OPTIKA®
MICROSCOPES
ITALY

POL Series

Routine & Research Lab Polarizing Microscopes

Polarized Light Microscopy

Polarized light microscopy is an optical microscopy technique involving polarized light. Simple techniques include illumination of the sample with polarized light. Directly transmitted or incident light can, optionally, be blocked with a polariser orientated at 90 degrees to the illumination.
These illumination techniques are most commonly used on birefringent samples where the polarized light interacts strongly with the sample and so generating contrast with the background. Polarized light microscopy is used extensively in optical mineralogy.
As polarised light passes through a birefringent sample, the phase difference between the fast and slow directions varies with the thickness, and wavelength of light used. The optical path difference (o.p.d.) is defined as

$$o.p.d. = \Delta n \times t$$

where t is the thickness of the sample.

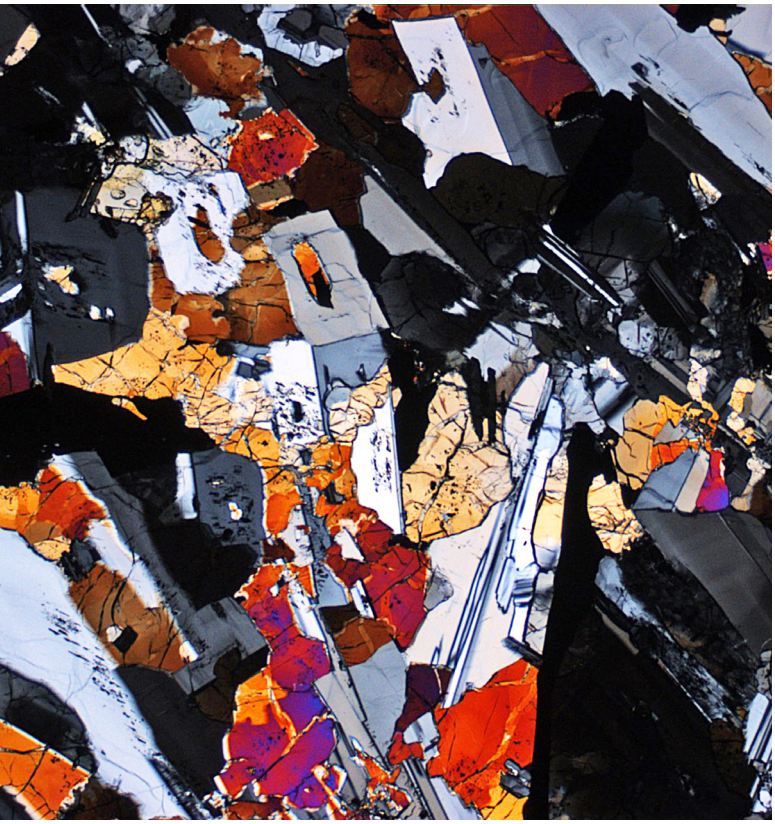
This then leads to a phase difference between the light passing in the two vibration directions of

$$\delta = 2\pi(\Delta n \times t / \lambda)$$

For example, if the optical path difference is $\lambda / 2$, then the phase difference will be π, and so the polarisation will be perpendicular to the original, resulting in all of the light passing through the analyser for crossed polars.
If the optical path difference is $n \times \lambda$, then the phase difference will be $2 n \times \pi$, and so the polarisation will be parallel to the original. This means that no light will be able to pass through the analyser which it is now perpendicular to.
The Michel-Levy Chart arises when polarised white light is passed through a birefringent sample. If the sample is of uniform thickness, then only one specific wavelength will meet the above condition described above, and be perpendicular to the direction of the analyser. This means that instead of polychromatic light being viewed at the analyser, one specific wavelength will have been removed. This information can be used in a number of ways:

- If the birefringence is known, then the thickness, t, of the sample can be determined
- If the thickness is known, then the birefringence of the sample can be determined

As the order of the optical path difference increases, then it is more likely that more wavelengths of light will be removed from the spectrum. This results in the appearance of the colour being "washed out", and it becomes more difficult to determine the properties of the sample. This, however, only occurs when the sample is relatively thick when compared to the wavelength of light.

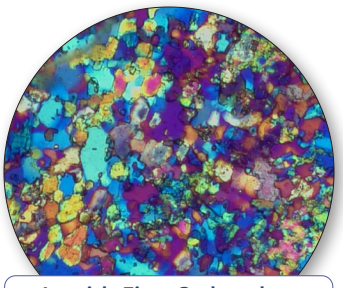


Icons

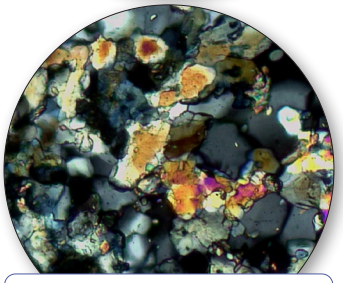
- Field number
- Incident light
- Transmitted light
- X-LED illuminator
- Multi-Plug low voltage power supply
- Infinity corrected optics
- Polarized light
- W-PLAN Objectives (22mm field of view)
- U-PLAN Objectives (25mm field of view)

B-383POL - Polarizing Microscope

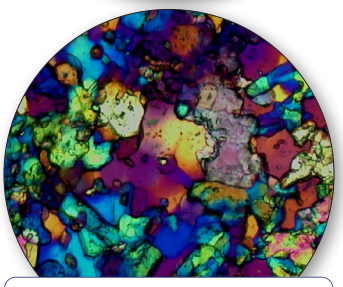
Upright microscope for brightfield and polarizing light observations with strain-free IOS N-PLAN POL objectives. Complete of polarizer and analyzer filters, Bertrand lens for conoscopic observation, compensator plates and high-precision rotatable stages. It comes with the exclusive ***X-LED³*** illumination system to deliver bright and clear images, along with all the accessories to perform accurate polarization analysis in biology and materials science.



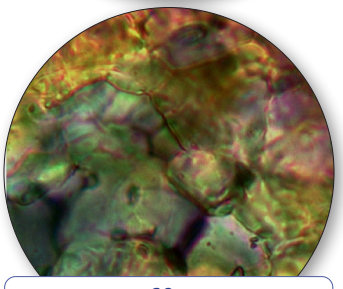
4x with First Order plate



10x



10x with First Order plate



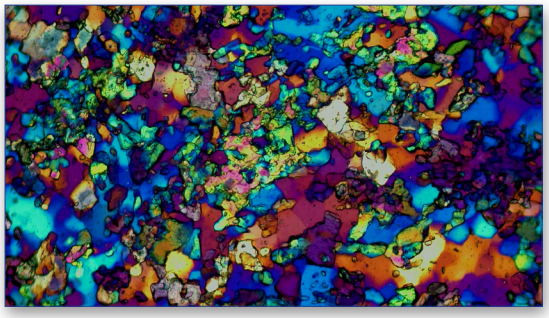
60x

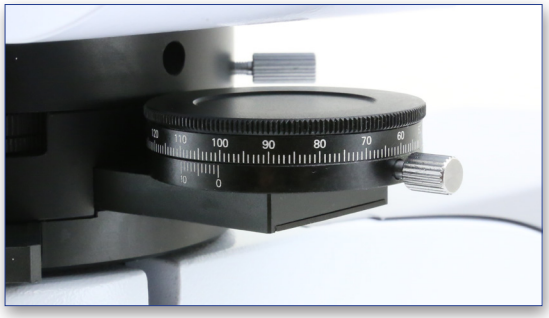
Part	Description
Observation mode:	Brightfield, transmitted polarized light and conoscopy.
Bertrand lens and polarizing attachment:	Swing-out type with centering mechanism for observation in conoscopy/orthoscopy. Rotatable analyzer from 0° to 90° with graduated scale. Tint plates: 1° order red (λ); λ/4; Quartz wedge.
Head:	Trinocular (fixed 50/50), 30° inclined, 360° rotating.
Interpupillary distance:	Adjustable between 48 and 75 mm.
Dioptric adjustment:	On the left eyepiece tube.
Eyepieces:	WF10x/20 mm, high eye-point and secured by screw. One with crosshair.
Nosepiece:	Quadruple revolving nosepiece, rotation on ball bearings. Centering system for each objective.

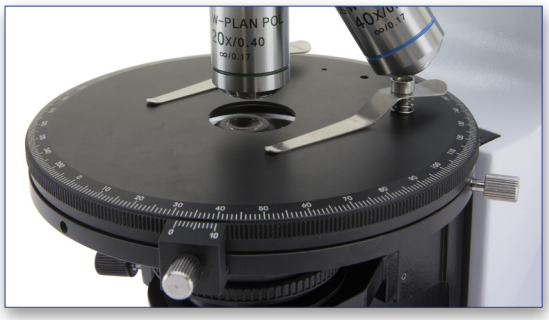
Part	Description
Objectives (strain-free):	IOS N-PLAN POL 4x/0.10 IOS N-PLAN POL 10x/0.25 IOS N-PLAN POL 40x/0.65 IOS N-PLAN POL 60x/0.80 All with anti-fungus treatment.
Specimen stage:	Rotatable stage with locking mechanism. Vernier scale with accuracy 0.1 mm. Diameter 160 mm. Specimen slide clamps.
Focusing:	Coaxial coarse (adjustable tension) and fine focusing mechanism with limit stop to prevent the contact between objective and specimen.
Condenser:	Abbe N.A. 1.25, with objective-coded iris diaphragm, focusable and centerable. With rotating polarizing filter.
Transmitted illumination (Fixed Koehler type):	X-LED³ with white 3.6 W LED (6.300 K) with brightness control. Multi-plug 100-240Vac/6Vdc external power supply.

B-510POL - Polarizing Microscope

Advanced routine laboratory microscope for transmitted light in brightfield and polarized light observations with strain-free IOS W-PLAN POL objectives. Complete of polarizer and analyzer filters, Bertrand lens for conoscopic observation, compensator plates and high-precision rotatable stages. It comes with the exclusive ***X-LED³*** illumination system to deliver bright and clear images, along with all the accessories to perform accurate polarization analysis in biology and materials science.





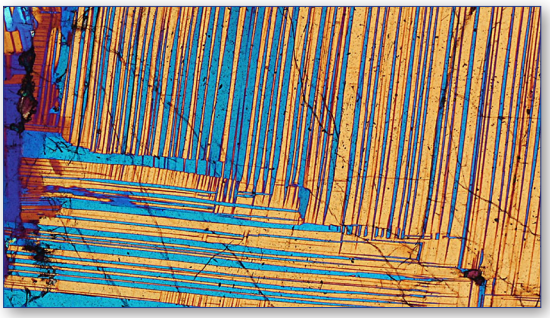


Part	Description
Observation mode:	Brightfield, transmitted polarized light and conoscopy.
Bertrand lens and polarizing attachment:	Swing-out type with centering mechanism for observation in conoscopy/orthoscopy. Rotatable analyzer from 0° to 90° with graduated scale. Tint plates: 1° order red (λ); λ/4; Quartz wedge.
Head:	Trinocular (fixed 50/50), 30° inclined, 360° rotating.
Interpupillary distance:	Adjustable between 50 and 75 mm.
Dioptric adjustment:	On the left eyepiece tube.
Eyepieces:	WF10x/22 mm, high eye-point and with rubber cups. One with crosshair.
Nosepiece:	Quadruple revolving nosepiece, rotation on ball bearings. Centering system for each objective.

Part	Description
Objectives (strain-free):	IOS W-PLAN POL 4x/0.10 IOS W-PLAN POL 10x/0.25 IOS W-PLAN POL 20x/0.45 IOS W-PLAN POL 40x/0.65 All with anti-fungus treatment.
Specimen stage:	Rotatable stage with locking mechanism and centering knobs. Vernier scale with accuracy 0.1 mm. Diameter 145 mm. Specimen slide clamps.
Focusing:	Coaxial coarse (adjustable tension) and fine focusing mechanism with limit stop to prevent the contact between objective and specimen.
Condenser:	Swing-out N.A. 0.2/0.9, with iris diaphragm, focusable and centerable. With rotating polarizing filter.
Transmitted illumination (Full Koehler type):	X-LED³ with white 3.6 W LED (6.300 K) with brightness control. Multi-plug 100-240Vac/6Vdc external power supply.

B-510POL-I - Polarizing Microscope

Advanced routine laboratory microscope for brightfield and polarized light observations in transmitted and incident light with strain-free IOS LWD W-PLAN POL objectives. Complete of polarizer and analyzer filters, Bertrand lens for conoscopic observation, compensator plates and high-precision rotatable stages. It comes with the exclusive ***X-LED³*** illumination system to deliver bright and clear images, along with all the accessories to perform accurate polarization analysis in biology and materials science.



Incident/transmitted light Objectives included

Description
IOS LWD W-PLAN POL 5x/0.12, W.D. 15.5 mm
IOS LWD W-PLAN POL 10x/0.25, W.D. 10.0 mm
IOS LWD W-PLAN POL 20x/0.40, W.D. 5.8 mm
IOS LWD W-PLAN POL 50x/0.75, W.D. 0.32 mm

Part	Description
Observation mode:	Brightfield, transmitted/incident polarized light and conoscopy.
Epi-illumination and filters:	X-LED[8] with white 8 W LED (6.300 K) with brightness control. With polarizer and rotating analyzer for incident illumination, aperture and field diaphragm. With additional filter holder.
Bertrand lens and polarizing attachment:	Swing-out type with centering mechanism for observation in conoscopy/orthoscopy. Rotatable analyzer from 0° to 90° with graduated scale. Tint plates: 1° order red (λ); λ/4; Quartz wedge.
Head:	Trinocular (fixed 50/50), 30° inclined, 360° rotating.
Interpupillary distance:	Adjustable between 50 and 75 mm.
Dioptric adjustment:	On the left eyepiece tube.
Eyepieces:	WF10x/22 mm, high eye-point and with rubber cups. One with crosshair.
Nosepiece:	Quadruple revolving nosepiece, rotation on ball bearings. Centering system for each objective.

Part	Description
Objectives (strain-free):	IOS LWD W-PLAN POL 5x/0.12 IOS LWD W-PLAN POL 10x/0.25 IOS LWD W-PLAN POL 20x/0.40 IOS LWD W-PLAN POL 50x/0.75 All with anti-fungus treatment.
Specimen stage:	Rotatable stage with locking mechanism and centering knobs. Vernier scale with accuracy 0.1 mm. Diameter 145 mm. Specimen slide clamps.
Focusing:	Coaxial coarse (adjustable tension) and fine focusing mechanism with limit stop to prevent the contact between objective and specimen.
Condenser:	Swing-out N.A. 0.2/0.9, with iris diaphragm, focusable and centerable. With rotating polarizing filter.
Transmitted illumination (Full Koehler type):	X-LED³ with white 3.6 W LED (6.300 K) with brightness control. Multi-plug 100-240Vac/6Vdc external power supply.

B-1000POL - Polarizing Microscope

The modular OPTIKA B-1000 is available with transmitted polarized light, helping you working in a comfortable way during extended periods of use and performing reliable, accurate and rapid diagnosis benefiting from modularity, which gives the chance to create customized configurations tailored on customer needs. Versatile, robust, durable and sturdy, B-1000 offers premium quality optics, the state-of-the-art, exclusive ***X-LED⁸*** (8 W) illumination system, designed by OPTIKA and the Koehler diaphragm.
B-1000 gives multiple options as manual or motorized configuration.

Dedicated version for transmitted (***X-LED⁸***, 8 W) illumination and polarization analysis.

B-1000POL - Configuration Chart

Build the microscope that suites your needs by choosing among the components

M-781
PL10x/22 eyepiece, high eyepoint, with micrometric scale (10mm/100um) & rubber cup (retractable)

M-1001
PL10x/22 eyepieces (pair), high eyepoint, with rubber cup (retractable)

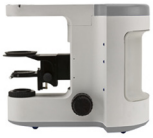
M-1002
PL10x/24 eyepieces (pair), high eyepoint, with rubber cup (retractable

M-1011
Trinocular head, three positions (100/0, 50/50, 0/100)

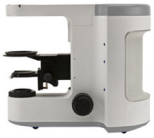
M-1012
Binocular ERGO head

M-1033
Bertrand lens with analyzer and slot for sliders (with Lambda, 1/4 Lambda and Quartz Edge)

M-1021B
Main body with focus system and X-LED[8] illumination, for general purposes



M-1021B+M-1156*+M-1149
Main body with motorized system and X-LED[8] illumination, for general purposes



M-1044
Quintuple reversed nosepiece, with centrable positions for POL objectives

IOS U-PLAN POL

M-1080	4x
M-1081	10x
M-1081.5	20x
M-1082	40x
M-1083	60x

M-1145+M-1146
Rotating Stage, centrable + attachable XY stage

M-1153
0.90 N.A. swing-out POL condenser

* Code M-1156 must be added only **once** for any motorized configuration

B-1000POL-I - Polarizing Microscope

The modular OPTIKA B-1000 is available with transmitted and incident polarized light, helping you working in a comfortable way during extended periods of use and performing reliable, accurate and rapid diagnosis benefiting from modularity, which gives the chance to create customized configurations tailored on customer needs. Versatile, robust, durable and sturdy, B-1000 offers premium quality optics, the state-of-the-art, exclusive ***X-LED⁸*** (8 W) illumination system, designed by OPTIKA and the Koehler diaphragm.
B-1000 gives multiple options as manual or motorized configuration.

Dedicated version for transmitted and incident illumination (***X-LED⁸***, 8 W)

B-1000POL-I - Configuration Chart

Build the microscope that suites your needs by choosing among the components

M-781
PL10x/22 eyepiece, high eyepoint, with micrometric scale (10mm/100um) & rubber cup (retractable)

M-1001
PL10x/22 eyepieces (pair), high eyepoint, with rubber cup (retractable)

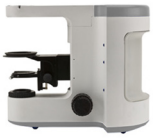
M-1011
Trinocular head, three positions (100/0, 50/50, 0/100)

M-1012
Binocular ERGO head

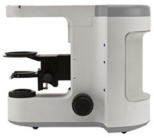
M-1033
Bertrand lens with analyzer and slot for sliders (with Lambda, 1/4 Lambda and Quartz Edge)

M-1034
Incident polarizing attachment

M-1021B
Main body with focus system and X-LED[8] illumination, for general purposes



M-1021B+M-1156*+M-1149
Main body with motorized system and X-LED[8] illumination, for general purposes



M-1044
Quintuple reversed nosepiece, with centrable positions for POL objectives

IOS LWD U-PLAN POL

M-1090 5x
M-1091 10x
M-1092 20x
M-1093 50x

M-1145+M-1146
Rotating Stage, centrable + attachable XY stage

M-1153
0.90 N.A. swing-out POL condenser

* Code M-1156 must be added only **once** for any motorized configuration

v 6.7 - OPTIKA reserves the right to make corrections, modifications, enhancements, improvements and other changes to its products at any time without notice.

Headquarters and Manufacturing Facilities

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