 mm snap-on front cap (101810), 52 mm snapon hood (111605) in plastic case (111771).

Leather case (111721) with rear cap type F (111831) is available on order.



Mount : Aperture diaphragm : Meter coupling prong : Picture angle : Distance scale :

Attachment size :

Filter : Lens hood : Dimensions :

Weight :

F-bayonet mount Non-automatic Click-stops to f/22 Not integrated in lens 23° 20' Graduated both in feet and meters up to 2.75 ft and 0.8 m (Earlier model in either feet or meters) Screw-in diameter 34.5 mm (P=0.5 mm); slip-on outer diameter 36 mm 34.5 mm screw-in 34.5 mm snap-on 53.8 mm (dia.) \times 80.6 mm (2 1/8" dia. \times 3 3/16") 250 g (9 oz)



135 mm f/3.5 Nikkor-Q Auto

This telephoto lens features high resolution, superior capability with a brightness of f/3.5. Comparatively compact, it is convenient for snapshots, portraiture and landscape photography.

Code No. 111027

Graduated both in feet and meters up

Screw-in diameter 52 mm (P=0.75 mm); slip-on outer diameter 54 mm

52 mm screw-in (111665) is also

66.0 mm (dia.) × 83.5 mm (219/32"

to 5 ft and 1.5 m

52 mm screw-in

available on order

52 mm snap-on (111605)

Mount : F-bayonet mount Aperture diaphragm : Automatic Click-stops to f/22 (Intermediate click-stop between f/3.5 and f/5.6 indicates f/4) Meter coupling prong: Integrated in lens Picture angle : 18°

Attachment size :

Distance scale :

Filter : Lens hood :

Dimensions :

Weight:

370 g (13 oz) Supplied with 52 mm snap-on front cap (101810) and 52 mm snapon hood (111605) in plastic case (111771).

dia. × 3 9/32")

Leather case (111723) with rear cap type F (111831) is available on order.



135 mm f/2.8 Nikkor-Q Auto

A high-speed telephoto lens with a brightness of f/2.8. Spherical and coma aberrations have been thoroughly corrected. Other aberrations, particularly the curvature of image, have been minimized. Even when photographing close distance objects, the same image plane flatness is maintained, throughout the corners of the picture as well as at the picture center.

In comparison to similar type of lenses, a very good resolution and contrast are produced at maximum aperture. Ideal for portraiture, indoor sports, stage and landscape photography.

Mount :	F-bayonet mount
Aperture diaphragm.	Automatic Click-stops to f/22
Meter coupling prong :	Integrated in lens
Picture angle :	18°
Distance scale :	Graduated both in feet and meters up to
	5 ft and 1.5 m
Attachment size :	Screw-in diameter 52 mm (P=0.75 mm);
	slip-on outer diameter 54 mm
Filter :	52 mm screw-in
Lens hood :	Sliding type built-in
Dimensions :	72.5 mm (dia.)×103.7 mm (2 7/8" dia.×
	4 1/16)"
Weight :	610 g (1.3 lbs)

Supplied with 52 mm snap-on front cap (101810) and built-in Lens hood in plastic case (111771).

Leather case (111723) with rear cap type F (111831) is available on order.



200 mm f/4 Nikkor-Q Auto

True telephoto-4 times magnification of 50 mm normal lens. One of the great advantages that SLR cameras enjoy over rangefinder types is that the SLR camera can use 200 mm telephoto lens as standard equipment. This compact, light-weight, long distance telephoto lens is ideal for sports and nature study because it can be hand-held with ease.

Mount :	F-bayonet mount
Aperture diaphragm :	Automatic Click-stops to f/22
Meter coupling prong :	Integrated in lens
Picture angle :	12°20′
Distance scale :	Graduated both in feet and meters up
	to 10 ft and 3 m
Attachment size :	Screw-in diameter 52 mm (P=0.75
	mm); slip-on outer diameter 54 mm
Filter :	52 mm screw-in
Lens hood :	Sliding type built in
Dimensions :	73.0 mm (dia.)×153.5 mm (27/8"
	dia.×61/32″)
Weight :	560 g (1.2lbs)

Supplied with 52 mm snap-on front cap (101810), with rear cap type F (111831) in leather case (111724).

This complete sales unit is referred to as Code No. 111029. If leather case is not included in sales unit, the unit (without case) shall be referred to as Code No. 111030.



300 mm f/4.5 Nikkor-P Auto

In spite of a long focal length, this lens is light-weight and its short barrel allows hand operating capabilities with Nikon F. Important features include a fully automatic aperture diaphragm which couples to the exposure meter, and brightness of f/4.5 which makes it possible for the lens to meet every requirement in game, outdoor sports and scenic photography. Mount : Aperture diaphragm : Meter coupling prong : Picture angle : Distance scale :

Attachment size :

Tripod socket : Filter : Lens hood : Dimensions :

Weight :

Graduated both in feet and meters up

Automatic Click-stops to f/22

F-bayonet mount

Integrated in lens

8

to 13 ft and 4 m Screw-in diameter 72 mm (P=0.75 mm); slip-on outer diameter 75 mm 1/4" threaded 72 mm, screw-in Sliding type built-in 80.0 mm (dia.) × 192.0 mm (3 5/32" dia. × 7 9/16") 980 g (2.2 lbs)

Supplied with 72 mm screw-in front cap (111811) with rear cap type F (111831) in leather case (111725).

This complete sales unit is referred to as Code No. 111031. If leather case is not included in sales unit, the unit (without case) shall be referred to as Code No. 111032.







NIKKOR 400mm, 600mm, 800mm & 1,200mm

Nikkor 400 mm, 600 mm, 800 mm and 1,200 mm lenses can be attached to the Nikon F by utilizing a common Focusing Unit inserted in between. So, even when using two or more of this series of lenses, it suffices to have only one Focusing Unit, thus offering not only a good deal of portability but also a greater economy. Four different focal lengths ranging from 400mm to 1,200mm provide great versatility in sports, news and game photography.

Focusing Unit for Nikkor 400 mm, 600 mm, 800 mm & 1,200 mm

Code No. 111314

The Focusing Unit does not contain optics and is an intermediate tube to fit in between Nikon F body and the following lens: 400 mm f/4.5, 600 mm f/5.6, 800 mm f/8, or 1200 mm f/11. The Focusing Unit with a built-in automatic diaphragm has the aperture scales of 4.5, 5.6, 8, 11, 16 and 22 on its barrel, and possesses a focusing ring covered with a rubber strap to assure a secure grip for quick and easy manipulation. The maximum aperture of the Focusing Unit naturally corresponds to that of the lens attached. Hence, only the 400 mm f/4.5 lens can be read directly from the lens. If the 600 mm f/5.6 lens is utilized at full aperture (even though Focusing Unit scale is set at 4.5) the true aperture of 5.6 is in actual operation. The same rule applies to the other two telephoto lenses. The Focusing Unit is constructed so the distance scale can be attached to it. The distance scale on each lens unit is calibrated in feet or meters, whichever the buyer wishes.

Mount :	Camera side -F-bayonet mount Lensside -88 mm (P=1.5 mm) screw mount
Aperture diaphragm :	Automatic (except for 1,200 mm f/11 lens unit) Click-stops to f/22
Meter coupling prong:	Not integrated in lens
Tripod socket:	1/4" threaded Provided on rotating ring for horizontal and vertical position
Dimensions :	102.0 mm (dia.)×304.5 mm (41/32" dia.×12")
Weight :	1.4 kg (3.0 lbs)
Supplied with rear cap	type F (111831) and shoulder strap.

Supplied with rear cap type F (111831) and shoulder strap. Supplied in cardboard case.





400 mm f/4.5 Nikkor-Q Auto

This lens is used on the Nikon F in combination with the Focusing Unit.

Picture angle : Distance scale:

Attachment size :

Filter : Lens hood : Dimensions : Footage: up to 16 ft Metric: up to 5 m Screw-in diameter 122 mm (P=1.0 mm);slip-on outer diameter 133 mm 122 mm screw-in Sliding type built-in 135.0 mm (dia.) \times 276.0 mm (55/16" dia. \times 107/8") 471.5 mm or 189/16" long with Focusing Unit 1.9 kg (4.2 lbs) 3.3 kg or 7.2 lbs with Focusing Unit

Weight :

Note: Finder screen type A can be used when focusing is made on the surrounding matte area, instead of the split image range finder portion. For details, see focusing screen chart. Supplied with 133 mm slip-on leather front cap (101814), slip-on leather rear cap (111835) and distance scale plate (feet or meters).

6°

Wooden case (111782) commonly used for 400 mm and 600 mm lenses with camera and Focusing Unit is available on order.



600 mm f/5.6 Nikkor-P Auto

Code No. 111036

This lens is used on the Nikon F in combination with the Focusing Unit.

Note: Finder screen type A can be used when focusing is made on the surrounding matte area, instead of the split image range-

finder portion. For details, see focusing screen chant.

Picture angle: Distance scale:

Attachment size :

Filter : Lens hood : Dimensions :

Weight :

4° Footage: up to 35 ft Metric: up to 11 m Screw-in diameter 122 mm (P=1.0 mm); slip-on outer diameter 133 mm 122 mm screw-in Sliding type built-in 135.0 mm (dia.) × 297.0mm (5 5/16" dia. × 11 11/16") 516.5 mm or 20 11/32" long with Focusing Unit 2.4 kg (5.3 lbs) 3.8 kg or 8.3 lbs with Focusing Unit

Supplied with 133 mm slip-on leather front cap (101814), slip-on leather rear cap (111835) and distance scale plate (feet or meters).

Wooden case (111782) commonly used for 400 mm and 600 mm lenses with camera and Focusing Unit is available on order.



800 mm f/8 Nikkor-P Auto

Used on Nikon F in combination with the Focusing Unit. Manual diaphragm (f/8 to f/64) is also provided with this lens.

Whichever diaphragm is used, keep the other diaphragm aperture setting at full aperture.

Picture angle : Distance scale :

Attachment siz

Filter :

Lens hood : Dimensions :

Weight :

Note: Finder screen type A can be used when focusing is made on the surrounding matte area, instead of the split image range finder portion. For details, see focusing screen chart.

le :	3°
ale:	Footage: up to 60 ft
	Metric: up to 18 m
size :	Screw-in diameter 122 mm (P=1.0
	mm); slip-on outer diameter 133 mm
	122 mm screw-in
	Sliding type built-in
:	135.0 mm (dia.)×510.0 mm (5 5/16"
	dia.×20 3/32″)
	703.5 mm or 27 11/16" long with
	Focusing Unit
	2.3 kg (5.0 lbs)
	3.7kg or 8.0lbs with Focusing Unit

Supplied with 133mm slip-on leather front cap (101814), slip-on leather rear cap (111835) and distance scale plate (feet or meters).

Wooden case (111783) is available on order to house camera, Focusing Unit and lens unit.



Nikon F Sales Manual

1,200 mm f/11 Nikkor-P

Used on Nikon F in combination with the Focusing Unit. To avoid vignetting, the automatic aperture diaphragm of the Focusing Unit should not be used. For this lens, a manual diaphragm (f/11 to f/64) is provided. When using manual diaphragm, always set automatic diaphragm at f/4.5.

Note: Finder screen type A can be used when focusing is made on the surrounding matte area, instead of the split image range-

finder portion. For details, see focusing screen chart.

Aperture diaphragm :	Non-automatic Click-stops to f/64
Picture angle :	2°
Distance scale:	Footage: up to 130 ft
	Metric: up to 40 m
Attachment size :	Screw-in diameter 122 mm (P=1.0
	mm);slip-on outer diameter 133 mm
Tripod socket :	1/4" threaded Revolves 90° to permit
	vertical and horizontal position
Filter :	122 mm screw-in
Lens hood:	Sliding type built-in
Dimensions :	150.0 mm (dia.) × 731.0mm (5 29/32"
	dia.×28 25/32")
	913.5 mm or 35 31/32" long with
	Focusing Unit
Weight :	3.5 kg (7.7 lbs)
	4.9 kg or 10.7 lbs with Focusing Unit

Supplied with 133mm slip-on leather front cap (101814), slip-on leather rear cap (111835) and distance scale plate (feet or meters).

Wooden case (111784) is available on order to house camera, focusing unit and lens unit.



REFLEX-NIKKOR

Reflex-Nikkor employs a catadioptric system consisting of mirror and lenses. Because the optical beams in this system are reflected by means of the mirror surfaces, the barrel is shortened to at least half of the focal length. This results in a great reduction of weight and bulkiness. Besides scientific applications, it can be effectively used for sports, news, natural history photography and isolation of architectural details, especially when both extreme telephoto features and great motivation is essential. To adjust the image brightness in the Reflex-Nikkor, which has no aperture diaphragm, neutral density filters are used. This also results in the same depth of field for all the image brightness. Except in special cases such as illumination from behind the subject or in a large, uniformly illuminated picture area, there is hardly any loss of image brightness near the circumference of the picture field.

Minute displacement of the focus caused by temperature change can be easily avoided by focusing sharply immediately before the shutter is released.

The sharpness of the focused image is unsurpassed because of the use of reflecting surfaces which do not cause any chromatic aberrations. It even captures a circular point in the out of focus range which may be imaged as a blurred ring or a line which appears as two separated blurred lines.

500 mm f/5 Reflex-Nikkor

This is a catadioptric telephoto system with a bayonet mount. Its extremely short lens barrel and light-weight for such a long focal length, allows it to be easily handheld. To stop down the system, screw a neutral density filter into the rear end of the system. The ND filter equivalent to f/10 or f/11 is supplied with the lens. The lens has a tripod socket permitting convenient changeover between vertical and horizontal camera positions.

Note: Finder screen type A can be used when focusing is made on the surrounding matte area, instead of the split image range finder portion. For details, see focusing screen chart.

Mount : Meter coupling prong : Picture angle : Distance scale : F-bayonet mount Not integrated in lens 5° Graduated both in feet and meters up to 50 ft and 15 m

Screw-in diameter 122mm (P=1.0
mm);slip-on outer diameter 125 mm
1/4" threaded
39 mm screw-in All Nikon filters
screw into the rear part of the
lens system
122 mm screw-in (111663)
Always keep lens hood on to protect
this lens
125.0mm (dia.)×192.6mm (4 29/32"
dia.×719/32″)
1.7 kg (3.7 lbs including hood)

Supplied with UV (L 39), Yellow (Y 52), Orange (056), Red (R60) and Neutral Density filters (39 mm in dia., 2 mm in thickness), 122 mm screw-in hood (111663), 125 mm slip-on leather front cap (111813), bayonet rear cap type F (111831) in leather case (111726).

In an earlier model of this lens system, the Photomic series finder must be removed for attachment to the camera.



1,000 mm f/6.3 Reflex-Nikkor

This is a catadioptric long telephoto system. Instead of an iris diaphragm, this model has built-in UV and three Neutral Density filters which can be interchanged by revolving the turret, giving the equivalent results of f/6.3, f/11, f/16 and f/22. These 52 mm screw-in diameter filters are exclusively designed for this system and have the same thickness (4.2 mm), so that no displacement of focus arises by changing the filter. 52 mm sharp-cut filters, all with the same thickness of 2 mm are available: UV (L39), Yellow (Y52), Orange (056) and Red (R60.) They are mounted behind the ND filters; each is brought into the optical path, one after another, by revolving another turret. The distance scale is graduated so as to indicate focused distances with the two above mentioned types of filters, used one over the other.

Focusing is done by elongation and contraction of bellows with rack and pinion.

This lens has a built-in revolving fitting at the rear end, making it possible to turn the camera up to 90° . Convenient carrying handle is attached to the lens.

Mount : Meter coupling prong : Picture angle : Distance scale : Attachment size :

Filter : Lens hood : Tripod socket : Dimensions :

Weight :

F-bayonet mount Not integrated in lens 2°30' Graduated both in feet and meters up to 100 ft and 30 m Screw-in diameter 216 mm (P=1.0 mm);slip-on outer diameter 224 mm 52 mm screw-in (built-in) 224mm slip-on (111664) 1/4" threaded 232.0 mm (dia.)×470.0 mm (91/8" dia.×181/2") 9.9 kg (21.9 lbs) The entire unit & case weighs 22.3 kg (49.1 lbs)

Supplied with 224 mm slip-on leather front cap (111814), 224 mm slip-on lens hood (111664), rear cap type F (111831), metal rear cover (111837) and light metal alloy carrying case (111785).

The earlier type of this lens (S-bayonet mount) requires the Adapter Tube N-F to be mounted on Nikon F.



1,000 mm f/11 Reflex-Nikkor

A very compact and lightweight super-telephoto lens. Despite the focal length of 1000 mm, the overall length is only 240 mm (9 1/2'') and weighs 1.6 kg (3.5 lbs.). All aberrations, particularly chromatic aberration, have been well corrected. This gives a high resolution and good contrast and very sharp pictures can be obtained. With this lens, the residual blurred ring becomes almost negligible due to its great depth of field.

It focuses down to as close as 8 meters (25 feet), which is an outstanding feature of this telephoto lens. It has four built-in filters (L39, Y48, 056 and R60) which are interchangeable by revolving the turret.

The tripod socket permits convenient change-over between vertical and horizontal camera positions, and a built-in revolving fitting at the rear end, makes it possible to turn the camera up to 90 degrees. Excellent for photography in nature study and sports.

Mount :	F-bayonet mount
Meter coupling prong :	Not integrated in lens
Picture angle :	2°30′
Distance scale :	Graduated in both feet and meters up to
	25 ft and 8 m
Attachment size :	Screw-in diameter 108 mm ($P = 0.75$ mm);
	slip-on outer diameter 115 mm
Tripod socket:	1/4" threaded (camera body can be rotated
	90 °)
Filters :	34.5 mm screw-in (built-in) All Nikon filters
	screw into the rear part of the lens system
Lens hood :	115 mm slip-on (111666) Always keep lens
	hood on to protect lens
Dimensions :	136.0 mm (dia.) × 238.0 mm (5 3/8" dia.
	× 9 3/8″)
Weight :	1.6 kg (3.5 lbs)
	The entire unit and case weighs 2.3 kg
	(5.1 lbs)

Supplied with UV (L39), Yellow (Y48), Orange (056) and Red (R60) filters, 115 mm slip-on hood (111666), 115 mm slip-on leather front cap (111815), rear cap type F (111831) in leather case (111727).



TELEPHOTO LENSES WITH N-F ADAPTER TUBE

N-F Adapter Tube for Telephoto Nikkors

An adapter tube is necessary for attaching the 180, 250, 350 or 500 mm telephoto Nikkor lens to the Nikon F. This group of lenses is designed primarily as interchangeable lenses for Nikon S-series rangefinder models to be used in conjunction with the reflex housing.

The adapter fits between the camera body and the lens. The adapter permits the camera body to rotate around the optical axis by loosening the lock screw. The camera can be locked in the horizontal or vertical click position. To use the lenses on the Nikon F, insert the N-F Adapter which gives an optical length corresponding to that in the reflex housing. Dimensions :

Weight:

61.5 mm (dia.)×62.3 mm (2 13/32" dia.×2 7/16") 180 g (6 1/2 oz)

Supplied in cardboard case.

Fixed type N-F Adapter without such a rotating device: discontinued.



180 mm f/2.5 Nikkor-H

Code No. 101028

High speed telephoto lens. Ideal for indoor sports and stage photography.

Requires the N-F Adapter Tube for use on Nikon F.

Mount : Aperture diaphragm : Meter coupling prong : Picture angle : Distance scale :

Attachment size :

Tripod socket : Filter : Lens hood : Dimensions :

Weight :

Supplied with 82 mm screw-in front cap (101816), rear cap type T (101831) and 82 mm screw-in hood (101657).

S-bayonet mount

to 7 ft and 2.1 m

1/4" threaded

dia. × 5 9/16")

1.7 kg (3.8 lbs)

13°30'

Not integrated in lens

Pre-set Click-stops to f/32

Graduated both in feet and meters up

Screw-in diameter 82 mm (P=0.75 mm); slip-on outer diameter 85 mm

90.0 mm (dia.) × 141.2 mm (3 17/32"

Series 9 fits into the lens hood

82 mm screw-in (101657)

Supplied in cardboard case.



250 mm f/4 Nikkor-Q

Compact telephoto lens. For sports, landscapes and action.

Requires N-F Adapter Tube for use on Nikon F.

Mount : Aperture diaphragm : Meter coupling prong : Picture angle : Distance scale :

Attachment size :

Tripod socket: Filter: Lens hood: Dimensions:

Weight :

Supplied with 68 mm screw-in front cap (101815), rear cap type T (101831) and 68 mm screw-in hood (101655).

S-bayonet mount

to 10 ft and 3 m

1/4" threaded

dia.×5 5/32")

910 g (2.0 lbs)

10°

Not integrated in lens

Pre-set Click-stops to f/32

Graduated both in feet and meters up

Screw-in diameter 68 mm (P=0.75 mm); slip-on outer diameter 72 mm

75.0 mm (dia.) × 131.0 mm (2 15/16"

Series 9 fits into the lens hood

68 mm screw-in (101655)

Supplied in cardboard case.



350 mm f/4.5 Nikkor-T

Light-weight for this long focal length. Requires the N-F Adapter Tube for use on Nikon F.

S-bayonet mount Mount: Semi-automatic* Click-stops to f/22 Aperture diaphragm : Meter coupling prong: Not integrated in lens Picture angle : **7**° Distance scale : Graduated both in feet and meters up to 13 ft and 4 m Screw-in diameter 82 mm (P=0.75 Attachment size : mm);slip-on outer diameter 86 mm Tripod socket: 1/4" threaded Series 9 filters fit into the lens hood 82 mm screw-in (101658) 95.0mm (dia.) × 301.0mm (3 3/4" dia. ×11 27/32") 1.7 kg (3.7 lbs)

* How the "semi-automatic" aperture diaphragm works: The aperture diaphragm is stopped down to the preset aperture by a cable release and the shutter is released almost simultaneously.

Since it does not return automatically to the full opening, the lever provided on the lens barrel must be manually operated to perform this function.

Weight :

Filter :

Supplied with 82 mm screw-in front cap (101816), rear cap type T (101831) and 82mm screw-in hood (101658).

Supplied in cardboard case.



Lens hood : Dimensions :

500 mm f/5 Nikkor-T

Long telephoto lens. Ten times the magnification of normal lens.

Requires N-F Adapter for use on Nikon F.

S-bayonet mount
Pre-set Click-stops to f/45
Not integrated in lens
5°
Graduated both in feet and meters up to 26 ft and 8 m
Screw-in diameter 108 mm (P=1.0
mm); slip-on outer diameter 112 mm
1/4" threaded Provided on rotating

Filter : Lens hood : Dimensions :

Weight :

110mm filters fit into the lens hood 108mm screw-in (101659) 126.0mm (dia.)×490.0mm (4 31/32" dia.×19 9/32") 8.5 kg (18.7 lbs)

vertical camera position

ring with clamp for horizontal or

Supplied with 126mm slip-on front cap (101817), rear cap type T (101831) and 108 mm screw-in hood (101659) in cardboard case.



NIKKOR AUTO ZOOM LENSES

Nikkor Auto Zoom lenses are interchangeable: the focal length of each lens can be changed continuously by moving its zooming ring. This makes it possible to pick out any focal length in quick succession and to select any desirable image size and picture angle within the zooming range with one lens, without any distraction from or dim-out on the finder screen of camera.

Once focused for the subject distance, these Nikkor Zoom lenses remain in sharp focus at every focal length and no readjustment or resetting is required. A knurled ring on the lens barrel (2 rings on 50-300 mm lens) allows the quickest possible manipulation: zooming, by moving back and forth; focusing, by rotating right and left. Depth of field is clearly and conveniently indicated on color-coded radiating lines for every aperture and focal distance setting. The supreme resolution obtained at all focal lengths and aperture ratios are comparable to individual lenses of the corresponding focal length.

The Nikkor Zoom series was designed to provide the highest resolution possible for zoom lenses, combined with quick operation. Since 1959, Nikkor zoom lenses have established new international standards for 35mm lens designs.

43-86 mm f/3.5 Zoom-Nikkor Auto

Code No. 111051

This compact, easy-to-use lens zooms from semi-wideangle through normal to semi-telephoto.

In this lens design stress was given to flexibility of the focal length, instead of overall critical sharpness of the image.

The sharpest image, comparable to non-zoom lenses, is obtained at a focal length of 60mm and at the focused distance of about 3 meters or 10 feet.

Mount :	F-bayonet mount
Zooming range :	43 mm-86 mm
Zooming ratio :	2X
Aperture diaphragm :	Automatic Click-stops to f/22
Meter coupling prong:	Integrated in lens
Picture angle :	From 53° to 28°30'
Distance scale :	Graduated both in feet and meters
	up to 4 ft and 1.2 m
Attachment size :	Screw-in diameter 52 mm (P=0.75
	mm); slip-on outer diameter 54 mm
Filter:	52 mm screw-in
Lens hood :	52 mm screw-in (111657)
Dimensions :	65.0mm (dia.) × 70.6mm (2 9/16" dia.
	×23/4″)
Weight:	400 g (14 oz)

Supplied with 52 mm snap-on front cap (101810) in plastic case (111771).

Leather case (111721) with rear cap type F (111831) is available on order.



85 mm f/4-250 mm f/4.5 Auto Nikkor Telephoto-Zoom

This versatile telephoto zoom lens is especially suitable for sports, press and animal photography when hand-held with the Nikon pistol grip. A masterpiece of design, this was the first zoom lens to satisfy highly critical professional requirements. In conjunction with the Motor Drive, it opened new vistas in 35mm photography. Since its introduction in 1959, production of this lens has not been able to keep up with demand.

Diagonal	vertical	Horizontal	
Diagonal	Mantinal	11	
	28°30′-10°		
ong :	Integrated in lens		
Maximum aperture :		f/4 (85mm-150mm) -f/4.5 (250mm)	
Aperture diaphragm :		stops to f/16	
Zooming ratio :			
Zooming range :		n	
	F-bayonet mount		
	m : e : ong :	F-bayonet mount 85 mm to 250 mm 2.9 × m : Automatic Click- e: f/4 (85mm-150mm ong : Integrated in lens 28° 30'-10°	

-	-		
85 mm	28°30′	16°	24 °
105 mm	23°20'	13°	19°30′
135 mm	18°	10°	15°
150 mm	16°20′	9°10′	13°40′
180 mm	13°40′	7°30′	11°30′
200 mm	12°20′	6°50′	10°20′
250 mm	10°	6 °	8 °

Graduated either in feet or meters

Code No. 111053

	(7 1/2 feet or 2.2 meters with Close-
	Up Attachment)
Attachment size :	Screw-in diameter 82 mm (P=0.75
	mm); slip-on outer diameter 86 mm
Tripod socket:	1/4" threaded
	Two sockets for horizontal and verti-
	cal camera position
Filter:	Series 9 filters fit into the lens hood
Lens hood :	82 mm screw-in (111659)
Dimensions :	89.0mm (dia.) × 294.5mm (3 1/2" dia.
	×11 29/32″)
Weight :	2 kg (4.3 lbs)-master lens alone

Supplied with 100 mm slip-on metal front cap (101813), Close-Up Attachment Lens (111551), 82mm screw-in hood (111659) and rear cap type F (111831).

Packed in cardboard case.

Distance scale :

Soft leather case with shoulder strap (111731) which accommodates camera with lens attached, is available on order.

Close-Up Attachment Lens (111551) is delivered attached to the front of the lens. Remove this attachment lens for general photography.

Discontinued type of the lens is not provided with the common, one-action, zooming focusing ring, but with separated zooming and focusing rings without clamp.



200 mm f/9.5-600mm f/10.5 Auto Nikkor Telephoto-Zoom

Longest focal length zoom lens. Widely used for action, sports and press photography. It is also applied in the more specialized fields of missile tracking and highway traffic control. Its wide-coverage focal length makes it a convenient single telephoto lens to use. Rotating ring is provided to permit camera positions up to 90° .

Mount :	F-bayonet mount
Zooming range :	200 mm-600 mm
Zooming ratio :	3×
Aperture diaphragm:	Automatic Click-stops to f/32
Maximum aperture :	f/9.5 (200-350mm)
	f/9.8 (400 mm)
	f/10.2 (500 mm)
	f/10.5 (600 mm)
Meter coupling prong:	Not integrated in lens
Picture angle :	12°20′-4°10′
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Focal Length	Diagonal	Vertical	Horizontal	Maximum Aperture
200 mm	12°20′	6°50′	10°20′	
250 mm	9°50′	5°30′	8°10′	1.95
300 mm	8°10′	4°30′	6°50′	1.5.5
350 mm	7 °	4 °	5°50′	
400 mm	6°10′	3°30′	5°10′	1:9.8
500 mm	5 °	2°40′	4°10′	1:10.2
600 mm	4°10′	2°20′	3°30′	1:10.5

protanto o o o o o o	Gradated entiter in reet of meters
	up to 13 ft or 4 m
	(7 1/2 feet or 2.3 meters with Close-
	Up Attachment)
Attachment size :	Screw-in diameter 82 mm (P=0.75
	mm); slip-on outer diameter 86 mm
Tripod socket:	1/4" threaded
Filter :	Series 9 filters fit into the lens hood
Lens hood :	82 mm screw in (111659)
Dimensions :	89.0mm (dia.)×482.2mm (3 1/2" dia. ×19")
Weight :	2.3 kg (5.1 lbs) master lens alone

Supplied with 100 mm slip-on metal front cap (101813), Close-Up Attachment Lens (111552), rear cap type F (111831), 82mm screw-in hood (111659) with filter adapter for Series 9 filters.

Packed in sturdy cardboard case.

Distance scale :

Close-Up Attachment Lens (111552) is delivered attached to the front of the lens. Remove this attachment lens for general photography. Wooden case is available on order.



Code No. 111055

Graduated either in feet or meters

LENSES FOR CLOSE-UPS

Nikon single lens reflex cameras excel in close-ups, macrophotography and photomicrography. Only Nikon lets you see the exact picture to be taken: finder field covers 100% of the frame area. What's more, you actually see your depth of field, compose and focus through the same optical system that takes the picture.

In order to meet the infinitely varying needs in photomicrography and macrophotography, Nikkor close-up lenses and accessories are designed to encompass the broadest effective range of magnification and reduction. Whether for scientific or commercial purposes, these special lenses and accessories have become indispensable for close-up photography.

For the many photographers who use the 50 mm lens with attachments in working with close-ups, Nikon suggests the use of the 50 mm f/2 Nikkor Auto lens for best results. The f/2 minimizes distortion and has proved to be the ideal 50 mm lens for close-up work.

55 mm f/3.5 Micro-Nikkor Auto

The Micro-Nikkor Auto 55 mm f/3.5 is a specially designed lens which is unsurpassed for use in close-up photography. It features continuous focusing from infinity to the close-up distance for the reproduction ratio 1/2. Hence, it shows its versatility as a dual-purpose lens to be used for both close-up (highest resolution at 1/10 reproduction ratio) and general purpose photography. This lens retains an excellent image quality even when used with the Extension Ring M for 1/1 (natural size), with the aperture stopped down two stops from the full opening, i.e., to f/5.6 on the scale. In effect, due to the natural size distance the aperture reduces to f/11. This Extension Ring M extends 28 mm for reproduction ratios to 1/1 and is attached between the lens and the camera with a bayonet mount.

Another remarkable feature of the lens is that the aperture diaphragm which is automatically linked to the focusing ring opens as the focused distance decreases. This compensates for the change in exposure in close-up work and keeps a constant brightness at varying reproduction ratios. Thus, necessary exposure factor adjustment is eliminated in close-up work. This automatic compensating feature is retained even when the Ring M is in use. However, automatic compensation is not effective beyond the maximum mechanical opening (full aperture) of the diaphragm. Consequently, as the focusing ring is rotated, an aperture scaling is disclosed on the left-hand side of the barrel. This scale shows the actual aperture for exposure calculation over the range of reproduction ratios shown in red on the barrel. Thus, at the reproduction ratio of approx. 1/7 (approx. 2 feet focused distance from the film plane) the lens set at f/3.5 has a value of f/4; at approx. 1/5, it has a value of f/4.5; at approx. 1/2.5, it has a value of f/5.

Two other scales are disclosed on the right-hand side of the barrel as the focusing ring is rotated. These refer to the use of the lens with the M-ring. The M-ring itself is calibrated in blue f-stop numbers, which are read off the short black index line on the meter-coupling prong. The extension of lens to film distance by the M-ring slows the lens speed by one half: instead of the lens aperture of f/3.5 through f/32 on the lens barrel, the lens aperture of f/5.6 through f/45 on the M-ring should be used. The blue scale on the right side of the lens gives settings for reproduction ratios with the Mring of 1:2, 1:1.5 and 1:1 (actual distance from film plane to object of: 24.1 cm, 22.3 cm and 21.4 cm, respectively). The second scale shown in black-f/5.6, f/6.3 and f/7.1-indicates actual aperture at reproduction ratio being employed when the lens is set at f/3.5.

Mount : Aperture diaphragm :

Meter coupling prong:

F-bayonet mount

Automatic Click-stops to f/32 (f/45 with M-ring); intermediate click between 3.5 and 5.6 indicates f/4 Integrated in lens Using the M-ring, it does not couple to the exposure meter

Picture angle :	43 degrees at infinity
Distance scale:	Graduated both in feet and meters up to 0.79 ft and 24.1 cm (330° turn)
Reproduction ratios :	Engraved in orange along the distance scale on the focusing ring
Attachment size :	52 mm screw-in (P=0.75 mm); slip- on outer diameter 56mm (can be utilized only when front end is ex- tracted)
Filter :	52 mm screw-in
Lens hood :	Not required, as the lens front is recessed However, if a filter is used
	mended (for 35 mm f/2.8-111657)
	to avoid reflection of light on the filter surfaces
Dimensions :	66.0 mm (dia.) \times 55.5 mm (with M-ring 80.0 mm) or 2 19/32" (dia.) \times
	2 5/32" (with M-ring 3 5/32")
Weight :	240 g (with M-ring 350 g) or 81/2 oz (with M-ring 121/2 oz)
Finder screen in camera :	Type A focusing screen is not recom- mended For details, see focusing screen chart
0 1 1 11 50	4040401 1 5

Supplied with 52 mm snap-on front cap (101810) and Extension Ring M (111317) in plastic case (111771).

Leather case (111723) for lens with M-ring and leather case (111701) for lens without M-ring are available on order.

Discontinued model of the Micro-Nikkor 55 mm f/3.5lens not equipped with the automatic diaphragm, does not permit automatic aperture compensation according to the reproduction ratio.

This model continuously focuses from infinity to the close distance for 1/1 magnification, without any extension ring inserted.


Reproduction ratio	Elongation of lens barrel (in.)	Focus distance (in.) from film plane to focused subject	Subject area (in.)	Exposure factor	Exposure increase in stop
1:10	0.22	25.95	14.17×9.45		
1:8	0.27	21.68	11.34×7.56		
1:7	0.31	19.55	9.92×6.61		
1:6	0.36	17.44	8.50×5.66		
1:5	0.43	15.34	7.09×4.72		
1:4	0.54	13.29	5.67×3.78		
1:3	0.72	11.30	4.25×2.83		
1:2.5	0.86	10.36	3.54×2.36		2
1:2	1.08	9.50	2.83×1.89	2.25	1
1:1.5	1.44	8.77	2.13×1.42	2.78	1
1:1	2.17	8.41	1.42×0.94	4	2

Working distance (from lens front edge to focused subject) for 1/1 is 2.3 in. or 5.7 cm. When using the Nikon Bellows Focusing Attachment with the Micro-Nikkor, reproduction scale from $1.7 \times up$ to 4.2x can be obtained. For this, the lens is reversed and attached to the Bellows by the Macro-Ring BR-2.



200 mm f/5.6 Medical-Nikkor Auto

Ideally suited for medical photography, as well as countless other scientific and industrial applications, the Medical-Nikkor is designed to eliminate numerous procedures formerly required in close-up photography.

The lens is self-compensating so procedures are simplified. By setting the film speed (ASA*) on the white dot for B & W films or on the red dot for color, and the desired reproduction or magnification ratio on the lens, the diaphragm opening is automatically stopped down to the correct setting at the moment of exposure. To obtain proper focus, it is only necessary to move the camera position until a sharp image is produced on the viewing screen.

The Medical-Nikkor with two illumination units: a multiple built-in lamp to provide clear, precise focusing, and a built-in electronic ring flash unit to illuminate the subject at the instant of exposure.

Code No.: Lens with AC Power Unit 111075 Lens with DC Power Unit 111076

The ring-flash shield surrounds the lens to provide optimum lighting and is frosted to provide even light diffusion. The lens front glass is on the same plane as the ring-flash window, but is encompassed with a chrome, milled-edge ring. If this ring is unscrewed, the whole flash head can be removed from the lens for servicing. Also, when removed, the ring-flash can be used as an independent flash head to provide special lighting angles. Surprisingly lightweight and compact, this hand-held lens allows fatigue-free manual operations without the use of tripod; even awkward shooting angle positions can be maintained for reasonable periods. And its long focal length offers greater conveniences when taking close-ups of cavities and recessed areas.

The Medical-Nikkor Auto reproduction ratio range is calibrated in eleven steps, from 1/15 reduction to 3 times magnification in combination with six auxiliary lenses noted below :

Reproduc-	Combination of lenses	Distance of subject from front surface of		Subject field	
		(inch)	(mm)	(incn×incn) (m	(mm×mm)
1/15×	Master lens	10′ 11.89″	3,350	14.17 × 21.26	360×540
1/8×	$1/8 \times + Master$ lens	5′ 10.08″	1,780	7.56×11.34	192×288
1/6 imes	$1/6 \times + Master lens$	4′ 4.64″	1,337	5.67× 8.50	144×216
1/4×	$1/4 \times + Master$ lens	2′ 11.04″	890	3.78× 5.67	96×144
1/3×	$1/4 \times + 1/6 \times + Master$ lens	2′ 1.0″	635	2.72× 4.06	69×103
1/2×	$1/2 \times + Master$ lens	1′ 5.32″	440	1.89× 2.83	48× 12
2/3 ×	$1/2 \times + 1/4 \times + Master$ lens	1′ 0.72″	323	1.38× 2.09	35× 53
1 ×	1× + Master lens	8.66″	220	0.94× 1.42	24× 36
1.5 ×	$1 \times + 1/2 \times + Master lens$	5.98″	152	0.67× 0.98	17× 25
2 ×	2× +Master lens	4.17″	106	0.47× 0.71	12× 18
3 ×	$2 \times + 1 \times + Master lens$	2.76″	70	0.33× 0.50	8.4×12.6

As shown in above table, the Medical-Nikkor Auto has, at any magnification, a much longer working distance than normal lenses.

Range of speed of the film to be used varies with the desired reproduction ratio or magnification as per the diagram shown at right:



* If you set the film speed - ASA - on the white mark for blackand-white films and on the red mark for color and the desired reproduction or magnification ratio on the lens, the diaphragm opening is automatically adjusted to correct aperture at the moment of exposure. This system eliminates the majority of exposure factor calculations formerly required in close-ups and flash photography. A "leak" flash is provided for printing (on each picture frame simultaneously with exposure) either an individual figure from 1 to 39, or a magnification ratio. This serves as a reference or key number, or as a guide to right-side-up projection. The intensity of the "leak" flash can be adjusted in three steps and is set to "A", "B" or "C" marking on the lens barrel. When an unnumbered negative is required, the recording aperture can be blocked off by setting the change-over ring to "D".

Film speed ASA (DIN) Marking	Black & white	Color
A	32 (16) or lower	64 (19) or lower
В	40 (17)-200 (24)	80 (20) -400 (27)
С	250 (25) or higher	500 (28) or higher

Power unit:

For the ring-flash :

For the focusing lamp :

Mount : Aperture diaphragm :

Meter coupling prong : Reproduction ratio Master lens : One auxiliary lens added : Two auxiliary lenses added : Focusing : AC type unit adjustable to 100 V, 117 V, 220 V, 240 V; or DC type unit rated at 240 V using a laminated battery (e.g. Eveready No. 491, Mallory PF-491, Ray-0-Vac 1010, etc) Four "D" cells are used, each 1.5 V (3V two connected parallel) F-bayonet mount F-number is automatically set by determining film speed and reproduction ratio Stops to f/45 Not integrated in lens

1/15

 $1/8, 1/6, 1/4, 1/2, 1 \times, 2 \times$

1/3, 2/3, 1.5, 3×

Fixed; focus distance varies with auxiliary lens or lenses attached



Shutter speed to be used :

Attachment size :

Illumination for shooting :

Output : Flash duration : Color temperature :

Recharge duration:

Illumination for focusing : Pilot lamp : Dimensions of master lens : Weight of master lens :

Finder screen in camera :

1/30 sec. or slower with camera Synch-selector set at FX 38 mm, screw-in slip-on outer diameter 42.5 mm Ring-type discharge xenon lamp, builtin Approx. 60 W Approx. 1/500 sec. 6000°K to permit use of daylight film AC unit, approx. 13 sec. DC unit, depending on frequency of use and others 4 light bulbs, each 2.5 V, built-in Built-in for checking electric circuit 80.0 mm (dia.)×168.5 mm (35/32" dia. $\times 65/8''$) 650 g (1.4 lbs)

Type A focusing screen is not recommended. For details, see focusing screen chart. Supplied with 38 mm screw-in front cap (111818) and rear cap type F (111831); safety camera shoe cover (111376); 6 auxiliary lenses- $1/8 \times (111553)$, $1/6 \times (111554)$, $1/4 \times (111555)$, $1/2 \times (111556)$, $1 \times (111557)$, $2 \times (111558)$; 1.5 meter power source cord (111373); synch cord for camera and lens (111374), four (4) 2.5 V spare bulbs. Also, a compartment leather case with shoulder strap (111734) which can accommodate a camera attached to the master lens, 6 auxiliary lenses, AC (111371) or DC (111372) power unit each in its own case with shoulder strap. 10 meter power cord is available on order. Choice of AC power unit with primary voltage cord or DC power unit (240 V laminated battery and 1.5 V D-cells excluded). Specify.

Photomic series finder should be removed for attaching the lens to the camera. With the Photomic series finder back in position, it will function solely as a view finder.

Caution! To avoid a slight electric shock, attach the safety cover to the accessory shoe on the camera so that synchro contact near the rewind crank cannot be touched, as the camera is provided with a body earth.



8. Reproduction ratio scale 9. Film speed (ASA) scale





135 mm f/4 Nikkor (short mount)

(For Bellows Focusing Attachment)

This lens is designed exclusively for the Bellows Focusing Attachment (111330) to take pictures continuously from infinity to the closest distance of 230 mm which corresponds to the reproduction ratio 1:1.

A superb image crispness is obtained even at close-up distances. Also, owing to the long focal length of this lens, the working distance can be held fairly long, compared with the normal lens. This feature provides the necessary convenience in close-ups. It attaches to the Bellows with the BR-1 Adapter Tube (111333). The extension of the Bellows is used for focusing this lens because it has no focusing device in itself.

Mount :	S-bayonet mount		
Aperture diaphragm :	Preset Click-stops to f/22		
Picture angle :	18°		
Attachment size :	Screw-in 43mm (P=0.5mm); slip-on		
	outer diameter 46 mm		
Filter :	43 mm screw-in		
Lens hood :	43 mm snap-on (111611)		
Dimensions :	55.8 mm (dia.) × 35.2 mm (2 3/16"		
	dia. ×1 ³ ⁄8″)		
Weight :	220 g (8 oz)		
-			

Supplied with 43 mm snap-on front cap (101812) in plastic case (111772). BR-1 Adapter Tube (111333) and rear cap type L are available on order.



SPECIAL EFFECT LENSES.

The 8 mm f/8 Fish-eye-Nikkor and 35 mm f/3.5 PC-Nikkor are classified as "Special Effects Lenses" and are described in this section. Their applications are so extraordinary that they cannot be classified simply as wide angle lenses.

Special effects, such as 180° picture angle or compensation of convergence, have become possible for the first time in 35 mm photography with these lenses by Nikon.

In this sense, special effect lenses contribute to the incomparable versatility of the Nikon F as a system camera. Other new types of lenses for expanding the fields of 35 mm photography will gradually be developed by Nikon in the future.

8 mm-f/8 Fish-eye-Nikkor

This lens covers a 180° picture angle horizontally and vertically. A circular image field, 24 mm in diameter, is obtained. This lens is ideal for such scientific requirements as measuring the zenith or azimuth angle of astronomical bodies or for showing the distribution of clouds in meteorology. In addition, the Fish-eye lens can also be used to obtain distorted pictures with unusual graphic impact, especially in advertising photography. The front element has an exceptionally large 69mm diameter. A manually set diaphragm operated by a lever has click-stops to f/22. No focusing is required because of its extreme depth of field : from infinity to 20" (50 cm) even at full opening. There are six built-in filters on a rotating turret: orange (057), medium yellow (Y48), dark yellow (Y51), skylight (LIA), yellowish green (XO) and red (R60) The lens is used with the mirror in the camera locked up. This lens requires the use of a matching Fish-eye Finder (111304) with the field of 160° which fits onto the camera accessory shoe. Because of its large 82 mm barrel diameter, the lens cannot be attached to the camera without first removing Photomic series finder.

Mount :	F-bayonet mount		
Aperture diaphragm :	Non-automatic Click-stops to f/22		
Meter coupling prong :	Not integrated in lens		
Picture angle :	180°		
Picture size :	24 mm in dia.		
Distance scale:	Fixed		
Attachment size :	Screw-in 79 mm (P=0.75 mm); slip-on outer diameter 80.5 mm		
Filter :	Built-in 6 filters on the turret		
Dimensions :	82.0 mm (dia.)×42.3 mm (37/32" dia.×121/32")		
Weight :	300 g (10 1/2 oz)		

Supplied with 79 mm screw-in front cap (111816), rear cap type 3 F (111833), Fish-eye Finder with cap (111304) in leather case (111733).

The 50° Centering Finder (discontinued) for Fish-eye-Nikkor requires the Flash Unit Coupler (111904) when it is attached to the accessory shoe.





35 mm f/3.5 PC-Nikkor

The great advantage of this lens is that the main section of the lens barrel, together with its focusing and aperture setting mechanisms, can be moved up to 11 mm parallel-with the film plane in any direction-by rotating the knob up to 3 rotations and clamping down. With this lens, it is possible to avoid the image convergence produced when the lens is not parallel to the subject extended horizontally, vertically or in any direction. Hence, the PC-Nikkor is extremely useful in architectural, industrial and commercial photography, where convergence compensation in the enlarging stage is difficult or impossible-such as in color reversal work, in which the subject is usually framed once for all exposures. Also, it makes possible a continuous wide view of two exactly matching pictures by shifting the lens without moving the camera. The PC-Nikkor expands the versatility of the 35 mm camera, and even replaces large format apparatus with "snaking" bellows. In general, the lens does away with the necessity of tilting the camera, or enables it to be tilted less. On many occasions, this makes the difference between acceptable and unacceptable convergence of verticals.

To make the shift available to all directions, the whole front section, including the shift movement, can be rotated in the lens flange which fits into the camera body. The lens can be rotated through the entire 360° and there are click-stop settings at the twelve 30° intervals. The amount of shift is calibrated in millimeters. It is easy to set the shift to a 0.5 mm accuracy.

Therefore, in addition to the conventional rise, fall and cross movements, an infinite series of diagonal movements can be obtained. This facility to shift is sometimes very convenient; for example, when the positioning of the camera is restricted and the angle of the camera would produce unwanted distortion.

Each of the 30° rotation click-stops is calibrated with a numeral denoting the maximum shift in that direction without vignetting: 11 mm for rise and fall, 8 mm of cross, and 7mm of diagonal shift. The extent to which the recommended shifts can be exceeded depends on the distribution of important fine detail in the subject. When the lens is shifted downward, the cut-off at the lower end of the mirror causes considerable vignetting



in the viewfinder. This, and other vignetting in the viewfinder at extreme shifts, does not appear on the negative. Therefore, the system shows no vignetting at any aperture or displacement.

The aperture diaphragm is not fully automatic, but is a manually preset type, with the preset ring at the front of the barrel and the stop-down ring immediately behind it. The preset ring and the stop-down ring rotate in the same direction. If manual presetting is not important, it is possible to adjust the preset ring to f/32, and then set the diaphragm with the stop-down ring reading on the preset scale. This aperture scale is duplicated on the other side of the lens front rim, so that settings are easily read with any shift movement. The aperture scale is linear, with a wide scale.

Mount : Aperture diaphragm : Meter coupling prong : Picture angle : F-bayonet mount Preset click-stops to f/32 Not integrated in lens 62° Although the picture angle is 62°

the lens itself is capable of maintaining a sharpness range of 74° This is to compensate for the 11 mm

	shift away from the center of the	
	film frame	
Distance scale:	Graduated both in feet and meters up to 1ft and 0.3 m	
Attachment size :	Screw-in diameter 52 mm (P=0.75 mm);slip-on outer diameter 54.7 mm	
Filter :	52 mm screw-in	
Lens hood :	52 mm screw-in (111655)	
Dimensions :	70.0 mm (dia.) \times 52.0 mm (2 3/4" dia. \times 2 1/16")	
Weight :	290 g (10 oz)	
Finder screen in camera:	Focusing screen type E is recom- mended For details, see focusing screen chart	

Supplied with 52 mm snap-on front cap (101810), rear cap type F (111831) in leather case (111732).

When using the PC-Nikkor in conjunction with the Photomic series finder, the following procedures must be performed:

- To mount : First, remove Photomic finder and mount lens. Then replace finder.
- To use: The finder housing will limit the rotation capability of the lens. Hence, the lens can only be shifted horizontal to the camera. If a vertical picture is desired, the camera itself will have to be rotated to the vertical position.



50mm f/2.8 EL-Nikkor

(Photo-enlarging lens for 35mm enlarger)

Fine definition obtained with Nikkor picture-taking lenses will be ineffective if improper lenses are used for enlarging. Thus, the EL-Nikkor enlarging lens embodying the following special characteristics has been made available for enlargers designed for 24×36 mm negatives with an aperture as large as f/2.8 to facilitate focusing. Aberrations of the lens are specifically corrected for near subject distances which enlarging work most commonly undergoes: from $2 \times to 20 \times$, corresponding to the size of paper from 6×8.2 cm to 45.5×56 cm.

Correction has been made not only for the visible range of light, but also for the light of shorter wave lengths up to near ultraviolet $350 \,\mathrm{m}\mu$ -450 $\mathrm{m}\mu$, to which the emulsion of enlarging paper (black and white) is most sensitive. The result is perfect conformity between visual and actual focusing. The lens uses elements with minute absorption of shorter wave-length light and has amber-coated surfaces, so that the light transparency of shorter wave lengths about 400 m μ is increased to full extent. Because the front and rear lens elements of large diameters (front element is 1.5 times as large as the effective aperture of the lens system) are contained, vignetting is minimized. There is no vignetting at f/4 or smaller apertures. Even at the largest aperture, it gives higher resolution than the taking lens.

Optimum aperture is around f/5.6. No focus displacement occurs when the lens opening is stopped down, an important feature in enlarging work for maintaining the sharpness obtained at full aperture at the time of exposure with the aperture stopped down.

Aberration correction covers an area in excess of the actual negative film area of 24×36 mm. This ensures a sharp image over the whole extent of the picture, even when positioning of the negative on the negative carrier is incorrect. Aperture settings are performed with click-stops on an equally spaced scale, indicated by large aperture figures engraved in white, so that the setting can be done very easily in the darkroom.

An intermediate 15 mm adapter is available to allow the lens to be used in enlargers with a comparatively short negative-to-lens distance.

Mount :	Screw-in diameter 39 mm ($P = 1/26''$)		
Aperture diaphragm :	Click-stops to f/16		
Attachment size :	Screw-in diameter 40.5 mm (P=0.5 mm)		
Dimensions :	47.5 mm (dia.)×27.7 mm (1 7/8″ dia. ×1 3/32″)		
Weight :	100 g (31/2 oz)		

Supplied with 40.5 mm snap-on front cap (22702) in plastic case (22704).



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EL-NIKKOR LENSES

EL-NIKKOR lenses are single purpose lenses which have been designed exclusively for photographic enlargers. According to the size of the negative to be enlarged, five types of EL-NIKKOR lenses are available.

The factors involved in the designing of enlarging lenses are different from those of photographic "taking" lenses. Special considerations must be given to the factors that would be bringing out their characteristics to extreme extents. One of the factors is its magnifying power. When a 35mm negative is enlarged to sizes of $3 \cdot 1/4'' \times 4 \cdot 1/4''$ and $10'' \times 12''$, the lens will have to be designed so that it will possess an accurate magnification of 3 or 10 times, respectively. Another factor to be considered is the spectral sensitivity of the printing material, that is, of the photosensitive paper. The EL-NIKKOR has been designed and manufactured with all the necessary factors being taken into full consideration to bring out its characteristics. Thus, it is a lens of the highest quality and ensures faithful reproduction of details and adequate image contrast exactly as found in the negative film. Today, it is recognized as the highest quality enlarging lens available on the market. Moreover, the EL-NIKKOR lenses are provided with two large F-number scales, click-stops at each marking, etc., and offer great convenience in use.

Features of EL-NIKKOR

1. Brightness

4

EL-NIKKOR lenses are designed to have a sufficiently large aperture which is advantageous for enlargement. They are furthermore designed so that the front and rear elements of the lens have a large diameter and sufficient light can be taken, not only at the center part, but also on the peripheries and edges of the picture field. Therefore, a uniform image brightness can be produced throughout the entire picture area. Consequently, since the image is bright and the depth of focus is small, focusing can be done easily even for dark negatives.

2. Aberration Correction

The aberration of the EL-NIKKOR lenses has been corrected for a short focusing distance according to their designed magnifying power, and differs from photographing lenses which are corrected for infinity. Aberrations are corrected to cover an area slightly larger than the size of the original negative. Thus, even if the negative gets slightly displaced, no blurring will occur at the picture corners. In addition, distortion aberration has been fully corrected so faithful reproduction of the negative film image can be obtained. There isn't the slightest shifting of the focus plane due to stopping down of the aperture.

3. Correction of Near Ultraviolet Rays

There is a considerable divergence between the focusing points of the light perceived by our eye, namely the visible light, and the light range to which black-and-white photographic printing paper is sensitive. In other words, our eyes are almost entirely insensitive to near ultraviolet ray $(350m\mu \sim 450m\mu)$, which is the main light range printing paper is sensitive to. Consequently, if focusing is perfomed by the naked eye there is no way of telling whether the focusing has been adjusted correctly for the light to which the printing paper is sensitive. EL-NIKKOR lenses are corrected against chromatic aberration, not only for visible light rays, but also for near ultraviolet rays, so that the image formed of the visible light exactly coincides with that of the ultraviolet ray and focusing can be adjusted perfectly whether in color or in black and white.

Another important point is that special type of glass is not used for making these lenses as such glasses are apt to absorb ultraviolet rays resulting in producing an enlarging lens with a rather deficient brightness. Furthermore, an anti-reflection coating is applied to increase the transmission of ultraviolet ray up to the wavelength of 400m^µ. Thus, the lens shows a uniform spectral transmission covering the range from visible light to ultraviolet ray.

4. Resolution

EL-NIKKOR lenses produce a flat image plane which does not shift focus even when the lens is stopped down or lights of different wavelengths are used. The lens has a higher resolution than the emulsion of negative film even when in fully opened condition. Thus, the EL-NIKKOR lenses come to ensure perfect enlargement results.

In order to achieve utmost enlargement results, it would be preferable to use the lens with the diaphragm set 3 or 4 stops before the full aperture. If the lens is stopped down above this limitation, other than for special purposes, there is a possibility of decreasing the resolution power.

5. Barrel of EL-NIKKOR

The EL-NIKKOR lens elements are housed in a black color finished barrel with an aperture ring provided on the front side of the barrel. Large F-number figures are engraved in white and equidistantly spaced. These figures are marked on both sides of the lens confronting each other and permit reading convenience from either side of the lens when attached to the enlarger. In addition, there is a clickstop at each marking and facilitates lens settings in dark rooms by touch feeling.

Not only do EL-NIKKOR lenses faithfully reproduce negative images on printing papers but they completely fulfill the basically important factor of "Handling Ease".

6. Attaching EL-NIKKOR to Enlarging Equipment

EL-NIKKOR lenses have been basically designed to fit any type of enlarger. However, adoption to certain type of enlargers will require an adaptor or the base plate will have to undergo certain modifications.

Other Applications

EL-NIKKOR lenses can also be used for specific projection and close-up photography as they possess a high resolution throughout a wide range of wavelength. Particularly, they are ideal for taking photographs under near ultraviolet ray which is emitted from cathode ray tube and fluorescent screen. In addition, they are used as an optical system for transmission of television pictures and also as a relay lens in combination with other lens group to meet various requirements.

50mm f/2.8 EL-Nikkor

Focal length Max. aperture Construction Standard magnification Range of magnification ratio Picture angle Correction wavelength range Subject size Overall working distance Vignetting Distortion Aperture scale

Mount

Dimensions: max. diameter max. length Weight

50mm f/2.8 6 elements 4 groups 8x 2x - 20x46° 370m µ-700m µ 24mm×36mm 522.5mm 0% at f/4 -0.1% 2.8, 4, 5.6, 8, 11, 16 Screw d=39mm p=1/26" 47.5mm 39.5mm 100g







63mm f/3.5 EL-Nikkor

Focal length	63mm	
Max. aperture	f/3.5	
Construction	6 elements	
	4 groups	
Standard magnification	8×	
Range of magnification ratio	2×-20×	
Picture angle	46°	
Correction wavelength range	$350m\mu - 700m\mu$	
Subject size	32mm×45mm	
Overall working distance	637.9mm	
Vignetting	0% at f/4	
Distortion	+0.4%	
Aperture scale	3.5, 4, 5.6, 8,	
	11, 16	
Mount	Screw	
	d=39mm p=1/26"	
Dimensions: max. diameter	47.5mm	
max. length	43.5mm	
Weight	130g	







80mm f/5.6 EL-Nikkor

Focal length Max. aperture Construction Standard magnification Range of magnification ratio Picture angle Correction wavelength range Subject size Overall working distance Vignetting Distortion Aperture scale Mount

Dimensions: max. diameter max. length

Weight

80mm f/5.6 6 elements 4 groups 5× $2 \times -15 \times$ 57° 40' $380m\mu - 700m\mu$ 56mm×72mm 576mm 0% at f/8 -0.035% 5.6, 8, 11, 16, 22, 32, 45 Screw d=39mm p=1/26" Screw d=32.5mm p=0.5mm Plate d=33mm 44mm 34.5mm







105mm f/5.6 EL-Nikkor

105mm

6 elements

4 groups

 $2 \times -10 \times$

756mm

0% at f/8

+0.009%

22, 32, 45

Screw

Screw

48mm

150g

39.5mm

380m µ -700m µ

65mm×90mm

5.6, 8, 11, 16

d=39mm p=1/26"

d=32.5mmp=0.5mm

Plate d=33mm

f/5.6

5×

56°

Focal length Max. aperture Construction

Standard magnification Range of magnification ratio Picture angle Correction wavelength range Subject size Overall working distance Vignetting Distortion Aperture scale

Mount

Dimensions: max. diameter max. length Weight







135mm f/5.6 EL-Nikkor

Focal length Max. aperture Construction

Standard magnification Range of magnification ratio Picture angle Correction wavelength range Subject size Overall working distance Vignetting Distortion Aperture scale

Mount

Dimensions: max. diameter max. length Weight 135mm f/5.6 6 elements 4 groups 5× $2 \times -10 \times$ 54° $380m\mu - 700m\mu$ 4"×5" 972mm 0% at f/8 +0.025% 5.6, 8, 11, 16, 22, 32, 45 Screw d=39mm p=1/26" Screw d=45mm p=0.5mm Plate d=45.5mm 57mm 47.2mm 200g





