ZEISS

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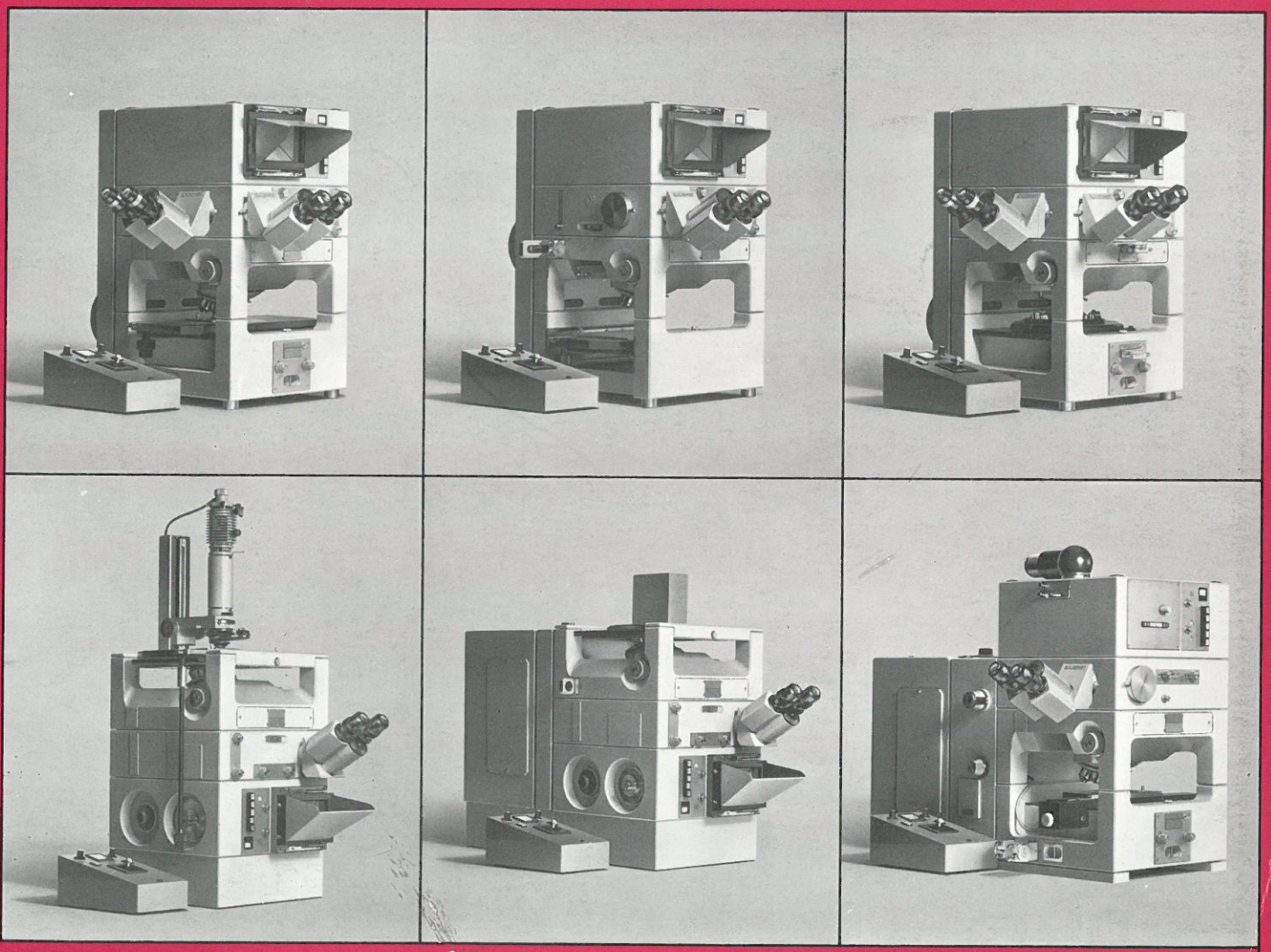
ZEISS AXIOMAT



ZEISS AXIOMAT NDC
Upright transmitted light microscope
for routine and research work

ZEISS AXIOMAT NAC
Upright reflected light microscope
for specimens up to 90 mm high

ZEISS AXIOMAT NDC Pol
Upright transmitted light microscope for
quantitative polarizing microscopy

ZEISS AXIOMAT IDC
Inverted transmitted light microscope
to study tissues, sediments, etc.

ZEISS AXIOMAT IAC
Inverted reflected light microscope,
accepts even heavy specimens

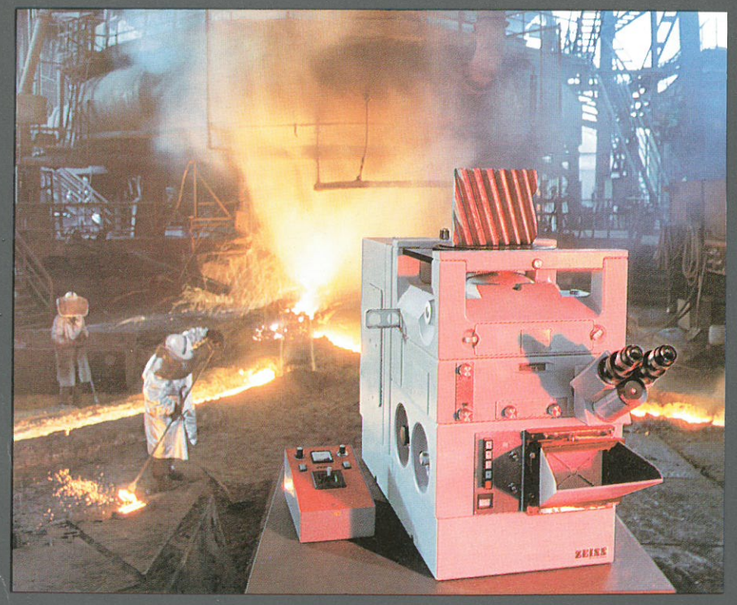
ZEISS AXIOMAT UV-NDPC Scan
Upright transmitted light UV microscope for specimen scanning
with UV camera and photometer

ZEISS AXIOMAT



the only true advance in microscope design in 100 years

The basic modules of the ZEISS AXIOMAT combined to form the configuration for an upright transmitted light microscope. Especially for research work in medicine, biology and related disciplines.



The basic modules of the ZEISS AXIOMAT combined to form an inverted reflected light microscope. Especially for metallography and microscopy in the industrial workshop.

ZEISS AXIOMAT–
key to
microscope configurations

N	Normal upright microscope
I	Inverted microscope
D (T)	Transmitted light microscope
A (R)	Reflected light microscope
C	Camera module
P	Photometer module with 35 mm UV camera
UV	for work in UV light from λ 230 nm
IR	for work in IR light to λ 1050 nm
U (I)	Base

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The new-era microscope

For over 100 years microscopes have been built according to scientifically computed formulae. And although new techniques in quantitative microscopy have constantly evolved, and technical progress has presented the microscopist with increasingly complex problems, the original design principle has remained virtually unchanged. Advanced microscope techniques meant specially designed instruments for specific purposes, the use of complex accessory equipment and as a result compromising on simplicity, stability, economy and precision. Reliable results became less of a certainty.

ZEISS sought a way to eliminate these problems once and for all and their researches culminated in a revolutionary new design principle. The basic functions of a microscope have been incorporated in square blocks which can be screwed together in varying combinations—depending on the function wanted. The result is a whole series of microscopes—upright, inverted and horizontal, transmitted and reflected light—of unparalleled mechanical and thermal stability. The configurations of the modules can be altered as you like; and one module replaced by another.

The outstanding feature of the instrument, whatever the configuration, is that the optical axis is coincident with the axis of symmetry of the modules. Thus a design principle from the early days of microscopy makes its reappearance in this brand new instrument.

The optics have been recomputed and the objectives corrected for infinity. Image aberrations have been corrected to an unprecedented extent, producing superb quality pictures of king-size panorama format, fully utilized by the OPTOVAR zoom system. Parts which have to be moved for focusing the image have been kept to a minimum.

Two fully automatic camera systems, for 35 mm and 4 x 5″ are combined in one unit, both ever ready but never in the way, meaning a fast reliable pictorial record. Large easily accessible operating elements make for rationalized work. All accessories—filters, condensers, pointers, micrometers, reflectors, compensators, analyzers, diaphragms, retardation plates, polarizers, and interference equipment—are arranged in smooth-action slides, inserted in the respective module. There are two easily accessible real intermediate image planes, one before and one after the OPTOVAR zoom system, which means every possible measuring device can be introduced with or without zoom effect. With the OPTOVAR system magnifications can be set so that one interval of the reference scale corresponds exactly to one unit of measurement in the object or a multiple of it. No more bothersome calculations.

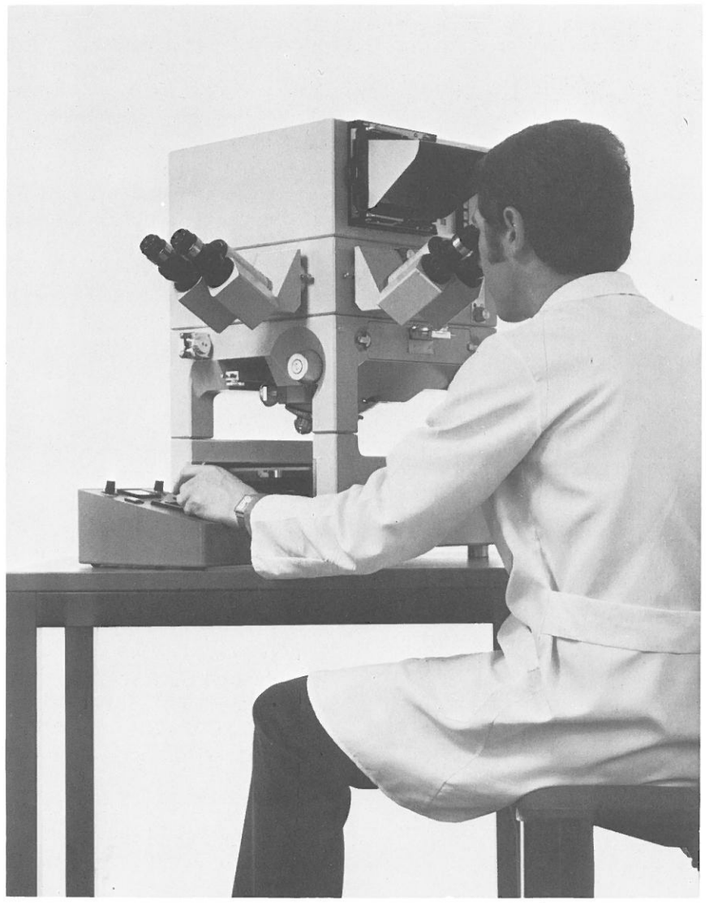
If a system for the intermediate imaging of the pupil is used, the object image can be affected in various ways, permitting, for instance, phase contrast viewing with normal brightfield objectives.

With its cubic form the ZEISS AXIOMAT is functionalized to the maximum. Its clear-cut lines makes for direct, easy and space-saving

attachment of peripheral equipment such as monochromators, TV cameras etc.

This is the great advantage: the ZEISS AXIOMAT can keep pace with new developments whatever the technique— with minimum outlay. It already offers brightfield, darkfield, phase contrast, differential interference contrast, fluorescence, polarization, multi-beam interference, object scanning, photometry, spectrofluorometry, TV image analysis and UV and IR microscopy.

Tomorrow will bring completely new techniques to further broaden the microscopist's range.



ZEISS AXIOMAT: Milestone in modern microscopy.
New optics, panoramic field of view, mechanical and thermal stability unparalleled in light microscopy, convenient dimensions, two separate viewing tubes.
This is technical progress with tomorrow's look—for seeing more—more clearly than ever before. For probing the unknown—with total objectivity.

ZEISS AXIOMAT NDC

Normal upright transmitted light microscope with 4×5″/35 mm camera



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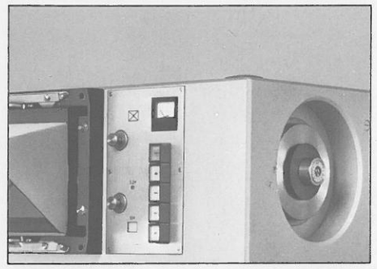
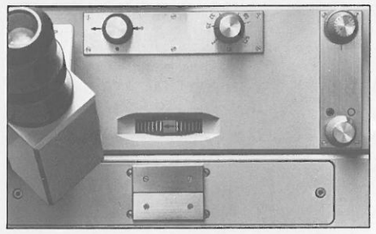
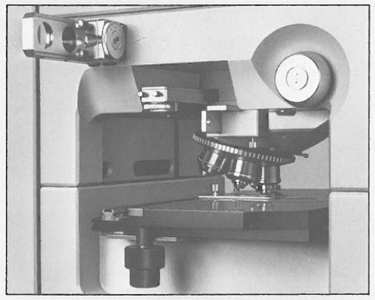


4 x 5″/35 mm camera with fully automatic exposure
Set the speed of the film used (between 5 and 50 DIN/2.5 and 8000 ASA) and trigger with key A: perfect exposure.
Display for monitoring exposure time.

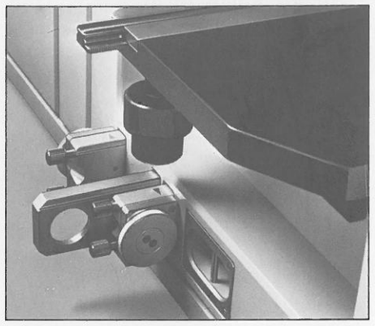
Switchover from spot to integral exposure reading.
Switchover between 4 x 5″ and 35 mm camera.
Pilot lights show which camera is ready for use.



Front plate of observation module
Above left: Switch for splitting of image between tubes 1 and 2.
Setting knob for OPTOVAR zoom system 0.8 . . . 3.2 x.
Below: Knob for splitting of image between observation and camera.
Right: Switch-in and focusing knob for Bertrand lens.



Reflected light fluorescence excitation with maximum effect
Slider for filters, slider with lamp field stop and slider with aperture iris diaphragm A for reflected light are inserted in the objective module. The reflected light fluorescence slider contains complete filter combinations for rapid exchange between two different types of fluorescence excitation.



Light path control in stage module D (T)
Lamp field iris diaphragm and aperture iris diaphragm in their mounts can be conveniently set and centered from the outside. The filter slider is sandwiched between them.

ZEISS AXIOMAT NDC

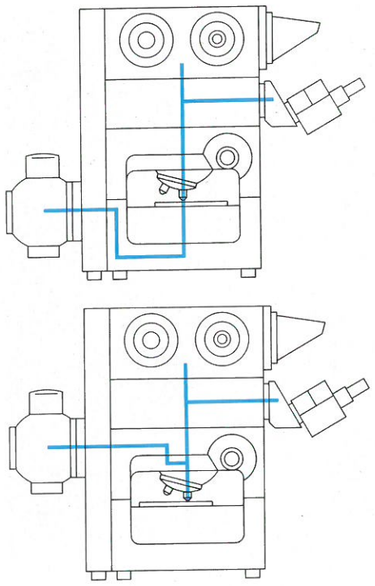


Diagram of the beam path in the ZEISS AXIOMAT NDC upright microscope.
Above: with transmitted light.
Below: with reflected light,
e.g. for reflected light excitation of fluorescence specimens.

The ZEISS AXIOMAT NDC is an upright microscope for all work in transmitted light in biology, medicine and applied fields.
Four modules form a compact microscope:
The base is formed by stage module D (T), containing all elements for regulation of the transmitted light illumination and including the large stable specimen stage.
On top of this is the objective module with electrically and manually focusable image forming systems.
Third block: observation module. According to the setting of the beam splitting systems the image is relayed to various receivers—simply by operating a switch. The receiver can be either the human eye, cameras and photometric detectors. The 0.8x...3.2x OPTOVAR zoom system and a focusing Bertrand lens are also built into the observation module.
Top module of this configuration: the 4×5″/35 mm camera module. With fully automatic exposure, always ready to shoot and never hindering other microscope functions, at the press of a button it records everything visible in the tubes.

ZEISS AXIOMAT for fluorescence work
Upright microscope for all work with transmitted light in biology, medicine and related fields. In addition: special equipment for all modern techniques in transmitted and reflected light fluorescence microscopy.
For transmitted light fluorescence excitation the stage module D (T) takes up to 10 exciter filters of numerous different permutations in the filter slider. The insert with the appropriate barrier filters slides into the objective module.
For reflected light fluorescence excitation there are sliders containing two complete filter combinations each (exciter filter + chromatic beam splitter + barrier filter) which can be exchanged by pushing the slider in or out respectively. Filter combinations are supplied for violet excitation and for blue and green excitation. By exchanging the filters, any other combination can be achieved. The epi-fluorescence condensers are inserted in the objective module.

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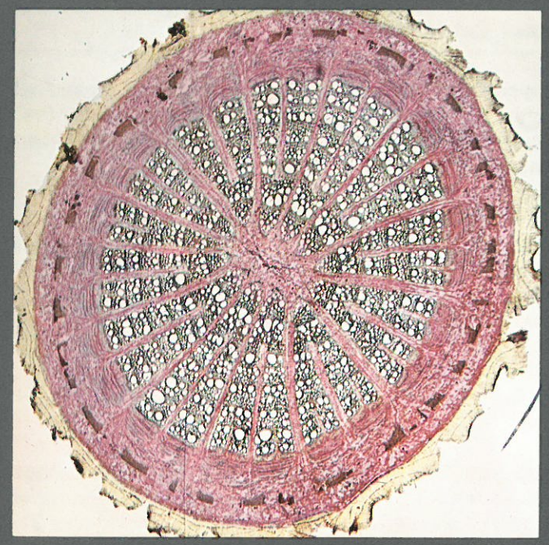
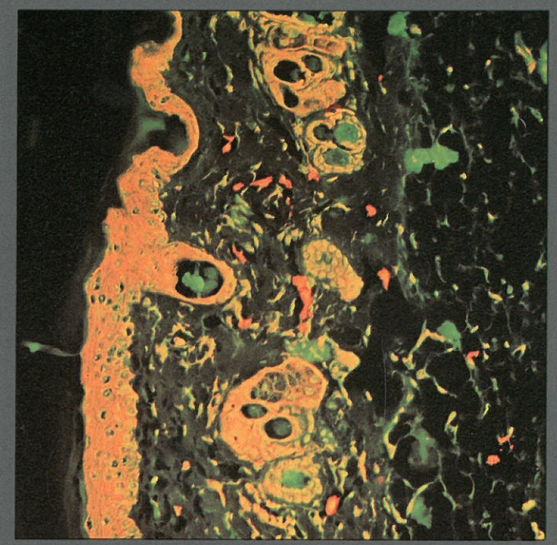
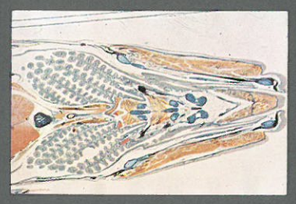
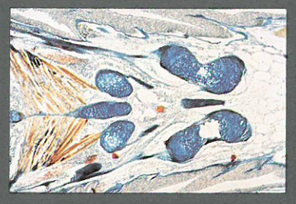


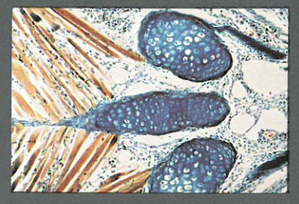




Planachromat
2.5 x / 0.07
0.8 x zoom OPTOVAR
Magnification: 6.5 x
Enlarged to 12 x



Planachromat
10 x / 0.25
0.8 x zoom OPTOVAR
Magnification: 25 x
Enlarged to 45 x



Planapochromat
25 x / 0.65
0.8 x zoom OPTOVAR
Magnification: 64 x
Enlarged to 120 x

Above left
Yellow jasmine, mature branch, cross-section
Planachromat 1.25 x / 0.03 + 0.8 x zoom OPTOVAR
Magnification: 10 x
Film: Agfachrome 50 L 9 x 12 cm
Specimen by Dr. K. Michel, Aalen
Photomicrograph by Dr. H. Gundlach, Carl Zeiss, Oberkochen

Above right
Dorsum of mouse, acridine orange, reflected light fluorescence
Planachromat 10 x / 0.25 + 1.6 x zoom OPTOVAR
Magnification: 160 x
Film: Agfachrome 50 L 9 x 12 cm
Specimen by Dr. Waldvogel, Frankfurt
Photomicrograph by Dr. H. Gundlach, Carl Zeiss, Oberkochen

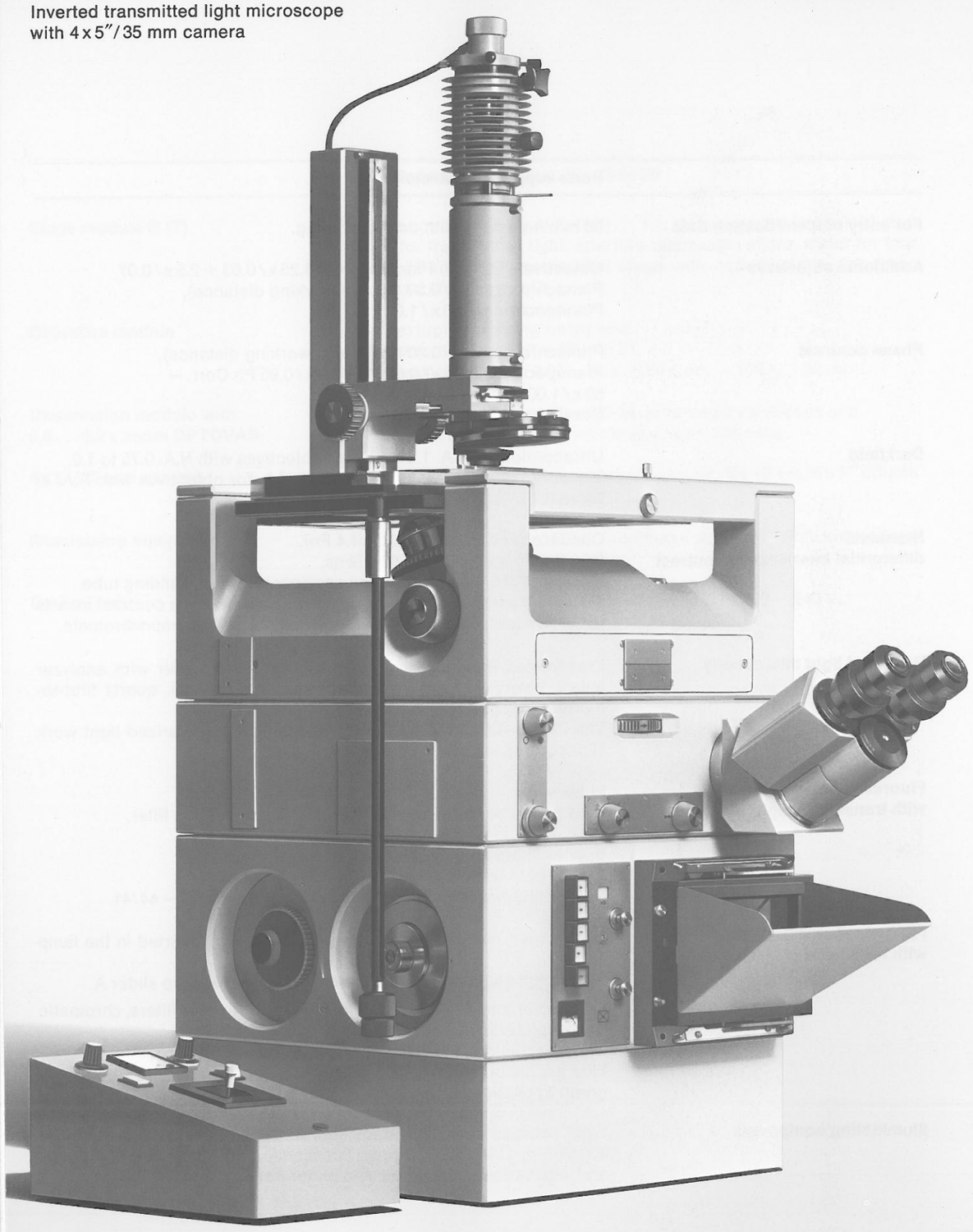
Left
Whitefish, gill region, frontal view, Azan stain
Film: Agfachrome 50 L 35 mm
Specimen and photomicrograph by Dr. H. Gundlach, Carl Zeiss, Oberkochen

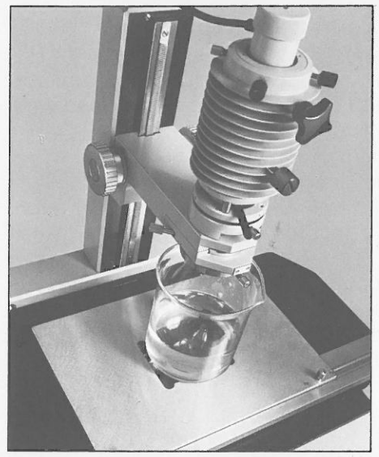
	Standard equipment, Cat. No. 49 56 30
Stage module D (T)	with zoom condenser N.A. 0.20 . . . 1.4, mirror insert, lamp field stop slider for transmitted light, aperture diaphragm slider, slider for four filters, 60 x 120 mm mechanical stage with coaxial drive, specimen clips and stage insert D.
Objective module	with sextuple revolving nosepiece, Planachromat 5 x / 0.12 — 10 x / 0.25, Planapochromat 25 x / 0.65 — 50 x / 0.95 Corr. — 100 x / 1.30 oil.
Observation module with 0.8 . . . 3.2 x zoom OPTOVAR	with binocular tube, two 10 x / 25 Br wide-angle eyepieces and reticle insert with focusing reticle (9 x 12 cm / 35 mm).
4 x 5″ / 35 mm camera	35 mm film cassette with exposure counter, 9 x 12 cm / 4 x 5″ double cassette.
Illuminating equipment	Cable box, lamp holder, 250 W illuminator and 12 V 100 W low-voltage filament lamp with socket.
Control unit	and power supply unit 100 — 110 — 115 — 127 — 220 — 240 V, 50 . . . 60 Hz, 190 VA, in housing, mains cable.

	Parts supplied separately:
For entry of identification data	35 mm magazine with data recording.
Additional objectives	Objective slide with Planachromat 1.25 x / 0.03 + 2.5 x / 0.07, Planachromat 16 x / 0.30 (19 mm working distance), Planapochromat 50 x / 1.00 oil.
Phase contrast	Planachromat 16 x / 0.30 Ph (19 mm working distance), Planapochromat 25 x / 0.65 Ph — 50 x / 0.95 Ph Corr. — 50 x / 1.00 oil Ph — 100 x / 1.30 oil Ph, Condenser head N.A. 0.13 . . . 0.9.
Darkfield	Ultracondenser N.A. 1.2 . . . 1.4 for objectives with N.A. 0.75 to 1.0. Dry darkfield condenser 0.78 . . . 0.95 N.A. for objectives with N.A. of 0.6 to 0.75.
Nomarski differential interference contrast	Condenser head N.A. 0.20 . . . 1.4 Pol, Condenser slider with DIC prisms. Transmitted light polarizer and analyzer insert with sliding tube. DIC quadruple revolving nosepiece and interference contrast inserts for 10 x Planachromat and 25 x — 50 x — 100 x oil Planapochromats.
Polarized light microscopy	Transmitted light polarizer, sliding tube for analyzer with analyzer insert, insert with red first-order retardation plates, quartz first-to-fourth order and quarter-wave plates. The ZEISS AXIOMAT NDC Pol for quantitative polarized light work is described in detail in the section called POL.
Fluorescence microscopy with transmitted light excitation	Filter slider, KG 1 heat absorbing filter and BG 38 red attenuation filter, UG 5 — UG 1 — BG 3 — BG 12 exciter filters. Exciter filters for FITC and other special purposes: KP 500 blue interference filter. Barrier filter insert with barrier filters 58/53 — 50/47 — 44/41.
Fluorescence microscopy with reflected light excitation	Filter slider, with BG 38 red attenuation filter, is inserted in the lamp holder. Sliding tube with reflected light mirror, lamp field stop slider A. Fl reflector insert taking two filter sets each (exciter filters, chromatic beam splitters, barrier filters) with violet excitation (405, 436, 385 . . . 440), blue excitation (455 . . . 490, 455 . . . 500), and green excitation (515 . . . 560, 546).
Illuminating equipment	Light sources mainly used for fluorescence excitation are the HBO 200 W/4 or CSI 250 W lamps. For illuminators for special purposes and with various intensities, see under Accessories.

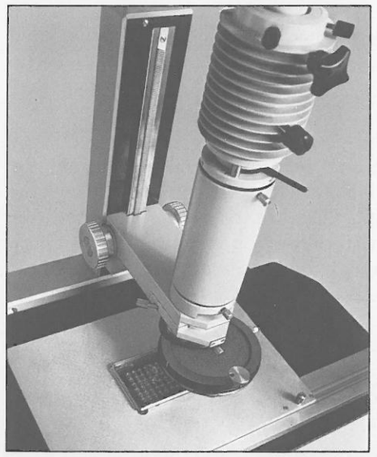
ZEISS AXIOMAT IDC

Inverted transmitted light microscope
with 4 x 5″/35 mm camera

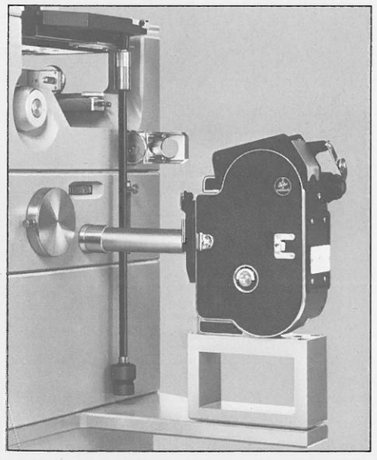




Viewing of specimens in culture vessels
Study of biological tissues, liquids or sediments is no longer a problem for users of the ZEISS AXIOMAT. Tubes, flasks, and chambers can be precisely guided on the microscope stage with the UPL specimen frame.
The 12 V 60 W high-energy illuminator ensures bright specimen images.



Köhler illumination
Specimens in chambers up to 6 mm high, microtest plates for the Terasaki tissue compatibility test, specimens on conventional specimen slides can be optimally illuminated—according to the Köhler principles. The illuminating equipment just has the spacer tube with auxiliary lens added and any of the STANDARD condensers is used.



Recording with movie and TV cameras
Objective image detectors can be attached at a side exit of the observation module.
Movie cameras can document developments in the specimen and TV camers provide stereometric analysis of objects and relay pictures of infectious or infection-prone material to adjacent rooms.

ZEISS AXIOMAT IDC

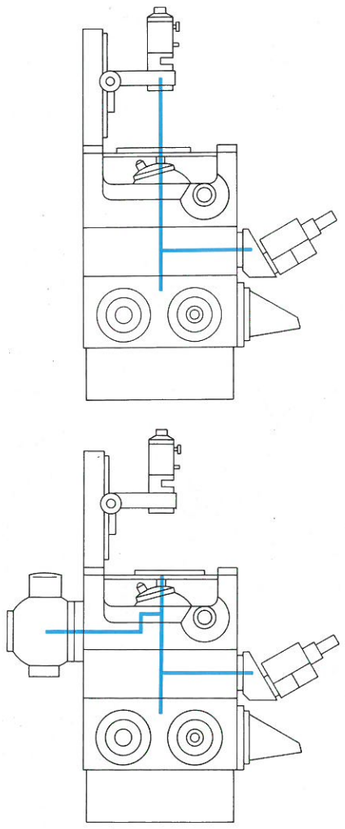


Diagram of the beam path in the ZEISS AXIOMAT IDC inverted microscope.
Above: with transmitted light.
Below: with reflected light, e.g. for reflected light excitation of fluorescence specimens.

The ZEISS AXIOMAT IDC is an inverted transmitted light microscope for viewing cell tissues and sediments in biology, medicine and related fields.
The U (I) base is used to give the correct viewing height and three modules on top form a compact microscope.
Second module of this setup is the 4 x 5″/35 mm camera. Fully automatic and always at the ready, it records everything visible in the tube.
On top of this—the observation module. According to the setting of the beam splitters, the image is relayed to the respective receiver—the eye, a camera or a photometric detector. The 0.8x...3.2x OPTOVAR zoom system and a focusing Bertrand lens are included in the observation module.
The reversed objective module in this setup contains not only the electrically and manually focusable image forming systems, but the specimen stage and transilluminator U.

ZEISS AXIOMAT IDC for fluorescence work
Inverted microscope with accessory equipment for epi-fluorescence examination of cell tissues and sediments in biology, medicine and related fields.
Epi-fluorescence inserts cater for reflected light excitation. Each one contains two complete filter combinations (exciter filter + chromatic beam splitter + barrier filter) which are exchanged by sliding the sleeve in and out. We recommend filter combinations for violet excitation and for blue and green excitation. By exchanging the filter content other combinations can easily be produced. The epi-fluorescence inserts are inserted in the objective module.
For epi-fluorescence excitation the ZEISS AXIOMAT IDC uses the microscope illuminator 250 and say, an HBO 200 W/4 lamp.

If phase contrast or darkfield work is to be done, the conventional condensers are provided.

ZEISS



Chlorophytes
Planapochromat 50 x / 0.95 + 1.0 x zoom OPTOVAR
Magnification: 160 x
Enlarged to 610 x
Film: Agfachrome 50 L 35 mm
Specimen by Göttinger Algensammlung
Photomicrograph by Dr. H. Gundlach, Carl Zeiss, Oberkochen

Brightfield



Differential interference contrast



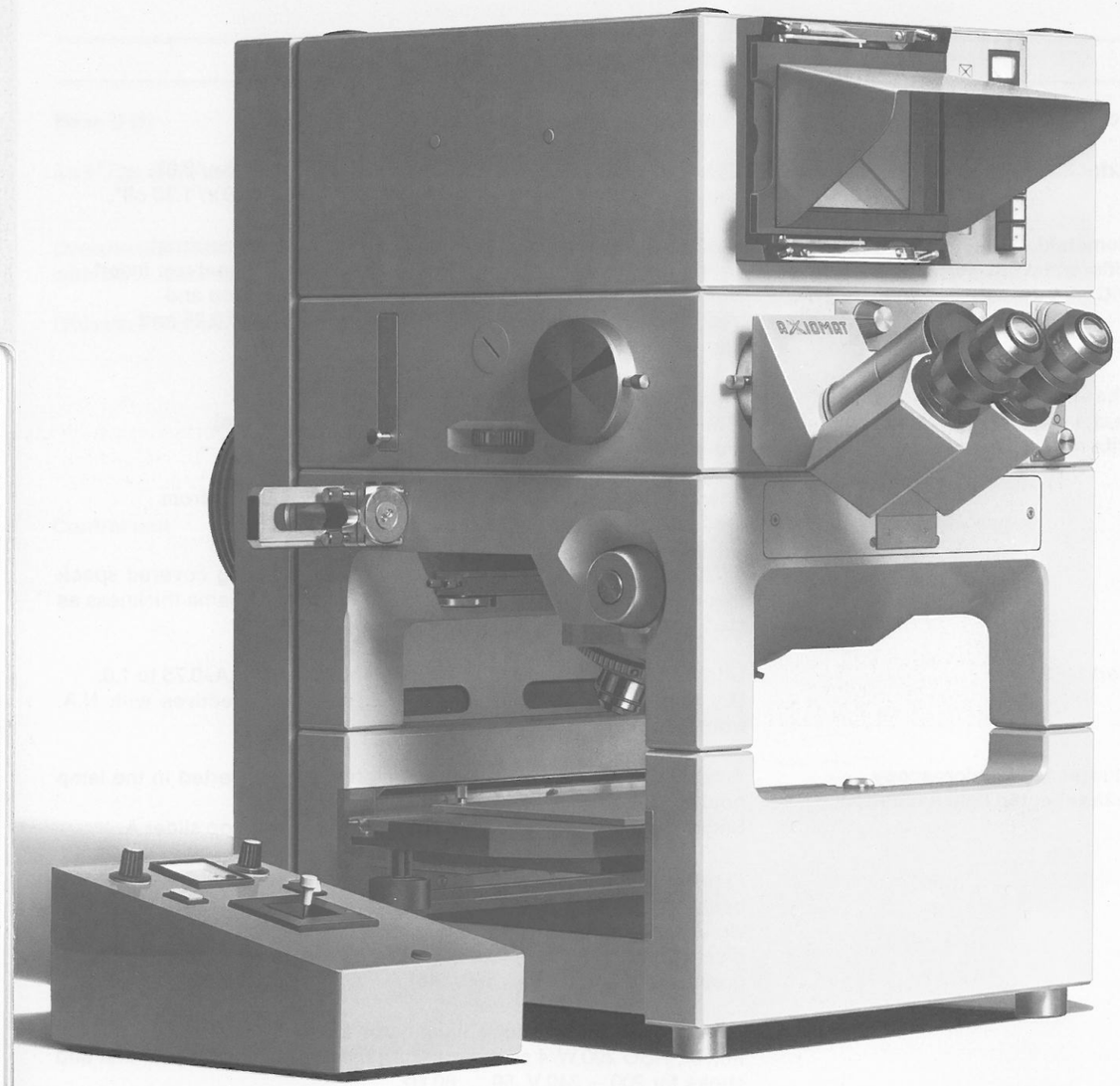
Darkfield

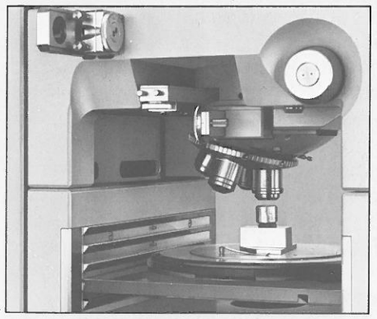
	Standard equipment, Cat. No. 49 56 34
Base U (I)	
4 x 5″/ 35 mm camera	35 mm film cassette with exposure counter, 9 x 12 cm (4 x 5″) double cassette, observation mirror.
Observation module with 0.8 . . . 3.2 x zoom OPTOVAR	with binocular tube, two 10 x / 25 Br wide-angle eyepieces and insert with focusing reticle (9 x 12 cm [4 x 5″]–35 mm).
Objective module	with sextuple revolving nosepiece. Planachromat 5 x / 0.12 – 10 x / 0.25 – 16 x / 0.30 (19 mm working distance). Planapochromat 25 x / 0.65. Stage carrier U, 60 x 120 mm mechanical stage with long coaxial drive and UPL specimen frame. Carrier for U illuminator, 12 V 60 W lamp complete.
Control unit	and power supply unit 100 – 110 – 115 – 127 – 220 – 240 V, 50 . . . 60 Hz, 190 VA, in housing, mains cable.

	Parts supplied separately:
For entry of identification data	35 mm magazine with data recording.
Extra objectives	Objective slider with Planachromat 1.25 x / 0.03 + 2.5 x / 0.07. Planapochromat 50 x / 0.95 Corr. – 50 x / 1.0 oil – 100 x / 1.30 oil*.
Nomarski differential interference contrast, DIC	Achromatic-aplanatic phase-contrast interference-contrast condenser IV Z/7 (0.63) or IV 7 (1.4). Polarizer and analyzer insert with sliding tube. DIC quadruple revolving nosepiece and interference contrast inserts for Planachromat 10 x / 0.25 and Planapochromats 25 x / 0.65 Corr. – 100 x / 1.30 oil.
Phase contrast with specimens in chambers up to 6 mm high and with Köhler illumination	Spacer tube with auxiliary lens. Planachromat 16 x / 0.30 Ph (19 mm working distance). Planapochromat 25 x / 0.65 Ph* – 50 x / 0.95 Ph Corr.* – 50 x / 1.00 Ph oil* – 100 x / 1.30 Ph oil. Phase contrast condenser IV 1/7 or other condensers from the STANDARD range. * These objectives should only be used for viewing covered specimens or with chambers of which the bottom is the same thickness as standard coverglasses.
Darkfield	Ultracondenser N.A. 1.2 . . . 1.4 for objectives with N.A. 0.75 to 1.0. Dry darkfield condenser N.A. 0.78 . . . 0.95 for objectives with N.A. from 0.6 to 0.75.
Fluorescence microscopy with reflected light excitation	Filter slider with BG 38 red attenuation filter, is inserted in the lamp holder. Sliding tube with reflected light mirror, lamp field stop slider A. Fl reflector insert taking two filter sets each (exciter filters, chromatic beam splitters, barrier filters) with violet excitation (405, 436, 385 . . . 440), blue excitation (455 . . . 490, 455 . . . 500), and green excitation (515 . . . 560, 546). Lamp holder, microscope illuminator 250 with adjustable concave mirror, HBO 200 W/4 super-pressure mercury lamp, lamp socket and choke for 200 – 240 V, 50 . . . 60 Hz.

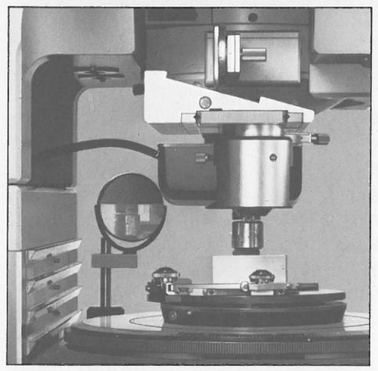
ZEISS AXIOMAT NAC

Normal upright reflected light microscope
with 4 x 5″/35 mm camera



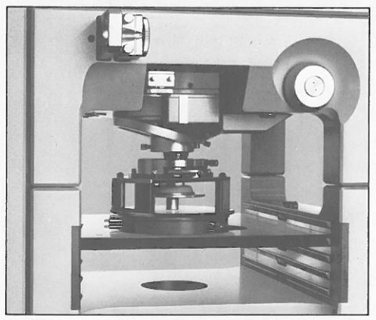


Reflected light examination of specimens up to 90 mm high
The stage module A (R) has 5 dovetail bars so that the specimen stages can be inserted in steps at 18 mm intervals. The objectives have a vertical adjustment range of 20 mm—permitting specimens of up to 90 mm height to be examined.



Microhardness Tester
The Microhardness Tester has an EPIPLAN 80/0.9 objective and a diamond indenter. The load exerted on the specimen is monitored on a meter whose scale is expandable in 6 load ranges 0 . . . 5 / 10/ 20 / 50 / 100 / 200 pond. Exchange between diamond pyramid and measuring objective is electric. Accuracy $\pm 0.5\ \mu m$.

Superb contrast with Normarski differential interference contrast. A scanning objective can be screwed to both sides of the Microhardness Tester.



Multi-beam interference device
Attachment for measuring vertical differences in specularly reflecting surfaces: smoothness of polished sections, residual roughness of finished surfaces, depth of surface layers etc.
EPIPLAN LD objectives exchangeable with constant specimen focus and with the multi-beam interference device. Can be combined with Nomarski differential interference contrast for better discrimination between fine and coarse unevennesses in the specimen.

ZEISS AXIOMAT NAC

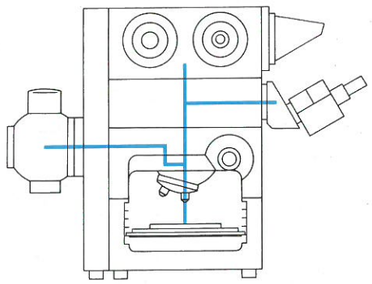


Diagram of the beam path in the normal upright ZEISS AXIOMAT NAC for reflected light viewing of objects up to 90 mm high.

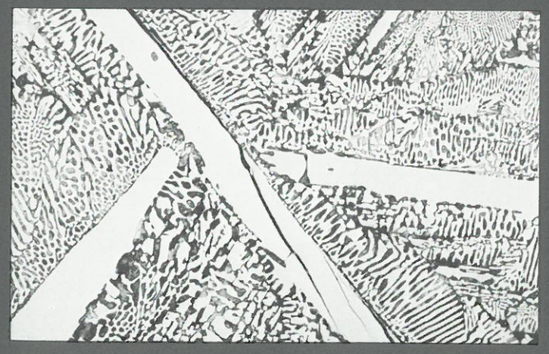
The ZEISS AXIOMAT NAC is an upright microscope for all work in reflected light of opaque specimens.
The compact microscope consists of 4 modules:
Stage module A (R) forms the base, carrying the stable generous-sized specimen stage which can be inserted at 5 different levels depending on the specimen height.
On top of this is the objective module with the electrically and manually focusable image forming systems.
The third block is the observation module. According to the setting of the beam splitting system the image is transmitted to the respective receiver—the eye, the camera or a photometric detector. The 0.8 . . . 3.2 x OPTOVAR zoom system and a focusing Bertrand lens are contained in the observation module. Final block in this setup is the 4 x 5″/35 mm camera. With fully automatic exposure, always ready for use and never obstructing other microscope functions, it records at the press of a button whatever is visible in the tubes.

ZEISS AXIOMAT NAC with Microhardness Tester
For checking the hardness of materials in minutest dimensions a Microhardness Tester is used on the ZEISS AXIOMAT NAC, taking the place of the revolving nosepiece. Its 80 x / 0.9 EPIPLAN objective and diamond indenter are attached beside each other on a common mount, ensuring that the objective aperture is fully utilized. The mount is moved by a motorized drive over the distance from diamond point to objective axis with an accuracy of ± 0.5 μm. Either the tetragonal (Vickers) diamond indenter or the rhombic (Knoop) pyramid can be used.
Six load ranges can be selected on the meter—from 0 to 5 — 10 — 20 — 50 — 100 — 200 pond respectively. Each range is then displayed over the entire scale width, permitting a high degree of reading accuracy and easy control of loading speed.
With the hardness measuring insert the length of the diagonal indents is rapidly determined and read off in the tube to an accuracy of 0.2 μm.
Apart from the actual Microhardness Tester the microhardness insert can take two viewing objectives which are brought into the light path by shifting them between two stops.

ZEISS







White pig iron
EPIPLAN 10 x / 0.25 HD + 1.0 x zoom OPTOVAR
Magnification: 85 x (100 x), brightfield
Specimen by P. F. Dujardin & Co.,
Metallographische Anstalt, Düsseldorf
Photomicrograph by W. Cebulla,
Carl Zeiss, Oberkochen

Above left
Fine-grained steel, St. 60.7
tempered 5 minutes at 400 ° C
Epiplanapochromat 25 x / 0.65 HD +
1.0 x zoom OPTOVAR
Magnification: 250 x, brightfield
Film: Agfachrome 50 L 9 x 12 cm
Specimen by Mannesmann-Röhrenwerke,
Mülheim/Ruhr
Photomicrograph by W. Cebulla,
Carl Zeiss, Oberkochen

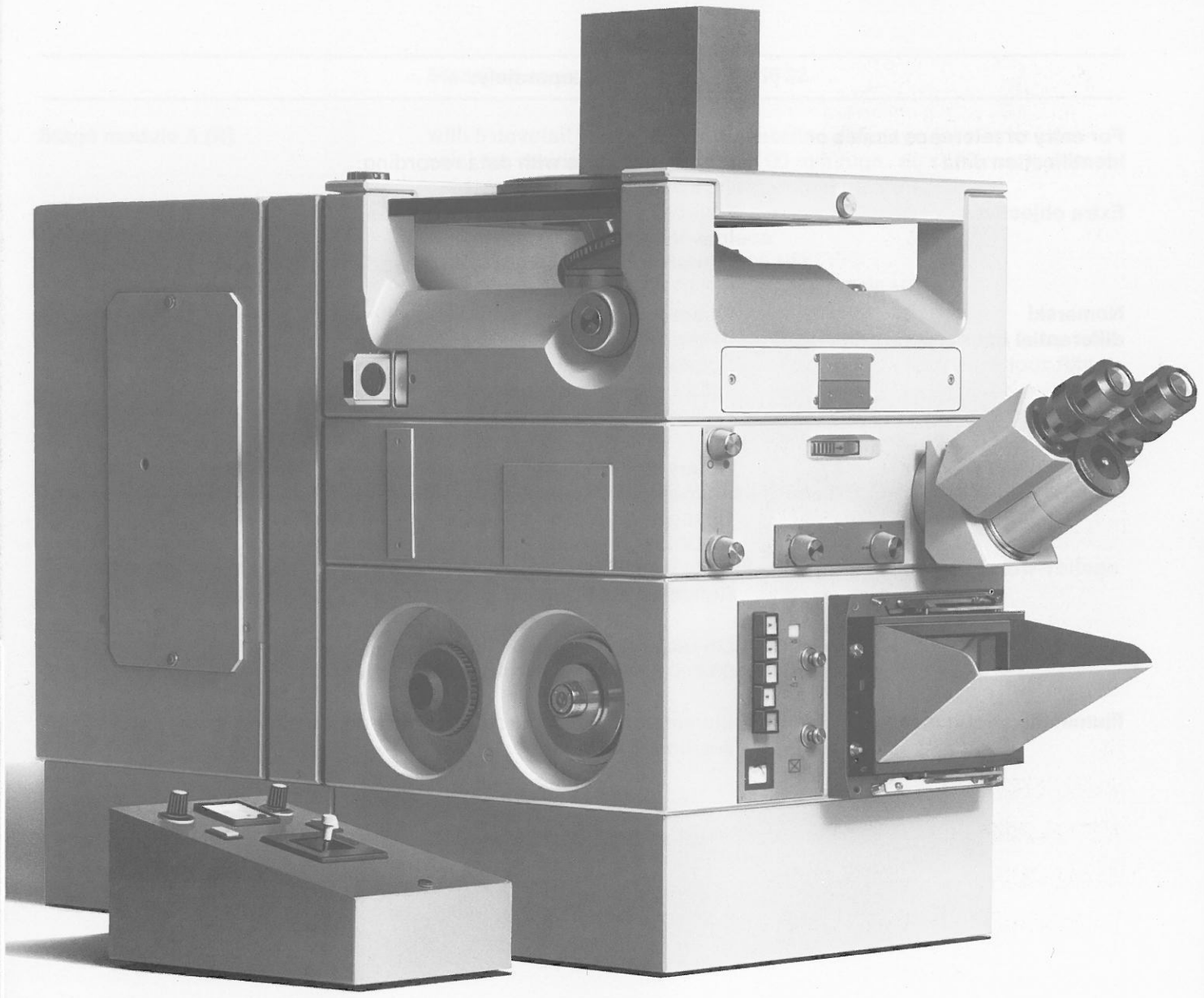
Above right
Sicromal 18/8, X 12 Cr Ni 18.8
tempered 10 minutes at 600 ° C with sigma phase
EPIPLAN 5 x / 0.12 HD + 1.0 x zoom OPTOVAR
Magnification: 50 x, brightfield
Film: Agfachrome 50 L 9 x 12 cm
Specimen by Mannesmann-Röhrenwerke,
Mülheim/Ruhr
Photomicrograph by W. Cebulla,
Carl Zeiss, Oberkochen

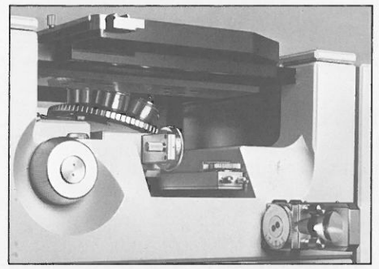
	Standard equipment, Cat. No. 49 56 32
Stage module A (R)	with 5 dovetail slide rails for the mechanical stage (at 18 mm intervals) for viewing of objects up to 90 mm high. 60 x 120 mm mechanical stage with coaxial drive and specimen plate A.
Objective module	with sextuple revolving nosepiece. EPIPLAN 5 x / 0.12 HD – 10 x / 0.25 HD. Epiplanapochromat 25 x / 0.65 HD – 50 x / 0.95 HD – 100 x / 1.30 HD oil. Reflected light mirror with sliding tube, HPL + D reflector, lamp field stop slider A, aperture diaphragm slider and slider with four filters.
Observation module with 0.8 . . . 3.2 x zoom OPTOVAR	with binocular tube, two 10 x / 25 Br wide-angle eyepieces and slider with focusing reticle (9 x 12 cm [4 x 5″]–35 mm).
4 x 5″ / 35 mm camera	35 mm film cassette with exposure counter, 9 x 12 cm (4 x 5″) double cassette.
Illuminating equipment	Cable box, lamp holder, 250 W illuminator and 12 V 100 W low-voltage filament lamp with socket.
Control unit	and power supply unit 100 – 110 – 115 – 127 – 220 – 240 V, 50 . . . 60 Hz, 190 VA, in housing, mains cable.

	Parts supplied separately:
For entry of reference scales or identification data	35 mm magazine with data recording.
Extra objectives	Objective insert with EPIPLAN 1.25 x / 0.03 + 2.5 x / 0.07 for low-power magnifications. Planachromat 16 x / 0.30 (19 mm working distance).
Nomarski differential interference contrast	Quadruple revolving nosepiece with interference contrast prisms for EPIPLAN 10 x / 0.25 HD objectives and Epiplanapochromat 25 x / 0.65 HD – 50 x / 0.95 HD – 100 x / 1.30 HD oil. Reflected light polarizer and analyzer insert.
Microhardness Tester	Rotary Pol stage with graduation, specimen plate A and attachable mechanical stage needed for the section tilt attachment. Changer with microhardness tester and accessories. NEOFLUAR 80 x / 0.9 with Vickers pyramid. Hardness measuring insert, insert with reference scale. Reflected light polarizer, analyzer with sliding tube. On request: 80 x / 0.9 NEOFLUAR with Knoop pyramid.
Illuminating equipment	Illuminators, light sources with varying intensity and chokes: see under Accessories.

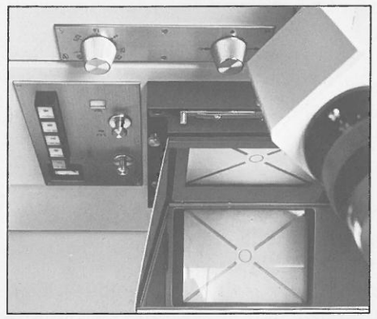
ZEISS AXIOMAT IAC

Inverted reflected light microscope with 4 x 5″/35 mm camera

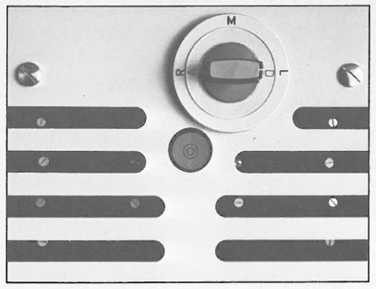




Objective module with stage carrier U
Here's why the ZEISS AXIOMAT is such a practical and economic buy:
The same modules are used for inverted and upright reflected light microscopes. Here stage carrier U on the objective module, there stage module A beneath the objective module. Diaphragm sliders and other accessories for the inverted configuration all fit with the parts of the upright configuration.
ZEISS AXIOMAT—half a dozen microscopes in one!



Inverted 4 x 5″/35 mm camera
Image focusing is done as usual in the binocular tube, but for a quick survey of the specimen section, one can take a glance at the camera focusing screen. The inner surface of the anti-glare shield is therefore silvered.



Three alternate light sources
The large lamp housing of the ZEISS AXIOMAT takes up to three light sources. A flick of the switch changes over between filament lamp, xenon and mercury lamps. The illuminated area can be laterally and horizontally adjusted and the lamp condenser shifted. And all these manipulations can be conveniently monitored on a little projection screen.

ZEISS AXIOMAT IAC

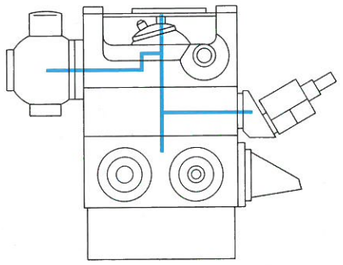
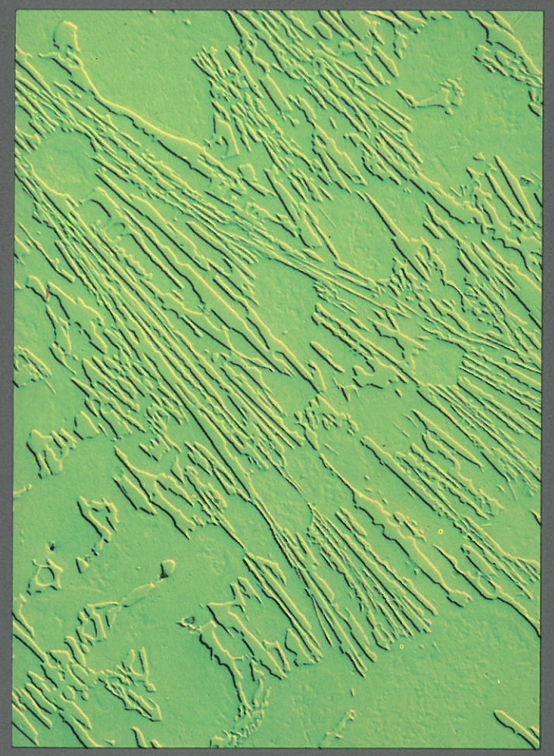


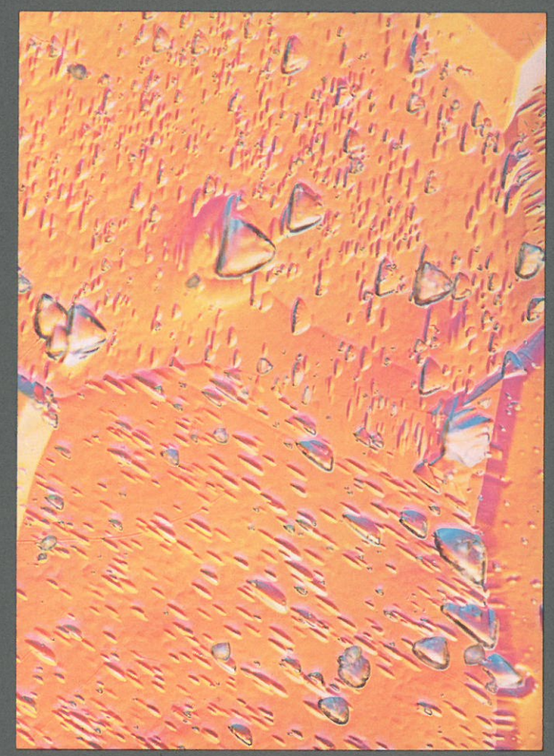
Diagram of the light path in the ZEISS AXIOMAT IAC inverted reflected light microscope for the examination of opaque objects of any dimensions.

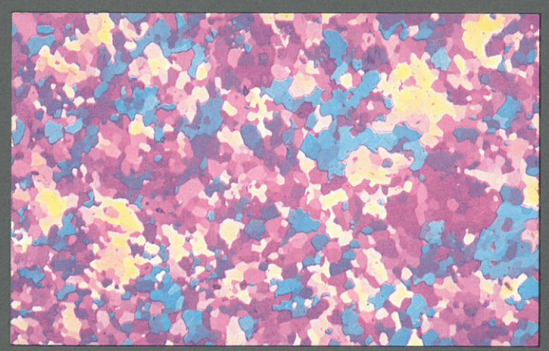
The ZEISS AXIOMAT IAC is an inverted reflected light microscope for the viewing of opaque objects as in metallography. The arrangement is designed on the Le Chatelier principle and is exceptionally stable.
Four modules form a compact microscope:
At the bottom the U (I) base provides for convenient viewing height.
Second block is the 4x5″/35 mm camera—fully automatic and always at the ready for recording of all details visible in the tubes.
On top of this, the observation module. According to the setting of the beam splitters, the image is transmitted to the receiver—whether the eye, a camera or a photometric detector. The 0.8x...3.2x OPTOVAR zoom system and a focusing Bertrand lens are built into the observation module.
The objective module contains the electrically and manually focusable image forming systems and—in stage carrier U—the specimen stage. The objective module also carries all the elements for adjustment of the epi-illumination.

ZEISS AXIOMAT IAC
with Nomarski differential interference contrast
Differential interference contrast (DIC) converts height differences into brightness variations, with the result that even objects with minor variations in reflectance produce an impression of dramatic relief, with both sharply defined boundaries and continuous structures clearly visible. Object details are reproduced in brightfield, darkfield or color contrast depending on the mode selected. EPIPLAN or EPIPLAN POL objectives are used for observation.
With DIC, too, the numerical aperture of the objectives is fully utilized, giving optimum image resolution. The easy push-in analyzer permits swift changeover from DIC to other types of illumination—for comparison purposes, for instance. If the ZEISS AXIOMAT IAC is used with the rotary microscope stage, every object structure can be brought into position for the best viewing angle respectively.

ZEISS







Above left
Chilled cast iron Cr 18-Ti 1-Mo 0.5; Carbide eutectic
EPIPLAN 10x/0.25 HD + 1.0x zoom OPTOVAR
Magnification: 100x, DIC
Film: Agfachrome 50 L 9x12 cm
Specimen by August-Thyssen-Hütte AG, Duisburg-Hamborn
Photomicrograph by W. Cebulla, Carl Zeiss, Oberkochen

Above right
Nickel anode, etching pit
Epiplanapochromat 50x/0.95 HD + 1.0x zoom OPTOVAR
Magnification: 500x, DIC
Film: Agfachrome 50 L 9x12 cm
Specimen by P. F. Dujardin & Co., Metallographische Anstalt, Düsseldorf
Photomicrograph by W. Cebulla, Carl Zeiss, Oberkochen

Beryllium-boron compound:
15.5 atom % boron: annealed four days at 975° C
EPIPLAN 10x/0.25 HD + 1.0x zoom OPTOVAR
Crossed polarizers, red first-order retardation plate
Magnification: 240x (100x)
Film: Agfachrome 50 L 35 mm
Specimen by MPI für Sondermetalle, Stuttgart
Photomicrograph by W. Cebulla, Carl Zeiss, Oberkochen

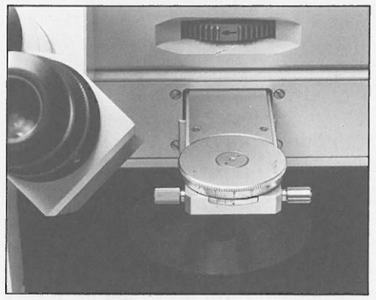
	Standard equipment, Cat. No. 495633
Base U (I)	
4 x 5″/35 mm camera	35 mm film cassette with exposure counter, 9 x 12 cm (4 x 5″) double cassette, observation mirror for checking camera focusing screen.
Observation module with 0.8 . . . 3.2 x zoom OPTOVAR	with binocular tube, two 10 x / 25 Br wide-angle eyepieces and insert with focusing reticle (9 x 12 cm [4 x 5″]–35 mm).
Objective module	with sextuple revolving nosepiece. EPIPLAN 5 x / 0.12 HD – 10 x / 0.25 HD. Epiplanapochromat 25 x / 0.65 HD – 50 x / 0.95 HD – 100 x / 1.30 HD oil. Sliding tube with reflected light mirror, HPL + D reflector, lamp field stop slider A. Aperture diaphragm slider and slider with four filters. Stage carrier U, 60 x 120 mm mechanical stage with long coaxial drive, with specimen plate U and stage inserts 24 and 28.
Illuminating equipment	Lamp holder, 250 W illuminator, 250 W CSI metal halide lamp with socket and power supply unit 220 – 240 V, 50 . . . 60 Hz.
Control unit	and power supply unit 100 – 110 – 115 – 127 – 220 – 240 V, 50 – 60 Hz, 190 VA, in housing, mains cable.

	Parts supplied separately:
For projection of identification data	35 mm magazine with data recording.
Extra objectives	Objective insert with EPIPLAN 1.25 x / 0.03 + 2.5 x / 0.07 for low-power magnifications. Planachromat 16 x / 0.30 (19 mm working distance).
Nomarski differential interference contrast	Quadruple revolving nosepiece and interference contrast inserts for EPIPLAN 10 x / 0.25 HD and Epiplanapochromat 25 x / 0.65 HD – 50 x / 0.95 HD – 100 x / 1.30 HD oil. Reflected light polarizer and analyzer slider.
Illuminating equipment	Illuminators, light sources with various intensities and chokes: see under Accessories.

ZEISS AXIOMAT NDC Pol

Normal upright transmitted light microscope with 4 x 5″/35 mm camera
and universal rotary stage for mineralogical examinations



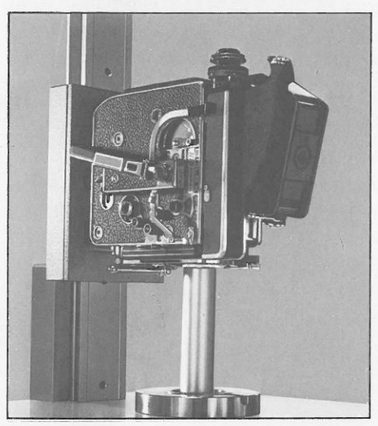


Analyzer
The objective module contains the sliding tube for the analyzer. With incident illumination it functions simultaneously as carrier for the reflected light mirror.
The analyzer is inserted in the sliding tube and can be rotated through 360° by a knurled knob.

The position of the analyzer can be read on a graduation with vernier to $^{1}/_{10}$° exactly. It can be fixed in each position, and is made ineffective by pulling out as far as it will go—as shown in the illustration.



Insert with zoom condenser, polarizer and DIC slider
For the zoom condenser there are condenser heads available for maximum apertures 0.9 and 1.4.
The diaphragm system is set for the objective aperture at the turn of a knob and the condenser itself focused with the second knob.
The polarizer is inserted in the condenser slider and rotates by 360°. Each setting can be read off to $^{1}/_{10}$° exactly.
For work with Nomarski differential interference contrast a slider with DIC prisms is located above the polarizer.



Photography with cine and TV cameras
With the ZEISS AXIOMAT you can record developments in the specimen with TV or cine camera. The necessary stability is guaranteed. The solid support with adapters for cameras is fastened on to the camera module (or the observation module).
The zoom system can be used to focus any desired image section.

ZEISS AXIOMAT NDC Pol

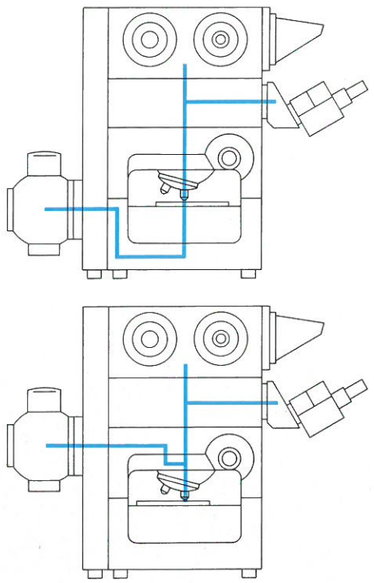
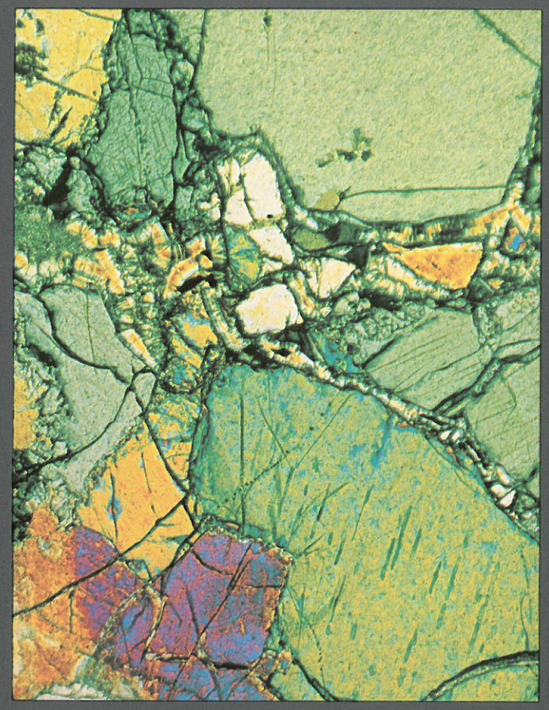


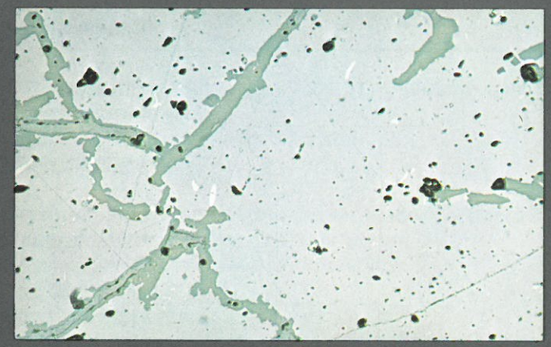
Diagram of the beam path in the ZEISS AXIOMAT for polarized light viewing.
Above: in the normal transmitted light polarizing microscope.
Below: in the upright reflected light polarizing microscope.

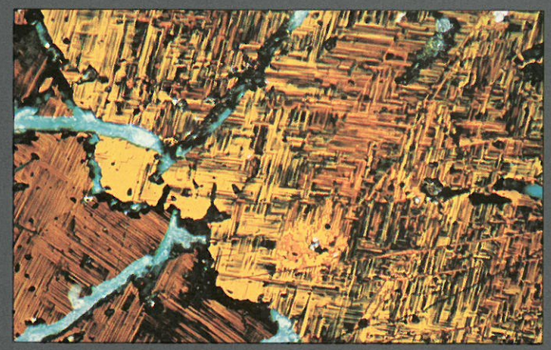
The ZEISS AXIOMAT NDC Pol is a normal upright transmitted light microscope for qualitative and quantitative polarized light examinations of thin sections and transparent specimens in mineralogy, geology, mineral resources research, coal petrography, crystallography, biology and medicine.
The ZEISS AXIOMAT NDC Pol can take all the accessories required to produce the characteristic effects of birefringence and to analyze inorganic substances and living and dead biological specimens in polarized light.
Four modules combine to form one compact microscope block.
The whole is built on stage module D (T), containing all elements for regulation of transillumination and carrying the large stable rotary polarizing stage.
Above this is the objective module with manually and electrically focusable image forming systems. The analyzer and insert with retardation plates are included here.
Third module is the observation module. According to the setting of the beam splitters, the image is relayed to the respective receiver—the eye, the camera or a photometric detector—by turning a knob. Also included in the module are the 0.8x . . . 3.2x OPTOVAR zoom system, a focusing Bertrand lens and an iris diaphragm for pin-pointing minute specimen details during binocular conoscopic viewing.
No special eyepieces for polarization microscopy needed!
Focusing reticles and a centerable crossline are inserted separately from the eyepiece in the plane of the second intermediate image.
The 4x5″/35 mm camera tops this ZEISS AXIOMAT NDC Pol. With fully automatic exposure, always at the ready and leaving all other functions unrestricted, at the press of a button it records everything visible in the tube.

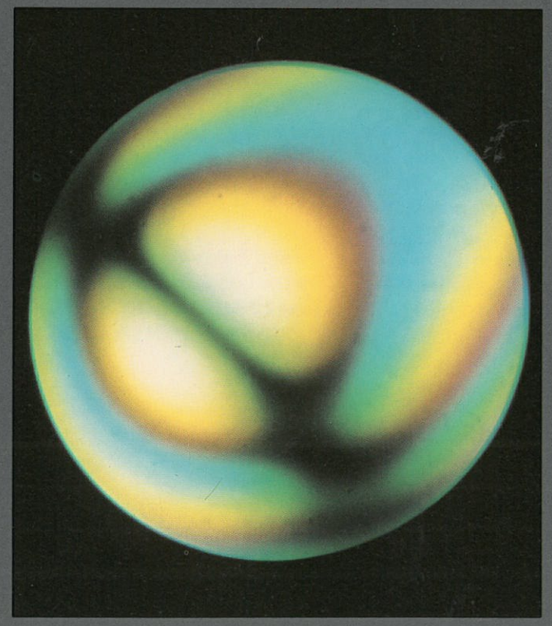
ZEISS AXIOMAT IAC Pol
Along with the equipment for the ZEISS AXIOMAT NAC and IAC accessories are available for reflected light polarization microscopy. Instead of the square mechanical stage the large circular rotary polarization stage with specimen holder is used. The objectives are mounted strain-free and used in a revolving nosepiece with centering mount. The equipment includes polarizer and analyzer.

ZEISS









Umangite, Sierra de Umango, reflection in air
EPIPLAN 10x/0.25 Pol + 1.6x zoom OPTOVAR
Magnification: 120x (50x)
Film: Agfachrome 50 L 35 mm
Specimen by Min. Institute of the University of Frankfurt/Main
Above: in simple polarized light.
Below: between crossed polarizer and analyzer.

Above left: Dunite, olivine crystal, Vogelsberg
Planachromat 5x/0.12 Pol + 0.8x zoom OPTOVAR
Magnification: 40x
Film: Agfachrome 50 L 9x12 cm
Specimen by Dr. Steeg & Reuter, Bad Homburg v. d. H.

Conoscopic interference image of the central and almost rectangular, bright olivine crystal of the orthoscopic image. Section virtually perpendicular to axis.
Planachromat 100x/1.30 Pol oil + Bertrand lens
Film: Agfachrome 50 L 9x12 cm
Specimen by Dr. Steeg & Reuter, Bad Homburg v. d. H.

All photomicrographs by
Dr. H. Piller, Carl Zeiss, Oberkochen

ZEISS AXIOMAT NDC Pol

	Standard equipment, Cat. No. 495631
Stage module D (T)	with zoom condenser N.A. 0.20 . . . 1.4 Pol, transmitted light polarizer, mirror insert, lamp field stop slider for transmitted light, aperture diaphragm slider, slider with four filters and rotary polarizing stage with graduation and attachable mechanical stage.
Objective module	with quadruple revolving nosepiece, three objectives centerable. Planachromat 5x/0.12 Pol – 10x/0.25 Pol. Planapochromat 25x/0.65 Pol – 50x/0.95 Pol Corr. – 100x/1.30 Pol oil. Analyzer with sliding tube. Insert with first order red retardation plates, quartz I–IV order and λ/4.
Observation module with 0.8 . . . 3.2x zoom OPTOVAR	with binocular tube, two 10x/25 Br wide-angle eyepieces and turret for four reticles with 9x12 cm (4x5″)/35 mm focusing reticle and crosshairs. Insert with adjustable crossline micrometer.
4x5″/35 mm camera	35 mm film cassette with exposure counter, 9x12 cm (4x5″) double sheet film holder.
Illuminating equipment	Cable box, lamp holder, 250 W illuminator and 12 V 100 W low-voltage filament lamp with socket.
Control unit	and power supply unit 100 – 110 – 115 – 127 – 220 – 240 V, 50 . . . 60 Hz, 190 VA, in housing, mains cable.

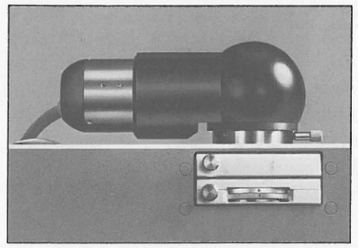
ZEISS

	Parts supplied separately:
For entry of identification data	35 mm magazine with data recording.
Additional objectives	Planachromat 16x/0.30 Pol (19 mm working distance). Planapochromat 50x/1.0 oil Pol.
Compensators	Slider with λ/4 plates for Sénarmont compensation. Slider with rotation and λ/10 or λ/20 compensator plate. Quartz tilting compensator, calcite tilting compensator.
Nomarski differential interference contrast	Condenser slider with DIC prisms. Quadruple DIC revolving nosepiece and interference contrast inserts for Planachromat 10x/0.25 Pol and Planapochromats 25x/0.65 Pol – 50x/0.95 Pol – 100x/1.30 Pol oil.
Universal rotary stage and special objectives	Universal rotary stage (inserted in the Pol rotary stage). Hemisphere segments n_D 1.555 and n_D 1.649, attachable mechanical stage and parallel guide, condenser head N.A. 0.65. Carrier for single objectives on change ring, U-Achromat 8x/0.15 (5x/0.01) Pol – 25x/0.50 (16x/0.3) Pol – 50x/0.65 (32x/0.42) Pol*. U stage attachment for reflected light, extra segments and Wulff grid for stereographic projection on demand. * Figures in brackets: magnifications and apertures when objectives are used without hemisphere segment.
Conoscopic observations	The built-in Bertrand lens is focusable and has an iris diaphragm. Specific specimen details can thus be singled out and their size optimally adjusted to the diaphragm diameter by the zoom OPTOVAR system. Binocular viewing and photography is possible. A micrometer can be projected into the field of view.
Illuminating equipment	Illuminators, light sources with various intensities and chokes: see under Accessories.
Equipment for reflected light polarization microscopy with the ZEISS AXIOMAT IAC and the ZEISS AXIOMAT NAC	Rotary polarizing stage with attachable mechanical stage, quadruple revolving nosepiece, three objectives centerable. EPIPLAN 5x/0.12 HD Pol – 10x/0.25 HD Pol. Epiplanapochromat 25x/0.65 HD Pol – 50x/0.95 HD Pol – 100x/1.30 HD Pol oil. Reflected light polarizer and analyzer.

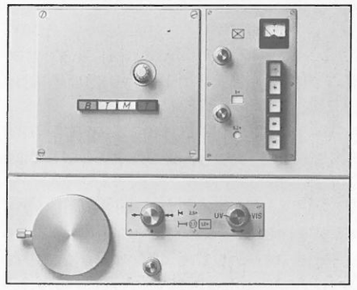
ZEISS AXIOMAT UV-NDPC-Scan

Normal upright transmitted light microscope with UV optics, corrected over the range from 230–700 nm, grating monochromator and UV lamp housing. With UV camera in photometer module. Scanning stage for automatic systematic specimen analyses.

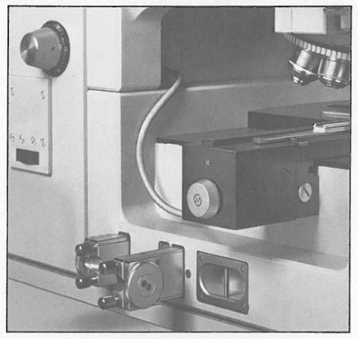




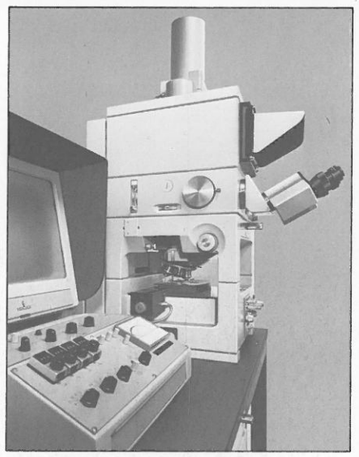
Detector housing, photometer diaphragms
The detector housing on top of the photometer module takes the HTV R 446 photomultiplier or another suitable type. Measuring diaphragms are mounted on the insert visible directly beneath, with three systems:
turret with fixed measuring diaphragms, insert with iris diaphragms and insert with adjustable square diaphragm.
The measuring diaphragm in use is visible through the binocular tube.



UV observation module and UV camera with photometer
for automatic photography and photometry in VIS and UV light.
The special UV observation module is only used for measurement and photography in UV light.
Work in visible light is done with the normal observation module with OPTOVAR zoom system.



Scanning stage on UV stage module D (T)
There are two scanning stages for systematic specimen scanning in defined steps of 0.5 μm or 10 μm.

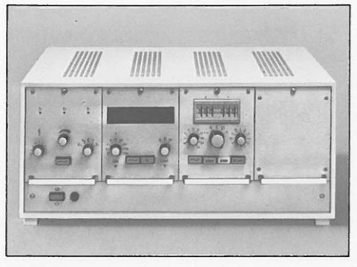


ZEISS MICRO-VIDEOMAT
Stereometric analyses furnish information on the structure and distribution of individual components in the specimen, and much else besides.
The ZEISS AXIOMAT in conjunction with the ZEISS MICRO-VIDEOMAT produces information like this reliably, objectively, swiftly and automatically.
For precise details on electronic image analysis on the television principle, please see brochure 41-495.

Modular electronic system
The selection of inserts determines the functional units for semi-automatic or fully automatic photometry and stereometry with the microscope. Brochure 41-830.

Software programming
Photometer or MICRO-VIDEOMAT can be fully computer-assisted. Specimen travel, data acquisition, data processing and print-out are freely programmable.

Recording
The results produced are recorded by a computer-controlled, alphanumeric teleprinter.



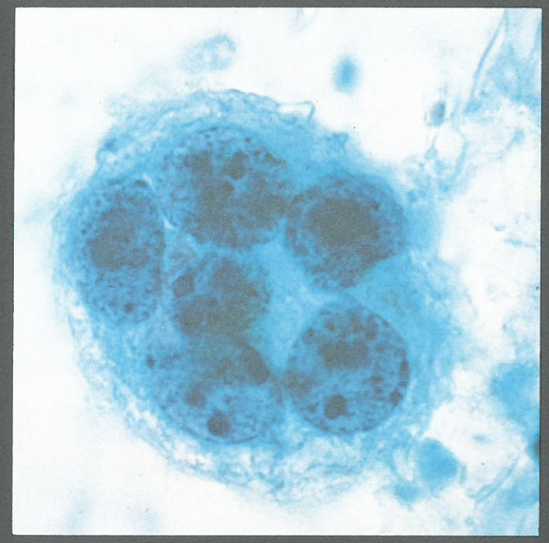


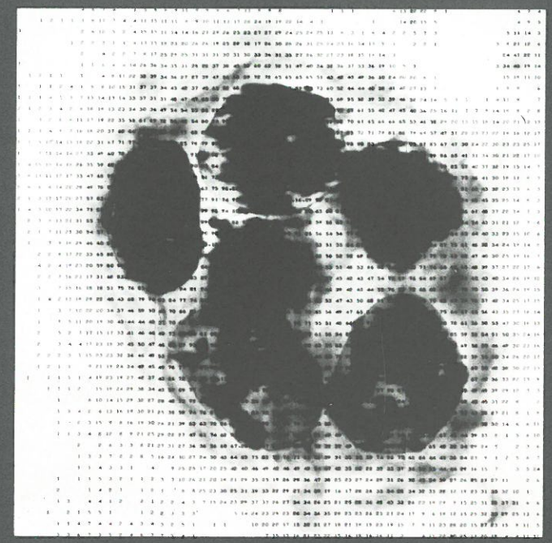


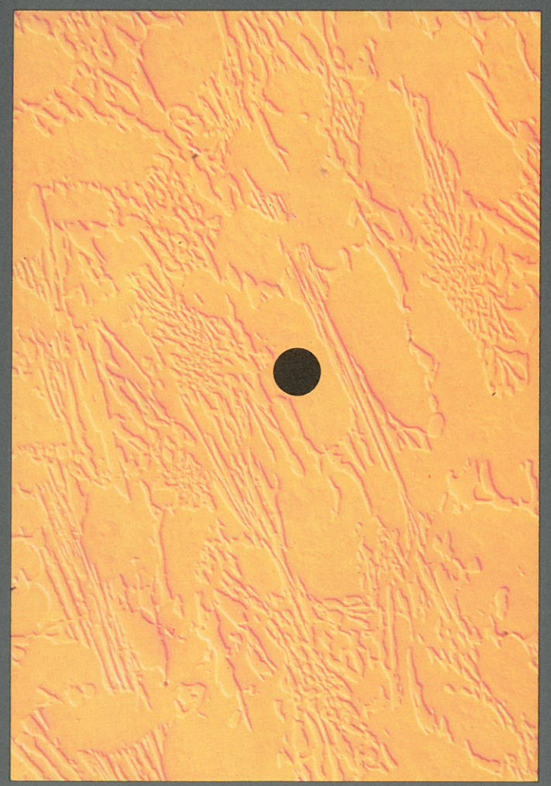
ZEISS AXIOMAT UV-NDPC-Scan

Four modules with optics corrected for the spectral range from 230 to 700 nm, together with grating monochromator and the UV lamp house, form a compact UV microscope. The UVC stage module contains the aperture and lamp field stop for UV illumination on Köhler principles. An ULTRAFLUAR condenser with aperture 0.8 or an ULTRAFLUAR objective serves as condenser.
The UV objective module contains the motorized and manual focusing for the ULTRAFLUAR objectives 6.3x/0.1 – 16x/0.25 – 50x/0.50 Glyc. – 125x/1.25 Glyc. and the UV corrector on slider. When it is pulled out, the ZEISS AXIOMAT is automatically corrected for the conventional series of Planachromats and Planapochromats.
With the UV microscope goes the UV camera with photometer. Apart from a fully automatic 35 mm camera, the module includes a microscope photometer, whose measuring diaphragms in the object image are visible in the binocular tube in UV too.
The light sources are contained in the UV lamp housing. Apart from an XBO 250 W super-pressure xenon lamp, other lamp holders can take filament lamps and mercury lamps as desired.
For working with the ZEISS AXIOMAT UV-NDPC the side viewing tube is preferable because it is most suitable for the setting of the grating monochromator. An advantage here is the separate control unit which can always be brought into easy reach.
The photometric version of the ZEISS AXIOMAT is completed by units of the modular electronic system:
Amplifier with power supply unit 47 74 00 and decimal display unit 47 74 43 in 2/4 (19″) rack mount 47 90 81 and special cable.
The ZEISS AXIOMAT UV-NDPC is the modern instrument for quantitative und qualitative specimen analysis.

ZEISS







Above
Automatic analysis of a sexnucleate epithelial cell from a vaginal smear.
Left: Photomicrograph, automatic exposure
Right: Computer print-out of photometrically measured transmission values. For greater clarity the outline of the specimen has been drawn in.
Specimen by Dr. Walz, Heidenheim
Photomicrograph by Dr. H. Gundlach,
Carl Zeiss, Oberkochen
Photometry: Dr. H.-G. Zimmer,
Carl Zeiss, Oberkochen

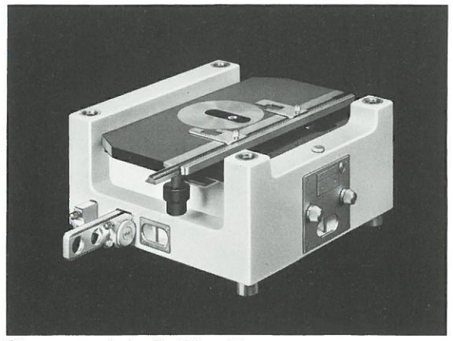
Left
Chilled cast iron, Cr 18 - Ti 1 - Mo 0.5
Photometer diaphragm visible in image centre.
DIC for enhanced contrast for visual specimen assessment.
EPIPLAN 10x/0.25 HD + 1.0x zoom OPTOVAR
Magnification: 100x
Film: Agfachrome 50 L 9x12 cm
Specimen by August-Thyssen-Hütte AG,
Duisburg-Hamborn
Photomicrograph by W. Cebulla,
Carl Zeiss, Oberkochen

ZEISS AXIOMAT UV-NDPC-Scan

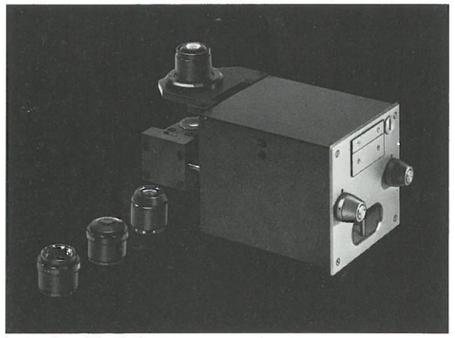
	Standard equipment, Cat. No. 49 56 38
UV stage module D (T)	with UV condenser 0.8 with holding ring, UV mirror insert, lamp field stop slider with a set of measuring diaphragms and switchover from one to the other, aperture diaphragm slider, filter slider with three filters and 0.5 μm scanning stage with specimen holders.
UV objective module	with UV correction, quadruple revolving nosepiece (three centerable screw threads), ULTRAFLUAR 6.3x/0.10 – 16x/0.25 – 50x/0.50 Glyc. – 125x/1.25 Glyc. Coverglasses, specimen slides and quartz specimen micrometer 100/100.
Observation module with UV image converter	with binocular tube, two 10x/25 Br wide-angle eyepieces, two 4x/25 eyepieces, centering telescope and HA 12 high-voltage unit for operation of UV image converter.
UV camera with photometer	35 mm film cassette with exposure counter. Photometer insert with fixed measuring diaphragms and photometer insert with adjustable square diaphragm, insert with iris diaphragm.
Illuminating equipment	Cable boxes, one with light modulator. Large UV lamp housing, lamp holder with socket and 12 V 100 W low-voltage halogen filament lamp, UV lamp holder with socket and XBO 250 W xenon lamp, 12 V 100 W stabilized power supply unit, VX 250 stabilized choke, monochromator with UV grating.
Control unit	and power supply unit 100 – 110 – 115 – 127 – 220 – 240 V, 50 . . . 60 Hz, 190 VA, in housing, mains cable.

ZEISS

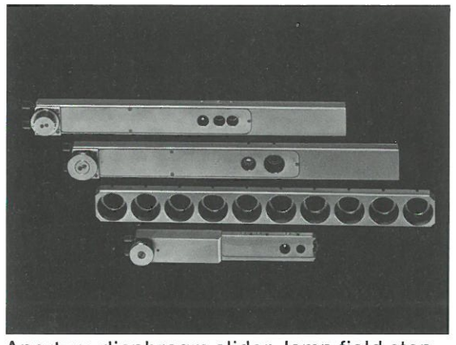
	Parts supplied separately:
Electronic sub-assemblies for photometry	**for on-line operation with Wang 720 C desk calculator** Detector housing with mount and HTV R 446 photomultiplier. Amplifier with power supply unit, decimal display unit, motor control with panel. Interface for Wang 700/720 in 4/4 rack mount. Mains cable. Wang 720 C desk calculator, Wang 701 printer. Special connecting cables. Further on-line versions on request.
For entry of identification data in photomicrographs	35 mm magazine with data recording.
For work in the visible spectral range	Second binocular tube, 10x/25 Br eyepieces.



Stage module D (T) with
inserts and 60 x 120 mm mechanical stage.



Insert with 1.4 zoom condenser.
Alongside:
Dry darkfield condenser 0.78/0.95,
Ultracondenser 1.2/1.4 and
Phase contrast condenser head 0.9.



Aperture diaphragm slider, lamp field stop slider D for transmitted light, filter slider and lamp field stop slider A for reflected light.

Stage module D (T) (47 56 30) and inserts

For transmitted light the specimen stage is firmly screwed on, guaranteeing maximum stability.
The stage module contains the equipment for transillumination.
The zoom condenser ensures optimum illumination at all magnifications.

Zoom condenser insert (47 57 31)
With
condenser head N.A. 0.20 . . . 1.4 (46 52 91) for brightfield illumination and fluorescence.
Condenser head N.A. 0.13 . . . 0.9 (46 52 93) for brightfield and phase contrast examinations.
Condenser head N.A. 0.20 . . . 1.4 Pol (46 52 94) for polarizing microscopy and differential interference contrast.
Dry darkfield condenser 0.78/0.95 (0.6 . . . 0.75) (46 55 05).
Ultracondenser 1.2/1.4 (0.75 . . . 1.0) (46 55 00).
Carrier ring for darkfield condensers (47 57 40).

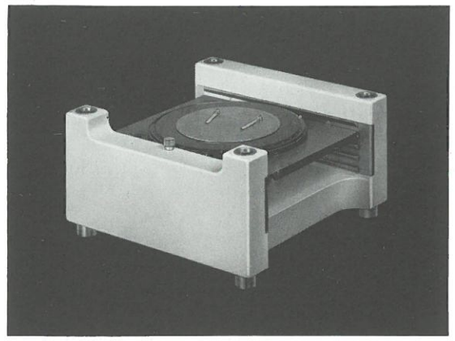
The polarizer (47 58 10) and the slider with interference contrast prisms (47 58 50) can be inserted in the condenser slider.

Mirror insert for zoom condenser (47 57 21)
The mirror insert 47 57 21 is exchangeable for the UV mirror insert 47 57 20 or for other mirrors with special properties.

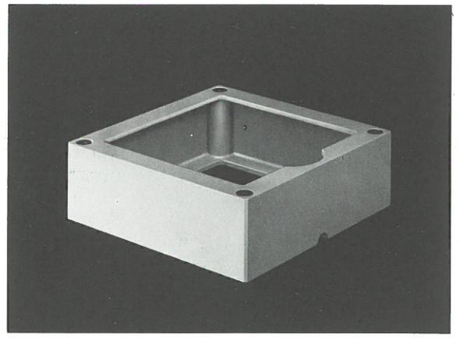
Lamp field stop slider for transmitted light (47 57 01)
With iris diaphragm easily adjusted and centered externally. An extra opening beside the iris diaphragm can be used for instance to take fixed measuring diaphragms for photometry.

Aperture diaphragm slider (47 57 05)
With iris diaphragm, adjustable and centerable externally. With two extra openings for fixed diaphragms. One is filled by the annular phase contrast diaphragm. Precise notches for each diaphragm setting.

Filter slider (47 58 00)
For ten filters or filter combinations, 32 mm dia. freely selectable. Exciter filters for transmitted light fluorescence, neutral density filters for light attenuation, color contrast filters and color conversion filters. Arrested in each position.



Stage module A (R) with rotary Pol stage.



Base U (I) for inverted microscope.

Stage module A (R) (47 56 35)
For examination of reflected light specimens to 90 mm height. The specimen stage can be slid in sideways at five different levels with 18 mm interval respectively depending on the specimen height.
Lengthwise it is firmly supported from end, guaranteeing maximum stability.

Stage carrier for inverted microscope (47 56 36)
These are screwed direct on the objective module of the inverted ZEISS AXIOMAT and hold the specimen stages.

Base U (I) (47 56 39)
Base U is used with the inverted ZEISS AXIOMAT configuration for convenient viewing height.

Specimen stages

Mechanical stage (47 56 55)
Surface area 430 x 200 mm, travel range 60 x 120 mm. The low-lying coaxial drive knob can be attached at both sides. Coaxial drive, short (47 56 59) for upright and coaxial drive, long (47 56 58) for inverted microscopes.

The specimen holders are exchangeable, permitting convenient and reliable guiding of specimens of all sizes, culture chambers and tubes.

Screening stage with X motor drive (47 56 75)
Screening stage with Y motor drive (47 56 76)
The manual coaxial drive can be supplemented with a motorized drive so that specimens can be screened in one coordinate or the other—or both simultaneously—with infinitely variable speed. Joystick or pedal operated.

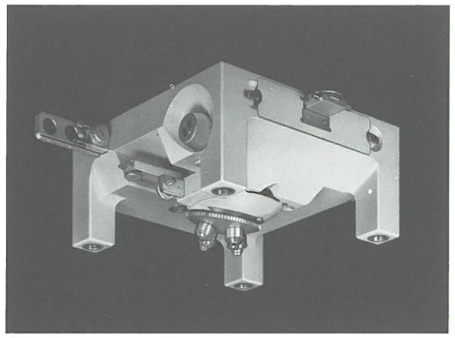
Rotary Pol stage (47 56 60)
With graduation and vernier. 232 mm diameter. Arrestable in each position. The 45° click stop ring can be disconnected.

Attachable mechanical stage (47 56 61)
Travel range 40 x 60 mm.
Together with rotary Pol stage for rotary mechanical stage. Specimen holders are exchangeable.

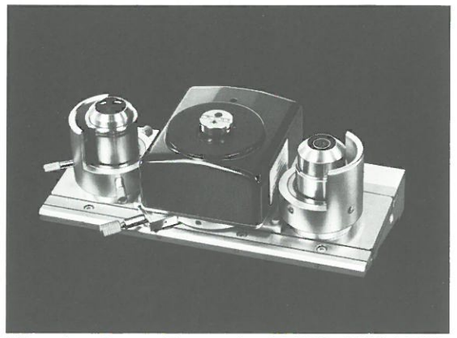
Universal rotary stage (47 56 65)
Four-axis, attachable on rotary Pol stage, for conoscopic measurements.

Scanning stage 0.5 μm (47 56 71)
Scanning stage 10 μm (47 56 72)
For automatically controlled specimen advance in quantitative microscopy.
Choice of two scanning stages:
Basic step size 0.5 μm or basic step size 10 μm.
Specimen travel range in both cases 25 x 75 mm.

Objective module, inserts



Objective module, equipped for observations in reflected polarized light.



Microhardness Tester for ZEISS AXIOMAT with room for two viewing objectives.

Objective module (47 56 01)

The stable objective module bears the objectives on sextuple revolving nosepiece (47 56 09), for polarizing microscopy on quadruple revolving nosepiece with three centering devices (47 56 08), centerable on single objective holder (47 56 07), on DIC quadruple nosepiece with interference contrast prisms (47 58 55) or on changer with microhardness tester (47 57 90).

Within a range of 20 mm objectives can be raised or lowered manually or electrically with variable speed. Continuous transition is possible from high-speed coarse focusing to slow fine focusing. The finest adjustments can also be made manually with the two drive knobs at the side. Limit switches and stops protect objectives and specimens from damage. The position of the lower limit switch is adjustable and can be taken up again—when refocusing—electrically.

Auxiliary illumination, built in to the objective module, lights the specimen area.

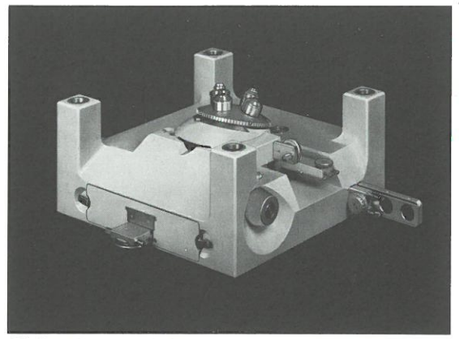
Inserts

HPI + D reflector (47 57 55)
For brightfield Smith's double mirror reflectors are built in which also feature superb polarizing properties. An annular mirror serves as darkfield reflector. To change from one type of illumination to another the reflector is shifted between two stops. For polarization work in reflected light the reflected light polarizer (47 58 15) is inserted in the reflector.

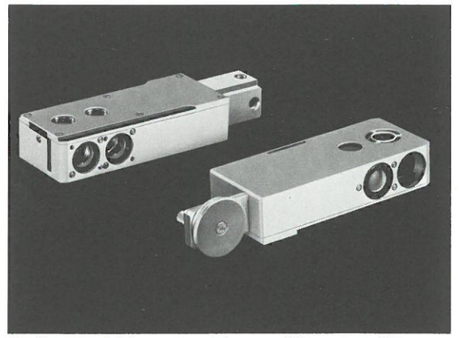
FI reflector insert taking two filter sets each exciter filters, chromatic beam splitters, barrier filters) with
violet excitation (405, 436, 385 . . . 440),
blue excitation (455 . . . 490, 455 . . . 500), and
green excitation (515 . . . 560, 546).

Other combinations can easily be achieved simply by exchanging filters. The reflectors are shifted from one stop position to the other to change the type of excitation.

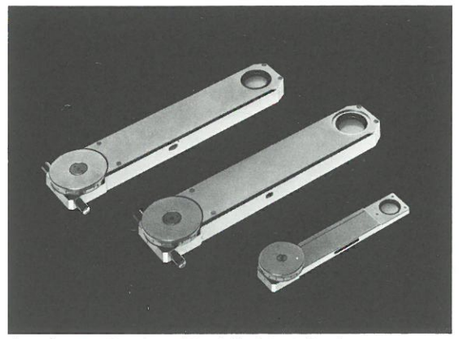
Insert with retardation plates (47 58 30)
The first-order red retardation plate, $\lambda/4$ and quartz wedge are switched in and out conveniently on a slider.



Objective module.
Arrangement for inverted microscope.



Reflector FI insert with two filter combinations (exciter filter + reflector + barrier filter) for simultaneous effect with the 2λ method. HPI + D reflector for reflected light.



Analyzer, transmitted light polarizer, reflected light polarizer.

Compensators
Inserted in the retardation plate slider are:
Sénarmont compensator 589/4 and 546/4 on slider (47 58 31).
Inserted in the sliding tube for the analyzer:
Slider with rotation for compensator plates (47 58 40). With $\lambda/10$ compensator plate (47 58 42) and $\lambda/20$ compensator plate (47 58 43). Quartz tilting compensator (47 58 45) and calcite tilting compensator (47 58 46).

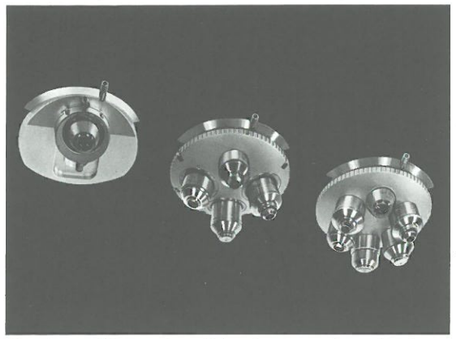
Barrier filter insert (47 58 01)
For filters for transmitted light fluorescence excitation. The insert has a complete set of barrier filters.

Lamp field stop slider A for reflected light (47 57 10)
With iris diaphragm, adjustable and centered externally. With extra opening, e.g. for fixed measuring diaphragms for photometry.

Aperture diaphragm slider (47 57 05)
With iris diaphragm adjustable and centered externally. Two extra openings for other fixed diaphragms. Each diaphragm setting precisely arrested.

Filter slider (47 58 00)
For ten filters or filter combinations, 32 mm dia., free selection; e.g. neutral density filters for light attenuation, color contrast filter and color conversion filters.

Sliding tube for analyzer (47 57 60)
Takes the actual analyzer slider (47 58 20), the reflected light mirror (47 57 59) for reflected light illumination, and compensators for polarized light microscopy.



Carrier with centerable changer for single objectives, quadruple revolving nosepiece, three objectives centerable, sextuple revolving nosepiece.

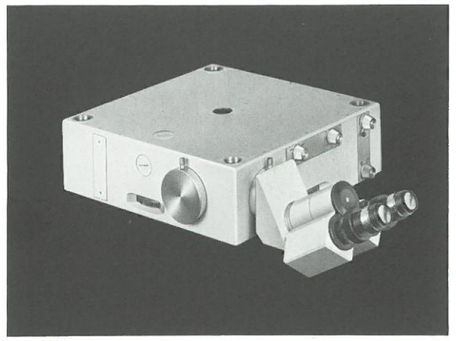
Objectives

The entire optics for the ZEISS AXIOMAT have been recomputed according to latest findings. The objectives are corrected for an effective field-of-view diameter of 32 mm and for infinity. This generous field-of-view diameter is effective as soon as the OPTOVAR zoom system is set to the factor 0.8 x.

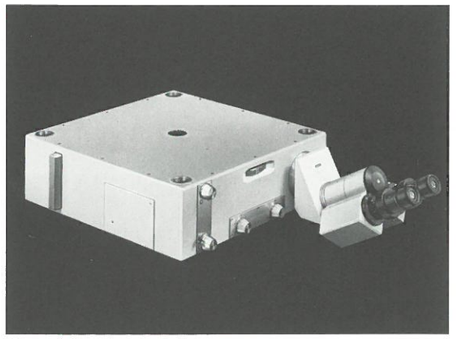
Objective insert with Planachromat 1.25 x / 0.05 + 2.5 x / 0.07 for low-power magnifications.
Planachromat 5 x / 0.12 – 10 x / 0.25.
Planapochromat 25 x / 0.65 – 50 x / 0.95 Corr. – 50 x / 1.0 oil – 100 x / 1.3 oil.
Planachromat 16 x / 0.30 with 19 mm working distance.

Objective insert with EPIPLAN 1.25 x / 0.03 + 2.5 x / 0.07 for low-power magnifications.
EPIPLAN 5 x / 0.12 HD – 10 x / 0.25 HD.
Epiplanapochromat 25 x / 0.65 HD – 50 x / 0.95 HD – 100 x / 1.30 HD oil.

The objectives on sliders are optically parfocalized with the other objectives on the instrument.
For polarization microscopy all objectives are supplied strain-free.
Phase contrast objectives for transmitted light are available starting with magnification 16 x.
Differential interference contrast work can be done with objectives of 10 – 25 – 50 – 100 x magnification.
ULTRAFLUAR 6.3 x / 0.10 – 16 x / 0.25 – 50 x / 0.50 Glyc. – 125 x / 1.25 Glyc. are offered for examinations in the extended spectral range from $\lambda = 230$ nm to $\lambda = 700$ nm.
There are special objectives for methods with the universal rotary stage.



Observation module
Setup for upright microscopes.



Observation module
Setup for upright microscopes.

Observation module (47 56 10)

In the observation module there are variable distributors for the light flux. According to their setting the image produced in infinity by the objectives is relayed to specific detectors: either to one or two observers, to photomicrographic cameras with fully automatic exposure, movie cameras, qualitative and quantitative TV equipment, a microscope photometer, or a projection unit of one type or another.
Light directed upwards, i.e. to the camera or photometer module goes direct and unaffected by a secondary optical system. To all other detectors it passes through intermediate systems.

The zoom OPTOVAR
The OPTOVAR permits continuous alteration of objective magnification by 0.8 x to 3.2 x, producing in conjunction with the 10 x wide-angle eyepieces a secondary magnification range of 8 x to 32 x.

The system for intermediate pupil imaging
This is installed if desired and permits various components to be introduced into the beam path which influence the image. Retardation plates, for instance—with varying properties– permitting phase contrast observation—like all other observation techniques—with normal brightfield objectives.

Two accessible real intermediate images
Two real intermediate images are produced in the observation module in accessible planes. At this point reticles can be introduced into the beam path which are visible in both binocular tubes and also appear in the image plane of the camera. The first intermediate image is before the OPTOVAR zoom system, the second after it.
Magnifications in the first intermediate image maintain their micrometer value independently of a secondary magnification by the OPTOVAR zoom system. Specimen and reference scale change magnification together.
Magnifications in the second intermediate image change their micrometer value with adjustment of the OPTOVAR zoom system. Certain lines in the specimen can be adapted to full micrometer values.

The Amici Bertrand lens
This is built in and switched in as required. It can be focused and has an iris diaphragm for isolation of specimen details for conoscopic observation. It is also used to check the annular diaphragm adjustment in phase contrast work.

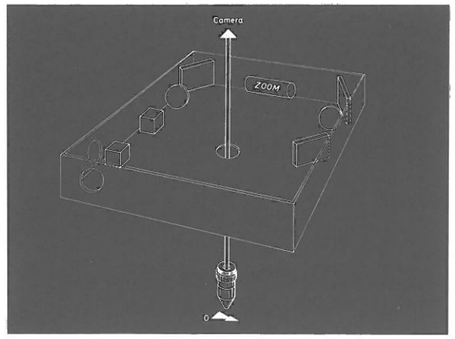


Diagram of beam path in the observation module. All light from beam splitter 1 direct to the camera.

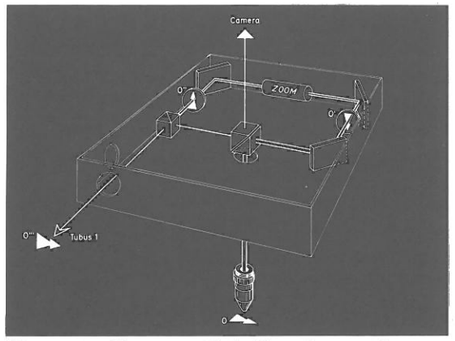


Diagram of beam path in the observation module. All light through the zoom system. Division at beam splitter 2: part to tube 1 and part to the camera.

With the observation module every practical variation of the beam direction is possible. All the light can be used for observation, in one or two viewing tubes, and each observer sees an unreversed image.
All the light can be relayed upwards into the next module. Direct or via the OPTOVAR zoom system.
The light can be used in various proportions for observation, photography or photometry.
Movie or TV cameras can be used during observation.
Portions of the image can be relayed direct to a detector, and others simultaneously via OPTOVAR zoom system.

Inserts and recticles for the observation module

Reticle insert (47 57 70)
for one permanently built in reticle respectively.

Reticle turret (47 57 71)
for quick change between four reticles.

Reticles for inserts

Focusing reticle 9 x 12 cm / 24 x 36 mm	47 58 81
Focusing reticle 4″ x 5″ / 24 x 36 mm	47 58 82
Focusing reticle UV 24 x 36 mm	47 58 83
Focusing reticle for spot measurement	47 58 84

Focusing reticles circumscribe specific image sections in the field of view, and double reticles permit exact focusing in the binocular tube for the film plane too.
The focusing reticle for spot measurement circumscribes that specimen portion in the field of view which is taken for a spot exposure measurement.
Glass plates (2 mm thick, 19 mm dia.) with the conventional reticle patterns for eyepiece micrometers are available on demand.

Insert for reticle turret (47 57 72)
This insert accepts a turret with six reticles, e.g. integrating and grain size comparison disks.
Description: For further details see brochure 41-261.

Insert with pointer (47 57 73)
Every detail in the whole field of view can be singled out. The pointer is visible in both binocular tubes and can be included in photomicrographs.

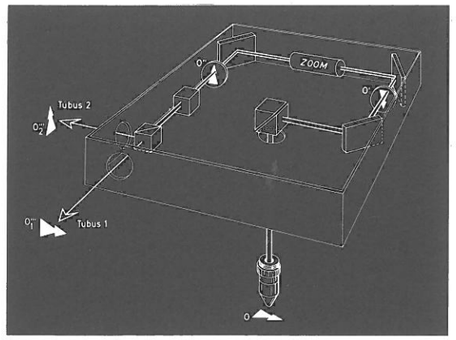
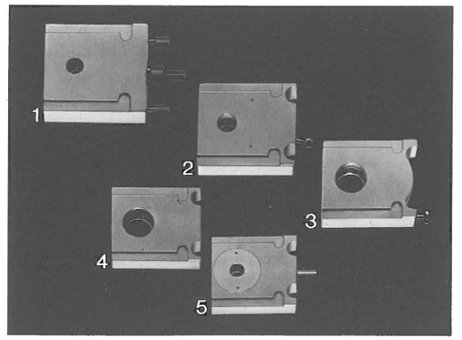


Diagram of beam path in the observation module. All light through the zoom system. Division at beam splitter 3: part to tube 1 and part to tube 2.



Some inserts for the observation module:
1 Hardness measurement insert (47 57 75)
2 Insert with pointer (47 57 73)
3 Reticle insert (47 57 70)
4 Insert with centered reticle (47 57 80)
5 Insert with adjustable reference scale (47 57 81)

Micrometer insert (47 57 74)
With internal reading, graduation 10 mm in 200 intervals. Vernier reading to 0.1 mm in the intermediate image.
Built on the principle of eyepiece screw micrometers. With the OPTOVAR zoom system each scale interval can be set in the specimen.

Hardness measurement insert (47 57 75)
With internal reading, for exact measurement of diagonal indents by Vickers pyramids.

Insert with centered reticle (47 57 80)
Replaces crossline eyepieces for polarization microscopy and offers crosshairs in both eyepieces.

Insert with adjustable reference scale (47 57 81)
A pair of crosshairs with variable distance in the first intermediate plane, is set to a specific distance in the specimen with a specimen micrometer, and this calibrated value is shown in the image of the specimen and in the photomicrograph, independent of the OPTOVAR zoom setting.

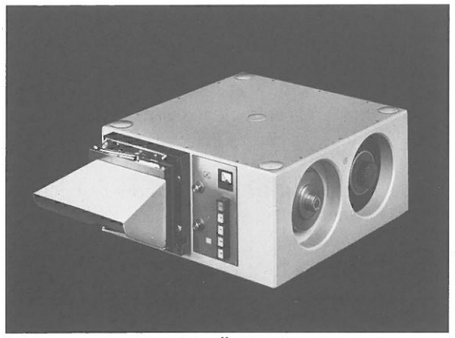
Insert with set crossline micrometer (47 57 82)
For instance for measurement of interference figures with conoscopic imaging.

Binocular tube (47 56 19)
The interpupillary distance is adapted for the respective user by swivelling of the eyepieces. Both eyepieces can be focused on the reticles. An unreversed image appears in each tube, in accordance with the position in which the respective user has the specimen lying on the stage in front of him.

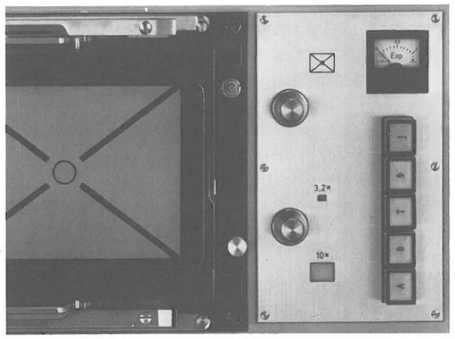
10 x / Br wide-angle eyepiece (46 40 02)
Field-of-view number 25, field angle 55°, equally suitable for spectacle wearers and non-spectacle wearers. As reticles and micrometers are introduced into the intermediate image plane and final magnification can be altered with the OPTOVAR zoom system, a single pair of eyepieces suffices for all viewing methods.

ZEISS AXIOMAT

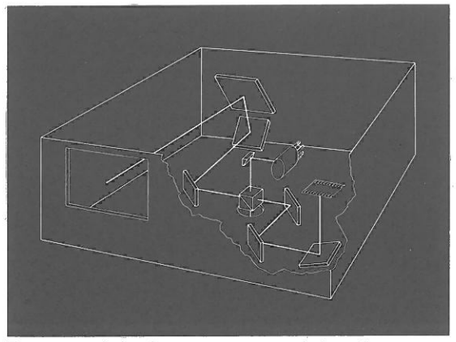
4 x 5″/35 mm camera



Camera module, 4 x 5″ and 35 mm camera with fully automatic exposure.



Manual or automatic exposure, flash preparation. 4 x 5″ or 35 mm. Spot or integral measurement.
At the press of a button.



Beam path in the camera module, diagram.

4 x 5″/35 mm camera module (47 56 20)

This module incorporates a large format 9 x 12 cm (4 x 5″) camera with automatic exposure control and a fully automatic 35 mm camera. Both cameras are always at the ready, the formats are simply switched over.
Large format micrographs are taken with a camera magnification of 10 x, and 35 mm micrographs with a camera magnification of 3.2 x. The camera factors are varied by the OPTOVAR zoom system by 0.8 . . . 3.2 x. The result is a compact double-format camera with the characteristics of a bellows camera, but the convenience of a rigid camera: focusing in a binocular tube, image section similar for both formats.
On the large format with the corresponding objective magnifications can be through-focused from 12.5 x to 3200 x, on 35 mm film from 4 x to 1000 x.
When you switch over from large format to 35 mm, the stray-light coming from the large format screen is automatically eliminated.

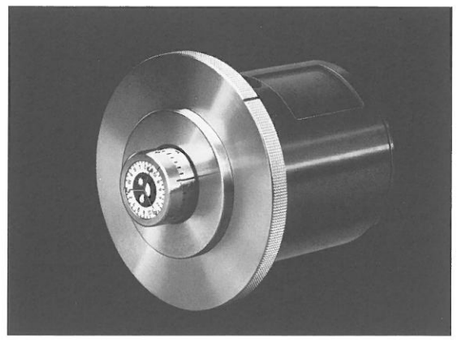
Exposure timing is controlled by a multiplier. With the result that even weak immunofluorescence or similar low-light specimens can be optimally photographed.

Spot and integral measurement both are possible.
If spot measurement is applied, it is indicated by a pilot light.

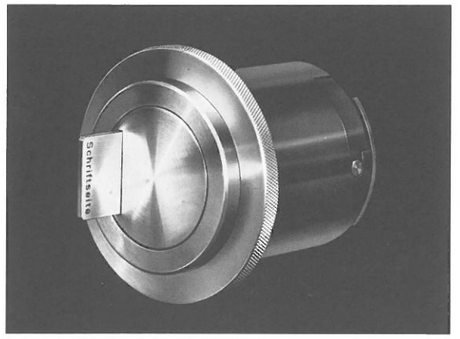
The indicator for the exposure time to be expected is a little galvanometer. If no pointer movement is seen, the exposure time is longer than a second. If the pointer stands still in the range between 0 and 1, the exposure time will be less than a second. If the pointer moves to 1, the shutter is blocked, because even with the briefest exposure time of $^1/_{100}$ sec. the image brightness would inevitably result in over-exposure.

Fully automatic exposure control for both cameras requires simply pressing key A on the camera module or, more conveniently, on the control unit. A pilot light indicates the camera which is switched on.

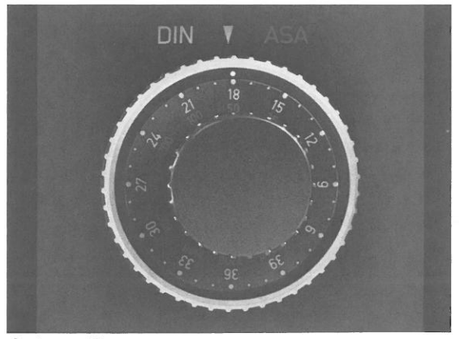
For manual time release key B is pressed. As long as this key is pressed the shutter remains open. Key T is for time exposures. Once depressed, it stays in and keeps the shutter open until it is released by pressing it a second time.



35 mm film magazine with frame counter. Indicates the number of exposures left. Film identification disk adjustable to color or B/W, artificial light or daylight and film speed.



35 mm magazine with data recording. Reference scales, markings and data appear on the negative.



Automatic exposure.
In steps of 1 DIN (1.26 ASA) programmable between 5 and 40 DIN (2.5 and 8000 ASA) film speed.

Flash preparation for 35 mm is achieved by pressing key "$\frac{1}{2}$". As long as this key is depressed a synchronous contact with the microflash functions.

Electrical double exposure lock for large format micrographs, another safeguard which can be overridden if desired.

Automatic film advance for 35 mm prevents double exposures here too.

Automatic exposure counter for large format photography. Exposure numbers from 01–99 light up on the microscope and are copied direct on to the film. Each time a new cassette is loaded, the counter is automatically switched on. Numbers can be manually selected as desired.

35 mm film cassette with exposure counter gives constant indication of how many exposures are left on the film. Changing over between various cassettes, such as B/W and color, does not entail any loss of film.

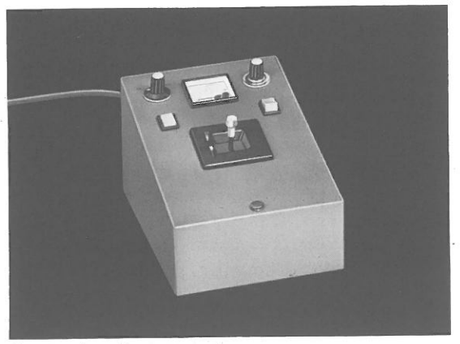
35 mm magazine with data recording permits the copying of specific reference scales or handwritten symbols direct on to the film.

Function is indicated by the key with "1". When it lights up, both camera systems are at go-ahead. When it blinks, the 35 mm film is exhausted. Other disturbances are similarly signalled; the 35 mm camera is then blocked.

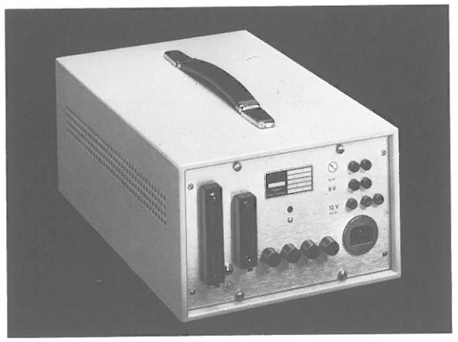
Brightness measurements (simple photometry) can be made with a meter connected parallel to the galvanometer for the light measurement and fixed in front of the large format camera like a film cassette.

ZEISS AXIOMAT

Control unit, power supply unit



Control unit
for focusing and illumination.



Mains power supply.

Control unit (47 56 90)
The control unit contains the operating elements for the electrical functions of the ZEISS AXIOMAT.

Master switch with regulator
A knob which functions primarily as main electrical switch and when turned further regulates the brightness of the low-voltage filament lamps. The respective operating voltage of the latter is read off a voltmeter. A red pilot lamp indicates when the ZEISS AXIOMAT is under voltage.

Joystick
When the switch is at "int", the objectives are raised or lowered with a joystick at infinitely variable speed. When the switch is at "ext" this function can be pedal actuated.

Switch for auxiliary illumination
The auxiliary illumination is located underneath the objective module.

Trigger for fully automatic photomicrography
Switch in parallel to key A on the camera.

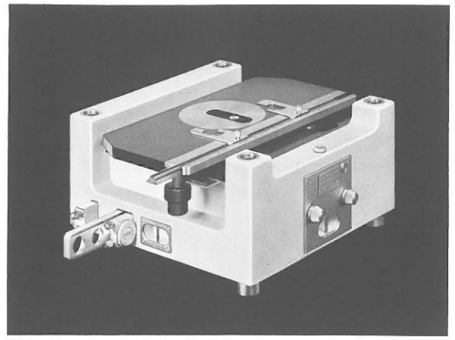
The operating console can be set up at a convenient height and connects the ZEISS AXIOMAT with the separate power supply unit.

Power supply unit (47 20 83)
The power supply unit does not require any attention. Apart from supplying the automatic camera mechanism, it can supply voltage for two 6 V 15 W low-voltage filament lamps or a 12 V 60 W or 12 V 100 W low-voltage filament lamp. Loads: 100 – 110 – 115 – 127 – 220 – 240 V, 50 . . . 60 Hz, 190 VA, in housing. Mains cable.

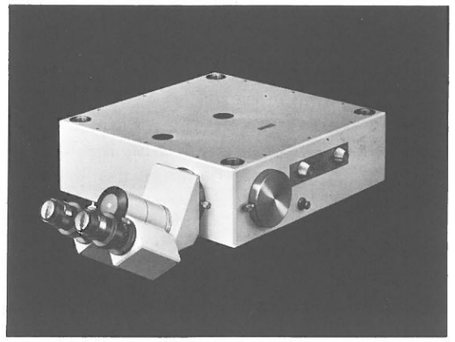
Cable box (47 56 48 high, 47 56 49 low)
Cable boxes separate the microscope block on the light entrance side from the adjacent illumination components. The boxes have a double function: they afford cover and protection for the electrical connections to the modules and shield the microscope against any thermal influence from the light sources.

ZEISS

UV modules



UV stage module D (T).
Optics transmittant from λ 230 nm and achromatized both in the UV and visible spectral ranges.



UV observation module
with built-in UV image converter (instead of OPTOVAR zoom system in the observation module 47 56 10).

UV objective module with UV correction (47 56 03)
An exceptional feature of the UV objective module is a correction system parfocalized with the ULTRAFLUAR objectives.
For work with the Planachromats and Planapochromats of the standard ZEISS AXIOMAT series, a second corrector functions which matches these systems.

All further accessories are identical with those described for the objective module 47 56 01.

UV stage module D (T) (47 56 32)
The UV stage module D (T) contains illuminating optics transmitting light from λ 230 nm and achromatized both in the UV and in the visible spectral ranges. It can also be used for work in the visible spectral range.

UV condenser insert (47 57 30)
In the UV stage module D (T) the vertically adjustable and centerable UV condenser insert is used with a UV auxiliary condenser lens (47 57 45). The condenser systems are inserted with holding rings: holding ring for ULTRAFLUAR objectives as condenser (47 57 46), holding ring (47 57 48) with 0.8 UV condenser (46 55 57).
The UV stage module D (T) further includes the UV mirror insert (47 57 20) and the UV lamp field stop slider (47 57 00). Aperture diaphragm slider, filter slider and specimen stages with accessories are described under the heading of stage module D (T) for visible light.

UV observation module with image converter (47 56 12)
The optical system of the UV observation module is light transmittant from λ 230 nm and achromatized both in the UV and visible spectral ranges. The OPTOVAR zoom system (observation module 47 56 10) is replaced here by the UV image converter which makes the otherwise invisible UV images visible. The image can be directed straight into the tube for observations in the visible spectral range.

Calculation of the final magnification must take into account the effective factors of the UV observation module:

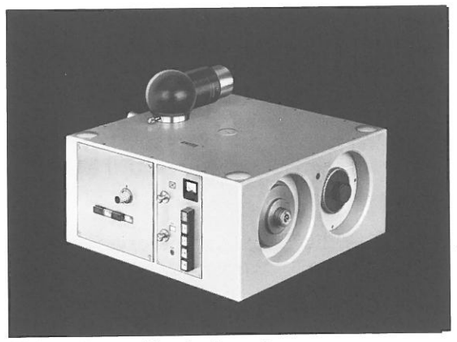
Image formation	without photometry	with photometry
Observation tube	2.5	1.5
TV camera	1.0	0.6

For microphotometry both in visible and UV light the measuring diaphragm is visible in the object image. To view the specimen on the fluorescent screen of the UV image converter, not only the 10 x / 25 Br wide-angle eyepieces may be used but 4 x / 25 eyepieces, which give an even brighter image.

For direct observation in the visible range a second binocular tube may be used by a second viewer.

For transfer to IR microscopy to λ 1050 nm an IR image converter is inserted in the observation module instead of the UV converter.

For photomicrography in UV and visible light focusing is done in the binocular tube. The image format is shown there.



UV camera with photometer.
Here the photometer takes the place of the 4 x 5" camera.

UV camera with photometer (47 56 22)
This module consists of a fully automatic 35 mm camera for photos in UV and VIS ranges and a microscope photometer. Both systems can be used in the extended range from λ 230 nm to λ 700 nm with the observation module (47 56 10) in the VIS range or with the UV module (47 56 12), both in the upright and inverted configurations.

The 35 mm camera
Setup and electrical and mechanical functions are identical with those of the 35 mm camera in camera module 47 56 20. And the same film cassettes are used.
The camera optics are however corrected for the entire wavelength range of the ULTRAFLUAR objectives.
The 5 x camera factor is adapted to the UV observation module. The entire square field photographed is marked and visible on the screen of the UV image converter. A lever on the front plate of the module switches over from photomicrography to microphotometry. Pilot lamps show which is functioning.

The microscope photometer
When this photometer is used, the measured field is visible in the binocular tube simultaneously with the image of the adjacent parts of the specimen. For the reverse projection of the image into the observation module a photometer factor of 2.5 applies.
The measuring diaphragms are on inserts: there are fixed diaphragms, an iris diaphragm and an adjustable rectangular diaphragm.

Photometer insert with fixed measuring diaphragms (47 56 81)
Eight different diaphragms can be switched in consecutively.

Measuring diaphragm	.125 – .25 – .5 – 1	Red numbers 1 – 2 – 4 – 8 (mm dia.)
Measuring field dia. in specimen with zoom factor 1 and 100 x objective	0.5 – 1 – 2 – 4	4 – 8 – 16 – 32 (μm dia.) (inner reflection)

Equation: measuring fied dia. (μm) in specimen =
$$\frac{1000 \times \text{measuring diaphragm dia. (mm)}}{2.5 \times \text{objective magnification (x zoom factor)}}$$
If measurements are only made in the visible region, and the photometer module is used in conjunction with the observation module 47 56 10, the diameters of these diaphragms can be infinitely varied in the OPTOVAR zoom range between 0.8 x and 3.2 x.
For measurements in UV the photometer module is combined with the UV observation module 47 56 12. The highest power objective then available is the ULTRAFLUAR 125x/1.25.

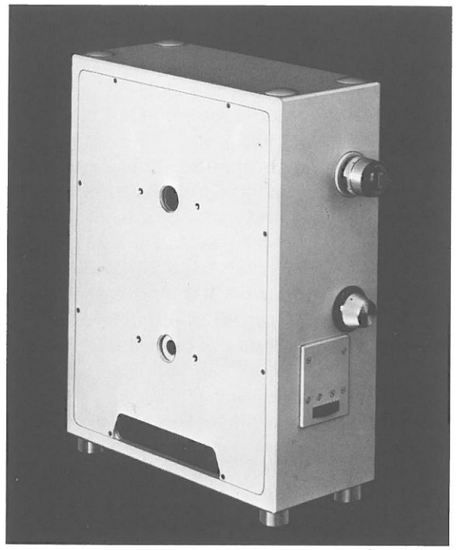
Photometer insert with iris diaphragm (47 56 83)
The iris diaphragm is used to isolate a circular measuring field of any diameter in the total specimen field. The diaphragm image is visible together with the specimen image in the tube.

Photometer insert with adjustable rectangular diaphragm (47 56 82)
A rectangular measuring field of any desired length and width can be isolated from the total measuring field. Further photometer inserts are in preparation.

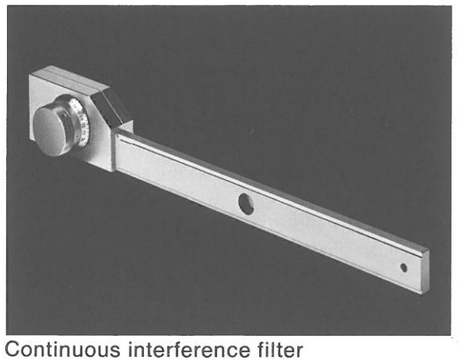
HTV R 446 photomultiplier
An HTV R 446 photomultiplier (38 00 73 - 2570) is recommended as detector, which can be used for measurements in the spectral range from 230 nm to 700 nm. In mount 47 42 80 it is fixed with the detector housing 47 42 30 on the photometer.

Units of the electronic slide-in system complete the basic equipment (Brochure 41-830).

Monochromators



Grating monochromator
for the wavelength range from λ 200 nm to λ 1050 nm.



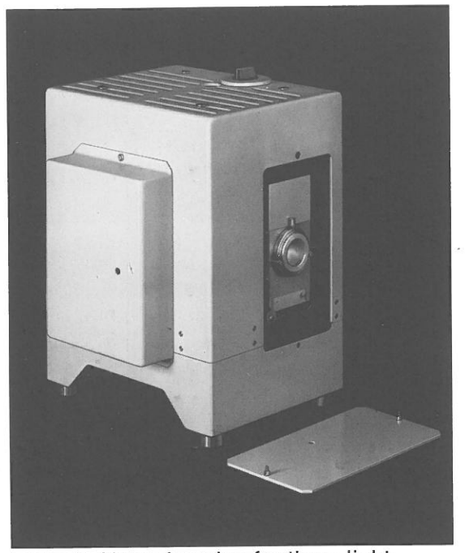
Continuous interference filter monochromator b for the wavelength range from λ 400 nm to λ 750 nm.

There is a choice of various monochromators for the selection of spectral ranges for specimen illumination:

1. Continuous interference filter monochromator a (47 58 07)
For isolating one spectral band from the visible spectral range by manual shifting of the continuous interference filter. Range λ 400 nm to λ 750 nm. Fixed spectral half width 15 nm.

2. Continuous interference filter monochromator b (47 58 08)
For isolation of a spectral band from the visible spectral region. Shifted manually or motorized, electric pulse from 10 to 10 nm. Range λ 400 nm to λ 750 nm. Fixed spectral half width 15 nm.

3. Grating monochromator (47 56 45)
For spectral photometry in the UV, visible and IR spectral ranges. Wavelength range λ 200 nm to λ 1050 nm.
The grating monochromator is designed as a component of the ZEISS AXIOMAT so that simply by turning it it can be used for both transmitted and reflected light.
Slit width adjustable between 2 nm and 30 nm spectral half width.
Exchangeable gratings:
The grating with effective wavelength (blaze) at 280 nm is optimized for work in the UV, but can be used for the visible range.
The grating with effective wavelength (blaze) at 450 nm has about double the brightness in the visible range of the UV grating. It can also be applied for the IR range up to λ 1050 nm, but not for UV.
For the range from 240 nm to 300 nm, which is of particular interest for absorption measurements of biological specimens, there are two straylight barrier filters which block the longer-wave UV and the visible light. The UV 250 filter is used from 230 nm to 270 nm, the UV 280 filter from 260 nm to 300 nm. Further straylight filters or barrier filters for the second order are inserted in to the filter slider (47 58 00).

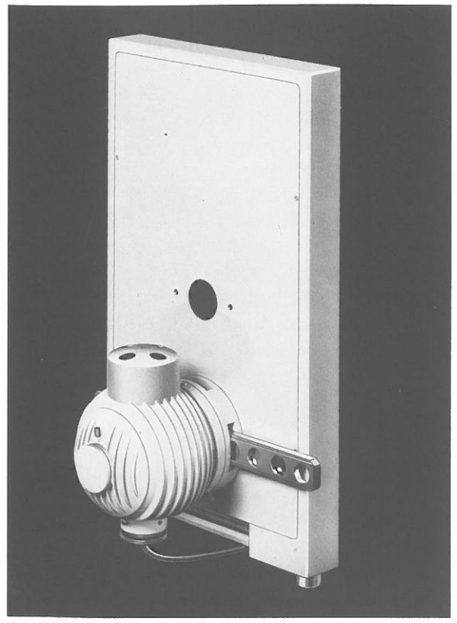


Large UV lamp housing for three light sources. A lamp holder 47 56 43 with mirror lamp condenser for the XBO 250 W super-pressure xenon lamp.
Two lamp holders 47 56 41 with lens lamp condensers for light sources as desired.

Large lamp housing for visible light (47 56 40)
The large lamp housing for the ZEISS AXIOMAT can take three lamp holders (47 56 41) taking various light sources with special sockets. The light sources can all be conveniently centered to the optical axis. By focusing the lamp condenser the light source is imaged in the pupil plane. Focusing can be checked on a small projection screen with fiducial marks. A diffusion disk can be introduced into the beam path to homogenize the image of the light source. The large lamp housing has a switch on top to switch on either the three light sources separately for reflected or transmitted light, or two simultaneously for reflected and transmitted light. The adjustable concave mirror (47 56 46) is used in the lamp holder when a light source does not fully illuminate the pupil without this aid.

Large UV lamp housing for the entire spectral range (47 56 42)
The large UV lamp housing is similar in form and function to the usual version but contains UV transmittant optics. One of the three lamp holders is modified to take the XBO 250 W super-pressure xenon lamp with socket and also has a mirror lamp condenser. This has the advantage that the image of the light source remains in focus even when the wavelength used is changed.

250 W illuminator (47 25 10) with lamp holder (47 56 44)
The 250 W is an illuminator with only one light source for visible light. Its holder—with room for another filter slider—is screwed on to the cable box at the level of the transmitted or reflected light illumination axis and the lamp housing clamped on to it. The 250 W illuminator then accepts the lamp selected. The optics in the 250 W illuminator are unsuitable for UV light under λ 360 nm. It is however possible to use the special version of the 250 W with lamp condenser focusing (47 25 15) with a quartz glass lamp condenser (46 72 65).



Cable box with 250 W illuminator

Lamps, lamp sockets and chokes
The ZEISS AXIOMAT offers the free choice of light sources. In the large lamp housing on the lamp holders 47 56 41 or in the 250 W illuminator.

Designation	Cat. Nos.		
	Lamp	Lamp socket	Choke
12 V 100 W* low-voltage filament lamp	38 00 18 - 2600	46 80 21	built in
12 V 100 W* low-voltage halogen filament lamp	38 00 59 - 1660	46 80 18	built in
CSI 250 W/1 metal halide arc lamp	38 00 76 - 7060	46 80 25	39 00 74 - 2980
HBO 100 W/2* super-pressure mercury lamp	38 00 18 - 4060	46 80 29	38 00 76 - 7080
HBO 200 W/4 L1 super-pressure mercury lamp	38 00 18 - 4070	46 80 28	39 00 74 - 2980
XBO 150 W/1* high-pressure xenon lamp	38 00 44 - 7390	46 80 27	38 00 78 - 8010**
For insertion in the UV lamp holder 47 56 43 in the large UV lamp housing			
XBO 250 W* high-pressure xenon lamp	38 00 18 - 6900	46 80 39	38 00 74 - 3680

* also available with stabilized power supply for photometry
** with housing (47 90 66) and mains cable (38 00 71-2810)

Microscope tables

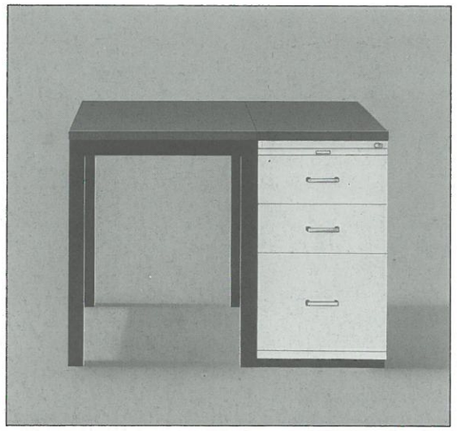


Table 750 x 600 x 780*	
Table base	47 90 25
Table top	47 90 30
Accessory cabinet 750 x 420 x 780	47 90 41
Connecting pieces table/cabinet	47 90 29

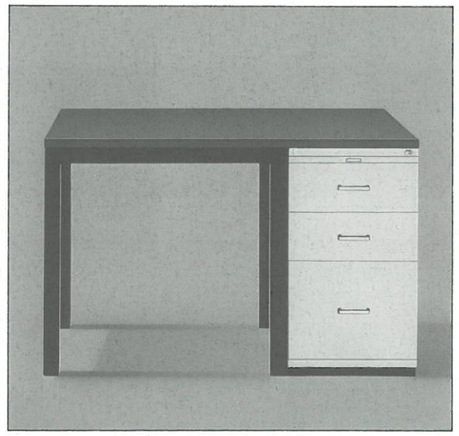


Table 750 x 780 x 780	
Table base	47 90 25
Table top	47 90 31
Accessory cabinet 750 x 420 x 780	47 90 41
Connecting pieces table/cabinet	47 90 29



Table 750 x 1200 x 600	
Table base	47 90 25
Table top	47 90 32
Accessory cabinet 650 x 420 x 600	47 90 42
Connecting pieces table/cabinet	47 90 29

* The dimensions are in millimeters, height x width x depth respectively.

ZEISS AXIOMAT



the only true advance in microscope design in 100 years

ZEISS AXIOMAT inverted transmitted light microscope to study tissues, sediments, etc.



ZEISS AXIOMAT upright polarizing microscope for mineralogical, crystallographic, and petrographic examinations using all microscope techniques.

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