Nikkor Lenses

SALES MANUAL

Nikon

INTRODUCTION

Among the most noticeable paraphernalia of the professional photographer at work is the battered and worn leather bag slung over his shoulder. Nestling snugly in lined compartments inside the bag is an extensive selection of lenses. Why does the photographer carry so many lenses? To one who makes his living with his wits and his camera, the answer is simple—lenses make the picture, and to make the picture you must have the lenses. But to make the fullest use of all these lenses, the modern photographer also needs a fast handling, responsive and portable camera.

These are precisely the factors that have led to the present-day overwhelming acceptance of the *35mm SLR* camera. *SLR*, because it is the only camera which meets both the requirements of fast handling and responsiveness and enables the photographer to see the image exactly as it will appear in the finished picture—before he takes the picture. (And this is possible with any lens, regardless of whether it is a so-called 'normal' lens, a mind-bending ultra-wideangle or an eye-catching super-telephoto.) And *35mm*, because it is small enough to enable the photographer to carry his selection of lenses and still have the stamina to take photographs, a seemingly simple thing that becomes more and more of a feat as the format gets bigger. And, given good technique and careful selection of film type, the 35mm format is capable of handling virtually all the photographic requirements of any photographer, amateur or professional.

This superiority of the SLR is clearly obvious to us now, but it has not always been so. Interestingly enough, the rise of the 35mm SLR closely matches the development of the Nikon SLR series. For, more than any other single camera, the Nikon F and, later, its successor the F2, spearheaded the acceptance of the 35mm SLR as the professional's tool. And what is one of the biggest reasons for the success of these Nikon cameras? *The extensive range of Nikkor lenses made exclusively for them.* Comprising the biggest range of the highest quality SLR lenses on the market, they encompass more than just what can be considered as 'conventional' lenses. For Nikon pioneered the development of lenses which are now thought of as ordinary but which, to photographers of ten years ago, were revolutionary. These include the Micro-Nikkors, Zoom-Nikkors and, most famous of all, the, Fisheye Nikkors. Not only does Nikon make the biggest selection of different focal length lenses—thus ensuring that whatever the purpose of the photograph there is a lens available to achieve it—but, also, most of these lenses are made with several different apertures. This ensures that the Nikon user, whatever his calling, has the choice of speed, size and cost to suit his purpose and pocketbook—without sacrificing any of the quality he has come to expect of Nikon.


Nikon
NIKKOR
Nikon
ROYAL
MOTOR COACH TOURS
from
LANDS END
to
JOHN o' GROATS
NORTH SEA
ENGLISH CHANNEL

NIKKOR LENS DESIGN

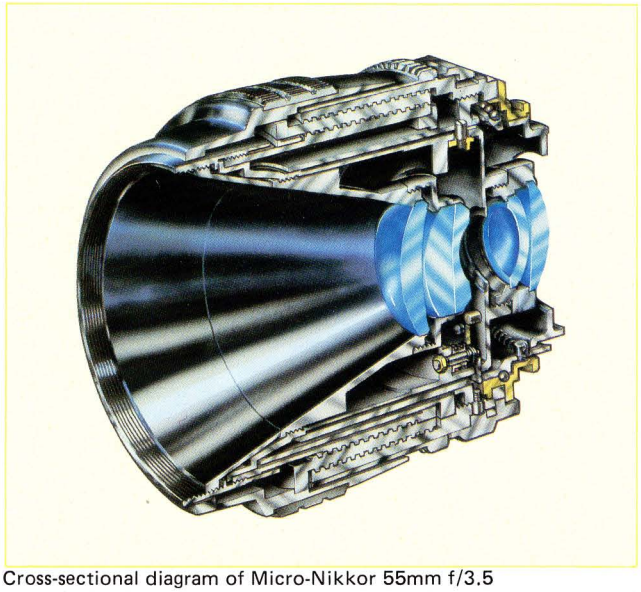
The time when it was possible for an individual working alone to come up with a revolutionary lens design is long past. Lens design has advanced to the stage where even a relatively simple task like refining an existing design tasks a determined effort by a team of dedicated professionals supported by the largest, most modern computers and scientific measuring instruments. The end result: photographic lenses of a quality and scope undreamed of only a few years ago.

The lens designer involves himself with the most basic raw material of photography—light itself. A medium of incredible complexity that demands painstaking attention to detail and a touch of genius to control. While a recognizable image can be formed by even the simplest of optical systems, to produce one satisfactory for use in a high-quality photographic system requires a more exacting control of lens' aberrations (the defects in an image formed by a lens which can never be completely eliminated). It is in the degree of control, or minimization, of these aberrations that the designer is able to achieve that begins to distinguish one optical company from another.

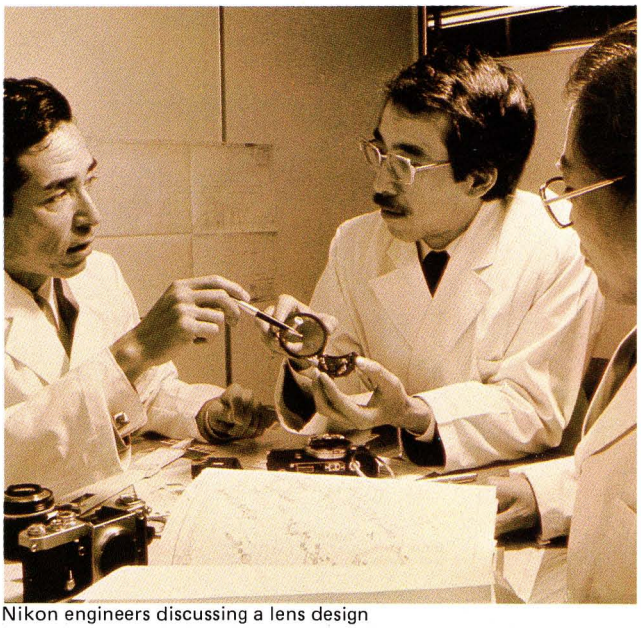
The originality of the designer manifests itself right from the start at Nikon. Whenever we approach a lens design, the first thing we consider is whether or not to rework a previous design or start from scratch to develop an entirely new concept. Both approaches have their place in the Nikon System, and both are weighed on their own merits.

The initial design concept is then fed into the computer, and the ray paths traced out. This is not a particularly difficult task, but the enormous number of computations to be made for an individual lens was one of the limiting factors of the early lens designers. Life was literally not long enough for them to work with mathematical tables in order to complete the calculation. With the high-speed computers at work at the Nikon factory, our designers are able to complete the calculation in a fraction of the time. The resultant ray paths are then plotted out automatically by the computer, along with residual aberrations and performance predictions. All this data gives the lens designer a clear picture of how the lens will perform in practice without actually having to make it. This first model will usually not be quite what is wanted, and some of the basic parameters will be changed, and the calculation will begin again.

The idea is to optimize the lens' performance for any given concept. Factors that are taken into account include such basics as focal length, lens speed, filter size (which will determine the diameter of the front element) and size desired (i.e., compact or not). The optimization process is one which calls for an informed judgement on the part of the designer and is where the personality of a lens line comes into being.



Cross-sectional diagram of Micro-Nikkor 55mm f/3.5



Nikon engineers discussing a lens design

Automatic plotting of ray paths

Computer studies like these are regularly called upon at Nikon to try out highly original ideas and see if it is feasible to make the proposed lens at all; the concept is then refined to produce a practical working model. It is important to note that spin-offs from this process often lead to developments in other fields, for example in the manufacture of new types of optical glass. Nikon is by design an integrated optical company even to the extent of making its own optical glass, a rarity indeed in the photographic world. Thus when the studies indicate that an advance or an original concept is possible only if there is a certain type of glass, this is communicated to the glass division which then attempts to develop the glass required. Sometimes this works the other way. New developments in Nikon's glass technology open up new avenues in lens design.

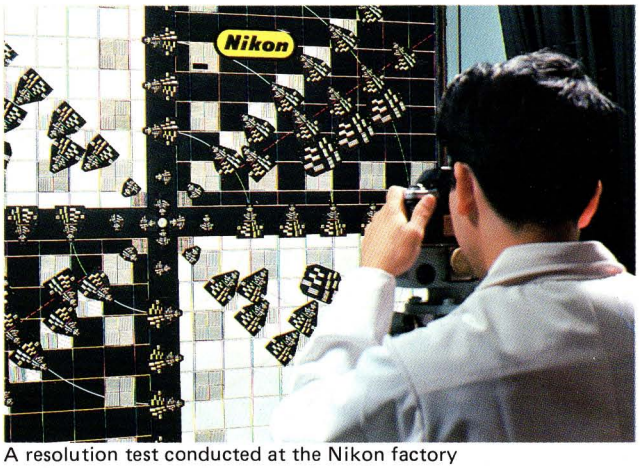
Once the mathematical concept is proven, the proposed lens enters the realms of production design; further modifications will be made to the concept to ensure that the lens can not only be manufactured with the degree of quality as designed, but that it can be manufactured consistently as well. To this end some of the curves may be modified so that they can be ground and polished with greater precision; compensating changes are then made elsewhere. Or perhaps an element will be added or subtracted—again with compensating changes made elsewhere—to further improve consistency in manufacture. Indeed, one of the major differences between a good optical company and one of lesser stature is not the quality of their best lens but the spread in tolerances that occur from lens to lens. Nikon's tolerances are such that variation in individual lenses is minimized, and 'selecting' lenses is an unnecessary practice.

To the customer this design process may be exciting, but what he is more concerned about is just how 'good' his particular lens is in practice. This is even more so since the 'quality' of a lens, unlike its speed, size, weight and price, is difficult to determine—even by people with considerable photographic experience. In fact, the subject of lens quality is so controversial that even the experts themselves disagree.

This state of affairs exists because the basic concept of lens quality, usually referred to as 'definition,' is difficult to explain scientifically, as it includes concepts that are subjective and therefore vary from individual to individual. The aspect of definition that is most well known is that of 'resolution' or 'resolving power,' and refers to the lens' ability to reproduce fine detail. 'Sharpness,' on the other hand, is the measure of the lens' ability to reproduce a well-defined image of the edge of the subject and, as it also takes into account lens contrast, is a more satisfactory basis for scientific determination of the definition of a lens.

The bar-chart used for resolution testing consists of

Some of Nikon's original lens designs



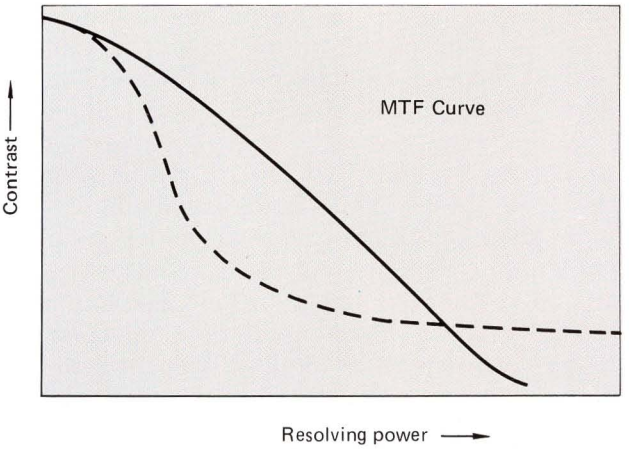
A resolution test conducted at the Nikon factory

a chart covered with groups of finely spaced parallel lines arranged in a definite pattern. The lines on the chart are separated by spaces of the same width and the combination of line and space is referred to as a 'line pair.' The chart is photographed, using the lens under test, so that the image formed of the chart is reduced greatly in size. The negative is then examined under a microscope and the smallest line pair spacing that can be distinguished distinctly is referred to as the resolution of the lens. The advantage of the resolution test is that it is simple and straightforward and, in the hands of an experienced tester, can give a fair indication of the lens' performance. However, factors such as the film used, the developer, length of development, the nature of the chart, the direction of the lines (either radial or tangential), the difficulty in determining the degree of 'distinctness' all have to be taken into account by the tester and thus, ultimately, rendering the test subjective.

Recently, the concept of Modulation Transfer Function determination or MTF was evolved. This gave designers not only a workable method of evaluating the performance of a lens but a totally objective one, too.

To obtain an MTF curve for a lens a test target having a sinusoidial variation in illuminance in one direction and a variation in spatial frequency in the other is used. The image formed by the lens of this test pattern is then scanned by a microdensitometer. This is done for several different frequencies and illuminance values, both radially and tangentially. This way a mathematical model of the lens' performance can be constructed. This mathematical picture not only relates to the lens' performance in practice but can also be understood by the computer. Consequently, MTF testing has become the regular tool of the designer here at Nikon, and so good is our grasp of this technique that our MTF testing machines are used by other optical companies, too.

You may well be thinking that this is all very good for the engineer, but you don't understand a word. Yes, MTF testing is very complicated, and it also has its drawbacks. Which is why Nikon engineers always make full use of a battery of other tests that they have evolved over the years, both visual and photographic, in order to fully evaluate the performance of the lens in question. Some of the other factors that are taken into account include distortion, vignetting, variation of illumination, color balance, ghost and flare. All these factors have to be balanced one against the other by the designer in his endeavors to evolve the final design for the lens that will produce the best possible results in practical picture-taking situations. Because, as far as the photographer is concerned, the final test is always the picture itself; this is why more professional photographers use Nikkor lenses than any other make.



Nikon-produced MTF testing apparatus

Mechanical Design

Of all the aspects of lens and, incidentally, camera construction, the mechanics are the hardest part for the customer to evaluate. This is where the reputation of the manufacturer becomes so important. If the camera has a long proven history of dependability, then it is more than reasonable to assume that the manufacturer is not going to jeopardize that reputation just for the sake of a few yen. In the field of 35mm SLR's, Nikon reigns supreme as the name for reliability and dependability.

Why does Nikon have this outstanding reputation? Unfortunately for us the reasons are all hidden from view deep within the lens itself, and we aren't going to encourage you or your customers to delve inside and have a look. A task that you would find formidable indeed, because Nikkor lenses are not designed to come to pieces easily—except in the hands of a properly qualified technician. The ruggedness of the Nikkor lens starts with design. The forces acting on each mechanical component are carefully analyzed; both from the point of view of theory, and in the light of practical experience. (In fact, our designers have actually been seen carrying Nikon cameras and, while their artistic sense is something else, their understanding of the practical side of photography is pretty good.)

Generally, the actual cost of the materials in a lens is not such a significant factor; the cost comes from the machining and assembly. Consequently, we at Nikon do not consider savings made from the use of cheaper materials to be worth the cost to our reputation. So our designers specify the best grades and strongest alloys for the mechanical components of Nikkor lenses. An example, the lens mount—one of the most critical components for long-term reliability. The flange on the camera body is made from specially treated stainless steel, an expensive and difficult material to machine because it is hard. Good engineering practice requires that a dissimilar metal be used for the matching bayonet on the lens. Here is a good opportunity to cut costs and use aluminum. We use brass. We harden and precision-machine it to exacting tolerences, then plate it with hard chromium to both inhibit corrosion and to further bring its hardness up to a value just below that of the stainless steel of the mount on the camera body. It's an expensive way to do things, but it pays off in reliability and durability.

As for other constructional details, because they are hidden inside the lens itself, you will just have to take them on trust: they include threaded retaining rings for the individual elements instead of cheaper and less precise spun-in elements or split-ring retainers. Additionally, each retaining ring is secured by tiny screws which go through both the ring and the lens body, thus preventing the rings from unscrewing. How to prevent the screws from unscrewing? Well, good design ensures that there are no forces acting on the screws. So they shouldn't unscrew, but we use a sealer on them—just in case.

Individual parts of a Nikkor normal lens

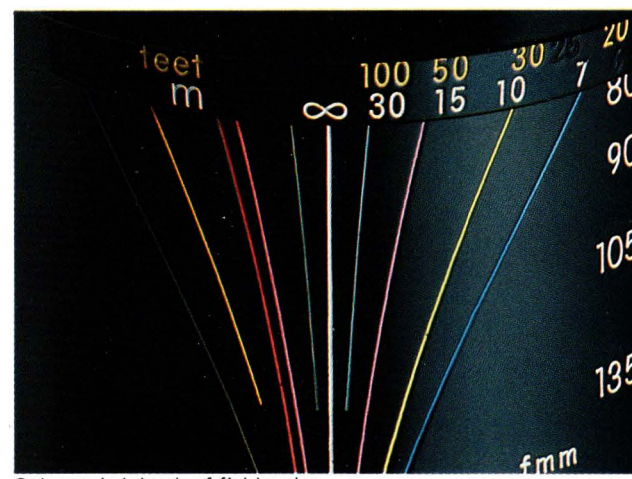
Sturdy Nikon bayonet mount

Individual lens elements are held in place with threaded retaining rings.

Impressive as all this is, we all know the dangers inherent in letting engineers loose on the total design. They often produce truly marvelous equipment which is completely unusable. This is a situation which is not allowed to happen at Nikon. Everything has to be practical—and it is. The most obvious example is the standardization of filter sizes, most Nikkor lenses accepting 52mm screw-in filters. Other lenses fall into sub-groups, each with a common filter size. A situation we will not tolerate is having two or three different filter sizes, each varying by only two or three millimeters, for our range of normal lenses! Another practical aspect of Nikkor lens design is the standardization of focusing ring rotation. Nikkor lenses are amongst the few that all turn the same way for focusing—thus avoiding missed shots due to fumbled focusing. The same goes for the aperture rings, too; these all turn the same way, with positive click-stop settings. Intermediate values can be set easily, too. This standardization even continues down to the depth-of-field indicators. They are fully color-coded to match the coding on the aperture ring. This simplifies operation by eliminating the confusing mess of figures and lines that would otherwise have to be used.

Even the physical size of the controls is carefully designed to be just right for ease of handling. One final point, and it's virtually unique to Nikkor lenses, is the lens grip ring—the chrome ring around the lens just in front of the aperture ring. This provides positive grip when changing lenses. How many other lenses have this feature? Not many. And with those that don't, just how much damage do you do to the lens when you jam the focusing helicoid against its end stop when changing lenses?

Most Nikkor lenses take standard 52mm filters.



Color-coded depth-of-field scales

Chrome ring for positive grip when changing lenses

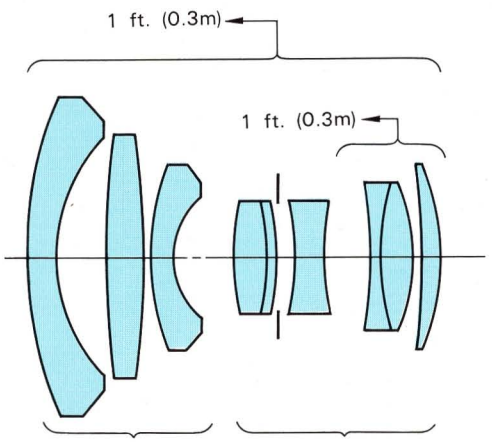
Close-Range Correction System

As we briefly mentioned, in the section on internal focusing, there is a tendency for the image quality of a lens to fall-off as the lens is focused closer. This is a result of it only being possible to design a lens to work at one specific distance, usually infinity, with conventional design techniques. Even so, image quality will be maintained throughout the lens' focusing range down to about a meter or so. Focusing closer usually results in a slight fall-off. This is compensated somewhat by the image size getting larger as you approach the subject, so in practice the lens' performance does not seem to deteriorate very much. With wideangle lnses, however, the situation is a little different.

When conventional retrofocus design techniques are applied to wideangle lenses of either large apertures or very large picture angles, a marked image fall-off results as the lenses are focused closer. This was simply solved in the past, and still is in some systems, by limiting the focusing travel of the lenses. However, the call from many sections of the community, both artists and scientists, was for fast lenses or extremely wideangle lenses that could focus close-up without losing image quality. Nikon solved this problem in a highly original way—the elements within the lenses were made to move, altering their relative positions as the lenses were focused closer.

Some Nikkor lenses which employ the Close-Range Correction System

High resolution is possible even at close distances.



Front Divergent Lens System Rear Convergent Lens System

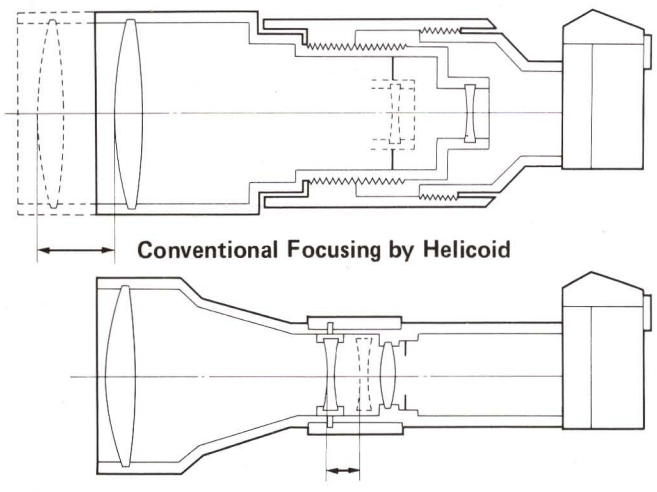
Schematic diagram of Nikon's invention applied to the 24mm f/2.8 Nikkor Auto.

Internal Focusing System

Although a good designer can significantly reduce the physical length of a long focus lens by using a telephoto optical configuration, the resulting lens, even though relatively short, is still a big lens. And, with conventional optical construction, it is necessary to move the entire lens group to focus. Again, as a result of its size, to give long service the focusing mechanism—the helicoid—has to be robust. As you can imagine, to make a robust, serviceable helicoid results in a large, heavy assembly. Some manufacturers resort to lightweight construction but these products do not usually stand up to the demands of the professional user.

Our original step in the development of the super-telephoto was the introduction of interchangeable lens heads for the different focal lengths, and a common focusing unit. This made life a little easier for the photographer who carries a selection of super-telephoto lenses, but was not quite the solution we wanted. So our engineers went back to the drawing board and studied the subject anew. It soon became apparent that to reduce the weight of the helicoid significantly would mean the adoption of some radically new method of focusing. Our engineers thus applied themselves to designing lenses in which the lens barrel is fixed and focusing is achieved by moving the lens elements *internally*. The result: the new internal-focusing Nikkors.

Not only have the weight and bulk of the helicoid been virtually eliminated—a great plus for the user, particularly at the end of a day's shooting—but the operational characteristics of the lenses themselves have been improved, too. Focusing, because of the reduction in weight and bulk, is now fast and light, making it easier to focus quickly or to follow-focus when shooting a rapidly moving subject. The optical elements used for focusing also make it possible to add extra correction so that image fall-off, as the lenses are close-focused, has been eliminated; the result is lenses which both focus closer and deliver high-quality images throughout their focusing range.



Conventional Focusing by Helicoid

Internal Focusing System

It's easy to focus and hand-hold a Nikkor "Internal Focusing" telephoto lens.

Three of Nikon's "Internal Focusing" lenses

Nikon Zoom Lens Technology

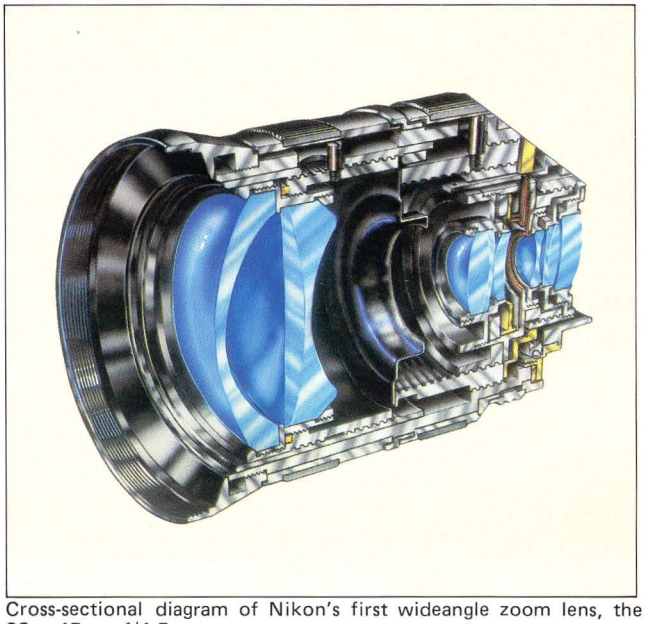
Once an item strictly avoided by the professional in his constant search for outstanding picture quality, the zoom lens for the 35mm still camera has since undergone nothing less than a total revolution. The latest advances in optical glass technology, computer design techniques and metallurgy have been applied to the design of the zoom lens with the result that it is now the preferred lens for many a discriminating photographer, particularly those who have to travel on assignments.

Nikon makes an extensive range of zoom lenses covering, with a variety of models, all focal lengths from 28mm wideangle up to 1200mm supertelephoto—a range that is not only remarkable in itself but also one that far exceeds the range offered by any other camera maker.

Although widely acclaimed by professional photographers ever since their introduction to the Nikon lens line, zoom lenses really captured the imagination of photographers throughout the world with the introduction of the Zoom-Nikkor 80—200mm f/4.5. Now available for the first time was a compact, lightweight zoom lens that rivalled the performance of fixed focal length lenses. But, apart from the Zoom-Nikkor 43—86mm f/3.5, no one had succesfully tackled the wideangle zoom; even the 43—86mm itself, an outstandingly useful lens, could not really, with its 43mm minimum focal length, lay claim to the apellation 'wideangle.' All this changed with the introduction of the Zoom-Nikkor 28—45mm f/4.5. Now, for the first time, there was available not only the world's first wideangle zoom, but a wideangle zoom that could successfully challenge fixed focal length lenses in every respect.

This breakthrough in zoom lens technique was a direct result of the Nikon engineer's capability to adopt radically new design techniques—in this case, a new zooming system which enabled them to simultaneously eliminate the previous stumbling blocks of extreme distortion, poor minimum focusing distance and excessive front element diameter. Following on the success of the 28—45mm f/4.5 Zoom-Nikkor came the 35—70mm f/3.5 Zoom-Nikkor, thus putting Nikon's engineers well on the way to achieving the most desirable optic of the future: the compact, lightweight all-purpose zoom lens.

The Zoom-Nikkor 50 ~ 300mm has an extremely wide zoom range.



Cross-sectional diagram of Nikon's first wideangle zoom lens, the 28 ~ 45mm f/4.5

Some Zoom-Nikkors

Aspherical Surface Lenses

⓬ Harbor scene taken with Noct-Nikkor 58mm f/1.2

Nikon is no stranger to aspherical lenses which, unlike 'conventional' ones, employ non-spherical surfaces in their design. For, in addition to those we make for photographic purposes, we make many more very advanced and specialized types for science and industry. In fact, our largest aspherical lens is the primary mirror for a giant reflecting telescope and measures a full meter (3 ft. 3 in.) in diameter. However, for the vast majority of even the most demanding applications, conventional lenses are much more than adequate. Consequently, we restrict our use of aspherical surfaces to lenses where they are essential.

Two such applications in the Nikon System are the OP Fisheye-Nikkor 10mm f/5.6 and the Noct-Nikkor 58mm f/1.2. In the OP Fisheye-Nikkor the front element is aspherical to ensure that its mathematically correct illumination pattern, indispensable for scientific applications, is indeed obtained in practice. The Noct-Nikkor also employs an aspherical front element, but this time for the purpose of reducing both coma and flare as this lens is primarily intended to be used for high-quality photography under conditions of dim illumination.

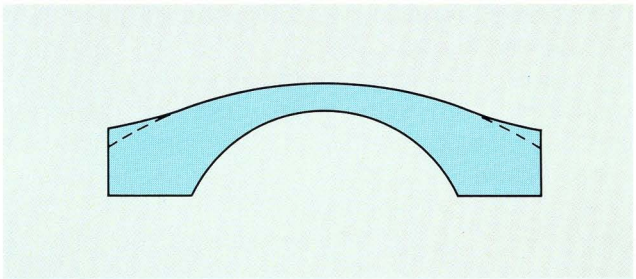
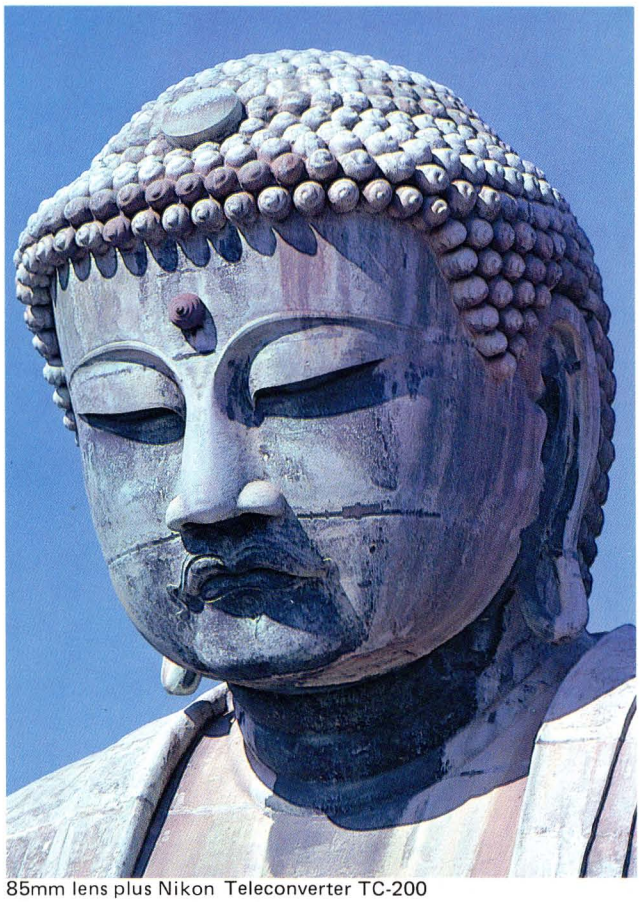


Diagram of aspherical lens element

Two Nikkor lenses employing aspherical front lens elements

Teleconverters

Great Buddha taken with Nikkor 85mm telephoto lens



85mm lens plus Nikon Teleconverter TC-200

Used in conjunction with a standard or telephoto lens, teleconverters have long been known as a simple way of providing the budget-minded photographer with a way of doubling the focal length without having to buy an additional lens. Now Nikon has succeeded in overcoming the major obstacle to their widespread use by discerning photographers: lack of image quality.

Our engineers discovered that, as long as the converter is used with a high-quality lens, and the converter itself is designed and manufactured to the same high standard, there would be virtually no loss of image quality in the final picture.

This concept was first implemented by Nikon at the Montreal Olympics. Two teleconverters, the TC-1 and the TC-2 were made available to professional photographers who put them through a rigorous workout. The acclaim these converters won was so strong that Nikon put them straight into general production.

Now known as the TC-200, for use with lenses of up to 200mm, and the TC-300, for lenses of 300mm and over, these converters give results virtually indistinguishable from those of the prime lens alone. In practice, their only drawback is a loss of two stops in maximum aperture. But this is more than made up for by the fact that, as so many professionals have found out, these teleconverters are, indeed, an economical and space-saving item to carry in the gadget bag.

Then in the fall of 1978, Nikon introduced its third teleconverter, the TC-14. Unlike the TC-200 or 300, the TC-14 provides a 1.4X increase in the focal length with only a ***one*** stop loss in effective aperture. Thus, the TC-14 is ideal for adding "extra reach" to telephoto lenses from 300—1200mm (plus the 180mm f/2.8) without drastically reducing their speed.

Nikon's three teleconverters

Extra-Low Dispersion (ED) Glass

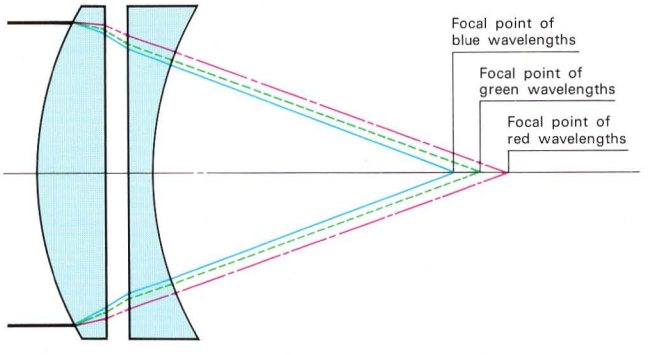
Photographers working with long (more than 300 mm) telephoto lenses on very critical assignments sometimes complain that the picture is not very 'crisp.' This is usually only noticeable when the picture is compared with one taken with a shorter focal length lens. The long telephoto seems to lack the 'bite' of the shorter lens. This is caused by chromatic aberration, or, more exactly, by secondary spectra. Simply stated, ordinary or 'white' light consists of a mixture of colors—like the colors of the rainbow. When this 'white' light passes through a lens, in addition to forming an image, the lens also splits the light into its constituent colors. This is called dispersion. One of the functions of the elements in a multi-element lens is to compensate for the dispersion of one element by an equal and opposite dispersion of another. Usually, this is done for two colors (blue and red). Any more is, with conventional glass, very difficult and, with most shorter focal length lenses, unnecessary. The slight residual color is known as secondary spectra.

However, when the focal length of the lens exceeds 300mm, this secondary spectra, since it is directly proportional to focal length, becomes more significant. The conflicting demands for both large apertures and high picture quality in long telephoto lenses had not been satisfactorily resolved until recently. Some manufacturers, using artificially grown crystals of calcium fluorite, produced lenses which appeared to have solved the problem. Unfortunately, the use of fluorite as an optical material gives rise to more problems than it solves. Apart from its temperature sensitivity, which results in its optical properties changing with changes in temperature, it also has an affinity for water and is, consequently, affected by changes in humidity. Another adverse characteristic of fluorite that severely limits the designer's options is its extreme softness, which prevents it from being used for anything other than internal lens elements. All in all, it can safely be said that fluorite has a few advantages and, considering that lenses are subjected to anything but a controlled laboratory environment, quite a few disadvantages.

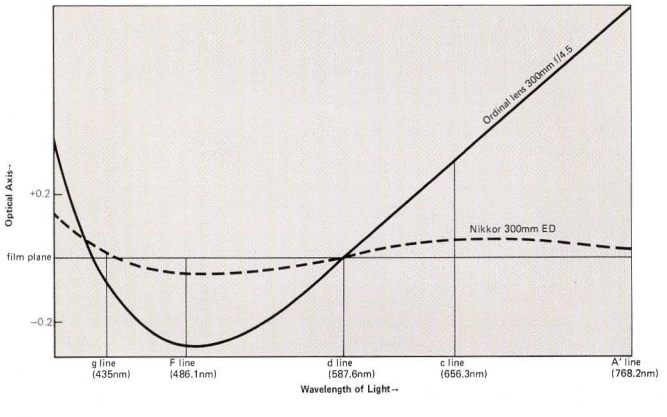
The solution to the dilemma came recently with the development, by Nikon, of ED glass. ED, or to give it its full name, Extra-Low Dispersion glass, is one of those developments that is only open to a lens manufacturer who is also an optical glass manufacturer. And, in the development of this glass, this principle has certainly been vindicated. As there is little dispersion with the glass, good color correction is easily obtained, resulting in that prized achievement: the large-aperture super-telephoto lens that can be used at full aperture—even for the most critical assignments.

With ED-series lenses, stopping down, except for increasing depth of field, is not necessary. Image quality, unlike conventional lenses of their specification, does not improve on stopping down. Being

You can get sharp results with Nikkor ED super-telephoto lenses.

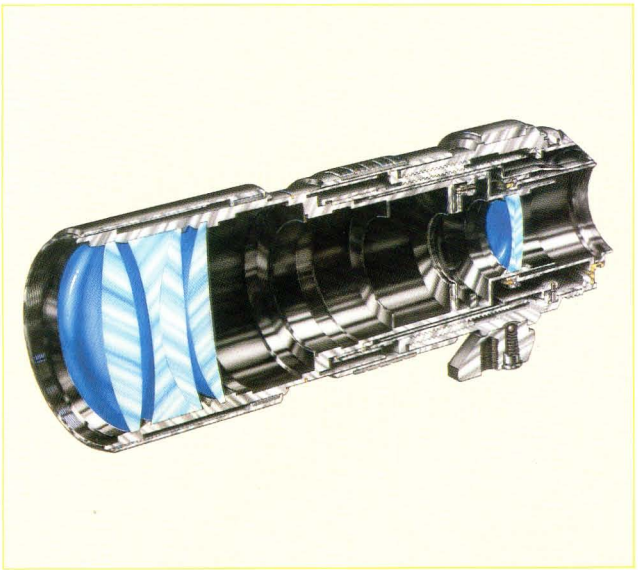


Correction of chromatic aberration by use of plano-concave element

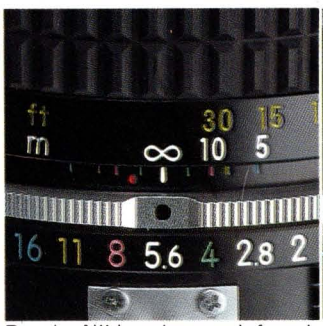


Chromatic aberration on optical axis

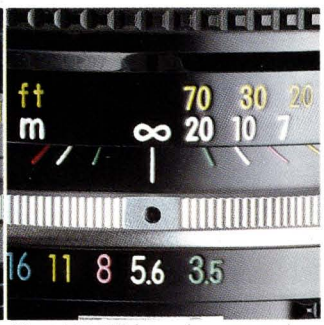
a glass, and consequently virtually inert, there is little restriction on the temperature and humidity conditions in which they can be used. What is more, ED glass is hard enough to be used as a front element, thereby giving the designer maximum freedom in the design of the lens. The only apparent drawback to ED glass is its cost. It's difficult to make, and it took a lot of development. Unfortunately, this is reflected in the price of the lenses in which it is used. Is it worth the price? To the average Sunday photographer, probably not. But to the man who needs a lens like a 400mm f/3.5 and needs to use it at full aperture while still being able to satisfy the critical demands of picture editors and photoengravers, the Nikon ED series represents an advance of at least an order of magnitude. To print side-by-side comparison photographs by ED and non-ED lenses in this manual would not, due to the limitations of our printing process, show any great difference. But, actually, without ED glass there would be no 400mm f/3.5 Nikkor.



Cross-sectional diagram of Nikkor 300mm f/4.5 ED



Regular Nikkors have an infrared focusing index.



Most ED Nikkors do not need such an index.

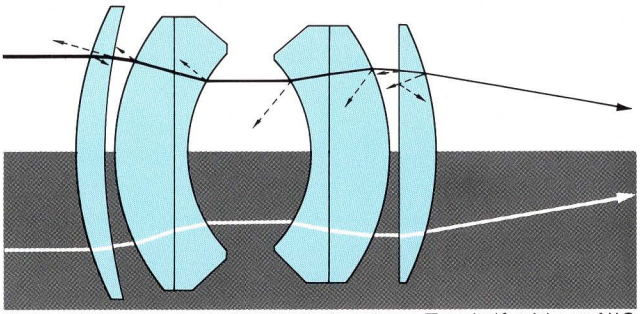
All ED Nikkors are indicated by a gold band around the lens barrel.

Nikon Integrated Coating

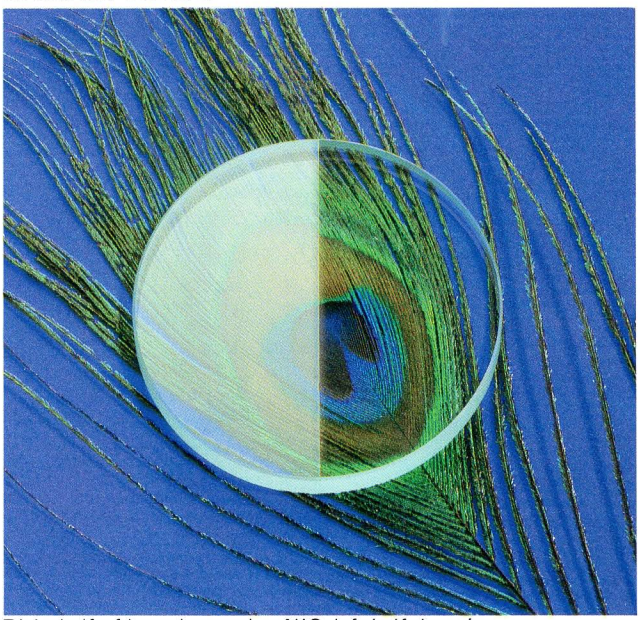
By coating we mean the present unanimous practice of depositing a layer or layers of an antireflective material on the surface of each lens element. This reduces the amount of light lost by reflection off, and scattered about between, the lens elements, resulting in lenses with both higher light transmission and higher image contrast.

With the increasing complexity of advanced optical systems such as high-ratio zoom lenses, or even a relatively simple system such as a six-element standard lens, but with all the elements separated, lens coating has become more significant. Indeed, it is probably true that if it were not for our present-day lens coating technology, many lens designs would be impossible to achieve in practice. However, there is much more to lens coating than merely painting each element with as many layers as you can, or as few as you can get away with, and then claiming 'multi.'

Every layer of coating applied to a lens affects the final image in some way. This is particularly noticeable in the field of color balance. The ideal situation is that each lens in the system should have the same color balance, so that when photographing the same scene with several different lenses, no color shift is noticeable in the final photographs. This can only be achieved by integrating the coating into the design of the lens. Instead of blindly coating every element with the same number of layers irrespective of the other elements, each element should have exactly the number and types of layers required for optimum performance and color matching. This is why we call the coating on each and every Nikkor lens 'Nikon *Integrated* Coating'; it gives the lenses their own characteristic appearance when you look through the front. The resultant image is identically color matched to each and every other Nikkor lens in the Nikon System, producing uniformity where it counts—in the finished picture.



Paths of light rays passing through a lens. Top half without NIC; bottom half with NIC.



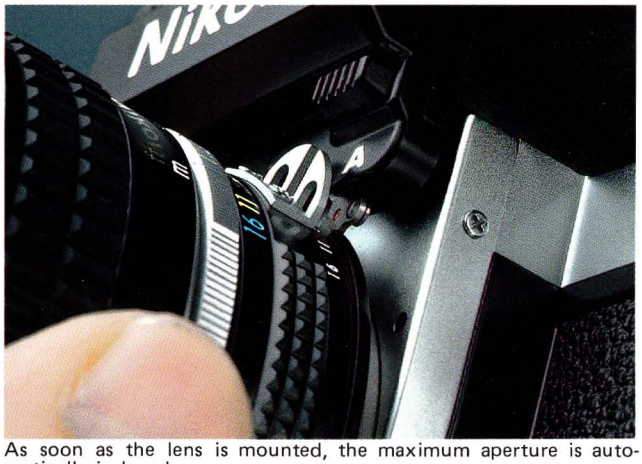
Right half of lens element has NIC; left half doesn't.

Automatic Maximum Aperture Indexing

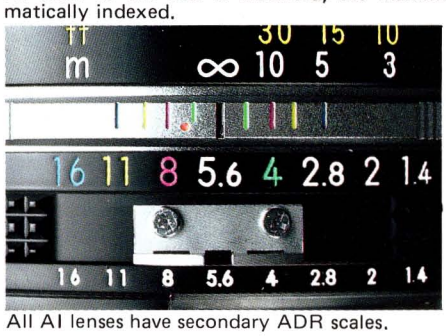
How remarkable the advances that have occurred in photographic technology in the years that have elapsed since the early fifties when the first Nikon SLR, the Nikon F, was conceived, designed and developed! What is even more remarkable, however, is the way that the Nikon System has stayed on top for all that time and now, with a deceptively minor change, reasserts its commanding position for the next generation. The change is, of course, AI or more precisely 'Automatic Maximum Aperture Indexing,' with its attendant feature of ADR or 'Aperture Direct Readout.' This change is even more remarkable when you consider that virtually all old Nikkor lenses can be modified to work with this system for a very modest fee; not only that, but both these modified old lenses and the new AI-type lenses will work perfectly with all previous Nikon and Nikkormat cameras. For Nikon, with its policy of non-obsolescence, retaining the integrity of the mount was of prime importance. The very neat way this has been accomplished is now history, but it proves that the driving force behind the Nikon System is still as active today as it was when the system was launched, back in 1959.

Why the change? The reason is the maturing of TTL metering as *the* exposure measurement method. Full-aperture TTL exposure metering systems require calibrating or 'indexing' as to the maximum aperture of each lens as it is mounted on the camera. Previously, this had required an extra step in the lens-mounting procedure—the rotation of the aperture ring to its maximum setting. Although most old Nikon 'hands' soon developed this into a reflex action, it was considered a little daunting to the new entrant to the system. As the development of the SLR with its attendant TTL metering method is much easier to predict now than it was in those early days, we at Nikon are confident that the minor change we have made to the system, in the form of AI-type lenses, will be all that is required for the future. The lenses will, of course, continue to improve as they have done in the past, both in performance and compactness, but we are confident that the AI System will maintain our lead in the future.

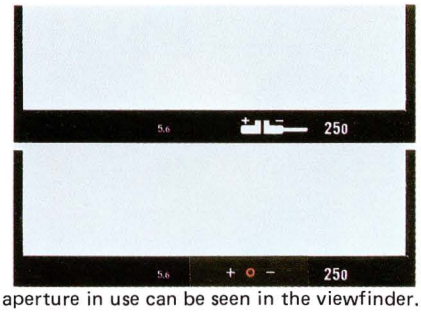
Making full use of the opportunity provided by the change to AI, we added the ADR feature. This enables us to provide the photographer with an indication in the viewfinder of the lens' aperture setting. Previously, this had been accomplished by a complicated assembly of gears and moving scales. However, with the increasing demands for compactness and simplicity and, conflictingly, sophistication, we developed the ADR feature. A totally optical system, fully sealed, with no moving parts other than the aperture ring the ADR system is the essence of simplicity and is a significant advance in itself.



As soon as the lens is mounted, the maximum aperture is automatically indexed.



All AI lenses have secondary ADR scales.



The aperture in use can be seen in the viewfinder.

The Nikon bayonet mount has remained unchanged since 1959.

Nikon makes all of its own optical glass.

NIKKOR LENS MANUFACTURE

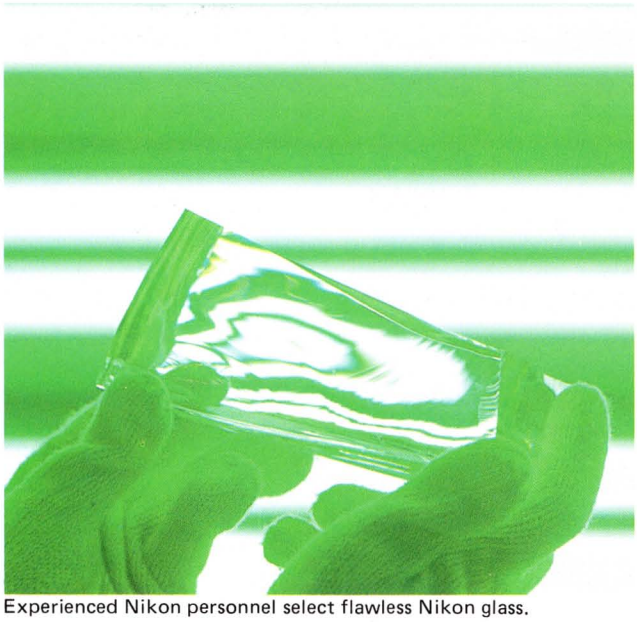
Designing the world's best lenses is one thing, making them is another. To be successful you have to have everything under your control from the outset, and that includes the most basic component there is—raw glass. Amazingly, however, the number of camera companies that make their own glass can be counted on one hand. At the Nikon glass factory, we make all of the many different types of glass used in our lenses. Some of them are literally poured out in large quantities. Others are an exacting manufacturing job in themsalves and have to be made in platinum crucibles in small lots.

Just because we made it, the glass is not automatically guaranteed a place in one of our lenses; it has to prove itself first. Each batch of glass is carefully checked to see that its optical properties (refractive index, dispersion, etc.) are up to scratch. Then, each piece of glass (which usually breaks into lumps on cooling) is examined minutely for bubbles, flaws (splits) and stria (filaments of impurities). If it is free of these defects, the glass passes to the first steps of lens manufacture. The glass lumps are sawed up into element-sized pieces using a diamond-tipped saw. The pieces are placed into iron molds. The molds, with the glass inside them, are heated to "red heat" and the glass pressed, so that it takes the shape of the mold.

The glass pressings are then removed from the mold, at which stage they become what is known as lens 'blanks,' and 'annealed' or cooled slowly. When they are completely annealed, they are tested for strain with the use of polarized light. Only after the glass passes all our tests to reach this stage does it stand any chance of becoming part of a Nikkor lens. All this fun is missed by camera companies that buy their glass from outside makers. But, here at Nikon, we wouldn't miss it for the world. For Nikon, making the glass is just the beginning of our investment in quality control. And, in the final analysis, our quality control is what really makes the difference between an ordinary lens and a Nikkor.

Now the work of turning the blank into a lens element really begins in earnest. The blank is first milled, using a diamond cutter (curve generator), to shape the surfaces to approximately the desired curvature. This is done to both sides of the blank, which is left a little oversize to allow for centering later. The blank then passes to the smoothing shop. Here, successively finer grades of carborundum (aluminum oxide) are used in combination with an iron tool to smooth out the minute ridges left from the milling stage. When finished, the blank's surface is very finely ground at the required curvature. Now, it is thoroughly cleaned to remove all traces of abrasive and is passed on to the polishing shop.

In the polishing shop the final curvature and characteristic high 'polish' of a fine lens is put on. The polishing process is similar to smoothing except that a polishing agent, usually cerium oxide, is substituted for abrasive. When the element has received its final polish, its surface is tested to ensure that it has both the correct radius of curvature and 'figure.' Figure, in this case, means that the element is perfectly spherical and free from distortion. The accuracy requirements of the finished element are so high that mechanical testing methods are unusable. Instead, optical methods, using the wavelength of light itself as the yardstick, have to be employed.



Experienced Nikon personnel select flawless Nikon glass.

Polishing of lens elements

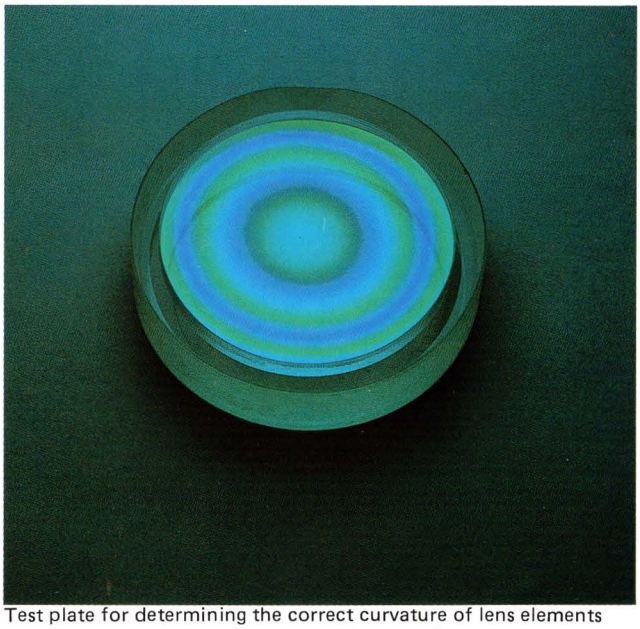
This optical method uses a test-plate shaped to the opposite curve of that of the lens and is quite fast and very accurate. After testing, the element then passes on to the centering department where the physical center of the element is exactly aligned with its optical center, and the excess glass ground away.

The next step in the process is really a process in itself—applying the Nikon Integrated Coating. Here of coatings required by the element's function in the finished lens. Each element is individually loaded into a jig which is then placed into a vacuum chamber. The chamber is pumped down to a very close approximation of an absolute vacuum, and an electric current is applied to the coating material, which vaporizes. The various different materials for the different layers of coating are contained in crucibles inside the chamber and are vaporized in turn. The vapor is deposited on the elements suspended above the crucibles. The process is continuously monitored and, when the correct value is reached, the current is cut off. This is repeated several times until the element is fully coated. After coating, the element is removed from the chamber, and the edge is painted black to eliminate reflections off the side. Having got this far, the story seems complete, but not so. What about the metalwork? And assembly, and testing? Actually, the story is far from over.

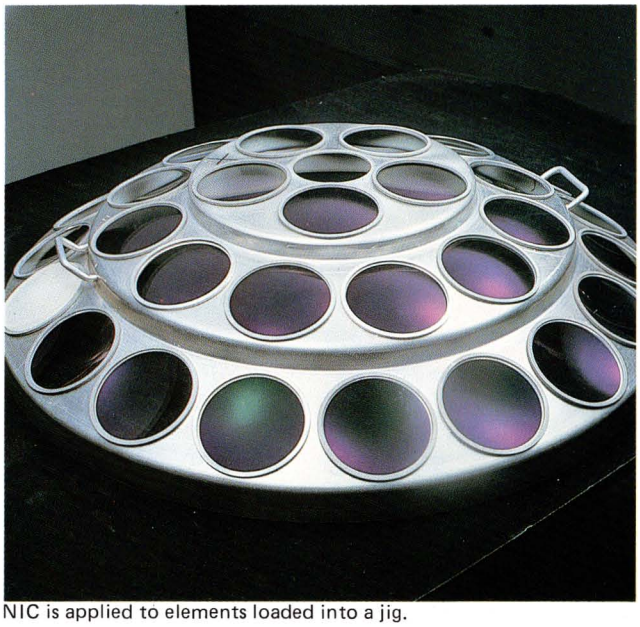
Mechanically, the components of the lens involve simple metalworking techniques including turning, milling, stamping, heat treatment, plating, cutting, threading and painting. Unfortunately, all these components then have to fit together inside a very small container, and they have to fit together with a degree of accuracy that is seldom even contemplated outside of a research lab. But, in our case, we are talking about a production line process!

One of the prime requirements for the lens barrel components is concentricity, for they align the lens elements, and any eccentricity on their part will result in a decentered lens—thus destroying all the efforts which have so far been put into the design and production of the lens. However, there are many other aspects which are just as important in ensuring that you get the best out of every lens. The matte-black paint used inside the lens must not only be good at preventing reflections, it must also be carefully applied so that it does not fall off in use and fill the inside of the lens with tiny little flecks of paint. These are just a few examples of the care and attention to detail that go into the making of every Nikkor lens.

Next comes assembly, where the two separate worlds of optics and mechanics are blended together to produce a fine photographic product—the Nikkor lens. Highly trained technicians assemble the components. Each lens element is carefully fitted in place, seated against its locating stop; its retaining



Test plate for determining the correct curvature of lens elements



NIC is applied to elements loaded into a jig.

Hard painting of color-coded aperture numbers

ring is then screwed down with just the right degree of torque so that the element is held firmly but not too tightly—otherwise strain and distortion will occur. Thermal expansion of both the glass and metal components of the lens has to be taken into consideration when deciding on how much torque to apply. The placement of the element is then checked and the lens passes on to the next assembly stage where another element is added, and so on down the assembly line.

Now we are at the end of the line, row upon row of lenses standing in serried ranks in deep gloss black and shining chrome. Into the box and off to the customer? Not a chance. Now comes the most exacting part of all—testing. As we mentioned earlier, there are many aspects to lens testing. Some of them can be done reliably, accurately, automatically and cheaply by machines. But, the final function of a lens is to make a picture which will be viewed by the human eye. And what makes a good picture cannot yet be judged scientifically. The only way to finally judge whether or not a lens will produce a good photograph is to look at the image. Taking actual test photographs is a guide, but this technique introduces variables such as exposure and development—not to mention the optics used to examine the negative. In order to eliminate these variables and to give a direct, magnified final image of the lens we, at Nikon, use a very simple method—given a highly trained and experienced, and unfortunately, expensive technician, gives a very good indication of the quality of the lens. In this system we use a precision graticle, or target, which we place at the focus of the lens, where the film would lie in the camera. The lens is then used as a projection lens and an image is projected onto a large matte glass screen several meters away. Here, the technician uses a high quality magnifying glass to examine the resultant image. Any defects are magnified enormously and, consequently, it is easy for us to ensure that no imperfect lenses are ever released from the factory.

From now on it's all a bit of an anti climax: packaging, shipping, paperwork, letters of credit, invoices, delivery slips, etc. But even here, we have to ensure that the lens gets to the farthest parts of the globe undamaged. So Nikon's quality control is actively checking and rechecking, ensuring that our products arrive on your shelves in mint condition—no matter where in the world you are situated.

The final testimony to Nikon quality is our worldwide guarantee, our backing of our name with service throughout the world. And, as even the finest equipment will be damaged if treated harshly, or if dropped, our worldwide network of service facilities will ensure that it is back in action in the shortest possible time.

Placing a lens element into its retaining ring

Lenses boxed and ready for shipment.

Nikon's after-sales service

The Nikon user has the widest selection of lenses available in 35mm photography.

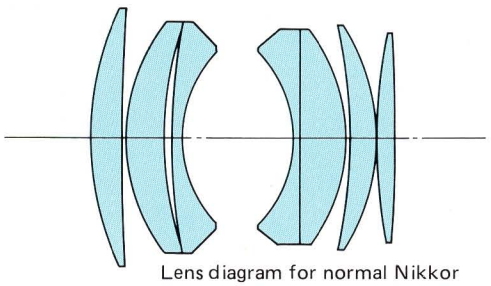
CUSTOMER GUIDANCE ON LENS SELECTION

With its more than 55 lens models there is no doubt that the Nikon System offers the creative photographer the most comprehensive and extensive lens line-up available today. But, whereas many of us are quite positive about our own personal lens choice, there are many people who want to avail themselves of the advantages of the Nikon System but are unsure as to exactly what they want. The purpose of this section is to give you some ideas on the uses that the various Nikkor lenses are put to, to guide you in your answers to your customers' requests. In addition to this general introduction, a more specific description of each lens' actual characteristics is to be found in the data sheets that follow.

The two significant factors in lens selection are focal length and maximum aperture. Of these, focal length is of prime importance. The interchangeable lens concept has been with us for so long now that very few people are not attuned to the concept of focal length affecting picture angle. With 35mm photography, with its fixed format size of 24 x 36mm, any change in lens focal length must result in a change in picture angle. (This concept, of course, holds true for any fixed format camera; cameras taking a variety of formats are a little different.) The usual datum points are the 50 to 55mm lenses which are referred to as 'normal' lenses and are the ones usually supplied with the camera. Lenses of longer focal length are referred to as 'telephoto,' although this term should really be reserved for long-focus lenses using telephoto optical construction, giving a physical lens length shorter than its actual focal length. Shorter focal length lenses are called 'wideangle'—because they encompass a field of view wider than that of the normal lens. Most wideangle lenses (those of 35mm focal length or shorter) employ retrofocus optical construction in order to retain the full use of the camera's reflex viewing facility.

As you can see, we have divided the system into three nominal groups and, fortunately for us, these three groups do in practice exhibit quite distinct characteristics. So our apparently rather arbitrary grouping does, in fact, point the way to actual functional differences.

We will start by considering the **normal** lens group for, as we have mentioned earlier, these are the lenses generally supplied with the camera or bought when the customer is contemplating the purchase of only one lens. Contrary to popular belief, the 50mm lens' rise to prominence is more the result of historical accident rather than any carefully thought-out concept on the part of the various camera companies in the early days of 35mm photography. However, despite its humble beginnings, the 50mm lens has proved itself to be very satisfactory for general picture-taking situations, representing a good compromise between picture angle, image size, depth of field and perspective rendition. The new factor just introduced, perspective rendition, should really be restated as 'apparent perspective' and refers to the relationship between the main subject and the background when a lens is used at normal shooting distances.

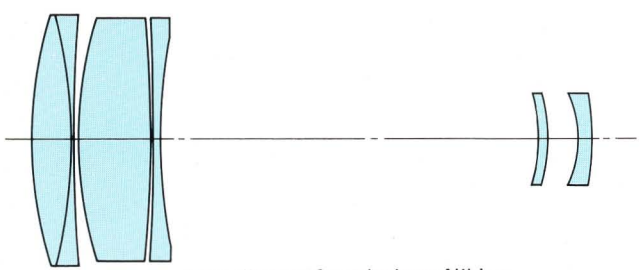


Lens diagram for normal Nikkor

It is often stated that the 50mm lens reproduces the scene as the eye sees it. This is not so; rather we have become accustomed to viewing photographs taken with this lens and now accept them as the norm. In actuality, though, the 50mm does give us a very good compromise between apparent perspective and picture angle. And, although many people find it fashionable to decry the 50mm as 'uncreative,' this is a very short sighted attitude in view of the proven history of this lens. In fact, attempting to eliminate the 50mm lens from the selection invariably results in the substitution of two lenses, usually the 35 and 85mm lenses. For, although the 50mm has some shortcomings—it literally is too short for a really effective portrait—the narrower picture angle compared to the 35mm lens—its nearest competitor in the single lens stakes, eliminates the "wasteland" effect so often seen in the foreground on wideangle-type photographs. The only single lenses that can in fact be considered as replacements for the 50mm lens as general-purpose lenses are either the world-famous 43–86mm f/3.5 Zoom-Nikkor or, the latest addition to the Nikon zoom family, the 35–70mm f/3.5 Zoom-Nikkor.

Landscape taken with Nikkor 50mm f/1.4

Following the normal lens, the second most popular choice is a **telephoto.** Why? As the focal length of the lens gets longer, the picture angle gets smaller, and the center of interest occupies a greater proportion of the format. This singling out or concentrating on the subject is also enhanced by a rapid decrease of depth of field, which serves to further isolate the subject. The ultimate effect is a powerful picture with simple, strong content. Even a moderate increase in focal length over the 50mm normal lens produces a strong composition. The 105mm lens, in particular, has a very good reputation, especially in professional circles, as ***the*** lens for heads. Both the 105 and the 85mm also find themselves being used extensively in shooting situations where a natural perspective rendition is required. These two reproduce the foreground/background relationship exactly as it appears to our eye when we concentrate on a particular subject. The average photographer, because of his more modest initial ambitions, is often advised to limit his telephoto lens selection to one lens only and the lens he is usually recommended is the 135mm. It is a fine lens, and is an ideal complement to the photographer who has, or intends to get, an 85mm and a 200-300mm as well. But as a single telephoto it has its drawbacks. Too short for a really effective long telephoto and too long for a really good portrait lens. It is, however, the shortest of the telephoto lenses that exhibits a strong 'telephoto' effect—the distinct flattening of apparent perspective—and this, coupled with ease of handling, has won it a very wide following. The beginning photographer may well be better served if he buys an 85 or an 105mm as his initial telephoto lens selection and then buys either the 180 or the 200mm. If cost is a major consideration, either the 85 or the 105mm plus the TC-200 teleconverter will provide a very useful and versatile lens combination. This combination will also appeal to the backpacker or climber who wants a lightweight, compact outfit.



Lens diagram for telephoto Nikkor

Portrait taken with Nikkor 105mm f/2.5

As telephoto lenses get longer, the magnification (compared to the normal lens) gets greater and the effect of camera shake is magnified proportionally. Compounding this is the fact that longer lenses are also slower, partially as a result of the optical problems of making long, fast lenses and partially as a result of the demand for compact, easy-to-hold products. These two factors work together to limit the usable range of shutter speeds that will produce images free of camera shake. Indeed, the old rule of thumb of the professional is to limit the minimum shutter speed to the reciprocal of the focal length—e.g., 1/500 sec. in the case of a 500mm lens: a rather restricting practice. Hand-held telephotos of 300mm and more are widely used today, rather a different story to the early days when anything over 200mm was a specialist lens and very seldom seen, and they figure prominently in the Nikkor lens line-up. These lenses are ideal for following sports action or wildlife photography, enabling you to get close-in even if it is physically impossible for you to do so. They do require practice in order to gain the full benefit of using them and, for the sharpest results, the use of a tripod is recommended whenever possible.

Sailboats taken wtih Nikkor 300mm f/4.5 ▶


37300
37300
SALTY DOG

For people who wish to capture every detail of distant action or to pursue long-distance photography to its farthest limits, the **super-telephoto** is invaluable and its use produces interesting and seldom seen aspects of contemporary life. The only significant limiting factor now with super-telephoto lenses is their physical size. The previous slight loss of image crispness due to chromatic aberration, has been fully countered by the introduction of Nikon's ED glass. An alternative to conventional refracting lens systems, which brings significant advantages in the form of lightweight and compactness, is the mirror lens or **Reflex-Nikkor.** Its use of mirror optics also results in virtually chromatic aberration-free images. To achieve these desirable characteristics results in some drawbacks, most significantly, small maximum apertures—usually about f/8 or f/11. But these lenses are ***so*** light and compact that they can easily be carried about by the photographer, and, for the majority of users, they represent the best compromise in super-telephoto lenses. For professionals, or where maximum aperture is important, the **ED-Nikkors** are undoubtedly the best bet. In particular, the internal focusing ED-Nikkors (abbreviated to IF-ED), probably the finest super-telephoto lenses available today, are the ideal choice for the man who wants or needs a fast-handling, lightweight and high speed supertelephoto lens.

With telephoto lenses, a relatively big increase in focal length is needed to produce a significant change in picture angle. With wideangle lenses this is emphatically not so. The change in picture angle caused by merely moving from 50 to 35mm focal length is significant—46° to 62.° Further down the scale, from 15 to 13mm focal length, a change of only 2 millimeters produces a change in picture angle of 8.° What is even more striking though is the change in apparent perspective. The apparent perspective that can be achieved with wideangle lenses is often called 'wideangle distortion.' This is an incorrect use of the term 'distortion' and is merely a result of the camera's positioning. (Our designers have gone to great lengths to correct the Nikkor wideangle lenses for optical distortion and they can all be said to be, for all practical purposes, distortion-free.)

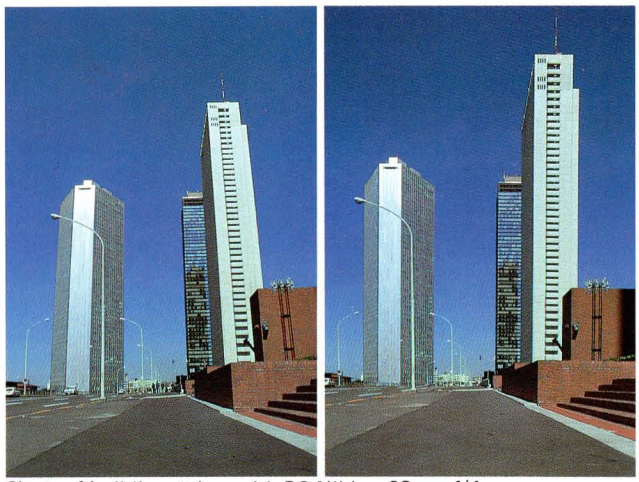
The first purchase in the **wideangle** line is usually a 35mm, probably more for historical reasons than anything else. The lack of wider or faster lenses in the past restricted the photographer's choice somewhat. For indoor flash work, the 35mm is very good, and its increased depth of field makes it a useful alternative to the 50mm normal lens for out-and-about 'grab' shooting. For the average amateur, the 28mm is probably the better initial choice for a general-purpose wideangle. Its coverage is greater, yet it is not oversensitive to the camera being out-of-level. Most Nikon flash units can also be used with the 28mm, although for some models a wide-

Sunset taken with Nikkor super-telephoto lens

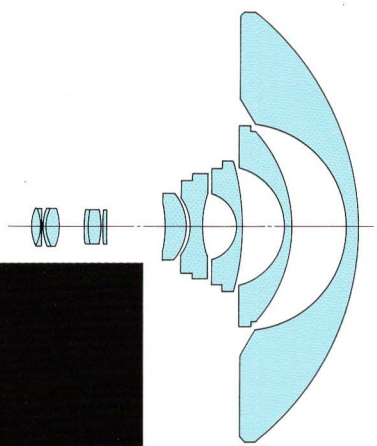
Model and interior taken with Nikkor 20mm f/3.5

angle adaptor is required. The apparently minor 4mm difference in focal length between the 24 and the 28mm lenses produces a big jump in picture angle—from 74° to 84°—and a much more pronounced 'wideangle' perspective. Lenses of this focal length and shorter are much more sensitive to the camera being out-of-level, tending to produce marked converging or diverging verticals when the camera is not held absolutely level. In many ways, the 24mm marks the limit of the general wideangle lenses. Lenses wider than this should be employed if their picture angle is needed, as in architectural or interior photography for example, or if the photographer wants to obtain their particular kind of apparent perspective for creative shooting situations. A seldom considered, but perfectly viable alternative to the conventional wideangle lens is the **PC-Nikkor** series. These lenses feature a lateral shift mechanism which, by enabling the photographer to raise the lens instead of tilt the camera, eliminates converging verticals when shooting tall buildings. These lenses have many other uses, too, effectively turning the camera into a high-mobile view camera. However, the PC-Nikkors are not limited to architectural photography; they find extensive use in studio sessions as well, enabling the photographer to obtain differing perspective effects when shooting still-life or commercial sets. The fact that these lenses are fitted with pre-set instead of the usual automatic diaphragm is not significant as this type of shooting is usually considered and deliberate. The PC-Nikkors are so versatile that they deserve wider usage and should really be considered not as special lenses but as alternative choices in lens selection.

Taking the wideangle lens concept to its fullest extent are the **Fisheye-Nikkors.** These revolutionary lenses were first introduced by Nikon in 1966, as an off-shoot of our scientific lens development program. We realized the creative possiblilities inherent in these lenses and placed them on the general market. Apart from such industrial applications as photographing the interior of pipelines and wind tunnels or, in the case of the 10mm f/5.6 OP Fisheye-Nikkor, for sky-factor measurement in urban planning, they have found wide use amongst both professionals and amateurs seeking a new outlook on a common subject. All in all, the Fisheye-Nikkors from an essential item for those who need them and an intriguing option for those who wish to fully exploit their creative talent.



Shots of buildings taken with PC-Nikkor 28mm f/4

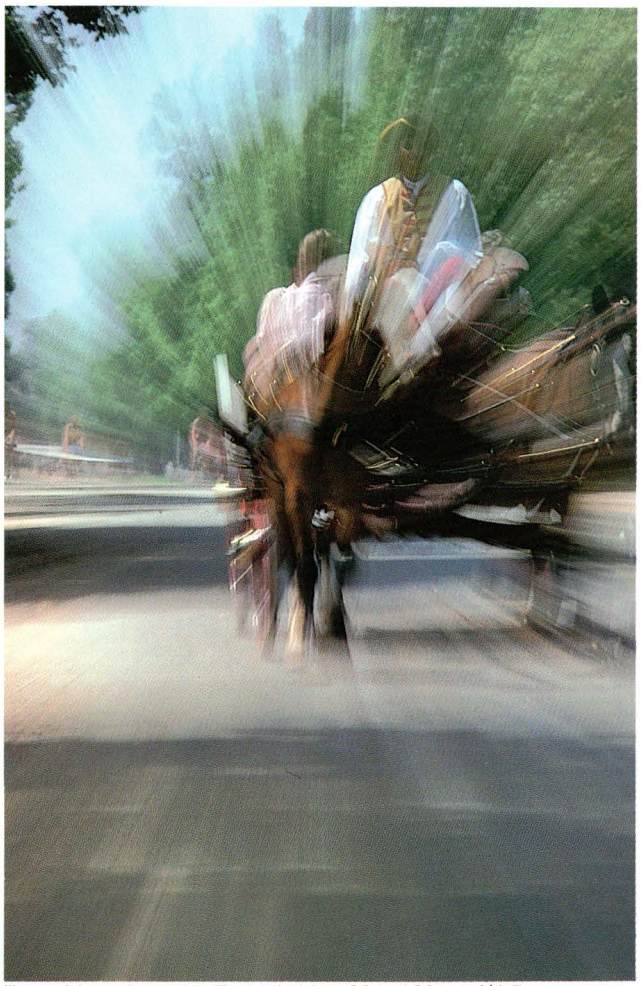


Lens diagram for Fisheye-Nikkor

Night scene taken with Fisheye-Nikkor 8mm f/2.8

To **zoom** or not to zoom? That is perhaps the question that is running through the minds of most photographers today. Now, in the Nikon System, the photographer has available for the first time a range of zoom lenses that equal in every aspect the performance of the fixed focal length Nikkor lenses. But the zoom lens does not merely replace a selection of fixed focal length lenses—it presents the photographer with an entirely new method of working. Now, for the first time, it is possible to compose directly in the camera, eliminating the need to 'crop' the picture in the darkroom later. For the photographer working with color slide film, where the slide ***is*** the finished picture, the ability to crop in the camera is a great advance. In fact, the use of zoom lenses presents the photographer with a creative challenge he may not be capable of rising to meet.

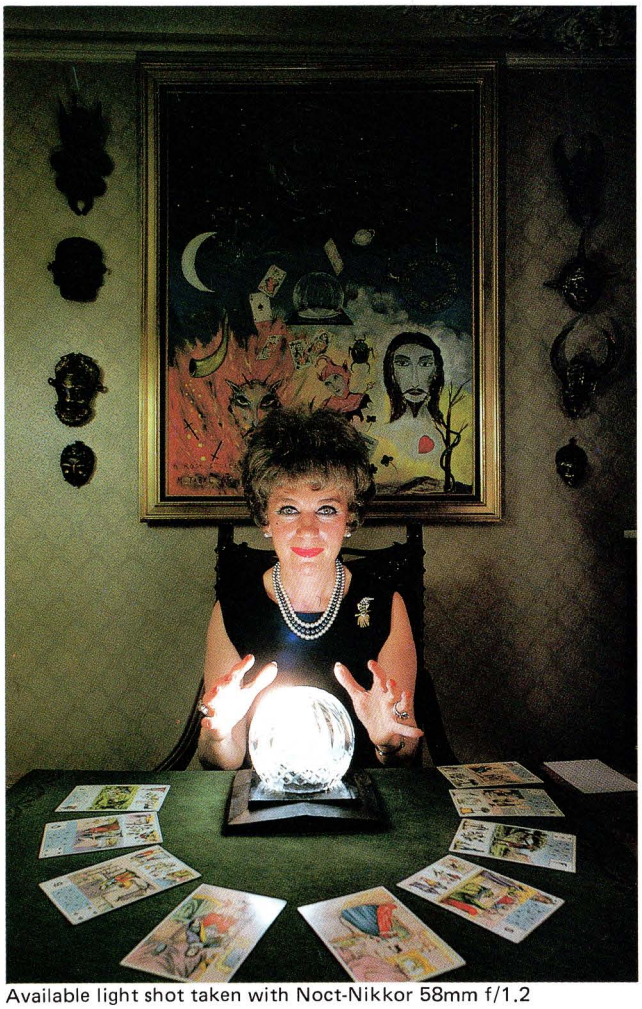
For most photographic situations zoom lenses are more than adequate, and for sheer speed of focal length changing unbeatable. For situations requiring high maximum apertures, fixed focal length lenses still have the edge, as they do also for lightness and compactness—although the latter are rapidly eroded as the number of lenses being carried increases. Two outstanding exceptions to the concept of the bulky zoom are the 43—86mm and 80—200mm Zoom-Nikkors, which are what surely must be the two most compact, high-performance zoom lenses on the market today. The 80—200mm is legendary for its superb picture quality and, for the ordinary Sunday photographer, is probably the best choice following the 50mm normal lens. The 43—86mm is one of the most famous lenses in the world with its place in every professional's camera bag and, for the photographer who wants one compact,. multi purpose package is unbeatable. The longer zooms are ideal for use from fixed positions, for example, in press photo calls. However, the 50—300mm—particularly the ED version—is somewhat of an exception to this in that it offers the stronger sports or press photographer a high-ratio, portable zoom lens. At the other end of the scale, the 28—45mm f/4.5 Zoom-Nikkor, by virtue of its outstanding distortion correction is ideal for use in photographing architectural interiors on color slide film. It ensures that the photographer can frame the picture precisely and thereby make full use of the 35mm film format.



Zoom blur taken with Zoom-Nikkor 80 ~ 200mm f/4.5

Throughout this discussion we have referred briefly to the lens' maximum aperture, but without making any hard and fast statements. Which maximum aperture is best? A difficult question. In many ways the maximum aperture of a lens is like horsepower in a car. A powerful car is often an asset under difficult driving conditions, and likewise with a fast lens—when the lighting gets poor it can make all the difference between a picture and no picture. So, obviously, for the press or professional photographer the faster the lens the better. For the amateur the situation is not so simple. The plain fact is, the faster the lens the higher the cost. And, as for some people, it is difficult for them to justify the cost of their Nikon camera, let alone the cost of accessory Nikkor lenses. So, as a result, we at Nikon provide a choice of two or three different apertures for the most often used focal length lenses in our system, so that the Nikon owner can stay with the Nikon System even if his budget is limited.

Where compactness and light weight are concerned, the slower lenses are generally smaller and lighter, a fact that should be pointed out to the customer who values these qualities in his own personal photographic system: another plug here for the Reflex-Nikkors, two really compact and lightweight high-performance super-telephotos..



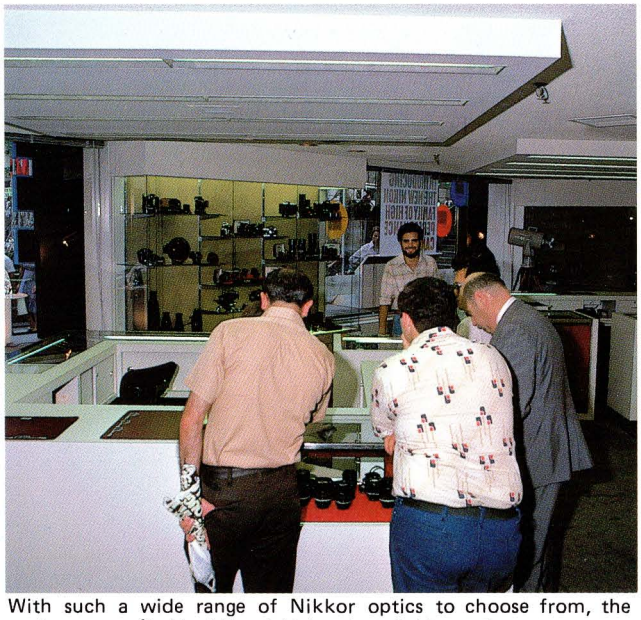
Available light shot taken with Noct-Nikkor 58mm f/1.2

It is important to note there is little or no difference in performance between lenses of the same focal length, but different maximum aperture, when they are used at the same working aperture. So the purchaser of a slower lens is not sacrificing anything—over the range that he will be using the lens. However, as the optimum lens aperture of any lens is usually two or three stops below maximum, the owner of the faster of the two lenses will gain a slight operational advantage over the slower lens user. This also applies to focusing. At wider apertures, the image is not only brighter but the depth of field is shallower, too, so the subject snaps in and out of focus clearly and distinctly. This is particularly noticeable when focusing wideangle lenses in low-light shooting situations. Two classes of Nikkor lenses, the ED-super-telephotos and the **Noct-Nikkor** are important, however, in that they are designed for maximum performance at full aperture. Consequently, the fact that these lenses represent a significant advance in full-aperture performance should be kept in mind when discussing their merits with prospective customers.

A factor which is seldom considered, yet has a direct bearing on the lens aperture to be used, is the type of film the customer intends to use for the majority of his shooting. For doubling the film speed will in effect give the user the equivalent of an extra f/stop. For the man who works exclusively in black and white, the fastest lenses are not so essential. However, for the photographer who wishes to get the maximum possible quality out of the 35mm format by using ultra-fine grained black and white or color film, fast lenses become essential due to the inherent slowness of these films.

As an interesting footnote, we would like to point out one generally little-known factor of lens aperture in these days of TTL metering. This is that the sensitivity of the meter is proportional to the maximum aperture of the lens in use on the camera. So, in low light shooting situations, the faster the lens mounted on the camera the lower the light level that can be metered.

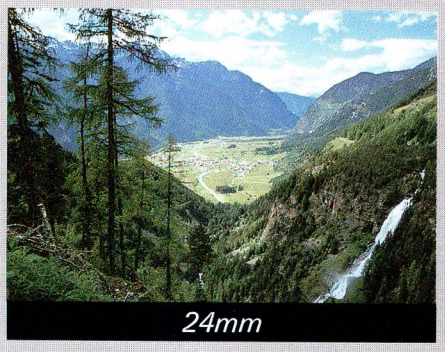
As you can see, the choice of the best lens for the individual customer can only be arrived at by careful consideration of his needs. Care and consideration that will surely repay themselves in the form of repeat sales as your customer expands his personal Nikon System, lens by Nikkor lens.



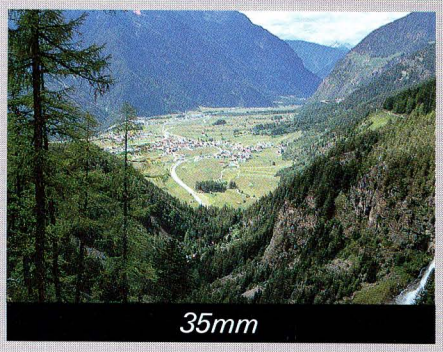
With such a wide range of Nikkor optics to choose from, the customer can find just the right lens to suit his needs.

Picture Angle

All these photographs were taken from exactly the same position. The only thing that was changed was the focal length. Notice the radical difference in the angle of coverage between the 24mm wideangle lens (taking in 84°) and the 1000mm (which sees a narrow 2°30′).



24mm

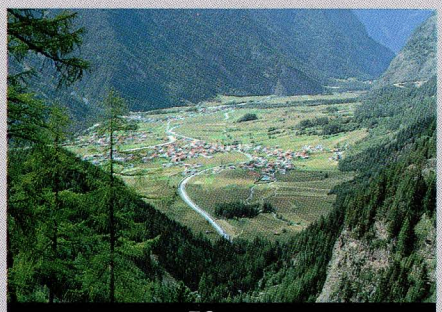


35mm

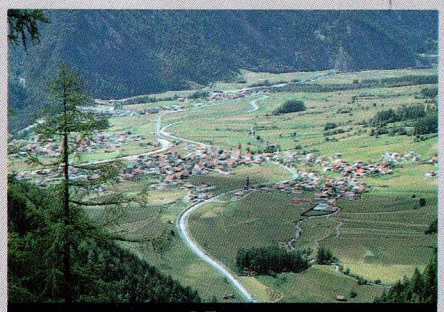
200mm

400mm

24mm



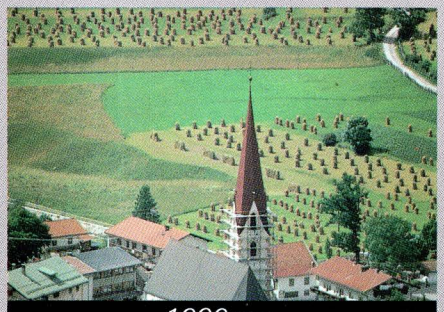
50mm



85mm

135mm

800mm



1000mm

1000mm

FISHEYE As the name implies, a fisheye lens approximates the way a fish's eye might see the world. Naturally, since an entire hemisphere (180°) is included in the picture, straight lines on the periphery are bowed in, thus creating one of the fisheye lens' most famous characteristics: extreme barrel distortion. To meet the demands of scientists and creative photographers alike, Nikon makes both types of fisheye lenses: circular and full-frame. Nikkor circular fisheyes produce a circular image in the center of the 24 × 36mm format. In this category, there are four Fisheye-Nikkors ranging in focal length from 6 to 10mm. The two 6mm lenses take in an incredible 220° and can actually "see" slightly behind themselves! The 8mm, with its traditional 180° angle of view, is one of the most popular fisheyes around.

It offers through-the-lens viewing and focusing down to one foot (0.3m), while its maximum aperture provides a bright and clear image in the viewfinder. The Nikkor 10mm OP-Fisheye lens employs a special orthographic projection formula in its design and is used for civic planning, architectural design, and fire safety studies. In the full-frame fisheye category, Nikon's entry is the 16mm, which has a 170° angle of view across the diagonal of the frame and exhibits the same fisheye characteristics. When it's impossible to move back, as when photographing inside the cockpit of an airplane, or when the scene is just too big to include any other way, nothing can beat a fisheye lens for taking it all in. Nikon makes *five* fisheye lenses in all, more than any other camera manufacturer in the world.

Fisheye-Nikkor 6mm f/2.8

220° Coverage with Through-The-Lens Viewing

Sales Points

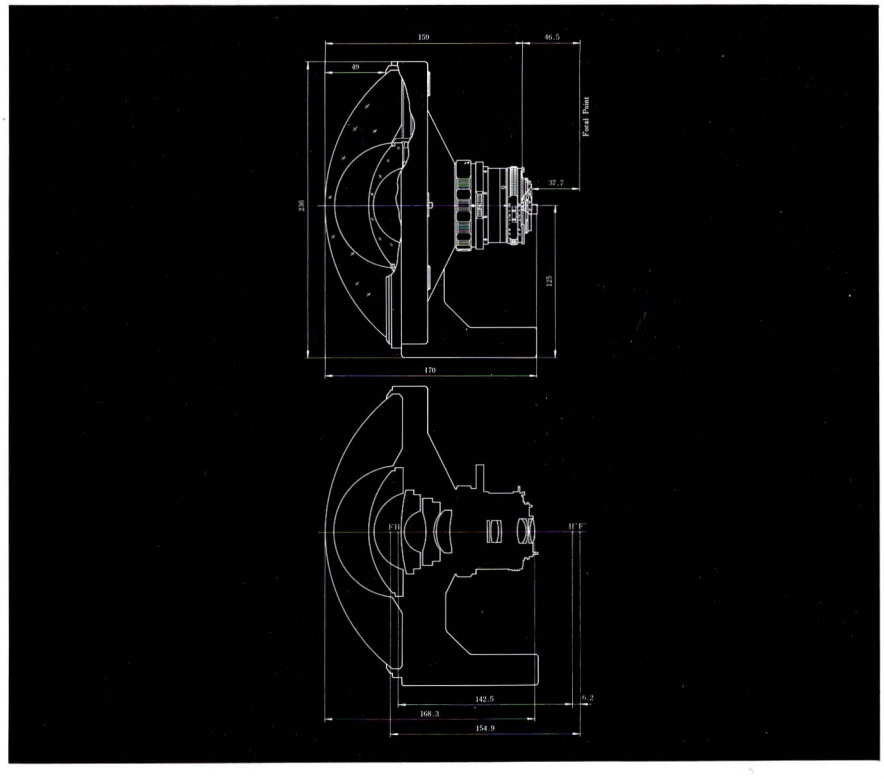
- Circular fisheye coverage of 220.°
- Large maximum aperture.
- Through-the-lens viewing and focusing down to one foot (0.25m).
- Built-in lens stand/tripod mounting socket.
- Supplied with a set of 5 filters (skylight, two yellow, orange, and red) built into a revolving turret, and slip-on front lens cap.
- Photographic uses include scientific and industrial applications, and special effects in advertising and commercial work.

Note: Unless specified otherwise, each Nikkor lens is supplied with a snap-on front lens cap and rear lens cap.

Specifications

Focal length/Aperture:	6mm f/2.8
Lens construction:	12 elements in 9 groups
Picture angle:	220°
Diaphragm:	Automatic
Aperture scale:	f/2.8 ~ f/22 on both standard and aperture direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 0.25m (0.9 ft) to infinity (∞)
Weight:	5.2kg
Dimensions:	236mm dia. x 171mm long (overall); 159mm extension from flange
Filters:	Built-in; L1A, Y48, Y52, O56, R60
Front lens cap:	Slip-on
Lens case:	Metal case

Note: This lens is only available by special order.



Fisheye-Nikkor 6mm f/5.6

220° Coverage in a Compact Package

Sales Points

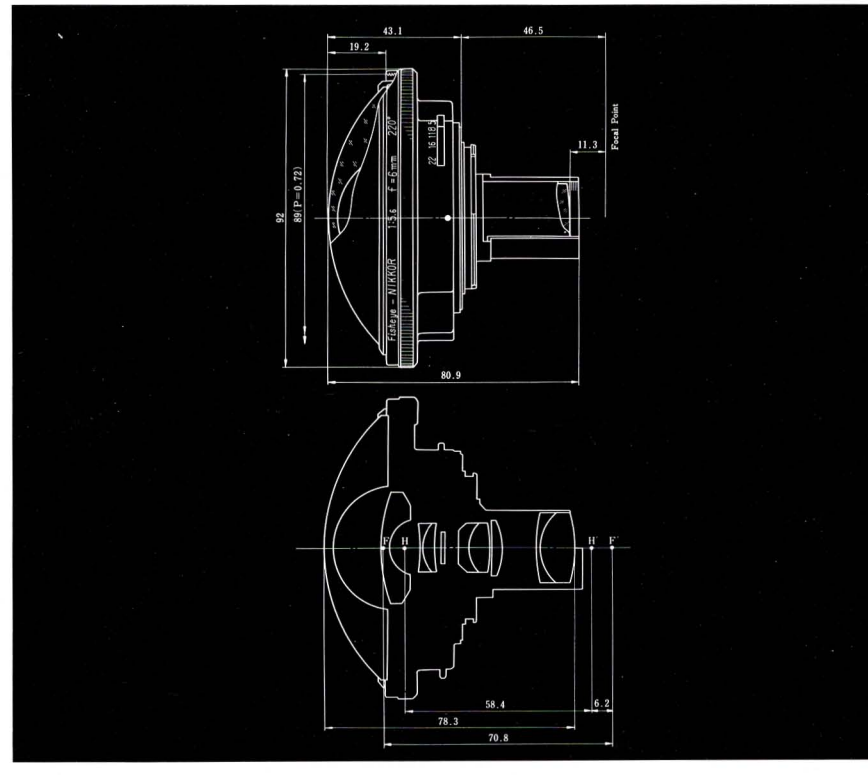
- Circular fisheye coverage of 220.°
- Compact and lightweight—only 430 grams.
- Fixed focus design makes focusing unnecessary.
- Separate 160° Fisheye Viewfinder (DF-1) for bright viewing.
- Supplied with a set of 6 filters (skylight, two yellow, orange, red and green) built into a revolving turret, and screw-in front lens cap.
- Photographic uses include scientific and industrial applications, and special effects in advertising and commercial work.

This lens cannot be used with Nikon FM or FE cameras, because they do not have a provision for locking the mirror in the "up" position.

Specifications

Focal length/Aperture:	6mm f/5.6
Lens construction:	9 elements in 6 groups
Picture angle:	220°
Diaphragm:	Manual
Aperture scale:	f/5.6 ~ f/22 on both standard and aperture-direct-readout scale
Weight:	430g
Dimensions:	92mm dia. x 81mm long (overall); 43mm extension from flange
Filters:	Built-in; L1A, Y48, Y52, O57, R60, X0
Front lens cap:	Screw-in
Lens case:	Leatherette case

Note: This lens is only available by special order.



Fisheye-Nikkor 8mm f/2.8

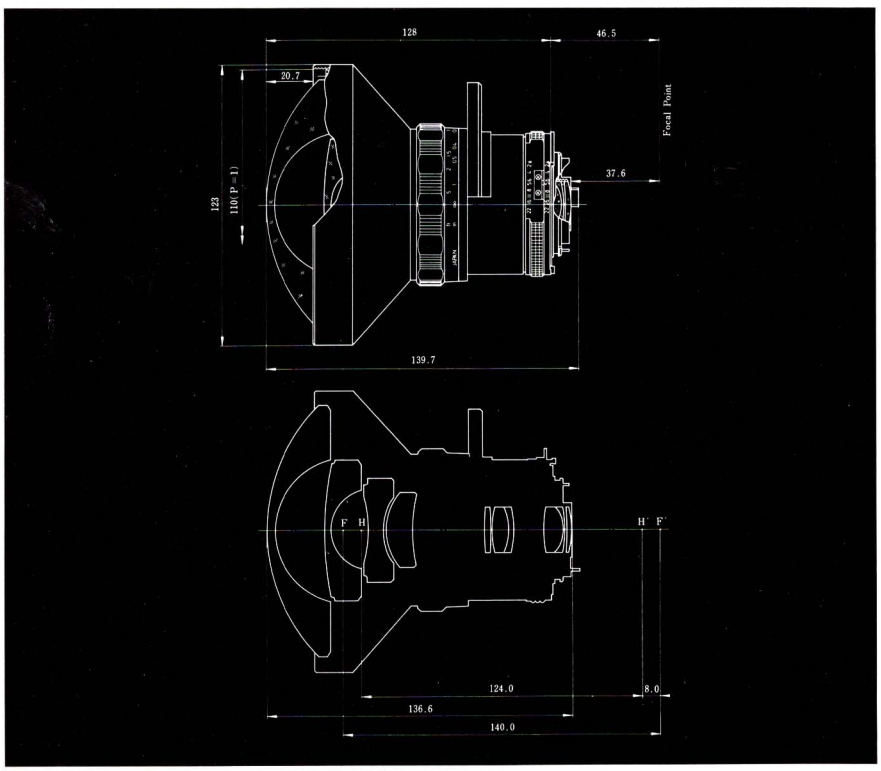
180° Coverage with Through-The-Lens Viewing

Sales Points

- Circular fisheye coverage of 180.°
- Large maximum aperture.
- Through-the-lens viewing and focusing down to one foot (0.3m).
- Supplied with a set of 5 filters (skylight, two yellow, orange, and red) built into a revolving turret screw-in front lens cap.
- Photographic uses include scientific and industrial applications, and special effects in sports, travel, photojournalism, advertising, and commercial work.

Specifications

Focal length/Aperture:	8mm f/2.8
Lens construction:	10 elements in 8 groups
Picture angle:	180°
Diaphragm:	Automatic
Aperture scale:	f/2.8 ~ f/22 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 0.3m (1 ft) to infinity (∞)
Weight:	1.1kg
Dimensions:	123mm dia. x 139mm long (overall); 128mm extension from flange
Filters:	Built-in; LIA, Y48, Y52, O56, R60
Front lens cap:	Screw-in
Lens case:	CL-11 (provided)



OP Fisheye-Nikkor 10mm f/5.6

Specially Designed for Scientific and Industrial Applications

Sales Points

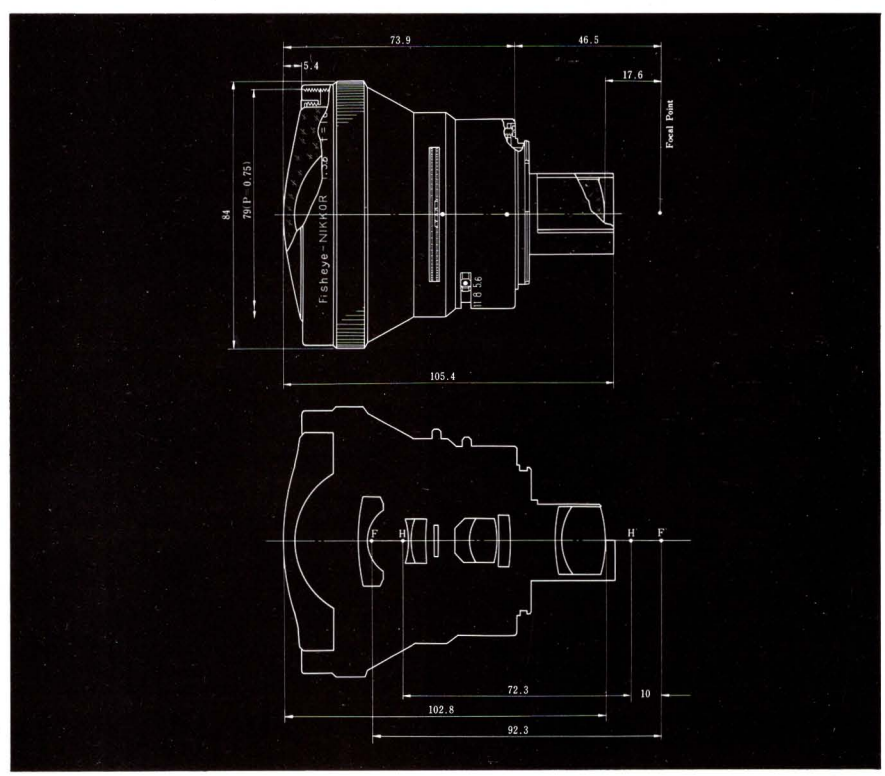
- Circular picture coverage of 180.°
- Employs unique orthographic projection formula.
- When a light source is photographed, the proportion of image area of the light source to the total area represents the luminance or brightness of a place. This proportion is called the "Configuration Factor" and is often used in civic planning, architectural design and fire safety studies.
- Subjects of equal brightness are reproduced with equal density regardless of their position in the picture, facilitating the use of color films.
- Produces a more conspicuous fisheye effect than other fisheyes in that the image reproduced is larger in the center and becomes gradually compressed at the periphery.

This lens cannot be used with Nikon FM and FE cameras, because they do not have a provision for locking the mirror in the "up" position.

Specifications

Focal length/Aperture:	10mm f/5.6
Lens construction:	9 elements in 6 groups
Picture angle:	180°
Diaphragm:	Manual
Aperture scale:	f/5.6 ~ f/22 on both standard and aperture-direct-readout scale
Weight:	400g
Dimensions:	84mm dia. x 105mm long (overall); 74mm extension from flange
Filters:	Built-in; LIA, Y48, Y52, O57, R60, X0
Front lens cap:	Screw-in
Lens case:	CL-4 (provided)

Note: Finder DF-1 provided.



Fisheye-Nikkor 16mm f/3.5

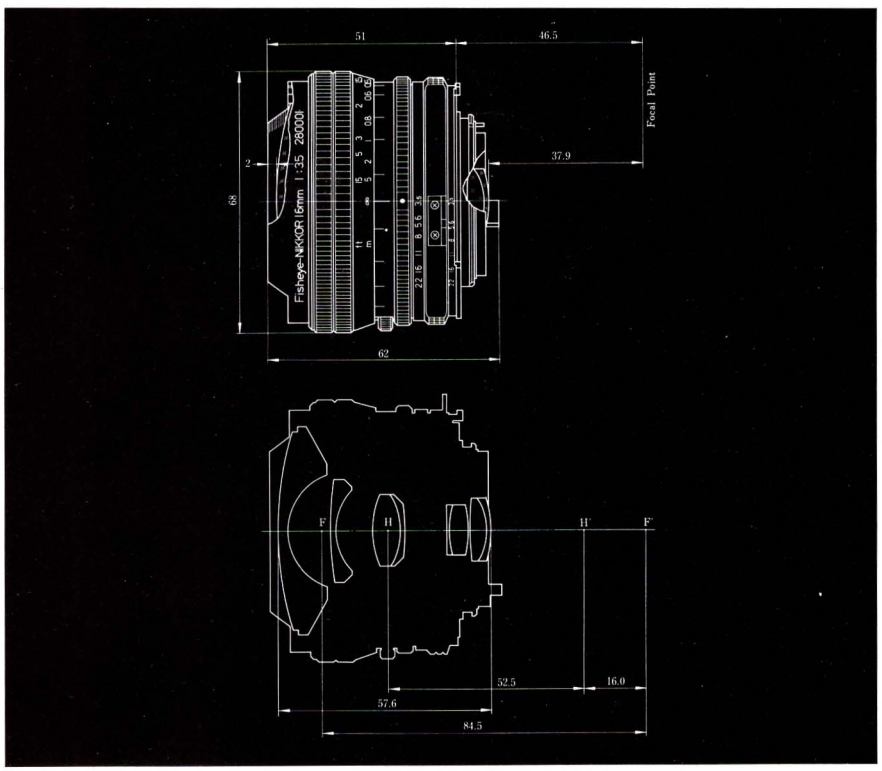
Fisheye Effects in a Rectangular Format

Sales Points

- Full-frame fisheye coverage of 170.°
- Very compact and lightweight—only 30 grams.
- Through-the-lens viewing and focusing down to one foot (0.3m).
- Built-in scalloped lens hood.
- Supplied with a set of 4 filters (plain glass, yellow, orange, and red) built into a revolving turret slip-on front lens cap.
- Photographic uses include sweeping panoramic effects in sports, travel, photojournalism, advertising, and commercial work.

Specifications

Focal length/Aperture:	16mm f/3.5
Lens construction:	8 elements in 5 groups
Picture angle:	170°
Diaphragm:	Automatic
Aperture scale:	f/3.5 ~ f/22 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 0.3m (1 ft) to infinity (∞)
Weight:	330g (11.7oz)
Dimensions:	68mm dia. x 62mm long (overall); 51mm extension from flange
Filters:	Built-in; Y48, O56, R60, and plain glass (N)
Front lens cap:	Slip-on
Lens hood:	Built-in (fixed)
Lens case:	CL30S; No. 61; CP-1



ULTRA-WIDEANGLE

Ranging from the 13mm, the widest wideangle ever created for 35mm photography, to one of the lightest and most compact 20mm's around, Nikon has *four* ultra-wideangle lenses which are unsurpassed for their innovative optical design. Unlike a fisheye lens, an ultra-wideangle has rectilinear "vision," meaning that it renders straight lines in the subject as straight lines in the photograph. Combine this characteristic with its ability to take in more of the scene, and you have the perfect lens for photographing small interiors or for creating single-shot "panoramas" of almost anything you point the lens at. Another advantage of the ultra-wideangle is its immense depth of field at virtually all apertures. The photographer can simply prefocus his lens using the depth-of-field scale and never worry about the subject being out of focus. But probably the most exciting feature of an ultra-wideangle lens is its tendency to exaggerate the size of objects close to the lens. By stretching out the apparent space between foreground and background, an ultra-wideangle photograph creates a striking impression of three-dimensionality. Its creative applications are limitless in the fields of fashion, product, and travel photography, as well as photojournalism and "character study" portraiture.

Nikkor 13mm f/5.6

The Widest Wideangle in 35mm Photography

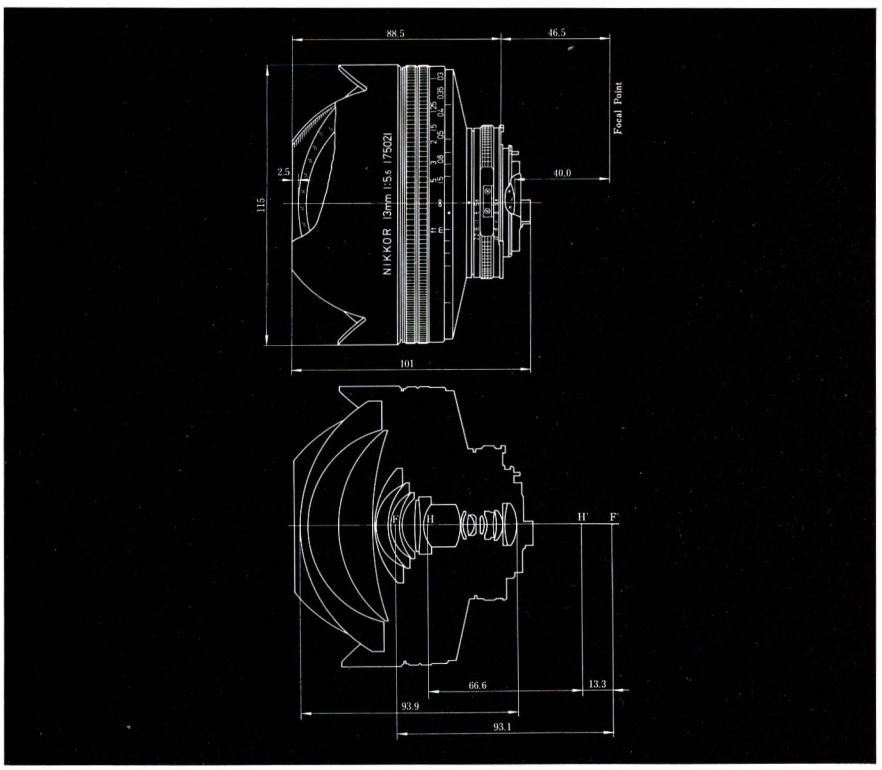
Sales Points

- Sweeping 118° picture coverage.
- Straight line rendition of subjects.
- Immense depth of field.
- Floating Element System for improved close focusing performance—down to one foot (0.3m).
- Built-in scalloped lens hood.
- Supplied with a set of 4 rapid-mount bayonet filters (plain glass, yellow, orange, and red), a slip-on front lens cap, and hard lens case.
- Photographic uses include single shot "panoramas," architecture, interiors, and extreme ultra-wideangle effects in fashion, product, industrial, and travel photography.

Specifications

Focal length/Aperture:	13mm f/5.6
Lens construction:	16 elements in 12 groups
Picture angle:	118°
Diaphragm:	Automatic
Aperture scale:	f/5.6 ~ f/22 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 0.3m (1 ft) to infinity (∞)
Weight:	1.2kg
Dimensions:	115mm dia. x 101mm long (overall); 88.5mm extension from flange
Filters:	Provided; Y48, O56, R60, plain glass (N)
Front lens cap:	Slip-on
Lens hood:	Built-in (fixed)
Lens case:	CL-14 (provided)

Note: This lens is only available by special order.



Nikkor 15mm f/5.6

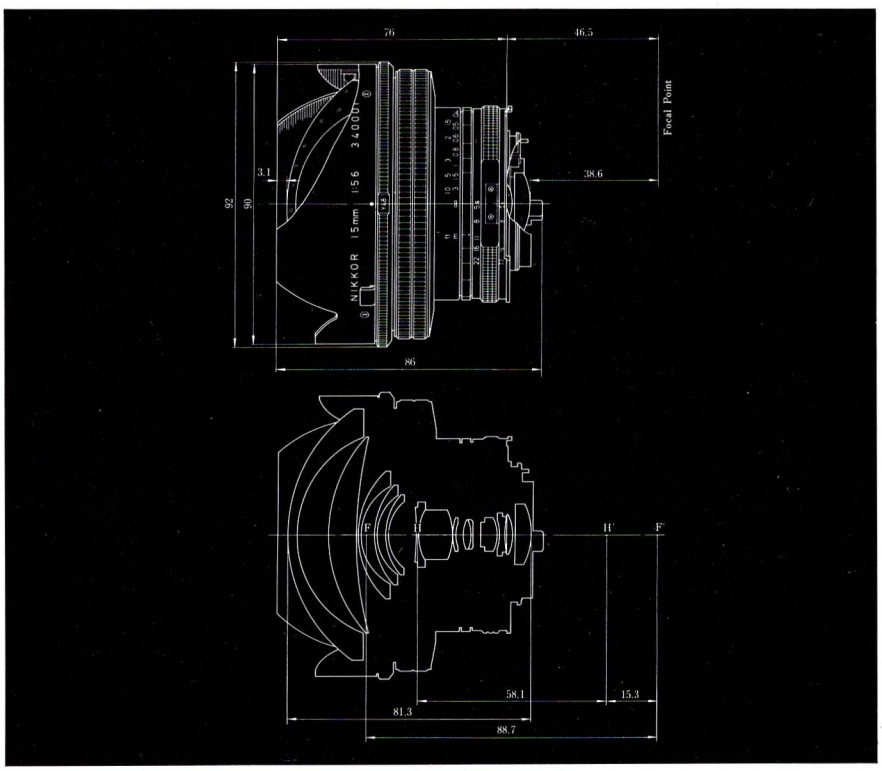
For Striking Ultra-Wideangle Effects

Sales Points

- Sweeping 110° picture coverage.
- Straight line rendition of subjects.
- Immense depth of field.
- Floating Element System for improved close focusing performance—down to one foot (0.3m).
- Built-in scalloped lens hood.
- Supplied with 4 filters (plain glass, yellow, orange, and red) on a built-in revolving turret, slip-on front lens cap, and hard lens case.
- Photographic uses include single shot "panoramas," architecture, interiors, and ultra-wideangle effects in fashion, product, industrial, and travel photography.

Specifications

Focal length/Aperture:	15mm f/5.6
Lens construction:	14 elements in 12 groups
Picture angle:	110°
Diaphragm:	Automatic
Aperture scale:	f/5.6 ~ f/22 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 0.3m (1 ft) to infinity (∞)
Weight:	645g
Dimensions:	92mm dia. x 86mm long (overall); 76mm extension from flange
Filters:	Built-in; Y48, O56, R60 and plain glass (N)
Front lens cap:	Slip-on
Lens hood:	Built-in (fixed)
Lens case:	CL-26 (provided)



Nikkor 18mm f/4

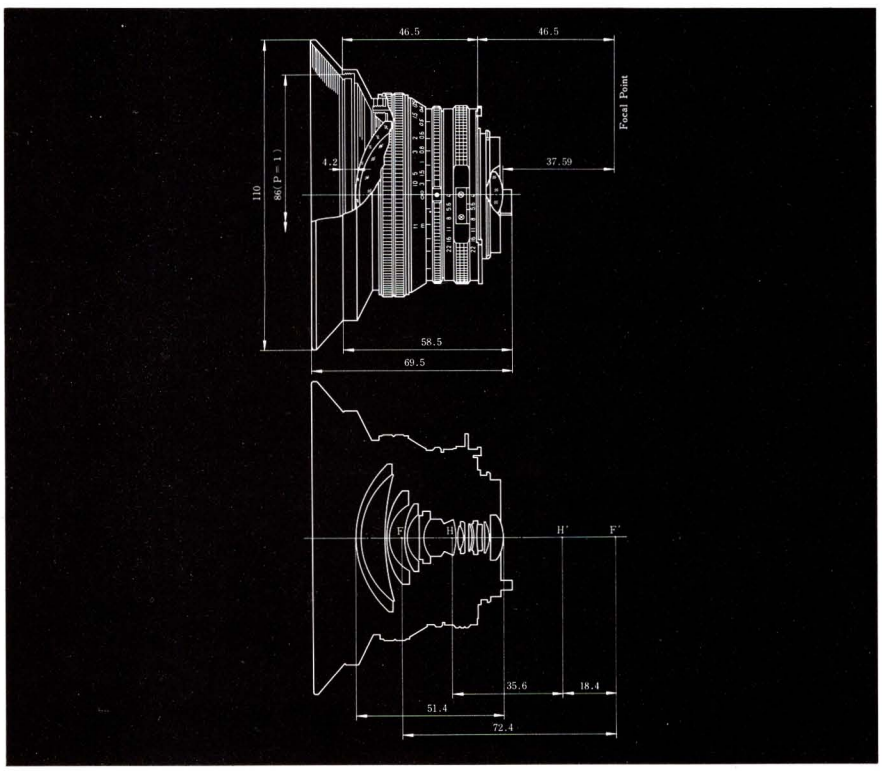
The "Basic" Ultra-Wideangle

Sales Points

- Ultra-wide 100° picture coverage.
- Weighs only 325 grams.
- Immense depth of field.
- Accepts standard Series 9 filters.
- Supplied with an 86mm screw-in lens hood and screw-in front lens cap.
- Photographic uses include architecture, interiors, travel, photojournalism, and industrial work.

Specifications

Focal length/Aperture:	18mm f/4
Lens construction:	13 elements in 9 groups
Picture angle:	100°
Diaphragm:	Automatic
Aperture scale:	f/4 ~ f/22 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 0.3m (1ft) to infinity (∞)
Weight:	325g
Dimensions:	89mm dia. x 58.5mm long (overall); 46.5mm extension from flange
Attachment size	86mm (P = 1)
Filters:	Series IX
Front lens cap:	Screw-in
Lens hood:	Screw-in (HN-15)
Lens case:	CL-28



Nikkor 20mm f/3.5

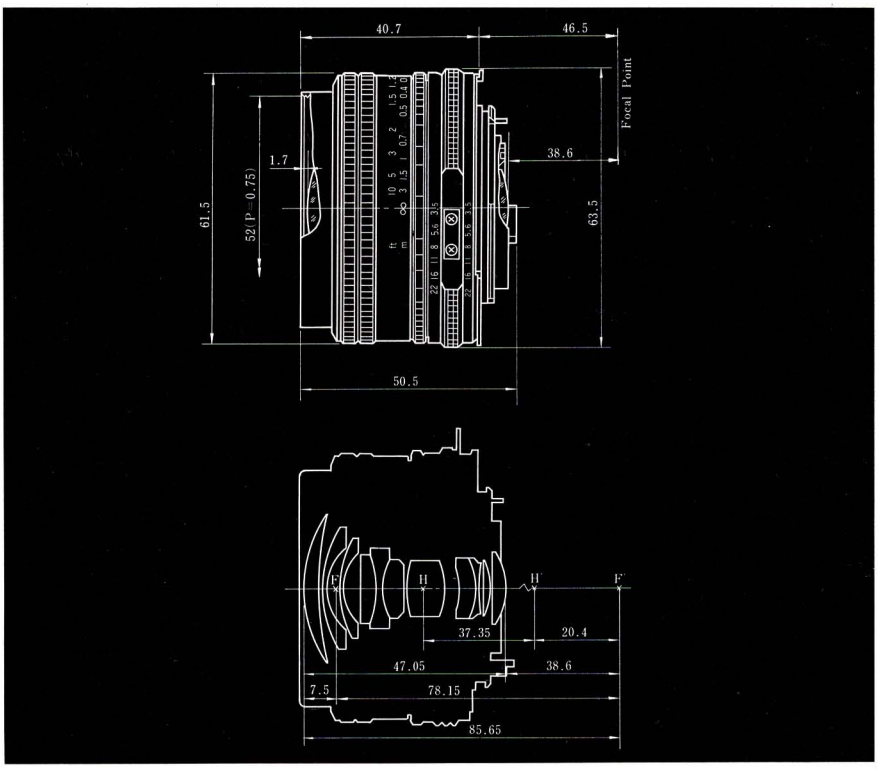
A Good Introduction to Ultra-Wideangle Photography

Sales Points

- Ultra-wide 94° picture coverage.
- Weighs only 235 grams.
- Immense depth of field.
- Macrophotography—up to 12X magnification when reverse-mounted on a bellows unit.
- Quick focusing through a short 100° rotation of the focusing ring from infinity to the closest focusing distance.
- Takes 52mm filters—the standard for most Nikkor lenses from 20 to 20mm.
- Photographic uses include architecture, interiors, sports, photojournalism, travel, scenics, annual report shooting, and macrophotography.

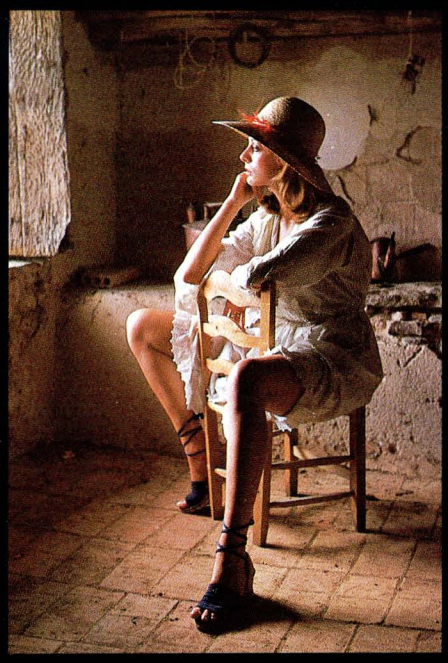
Specifications

Focal length/Aperture:	20mm f/3.5
Lens construction:	11 elements in 8 groups
Picture angle:	94°
Diaphragm:	Automatic
Aperture scale:	f/3.5 ~ f/22 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 0.3m (1 ft) to infinity (∞)
Weight:	235g
Dimensions:	63.5mm dia. x 50.5mm long (overall); 40.7mm extension from flange
Attachment size:	52mm (P = 0.75)
Front lens cap:	Snap-on
Lens hood:	Slip-on (HK-6)
Lens case:	CL-30S, No. 61, CP-1



WIDEANGLE

Nikkor wideangle lenses encompass three of the most popular focal lengths in 35mm photography: 24, 28, and 35mm. With a larger than normal angle of view and additional depth of field, a wideangle lens is excellent for "grab shooting" where the photographer doesn't always have enough time to focus or compose carefully. And because Nikon is the only camera maker in the world to offer a truly high-speed lens in each of the three wideangle focal lengths (i.e. 24mm f/2, 28mm f/2, and 35mm f/1.4), many photographers are choosing a Nikkor wideangle as the lens they keep on their camera most of the time for shooting scenics, or candids of people. Other applications include sporting events, architecture, interiors, and environmental portraits. To meet any photographer's requirements, Nikon offers a total of *eight* wideangle lenses in a variety of maximum apertures, sizes, and prices to choose from.

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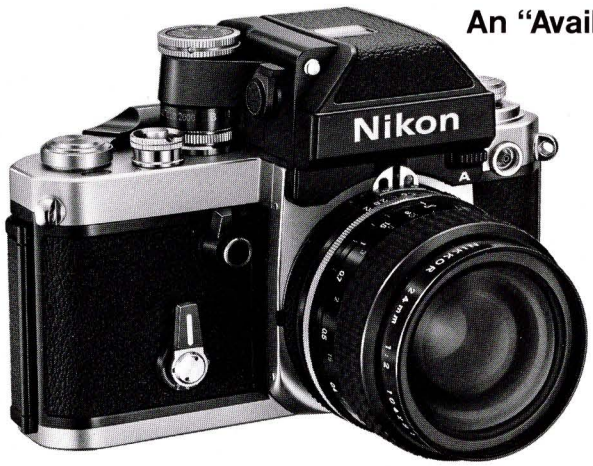
MARCHAL
DYNAMIC
ANCO

Nikkor 24mm f/2



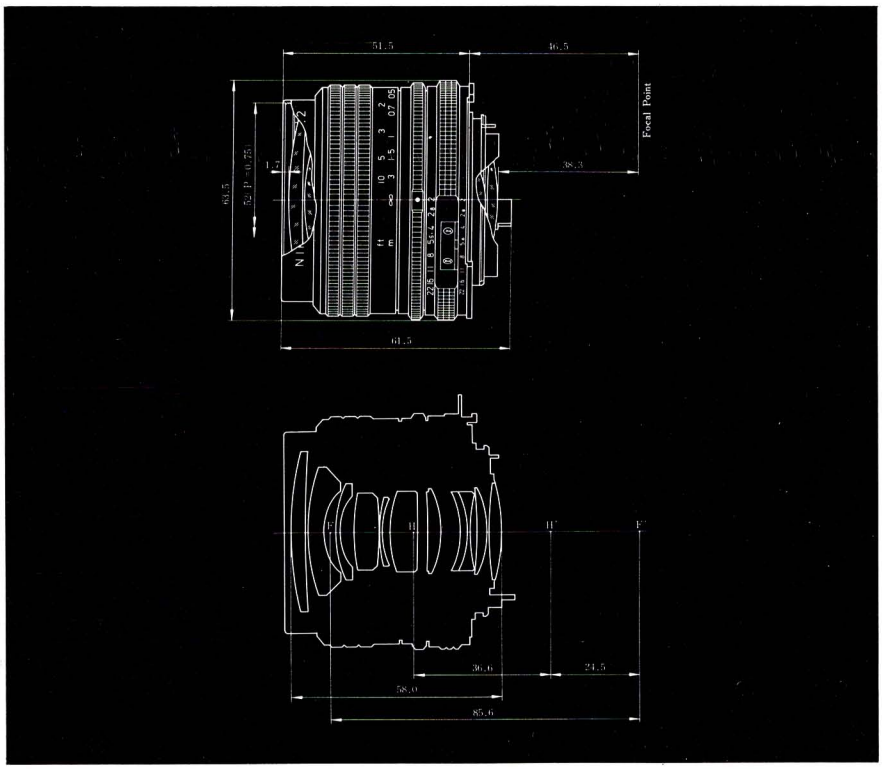
An "Available Light" 24mm

Sales Points

- Wide 84° picture coverage.
- Large maximum aperture.
- Compact and lightweight—only 300 grams.
- Floating Element System for improved close focusing performance—down to one foot (0.3m).
- Takes 52mm filters—the standard for most Nikkor lenses from 20 to 200mm.
- Photographic uses include photojournalism, sports, environmental portraiture, annual report work, scenics, interiors, travel, candids of people, and available light shooting.

Specifications

Focal length/Aperture:	24mm f/2
Lens construction:	11 elements in 10 groups
Picture angle:	84°
Diaphragm:	Automatic
Aperture scale:	f/2 ~ f/22 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 0.3m (1 ft) to infinity (∞)
Weight:	300g
Dimensions:	63.5mm dia. x 61.5mm long (overall): 51.5mm extension from flange
Attachment size:	52mm (P = 0.75)
Front lens cap:	Snap-on
Lens hood:	Slip-on (HK-2)
Lens case:	CL-31S; No. 61; CP-1



Nikkor 24mm f/2.8

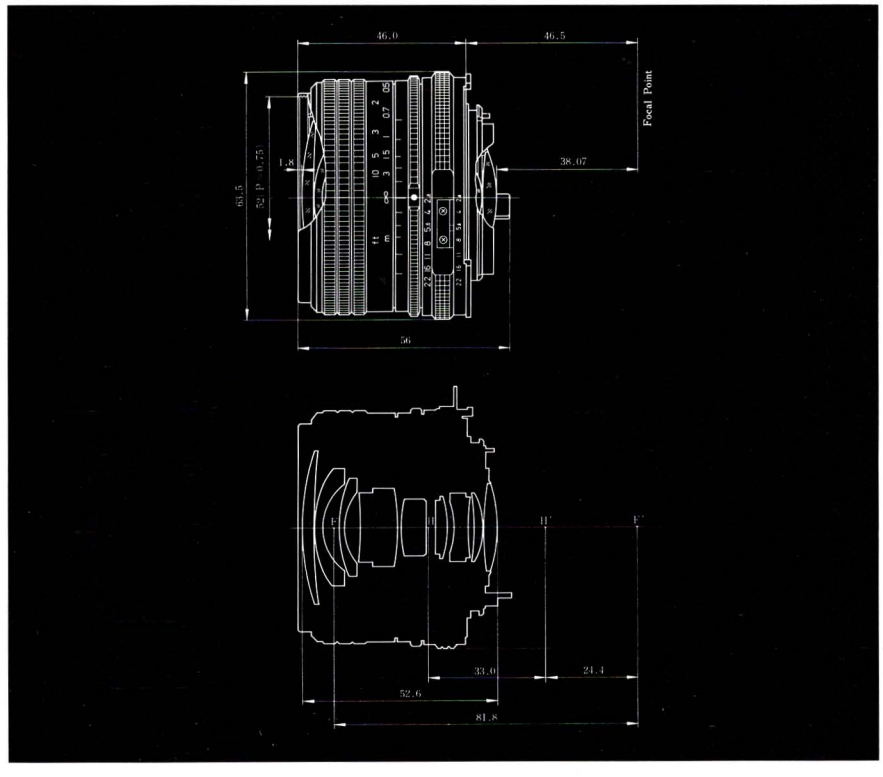
One of the Most Popular 24mm's Around

Sales Points

- Wide 84° picture coverage.
- Compact and lightweight—only 270 grams.
- Floating Element System for improved close focusing performance—down to one foot (0.3m).
- Macrophotography—up to slightly over 10X magnification when reverse-mounted on a bellows unit.
- Takes 52mm filters—the standard for most Nikkor lenses from 20 to 200mm.
- Photographic uses include photojournalism, sports, environmental portraiture, annual report work, scenics, interiors, travel, backpacking, and candids of people.

Specifications

Focal length/Aperture:	24mm f/2.8
Lens construction:	9 elements in 9 groups
Picture angle:	84°
Diaphragm:	Automatic
Aperture scale:	f/2.8 ~ f/22 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 0.3m (1 ft) to infinity (∞)
Weight:	270g
Dimensions:	63.5mm dia. x 56mm long (overall); 46mm extension from flange
Attachment size:	52mm (P = 0.75)
Front lens cap:	Snap-on
Lens hood:	Screw-in (HN-1)
Lens case:	CL-30S; No. 61; CP-1



Nikkor 28mm f/2

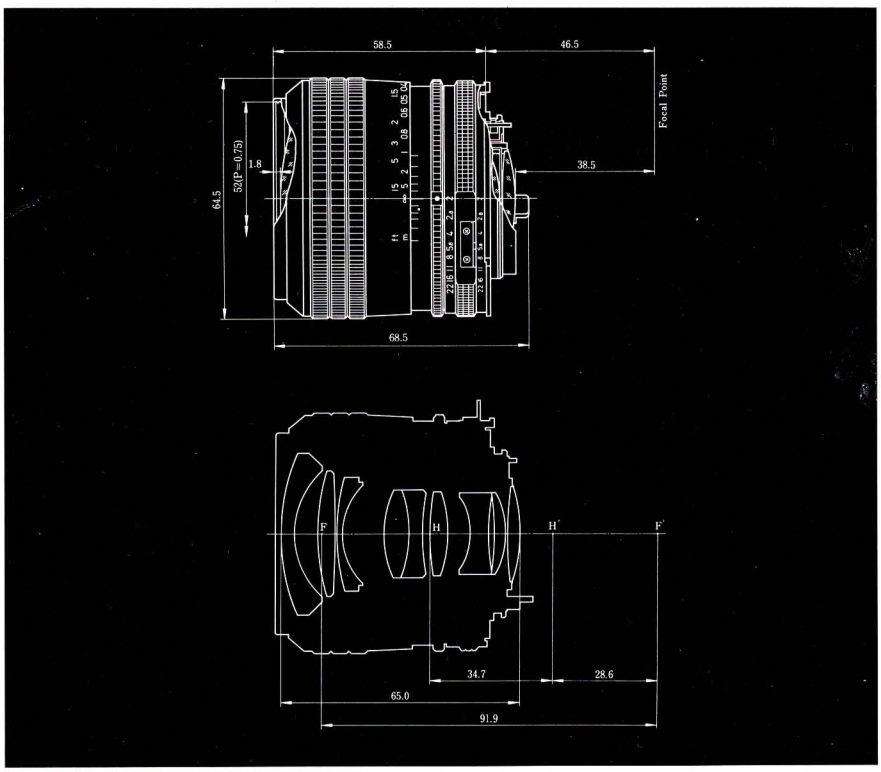
Perfect for Available Light Shooting in Close Quarters

Sales Points

- Wide 74° picture coverage.
- Large maximum aperture.
- Weighs only 355 grams.
- Floating Element System for improved close focusing performance—down to one foot (0.3m).
- Takes 52mm filters—the standard for most Nikkor lenses from 20 to 200mm.
- Photographic uses include photojournalism, sports, environmental portraiture, annual report shooting, scenics, interiors, candids of people, and available light photography.

Specifications

Focal length/Aperture:	28mm f/2
Lens construction:	9 elements in 8 groups
Picture angle:	74°
Diaphragm:	Automatic
Aperture scale:	f/2 ~ f/22 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 0.3m (1 ft) to infinity (∞)
Weight:	355g
Dimensions:	64.5mm dia. x 68.5mm long (overall); 58.5mm extension from flange
Attachment size:	52mm (P = 0.75)
Front lens cap:	Snap-on
Lens hood:	Screw-in (HN-1)
Lens case:	CL-31S; No. 61; CP-1



Nikkor 28mm f/2.8

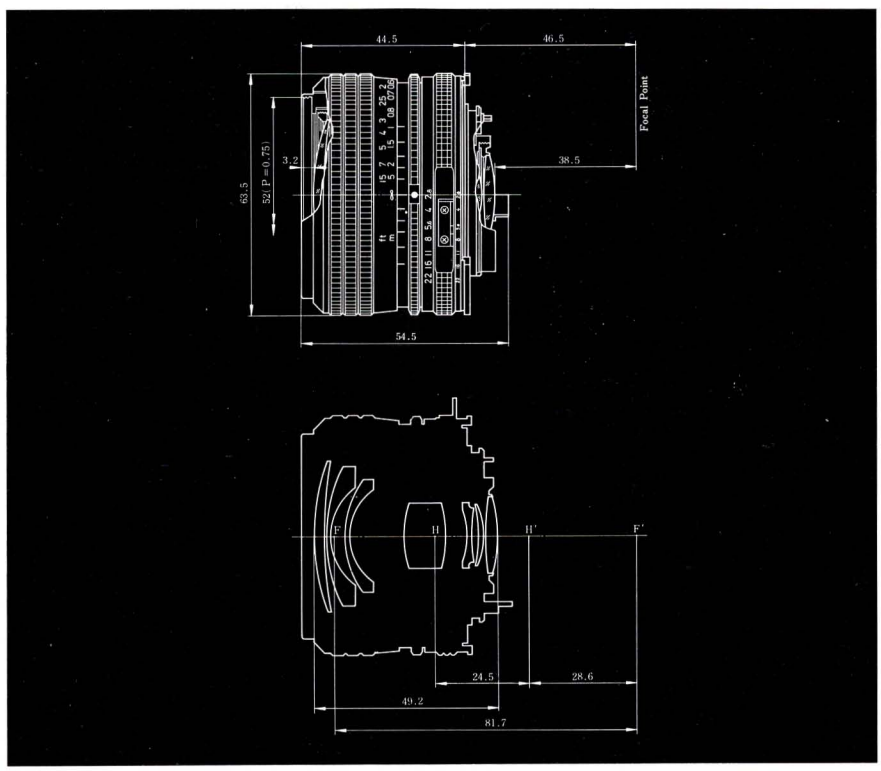
For the Photographer Who Wants to Carry Only One Wideangle Lens

Sales Points

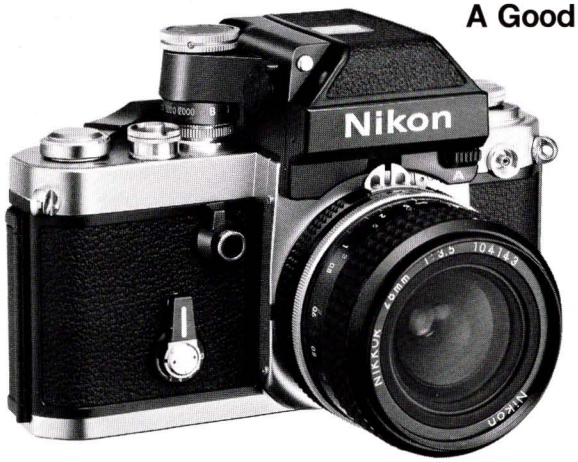
- Wide 74° picture coverage.
- Very compact and lightweight—only 245 grams.
- Macrophotography—up to nearly 9X magnification when reverse-mounted on a bellows unit.
- Takes 52mm filters—the standard for most Nikkor lenses from 20 to 200mm.
- Photographic uses include photojournalism, sports, travel, backpacking, environmental portraiture, annual report work, scenics, interiors, and candids of people.

Specifications

Focal length/Aperture:	28mm f/2.8
Lens construction:	7 elements in 7 groups
Picture angle:	74°
Diaphragm:	Automatic
Aperture scale:	f/2.8 ~ f/22 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 0.3m (1 ft) to infinity (∞)
Weight:	245g
Dimensions:	63.5mm dia. x 54.5mm long (overall); 44.5mm extension from flange
Attachment size:	52mm (P = 0.75)
Front lens cap:	Snap-on
Lens hood:	Screw-in (HN-2)
Lens case:	CL30S; No. 61; CP-1



Nikkor 28mm f/3.5



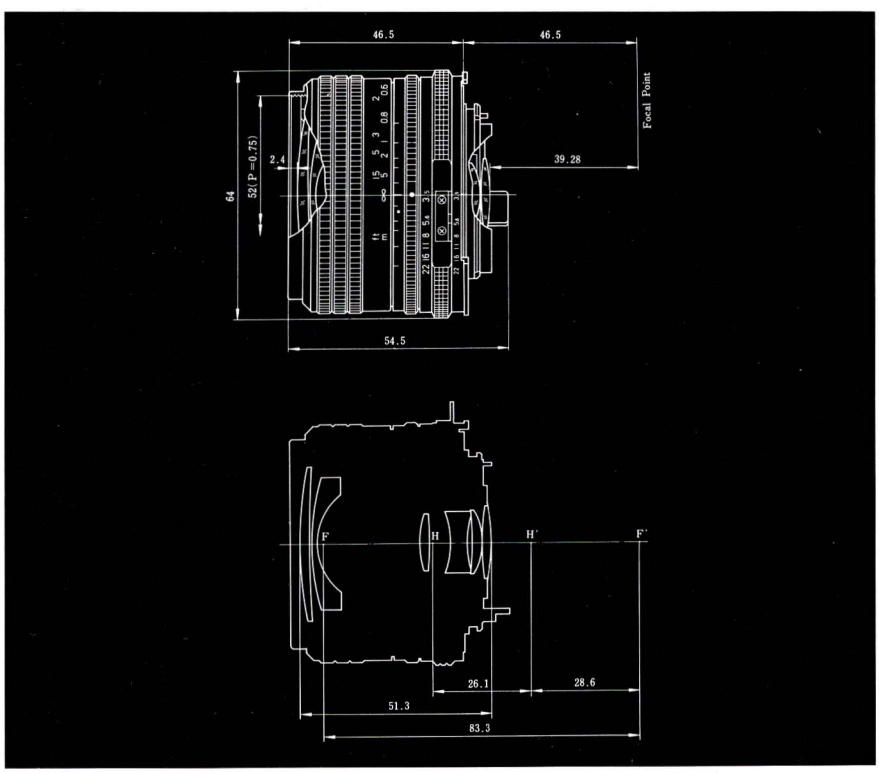
A Good Wideangle for the Budget-Minded Photographer

Sales Points

- Wide 74° picture coverage.
- Very compact and lightweight—only 235 grams.
- Macrophotography—up to nearly 9X magnification when reverse-mounted on a bellows unit.
- Takes 52mm filters—the standard for most Nikkor lenses from 20 to 200mm.
- Photographic uses include photojournalism, sports, travel, backpacking, environmental portraiture, annual report work, scenics, interiors, and candids of people.

Specifications

Focal length/Aperture:	28mm f/3.5
Lens construction:	6 elements in 6 groups
Picture angle:	74°
Diaphragm:	Automatic
Aperture scale:	f/3.5 ~ f/22 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 0.3m (1 ft) to infinity (∞)
Weight:	235g
Dimensions:	64mm dia. x 54.5mm long (overall); 46.5mm extension from flange
Attachment size:	52mm (P = 0.75)
Front lens cap:	Snap-on
Lens hood:	Screw-in (HN-2)
Lense case:	CL-30S; No. 61; CP-1



Nikkor 35mm f/1.4

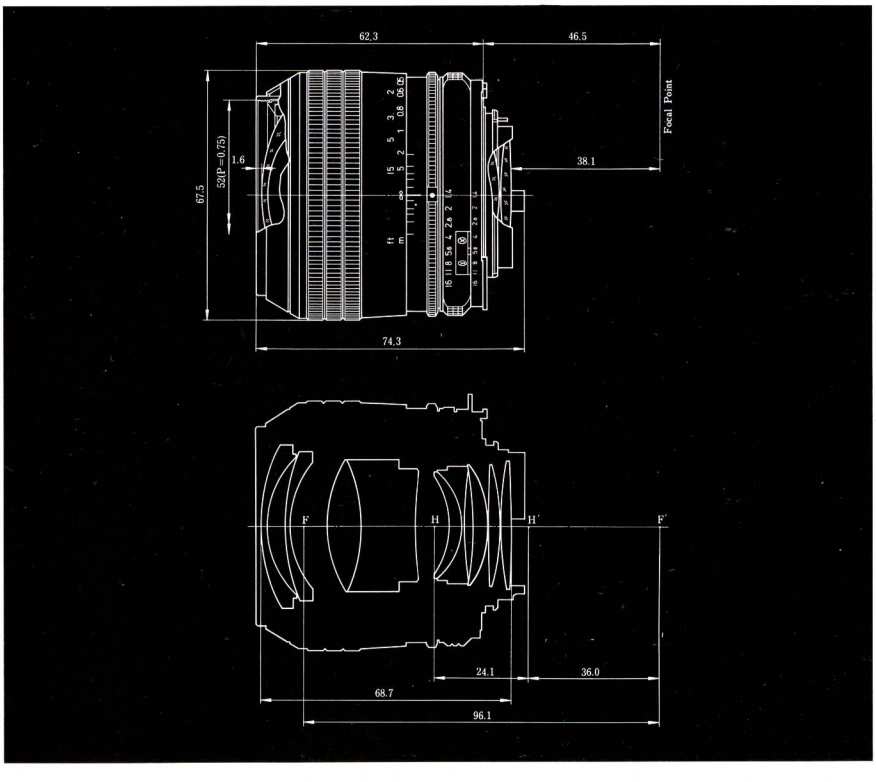
The Photojournalist's "Normal" Lens

Sales Points

- Wide 62° picture coverage.
- Large maximum aperture.
- Matches the coverage of most electronic flash units.
- Floating Element System for improved close focusing performance—down to one foot (0.3m).
- Takes 52mm filters—the standard for most Nikkor lenses from 20 to 200mm.
- Photographic uses include photojournalism, available light shooting, indoor and outdoor sports, environmental portraiture, travel candids of people, landscapes, weddings, and electronic flash photography.

Specifications

Focal length/Aperture:	35mm f/1.4
Lens construction:	9 elements in 7 groups
Picture angle:	62°
Diaphragm:	Automatic
Aperture scale:	f/14 ~ f/16 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 0.3m (1 ft) to infinity (∞)
Weight:	400g
Dimensions:	67.5mm dia. x 74mm long (overall); 62.5mm extension from flange
Attachment size:	52mm (P = 0.75)
Front lens cap:	Snap-on
Lens hood:	Screw-in (HN-3)
Lens case:	CL-31S; No. 61; CP-1



Nikkor 35mm f/2

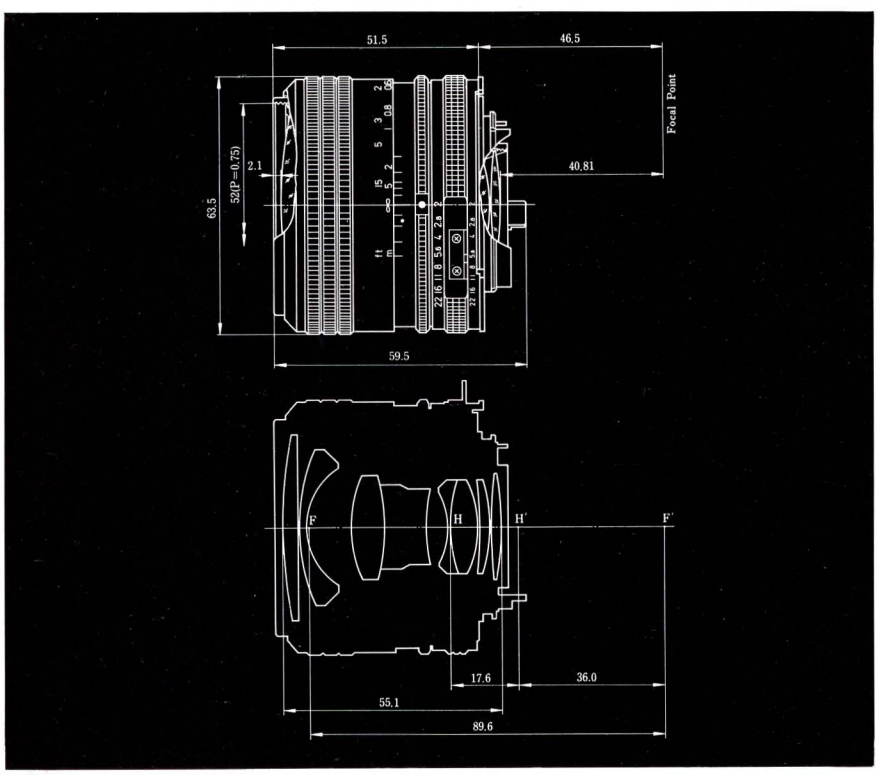
A Perfect Choice for One's First Wideangle

Sales Points

- Wide 62° picture coverage.
- Compact and lightweight—only 280 grams.
- Up to nearly 7X magnification when reverse-mounted on a bellows unit.
- Matches the coverage of most electronic flash units.
- Takes 52mm filters—the standard for most Nikkor lenses from 20 to 200mm.
- Photographic uses include photojournalism, landscapes, candids of people, sports, environmental portraiture, weddings, travel, backpacking, electronic flash photography, and available light shooting.

Specifications

Focal length/Aperture:	35mm f/2
Lens construction:	8 elements in 6 groups
Picture angle:	62°
Diaphragm:	Automatic
Aperture scale:	f/2 ~ f/22 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 0.3m (1 ft) to infinity (∞)
Weight:	280g
Dimensions:	63.5mm dia. x 59.5mm long (overall); 51.5mm extension from flange
Attachment size:	52mm (P = 0.75)
Front lens cap:	Snap-on
Lens hood:	Screw-in (HN-3)
Lens case:	CL-31S; No. 61; CP-1



Nikkor 35mm f/2.8

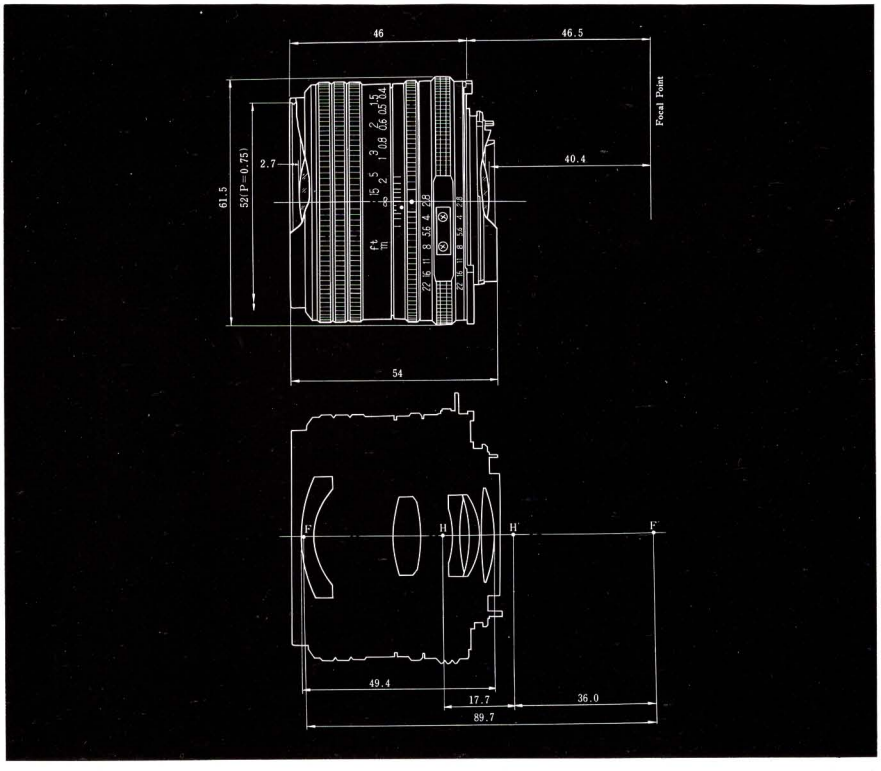
The Least Expensive Nikkor Wideangle

Sales Points

- Wide 62° picture coverage.
- Very compact and lightweight—only 240 grams.
- Up to nearly 7X magnification when reverse-mounted on a bellows unit.
- Matches the coverage of most electronic flash units.
- Takes 52mm filters—the standard for most Nikkor lenses from 20 to 200mm.
- Photographic uses include photojournalism, landscapes, candids of people, sports, environmental portraiture, weddings, travel, backpacking, and electronic flash photography.

Specifications

Focal length/Aperture:	35mm f/2.8
Lens construction:	5 elements in 5 groups
Picture angle:	62°
Diaphragm:	Automatic
Aperture scale:	f/2.8 ~ f/22 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 0.3m (1 ft) to infinity (∞)
Weight:	240g
Dimensions:	63.5mm dia. x 54.5mm long (overall); 44.5mm extension from flange
Attachment size:	52mm (P = 0.75)
Front lens cap:	Snap-on
Lens hood:	Screw-in (HN-3)
Lens case:	CL-30S; No. 61; CP-1



NORMAL

A normal lens is defined as one whose focal length closely approximates the diagonal dimension of the picture frame. In 35mm photography, lenses from 50~55mm are considered "normal," even though their focal lengths are somewhat longer than the 43mm diagonal of the 24 × 36mm format. In practical terms, a normal Nikkor lens is the single most useful one for the majority of shooting assignments.

Why? Because it "sees" the world the way we see it with objects from near to far in their normal size relationships. Thus, the perspective* produced looks natural or "normal." Another reason is its high speed. With maximum apertures from f/1.2~2, all four normal Nikkors produce a bright and easy-to-focus image in the viewfinder and permit the photographer to shoot in low-light situations without flash. And, by stopping down, normal lenses can be used in daylight for a variety of subjects, including scenics, parades, and people. A normal lens is also perfectly suited for full-length portraits in the studio or on location.

* Perspective is based entirely on camera-to-subject distance and really has nothing to do with focal length per se. However, in practice, normal focal length lenses, because of their angle of view, are usually used at normal shooting distances (i.e. 5 feet to infinity). Therefore, the perspective tends to look natural.

Nikkor 50mm f/1.2

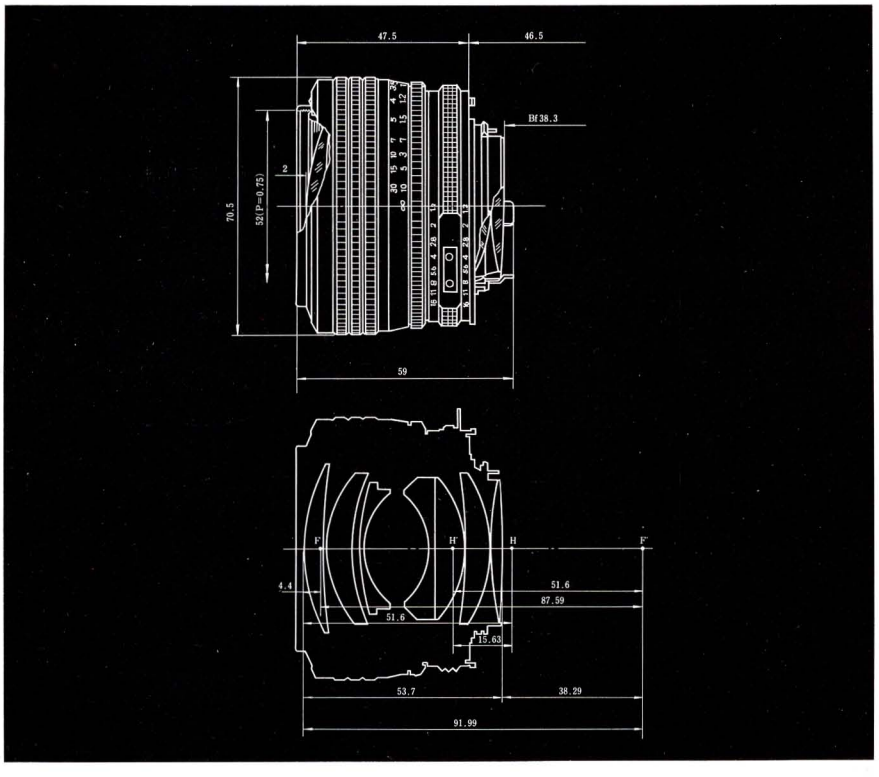
The Fastest Lens in the Nikkor Line

Sales Points

- Normal 46° picture coverage.
- Very large maximum aperture.
- Available light shooting capacity.
- Easy focusing and viewing in dim light.
- Takes 52mm filters—the standard for most Nikkor lenses from 20 to 200mm.
- Photographic uses include indoor and outdoor snapshots, landscapes, candids of people, electronic flash photography, travel, full-length portraits in the studio or on location, photojournalism, and available light shooting.

Specifications

Focal length/Aperture:	50mm f/1.2
Lens construction:	7 elements in 6 groups
Picture angle:	46°
Diaphragm:	Automatic
Aperture scale:	f/1.2 ~ f/16 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 0.5m (1.7 ft) to infinity (∞)
Weight:	390g
Dimensions:	70.5mm dia. x 59mm long (overall); 47.5mm extension from flange
Attachment size:	52mm (P = 0.75)
Front lens cap:	Snap-on
Lens hood:	Snap-on (HS-12), rubber screw-in (HR-2)
Lens case:	CL-34A; No. 61; CP-1



Nikkor 50mm f/1.4

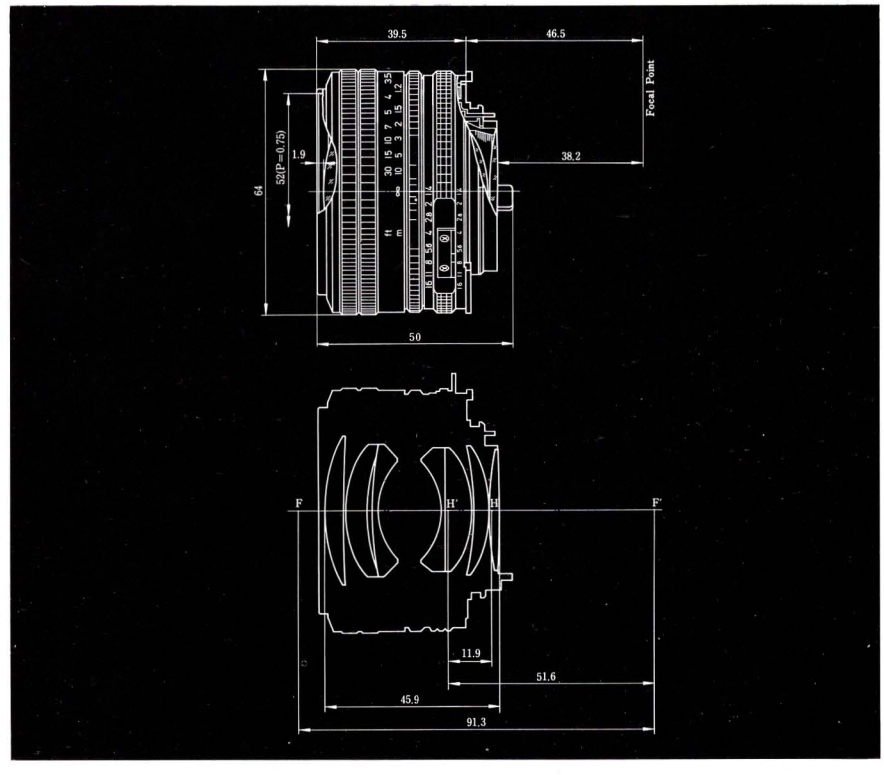
Ideal as a Photographer's First Lens

Sales Points

- Normal 46° picture angle.
- Large maximum aperture.
- Compact and lightweight—only 255 grams.
- Takes 52mm filters—the standard for most lenses from 20 to 200mm.
- Photographic uses include available light shooting, indoor or outdoor snapshots, landscapes, candids of people, travel, backpacking, electronic flash photography, photojournalism, and full-length portraits in the studio or on location.

Specifications

Focal length/Aperture:	50mm f/1.4
Lens construction:	7 elements in 6 groups
Picture angle:	46°
Diaphragm:	Automatic
Aperture scale:	f/1.4 ~ f/16 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 0.45m (1.5 ft) to infinity (∞)
Weight:	255g
Dimensions:	64mm dia. x 51.5mm long (overall); 39.5mm extension from flange
Attachment size:	52mm (P = 0.75)
Front lens cap:	Snap-on
Lens hood:	Snap-on (HS-9), rubber screw-in (HR-1)
Lens case:	CL-34A; No. 61; CP-1



Nikkor 50mm f/1.8

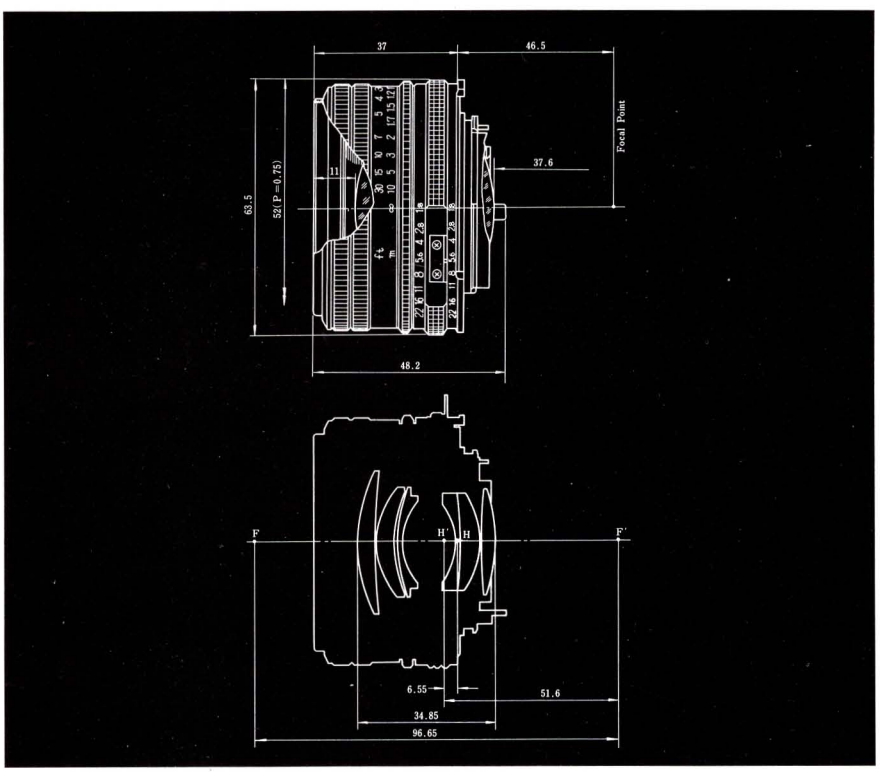
Nice Combination of Size, Weight, Price, Maximum Aperture and Angle of View

Sales Points

- Normal 46° picture angle.
- Very compact and lightweight—only 220 grams.
- Especially recommended for close-up and macrophotography using Nikon accessories.
- Takes 52mm filters—the standard for most Nikkor lenses from 20 to 200mm.
- Photographic uses include indoor and outdoor snapshots, landscapes, candids of people, travel, backpacking, photojournalism, electronic flash photography, available light shooting and full-length portraits in the studio or on location.

Specifications

Focal length/Aperture:	50mm f/1.8
Lens construction:	6 elements in 5 groups
Picture angle:	46°
Diaphragm:	Automatic
Aperture scale:	f/1.8 ~ f/22 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 0.45m (1.5 ft) to infinity (∞)
Weight:	220g
Dimensions:	63.5mm dia. x 48mm long (overall); 37mm extension from flange
Attachment size:	52mm (P = 0.75)
Front lens cap:	Snap-on
Lens hood:	Snap-on (HS-11), rubber screw-in (HR-1)
Lens case:	CL-34A; No. 61; CP-1



Nikkor 50mm f/2

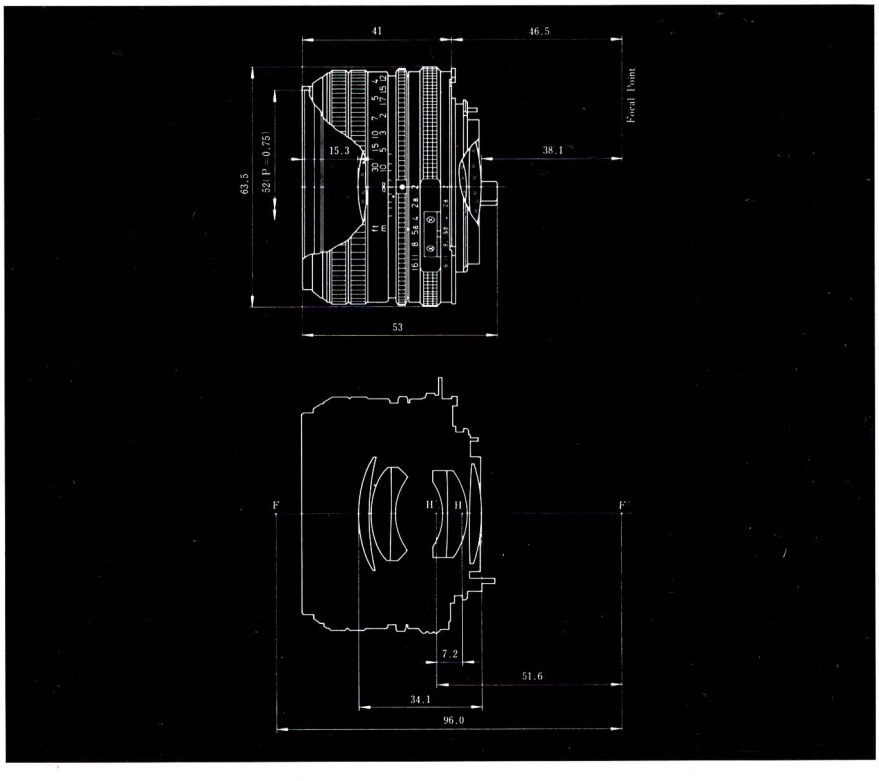
The Best Choice for the Budget-Minded Beginner

Sales Points

- Normal 46° picture angle.
- Very compact and lightweight—only 220 grams.
- Especially recommended for close-up and macrophotography using Nikon accessories.
- Takes 52mm filters—the standard for most Nikkor lenses from 20 to 200mm.
- Photographic uses include indoor and outdoor snapshots, landscapes, candids of people, travel, backpacking, photojournalism electronic flash photography, available light shooting and full-length portraits in the studio or on location.

Specifications

Focal length/Aperture:	50mm f/2
Lens construction:	6 elements in 4 groups
Picture angle:	46°
Diaphragm:	Automatic
Aperture scale:	f/2 ~ f/16 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 0.45m (1.5 ft) to infinity (∞)
Weight:	220g
Dimensions:	63.5mm dia. x 53mm long (overall); 41mm extension from flange
Attachment size:	52mm (P = 0.75)
Front lens cap:	Snap-on
Lens hood:	Snap-on (HS-6), rubber screw-in (HR-1)
Lens case:	CL-34A; No. 61; CP-1



TELEPHOTO

Nikon has eleven telephoto lenses ranging in focal length from 85 to 300mm. The fascination of a telephoto lens lies in its ability to pull in a distant scene. Thus, the photographer can fill up the frame with a subject, yet still keep his distance. When compared with wideangle or normal lenses, a telephoto has inherently less depth of field at each f/stop. By shooting at wide apertures, an experienced photographer can isolate the subject, while blurring out a distracting or unwanted background and/or foreground. This technique is called "selective focus" and is one of the telephoto lens' greatest advantages. Another characteristic of a telephoto lens is that it compresses the space between objects producing the impression of flattened perspective. Telephoto lenses in the 85 to 135mm range are superbly suited for head-and-shoulders portraits, distant landscapes, or for isolating important details in cityscapes. 180 to 300mm telephotos provide that "extra reach" so necessary when shooting sports, theatrical performances, or wildlife.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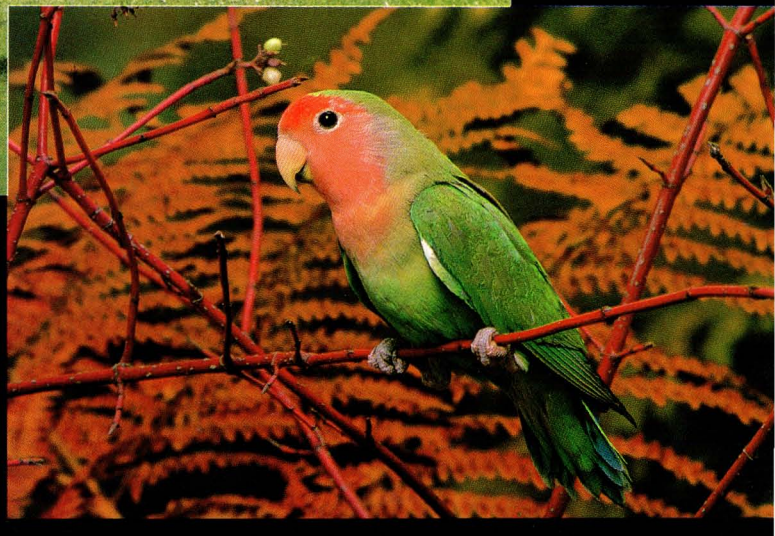
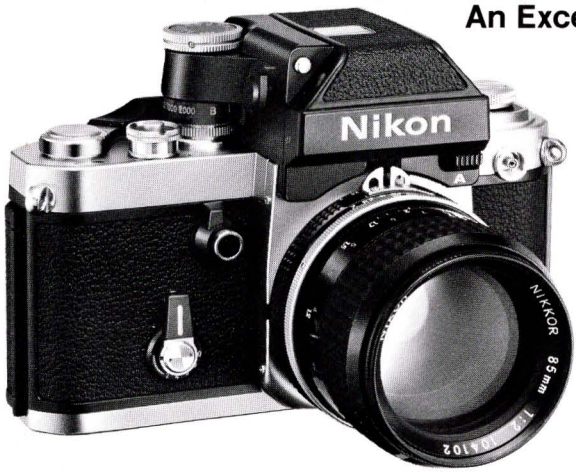


Nikkor 85mm f/2



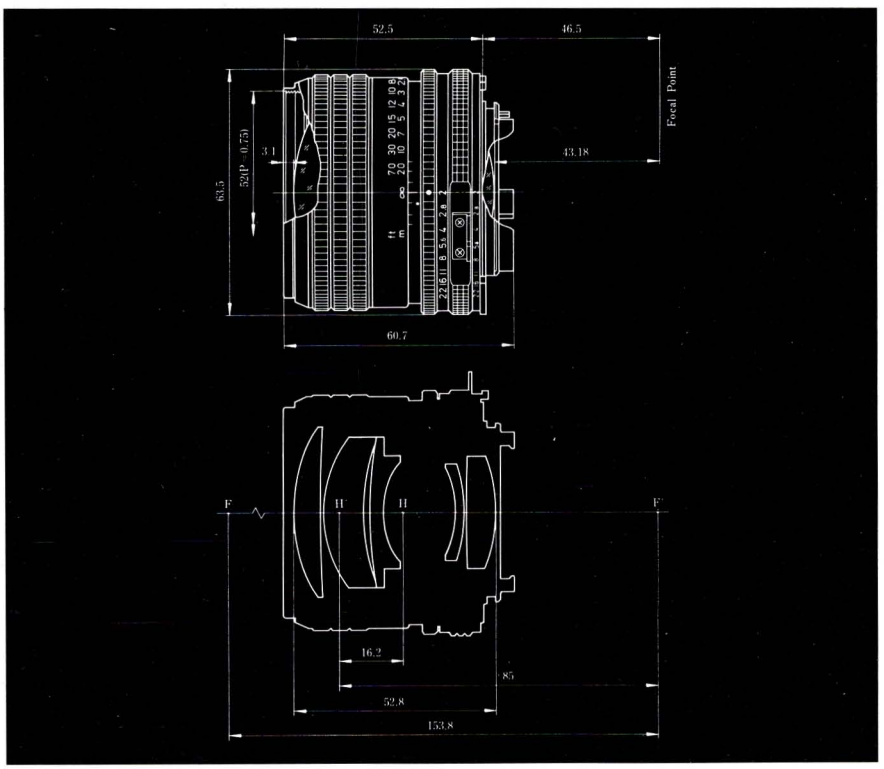
An Excellent Choice for One's First Telephoto

Sales Points

- Telephoto 28°30′ picture coverage.
- Large maximum aperture.
- Very compact and lightweight—only 310 grams.
- Focuses down to 3 feet (0.85m).
- Takes 52mm filters—the standard for most Nikkor lenses from 20 to 200mm.
- Supplied with a snap-on lens hood which can be stored in the reverse position.
- Photographic uses include head-and-shoulders portraits in the studio or on location, indoor and outdoor sports, travel, backpacking, photo-journalism, distant landscapes, available light shooting, candids of people, and electronic flash photography.

Specifications

Focal length/Aperture:	85mm f/2
Lens construction:	5 elements in 5 groups
Picture angle:	28°30′
Diaphragm:	Automatic
Aperture scale:	f/2 ~ f/22 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 0.85m (3 ft) to infinity (∞)
Weight:	310g
Dimensions:	63.5mm dia. x 61mm long (overall); 52.5mm extension from flange
Attachment size:	52mm (P = 0.75)
Front lens cap:	Snap-on
Lens hood:	Snap-on (HS-10)
Lens case:	CL-31S; No. 61; CP-1



Nikkor 105mm f/2.5

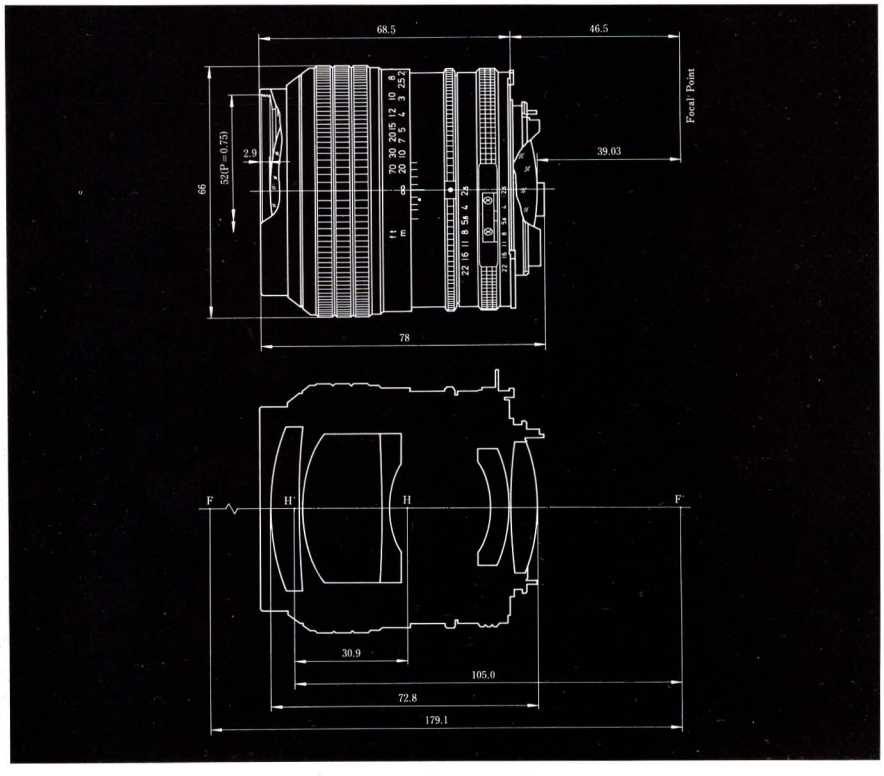
The "Portrait" Lens

Sales Points

- Telephoto 23°20′ picture coverage.
- Compact.
- Focuses down to 3½ feet (1m) from the film plane.
- Takes 52mm filters—the standard for most Nikkor lenses from 20 to 200mm.
- Supplied with a snap-on lens hood which can be stored in the reverse position.
- Photographic uses include head-and-shoulders portraits in the studio or on location, distant landscapes, photo-journalism, travel, backpacking, candids of people, and available light shooting.

Specifications

Focal length/Aperture:	105mm f/2.5
Lens construction:	5 elements in 4 groups
Picture angle:	23°20′
Diaphragm:	Automatic
Aperture scale:	f/2.5 ~ f/22 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 1m (3.5 ft) to infinity (∞)
Weight:	435g
Dimensions:	66mm dia. x 78mm long (overall); 68.5mm extension from flange
Attachment size:	52mm (P = 0.75)
Front lens cap:	Snap-on
Lens hood:	Snap-on (HS-8)
Lens case:	CL-32S; No. 62; CP-2



Nikkor 135mm f/2

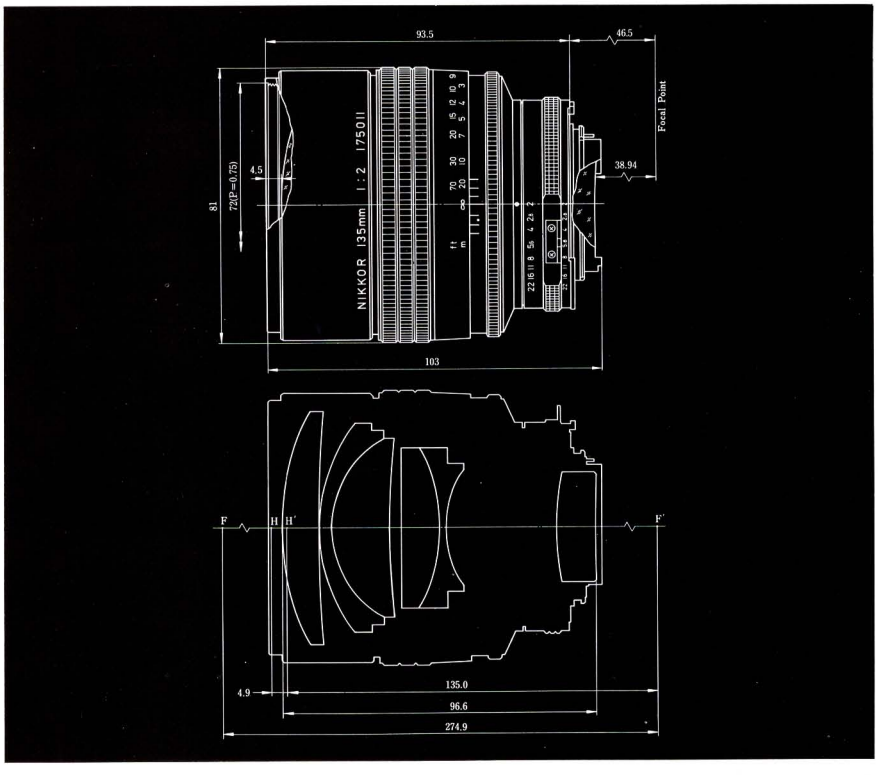
One of the Fastest 135mm's Around

Sales Points

- Telephoto 18° picture coverage.
- Very large maximum aperture.
- Built-in telescopic lens hood.
- Takes 72mm filters.
- Supplied with a 72mm screw-in front lens cap.
- Photographic uses include indoor or outdoor sports, stage shows, wildlife, photo-journalism, candids of people, and available light shooting.

Specifications

Focal length/Aperture:	135mm f/2
Lens construction:	6 elements in 4 groups
Picture angle:	18°
Diaphragm:	Automatic
Aperture scale:	f/2 ~ f/22 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 1.3m (4.5 ft) to infinity (∞)
Weight:	860g
Dimensions:	81mm dia. x 103mm long (overall); 93.5mm extension from flange
Attachment size:	72mm (P = 0.75)
Front lens cap:	Screw-in
Lens hood:	Built-in
Lens case:	CL-15; CL-62



Nikkor 135mm f/2.8

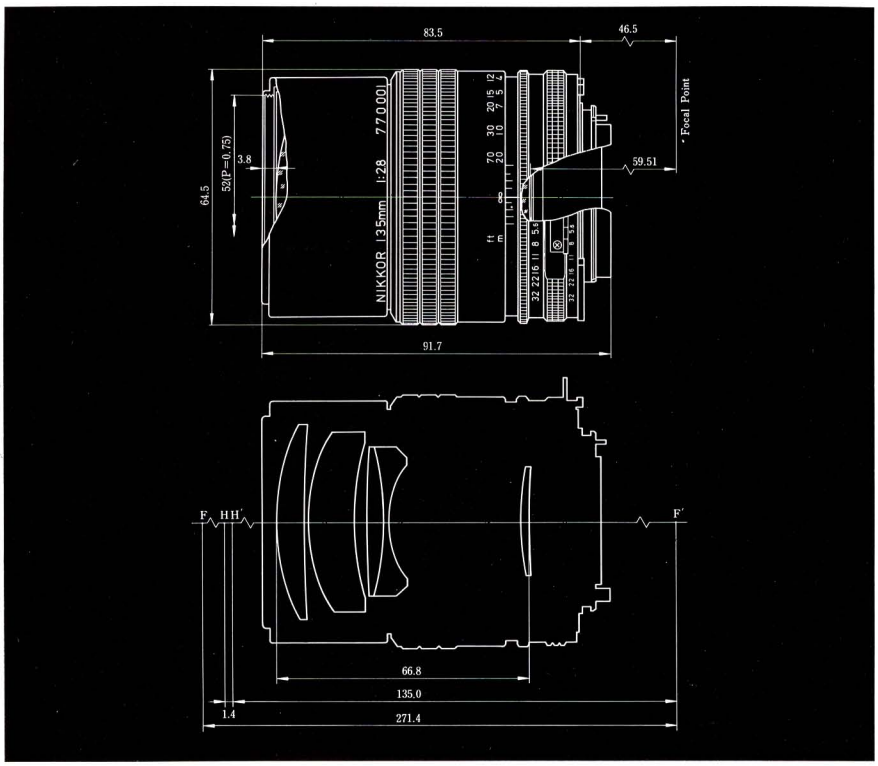
For the Photographer Who Wants to Carry Only One Telephoto

Sales Points

- Telephoto picture coverage of 18.°
- Very compact and lightweight.
- Stops down to f/32 for additional depth of field.
- Built-in telescopic lens hood.
- Takes 52mm filters—the standard for most Nikkor lenses from 20 to 200mm.
- Photographic uses include sports, stage shows, distant landscapes, photojournalism, travel, backpacking, wildlife, available light shooting, and candids of people.

Specifications

Focal length/Aperture:	135mm f/2.8
Lens construction:	5 elements in 4 groups
Picture angle:	18°
Diaphragm:	Automatic
Aperture scale:	f/2.8 ~ f/32 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 1.3m (4.5 ft) to infinity (∞)
Weight:	430g
Dimensions:	64.5mm dia. x 91.5mm long (overall); 83.5mm extension from flange
Attachment size:	52mm (P = 0.75)
Front lens cap:	Snap-on
Lens hood:	Built-in
Lens case:	CL-32S; No. 62; CP-2



Nikkor 135mm f/3.5

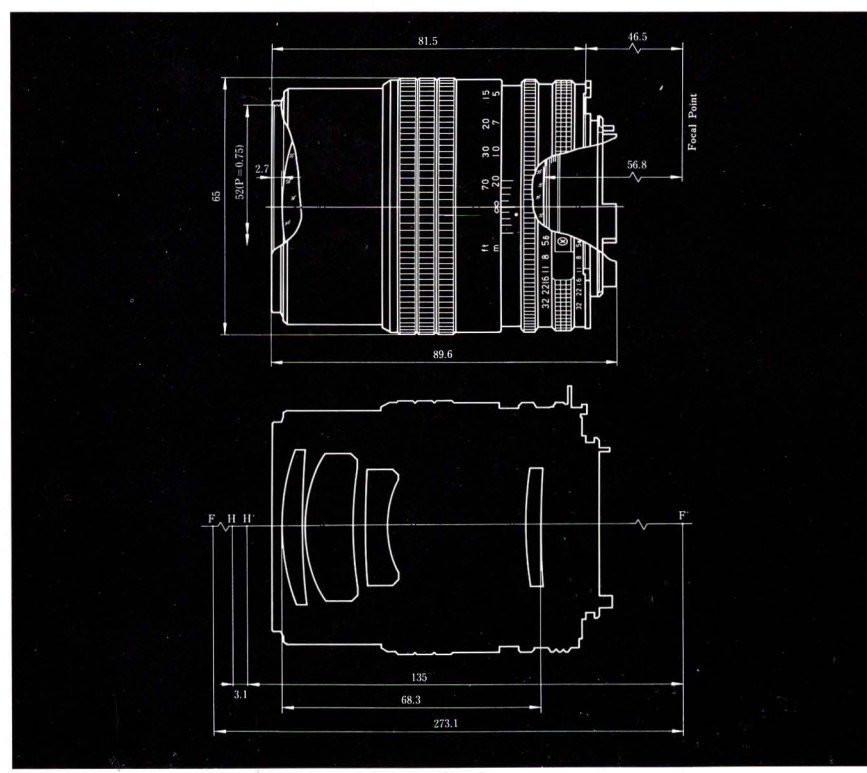
Perfect Telephoto for Travel and Backpacking

Sales Points

- Telephoto picture coverage of 18.°
- Very compact and lightweight—only 400 grams.
- Stops down to f/32 for additional depth of field.
- Built-in telescopic lens hood.
- Takes 52mm filters—the standard for most Nikkor lenses from 20 to 200mm.
- Photographic uses include sports, stage shows, distant landscapes, photojournalism, travel, backpacking, and candids of people.

Specifications

Focal length/Aperture:	135mm f/3.5
Lens construction:	4 elements in 4 groups
Picture angle:	18°
Diaphragm:	Automatic
Aperture scale:	f/3.5 ~ f/32 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 1.3m (4.5 ft) to infinity (∞)
Weight:	400g
Dimensions:	65mm dia. x 89.5mm long (overall); 81.5mm extension from flange
Attachment size:	52mm (P = 0.75)
Front lens cap:	Snap-on
Lens hood:	Built-in
Lens case:	U-32S; No. 62; CP-2



Nikkor 180mm f/2.8

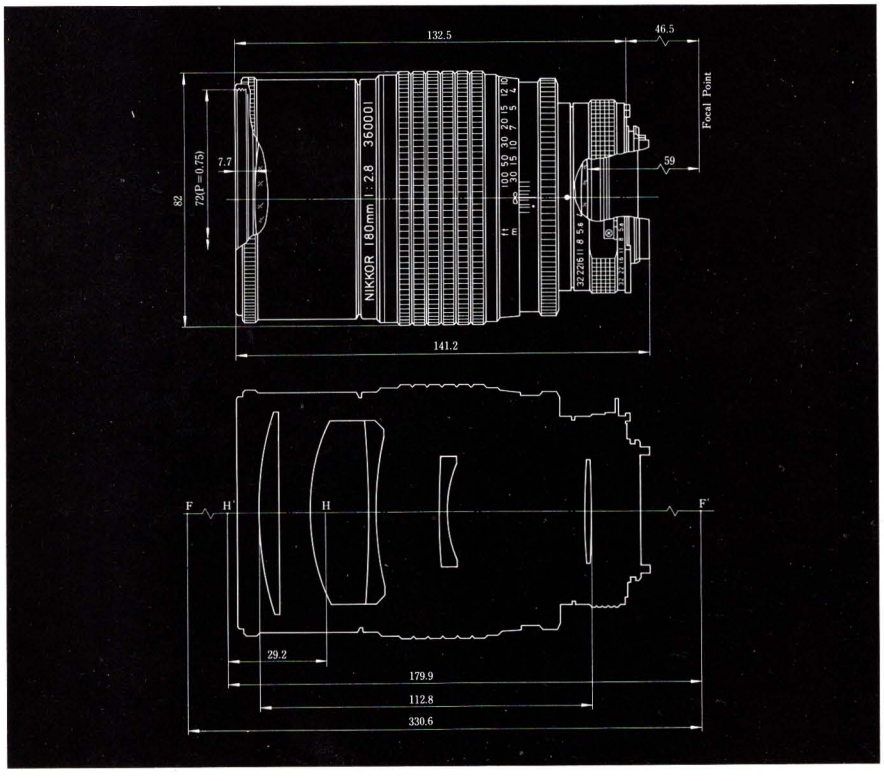
Ideal for Shooting Indoor Sporting Events or Stage Shows

Sales Points

- Telephoto picture coverage of 13°40′.
- Large maximum aperture.
- Built-in telescopic lens hood.
- Focuses down to 6 feet (1.8m).
- Stops down to f/32 for additional depth of field.
- Takes 72mm filters.
- Supplied with a 72mm screw-in lens cap and hard lens case.
- Photographic uses include indoor or outdoor sports, stage shows, wildlife, photojournalism, candids of people, and available light photography.

Specifications

Focal length/Aperture:	180mm f/2.8
Lens construction:	5 elements in 4 groups
Picture angle:	13°40′
Diaphragm:	Automatic
Aperture scale:	f/2.8 ~ f/32 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 1.8m (6 ft) to infinity (∞)
Weight:	880g
Dimensions:	82mm dia. x 141mm long (overall); 132.5mm extension from flange
Attachment size:	72mm (P = 0.75)
Front lens cap:	Screw-in
Lens hood:	Built-in
Lens case:	CL-35A (provided); No. 63



Nikkor 200mm f/4

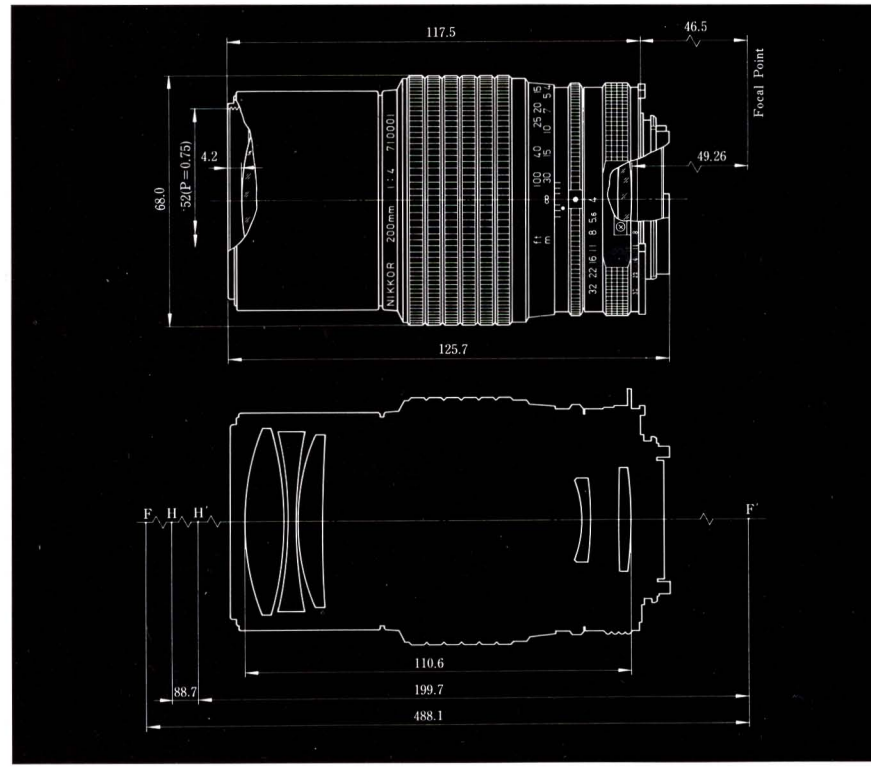
A Compact Version of One of the Most Popular Telephoto Lenses in 35mm Photography

Sales Points

- Telephoto picture coverage of 12°20′
- Lightweight—only 530 grams.
- Built-in telescopic lens hood.
- Stops down to f/32 for additional depth of field.
- Takes 52mm filters—the standard for most Nikkor lenses from 20 to 200mm.
- Photographic uses include sports, photojournalism, travel, backpacking, candids of people, and wildlife.

Specifications

Focal length/Aperture:	200mm f/4
Lens construction:	5 elements in 5 groups
Picture angle:	12°20′
Diaphragm:	Automatic
Aperture scale:	f/4 ~ f/32 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 2m (7 ft) to infinity (∞)
Weight:	530g
Dimensions:	68mm dia. x 126mm long (overall); 118mm extension from flange
Attachment size:	52mm (P = 0.75)
Front lens cap:	Snap-on
Lens hood:	Built-in
Lens case:	CL-13; No. 56



Nikkor 300mm f/2.8 IF-ED

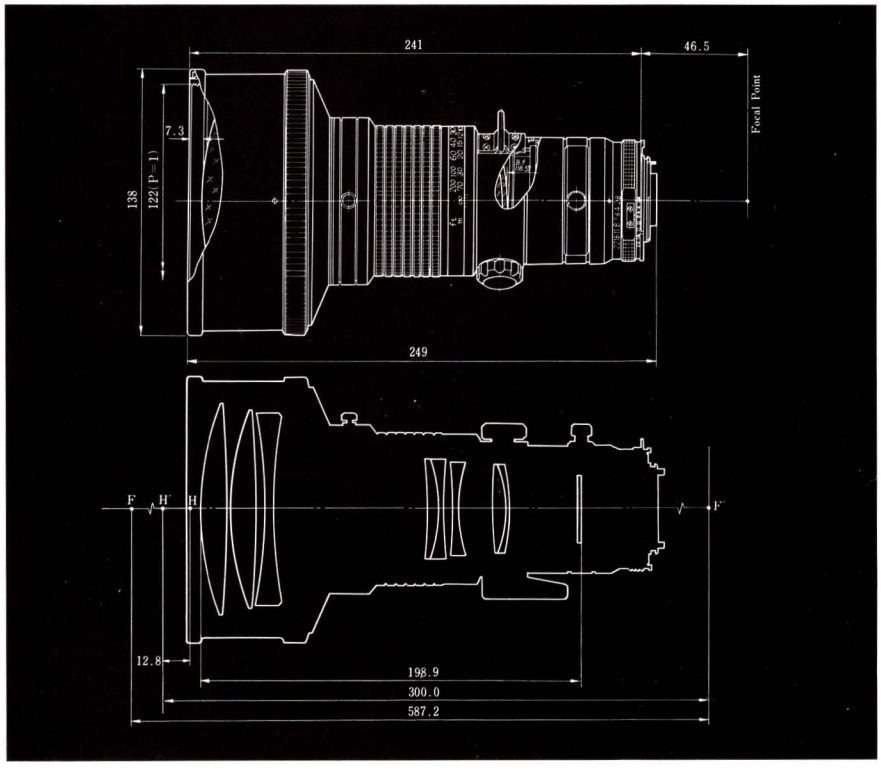
One of the Fastest 300mm's Around

Sales Points

- Telephoto picture coverage of 8° 10′.
- Internal Focusing (IF) design for easy handling.
- Extra-Low Dispersion (ED) glass for outstanding picture quality.
- Focusing ring allows adjustment to a particular click-stop setting for rapid refocusing.
- Special slip-in filter holder accepts 39mm screw-in filters.
- Built-in telescopic lens hood and rotatable tripod socket collar.
- Supplied with a screw-in front lens cap and hard lens case.
- Photographic uses include photojournalism, sports, wildlife, stage shows, and available light shooting.

Specifications

Focal length/Aperture:	300mm f/2.8 IF-ED
Lens construction:	8 elements in 6 groups
Picture angle:	8° 10′
Diaphragm:	Automatic
Aperture scale:	f/2.8 ~ f/22 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 4m (13 ft) to infinity (∞)
Weight:	2.5kg
Dimensions:	138mm dia. x 249mm long (overall); 241mm extension from flange
Attachment size:	122mm (P = 1)
Front lens cap:	Slip-on
Lens hood:	Built-in
Lens case:	CL-63 (provided); No. 57



Nikkor 300mm f/4.5 IF-ED

Exceptionally Compact and Lightweight for Its Focal Length

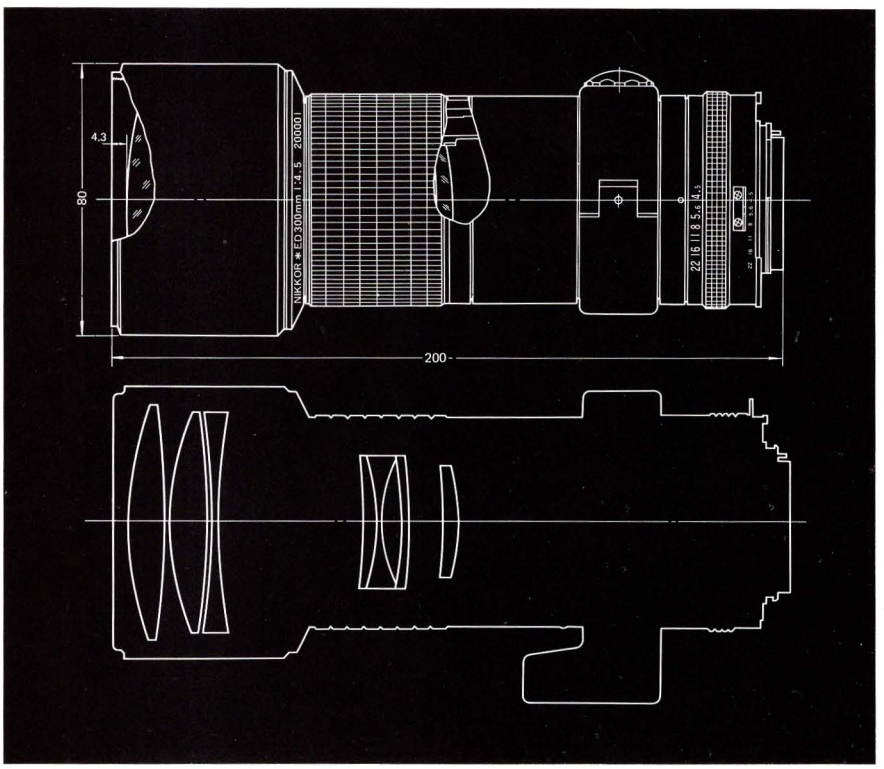
Sales Points

- Telephoto picture coverage of 8° 10′.
- Internal Focusing (IF) design for easy handling and smooth focusing down to a close 10 feet (2.5m).
- Extra-Low Dispersion (ED) glass for outstanding picture quality.
- Very lightweight—only 990 grams.
- Built-in telescopic lens hood and rotating tripod socket.
- Takes 72mm filters.
- Photographic uses include sports, wildlife, photojournalism, and travel photography.

Specifications

Focal length/Aperture:	300mm f/4.5
Lens construction:	7 elements in 6 groups
Picture angle:	8° 10′
Diaphragm:	Automatic
Aperture scale:	f/4.5 ~ f/22 on both standard and aperture-direct-readout scales
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 2.5m (10 ft) to infinity (∞)
Weight:	990g
Dimensions:	80mm dia. x 200mm long (overall); 192mm extension from flange
Attachment size:	72mm (P = 0.75mm)
Front lens cap:	Screw-in
Lens hood:	Built-in
Lens case:	CL-20A

Note: Rotatable tripod collar provided.



Nikkor 300mm f/4.5

A Powerful Telephoto in a Portable Package

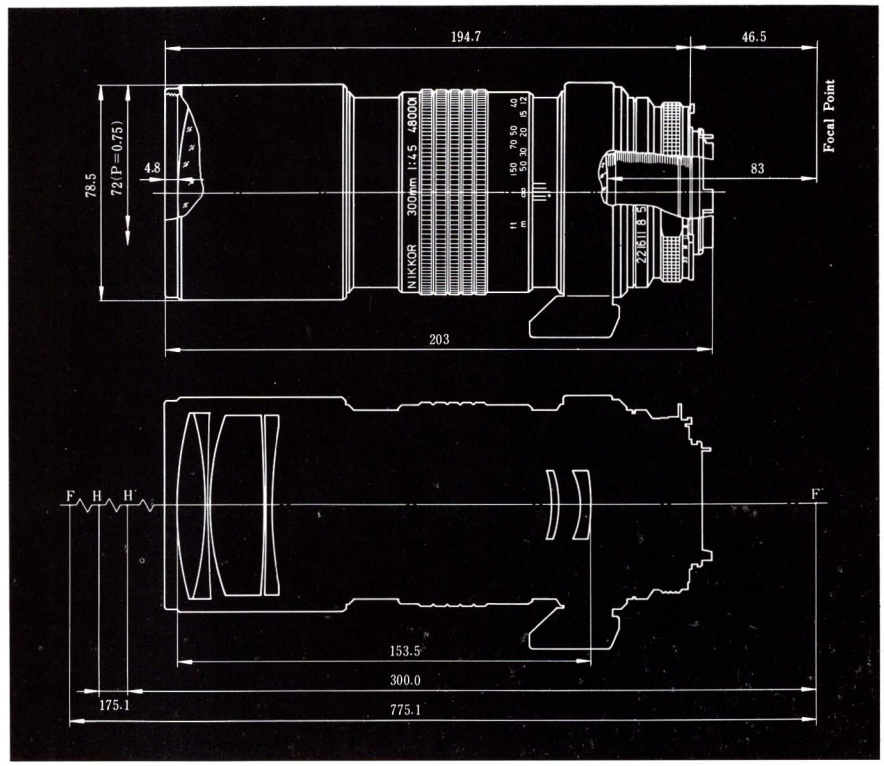
Sales Points

- Telephoto picture coverage of 8°10′.
- Built-in telescopic lens hood and rotatable tripod socket.
- Focuses down to 13 feet (4m).
- Takes 72mm filters.
- Supplied with a 72mm screw-in front lens cap.
- Photographic uses include sports, wildlife, photojournalism, and travel photography.

Specifications

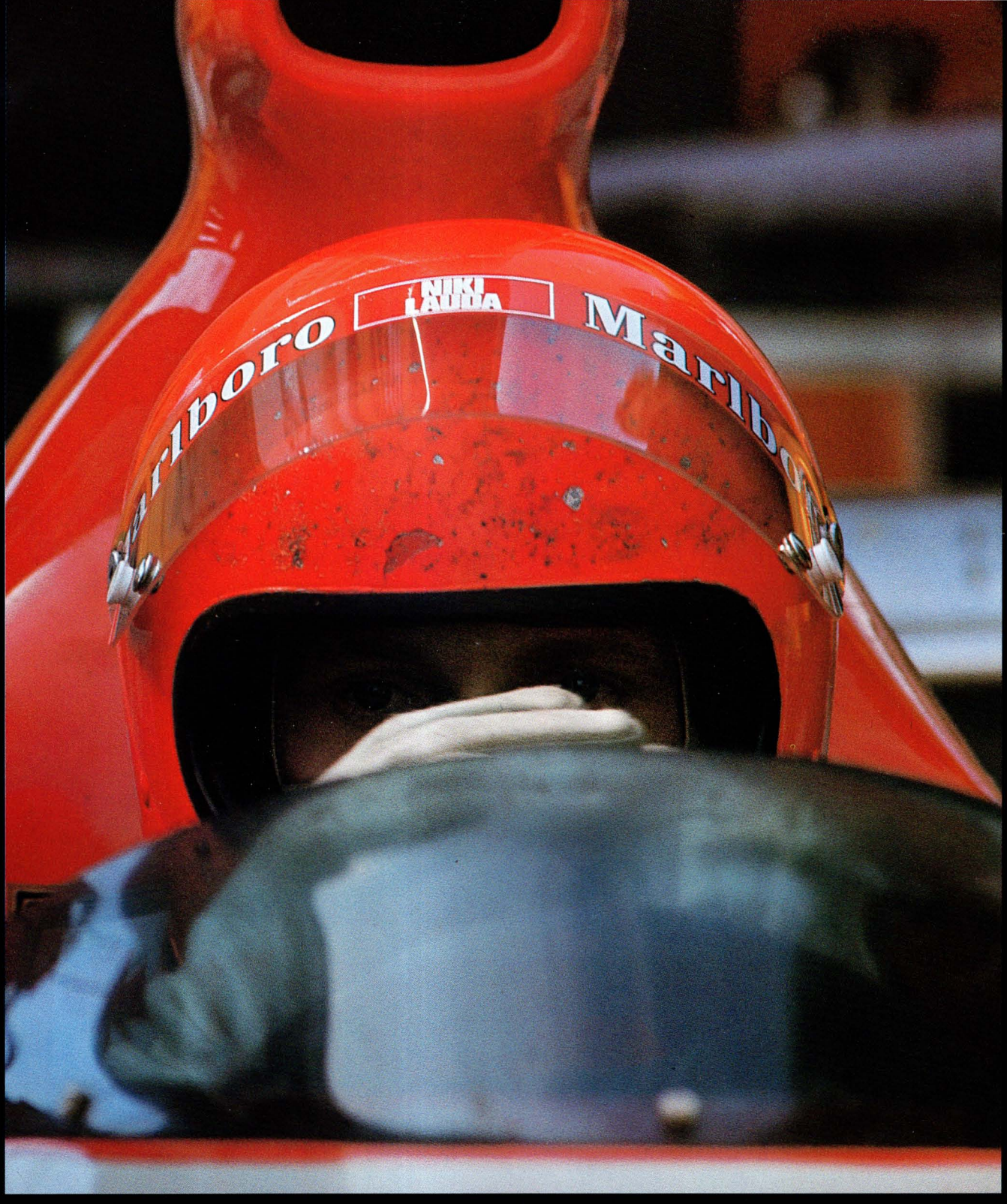
Focal length/Aperture:	300mm f/4.5
Lens construction:	6 elements in 5 groups
Picture angle:	8°10′
Diaphragm:	Automatic
Aperture scale:	f/4.5 ~ f/22 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 4m (13 ft) to infinity (∞)
Weight:	1.1kg
Dimensions:	78.5mm dia. x 203mm long (overall); 195mm extension from flange
Attachment size:	72mm (P = 0.75)
Front lens cap:	Screw-in
Lens hood:	Built-in
Lens case:	CL-20A

Note: Rotatable tripod collar provided.



SUPER-TELEPHOTO

When it's physically impossible to approach the subject, either because of the danger involved (as when photographing a rocket launch), or because there is something in the way (like a body of water), then a super-telephoto lens is indispensible. With focal lengths of 400mm and above, Nikon's six super-telephotos have all the same characteristics of telephoto lenses, only to a greater degree. They have extremely narrow angles of view of just a few degrees, and depth of field is limited almost to the plane of focus unless the lens is stopped-down to f/22 or f/32. In addition, they compress space to the point where objects that are in reality separated by great distances appear to be stacked right behind one another. In the hands of a creative photographer, a super-telephoto lens is a formidable, yet totally harmless, weapon for shooting big game in Africa, or simply for capturing the private mood of the pretty girl across the street.


NIKI
LAUDA
Marlboro

Nikkor 400mm f/3.5 IF-ED

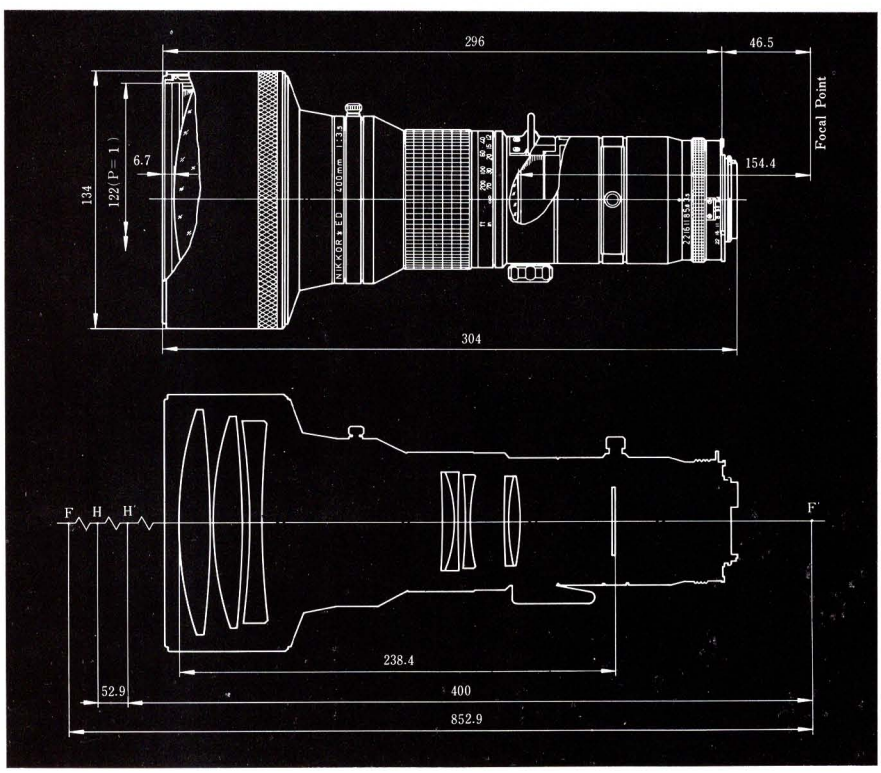
Fastest 400mm on the Market Today

Sales Points

- Super-telephoto picture coverage of 6° 10′ (Approx. 8X image magnification when compared to a normal lens)
- Internal Focusing (IF) design for easy handling and smooth focusing down to 14 feet (4.5m).
- Extra-Low Dispersion (ED) glass for outstanding picture quality.
- Focusing ring allows adjustment to a particular click-stop setting for rapid refocusing.
- Special slip-in filter holder accepts 39mm screw-in filters.
- Built-in telescopic lens hood and rotatable tripod socket collar. collar.
- Supplied with a screw-in front lens cap and hard lens case.
- Photographic uses include photojournalism, wildlife sports, stage shows, and available light photography.

Specifications

Focal length/Aperture:	400mm f/3.5 IF-ED
Lens construction:	8 elements in 6 groups
Picture angle:	6°10′
Diaphragm:	Automatic
Aperture scale:	f/3.5 ~ f/22 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 4.5m (14 ft) to infinity (∞)
Weight:	2.8kg
Dimensions:	134mm dia. x 304mm long (overall); 296mm extension from flange
Attachment size:	122mm (P = 1)
Front lens cap:	Screw-in
Lens hood:	Built-in
Lens case:	CL-61 (provided); No. 57



Nikkor 400mm f/4.5

Convenient Interchangeable Super-Telephoto Lens Head Using Nikon Focusing Unit

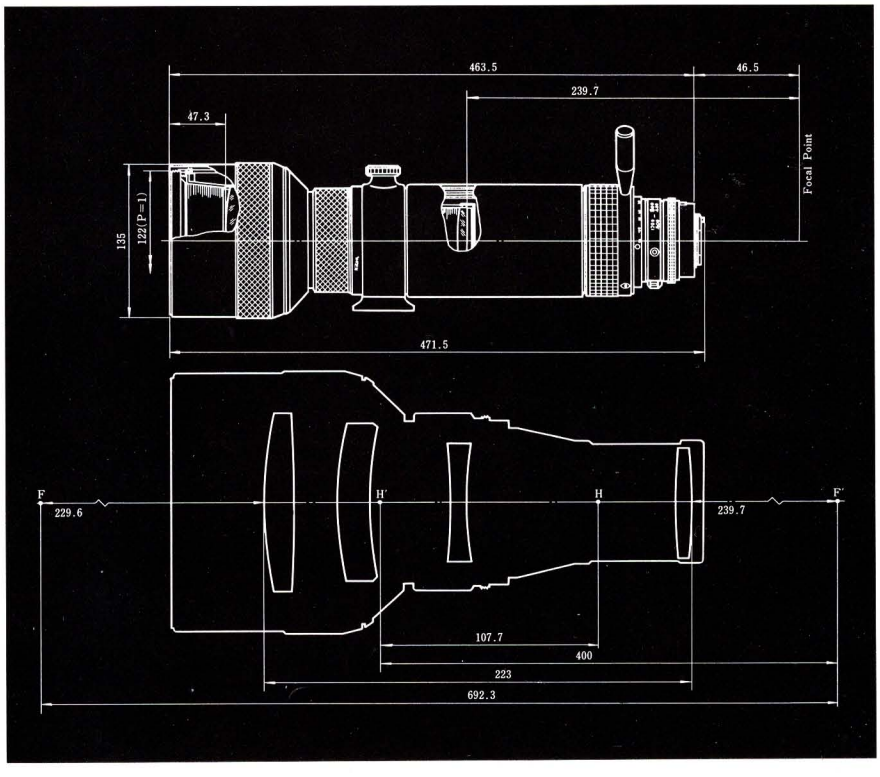
Sales Points

- Super-telephoto picture coverage of 6° 10′.
- Automatic diaphragm.
- Detachable focusing handle with two screw-in positions for rapid focusing.
- Built-in telescopic lens hood and rotatable tripod socket collar.
- Special slip-in filter holder accepts standard 52mm screw-in filters.
- Supplied with a screw-in front lens cap and leather slip-on rear lens cap.
- Photographic uses include photojournalism, sports, and wildlife.

Specifications

Focal length/Aperture:	400mm f/4.5
Lens construction:	4 elements in 4 groups
Picture angle:	6° 10′
Diaphragm:	Automatic
Aperture scale:	f/4.5 ~ f/22 on both standard and aperture-direct-readout scale
Exposure measurement:	Via stop-down method
Distance scale:	Graduated in meters and feet from 5.5m (18 ft) to infinity (∞)
Weight:	1.9kg, 4.3kg*
Dimensions:	135mm dia. x 276 (472)mm long (overall); 464mm* extension from flange
Attachment size:	122mm (P = 1)
Front lens cap:	Screw-in
Lens hood:	Built-in
Lens case:	CE-5*

* With Focusing Unit AU-1



Nikkor 400mm f/5.6 ED

A Super-Telephoto Light and Compact Enough to Handhold

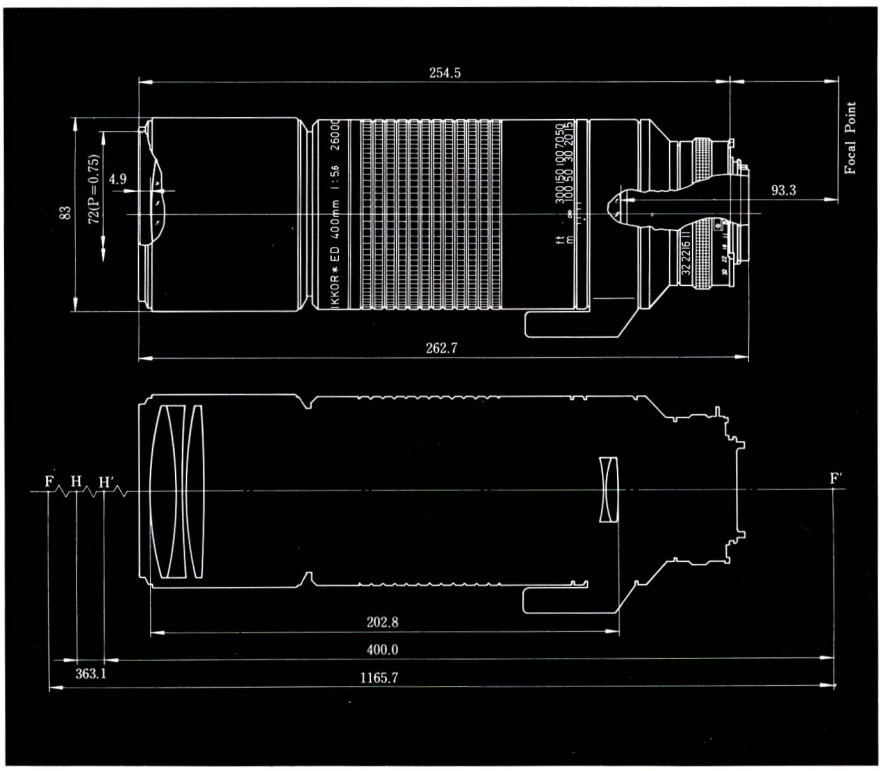
Sales Points

- Super-telephoto picture coverage of 6° 10′.
- Extra-Low Dispersion (ED) glass for outstanding picture quality.
- Built-in telescopic lens hood and rotatable tripod socket.
- Takes 72mm filters.
- Supplied with a 72mm screw-in front lens cap.
- Photographic uses include sports, wildlife, photojournalism, and travel photography.

Specifications

Focal length/Aperture:	400mm f/5.6 ED
Lens construction:	5 elements in 3 groups
Picture angle:	6° 10′
Diaphragm:	Automatic
Aperture scale:	f/5.6 ~ f/32 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 5m (16 ft) to infinity (∞)
Weight:	1.4kg
Dimensions:	83mm dia. x 263mm long (overall); 255mm extension from flange
Attachment size:	72mm (P = 0.75)
Front lens cap:	Screw-in
Lens hood:	Built-in
Lens case:	CL-27A

Note: Rotatable tripod collar provided.



Nikkor 400mm f/5.6 IF-ED

One of the Lightest 400mm's Around

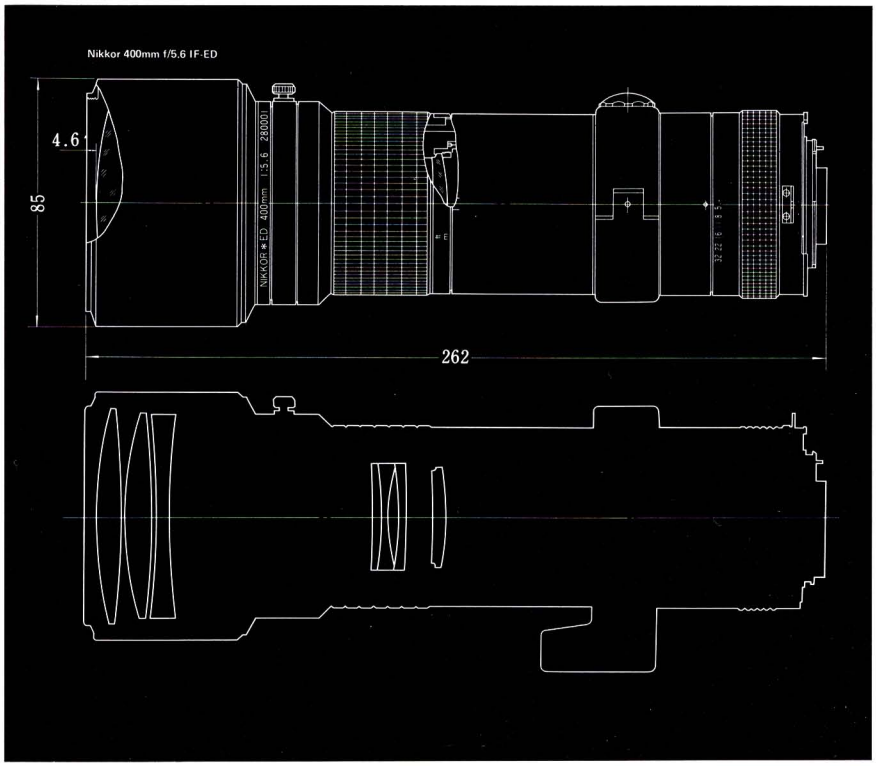
Sales Points

- Super-telephoto picture coverage of 6° 10′.
- Internal Focusing (IF) design for easy handling and smooth focusing down to 15 feet (4m).
- Extra-Low Dispersion (ED) glass for outstanding picture quality.
- Focusing ring allows adjustment to a particular click-stop setting for rapid refocusing.
- Built-in telescopic lens hood and rotatable tripod socket.
- Takes 72mm filters.
- Photographic uses include sports, wildlife, photojournalism, and travel photography.

Specifications

Focal length/Aperture:	400mm f/5.6
Lens construction:	7 elements in 6 groups
Picture angle:	6° 10′
Diaphragm:	Automatic
Aperture scale:	f/5.6 ~ f/32 on both standard and aperature-direct-readout scale
Exposure measurement:	Via full aperture measurement; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 4m (15 ft) to infinity (∞)
Weight:	1.2kg
Dimensions:	85mm dia. x 262mm long (overall); 254mm extension from flange
Attachment size:	72mm (P = 0.75mm)
Front lens cap:	Screw-in
Lens hood:	Built-in
Lens case:	CL-27A

Note: Rotatable tripod collar provided.



Nikkor 600mm f/5.6

Interchangeable Super-Telephoto Lens Head Using Nikon Focusing Unit

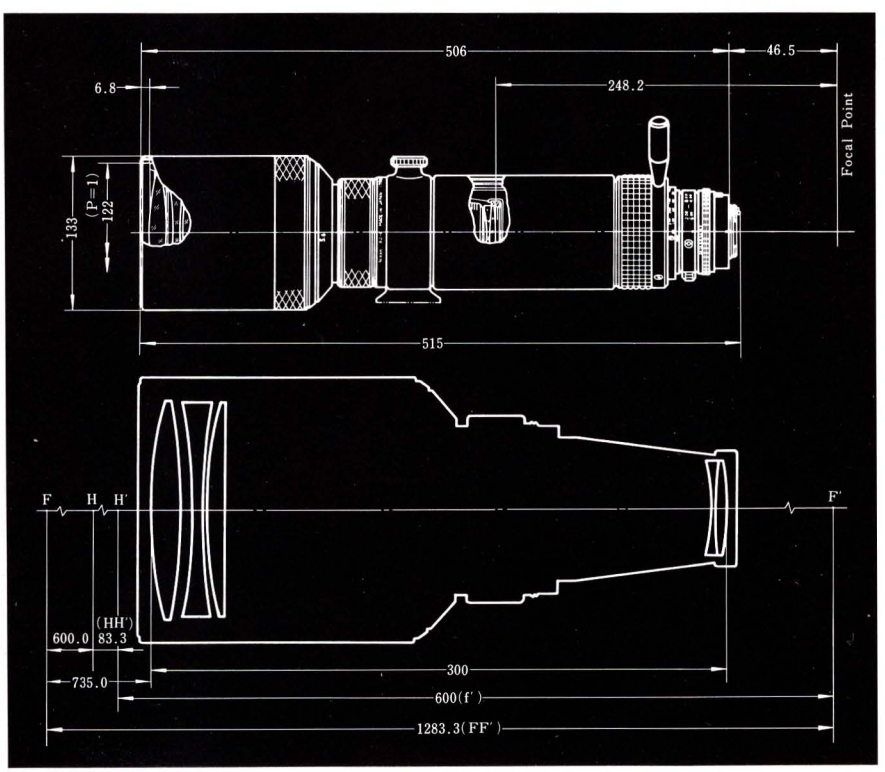
Sales Points

- Super-telephoto picture coverage of 4°10′.
- Automatic diaphragm.
- Detachable focusing handle with two screw-in positions for rapid focusing.
- Built-in telescopic lens hood and rotatable tripod socket collar.
- Special slip-in filter holder accepts standard 52mm screw-in filters.
- Supplied with a screw-in front lens cap and leather slip-on rear lens cap.
- Photographic uses include photojournalism, sports, wildlife, and special effects.

Specifications

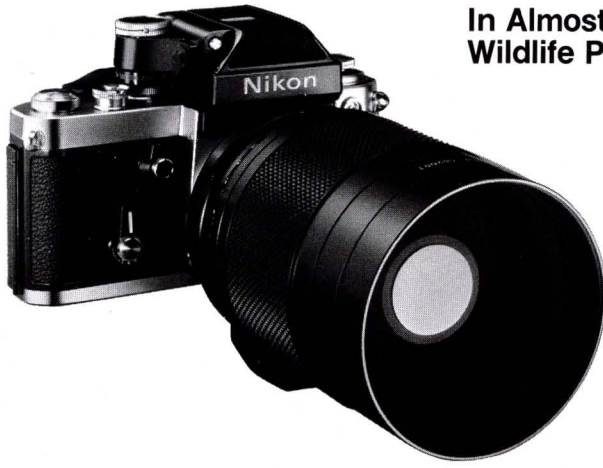
Focal length/Aperture:	600mm f/5.6
Lens construction:	5 elements in 4 groups
Picture angle:	4°10′
Diaphragm:	Automatic
Aperture scale:	f/5.6 ~ f/22 on both standard and aperture-direct-readout scale
Exposure measurement:	Via stop-down method
Distance scale:	Graduated in meters and feet from 5m (16 ft) to infinity (∞)
Weight:	2.4kg, 4.8kg*
Dimensions:	135mm dia. x 297 (517)mm long (overall); 509mm* extension from flange
Attachment size:	122mm (P = 1)
Front lens cap:	Screw-in
Lens hood:	Built-in
Lens case:	CE-5*

* With Focusing Unit AU-1



REFLEX By using a combination of mirrors and lens elements to fold the optical path of light back and forth inside the lens, a reflex or "mirror" super-telephoto is able to pack an extra-long focal length into a relatively short lens barrel. And a short lens barrel means compactness and light weight, two qualities which endear the mirror lens to newspaper, sports, and wildlife photographers around the world. As an added benefit, the optical design of a reflex lens overcomes one of the telephoto's biggest shortcomings—chromatic aberration, or the inability of a lens to bring all wavelengths of visible light (especially red and blue) into the same plane of focus. Another optical characteristic of a mirror lens is that it can transform out-of-focus points of light into unique doughnut-shaped blurs, making it the perfect lens for creating striking renditions of night lights or back-lit seascapes. As you might expect from the leader in 35mm optics, Nikon makes *three* mirror lenses in focal lengths of 500, 1000, and 2000mm to match any super-telephoto requirement.

Reflex-Nikkor 500mm f/8



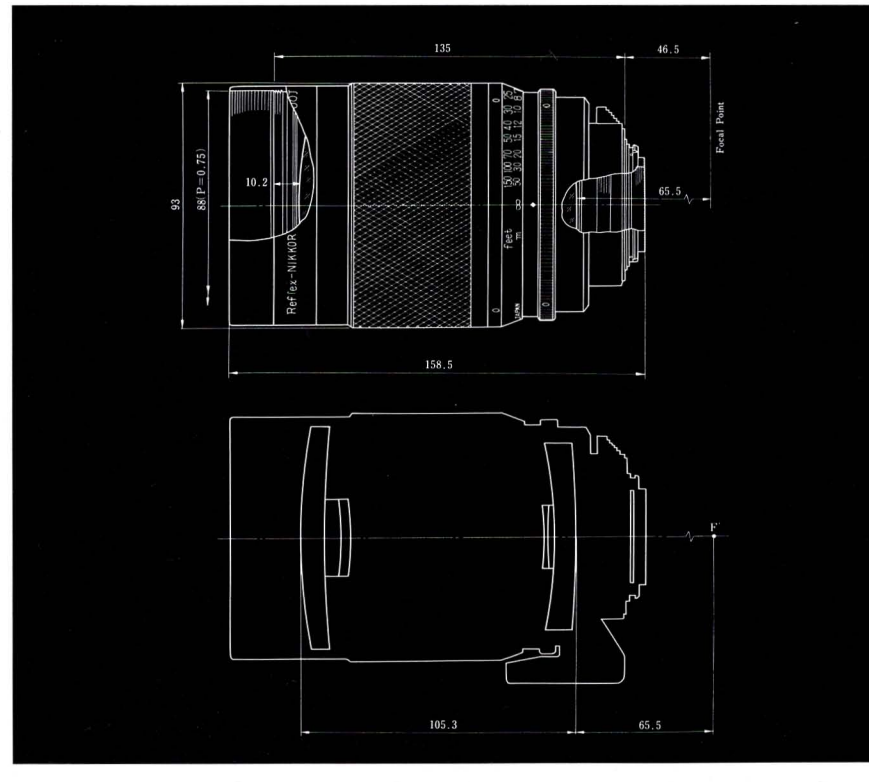
In Almost Every Photojournalist's and Wildlife Photographer's Camera Bag

Sales Points

- Super-telephoto picture coverage of 5°.
- Extremely compact and lightweight for its focal length.
- Focuses down to a close 13 feet (4m).
- Screw-in lens hood and rotatable tripod socket.
- Supplied with a set of five 39mm rear screw-in filters (ultraviolet, yellow, orange, red, and 4X neutral density), screw-in front lens cap, and hard lens case.
- Photographic uses include photojournalism, sports, and wildlife.

Specifications

Focal length/Aperture:	500mm f/8
Lens construction:	5 elements in 3 groups
Picture angle:	5°
Exposure measurement:	Via stop-down method
Distance scale:	Graduated in meters and feet from 4m (13 ft) to infinity (∞)
Weight:	1kg
Dimensions:	93mm dia. x 142mm long (overall); 135mm extension extension from flange
Filters	Screw-in
Front lens cap:	Screw-in
Lens hood:	Screw-in
Lens case:	CL-23 (provided)



Reflex-Nikkor 1000mm f/11

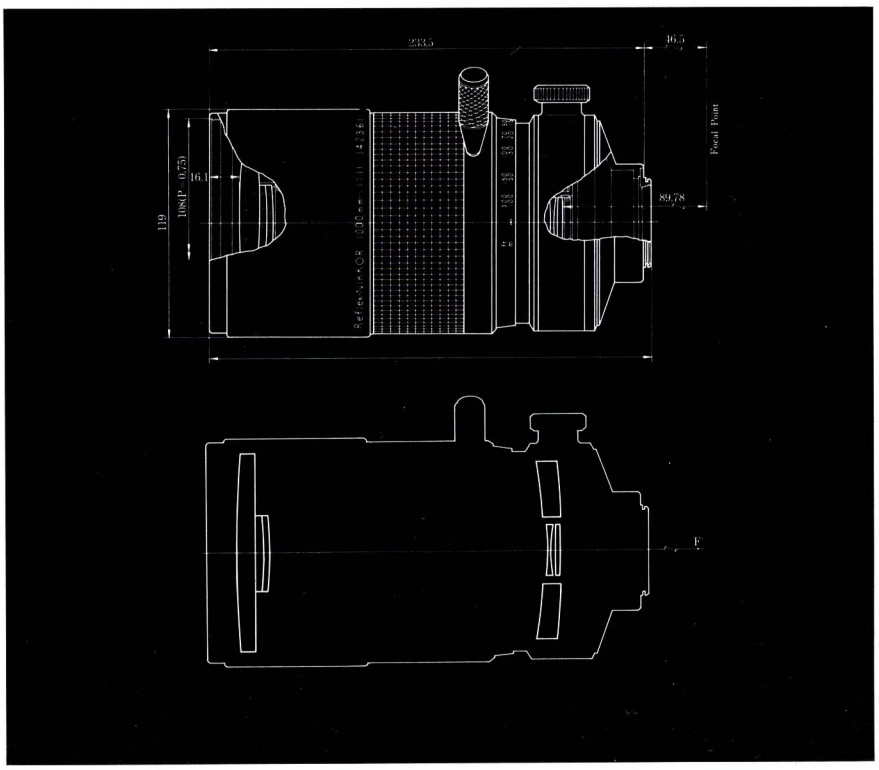
Ideal for Wildlife Photography of Shy or Dangerous Subjects

Sales Points

- Super-telephoto picture coverage of only 2°30′.
- Very compact and lightweight for its focal length.
- Detachable focusing handle with two screw-in positions for rapid focusing down to 25 feet (8m).
- Built-in telescopic lens hood and rotatable tripod mounting collar.
- Supplied with a set of five 39mm rear screw-in filters (ultraviolet, light amber, light blue, orange, and 4X neutral density), filter case, leather slip-on front lens cap, and hard lens case.
- Photographic uses include photojournalism, sports, wildlife, solar and lunar photography, and special effects.

Specifications

Focal length/Aperture:	1000mm f/11
Lens construction:	5 elements in 5 groups
Picture angle:	2°30′
Exposure measurement:	Via stop-down method
Distance scale:	Graduated in meters and feet from 8m (25 ft) to infinity (∞)
Weight:	1.9kg
Dimensions:	119mm dia. x 241mm long (overall); 233.5mm extension from flange
Filters:	Screw-in
Front lens cap:	Slip-on
Lens hood:	Built-in
Lens case	CL-29 (provided)



Reflex-Nikkor 2000mm f/11

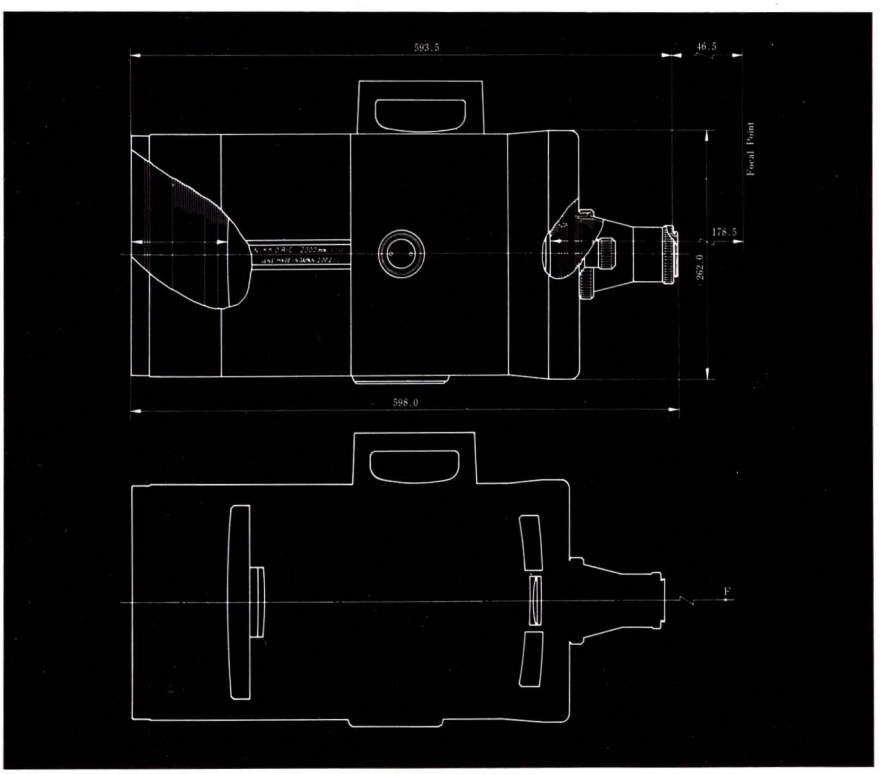
The Longest Mirror Lens Produced by Any Camera Manufacturer

Sales Points

- Extremely narrow picture coverage of only 1°10′.
- Catadioptic (mirror) design eliminates chromatic aberration for outstanding picture quality.
- Two-knobs—one for focusing and the other for filter selection—built into the back of the lens.
- Combination peep sight and carrying handle built into the top of the lens.
- Two built-in tripod sockets, plus an optional yoke mount, for secure mounting on a tripod, clock drive, or other support.
- Supplied with 4 filters (ultra-violet, yellow, orange, and red) on a built-in revolving turret, and slip-on front lens cap.
- Photographic uses include solar and lunar photography, wildlife, and sports.

Specifications

Focal length/Aperture:	2000mm f/11
Lens construction:	5 elements in 5 groups
Picture angle:	1°10′
Exposure measurement:	Via stop-down method
Distance scale:	Graduated in meters and feet from 18m (60 ft) to infinity (∞)
Weight:	17.5kg
Dimensions:	262mm dia. x 598mm long (overall); 593.5mm extension from flange
Filters:	Built-in
Front lens cap:	Slip-on
Lens hood:	Not provided
Lens case:	Metal case



ZOOM A comprehensive line of *nine* zoom lenses, spanning the gap between 28mm wideangle and 1200mm super-telephoto, is another reason why the name "Nikkor" has become synonomous with quality and versatility in 35mm optics. It used to be true that a zoom lens couldn't match the picture quality of a comparable single-focal-length lens in the same range, but Nikon changed all that. With the introduction of their 80~200mm f/4.5 zoom in 1970, Nikon created a lens whose performance was so outstanding that even the photographic reviewers couldn't believe it. At almost every focal length, including 85, 105, 135, 180, and 200mm, the 80~200mm zoom produced resolution figures that virtually equalled its single-focal-length counterparts. Since then, Nikon has continued to develop zoom lenses which have challenged the imagination of the most sophisticated photographers around the world. Take the 28~45mm f/4.5, for example. It was the first high-performance zoom lens with a minimum focal length of 28mm ever produced by a camera manufacturer. And the 360~1200mm f/11 ED is still unsurpassed for its super-telephoto zoom range. Part of the appeal of a zoom lens is convenience. In one lens, it gives the photographer a variety of focal lengths without having to carry extra lenses. It also allows the photographer to change focal lengths quickly, and therefore change his coverage, without actually having to change lenses or positions. But probably the biggest attraction is its ability to create "zoom blurs." By zooming the lens during a slow shutter speed, the cameraman can impart a feeling of action to stationary subjects, and what this action does to a moving object can often be surprising and eye-catching.

Zoom-Nikkor 28-45mm f/4.5

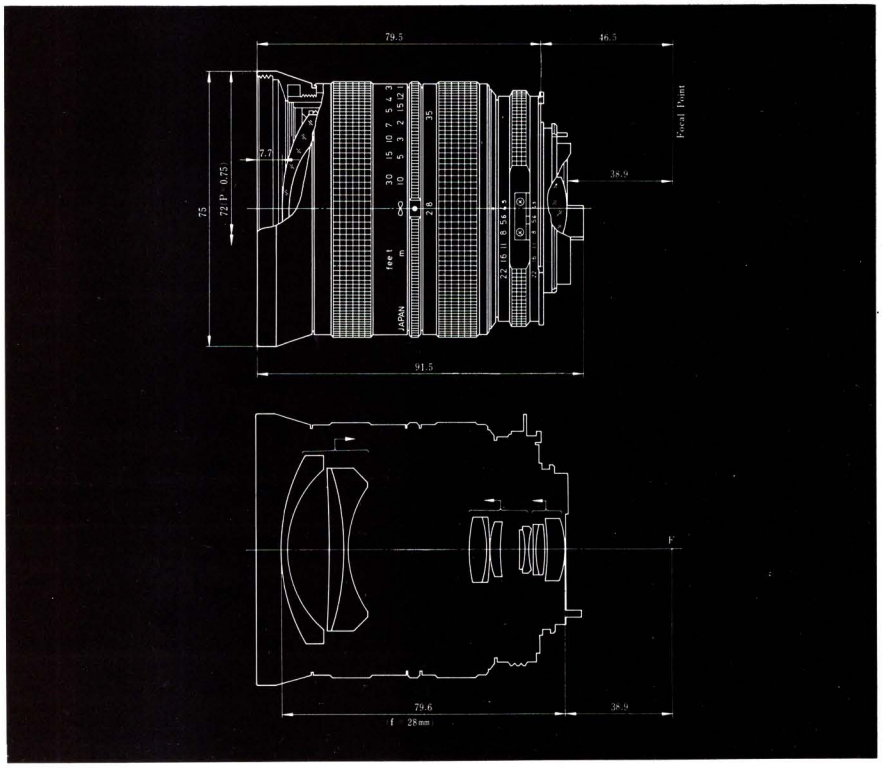
The First Zoom Lens with a Minimum Focal Length of 28mm

Sales Points

- Zoom coverage ranging from 74° wideangle to 50° normal.
- Compact and lightweight.
- Focuses down to 2 feet (0.6m).
- Separate zoom and focusing rings for independent control.
- Takes 72mm filters.
- Supplied with a 72mm screw-in front lens cap.
- Photographic uses include photojournalism, sports, travel, backpacking, environmental portraiture, annual report shooting, scenics, interiors, candids of people, weddings, electronic flash photography, group shots, full-length portraits in the studio or on location, and zoom blurs.

Specifications

Focal length/Aperture:	28 ~45mm f/4.5
Lens construction:	11 elements in 7 groups
Picture angle:	74° ~ 50°
Diaphragm:	Automatic
Aperture scale:	f/4.5 ~ f/22 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 0.6m (2 ft) to infinity (∞)
Weight:	440g
Dimensions:	75mm dia. x 91mm long (overall); 79mm extension from flange
Attachment size:	72mm (P = 0.75)
Front lens cap:	Screw-in
Lens hood:	Slip-on (HK-1)
Lens case:	CL-32S; No. 62



Zoom-Nikkor 35-70mm f/3.5

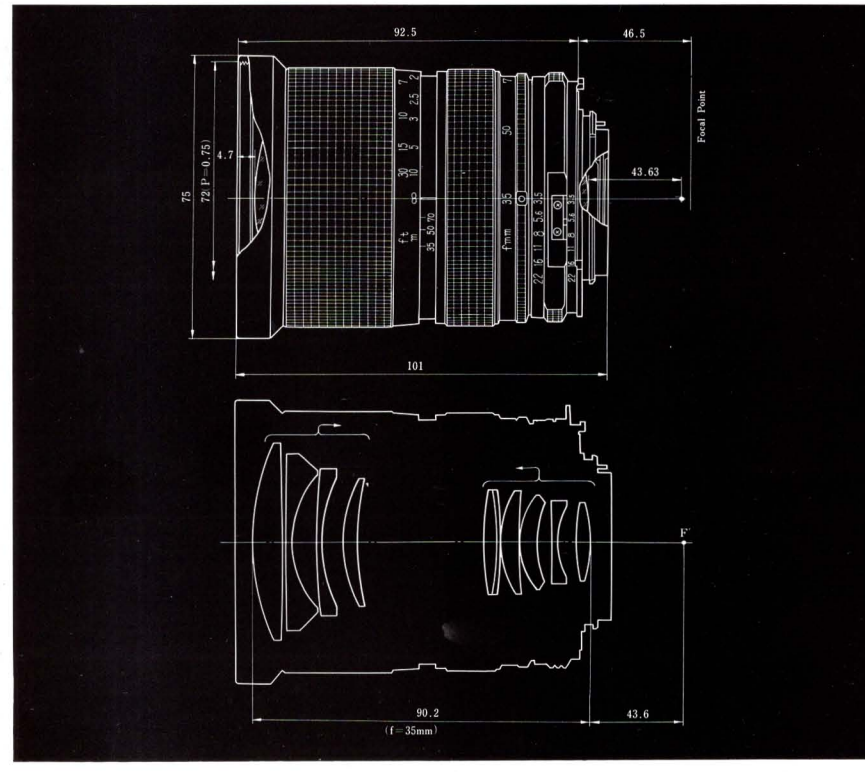
Ideal for Portraits and Weddings

Sales Points

- Zoom coverage ranging from 62° wideangle to 34°20′ moderate telephoto.
- Separate zoom and focusing rings for independent control.
- Takes 72mm filters.
- Supplied with a 72mm screw-in front lens cap and hard lens case.
- Photographic uses include photojournalism, sports, travel, backpacking, environmental portraiture, annual report work, scenics, candids of people, weddings, electronic flash shooting, group shots, full-length as well as head-and-shoulders portraits in the studio or on location, and zoom blurs.

Specifications

Focal length/Aperture:	35 ~ 70mm f/3.5
Lens construction:	10 elements in 9 groups
Picture angle:	62° ~ 34°20′
Diaphragm:	Automatic
Aperture scale:	f/3.5 ~ f/22 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 1m (3.5 ft) to infinity (∞)
Weight:	550g
Dimensions:	75mm dia. x 101mm long (overall); 92.5mm extension from flange
Attachment size:	72mm (P = 0.75)
Front lens cap:	Screw-in
Lens hood:	Slip-on (HK-5)
Lens case:	CL-32S; No. 62



Zoom-Nikkor 43-86mm f/3.5

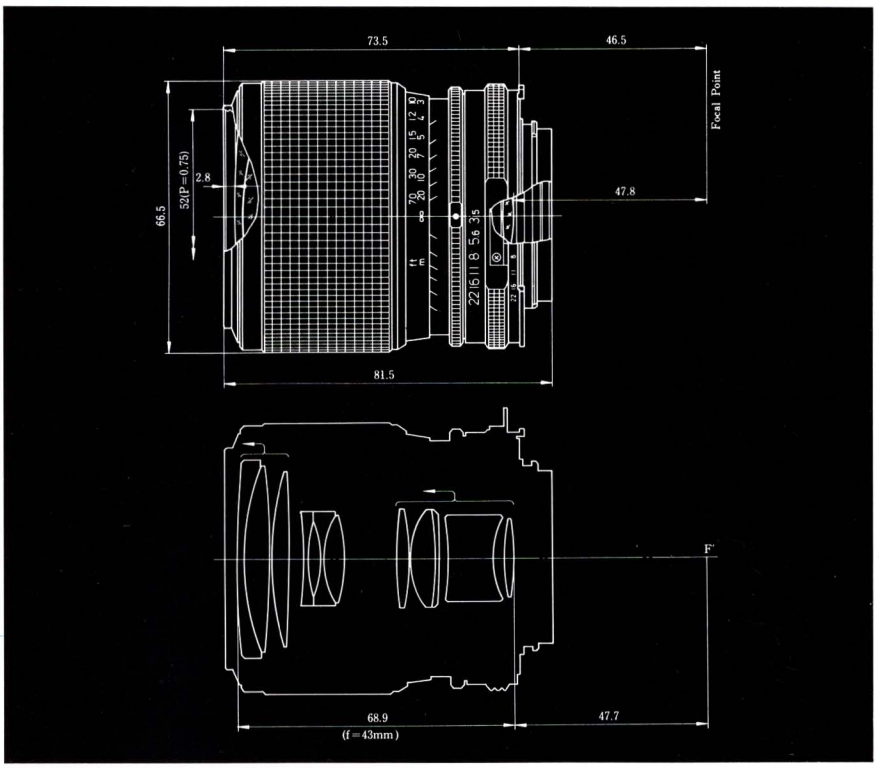
One of the Most Popular Zoom Lenses in the History of 35mm Photography

Sales Points

- Zoom coverage ranging from 53° normal to 28°30′ telephoto.
- Compact and lightweight.
- Combined zoom and focusing rings for fast handling.
- Takes 52mm filters—the standard for most Nikkor lenses from 20 to 200mm.
- Color-coded depth-of-field scale engraved on the lens barrel for accurate determination at any focal length setting.
- Photographic uses include photojournalism, sports, travel, backpacking, environmental portraiture, annual report work, scenics, candids of people, weddings, electronic flash shooting, group shots, full-length as well as head-and shoulders portraits in the studio or on location, and zoom blurs.

Specifications

Focal length/Aperture:	43 ~ 86mm f/3.5
Lens construction:	11 elements in 8 groups
Picture angle:	53° ~ 28°30′
Diaphragm:	Automatic
Aperture scale:	f/3.5 ~ f/22 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 1.2m (4 ft) to infinity (∞)
Weight:	450g
Dimensions:	66.5mm dia. x 81.5mm long (overall); 73.5mm extension from flange
Attachment size:	52mm (P = 0.75)
Front lens cap:	Snap-on
Lens hood:	Screw-in (HN-3)
Lens case:	CL-32S; No. 62; CP-2



Zoom-Nikkor 80-200mm f/4.5

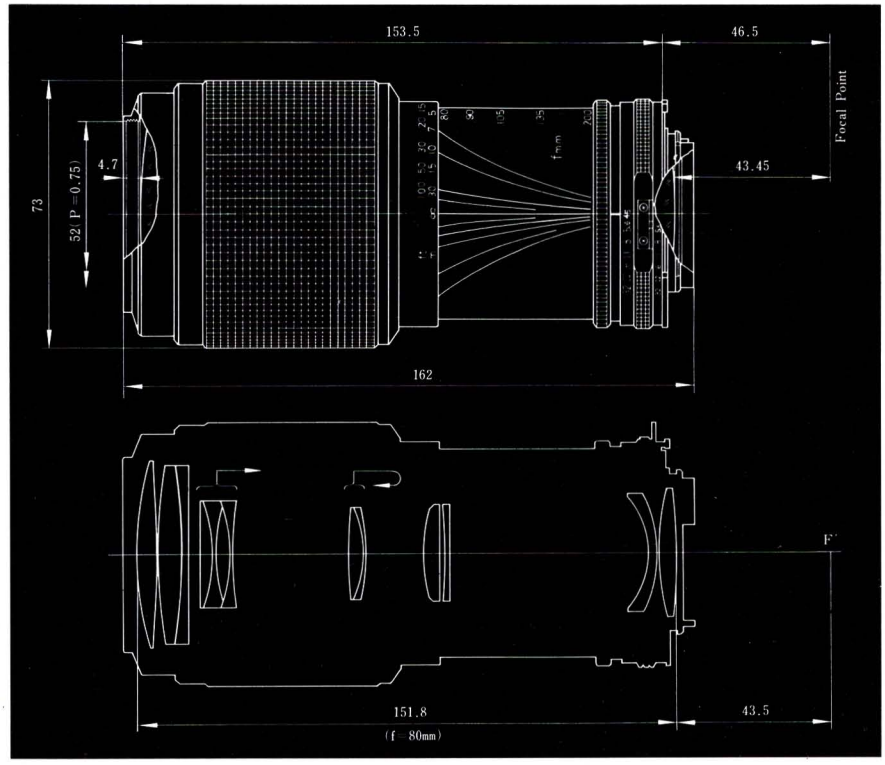
Five Telephoto Lenses in One—85, 105, 135, 180, and 200mm

Sales Points

- Telephoto zoom coverage ranging from 30°10′ to 12°20′.
- Compact and lightweight for its combination of focal lengths.
- Combined zoom and focusing rings for fast handling.
- Focuses down to 6 feet (1.8m).
- Takes 52mm filters—the standard for most Nikkor lenses from 20 to 200mm.
- Supplied with a hard lens case.
- Photographic uses include photojournalism, sports, wildlife, electronic flash photography, head-and-shoulders portraits in the studio or on location, travel, distant landscapes, candids of people, and zoom blurs.

Specifications

Focal length/Aperture:	80 ~200mm f/4.5
Lens construction:	12 elements in 9 groups
Picture angle:	30°10′ ~ 12°20′
Diaphragm:	Automatic
Aperture scale:	f/4.5 ~ f/32 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 1.8m (6 ft) to infinity (∞)
Weight:	750g
Dimensions:	73mm dia. x 162mm long (overall); 153.5mm extension from flange
Attachment size:	52mm (P = 0.75)
Front lens cap:	Snap-on
Lens hood:	Screw-in (HN-7)
Lens case:	CL-35A (provided), No. 63



Zoom-Nikkor 50-300mm f/4.5

The Only 6X Zoom Lens in 35mm Photography

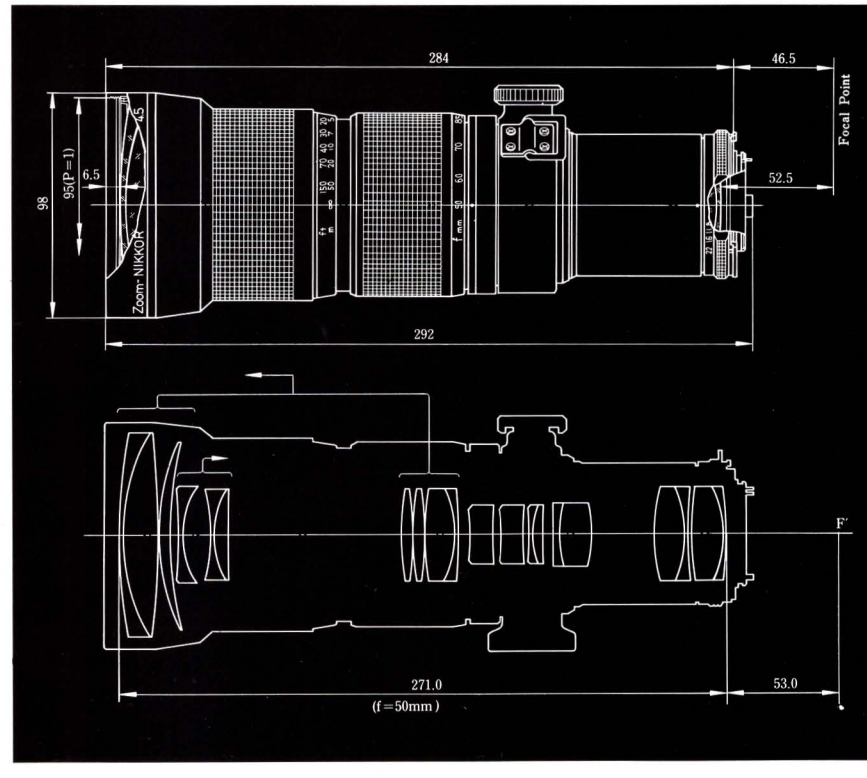
Sales Points

- Extreme zoom coverage ranging from 46° normal to 8° 10′ long telephoto.
- Separate zoom and focusing rings for independent control.
- Focuses down to 8½ feet (2.5m).
- Built-in rotatable tripod mounting collar.
- Supplied with a 95mm screw-in front lens cap and carrying strap.
- Photographic uses include photojournalism, sports, wildlife, landscapes, and zoom blurs.

Specifications

Focal length/Aperture:	50 ~ 300mm f/4.5
Lens construction.	20 elements in 13 groups
Picture angle:	46° ~ 8°10′
Diaphragm:	Automatic
Aperture scale:	f/4.5 ~ f/22 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 2.5m (8.5 ft) to infinity (∞)
Weight:	2.3kg
Dimensions:	98mm dia. x 292mm long (overall); 284mm extension from flange
Attachment size:	95mm (P = 1)
Front lens cap:	Screw-in
Lens hood:	Screw-in (HN-11)
Lens case:	CE-2

Note: Rotatable tripod collar provided.



Zoom-Nikkor 50-300mm f/4.5 ED

ED Version of One of the Most Versatile Lenses in 35mm Photography

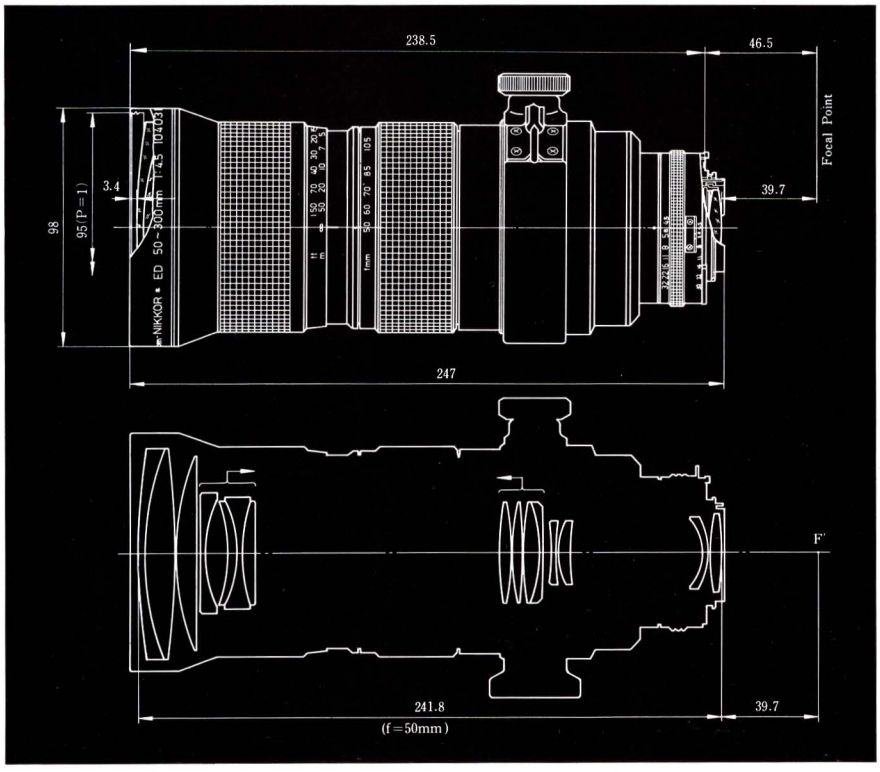
Sales Points

- Extreme zoom coverage ranging from 46° normal to 8° 10′ long telephoto.
- Extra-Low Dispersion (ED) glass for outstanding picture quality.
- Separate zoom and focusing rings for independent control.
- 45mm shorter than the standard version.
- Supplied with a 95mm screw-in front lens cap and carrying strap.
- Photographic uses include photojournalism, sports, wildlife, landscapes, and zoom blurs.

Specifications

Focal length/Aperture:	50 ~ 300mm f/4.5
Lens construction:	15 elements in 11 groups
Picture angle:	46° ~ 8° 10′
Diaphragm:	Automatic
Aperture scale:	f/4.5 ~ f/32 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 2.5m (8.5 ft) to infinity (∞)
Weight:	2.2kg
Dimensions:	98mm dia. x 247mm long (overall); 239mm extension from flange
Attachment size:	95mm (P = 1)
Front lens cap:	Screw-in
Lens hood:	Slip-on (HK-5)
Lens case:	CE-2

Note: Rotatable tripod collar provided.



Zoom-Nikkor 200-600mm f/9.5

Perfect for Sports or News Coverage

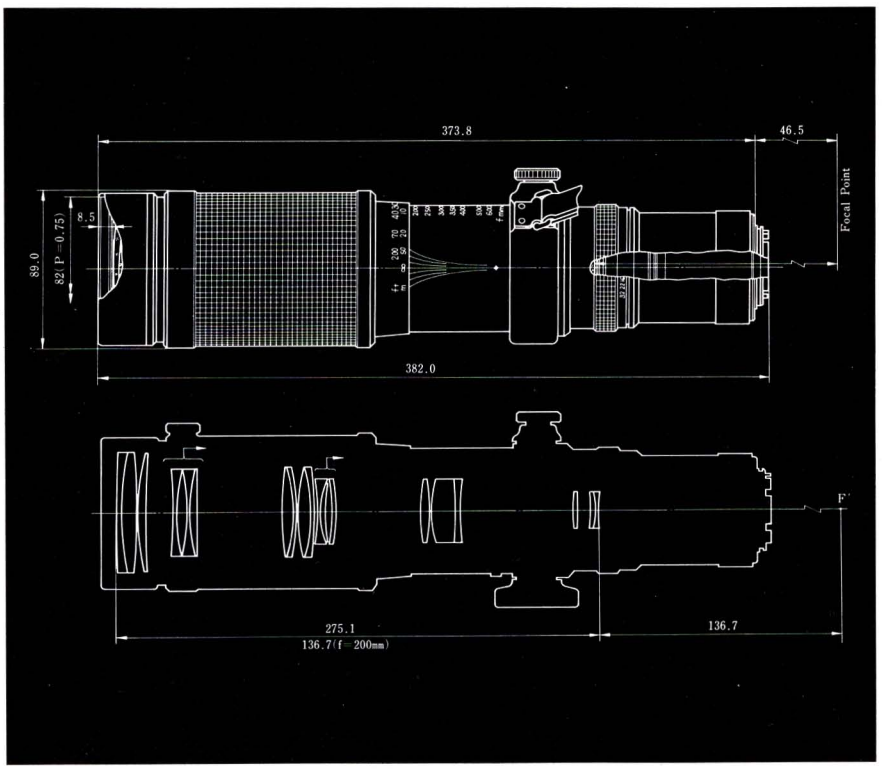
Sales Points

- Wide zoom coverage ranging from 12°20′ telephoto to 4°10′ super-telephoto.
- Combined zoom and focusing rings with locking screw.
- Focuses down to a close 7½ feet (2.3m) with the accessory close-up lens supplied with the lens.
- Built-in rotatable tripod mounting collar and screw-in lens hood.
- Supplied with accessory close-up lens, hood, and screw-in front lens cap.
- Photographic uses include photojournalism, sports, wildlife, and zoom blurs.

Specifications

Focal length/Aperture:	200 ~ 600mm f/9.5
Lens construction:	19 elements in 12 groups
Picture angle:	12°20′ ~ 4°10′
Diaphragm:	Automatic
Aperture scale:	f/9.5 ~ f/32 on both standard and aperture-direct-readout scale
Exposure measurement:	Via stop-down method
Distance scale:	Graduated in meters and feet from 4m (13 ft) to infinity (∞)
Weight:	2.4kg
Dimensions:	89mm dia. x 382mm long (overall); 374mm extension from flange
Attachment size:	82mm (P = 0.75)
Filters:	Series IX
Front lens cap:	Slip-on
Lens hood:	Screw-in (HN-10)
Lens case:	CE-3

Note: Rotatable tripod collar provided.



Zoom-Nikkor 180-600mm f/8 ED

Ideal for Shooting from a Press Box

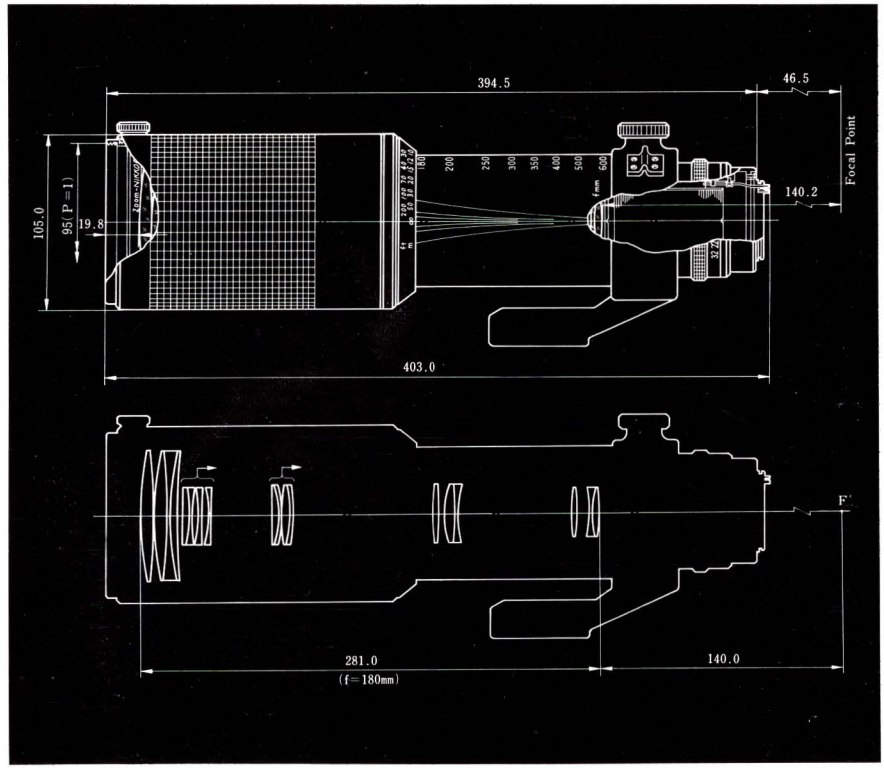
Sales Points

- Wide zoom coverage ranging from 13°40′ telephoto to 4°10′ super-telephoto.
- Extra-Low Dispersion (ED) glass for outstanding picture quality.
- Combined zoom and focusing rings for fast handling.
- Focuses down to a close 8½ feet (2.5m).
- Built-in cantilevered rotatable tripod collar for balanced tripod operation in either the vertical or horizontal format positions.
- Supplied with 95mm screw-in front lens cap and hood, carrying strap, and hard lens case.
- Photographic uses include photojournalism, sports, wildlife, and zoom blurs.

Specifications

Focal length/Aperture:	180 ~ 600mm f/8
Lens construction:	18 elements in groups
Picture angle:	13°40′ ~ 4°10′
Diaphragm:	Automatic
Aperture scale:	f/8 ~ f/32 on both standard and aperture-direct-readout scale
Exposure measurement:	Via stop-down method
Distance scale:	Graduated in meters and feet from 2.5m (8.5 ft) to infinity (∞)
Weight:	3.4kg
Dimensions:	105mm dia. x 403mm long (overall); 395mm extension from flange
Attachment size:	95mm (P = 1)
Front lens cap:	Screw-in
Lens hood:	Screw-in (HN-16)
Lens case:	CZ-1860

Note: This lens is only available by special order. Rotatable tripod collar provided.



Zoom-Nikkor 360-1200mm f/11 ED

The Longest Zoom Lens in 35mm Photography

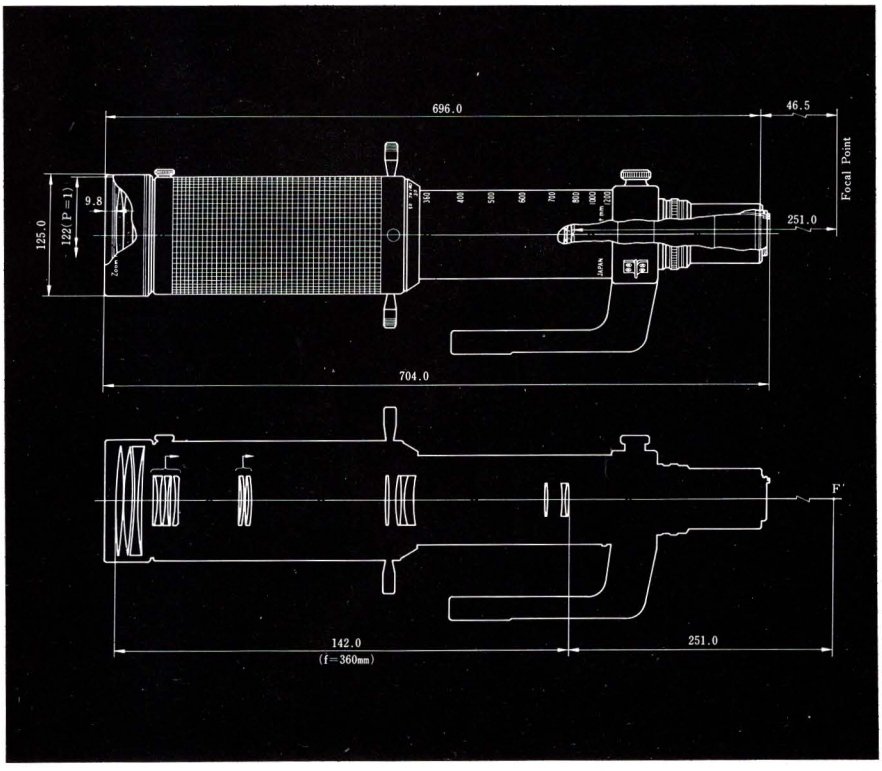
Sales Points

- Expansive super-telephoto zoom coverage ranging from 6°50′ down to only 2°.
- Extra-Low Dispersion (ED) glass for outstanding picture quality.
- Combined zoom and focusing ring with 4 screw-in handles for rapid response.
- Built-in cantilevered rotatable collar for balanced tripod mounting in either the vertical or horizontal format positions.
- Focuses down to a close 20 feet (6m).
- Supplied with 122mm screw-in front lens cap and hood, carrying strap, and hard lens case.
- Photographic uses include photojournalism, sports, wildlife, solar and lunar photography, and zoom blurs.

Specifications

Focal length/Aperture:	360 ~ 1200mm f/11
Lens construction:	20 elements in 12 groups
Picture angle:	6°50′ ~ 2°
Diaphragm:	Automatic
Aperture scale:	f/11 ~ f/32 on both standard and aperture-direct-readout scale
Exposure measurement:	Via stop-down method
Distance scale:	Graduated in meters and feet from 6m (20 ft) to infinity (∞)
Weight:	7.1kg
Dimensions:	125mm dia. x 704mm long (overall); 696mm extension from flange
Attachment size:	122mm (P = 1)
Front lens cap:	Screw-in
Lens hood:	Screw-in (HN-17)
Lens case:	CZ-3612

Note: This lens is only available by special order. Rotatable tripod collar provided.



SPECIAL-PURPOSE

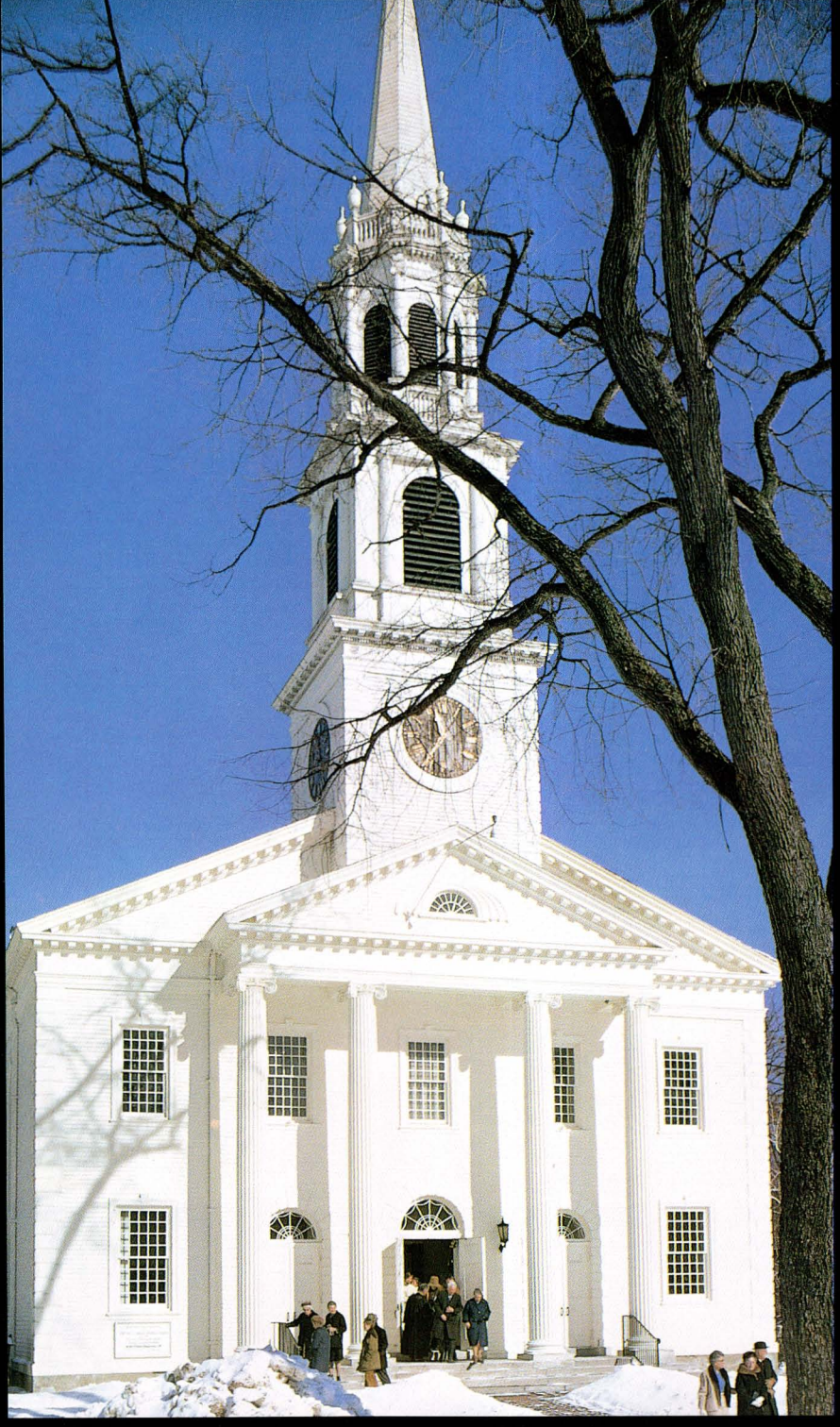
Close-up work, architectural photography, and available-light shooting are specialized photographic fields which demand special-purpose lenses, and Nikon has seven of them.

For the close-up and macrophotography enthusiast, there are three lenses: the Micro 55mm f/3.5, Micro 105mm f/4 and Micro 200mm f/4 IF. Each lens focuses down to 1/2 life-size and, with the aid of its own extension ring,* can produce full life-size images (that is, images in which a 1" × 1-1/2" subject fills up the 35mm frame). A fourth lens, the 200mm Medical-Nikkor, was designed for industrial, medical, and scientific applications. It consists of a prime lens with built-in ringlight flash and a set of six close-up lenses to provide reproduction ratios ranging from 1/15 to 3X, or *three* times life size. Because of its operational simplicity, the Medical-Nikkor doesn't require any prior experience in close-up photography.

In the field of architectural photography, the PC or "Perspective Control" Nikkors have established quite a fine reputation. They come in two focal lengths—28 and 35mm—and bring the versatility of a view camera to the 35mm format. Each lens can be shifted up to 11 mm off-axis and rotated a complete 360° for control of any situation. A PC-Nikkor can correct converging vertical lines in tall buildings and even improve upon the original scene by removing unwanted objects, like trees or signs, from the foreground.

Another specialized area is low-light photography. When used at maximum aperture for available-light shooting, most high-speed lenses do not provide optimum performance. The main reason is coma, the lens aberration which causes points of light near the edges of the frame to be reproduced as comet-shaped blurs. In utilizing an aspherical front lens element, the Noct-Nikkor 58mm f/1.2 has been specially corrected for this particular aberration, so that it delivers outstanding contrast and resolution even when used wide-open at f/1.2.

* The Micro 200mm uses either the T-200 or TC-300 to produce a 1:1 reproduction ratio.




1x

Micro-Nikkor 55mm f/3.5

Perfect for Normal Shooting As Well As Close-Ups

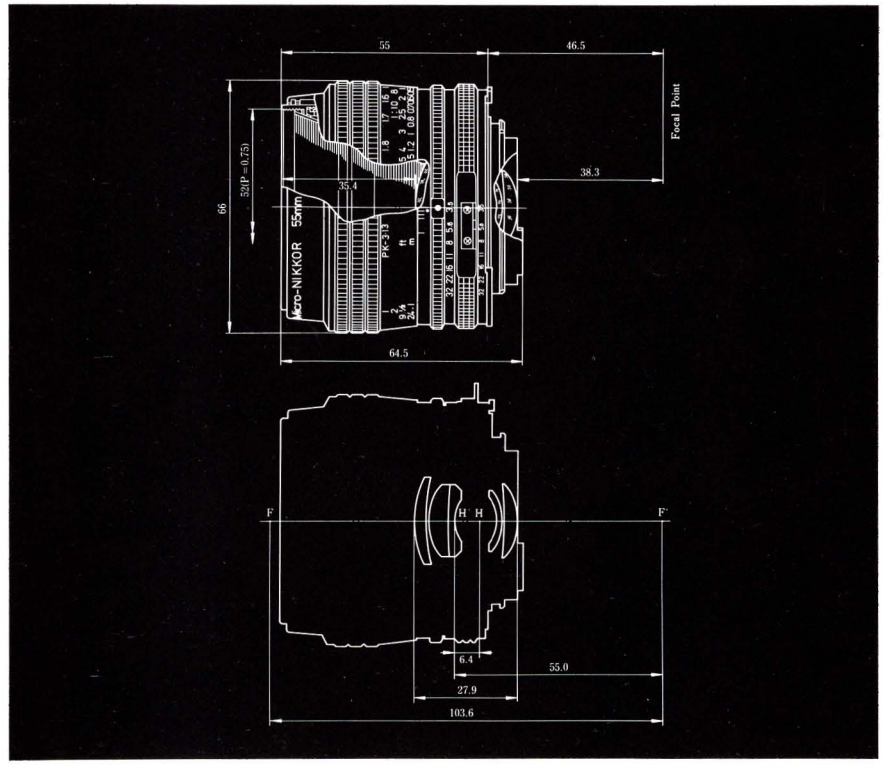
Sales Points

- Normal picture coverage of 43°.
- Focuses down to full life-size with the PK-13 extension ring.
- Exceptional sharpness and flatness of field.
- Lightweight—only 240 grams.
- Takes 52mm filters—the standard for most Nikkor lenses from 20 to 200mm.
- Photographic uses include close-ups and macro-photography, still-lifes, copy-work, product photography, snapshots, landscapes, candids of people, travel, backpacking, electronic flash photography, and full-length portraits in the studio or on location.

Specifications

Focal length/Aperture:	55mm f/3.5
Lens construction:	5 elements in 4 groups
Picture angle:	43°
Diaphragm:	Automatic
Aperture scale:	f/3.5 ~ f/32 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 0.241m (9-1/2 in.) to infinity (∞)
Weight:	240g
Dimensions:	66mm dia. x 64.5 (90.5)*mm long (overall); 55 (82.5)*mm extension from flange
Attachment size:	52mm (P = 0.75)
Front lens cap:	Snap-on
Lens hood:	Screw-in (HN-3)
Lens case:	CL-30; No. 61. With PK-13: CL-31S, No. 62; CP-2

* Represents the values when used with PK-13 Ring.



Micro-Nikkor 105mm f/4

Ideal for Photographing Insects or Taking Product Shots

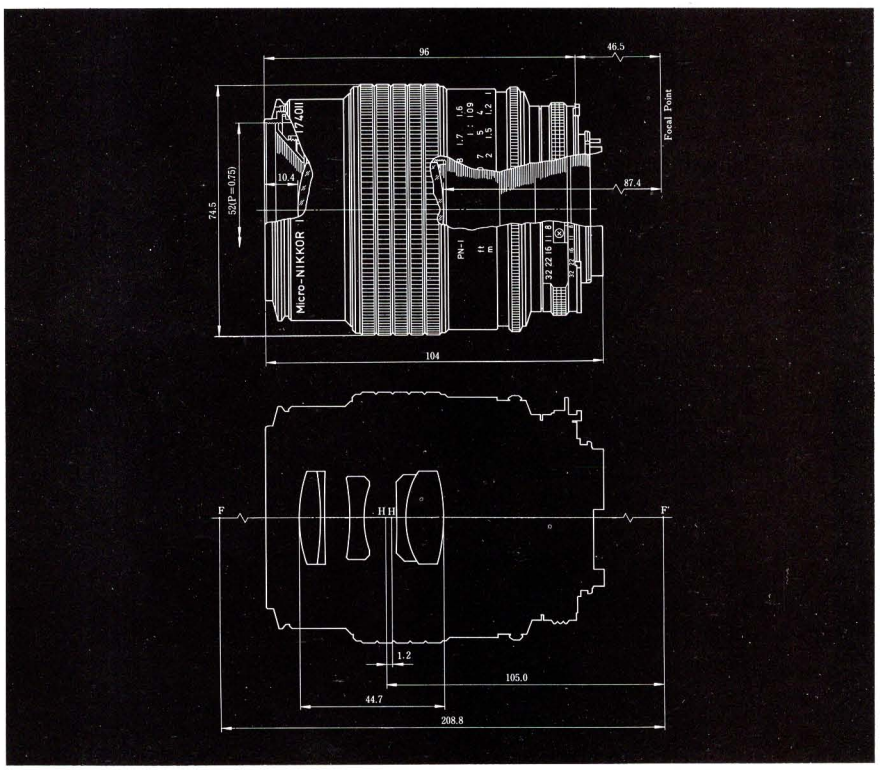
Sales Points

- Telephoto picture coverage of 23°20′.
- Focuses down to full life-size with the PN-11 extension ring.
- Provides extra working distance for shooting elusive subjects and/or ones requiring supplementary illumination.
- Exceptional sharpness and flatness of field.
- Takes 52mm filters—the standard for most Nikkor lenses from 20 to 200mm.
- Photographic uses include still-lifes, product photography, close-ups and macro-photography, distant landscapes, photojournalism, travel, back-packing, candids of people, electronic flash photography, and head-and-shoulders portraits in the studio or on location.

Specifications

Focal length/Aperture:	105mm f/4
Lens construction:	5 elements in 3 groups
Picture angle:	23°20′
Diaphragm:	Automatic
Aperture scale:	f/4 ~ f/32 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 0.47m (1.55 ft) to infinity
Weight:	500g
Dimensions:	74.5mm dia. x 104 (157)*mm long (overall); 96 (149)*mm extension from flange
Attachment size:	52mm (P = 0.75)
Front lens cap:	Snap-on
Lens hood:	Built-in
Lens case:	CL-33S; No. 62. With PA-11: CL-35A; No. 63

*Represents the values when used with PN-11 Ring. Rotatable tripod collar provided.



Micro-Nikkor 200mm f/4 IF

Great for Telephoto As Well As Close-Up Shots in Nature and Wildlife Photography

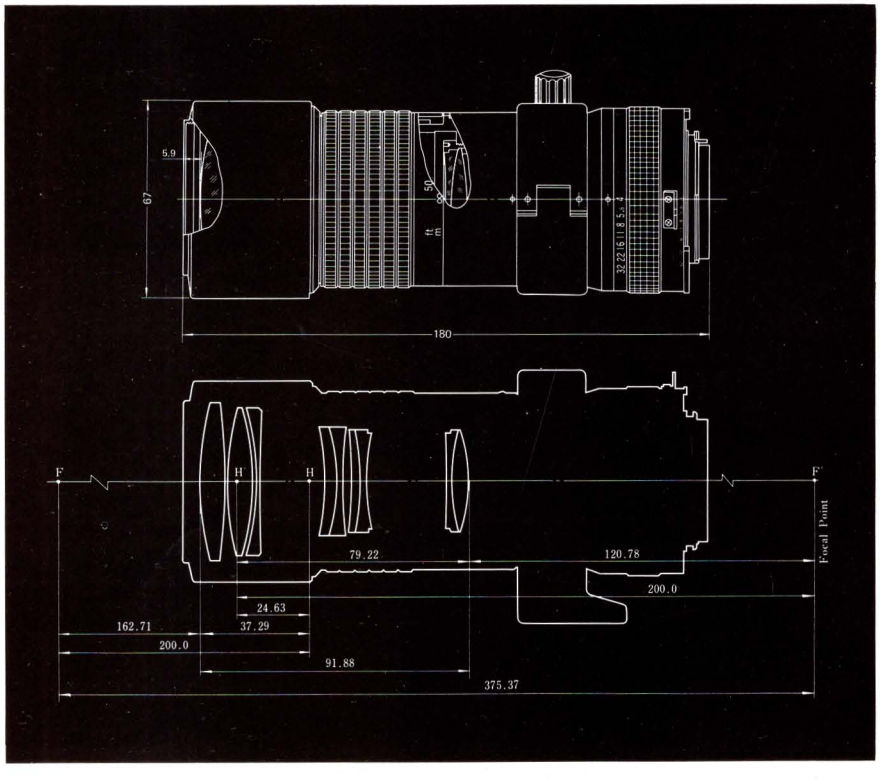
Sales Points

- Telephoto picture coverage of 12°20'.
- Internal Focusing (IF) design for easy handling and smooth focusing down to one-half life-size.*
- Provides extra-long working distance for close-ups of dangerous or "shy" wildlife.
- Exceptional sharpness and flatness of field.
- Takes 52mm filters—the standard for most Nikkor lenses from 20 to 200mm.
- Photographic uses include close-ups and macro-photography, distant landscapes, photojournalism, travel, backpacking, candids of people, sports, and wildlife.

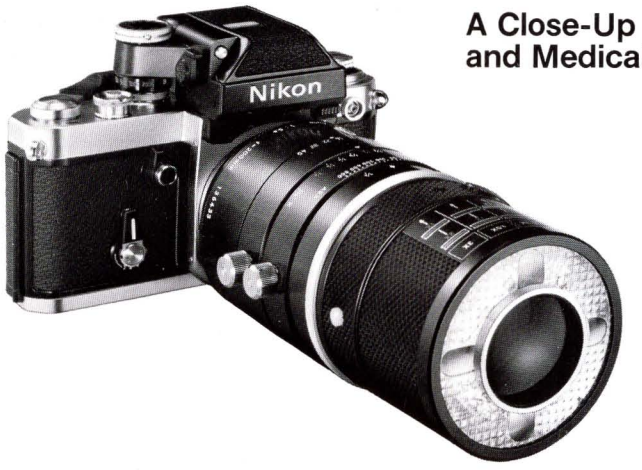
* When the Nikon TC-200 or TC-300 teleconverter is attached, this lens becomes the equivalent of a 400mm f/8 lens which focuses continuously from infinity down to 1:1 without any decrease in the effective aperture.

Specifications

Focal length/Aperture:	200mm f/4 IF
Lens construction:	9 elements in 6 groups
Picture angle:	12°20'
Diaphragm:	Automatic
Aperture scale:	f/4 ~ f/32 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI camera and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 0.71m (2.34 ft.) to infinity (∞)
Weight:	640g
Dimensions:	67mm dia. x 180mm long (overall); 172mm extension from flange
Attachment size:	52mm (P = 0.75)
Front lens cap:	Snap-on
Lens hood:	Built-in
Lens case:	CL-36



Medical-Nikkor 200mm f/5.6



A Close-Up Lens for Industrial, Scientific, Dental, and Medical Applications

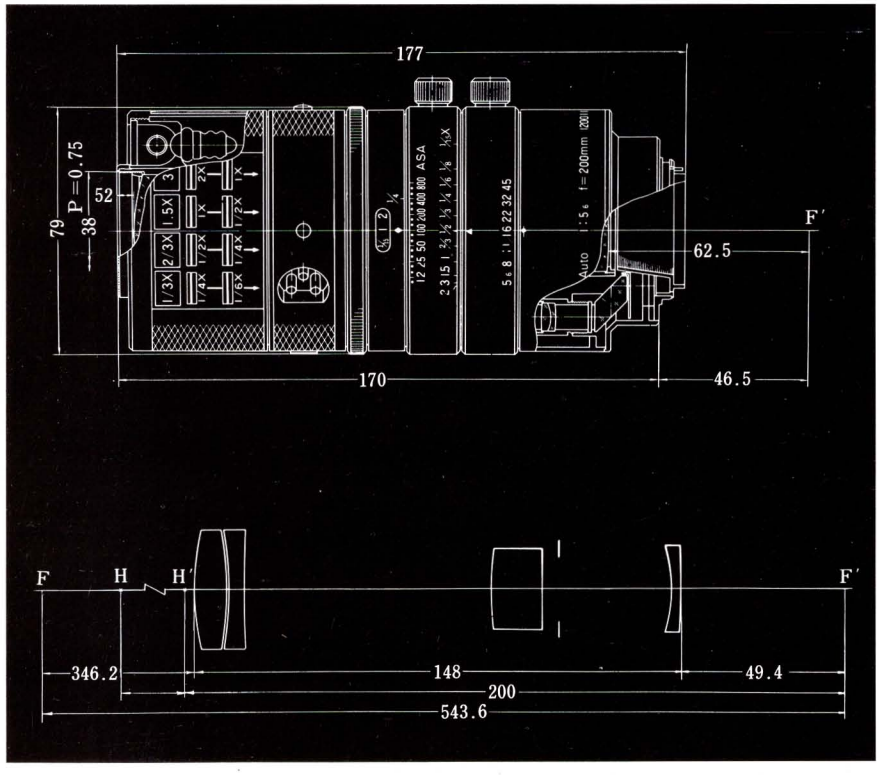
Sales Points

- Provides 11 set reproduction ratios ranging from 1/15X down to 3X life-size.
- Easy to use—even by unskilled personnel.
- Built-in ringlight flash for shadowless illumination.
- Uses either AC or DC power packs.
- Supplied with 6 screw-in auxiliary lenses, sync cord, power cord, and compartment case.
- Photographic uses include close-ups and macro-photography in science, industry, and the medical professions.

Specifications

Focal length/Aperture:	200mm f/5.6
Lens construction:	4 elements in 4 groups in prime lens; 6 auxiliary lenses provide a total of 11 different reproduction ratios
Diaphragm:	Automatically set by determining film speed and reproduction ratio; stops down to f/45
Reproduction ratios:	1/15X with prime lens; 1/8X, 1/6X, 1/4X, 1/3X, 1/2X, 2/3X, 1X, 1.5X, 2X, 3X when auxiliary lenses mounted singularly or in combination
Focusing distance:	Fixed when reproduction ratio is determined; 4 pilot lamps incorporated for focusing accuracy
Illumination:	Built-in xenon ring flash tube; output approx. 60W; flash duration approx. 1/1000 sec. (full output)
Identification number and reproduction ratio selector:	Provided
Power source:	AC or DC unit
Dimensions of prime lens:	79mm dia. x 177mm long
Weight of prime lens:	700g

Note: Supplied with 6 auxiliary lenses, a 1.5m power source cord, a sync cord, front and rear lens caps, accessory shoe safety cover and four 2.5V spare bulbs.



PC-Nikkor 28mm f/4

A Perspective Control Lens with Wide Coverage

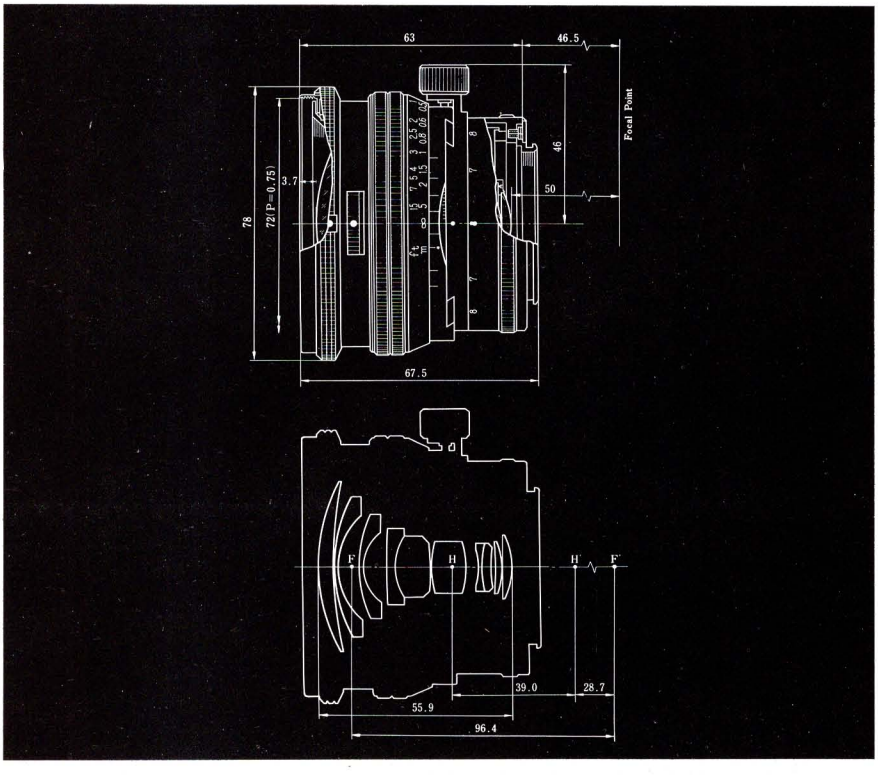
Sales Points

- Wideangle picture coverage of 74°.
- Provides 11mm of shift off-axis, plus 360° rotation for complete perspective control.
- Focuses down to one foot (0.3m).
- Takes 72mm filters.
- Supplied with a 72mm screw-in front lens cap, and hard lens case.
- Photographic uses include perspective control of architecture, interiors, still-lifes, and framed works of art, plus panoramas, photojournalism, landscapes, travel, environmental portraiture and annual report shooting.

Specifications

Focal length/Aperture:	28mm f/4
Lens construction:	10 elements in 8 groups
Picture angle:	74°
Diaphragm:	Manual preset
Aperture scale:	f/4 ~ f/22
Exposure measurement:	Via stop-down method
Distance scale:	Graduated in meters and feet from 0.3m (1 ft) to infinity (∞)
Weight:	410g
Dimensions:	78mm dia. x 67.5mm long (overall); 63mm extension from flange
Attachment size:	72mm (P = 0.75)
Front lens cap:	Screw-in
Lens hood:	Screw-in (HN-9)
Lens case:	CL-34A (provided); No. 61

Note: Maximum shift adjustment 11mm.



PC-Nikkor 35mm f/2.8

Brings View Camera Versatility to the 35mm Format

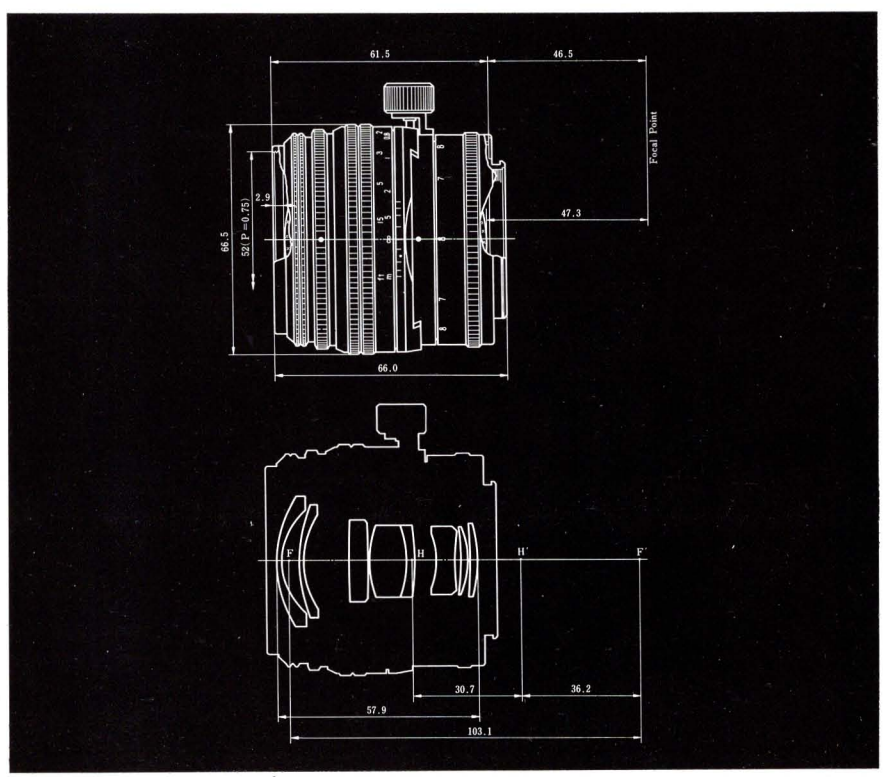
Sales Points

- Wideangle picture coverage of 62°.
- Provides 11mm of shift off-axis, plus 360° rotation for complete perspective control.
- Lightweight—only 330 grams.
- Focuses down to one foot (0.3m).
- Stops down to f/32 for additional depth of field.
- Takes 52mm filters—the standard for most Nikkor lenses from 20—200mm.
- Supplied with hard lens case.
- Photographic uses include perspective control of architecture, still-lifes, and framed works of art, plus panoramas, photojournalism, landscapes, travel, environmental portraiture, and annual report shooting.

Specifications

Focal length/Aperture:	35mm f/2.8
Lens construction	8 elements in 7 groups
Picture angle:	62°
Diaphragm:	Manual preset
Aperture scale:	f/2.8 ~ f/32
Exposure measurement:	Via stop-down method
Distance scale:	Graduated in meters and feet from 0.3m (1 ft) to infinity (∞)
Weight:	330g
Dimensions:	66.5mm dia. x 66m long (overall); 61.5mm extension from flange
Attachment size:	52mm (P = 0.75)
Front lens cap:	Snap-on
Lens hood:	Screw-in (HN-1)
Lens case:	CL-34A (provided); No. 61

Note: Maximum shift adjustment 11mm.



Noct-Nikkor 58mm f/1.2

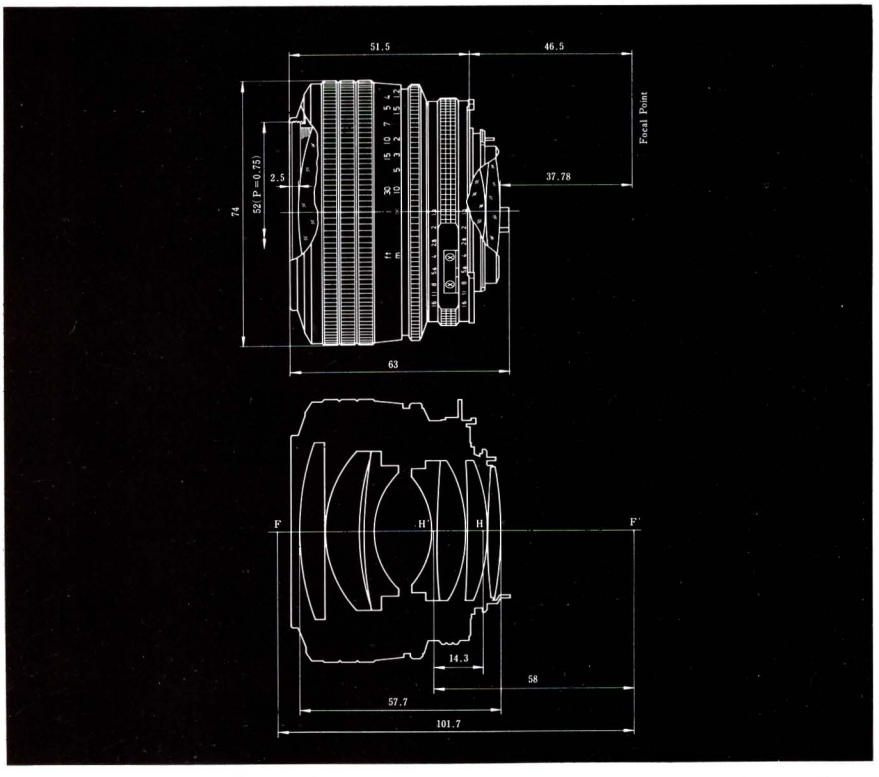
Perfect for Any Available Light Situation

Sales Points

- Normal picture coverage of 40°50′.
- Extremely large maximum aperture.
- Easy focusing and viewing in dim light.
- Aspherical front lens element for outstanding picture quality at f/1.2.
- Takes 52mm filters—the standard for most Nikkor lenses from 20—200mm.
- Photographic uses include available light shooting, snapshots, candids of people, landscapes, electronic flash photography, travel, photo-journalism, and full-length portraits in the studio or on location.

Specifications

Focal length/Aperture:	58mm f/1.2
Lens construction:	7 elements in 6 groups
Picture angle:	40°50′
Diaphragm:	Automatic
Aperture scale:	f/1.2 ~ f/16 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 0.5m (1.7 ft) to infinity (∞)
Weight:	480g
Dimensions:	74mm dia. x 63mm long (overall); 51.5mm extension from flange
Attachment size:	52mm (P = 0.75)
Front lens cap:	Snap-on
Lens hood:	Snap-on (HS-7); Rubber screw-in (HR-2)
Lens case:	CL-31S; No. 61; CP-1



Nikon Teleconverter TC-200

The Perfect Addition to Any Photographer's Lens Line-Up

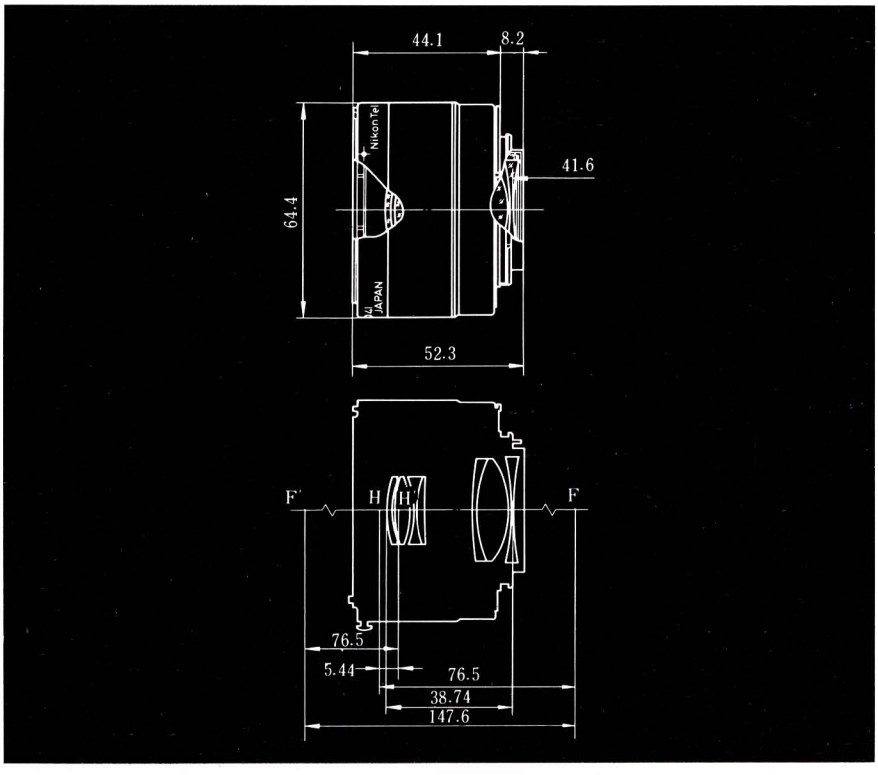
Sales Points

- Doubles the focal length of the lens in use.
- Virtually no loss in image quality.
- Permits automatic diaphragm control and full aperture metering with AI cameras.
- Nikon Integrated Coating (NIC) increases contrast and improves color rendition.
- The TC-200 can be used with the Micro-Nikkor Zoom f/4 IF to produce life-size close-ups.
- TC-200 is used with lenses up to 200mm, including the Reflex-Nikkor 500mm f/8.

Specifications

Lenses usable:	For lenses up to 200mm focal length
Lens construction:	7 elements in 5 groups
Focal length:	Double that of lens in use
Aperture coupling range:	f/2 ~ f/32
Effective aperture:	f/4 ~ f/64
Diaphragm:	Automatic
Metering:	Full-aperture exposure measurement with AI-type Nikkor lenses
Reproduction ratio:	Double that of lens in use
Depth of field:	1/2 that of lens in use
Closest focusing distance:	Same as that of lens in use
Dimensions:	64.4mm dia. x 52.2mm long (overall); 44mm extension from flange
Weight:	230g

Note: 1. This teleconverter can only be used in conjunction with lenses having AI features.
2. When used with non-AI camera bodies, exposures should be measured by the stop-down method.



Nikon Teleconverter TC-300

The Perfect Addition to Any Photographer's Lens Line-Up

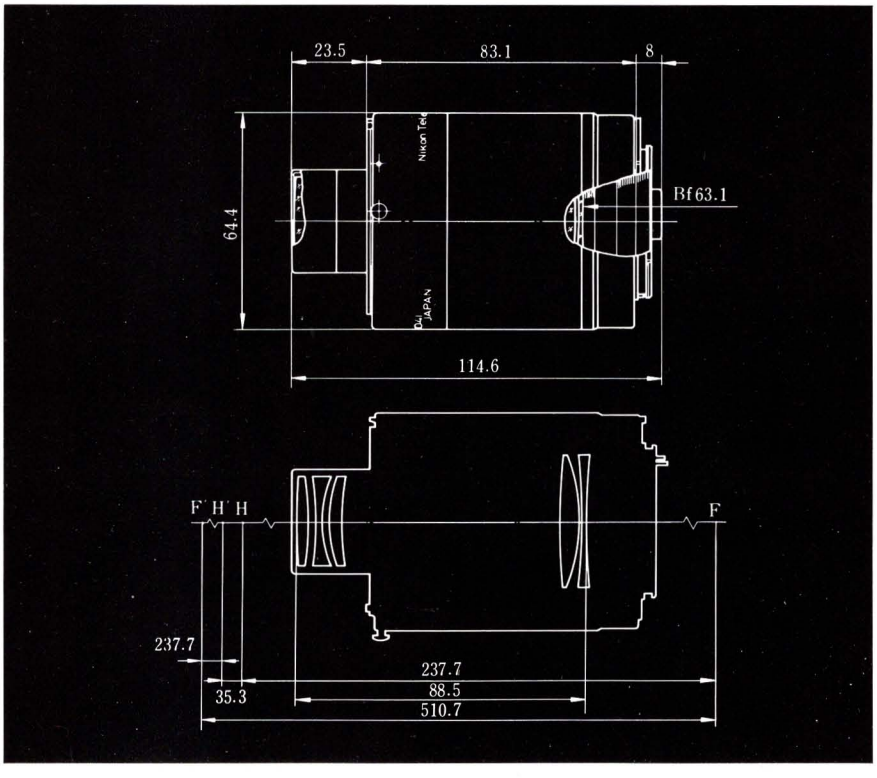
Sales Points

- Doubles the focal length of the lens in use.
- Virtually no loss in image quality.
- Permits automatic diaphragm control and full aperture metering with AI cameras.
- Nikon Integrated Coating (NIC) increases contrast and improves color rendition.
- The TC-300 can be used with the Micro-Nikkor Zoom f/4 IF to produce life-size close-ups.
- TC-300 is for lenses of 300mm and longer.

Specifications

Lenses usable:	For lenses 300m and longer
Lens construction:	5 elements in 5 groups
Focal length:	Double that of lens in use
Aperture coupling range:	f/2.8 ~ f/32
Effective aperture:	f/5.6 ~ f/64
Diaphragm:	Automatic
Metering:	Full-aperture exposure measurement with AI-type Nikkor lenses
Reproduction ratio:	Double that of lens in use
Depth of field:	1/2 that of lens in use
Closest focusing distance:	Same as that of lens in use
Dimensions:	64.5mm dia. x 115mm long (overall); 84mm extension from flange
Weight:	280g

Note: 1. This teleconverter can only be used in conjunction with lenses having AI features.
2. When used with non-AI camera bodies, exposures should be measured by the stop-down method.



Nikon Teleconverter TC-14

An Inexpensive Way to Increase the Focal Length of Super-Telephoto Lenses

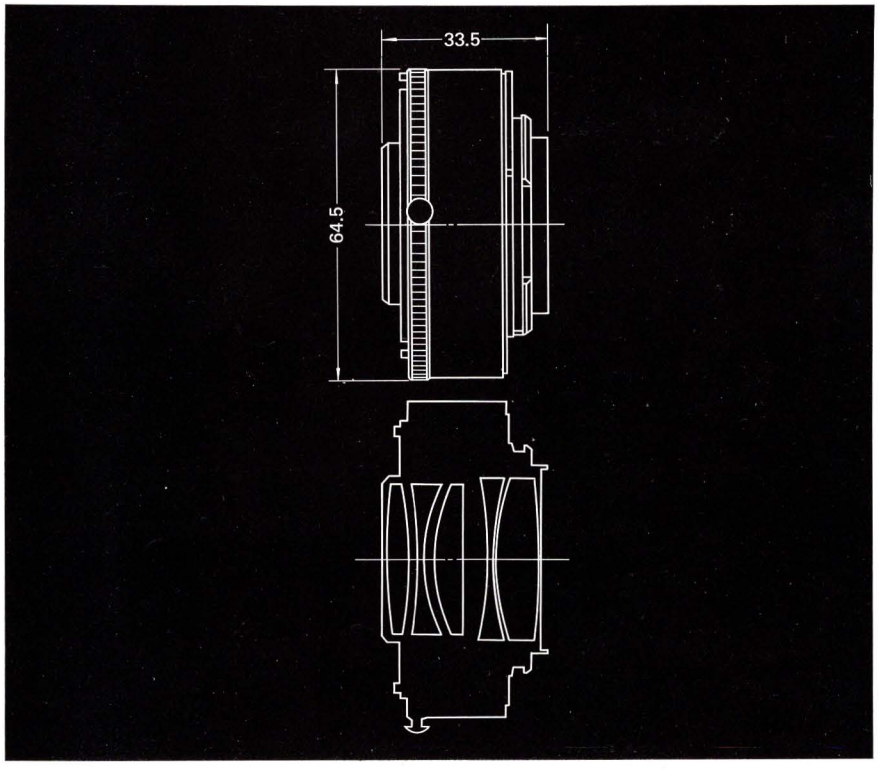
Sales Points

- Increases the focal length of the lens by 1.4 times.
- Only one f/stop decrease in the effective aperture.
- Virtually no loss in image quality.
- Permits automatic diaphragm control and full aperture metering with AI cameras.
- Nikon Integrated Coating (NIC) increases contrast and improves color rendition.
- Usable with lenses of 300mm and longer, including the 180mm f/2.8; not recommended for use with Zoom or Reflex lenses.

Specifications

Lenses usable:	Any Nikkor lens with a focal length of from 300mm to 1200mm, except Zoom-Nikkors and reflex-Nikkors; Nikkor 180mm f/2.8
Lens construction:	5 elements in 5 groups
Focal length conversion:	1.4X increase in focal length of lens in use
Aperture coupling range:	f/2 ~ f/32
Effective aperture range:	f/2.8 ~ f/45
Diaphragm:	Automatic
Metering:	Full-aperture exposure measurement with AI-type Nikkor lenses
Reproduction ratio:	1.4X that of lens in use
Depth of field:	1/1.4X that of lens in use
Closest focusing distance:	Same as that of lens in use
Dimensions:	64.5mm dia. x 33.5mm long (overall); 22mm extension from flange
Weight:	170g

Note: 1. This teleconverter can only be used in conjunction with lenses having AI features.
2. When used with non-AI camera bodies, exposures should be measured by the stop-down method.



Code Numbers

• Description	• Code number	• Remarks
FISHEYE		
Fisheye-Nikkor 6mm f/2.8	108-03-144	
Fisheye-Nikkor 6mm f/5.6	108-03-126	
Fisheye-Nikkor 8mm f/2.8 with CL-11 Leatherette Case	108-03-145	
OP Fisheye-Nikkor 10mm with DF-1 Finder and CL-4 Case	108-03-110	
Fisheye-Nikkor 16mm f/3.5	108-03-148	
ULTRA-WIDEANGLE		
Nikkor 13mm f/5.6 with CL-14 Leatherette Case	108-03-146	
Nikkor 15mm f/5.6 with CL-26 Leatherette Case	108-03-147	
Nikkor 18mm f/4	108-01-149	
Nikkor 20mm f/3.5	108-01-150	
WIDEANGLE		
Nikkor 24mm f/2	108-01-139	
Nikkor 24mm f/2.8	108-01-141	
Nikkor 28mm f/2	108-01-142	
Nikkor 28mm f/2.8	108-01-143	
Nikkor 28mm f/3.5	108-01-144	
Nikkor 35mm f/1.4	108-01-145	
Nikkor 35mm f/2	108-01-146	
Nikkor 35mm f/2.8	108-01-151	
NORMAL		
Nikkor 50mm f/1.2	108-00-117	
Nikkor 50mm f/1.4	108-00-113	
Nikkor 50mm f/1.8	108-00-015	
Nikkor 50mm f/2	108-00-115	
TELEPHOTO		
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Nikkor 105mm f/2.5	108-02-154	
Nikkor 135mm f/2	108-02-155	
Nikkor 135mm f/2.8	108-02-156	
Nikkor 135mm f/3.5	108-02-157	
Nikkor 180mm f/2.8	108-02-158	
Nikkor 200mm f/4	108-02-159	
Nikkor 300mm f/2.8 IF-ED with CL-63 Leatherette Lens Case	108-02-166	
Nikkor 300mm f/4.5	108-02-160	
Nikkor 300mm f/4.5 IF-ED	108-02-167	
SUPER-TELEPHOTO		
Nikkor 400mm f/3.5 IF-ED with CL-61 Leatherette Lens Case	108-04-177	
Nikkor 400mm f/5.6 ED	108-04-173	
Nikkor 400mm f/5.6 IF-ED	108-04-181	
Nikkor 600mm f/5.6 IF-ED with CL-62 Leatherette Lens Case	108-04-178	
Nikkor 400mm f/4.5 with AU-1 Focusing Unit	108-04-155 108-04-157	
Nikkor 600mm f/5.6 with AU-1 Focusing Unit	108-04-159 108-04-161	

• Description	• Code number	• Remarks
REFLEX		
Reflex-Nikkor 500mm f/8 with CL-23 Leather Case	108-04-126	
Reflex-Nikkor 1000mm f/11 with CL-29 Leather Case	108-04-176	
Reflex-Nikkor 2000mm f/11	108-04-150	
Mounting for 2000mm f/11	108-04-603	
Metal Carrying Case for 2000mm f/11	108-04-303	
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Zoom-Nikkor 35—70mm f/3.5	108-05-139	
Zoom-Nikkor 43—86mm f/3.5	108-05-131	
Zoom-Nikkor 80—200mm f/4.5	108-05-137	
Zoom-Nikkor 50—300mm f/4.5	108-05-133	
Zoom-Nikkor 50—300mm f/4.5 ED	108-05-134	
Zoom-Nikkor 200—600mm f/9.5	108-05-129	
Zoom-Nikkor 180—600mm f/8 ED	108-05-120	
Zoom-Nikkor 360—1200mm f/11 ED	108-05-121	
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Micro-Nikkor 200mm f/4 IF	108-03-154	
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2.5V Light Bulb	109-05-040	
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1/2X Auxiliary Lens	109-05-057	
1/4X Auxiliary Lens	109-05-058	
1/6X Auxiliary Lens	109-05-059	
1/8X Auxiliary Lens	109-05-060	
1X Auxiliary Lens	109-05-061	
2X Auxiliary Lens	109-05-062	
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Sync Cord for 200/5.6 Medical	109-05-064	
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TC-300 Teleconverter	108-06-103	
TC-14 Teleconverter	108-06-104	

Photographic Credits

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p. 24 *S. Garcia*
p. 25 *Tom Sawyer*

p. 26 *John Bryson* (top)
James B. Wood (bottom)
p. 27 *Andy Barker* (bottom)
p. 28 *Andy Barker*
p. 29 *Francisco Hidalgo*

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(left)

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Frank "Shorty" Wilcox
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(bottom)

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(top and bottom)
Jerry Cooke
(right)

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Andy Barker
(top)
Francisco Hidalgo
(bottom)

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(top and left)

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Leen Vantomme
(left)
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(top)
Andy Barker
(bottom)
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(right)

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(bottom)

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W. H. Murenbeeld
(top)
J. K. Kopec
(left)

Nikon

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Printed in Japan
Nikkor Lenses-1 (79-1)

Nikkor 600mm f/5.6 IF-ED

A Powerful Super-Telephoto with Full-Aperture Metering

Sales Points

- Super-telephoto picture coverage of 4° 10′.
- Internal Focusing (IF) design for easy handling and smooth focusing down to 20 feet (5.5m).
- Extra-Low Dispersion (ED) glass for outstanding picture quality.
- Focusing ring allows adjustment to a particular click-stop setting for rapid refocusing.
- Special slip-in filter holder accepts 39mm screw-in filters.
- Built-in telescopic lens hood and rotatable tripod socket collar. collar.
- Supplied with a screw-in front lens cap and hard lens case.
- Photographic uses include photojournalism, sports, wildlife, and special effects.

Specifications

Focal length/Aperture:	600mm f/5.6 IF-ED
Lens construction:	7 elements in 6 groups
Picture angle:	4° 10′
Diaphragm:	Automatic
Aperture scale:	f/5.6 ~ f/22 on both standard and aperture-direct-readout scale
Exposure measurement:	Via full aperture method; meter coupling ridge provided for AI cameras and meter coupling shoe for non-AI cameras
Distance scale:	Graduated in meters and feet from 5.5m (20 ft) to infinity (∞)
Weight:	2.7kg
Dimensions:	134mm dia. x 382mm long (overall); 374mm extension from flange
Attachment size:	122mm (P = 1)
Front lens cap:	Screw-in
Lens hood:	Built-in
Lens case:	CL-62 (provided)