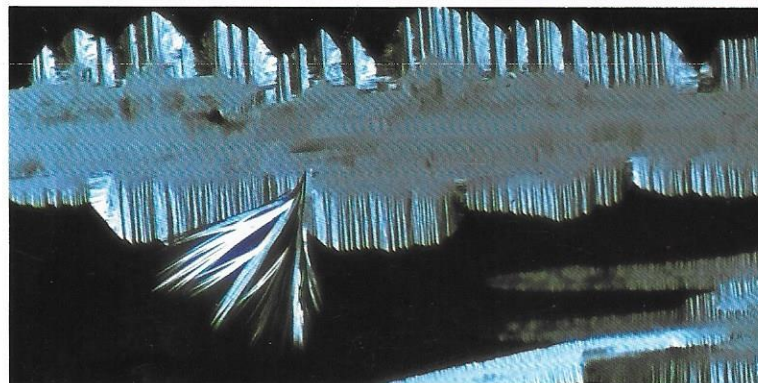
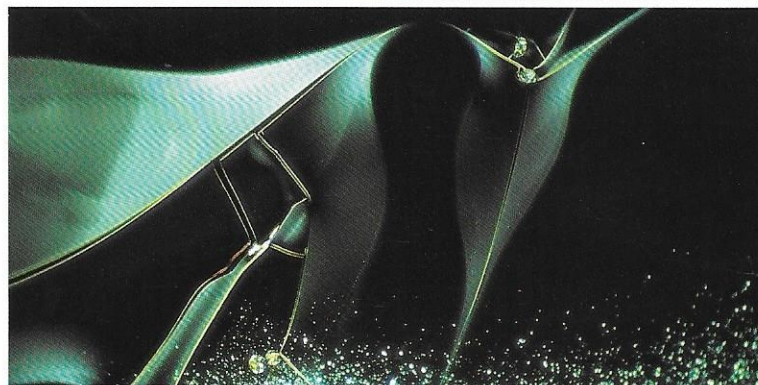
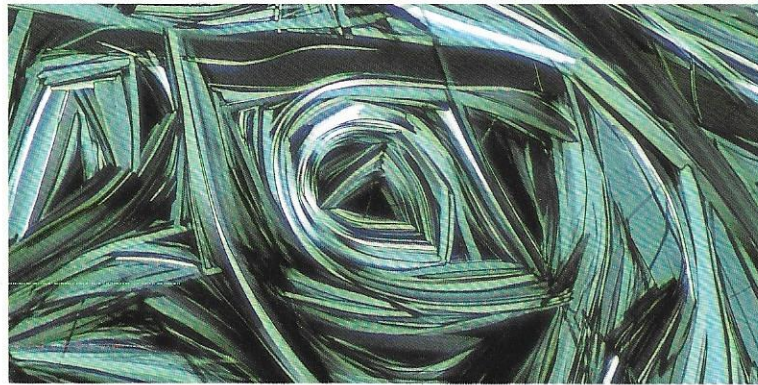
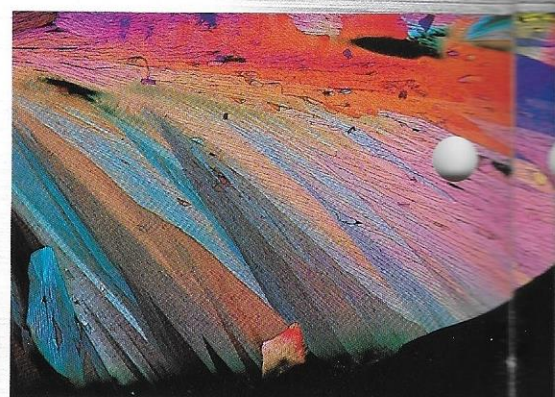
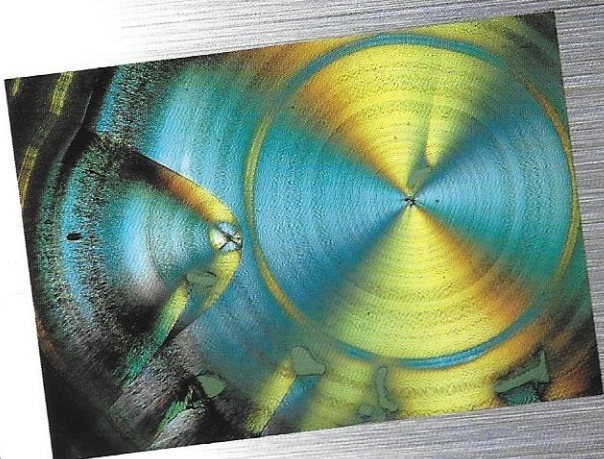


**Nikon**

# Polarizing Microscopes







Optiphot-2 Pol



Microphot-FXA with  
Polarizing Attachment

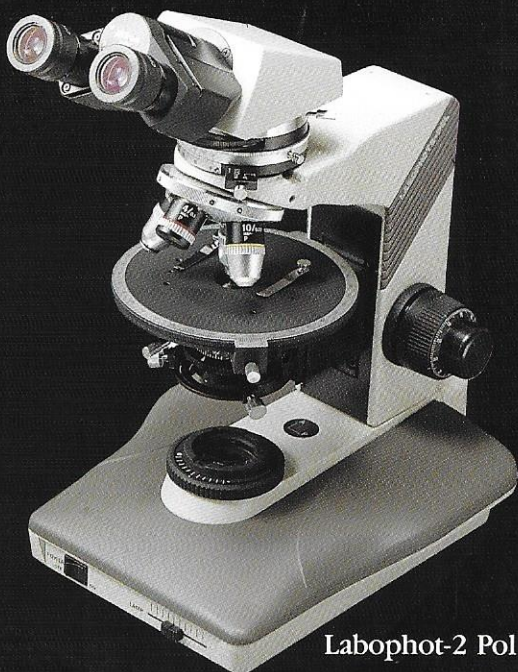




## *Polarization — Enter a New Phase of Discovery*

In many fields, including geology, petrology, fiber research, pharmacology, biology and materials science, polarizing microscopes have become indispensable. And the uses for polarized microscopy continue to develop and diversify. To meet this growing demand Nikon offers a complete line of Polarizing Microscopes, which includes the Microphot Series, Optiphot-2 Pol and Labophot-2 Pol. One of these is sure to satisfy any application and budget.

Incorporating Nikon's original design and world-acclaimed CF optical system, chromatic aberrations in magnification are virtually corrected by the objective lens. With this system, you get flare-free, sharp images not only during observation but also in photomicrography. And you'll find many new mechanical features that were designed with durability and ease of operation in mind. In addition to the optical and mechanical advantages, Nikon offers a wide range of accessories which enable these microscopes to offer you quality performance as reliable research partners.



Labophot-2 Pol



# Microphot-FXA with Diascopic Polarizing Attachment

Nikon's most advanced polarizing microscope enables you to perform observation and photomicrography simultaneously, without diverting your attention from the specimen. The built-in photomicrographic system features an accurate, movable 1% spot measurement area. For ease of operation, all functions are fully controlled by an integrated large-screen microcomputer system that serves as a user-defined multi-camera management system. Optical performance has been significantly improved as well.

- The measurement area can be moved, in either the 1% spot or 30% average exposure mode, while observing the placement of the area. The measurement area can be seen through the binocular eyepiece tube for accurate positioning.
  - The quick-return mirror in the simplified optical system allows 100% of the light used for observation to reach the film surface. Consequently, it enables very short exposure times, even for very low intensity images, and fast shutter speeds for clear, crisp pictures.
  - A focusable Bertrand Lens is built into the main body to facilitate observation and photography of conoscopic images. The built-in intermediate magnification lenses of 1x, 1.25x, 1.5x and 2x are convenient for determining picture composition.
- A centerable Bertrand Lens slider can be inserted between the eyepiece tube and main body for more accurate and detailed observation of conoscopic images.
- The special prism built into the photo arm provides a

unique three-way optical path that allows 100% of the light from the objective to be used for observation or photomicrography. It also enables simultaneous CCTV monitoring and photomicrography (or observation) at the 80:20 position. The FXA's two optical ports enable simultaneous use of a photographic camera and TV camera, or a photographic camera and P1 photometer. For the ultimate in convenience, two 35mm cameras plus one large-format camera can be attached.

- A powerful 12V-100W LL halogen lamp in combination with a Köehler system provides more than adequate illumination.
- The large LCD panel displays all information necessary for taking photomicrographs. Special backlit illumination ensures superior legibility, even in dim light. To simplify the photomicrography process, instructions appear at the bottom of the display, and a pull-out keyboard built into the base provides full control over the comprehensive photo-optical menu.

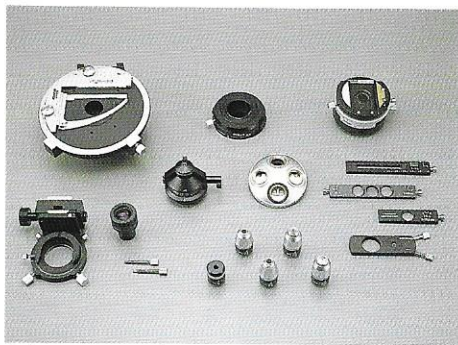


Diorite CF P4x



Liquid crystal focal-conic texture CF P4x

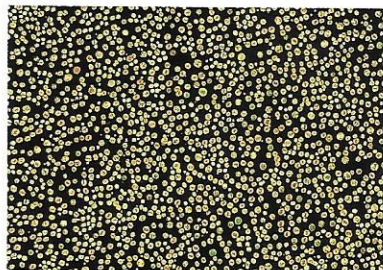




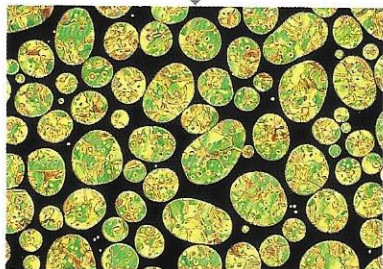
### Diascopic polarizing attachment

The high-precision design combined with chromatic-aberration-free CF objectives ensures exceptionally high-quality polarizing images. This attachment also makes it possible to take photomicrographs of conoscopic images and observe them via a TV camera.

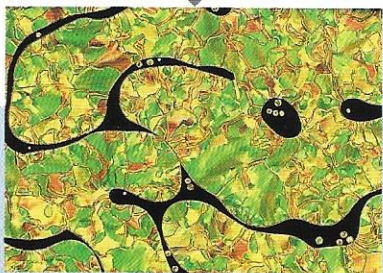
### Liquid crystal smectic face CF P10x



81.4°C



80.7°C



80.3°C



79.2°C

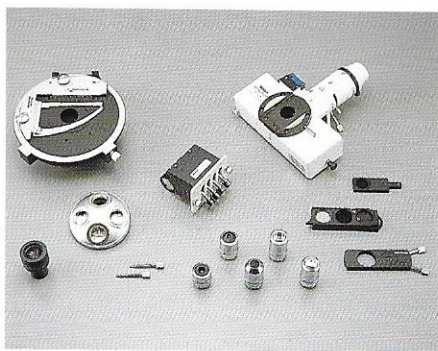




# Microphot-FXA with Episcopic Polarizing Attachment

Adding just a few attachments from the large variety of accessories available for the Microphot Series transforms the Microphot-FXA into a high-quality episcopic polarizing microscope with built-in photographic capabilities.

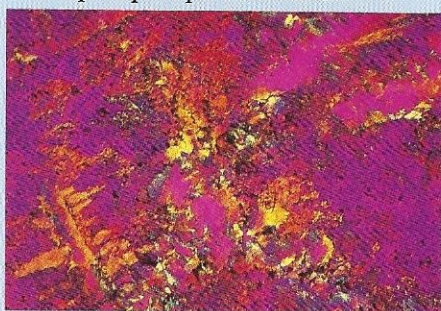
- With a powerful 12V-100W LL halogen illuminator, a bright image is observed, even of very low reflection specimens. A 100W xenon illuminator and 100W mercury illuminator are also available as options.
- Also by adding a few accessories to the episcopic polarizing version, instant switching between episcopic and diascopic microscopy is possible with high-quality, bright polarized images.
- Use of a special episcopic polarizing lens — CF M plan 50x PMMA or 100x PMMA — permits both diascopic and episcopic polarization microscopy.



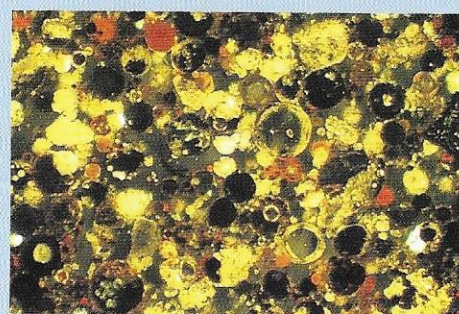
Episcopic Polarizing Attachment



Additional Attachment for  
Diascopic/Episcopic Polarization



Eutectic graphite cast iron CF M Plan DIC 20x



Fly ash CF M Plan.DIC 20x (epi/dia polarization)

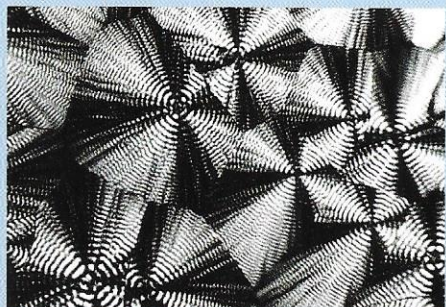


# Microphot-SA with Diascopic Polarizing Attachment

This large, sturdy research microscope features a simplified optical system. In addition to offering excellent optics, it can be used as either a diascopic or episcopic polarizing microscope. Microphot Series accessories can be attached to the Microphot-SA in various combinations, enabling you to develop the system that best meets your specific needs. It becomes a photo microscope when combined with Nikon's Photomicrographic System, a photometry microscope when combined with the P1 Photometer System, and a TV microscope when combined with a TV camera. The SA boasts two optical ports that enable simultaneous use of, for example, a photographic camera and TV camera or of a photographic camera and P1 photometer. The optional Bertrand Lens lets you observe the conoscopic image on a TV monitor while photographing.



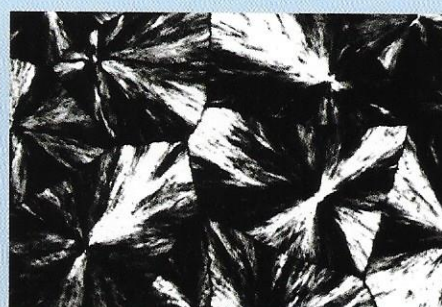
Polymer spherulite



Polyethylene CF P40x



Polypropylene CF P40x



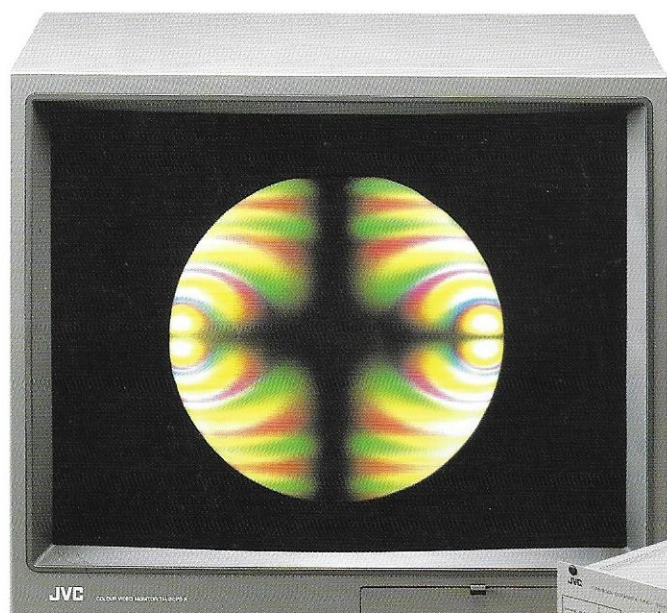
Polyoxymethylene CF P40x



# CCTV System

The Microphot Series microscopes all have a TV port equipped with the ENG mount. Attaching a CCTV system to this port adds TV monitoring capability to make the ideal polarizing microscope with the Microphot Series.

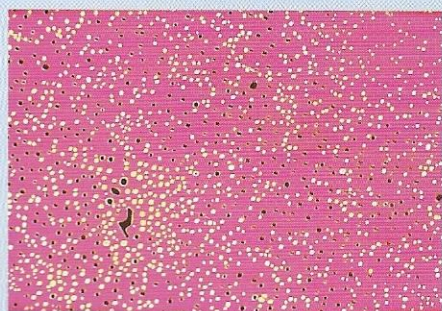
- The polarized light microscopy can be observed by many people simultaneously.
- The Bertrand Lens in the main body of the microscope facilitates the observation of conoscopic images on TV monitors. And the built-in intermediate magnification lenses can be conveniently used to determine the TV picture composition.
- Zooming adapter for the TV camera is available as an option.



Conoscopic image of mica  
TV picture simulated



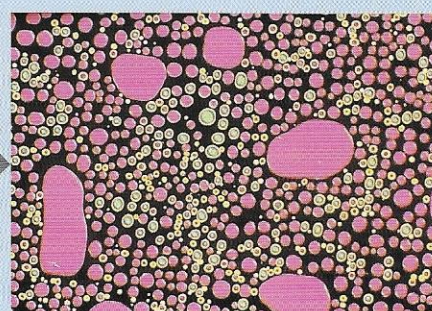
Liquid crystal nematic face CF P10x



68.9°C



70.7°C



71.5°C



## Specifications of Microphot-FXA

Main Body	
<b>Base:</b>	Separate transformer; voltmeter and field diaphragm are built in; filters (cassette type, NCB-11 HE, GIF, ND2, ND8, ND32).
<b>Light path switching:</b>	Observation/Photography: 100%/100%, Photography/TV: 100%/100%, 20%/80%; quick-return mirror mechanism employed.
<b>Photomicrographic system:</b>	Three cameras attachable, 1% spot and 30% average exposure measurement switchable; measurement area moveable; measurement area can be confirmed; 2.5x projection lens (fixed); graphical liquid crystal display of photographic data; film speed range ISO 1 ~25000; ISO film speed readable with DX code; exposure compensation 3 steps over and 3 steps under (1/3 increments); shutter speed mode; auto mode, manual mode, time mode, bulb mode, memory mode, flash mode; multiple exposure (2-999); interval photomicrography; simple photometry; reticle illumination (red/green); data printing (8 digits); ISO film speed, exposure compensation value, film count and frame number; shutter speed, photometric value, total photomicrographic magnification, scale length (auto scale setting), random alphanumeric data; data counting; ergo-control switch; frequently used switches such as exposure switch, reticle illumination switch and motorized revolving nosepiece switch are clustered around coaxial control knob.
<b>Focusing mechanism:</b>	Vertical stage movement with special triaxial differential gear trains and precise roller-race bearings; movement range 25mm; substage movement range 23mm.
<b>Triaxial focusing knob:</b>	Coarse motion 36.8mm rotation, medium motion 1.7mm and fine motion 0.1mm; minimum increment 1 $\mu$ m; torque of coarse motion knob adjustable.
<b>Substage:</b>	Detachable; vertical movement range of condenser 25mm; condenser centerable; polarizer detachable, rotatable, click stop every 45°.
<b>Intermediate magnification changer:</b>	1x, 1.25x, 1.5x and 2x lenses built into the turret; focusable Bertrand Lens also built in.
<b>Magnifier:</b>	4x magnifier built in (detachable).
<b>Illumination:</b>	12V-100W LL halogen lamp with lamphouse.
<b>Eyepiece tube:</b>	Constant tube length Siedentopf binocular with graduated interpupillary adjustment from 51mm to 75mm; rotation of eyepiece reticle is compensated (right eye).
<b>Eyepiece:</b>	CFWN 10 x CM (with crosslines and micrometer).
<b>Revolving nosepiece:</b>	Centering quadruple nosepiece; interchangeable.
<b>Stage:</b>	160mm $\phi$ circular graduated stage, 1° increments and vernier reading to 6'; rotation locking clamp; click stop every 45°; mechanical stage attachable.
<b>Interface:</b>	RS-232C.

## Polarizing Attachment

	Diascopic	Episcopic
<b>Intermediate tube</b>	Built-in analyzer, rotatable, removable from optical path; vernier reading to 6'; DIN compensator slot provided.	Aperture diaphragm provided; polarizer with 1/4 $\lambda$ plate and one $\lambda$ plate with ND filter available; filter cassette (NCB11, GIF, ND16, diffuser); analyzer, 360° rotatable, vernier reading to 6'; 1x magnification factor; bright/dark field switchable; fluorescence filter block can be inserted.
<b>Objective lenses</b>	CF Achromat P-4x, P-10x, P-20x, P-40x, P-100x. CF DIC Plan Achromat 10x. CF N DIC Plan Achromat 20x, 40x, 100x.	CF M Plan DIC 5x, 10x, 20x, 40x, 100x (dry).
<b>Bertrand Lens slider</b>	Centerable; inserted between the eyepiece tube and the main body.	
<b>Condensers</b>	Swing-out Achromat Condenser; N.A. 0.9; illuminated area 3.4mm $\phi$ (12mm $\phi$ when top lens is swung out); polarizer.	(For epi/dia application) Polarizer with compensator slot; swing-out achromat condenser; N.A. 0.9.



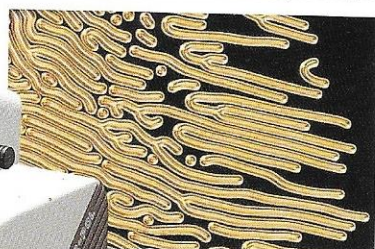
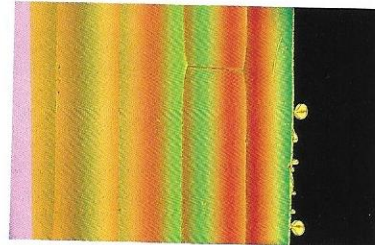
# Optiphot-2 Pol

A true research-oriented polarizing microscope in the tradition of the Optiphot-2. All of the necessary functions required of polarizing microscopes are incorporated. With a long list of accessories and attachments, the Optiphot-2 can be custom fit to your application. By adding the optional Nikon FX Photomicrographic System, it becomes a high-quality photomicroscope.

- Nikon has succeeded in incorporating a Bertrand Lens (that can be focused and centered) into the Intermediate Tube. Used in combination with the TP-2 Eyepiece Tube, this feature enables photography of conoscopic images, and is an important feature of this microscope.
- Eyepieces and objectives both employ Nikon's advanced design CF system. This ensures a high-resolution, high-contrast image virtually free from flare and ghosts.
- The conoscopic images of minute specimens can be observed by using Eyepiece Tube "TP2" or "BP".
- Special attention has been given to the stability of the rotating stage and the vertical stage movement mechanism to ensure stable and sharp images during movement of the stage.
- A bright 12V-100W LL halogen lamp is employed in the illumination system. In combination with the Köhler system, CF optics and the durable, vibration-free base, it is ideal for photomicrography. A 100W xenon illuminator and a 100W mercury illuminator are also available as options.
- Compact and ergonomically designed. The base portion, molded from special material, has been enlarged to reduce user fatigue.



Pitch change of liquid crystal  
CF M Plan DIC 5x



Liquid crystal focal-conic  
texture CF M Plan DIC 5x

## Specifications

**Base:** Large, soft-touch painted armrest; stabilized built-in transformer with voltage control; field diaphragm built in; 3 filter holders in lamphouse; auto photo button; LED light intensity indication.

**Focusing mechanism & coaxial focusing knob:** Vertical stage movement via rack and pinion; coarse motion 12mm/rotation, fine motion 0.1mm/rotation; refocusing stopper; coarse drive torque adjustable.

**Substage:** Circular dovetail centerable condenser mount; polarizer detachable, rotatable, click stop at 0°.

**Revolving nosepiece:** Centering quadruple nosepiece; interchangeable.

**Eyepiece tube:** Trinocular "TP2" F/N 20; inclined 30° with built-in, removable Bertrand Lens.

Binocular "BP2" F/N 20; inclined 30°.

Binocular "BPJ" F/N 20; inclined 45°.

**Intermediate tube:** Built-in focusable and centerable Bertrand Lens removable from optical path; built-in analyzer removable from optical path; built-in depolarizer; vernier reading to 6'; DIN compensator slot.

**Stage:** 160mmØ circular graduated stage, 1° increments and vernier reading to 6'; click stop every 45°.

**Illumination:** Köhler system; pre-centered and pre-focused, 12V-100W LL halogen lamp.

**Eyepieces:** CFWN 10x, CFWN 10xCM (with crosslines and micrometer).

**Objective lenses:** CF Achromat P4x, P10x, P20x, P40x, P100x (oil), CF P Plan 60x.

**Condenser:** Strain-free swing-out Achromat (N.A. 0.9)



# Labophot-2 Pol

Simple and compact in design, the Labophot-2 Pol is a polarizing microscope which shares many of the Optiphot-2 Pol's features at an economical price.

- The Nikon CF optical system, Köehler illumination system and 6V-30W pre-centered and pre-focused halogen lamp ensure polarizing microscopy with bright, sharp images.
- As with the Optiphot-2 Pol, conoscopic images of minute specimens can be observed and photography of conoscopic images can be facilitated.
- Improved stability of the rotating stage and vertical stage movement mechanism eliminates images which drift out of focus or wobble.



Starch CF P40x

- Illumination systems are built into the base, resulting in a compact design. All controls and the large armrest are ergonomically designed and arranged for fatigue-free operation, even over long work periods.



## Specifications

**Base:** Large armrest; stabilized built-in transformer with voltage control; field diaphragm built in.

**Focusing mechanism & coaxial focusing knob:** Vertical stage movement via rack and pinion; coarse motion 12mm/rotation, fine motion 0.1mm/rotation; coarse drive torque adjustable.

**Substage:** Circular dovetail centerable condenser mount.

**Revolving nosepiece:** Centering quadruple nosepiece fixed to the main body.

**Eyepiece tube:** Trinocular "TP2" F/N 20; inclined 30° with built-in, removable Bertrand Lens.

Binocular "BP2" F/N 20; inclined 30°.

Binocular "BPJ" F/N 20; inclined 45°.

**Intermediate tube:** Built-in focusable and centerable Bertrand Lens removable from optical path; built-in analyzer removable from optical path; built-in depolarizer; vernier reading to 6'; DIN compensator slot.

**Stage:** 160mmØ circular graduated stage, 1° increments.

**Illumination:** Köehler system; pre-centered and pre-focused, 6V-30W halogen lamp.

**Eyepieces:** CFWN 10x, CFWN 10xCM (with crosslines and micrometer)

**Objective lenses:** CF Achromat P4x, P10x, P20x, P40x, P100x (oil), CF P Plan 60x

**Condenser:** Strain-free swing-out Achromat (N.A. 0.9)



# Accessories

## Episcopic Polarizing Attachment

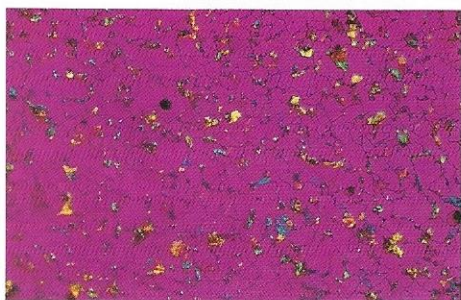
(for Optiphot-2 Pol, Labophot-2 Pol)

This attachment is installed between the microscope stand and the intermediate tube. A 12V-50W halogen Köehler illumination system provides bright images.



Episcopic Polarizing Attachment

Cast steel CF M PlanDIC 20x



## CF Objectives for Polarization

Type/Magnification			Numerical Aperture	Working Distance (mm)	Cover Glass Thickness (mm)	Remarks
For Diascopic Polarization (Mechanical Tube Length/Parfocal Distance = 160mm/45mm)						
Achromat	Dry	CF P 4x	0.10	20.0	—	
		CF P 10x	0.25	5.6	—	
		CF P 20x	0.40	2.23	—	
		CF P 40x	0.65	0.60	0.17	Spring loaded
	Oil	CF P 100x	1.25	0.14	0.17	Spring loaded
		Plan Achromat	Dry	CF Plan 2x	0.05	5.8
CF N Plan 4x	0.13			16.22	—	
CF Plan DIC 10x	0.25			7.10	—	
CF N Plan DIC 20x	0.50			1.78	0.17	Spring loaded
CF N Plan DIC 40x	0.70			0.61	0.17	Spring loaded
CF P Plan 60x	0.85			0.41 ~ 0.45	0.11 ~ 0.23	Spring loaded, with cover glass correction ring
Oil	CF N Plan DIC 100x		1.25	0.16	0.17	Spring loaded
For Episcopic Polarization (Mechanical Tube Length/Parfocal Distance = 210mm/45mm)						
M Plan Achromat	Dry	CF M Plan DIC 5x	0.10	20.0	0	
		CF M Plan DIC 10x	0.25	9.0	0	
		CF M Plan DIC 20x	0.40	3.0	0	
		CF M Plan DIC 40x	0.65	1.0	0	Spring loaded
		CF M Plan 100x	0.90	0.3	0	Spring loaded
		CF M Plan 50x PMMA	0.70	2.80	0 ~ 1.5	Spring loaded, for acrylic resin nd = 1.49
M Fluor	Oil	CF M Fluor Po-20x	0.60	0.41	0	Spring loaded, for Automatic Reflectance Micro-
		CF M Fluor Po-40x	1.00	0.41	0	photometry System and for epi-fluorescence



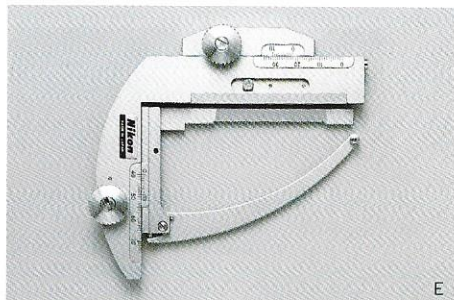
## Attachable Mechanical Stage E/EP

(for Microphot Series, Optiphot-2 Pol, Labophot-2 Pol)

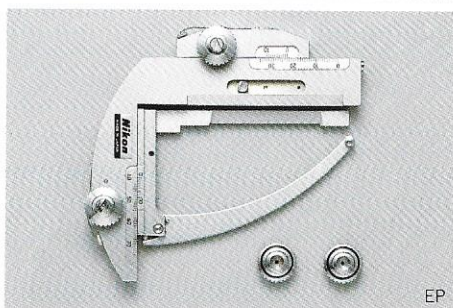
This stage attaches to the rotating stage for specimen manipulation. This improves efficiency in microscopy. EP type enables point counting.

Cross travel motion: 25 × 25 mm

Min. increment: 0.1mm on the vernier



E



EP

## Four-Axis Universal Stage

(for Optiphot-2 Pol)

This stage enables observation of specimens from various angles. A centering mechanism is incorporated.

Hemispherical lenses are supplied:

Nd=1.516, Nd=1.556, Nd=1.649

Usable objective lenses:

U5x N.A. 0.1 W.D.=5.3mm

U10x N.A. 0.22 W.D.=2.9mm

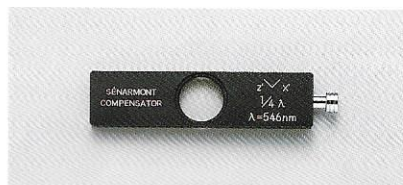
U20x N.A. 0.33 W.D.=1.1mm



## Compensators

(for Microphot Series, Optiphot-2 Pol, Labophot-2 Pol)

In addition to the standard 1/4λ and tint plate (1st order red plate), a Senarmont compensator for retardation measurements of 0 — 1st order and a quartz wedge for retardation measurements of 1 — 6λ are available.



Senarmont compensator



Quartz wedge

## Attachment for Diascopic/Episcopic Polarization

Use of the Microphot Rotatable Diascopic Polarizer with Compensator Slot enables you to perform dia/episcopic polarization studies on the FXA set with an episcopic illuminator. Addition of the 1/4λ and Tint Plate allows quantitative measurement under transmitted polarization. The Rotatable Universal Epi-Analyzer permits the use of the Senarmont Compensator and makes possible the measurement of retardation of diascopic specimens with outstanding accuracy.



Microphot rotatable diascopic polarizer with compensator slot



Rotatable universal epi-analyzer

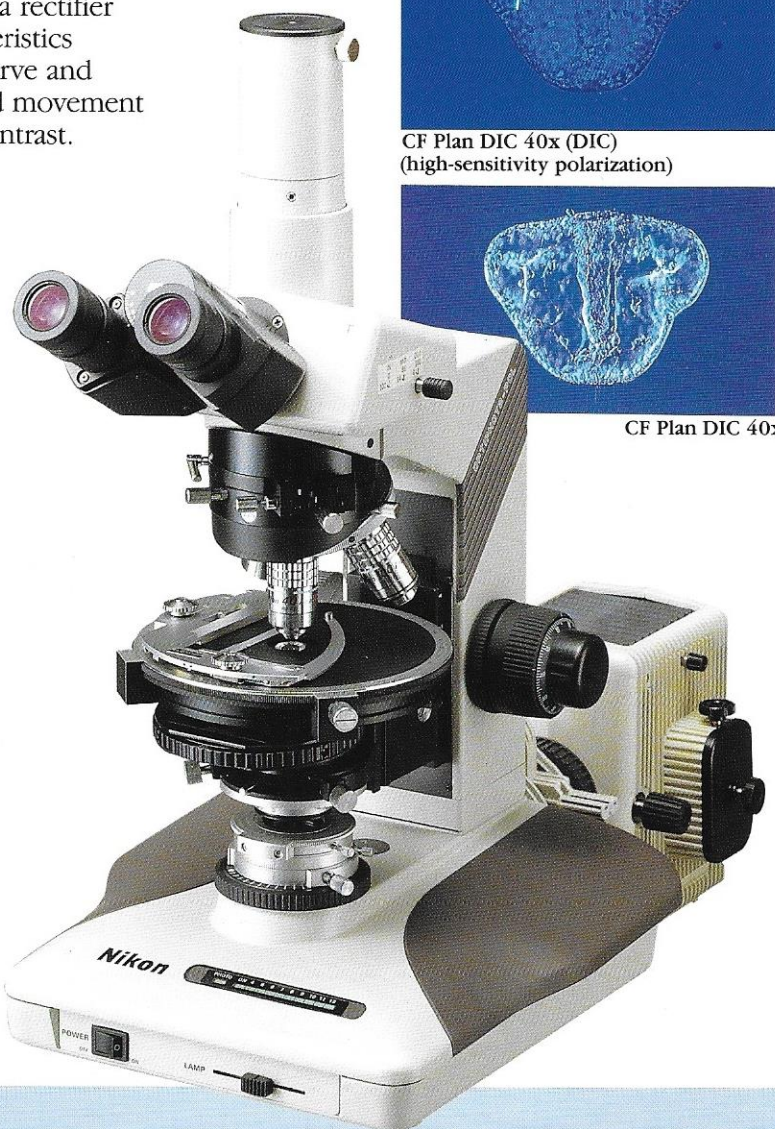


# Nomarski Rectifier

## High Sensitivity, Polarizing and DIC Microscope

This is Nikon's original design for a biological polarizing (and DIC) microscope that ensures the least birefringence when observing specimens. By incorporating a rectifier which compensates for the polarizing characteristics caused by lens curvature, it is possible to observe and photograph the internal structure, division and movement of unstained, living cells and germs in high contrast.

- This highly sensitive polarizing microscope detects the minutest birefringent patterns and measures the birefringence. (Brace-Köhler type compensator; min. retardation readout approx. 0.1mm)
- High-sensitivity DIC microscopy is possible at high magnifications.
- Four types of microscopic procedures can be utilized in rapid succession for easy comparison.
  1. High sensitivity polarizing (Objectives: 20x, 40x, 100x)
  2. Differential interference contrast (Objectives: 20x, 40x, 100x)
  3. Phase contrast (Objectives: 10x, 40x)
  4. Bright field (Objectives: 10x, 20x, 40x, 100x)



## Specifications

**Base:** Large, soft-touch painted armrest; stabilized built-in transformer with voltage control; field diaphragm built-in; 3 filter holders in lamphouse mount; auto photo button; LED light intensity indication.

**Focusing mechanism & coaxial focusing knob:** Vertical stage movement via rack and pinion; coarse motion 12mm/rotation, fine motion 0.1mm/rotation; refocusing stopper; coarse drive torque adjustable.

**Substage:** Circular dovetail centerable condenser mount.

**Revolving nosepiece:** Centering quadruple nosepiece; interchangeable.

**Illumination:** Köhler system; centerable and focusable 100W high-pressure mercury lamp.

**Eyepiece tube:** Trinocular "TP2" F/N 20; inclined 30° with built-in, removable Bertrand Lens.

**Binocular "BP2" F/N 20; inclined 30°.**

**Binocular "BPJ" F/N 20; inclined 45°.**

**Stage:** 160mmØ circular graduated stage, 1° increments, vernier reading to 6'; click stop every 45°.

**Eyepieces:** CFWN 10x, CFWN 10xM (with photo mask).

**Objective lenses:** CF N Plan DL-10x, 40x, CF N Plan DIC 20x, 40x, 100x (oil).

**Condenser:** DIC Achromat/Aplanat, N.A. 1.4 with Nomarski prisms 20x, 40x, 100x and phase annular rings Ph1 and Ph3.

**Attachment:** Diascopic Nomarski DIC attachment; 1.25x intermediate magnification; analyzer with depolarizer; rectifier lens.

**Compensator:** Brace-Köhler type;  $R_0 \approx \lambda/20$ ; wavelength  $\lambda = 546\text{nm}$  ( $R_0$ : retardation); retardation 0 — 27.3nm; minimum reading approx. 0.1nm.

**Total magnification:** Polarizing DIC 250x — 1250x (photography 62.5x — 625x\*); phase contrast 125x — 500x (photography 31.25x — 250x\*).

\*With 35mm film

**Notes:** 1) Optional P objectives are required in high-sensitivity polarization.  
2) Take special care in handling condenser because heat or shock may cause irreparable distortion.



# Microflex FX Series Photomicrographic System

Nikon provides four types of photomicrographic systems — from a sophisticated spot and average photomultiplier model to an economical manual model — to meet your needs as well as your budget. All the Microflex models employ a swing-out beam splitter system in which 100% of the light goes directly to the film during exposure, enabling high-quality pictures in the shortest exposure time. All models except the PFX can read the film's ISO number of the DX film.

## UFX-DX

This fully automatic microprocessor-controlled model utilizes a variety of photographic techniques including 1% spot measurement and multiple exposure, in addition to improved functionality. The 1% spot measurement is especially effective when shooting the very dark images inherent in polarizing and fluorescence microscopy, which are difficult with conventional automatic exposure.

## HFX-DX

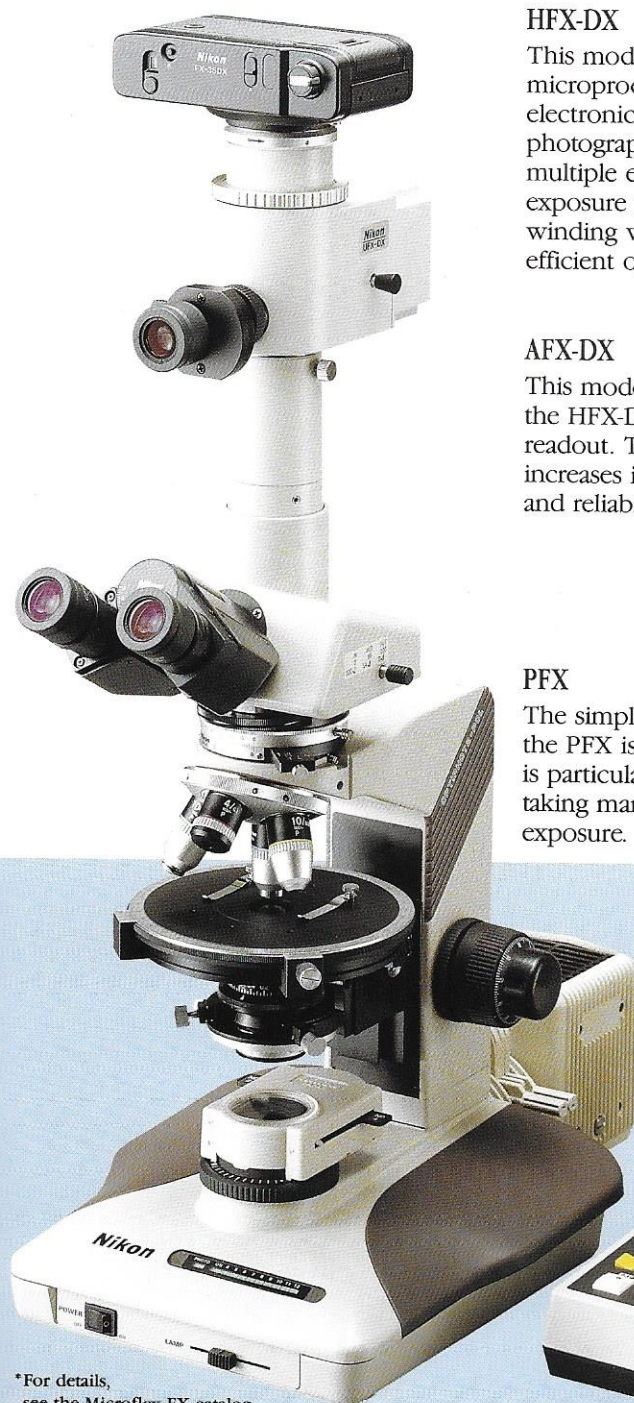
This model also employs a microprocessor, and has a built-in electronic shutter to perform various photographic techniques including multiple exposure. It also offers a digital exposure readout and automatic film winding with 35mm film for more efficient operability.

## AFX-DX

This model has all the same features as the HFX-DX, but has no exposure readout. The microprocessor greatly increases its measurement, functions and reliability.

## PFX

The simplest and lowest priced system, the PFX is a manual exposure model. It is particularly recommended when taking many photos at the same exposure.



Optiphot-2 Pol with photomicrographic attachment



Rabbit hair CF P10x

\*For details, see the Microflex FX catalog.



Specifications and equipment are subject to change without any notice or obligation on the part of the manufacturer.  
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