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ERNST LEITZ GMBH WETZLAR GERMANY



Polarizing Microscopes

and other instruments

for examinations

in polarized light

Leitz
WETZLAR

55–20/Engl.



Polarizing Microscopes

and other instruments for examinations in polarized light

ERNST LEITZ GMBH WETZLAR GERMANY

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Foreword

Optical methods of examination with the aid of polarized light have been perfected to such a remarkable extent in the course of the past hundred years that they have been introduced with great success into almost all fields of the natural sciences and technology.

The importance of polarized light for optical research work was recognized very early, and it was BREWSTER (1781–1868) who pointed out, only a few years after the discovery of polarization, the practical possibility of examining organic and unorganic objects in polarized light, especially the diagnosis of minerals. The development of special polarizing instruments, however, proceeded only very slowly at this early stage. H. F. TALBOT equipped a compound microscope with polarizer and analyser (Nicol prisms) for the first time in 1834 and thus introduced an efficient polarizing microscope. But still in 1860 the Utrecht scientist PIETER HARTING wrote in his book "The Microscope": The applications for which a specially constructed polarizing microscope may be desirable are very rare, and therefore an ordinary microscope supplemented by attachable polarizing elements should generally be preferred. In accordance with such opinions LEITZ microscopes supplied at the time were offered with separate polarizers and analysers for mineralogical work, and special polarizing microscopes such as the Rosenbusch polarizing stand of CARL KELLNER, the founder of the LEITZ works remained exceptions. It was not until the development of the preparation of polished mineralogical thin sections that more exacting methods of examination were called for and led to a growing demand for proper polarizing microscopes. The first LEITZ polarizing microscope was supplied in 1885, and already 5 years later a special petrological instrument was introduced. Ample proof of the efforts made in this new field is the fact that already in 1893 a special catalogue on polarizing microscopes and accessories was published by E. LEITZ, WETZLAR.

The type of microscope stand developed at the beginning of the twentieth century featured a horseshoe foot, inclinable curved limb, and a novel micrometer screw on horizontal axis immediately below the coarse focusing heads proved to be extremely successful for half a century. It was only in recent years that new advanced designs with built-in illuminating system were introduced, which have meanwhile been generally recognized for their perfection in every respect.

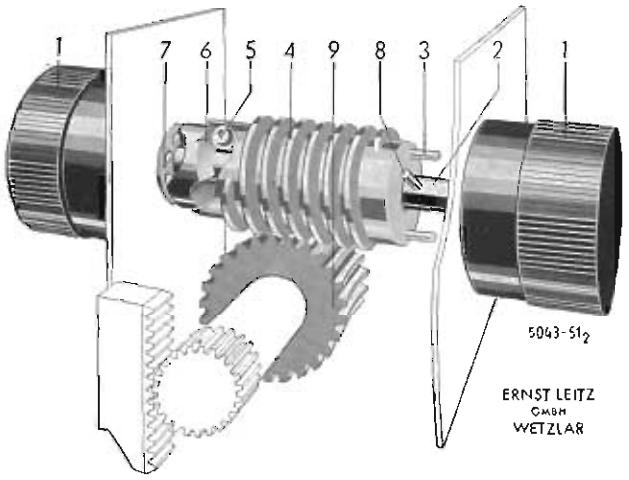
In 1912, MAX BEREK, former student of THEODOR LIEBISCH, the noted scientist on mineralogy and crystallography, joined the LEITZ staff. His work found its expression in the advancement of the polarizing microscope and optical methods of examination and consolidated the leading position of LEITZ microscopes in the mineralogical field. It is his merit to have laid down an exact theory on microscopy in transmitted and incident light including polarized light and to have introduced remarkable improvements in our designs. His achievements are most outstanding in incident light microscopy. His compensating prism (trapezoidal prism), widely used today, deflects the illuminating rays without changing their state of polarization. This optical means became the basis of quantitative examination in incident light.

The application of polarized light in microscopy initially confined to the work of the mineralogists gradually found its way into other fields of the natural sciences. W. J. SCHMIDT greatly contributed to the introduction of polarized light microscopy into biological and medical research by his fundamental papers (1924, 1954, 1955 as listed on page 60), by which new methods were laid down and former prejudices removed.

The classical form of the polarizing microscope stand as it was introduced at the beginning of our century was manufactured with more or less external modifications until radically new designs appeared a few years ago which followed the example set by the large biological research microscope ORTHOLUX about 25 years earlier. The outstanding features of this famous instrument were adopted for creating a range of polarizing microscopes which will meet all requirements of modern teaching, routine laboratory work, as well as research, as regards versatility, performance and convenience in operation, since our designers worked in close contact with noted scientists and users of our polarizing outfits.

Like the wellknown ORTHOLUX the new polarizing stands offer the advantages of a built-in illuminating system, low-placed focusing controls for utmost convenience and displacement of the freely accessible object stage while the observation height of the interchangeable monocular and binocular tubes remains unchanged. Binocular vision can now be applied to orthoscopic as well as conoscopic observations. A remarkable degree of interchangeability ensures ready adaptation of the new polarizing stands to all types of work without any loss in accuracy and dependability. The following outfits are available.

The illustration shows schematically the design and operation of the combined coarse and fine adjustment with single-knob control now incorporated in several LEITZ polarizing microscopes (for details see text below)



1. SM-POL. *Simple polarizing microscope for general examinations in transmitted light.*

2. LABORLUX-POL. *Polarizing microscope with built-in illuminating system for investigations in transmitted light and with provision for work in incident light.*

3. DIALUX-POL. *Large polarizing microscope with built-in illuminating system for all types of research work in transmitted light and with provision for work in incident light.*

4. EPILUX-POL. *Polarizing microscope for work in incident light with provision for fitting transmitted light equipment.*

5. ORTHOLUX-POL. *Large universal research microscope with built-in illuminating system for work in transmitted and incident light including incident phase contrast illumination.*

6. PANPHOT-POL. *Large universal camera micrascope.*

Full particulars of the mechanical and optical equipment of these microscopes will be found in the descriptions and specifications of this catalogue. These introductory notes will therefore only summarize some of the outstanding features of these instruments.

The new microscope stands are characterized by their modern pleasing and at the same time most practical form and the convenient arrangement of all controls and scales. Particularly noteworthy are the low-placed coarse and fine adjustment controls fitted on either side. These actuate the object stage so that the microscope tube always retains its vertical position. This renders these microscopes ideal for the use of camera attachments or other specialized tube equipment without the risk of adversely affecting the focusing adjustment by the weight of such equipment. The vertical stage movement operates along polished precision ball-races ensuring an unvarying smooth motion, free of backlash, at all times and under all conditions of practical use.

The polarizing microscopes SM-POL, LABORLUX-POL, DIALUX-POL and EPILUX-POL incorporate the single-knob combined coarse and fine focusing adjustment. The transition from one mode of focusing to another is instantaneous and effected by simply reversing the rotation of the control head.

The principle underlying the combined focusing motion is shown in the above schematic drawing. The control heads (1) are connected by an axis (2) which carries in its centre portion a rotatable worm gear (4). This gear is automatically coupled to the rotation of the axis as soon as the pin (8) of the latter touches one of the two small shafts (3) protruding from the end of the worm gear. When this is rotated the movement is transmitted via a pinion (9) to a rack fitted to the movable bracket of the object stage whereby its coarse adjustment is effected. The main axis (2) also carries near its left end a fixed cam piece (6). As long as the pin (8) moves freely between the two shafts (3) the rotary movement of the axis is changed into a lateral displacement of the worm gear by means of a spring-loaded ball (5) forming a pressure bearing (7) on the cam piece (6). The lateral worm displacement in turn effects a slow motion of the pinion (9) thus acting as a micrometer screw to the object stage.

The polarizing elements of the LEITZ microscopes are in most cases high-grade polarizing filters with a neutral-grey polarizing film to suit microscopic requirements. These filters have been considerably improved in recent years and their efficiency is equal to calcite prisms formerly exclusively used in LEITZ microscopes. As constructional elements for microscopes these filters are more advantageous as regards the smaller space required and the possibility of making the instruments even more convenient in their operation. Moreover, the microscopic images of instruments equipped with polarizing filters are free from astigmatism without the interposition of additional optical means. The DIALUX-POL research stand is alternatively made with calcite polarizing prisms which are still preferred for specialized work such as spectro-photometric measurements or prolonged examinations and photomicrography with the aid of high-power light sources, i. e. carbon arc or xenon discharge lamps. For the same reasons the PANPHOT-POL camera microscope is regularly equipped with a prism polarizer which is also recommended for the ORTHOLUX-POL when this instrument is used in conjunction with a high-power light source for work over long periods.

This catalogue with many illustrations and descriptions of instruments aims at providing a complete survey of LEITZ polarizing microscopes and accessories with full information as regards the range of applications or very special uses of the various items so as to enable the reader to select the outfit or supplementary equipment best suited to his work. Brief specifications and codewords are included to facilitate ordering. Particular attention is also drawn to the bibliography at the end of this catalogue, where text books and special papers are enumerated to help the user of our instruments in procuring even more detailed information on the construction and the use of our instruments than our catalogues and instruction booklets can provide. We shall be pleased to give additional individual advice and submit quotations through our agents.

A Instruments for General Investigations in Polarized Light

1. *LEITZ Polarizing Microscopes*

2. *General Microscope Accessories*

3. *LEITZ Universal Rotating Stages*

SM-POL

**Simple Polarizing Microscope
for general examinations
in transmitted light, recommended
for students' and general laboratory work**



SM-POL with binocular tube S 20
and objective centring clutch



Technical Description:

Stand

Combined coarse and fine adjustment with single-knob control actuating the object stage.

The scale intervals on the control head indicate 0.002 mm. in the micrometer range and approx. 0.025 mm. in the coarse focusing range.

Rotating object stage No. 35 of 120 mm. dia., with graduation in degrees with vernier and two clips (no provision for fitting universal rotating stages).

Condenser sleeve and rack and pinion focusing motion. Bushing in the microscope base to fit a daylight mirror or a lamp attachment.

Bayanet tube changing head and swing-out filter analyser in the top of the stand.

Revolving objective nosepiece with individual centring devices or objective centring clutch as desired; each with slot for compensators. The objective changer is permanently fitted to the stand.

Interchangeable Tubes

1. **Monocular Pol-tube P 11,** inclined, for the reception of wide-field eyepieces 30 mm. dia. Built-in Bertrand ouxiliory lens ond pin-hole diophragm, which moy be put into operation os required.
2. **Binocular Pol-tube S 20,** inclined, for the reception of stondard eyepieces 23.2 mm. dia.
3. **Photographic Pol-tube O 14,** verticol, with built-in Bertrand ouxiliary lens and pin-hale diaphragm os well as o flange with index for mounting o top anolyser.

Condenser and Polarizer

1. Polorizing condenser No. 57 in cylindrical maunt with swing-out top lens, N. A. 0.90.
   Top part replaceoble by a system for N. A. 1.40.
   Aperture iris diophragm ond detochable filter polorizer in rotating mount with markings ot eoch 90° setting.
2. Other condensers in cylindricol mount (see page 23) can also be fitted.

Illumination

The universally adjustable daylight mirrar can be instantly replaced by the lamp attachment with 6 volt 15 watt bulb or the Microdia lomp for direct connectian to the mains.

SM-POL with photographic-Pol-tube O 14 and objective centring clutch



Microscope Outfits

Polarizing micrascope SM-POL comprising stand with objective centring clutch and three objective changing collars,
rack ond pinion far focusing the condenser,
Pol-tube P 11,
rotating object stage No. 35,
polarizing condenser Na. 57,
first-order red compensator,
plane and concave mirror,
wooden cabinet with lock ond key.
Basic outfit (SM-POL 0-73-4 P 11 35/57) **IMIND**

General-purpose optical equipment:
Achromatic objective P 3.5/0.10 PEBAY
Achromatic objective P 10/0.25 PETRI
Achromatic objective P 50/0.85 PECAZ
Huygens eyepiece P 5x (30 mm. dia. with cross lines and focusing eyelens) IIAWS

Complete optical equipment No. B 1 **IMJES**
(magnifications 17.5–250x)

For other objectives and eyepieces see pages 21 and 22.

Polarizing Microscope SM-POL with objective centring clutch and optical equipment No. B 1 **IMKAS**
(SM-POL 0-73-4 P 11 35/57 B 1)

Polarizing Microscope SM-POL with quadruple revolving nosepiece with individual objective centring and optical equipment No. B 1 **IMKET**
(SM-POL 0-34-4 P 11 35/57 B 1)

Supplementary Equipment

Pol-tube P 11, inclined, far wide-field eyepieces 30 mm. dia. (as included in above outfits) PEBOC
Binocular pol-tube S 20, inclined, for eyepieces 23.2 mm. dia. PEBIB
Paired Huygens eyepieces P 8x, one with cross lines and focusing eyelens PEHUK
Photographic Pol-tube O 14 far wide-field eyepieces 30 mm. dia. with Bertrand auxiliary lens, pin-hole diaphragm and flange with index for a tap analyser PEFIF
Microdia (15 watt) attachment for direct connection to the mains NADAL
Spare bulb 15 watts (state voltage) LIORN
Low-voltage lamp attachment (6 volts 15 watts) with regulating transformer (state voltage) NANAW-
Regulating transformer for 110–220 volts A. C. RESEV
(separate price) RESEV
Regulating transformer for 220–250 volts A. C. (separate price) RESUY
Spare bulb 6 volts 15 watts LINOP
Wooden cabinet with lock and key (separate price) PEITY
Flexible plastic dust cover ISDID
For further accessories see pages 21–23.

LABORLUX-POL

Polarizing Microscope with built-in illuminating system for investigations in transmitted light and provision for work in incident light



LABORLUX-POL with monocular Pol-tube P 11 and objective centring clutch



Technical Description:

Stand

Cambined coarse and fine adjustment with single-knob control actuating the object stage.

The scale intervals an the control head indicate 0.002 mm. in the micrometer range and approx. 0.025 mm. in the coarse focusing range.

Rotating object stage No. 38 of 130 mm. dia. with graduation in degrees with vernier reading to 0.1°, frictional clamp, 2 object clips and removable ring plate for mounting the universal rotating stages.

Horizontal dovetailed condenser holder with rack and pinion focusing motion.

Illuminating system in the microscape base with removable 6 valt 15 walt lamp unit.

Bayonet tube changing head and swing-out filter analyser in the top of the stand.

Horizontal dovetailed holder taking the various interchangeable objective changers and incident light-illuminators.

Interchangeable Tubes

1. **Manocular Pol-tube P 11,** inclined, for use with wide-field eyepieces 30 mm. dia. Swing-out Bertrand auxiliory lens and independently operated pin-hole diaphragm.
2. **Binocular Pol-tube S 20,** inclined, for standard eyepieces of 23.2 mm. dia.
3. **Photographic Pol-tube O 14,** vertical type, with Bertrand lens and diaphragm as in the observation tube P 11 and an additional flange with index for using a top analyser.
4. **Photagraphic Pol-tube FS 22,** combined type, for binacular vision with standard



LABORLUX-POL
with photographic Pol-tube O 14
and objective centring clutch

eyepieces 23.2 mm. and photomicrography with wide-field eyepieces 30 mm. dia. fitting the combined straight tube with flange and index for using a top analyser.

Objective Changers

1. Objective centring clutch with compensator slot.
2. Revolving nosepiece with compensator slot and built-in individual centring devices for 4 or 5 objectives.
3. Vertical illuminator with compensator slot, prism polarizer and 6 volt 15 watt lamp (for full particulars see page 24).
4. Vertical illuminator as under 4., but with special bracket for using the microscope photometer (as described on page 42).
5. ULTROPAK illuminator with 6 volt 15 watt lamp for the examination of unpolished opaque specimens in incident dark-field illumination (for full particulars see page 25).

Condenser and Polarizer

1. Three-lens polarizing condenser No. 54 on dovetail slide, with swing-out top lens, N. A. 0.90; the top may be replaced by a system of N. A. 1.40. Aperture iris diaphragm and detachable filter polarizer in rotating mount with markings at each 90° setting.
2. Other condensers on dovetail slide can also be fitted (see page 23).

Illumination

Cylindrical 6 volt 15 watt lamp unit inserted in the base of the microscope from the rear and replaceable by a sodium vapour lamp. Supplementary plane and concave mirror for use with separate light sources.

Microscope Outfits

Polarizing microscope LABORLUX-POL, comprising stand with detachable objective centring clutch with 4 objective changing collars,
rack and pinion focusing motion for the condenser,
cylindrical 6 volt 15 watt lamp unit in the base of the microscope for transmitted light,
Pol-tube P 11,
rotating object stage No. 38,
polarizing condenser No. 54,
regulating transformer for 110–220 volts A. C.,
plane and concave mirror,
first-order red compensator,
quarter-wave compensator,
wooden cabinet with lock and key.

Basic outfit (LABORLUX-POL 7·74·5·30 P 11 38/54 + RESEV)	**PEDUG**
General purpose optical equipment:	
Achromatic objective P 3.5/0.10	PEBAY
Achromatic objective P 10/0.25	PETRI
Achromatic objective P 50/0.85	PECAZ
Achrom. oil immersion P 100/1.30	PELIM
Huygens eyepiece P 8x (30 mm. dia.) with cross lines and focusing eyelens	IIAXU
Huygens eyepiece P 6x (30 mm. dia.) with line cross, micrometer scale 10 mm. with 100 intervals, and focusing eyelens	IBLTI-IBXTI
Stage micrometer 2 mm. with 200 intervals	OBMET
Immersion condenser cap N. A. 1.40	PUKAP
Complete optical equipment No. B 2 (magnifications 21–800x)	**IMJIT**

For other objectives and eyepieces see pages 21 and 22.

Polarizing Microscope LABORLUX-POL with objective centring clutch and optical equipment No. B 2 (LABORLUX-POL 7·74·5·30 P 11 38/54 + RESEV 82)	**PEGEF**
Polarizing Microscope LABORLUX-POL with revolving nosepiece with individual centring devices for 4 objectives and optical equipment B 2 (LABORLUX-POL 7·34·5·30 P 11 38/54 + RESEV 82)	**PEGIG**

Supplementary Equipment

Attachments for incident light examinations as described on pages 24 and 25.	
Pol-tube P 11, inclined, for wide-field eyepieces 30 mm. dia. (as included in above outfits)	PEBOC
Binocular Pol-tube S 20, inclined, for eyepieces 23.2 mm. dia.	PEBIB
Photo-Pol-tube FS 22 for binocular observation (23.2 mm.) and photomicrography (30 mm.)	PEGAD
Paired eyepieces for S 20 and FS 22 tubes: Huygens eyepieces P 8x, one with cross lines and focusing eyelens	PEHUK
Photographic Pol-tube O 14 for eyepieces 30 mm. dia. with Bertrand lens, diaphragm and flange with index for top analyser	PEFIF
Rotating object stage No. 39, as No. 38, but with built-in arresting device for each 45° setting (this is in preparation and can only be supplied on new instruments).	PECOD
Detachable revolving nosepiece with centring devices for four objectives (7·34·–·–)	PEZUC
Detachable revolving nosepiece with centring devices for five objectives (7·35·–·–)	PEXOY
Detachable objective centring clutch with 4 objective changing collars (7·74·–·–)	PEZOB
Regulating transformer for 110–220 volts A. C. (separate price)	RESEV
Regulating transformer for 220–250 volts A. C. (separate price)	RESUY
Spare bulb 6 volts 15 watts	LINOP
Sodium vapour lamp unit with collimator and starting equipment for 110 volts A. C.	NATEC
for 220 volts A. C.	NATAB
Sodium vapour burner, as replacement	NAPOB
Wooden cabinet with lock and key (separate price)	PEINT
Flexible plastic dust cover	ISDEC

For further accessories see pages 21–31.

DIALUX-POL

Large Polarizing Microscope with built-in illuminating system for alle types of reseorch work in transmitted light and provision for work in incident light. Synchronous rotation of polarizer and analyser.



Technical Description:

Stand

Combined coarse and fine adjustment with single-knob control actuating the object stoge.

The scale intervals on the control head indicote 0.002 mm. in the micrometer range ond approx. 0.025 mm. in the coarse focusing range.

Rototing object stoge No. 37 of 150 mm. dia., with graduation in degrees ond verniers reoding to 0.1°, automotic stage setting device arresting the rotation ot 45° intervals regordless of the initial setting, frictionol clamp, two stage clips ond removable ring plote for mounting the universol rotating stoges.

Horizontol dovetoiled condenser holder with rack ond pinion focusing motion. Illuminating system in the microscope base with removoble 6 volt 15 wott lamp unit.

Bayonet tube chonging head ond swing-out filter or prism onolyser with 180° rototion in the top of the stand. The rotation con be reod on a circular scole with vernier to an accuracy of 0.1° and clamped in any position.

The Bertrand lens system con be centred, focused ond switched in ond out of operotion as required. It is fully effective for conoscopic work even with the binocular tube.

Horizontal dovetailed holder toking various interchangeable objective changers and incident light illuminotors.

DIALUX-POL with synchronous rotation of polarizer and analyser as well as universol rotating stoge



Interchangeable Tubes

1. **Monocular Pol-tube P 10,** inclined, for the reception of wide-field eyepieces of 30 mm. dia. and with built-in iris diaphragm.
2. **Binocular Pol-tube S 20,** inclined, for standard eyepieces of 23.2 mm. dia.
3. **Photographic Pol-tube O 14,** vertical type, for wide-field eyepieces of 30 mm. dia., with built-in iris diaphragm and flange with index for using a top analyser.
4. **Photographic Pol-tube FS 21,** combined type, for binocular vision with standard eyepieces 23.2 mm. and photomicrography with wide-field eyepieces 30 mm. dia. fitting the combined straight tube with flange and index for using a top analyser. Built-in pinhole diaphragm.

Objective Changers

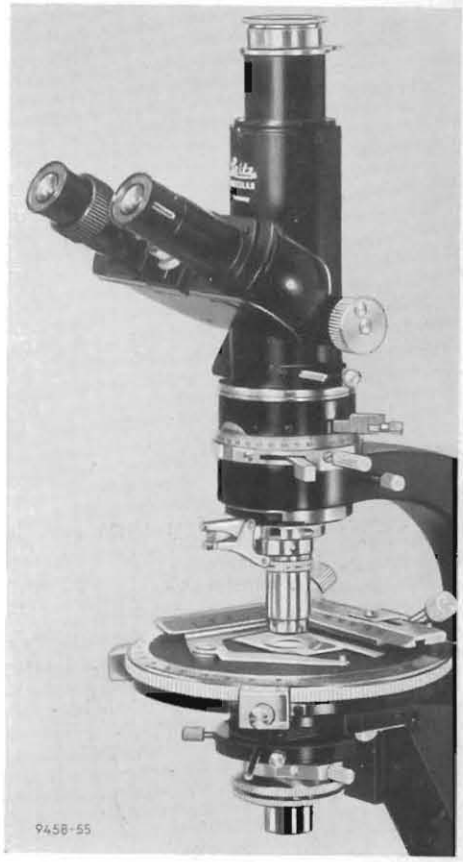
1. Objective centring clutch with compensator slot.
2. Revolving nosepiece with compensator slot and built-in individual centring devices for 4 or 5 objectives.
3. Vertical illuminator with compensator slot, prism polarizer and 6 volt 15 watt lamp (for full particulars see page 24).
4. Vertical illuminator as under 3., but with speciol brocket for using the microscope photometer (os described on page 42).
5. ULTROPAK illuminator with 6 volt 15 watt lamp for the examination of unpolished opoque specimens in incident dark-field illumination.

Condenser and Polarizer

1. Five-lens two-diaphragm polarizing condenser No. 50 f on dovetail slide with swing-out top part, N. A. 0.85; the top may be replaced by a system of N. A. 1.40. Aperture and field-of-view iris diaphragms and removable filter polarizer in rototing mount graduated at 5° intervals.
2. Five-lens two-diophragm polarizing condenser No. 50 p, as under 1., but with prism polarizer.
3. Other condensers on dovetail slide con also be fitted (see page 23).

Illumination

Cylindrical 6 volt 15 watt lamp unit inserted in the base of the microscope from the rear and replaceable by a sodium vapour lamp. Supplementary plane and concave mirror for use with separate light sources.

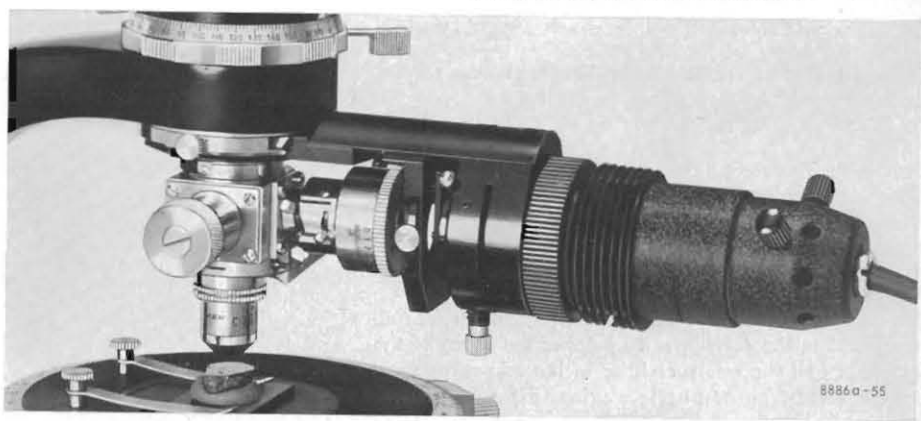


DIALUX-POL with photographic tube FS 21, objective centring clutch and attached mechanical stage

Top of stand with rotating analyser, Bertrand lens system, Pol-tube P 10 with iris diaphragm and objective centring clutch



Vertical illuminator with 6 volt 15 watt lamp attachment in position on DIALUX-POL





Sodium vapour lamp in position at the rear of the DIALUX-POL base (it is fitted to the LABORLUX-POL in the same way)

Microscope Outfits

Polarizing Microscope DIALUX-POL comprising stand with swing-out rotating analyser, centring and focusing Bertrand lens system and detachable objective centring clutch with 4 objective changing collars,
rack and pinion focusing motion for the condenser,
cylindrical 6 volt 15 watt lamp unit in the base of the microscope for transmitted light,
Pol-tube P 10,
rotating object stage No. 37,
polarizing condenser No. 50 f,
regulating transformer for 110–220 volts A. C.,
plane and concave mirror,
first-order red compensator,
quarter-wave compensator,
wooden cabinet with lock and key.

Basic outfit (DIALUX-POL 7·74·5·30 P 10 37/50 f + RESEV)	PEDEC
General-purpose optical equipment:	
Achromatic objective P 3.5/0.10	PEBAY
Achromatic objective P 10/0.25	PETRI
Achromatic objective P 50/0.85	PECAZ
Achromatic oil immersion P 100/1.32	PELIM
Huygens eyepiece P 8x (30 mm. dia.) with cross lines and focusing eyelens	IIAXU
Huygens eyepiece P 6x (30 mm. dia.) with line cross, micrometer scale 10 mm. with 100 intervals, and focusing eyelens	IBLTI-IBXTI
Stage micrometer 2 mm. with 200 intervals	OBMET
Immersion condenser cap N. A. 1.40	PUKAP
Complete optical equipment No. B 2 (magnifications 21–800x)	IMJIT

For other objectives and eyepieces see pages 21 and 22.

Polarizing Microscope DIALUX-POL with objective centring clutch and optical equipment No. B 2 (DIALUX-POL 7·74·5·30 P 10 37/50 f + RESEV B 2)	PEGOH
Polarizing Microscope DIALUX-POL with revolving nosepiece with individual centring devices for 4 objectives and optical equipment No. B 2 (DIALUX-POL 7·34·5·30 P 10 36/50 f + RESEV B 2)	PEGUJ

If desired the DIALUX-POL can be supplied with polarizing prisms in place of the filter equipment specified above. Then the condenser 50 p takes the place of the 50 f and the analyser filter in the microscope top replaced by an appropriate prism. Extra cost PEPUS

Supplementary Equipment

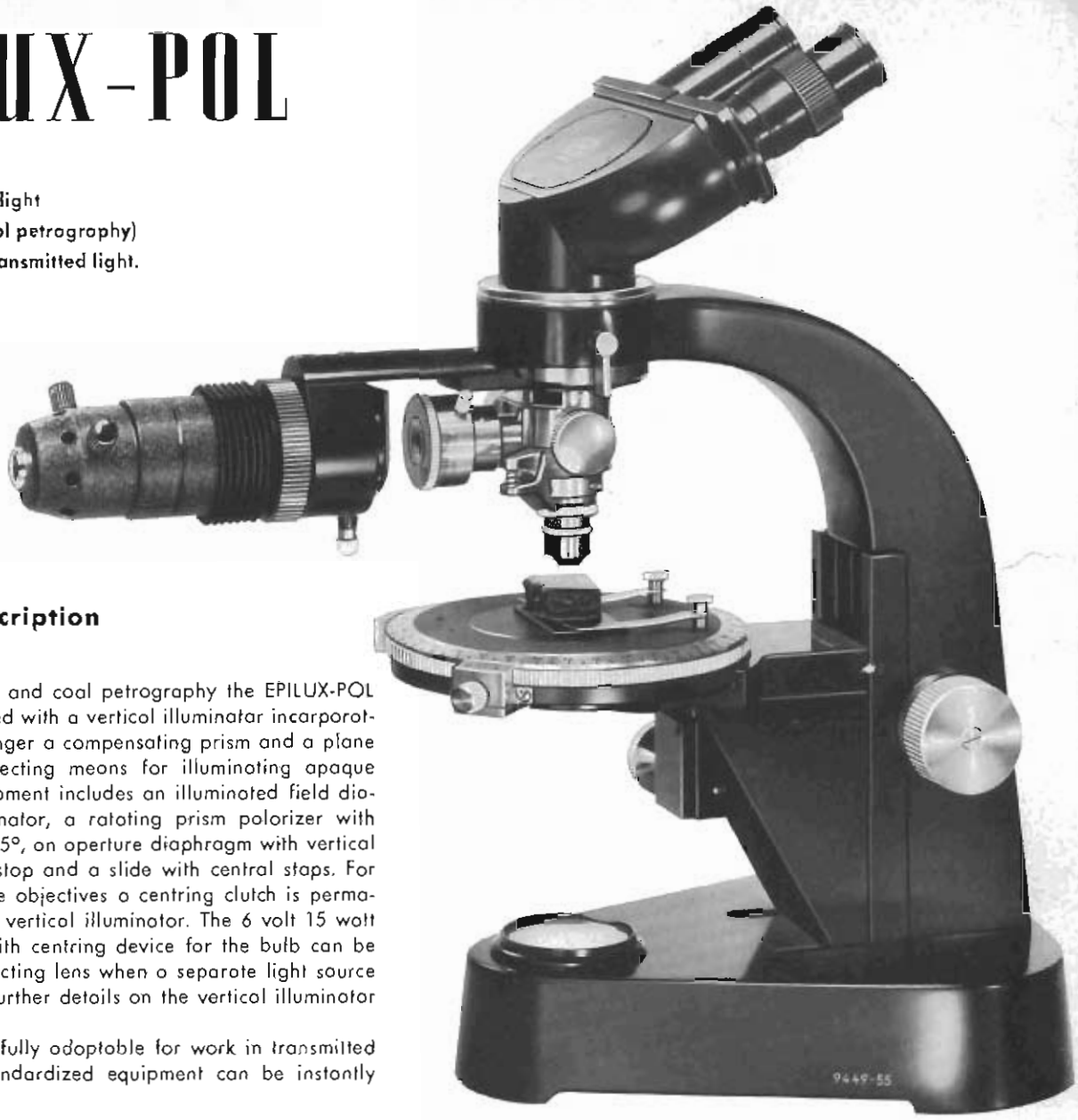
Attachments for incident light examinations as described on pages 24 and 25.

Pol-tube P 10, inclined, for wide-field eyepieces 30 mm. dia., with built-in iris diaphragm (as included in outfits specified at the left)	PEBUD
Binocular Pol-tube S 20, inclined, for eyepieces 23.2 mm. dia.	PEBIB
Photographic Pol-tube FS 21 for binocular observation (23.2 mm.) and photomicrography (30 mm.)	PEFOG
Paired eyepieces for S 20 and FS 21 tubes: Huygens eyepieces P 8x, one with cross lines and focusing eyelens	PEHUK
Photographic Pol-tube O 13, with iris diaphragm, for wide-field eyepieces 30 mm. dia.	PEFED
Detachable revolving nosepiece with centring devices for 4 objectives (7·34· – ·–)	PEZUC
Detachable revolving nosepiece with centring devices for 5 objectives (7·35· – ·–)	PEXOY
Detachable objective centring clutch with 4 objective changing collars 7·74·– ·–)	PEZOB
Arrangement for synchronous rotation of analyser and polarizer	PAZUR
Regulating transformer for 110–220 volts A. C. (separate price)	RESEV
Regulating transformer for 220–250 volts A. C. (separate price)	RESUY
Spare bulb 6 volts 15 watts	LINOP
Sodium vapour lamp unit with collimator and starting equipment for 110 volts A. C.	NATEC
for 220 volts A. C.	NATAB
Sodium vapour burner, as replacement	NAPOB
Wooden cabinet with lock and key (separate price)	PEIMS
Flexible plastic dust cover	ISDEC

For further accessories see pages 21–31.

EPILUX-POL

for work in incident light
(ore microscopy, cool petrography)
with provision for transmitted light.



Technical Description

For ore microscopy and coal petrography the EPILUX-POL is regularly equipped with a verticol illuminatar incarporoting an a rapid changer a compensating prism and a plane glass as light deflecting meons for illuminoting apaque specimens. Its equipment includes an illuminoted field diophragm with collimator, a rototing prism polorizer with scale reading to 0.25°, on operture diaphragm with vertical adjustment, a half-stop and a slide with central staps. For the reception of the objectives o centring clutch is permanently fitted to the verticol illuminotor. The 6 volt 15 watt lamp attachment with centring device for the bulb can be replaced by a collecting lens when o separote light source is to be used (for further detoils on the verticol illuminotor see p. 24).
The EPILUX-POL is fully odoptoble for work in transmitted light for which standardized equipment can be instontly fitted.

Microscope Outfits

Incident Light Microscope EPILUX-POL comprising
stond with detachoble vertical illuminatar on bracket with built-in 6 valt 15 watt lomp,
5 objective chonging collors,
rack and pinion focusing motion to the holder for transmitted light condensers,
Pol-tube P 11,
rototing object stoge No. 38,
regulating transformer for 110–220 volts A. C.,
wooden cobinet with lock and key.
Basic outfit (EPILUX-POL 7·55·5·35 P 11 38/–+RESEV) **PEMAK**

Generol-purpose opticol equipment:

Achromotic objective P 5.6/0.15	IICVO
Oil immersion objective P 12.5/0.25	IICYU
Fluorite objective P FI 45/0.85	IICXS
Fluorite oil imm. objective P FI Oil 60/0.95	IIDAX
Fluorite oil imm. objective P FI Oil 105/1.32	IIDCB
Huygens eyepiece P 8x (30 mm. dio.) with cross lines ond focusing eyelens	IIAXU
Huygens eyepiece P 10x (30 mm. dia.) with cross lines and focusing eyelens	IIWRM
Huygens eyepiece P 6x (30 mm. dia.) with line cross and micrometer scale 10 mm. with 100 intervols and focusing eyelens	IBLTI-IBXTI
Stoge micrometer for incident light with 1 mm. divided in 100 ports on o metol plote 48 x 27 mm.	IIDMU

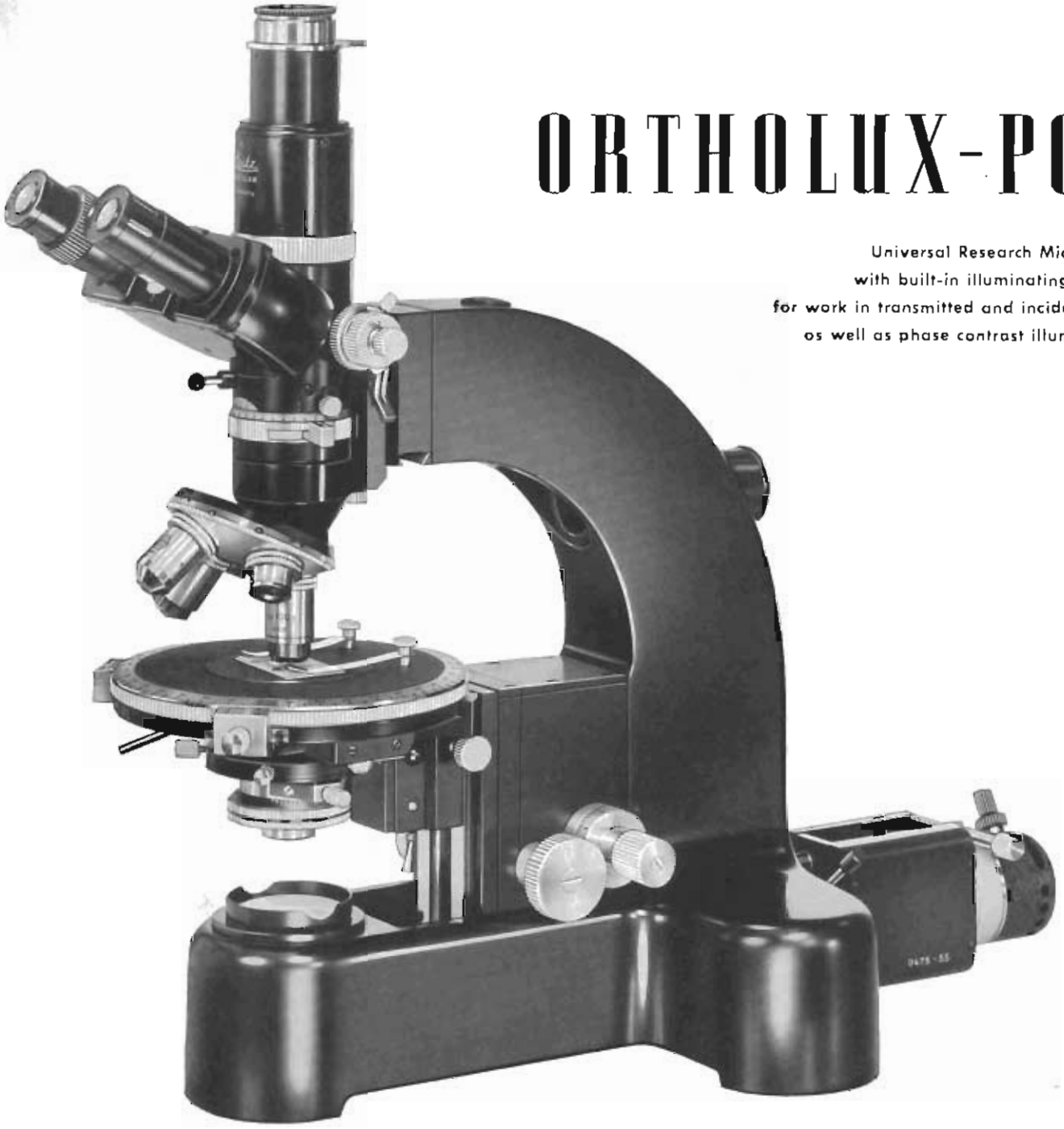
Complete opticol equipment E 2a **IMJAR**
(magnificotions 34–1050x)

For other objectives and eyepieces see poges 21 and 22.

Incident Light Microscope **EPILUX-POL with optical equipment E 2a** **PEMEL**
(EPILUX-POL 7·55·5·45 P 11 38/–+RESEV E 2o)
The EPILUX-POL takes the some supplementary equipment os specified for the LABORLUX-POL on poge 9.

Further accessories for work in incident light:

Hand press for levelling specimens	see p. 28
Immersion caps for incident light microscopy	see p. 25
Microscope photometer for measuring reflectance	see p. 42
Universal rotating stoge UTR 2	see p. 31
ULTROPAK illuminator	see p. 25



ORTHOLUX-POL

Universal Research Microscope
with built-in illuminating system
for work in transmitted and incident light
as well as phase contrast illumination

Technical Description:

Stand

Universally adaptable stand with built-in illuminating system for work in transmitted and incident light. Low-placed coarse and fine adjustment controls actuating the object stage. 1 interval of the micrometer scale equals 0.001 mm. Rotating object stage No. 37 of 150 mm. dia. and graduated in degrees with verniers reading to 0.1° and automatic stage setting device arresting the rotation at 45° intervals regardless of the initial setting, frictional clamp, two stage clips and a removable ring plate for mounting the universal rotating stages. Circular aperture in the top of the stand for the reception of the microscope photometer for measuring reflectance (full particulars are given on page 42).

Horizontal dovetail slide taking the arrangement for incident phase contrast illumination and the photometer unit.

Horizontal dovetailed condenser holder with rack and pinion focusing motion.

Microscope Tube

Photographic Pol-tube FS 45, combined type, for binocular observation with standard eyepieces of 23.2 mm. dia. at an inclined position and photomicrography with wide-field eyepieces of 30 mm. dia. in the vertical tube component. Built-in filter analyser which can be put out of operation; 180° rotation with clamp and scale with vernier reading to 0.2°. Bertrand lens system in centring and focusing mount operating in both the monocular and binocular tube ports so that conoscopic examinations are no longer restricted to monocular vision. The photographic tube is equipped with an iris diaphragm, flange with index to receive a top analyser and a supplementary vertical tube head for standard eyepieces of 23.2 mm. dia.

Objective Changers

1. Objective centring clutch with compensator slot.
2. Revolving nosepiece with compensator slot and individual centring devices for 4 or 5 objectives.
3. Vertical illuminator with compensator slot.
   (for detailed description see p. 24).
4. ULTROPAK illuminator (as described on p. 25).
5. Phase contrast equipment for work in incident light
   (for detailed description see p. 28).

Condensers and Polarizers

1. Five-lens two-diaphragm polarizing condenser No. 50 f on dovetail slide, with swing-out top part, N. A. 0.85; the top may be replaced by a system of N. A. 1.40. Aperture and field-of-view iris diaphragms and removable filter polarizer in rotating mount graduated at 5° intervals.
2. Five-lens two-diaphragm condenser No. 50 p, as under 1., but with prism polarizer (as required for work with arc lamps, xenon lamps etc.).
3. Other condensers on dovetail slide can also be fitted (see page 23).

Illumination

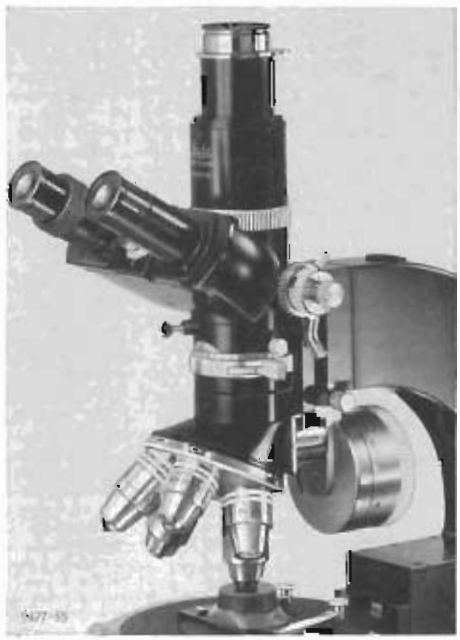
Two 6 volt 30 watt lamps units are attached to the rear of the stand for separate or joint transmitted and incident illumination.



ORTHOLUX-POL
with ULTROPAK illuminator



ORTHOLUX-POL with vertical illuminator



ORTHOLUX-POL with equipment
for incident phase contrast illumination

Microscope Outfits

ORTHOLUX-POL (basic outfit) comprising stand,
photographic Pol-tube FS 45,
rotating object stage No. 37,
first-order red plate,
quarter-wave plate,
lock-up storage case for interchangeable fittings,
wooden transport box,
ORTHOLUX-POL basic outfit — OLVAX
(ORTHOLUX-POL –·–·– FS 45 37/–)

Fittings for work in transmitted light:
Revolving nosepiece with compensator slot and individual centring devices for 4 objectives (13·34·–·–) — PEZIZ

Alternatively:
Objective centring clutch with 4 objective changing collars (13·74·–·–) — PEZAX
Rack and pinion motion to hold and focus the condenser (–·–·8–) — OZARB
Lower lamp attachment with 6 volt 30 watt bulb, daylight filter and ground glass screen for transmitted light (–·–·–·1) — EYMZE
Five-lens two-diaphragm polarizing condenser No. 50 f — PEVIV
Regulating transformer for 100–220 volts A. C. — REDYX

General-purpose optical equipment (transmitted light)
Achromatic objective P 3.5/0.10 — PEBAY
Achromatic objective P 10/0.25 — PETRI
Achromatic objective P 50/0.85 — PECAZ
Achromatic oil immersion P 100/1.30 — PELIM
Huygens eyepiece P 8x (30 mm. dia.) with cross lines and focusing eyelens — IIAXU
Huygens eyepiece P 6x (30 mm. dia.) with line cross, micrometer scale 1 mm. with 100 intervals and focusing eyelens — IBLTI-IBXTI
Paired Huygens eyepieces P 8x (23.2 mm. dia.), one with cross lines and focusing eyelens — PEHUK
Stage micrometer 2 mm. with 200 intervals — OBMET
Immersion condenser cap N. A. 1.40 — PUKAP
Complete optical equipment No. B 2o (magnifications 26–1000x) — IMJOV
For other objectives and eyepieces see pages 21 and 22.

Fittings for work in incident light:
Vertical illuminator on bracket with vertical dovetail slide, collecting lens with iris diaphragm, half-stop and changing slide with central stops, also 5 objective changing collars and a circular plate as stage inset (13·55·–·–) — OPARK
Upper lamp attachment for incident light with 6 volt 30 watt bulb for connection to the regulating transformer included in the transmitted light equipment, daylight filter and ground glass screen (–·–·–5) — OLTUB
Hand press with adjustable stop for levelling the specimens on slides — RPIIT
6 metal object slides — IWMBI

General-purpose optical equipment (incident light)
Achromatic objective P 5.6/0.15 — IICVO
Oil immersion objective P 12.5/0.25 — IICYU
Fluorite objective P Fl 45/0.85 — IICXS
Fluorite oil immersion P Fl Oil 60/0.95 — IIDAX
Fluorite oil immersion P Fl Oil 105/1.32 — IIDCB
Huygens eyepiece P 10x (30 mm. dia.) with cross lines and focusing eyelens — IIWRM
Stage micrometer for incident light with scale 1 mm. divided in 100 parts on metal slide 48 x 27 mm. — IIDMU

Complete optical equipment for incident light No. E 2b — IMJUW

For other objectives and eyepieces see pages 21 and 22.

ORTHOLUX-POL for work in transmitted light with objective centring clutch, optical equipment and transformer for 100–220 volts A. C. — OLVEY-REDYX
(ORTHOLUX-POL 13·74·8·1 FS 45 37/50 f + REDYX B 2a)

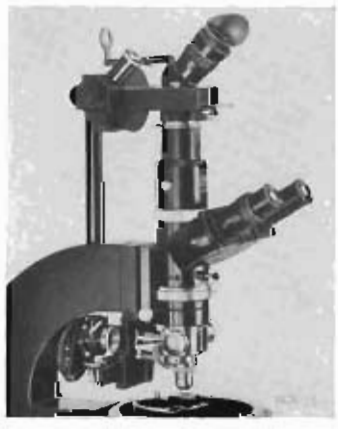
ORTHOLUX-POL, as above, but with revolving nosepiece with built-in centring devices for 4 objectives (in place of the centring clutch) — OLVIZ-REDYX
(ORTHOLUX-POL 13·34·8·1 FS 45 37/50 f + REDYX B 2a)

ORTHOLUX-POL for work in transmitted and incident light with objective centring clutch, vertical illuminator, optical equipment for transmitted and incident light and transformer for 100–220 volts A. C. — OLVOB-RERAS
(ORTHOLUX-POL {13·74·8·4 / 13·55·–·–} FS 45 37/50 f + RERAS {B 2a / E 2a})

The same ORTHOLUX-POL outfit as under OLVOB-RERAS but with revolving nosepiece with built-in centring devices for 4 objectives (in place of the centring clutch) — OLVUC-RERAS
(ORTHOLUX-POL {13·34·8·4 / 13·55·–·–} FS 45 37/50 f + RERAS {B 2a / E 2a})

Supplementary Equipment and Alternatives

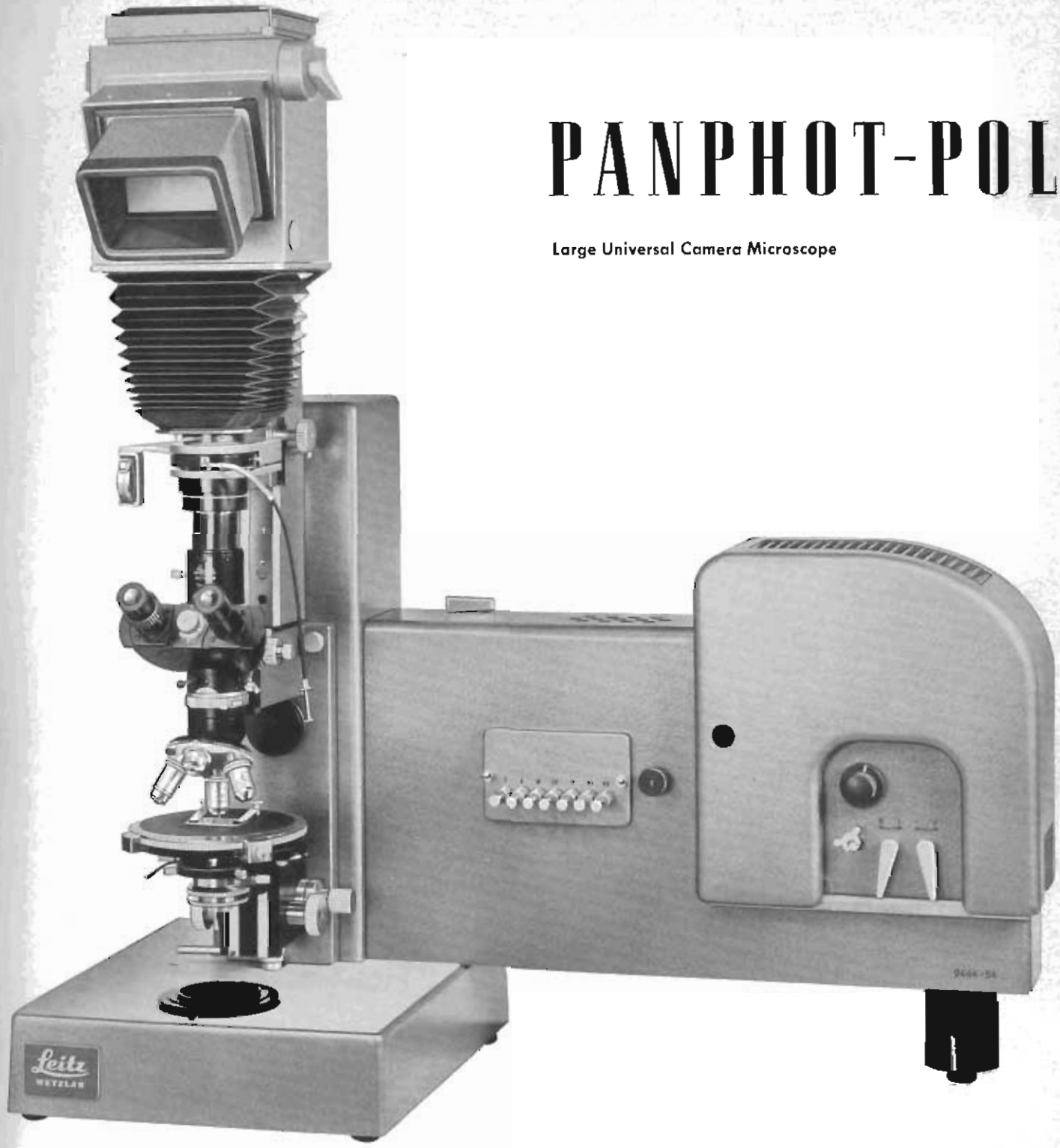
Detachable revolving nosepiece with built-in centring devices for 4 objectives (13·34·–·–) — PEZIZ
Detachable revolving nosepiece with built-in centring devices for 5 objectives (13·35·–·–) — PEXUZ
Detachable objective centring clutch with 4 objective changing collars (13·74·–·–) — PEZAX
Vertical illuminator (13·55·–·–) as described on p. 24 — OPARK
ULTROPAK illuminator (13·18·–·–), without analyser, as described on p. 25 — PABAM
Phase contrast equipment for incident illumination (20·42·–·–) with 5 objectives as specified on p. 28 — IIXVT
Lower lamp attachment for transmitted light (–·–·–·1) — EYMZE
Upper lamp attachment for incident light (–·–·–5) — OLTUB
Set of lamp attachments for transmitted and incident light (–·–·–4) — OLTAW
Regulating transformer with ammeter for 100–220 volts A. C. (separate price) — REDYX
Regulating transformer with ammeter for 160–250 volts A. C. (separate price) — REPOV
Double transformer with regulation and two ammeters for 100–220 volts A. C. (separate price) — RERAS
Double transformer with regulation and two ammeters for 160–250 volts A. C. (separate price) — REPIT
RERAS or REPIT is required in place of REDYX or REPOW when combined incident and transmitted illumination is to be employed.
Spare bulb 6 volts 30 watts — LINID
Two-diaphragm polarizing condenser No. 50 f (with filter polarizer) — PEVIV
Two-diaphragm polarizing condenser No. 50 p (with prism polarizer which is essential for work with highest power light sources: Xenon lamps, arc lamps etc.) — PEVET
Microscope photometer for measuring reflectance by incident light, as described on p. 42 — IIWTQ
Lock-up storage case for accessories (separate price) — EEVIB
Flexible plastic dust cover — ISCIC
For further accessories and alternatives see pages 21-40.



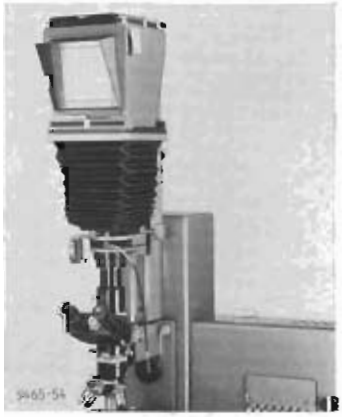
ORTHOLUX-POL
with microscope photometer for measuring reflectance

PANPHOT-POL

Large Universal Camera Microscope



The PANPHOT-POL represents a large polarizing microscope combined with a vertical reflex camera and a high-power illuminating arrangement in a robust compact unit for universal application and especially photomicrography in all ranges of magnification. The apparatus is always ready for use and can be instantly adapted for any type of microscopic illumination, observation and photography. All interchangeable units being fully standardized a simple outfit can be purchased to start with and supplemented for special uses whenever required.



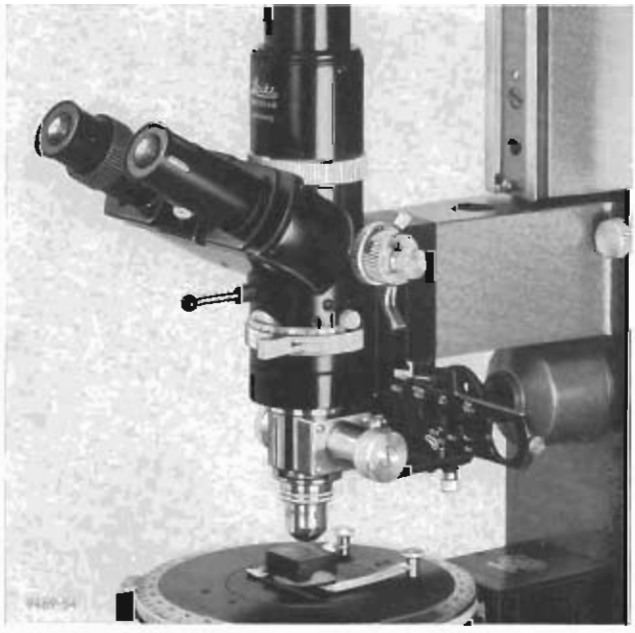
PANPHOT-POL with rotating mirror reflex camera (particulars on request)

Technical Description

of the PANPHOT-POL Camera Microscope



PANPHOT-POL with objective centring clutch



PANPHOT-POL with vertical illuminator

Stand

Rigid base with rectangular upright of light alloy with internally accommodated surface-coated mirrors for the illuminating system. Illuminating arrangement laterally fitted to the basic stand and microscope carrier as well as vertical camera rigidly attached to the upright front.

Illuminating Arrangement

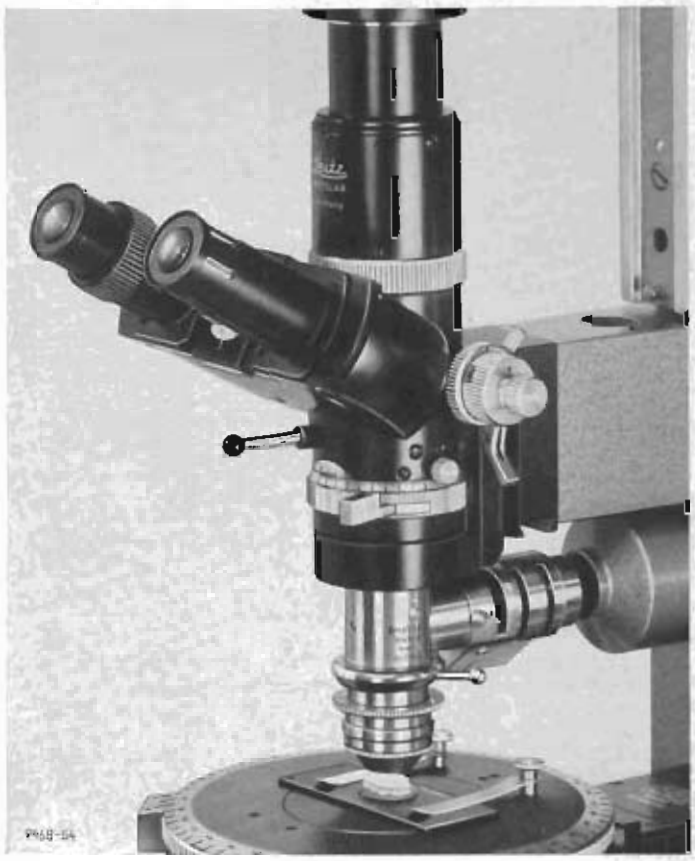
A filament lamp 12 volts 60 watts and an arc lamp or alternatively a xenon or a mercury vapour high-power lamp are accommodated in the suitably designed lamp housing together with a set of filters which may be used singly or jointly by push-button action. The filament lamp is equipped with a separate filter set consisting of ground glass screen, daylight filter and yellow-green filter for photomicrography.

Microscope Carrier

The microscope carrier rigidly held in front of the upright and perfectly aligned takes the interchangeable tube, objective changers, vertical illuminators, an object stage and various types of condensers as specified on the opposite page.



PANPHOT-POL with phase contrast equipment for incident light



PANPHOT-POL with ULTROPAK illuminator

Microscope Tube

Photographic Pol-tube FS 45, combined type, for binocular observation with standard eyepieces of 23.2 mm. dia. at an inclined position and for photomicrography with wide-field eyepieces of 30 mm. dia. fitting the vertical tube part with flange and index for mounting a top analyser. Built-in rotating filter analyser with clamp 180° graduation with vernier reading to 0.2°. Bertrand lens system in centring and focusing mount operating in both the monocular and binocular tube ports so that conoscopic examinations are no longer restricted to monocular vision. The photographic tube is equipped with an iris diaphragm and an interchangeable tube head for 23.2 mm. standard eyepieces.

Objective Changers

1. Revolving nosepiece which compensator slot and individual centring devices for 4 or 5 objectives.
2. Objective centring clutch with compensator slot.
3. Vertical illuminator with compensator slot, as described on page 24.
4. ULTROPAK illuminator with compensator slot, as described on page 25.
5. Phase contrast equipment for incident light (for particulars see page 28).

Object Stage

Rotating object stage No. 37 of 150 mm. dia. graduated in degrees with verniers reading to 0.1°. Frictional clamp. Automatic stage setting device arresting the rotation at 45° intervals regardless of the initial setting. Two stage clips and removable ring plate for mounting a universal rotating stage.

Condensers

Horizontal dovetailed condenser holder with rack and pinion focusing motion.
Five-lens two-diaphragm polarizing condenser No. 50 p on dovetail slide, with swing-out top component, N. A. 0.85; the top may be replaced by a system of N. A. 1.40. Aperture and field-of-view iris diaphragms and removable prism polarizer in rotating mount graduated in 5° intervals.
(For other condensers on dovetail slide see page 23)

Camera

A vertical bellows camera with mirror reflex housing for plates and films 9x12 cm. (3¼" x 4¼") is rigidly positioned above the microscope. The microscopic image on the ground glass screen can be conveniently viewed and focused from the observers normal position in front of the instrument. The changeover from visual observation to photomicrography is instantly achieved by simply moving the deflecting mirror, operated by a lateral lever out of the path of rays, thus giving the image-forming rays direct access to the photographic plate.

Microscope Photometer

The measurement of reflectance is made possible by the microscope photometer for which the PANPHOT-POL has been provided with the necessary means of reception (see also page 42).

Camera Microscope Outfits

PANPHOT-POL (bosic outfit) comprising
basic stand,
olternative illuminating arrangement with filament lamp 12 volts 60 watts, carbon arc lamp ond set of filters,
microscope carrier,
verticol bellows comera 9 x 12 cm. (3¹/₄" x 4¹/₄")
with detachable mirror reflex housing,
photographic Pol-tube FS 45, combined type,
rototing object stage No. 37,
first-order red compensator,
quarter-wave compensator,
regulating transformer for the filament lamp
and resistance for the corbon arc lamp,

PANPHOT-POL, basic outfit, for 220 volts A. C. **PIBAC**
(PANPHOT-POL –·–·–·7 FS 45 37/–+IDIKY)

Fittings required for work in transmitted light:
Revolving nosepiece with compensotor slot ond individual centring devices for 5 objectives (13·35·–·–) PEXUZ
Five-lens two-diophragm polarizing condenser No. 50 p with polarizing prism PEVET
Rack and pinion focusing motion with bracket for the condenser (–·–·8·–) OZARB

General-purpose optical equipment (transmitted light)
Achromatic objective P 3.5/0.10 PEBAY
Achromatic objective P 10/0.25 PETRI
Achromatic objective P 50/0.85 PECAZ
Achromatic oil immersion P 100/1.30 PELIM
Huygens eyepiece P 8x (30 mm. dia.) with cross lines and focusing eyelens IIAXU
Huygens eyepiece P 6x (30 mm. dia.) with line cross, micrometer scale 10 mm. with 100 intervals and focusing eyelens IBLTI-IBXTI
Paired Huygens eyepieces P 8x (23.2 mm. dia.) one with cross lines and focusing eyelens PEHUK
Stage micrometer with 2 mm. scale with 200 intervals OBMET
Immersion condenser cop N. A. 1.40 PUKAP

Complete optical equipment (transmitted light) No. B 2a **IMJOV**
(magnifications 26–1000x)
For other objectives and eyepieces see pages 21 and 22.

Fittings required for work in incident light:
Vertical illuminator on bracket with 5 objective changing rings, collecting lens with iris diaphragm, half-stop, changing slide with 4 central stops and circular closing disc for the object stage (13·55·–·–) and illuminating attachment OPORN
Hand press with adjustable stop for levelling the polished specimens on the object slide RPIIT
Set of 6 metal object slides IWM8I

General-purpose optical equipment (incident light)
Achromatic objective P 5.6/0.15 IICVO
Oil imm. objective P 12.5/0.25 IICYU
Fluorite objective P FI 45/0.85 IICXS
Fluorite oil immersion P FI Oil 60/0.95 IIDAX
Fluorite oil immersion P FI Oil 105/1.32 IIDC8
Huygens eyepiece P 10x (30 mm. dia.) with cross lines and focusing eyelens IIWRM
Stage micrometer for incident light 1 mm. divided in 100 parts on o metal slide 48 x 27 mm. IIDMU

Complete equipment (incident light) No. E 2b **IMJUW**
For other objectives and eyepieces see pages 21 and 22.

PANPHOT-POL Camera Microscope for work in transmitted light complete with centring revolving nosepiece for 5 objectives, optical equipment No. B 2a and electrical accessories for 220 volts A. C. **PIBEL**
(PANPHOT-POL 13·35·8·7 FS 45 37/50 p+IDIKY B 2a)

PANPHOT-POL Camera Microscope for work in transmitted light complete with objective centring clutch, optical equipment No. B 2a and electrical accessories for 220 volts A. C. **PIBIM**
(PANPHOT-POL 13·74·8·7 FS 45 37/50 p+IDIKY B 2a)

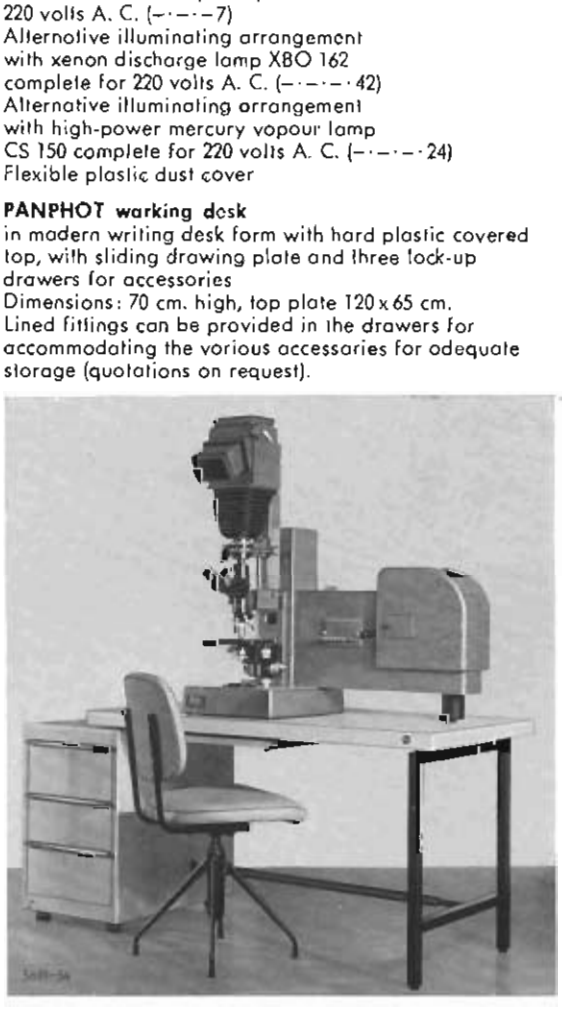
PANPHOT-POL Camera Microscope for transmitted and incident light with centring revolving nosepiece for 5 objectives, vertical illuminator and optical equipments for transmitted and incident light, complete for 220 volts A. C. **PIBON**
(PANPHOT-POL ⟨13·35·8·7 / 13·55·–·–⟩ FS 45 37/50 p+IDIKY ⟨B 2a / E 2b⟩)

PANPHOT-POL Camera Microscope for transmitted and incident light with objective centring clutch, vertical illuminator and optical equipments for transmitted and incident light, complete for 220 volts A. C. **PIBUP**
(PANPHOT-POL ⟨13·74·–·– / 13·55·8·7⟩ FS 45 37/50 p+IDIKY ⟨B 2a / E 2b⟩)

Supplementary Equipment

Detachable revolving and centring nosepiece for 4 objectives (13·34·–·–) PEZIZ
Detachable revolving and centring nosepiece for 5 objectives (13·35·–·–) PEXUZ
Detachable objective centring clutch with 4 objective changing collars (13·74·–·–) PEZAX
Two-diaphragm polarizing condenser No. 50 p (with prism polorizer) PEVET
Vertical illuminator (13·55·–·–), as described on p. 24 and illuminating attachment OPORN
ULTROPAK illuminator (13·19·–·–), as described on p. 25 PABEN
Phase contrast equipment for incident light (20·42·–·–) with 5 objectives and illuminating attachment (for full particulars see page 28) IIYBE
Low-power incident illuminator, field dia. 35 mm. quotations on request
Low-power incident illuminator, field dia. 60 mm. quotations on request
Microscope photometer for measuring reflectance in incident light (as described on p. 42) IIWZC
Spare bulb 12 volts 60 watts LILOM
Regulating transformer for 12 volt 60 watt lamp for 100–200 volts A. C. (separate price) REWOB
Alternative illuminating arrangement with carbon arc lamp complete for 220 volts A. C. (–·–·–7) LAZIC
Alternative illuminating arrangement with xenon discharge lamp XBO 162 complete for 220 volts A. C. (–·–·–·42) LAZOD
Alternative illuminating arrangement with high-power mercury vapour lamp CS 150 complete for 220 volts A. C. (–·–·–·24) LAZUF
Flexible plastic dust cover NIIVR

PANPHOT working desk
in modern writing desk form with hard plastic covered top, with sliding drawing plate and three lock-up drawers for accessories NIIUD
Dimensions: 70 cm. high, top plate 120 x 65 cm.
Lined fittings can be provided in the drawers for accommodating the various accessories for adequate storage (quotations on request).



PANPHOT-PO set up on working desk.

General Microscope Accessories

Objectives

Our polarizing microscopes are equipped with objectives which are free from stress, so that they have no polarization effects of their own. In order to preserve this state, the objectives must be handled with care and not exposed to severe changes in temperature. It must be pointed out, however, that especially with high-power systems when used between crossed polarizing units the field of view may not show complete extinction. This is due to the turning of the plane of polarization in relation to the angle of incidence of the light brought about by the refraction of the light on strongly curved lens surfaces.

For the examination of material showing only weak effects of anisotropy and especially for measuring purposes in polarized light only achromatic objectives are used. The exclusive use of glass lenses and special methods applied in their manufacture ensure that these systems are free from stress and polarization which is indicated by the engraving P in front of the type number. For less critical work and photomicrography also Fluorite and plano objectives may be used. Their superior spherical and chromatic correction will be noticeable when observing with full illuminating aperture. All these systems make use of fluorite components which are not always free from disturbing internal optical variations, so that they cannot be recommended for measuring work or the recognition of weak double refraction. These objectives which are only suitable for polarizing work within certain limits are designated by the engraving (P).

All objectives for observations in transmitted light are corrected for a mechanical tube length of 170 mm. and those for work in incident light for a mechanical tube length of 215 mm. in accordance with the requirements resulting from the use of the vertical illuminator.

The objectives are screwed to a revolving nosepiece (with built-in centring devices) or single objective changing collars fitting the objective changing clutch.

Objectives for work in transmitted light

	Designation Magnification / Aperture	Free working distance in mm.	Type of eyepiece [1]	Cover glass correction [2]	Code word	Remarks
Dry systems (achromatic objectives)	P 2.5/0.05	20	HO	DO	PEART	23.2 mm. eyepieces only
	P 3.2/0.12	35	HO	DO	PETTA	Not for SM-Pol
	P 3.5/0.10	23	HO	DO	PEBAY	
	P 4.3/0.15	27	HO	DO	IAYWI	also for tube length 215 mm. on vertical illuminator
	P 6/0.18	17.5	HO	DO	PETME	
	P 10/0.25	5.7	HO	DO	PETRI	
	P 13/0.40	3.4	HO	DO	PEAMP	
	P 25/0.50	0.92	PO	D	PEAPS	
	P 45/0.65	0.60	PO (HO)	D	IAZYI	
	P 50/0.85	0.40	PO	DI	PECAZ	Special type for conoscopy
	P 63/0.85	0.29	PO	DI	PETIS	
	P 63/0.85	0.29	PO	DI	IBAZY	
Water and oil immersions (achromats)	P W 50/1.00	0.44	PO	D	IBHOI	
	P W 90/1.20	0.09	PO	D	PEWAT	
	P Oil + W 10/0.25	0.58	HO	DO	IBCDI	
	P Oil + W 22/0.65	0.32	PO	DO	IBDFI	
	P Oil 100/1.30	0.13	PO	D	PELIM	
Oil immersions (Fluorite objectives)	(P) Fl Oil 54/0.95	0.22	PO	DO	PEFAM	
	(P) Fl Oil 70/1.30	0.20	PO	D	PEFOX	
	(P) Fl Oil 95/1.32	0.14	PO	D	PEFUN	
	(P) Fl Oil 114/1.32	0.08	PO	D	IBEHI	
Plano objectives	(P) Pl 4/0.10	15	PO	DO	PLAVS	when using plano-objectives in conjunction with ordinary ones on the same nosepiece the latter will require PLEZY adapters.
	(P) Pl 10/0.25	7.5	PO	DO	PLABY	
	(P) Pl 40/0.65	0.58	PO	D	PLASP	
	(P) Pl Apo Oil 100/1.32	0.27	PO	D	PLARN	special type for use in the tropics on request
Objectives for universal rotating stages — for use with segment $n_D = 1.55$	UM 5/0.10	1.45	HO	D (O)	ICNXI	with iris diaphragm with segment r = 13,5
	UM 10/0.22	1.45	HO	D (O)	ICOZI	with iris diaphragm with segment r = 13,5
	UM 20/0.33	1.45	PO	D (O)	ICPBI	with iris diaphragm with segment r = 13,5
	UM 32/0.30	1.45	PO	D (O)	ICQDI	with iris diaphragm with segment r = 13,5
	UMK 32/0.60	0.49	PO	D (O)	IIWUS	with iris diaphragm with segment r = 6,06
	UMK 50/0.60	0.75	PO	D (O)	PEHIH	with iris diaphragm with segment r = 5,73
Objectives for universal rotating stages — for use without segment	UM 5/0.10	14.9 [3]	HO	DO	ICNXI	with iris diaphragm Magnifications and aperture are as follows without the use of a segment 3.2/0.07
	UM 10/0.12	14.9 [3]	HO	DO	ICOZI	with iris diaphragm Magnifications and aperture are as follows without the use of a segment 6.5/0.15
	UM 20/0.33	14.9 [3]	PO	DO	ICPBI	with iris diaphragm Magnifications and aperture are as follows without the use of a segment 13/0.22
	UM 32/0.30	14.9 [3]	PO	DO	ICQDI	with iris diaphragm Magnifications and aperture are as follows without the use of a segment 20/0.20
	UMK 32/0.60	6.2 [3]	PO	DO	IIWUS	with iris diaphragm Magnifications and aperture are as follows without the use of a segment 20/0.40
	UMK 50/0.60	6.5 [3]	PO	DO	PEHIH	with iris diaphragm Magnifications and aperture are as follows without the use of a segment 32/0.40

Objectives for incident light

	Designation Magnification / Aperture	Free working distance in mm.	Type of eyepiece [1]	Cover glass correction [2]	Code word	Remarks
Achromatic objectives	P 4.3/0.12	32	HO	DO	IIATS	
	P 5.6/0.15	26	HO	DO	IICVO	
	P 8.0/0.18	16.5	HO	DO	IIOPS	
	P 16.0/0.40	3.4	HO	DO	IICWQ	
	P 50/0.65	0.66	HO (PO)	O	IIORT	
	P 50/0.65	0.55	HO (PO)	D	IEOXI	
	P Oil + W 12.5/0.25	0.35	HO	DO	IICYU	
	P Oil + W 25 /0.65	0.43	HO	DO	IICZW	
Fluorite objectives	(P) Fl 45/0.85	0.43	PO	O	IICXS	
	(P) Fl Oil 60/0.95	0.38	PO	DO	IIDAX	
	(P) Fl Oil 80/1.30	0.36	PO	(D) O	IIDBZ	
	(P) Fl Oil 105/1.32	0.30	PO	(D) O	IIDC8	
	(P) Fl Oil 125/1.32	0.20	PO	(D) O	IIDEF	
Objectives for universal rotating stages without segment	UM 5/0.10	11.9 [3]	HO	DO	ICNXI	with iris diaphragm Magnifications and apertures are as follow without the use of a segment 4.6/0.07
	UM 10/0.22	14.2 [3]	HO	DO	ICOZI	with iris diaphragm Magnifications and apertures are as follow without the use of a segment 8.5/0.15
	UM 20/0.33	14.8 [3]	PO	DO	ICP8I	with iris diaphragm Magnifications and apertures are as follow without the use of a segment 16/0.22
	UM 32/0.30	14.0 [3]	PO	DO	ICQDI	with iris diaphragm Magnifications and apertures are as follow without the use of a segment 25/0.20
	UMK 32/0.60	6.5 [3]	PO	DO	IIWUS	with iris diaphragm Magnifications and apertures are as follow without the use of a segment 25/0.40
	UMK 50/0.60	6.5 [3]	PO	DO	PEHIH	with iris diaphragm Magnifications and apertures are as follow without the use of a segment 40/0.40

Objective changing collars, singly PIZUT

[1] HO = Huygens eyepiece, PO = Periplanatic eyepiece

[2] D = with cover glass 0.17 ± 0.05 mm. thick, O = without cover glass, DO = for use with or without cover glass, DI = requirement of minutest cover glass variations of 0.17 ± 0.01 mm. or accurate adjustment of the objective corrections mount.

[3] These working distances are valid for examining specimens without cover glass.

Eyepieces

The type of eyepiece best suited for use with the various types of objectives is indicated in the opposite table where HO is a Huygens type and PO a Periplanatic eyepiece.

All eyepieces with built-in cross lines or a micrometer scole have an odjustable eyelens for accurate focusing. The eyepiece crass lines are always carrectly oriented in the microscope tube by means of a lateral lug. The tube adapter included in all microscape outfits enables standard eyepieces of 23.2 mm. dia. to be used in the polarizing tubes for 30 mm. eyepieces.

For the weorers of glosses we recommend **high-point eyepieces** with which the exit pupil is at a greater distance above the eyelens so that in spite of the longer viewing distance the whole of the image field can still be observed, thus making it unnecessary to remave the eyeglasses for microscopic observation.

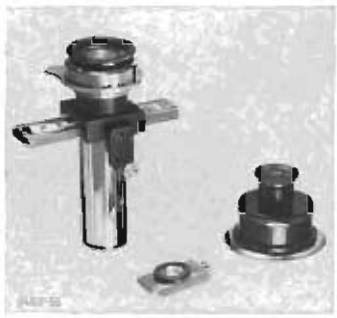
	Desig-nation (Magnif.)	Type[1]	Field of view mm.	Graticule or cross lines	Codeword singles	Codeword pair
Wide-field eyepieces 30 mm. dia.	P 5x	HO	23.0	cross lines	IIAWS	
	P 6x	HO	21.5	for the reception of graticules	IBLTI	
	P 6x	HO	21.5	graticule 10 mm. with 100 intervals	IBLTI-IBXTI	
	P 8x	HO	19.4	cross lines	IIAXU	
	P 10x	HO	18.0	cross lines	IIWRM	
Standard eyepieces 23.2 mm. dia.	P 6x	HO	16.7	graticule 10 mm. with 100 Intervals	IBUNI-OCBUH	
	P 8x	HO	14.2	cross lines	PIIWF	
	P 8x	HO	15.0	graticule 10 mm. with 100 intervals	IIW5O-OCBUH	
	P 8x	PO	16.0	graticule 10 mm. with 100 intervals	PEPEN-OCBUH	
	P 10x	PO	15.2	crosslines	PATEG	
Speciol wide-field eyepieces 23.2 mm. dia.	GF10x	GF	18.0	–	PERIR	
	GF16x	GF	15.0	–	PEROS	
	GF20x	GF	12.0	–	PERUT	
	GF25x	GF	10.0	–	PESAP	
	GF25xM	GF	10.0	graticule 10 mm. with 100 intervals	PE5ER-OCASY	
Paired eyepieces for binocular tubes 23.2 mm. dia.	P 6x	HO	16.7	one eyepiece with graticule 10 mm./100 intervals		PAZAL-OCBUH
	P 8x	HO	15.0	one eyepiece with cross lines		PEHUK
	P 8x	HO	15.0	one eyepiece with graticule 10 mm./100 intervals		PAZEM-OCBUH
	P 8x	PO	16.0	one eyepiece with graticule 10 mm./100 intervals		PAZIN-OC8UH
	P 10x	PO	15.2	one eyepiece with cross lines		PAZOP
	GF 10x	GF	18.0	–		PESIS
	GF 16x	GF	15.0	–		PESOT
	GF 20x	GF	12.0	–		PESUV
	GF 25x	GF	10.0	one eyepiece with graticule		PELOM-OCASY
High-point eyepieces 23.2 mm.	6,3x	PO	20.0	–	PEOHM	PEUCK
	8x	PO	18.0	–	PEXAV	PEXEW
	10x	PO	14.0	–	PERAN	PEREP
	10xM	PO	14.0	graticule 10 mm. with 100 intervals	PEOLS-OCASY	PATAF-OCASY
	16x	PO	12.0	–	PEOMT	PEUHP
	25x	PO	8.0	–	PEORX	PEUKS

[1]) HO = Huygens eyepiece, PO = Periplonotic eyepiece, GF = Periplanotic wide-field eyepiece

Eyepiece Micrometers ond Graticules

Far use with the eyepieces specified above the fallawing graticules can be supplied. They are available with and withaut metal mount. The latter type is required far placing the graticule on the fixed field-of-view diaphragm inside standard eyepieces whereas the measuring eyepieces with focusing eyelens require the graticule discs without metal mount.

Eyepiece micrometers	unmounted	mounted
5 mm. with 100 intervals	OCATZ	OCUFI
10 mm. with 100 intervals	OCASY	OCUME
10 mm. with 200 intervals	OCBAC	OEEFK
Line cross	OCAMT	OFPLA
Micrometer scale with line cross		
10 mm. with 100 intervals	OCBUH	OCCAD
8 mm. with 80 intervals with diaphragms 9.2 mm.	OCBIF	OCBOG
10 mm. with 100 intervals with diaphragms 13.5 mm.	IBXTI	OCCEF
Eyepiece net micrometers		
5 x 5 mm. divided in squares 0.5 x 0.5 mm. each	OCALS	OCNET
10 x 10 mm. divided in squares 0.5 x 0.5 mm. each	ICKRI	OCFOK
10 x 10 mm./squares 1 x 1 mm.	ICLTI	OCHAJ
10 x 10 mm./squares 2 x 2 mm.	ICMVI	OCHOM
Set of net micrometers 10 x 10 mm./squares 0.075 mm. 10 x 10 mm./squares 0.2 mm. 10 x 10 mm./squares 0.5 mm.	OCARX	OCIKT



Wright eyepiece and top analyser

WRIGHT Universal Eyepiece

This special eyepiece is designed far use with the top analyser and takes for positioning in its intermediate plane compensatian wedges, half-shadow plates and wedges. It can only be maunted on vertical (photographic) tubes and not the regular inclined observation eyepiece tubes.,

Specification:

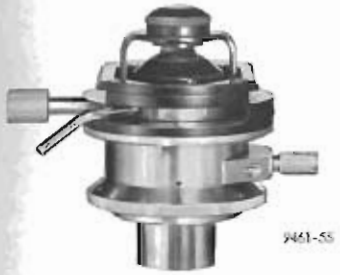
Wright universal eyepiece with field-of-view iris diaphragm, facusing eyelens, compensatar slot, and flange with index for the tap analyser	ICUMI
Tap anolyser with 360° graduation reading to 1°	ANTOP
Plates fitting the Wright eyepiece slot:	
1. Combination quartz wedge after Wright with orientation scale	PIBIN
2. Quartz wedge 1st–4th order	PIARZ
3. Quartz double wedge after Wright	PIDOP
4. Quartz-gypsum compensotor after Johannsen	PIJON
5. Half-shadow plate after Nakomura	KONAK
6. Half-shadow wedge after Mocé de Lépinoy	KOLEP
7. Soleil's double plate	PISOL

For o detailed description of the compensotors, half-shadow plates etc. see pages 34–36.

Condensers



Polarizing condenser No. 57



Polarizing condenser No. 54



Polarizing condenser No. 50 f

A. Polarizing Condensers *)

Polarizing condenser No. 57 in cylindrical sliding mount, with swing-out top component, N. A. 0.90; the top may be replaced by a system of N. A. 1.40. Aperture iris diaphragm and removable filter polarizer in rotating mount with markings at 90° intervals (as contained in SM-POL basic outfit) PEVAS

Three-lens polarizing condenser No. 54, on dovetail slide, with swing-out top component, N. A. 0.90, which may be replaced by a system of N. A. 1.40. Aperture iris diaphragm and removable filter polarizer in rotating mount with markings at 90° intervals (as contained in LABORLUX-POL basic outfit) PEWOX

Five-lens two-diaphragm polarizing condenser No. 50 f, on dovetail slide, with swing-out top component, N. A. 0.85; the top may be replaced by a system of N. A. 1.40. Aperture iris diaphragm and focusing illuminated field diaphragm, removable filter polarizer in rotating mount with graduation in 5° intervals (as contained in DIALUX-POL and ORTHOLUX-POL basic outfits) PEVIV

Five-lens two-diaphragm polarizing condenser No. 50 p, as under PEVIV but with prism polarizer (as contained in the PANPHOT-POL basic outfit) PEVET

B. Bright Field Condensers *)

No. 76 Two-diaphragm bright field condenser with swing-out top component, N. A. 0.95, aperture and field-of-view diaphragms, on dovetail slide ORBER

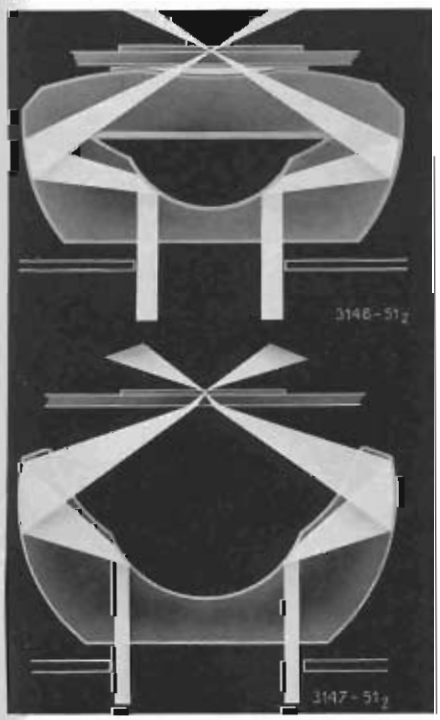
No. 77 as No. 76 but in cylindrical sliding mount IKOHR

Interchangeable condenser top component N. A. 1.40 fitting Nos. 76 and 77 ORAPU

No. 80 Two-lens condenser with swing-out top component, N. A. 0.90, with iris diaphragm and filter holder, on slide IKNOS

No. 81 as No. 80 but in cylindrical mount IKMOR

Path of rays in the dark field condensers
top: immersion dark field condenser D 1.20 A
bottom: dry darkfield condenser D 0.80



C. Dark Field Condensers *)

No. 82 Immersion dark field condenser D 1.20 A in centring mount, on dovetail slide, in case ORCIX

No. 83 as No. 82 but in cylindrical sliding mount CONCI

for use with these condensers the following objectives with built-in iris diaphragm are particularly recommended.

Achromatic oil immersion Oil 100/1.30–1.10 OBSOT

Fluorite oil immersion Fl Oil 95/1.32–1.10 OBSUV

No. 84 Dry dark field condenser D 0.80, in centring mount, on dovetail slide, in case OREBK

No. 85 as No. 84 but in cylindrical sliding mount SEEBK

Special objective for use with D 0.80:

Achromatic objective 63/0.85 with iris diaphragm OBTOV

*) Condenser in dovetail slide fit the microscope LABORLUX-POL, DIALUX-POL, EPILUX-POL, ORTHOLUX-POL and PANPHOT-POL.

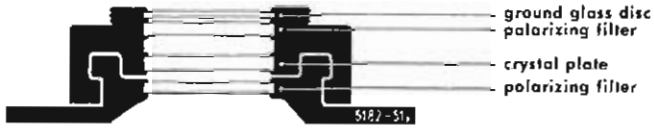
Condensers in cylindrical sliding mount fit the SM-POL microscope only.

D. Phase Contrast Condensers

See page 28.

VARIOCOLOR





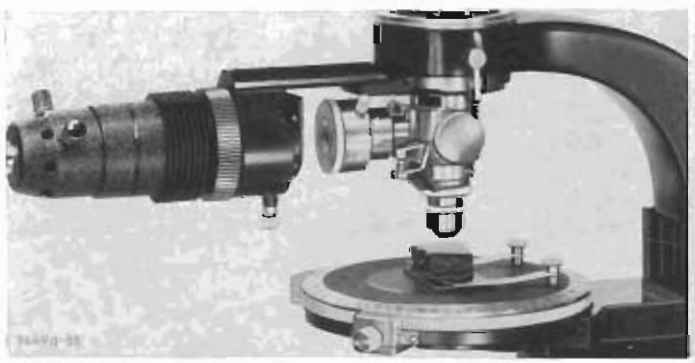
The VARIOCOLOR is an auxiliary device to the microscope condenser enabling the colour of the microscopic field of view to be varied continuously. Thus colour contrast can be achieved for stained and unstained microscopic specimens for more convenient detection of image details and diagnosis.*

*) It must be pointed out that strictly monochromatic light is not provided by the VARIOCOLOR attachment. Light of a narrow spectral range can only by expected from a monochromator and for many practical uses also from spectral filters (see pages 55–57).

Specifications:

VARIOCOLOR attachment with intermediate adapter LUYOX fitting the polarizing condensers Nos. 50 and 54	LUXOW-LUYOX
VARIOCOLOR attachment with intermediate adapter LUYOY fitting the polarizing condenser No. 57	LUXOW-LUYOY
VARIOCOLOR attachment with intermediate adapter LUYAT fitting the two-diaphragm condensers Nos. 76 and 77	LUXOW-LUYAT

Vertical Illuminator



Vertical illuminator with 6 volt 15 watt lamp as supplementary equipment for LABORLUX-POL and DIALUX-POL microscopes ▶

All LEITZ polarizing microscopes (with the exception of the simple SM-POL stand) are arranged for taking a vertical illuminator to make these instruments fully suitable for examinations in incident polarized light.

The vertical illuminator is available in two models, i. e. with built-in light-source and horizontal dovetail slide fitting the microscopes LABORLUX-POL and DIALUX-POL and also with bracket fitting the vertical dovetail holder on the ORTHOLUX-POL and PANPHOT-POL with which the necessary illumination is provided by the built-in light sources.

As light deflecting means the vertical illuminator incorporates an a rapid changing device a plane glass plate and a compensating prism (tropezoid after Berek), which deflects the illuminating rays without causing any change in their polarization condition. The rotation of the detachable polarizer prism can be read to 0.25°. A collecting lens, a vertically adjustable aperture diaphragm, an illuminated field diaphragm and a horizontally adjustable collimator ensure perfect guidance of the illuminating rays. Disturbing reflections and glare can be effectively eliminated by making use of the built-in half-stop or a set of central stops arranged on a sliding holder. The objectives are fitted to the precision objective changing clutch with three-point centring arrangement. Special requirements have to be met if the microscope photometer for measuring reflectance is to be combined with the above equipment (see page 42).

Specification

Vertical illuminator for the DIALUX-POL and LABORLUX-POL microscopes

Vertical illuminator on horizontal changing slide, compensator slot set at an angle of 45°, rigidly attached lamp, 6 volts 15 watts, Berek compensating prism on rapid changing axis with plane glass plate, horizontally adjustable collimator, illuminated field iris diaphragm, detachable rotating prism polarizer, central stop slide, half-stop aperture iris diaphragm with vertical adjustment, illuminating lens and 5 objective changing collars (7·55·–·35)	PEDAB
If not available, the regulating transformer 110/220 volts for the 6 volt 15 watt lamp must be provided	RESEV
The illuminator equipment PEDAB can, if desired, be supplied without the changing slide with a set of central stops: Vertical illuminator, as described above, but without the central stop changing slide	PEHAF
The vertical illuminator can be easily adapted for use in conjunction with a separate light source (sodium vapour lamp, monochromator etc.) by screwing a special collecting lens in place of the lamp unit. Collecting lens for separate light sources	PEHEG

Vertical illuminator for ORTHOLUX-POL and PANPHOT-POL microscopes

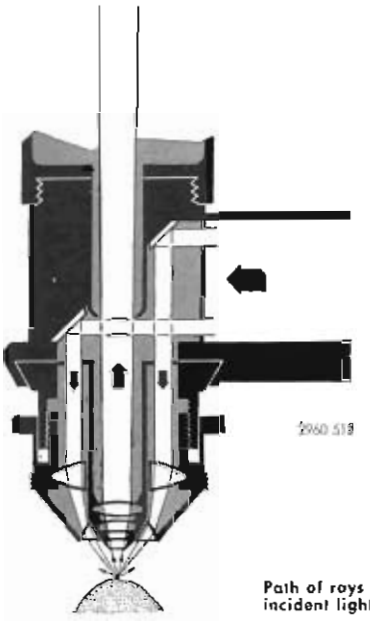
Vertical illuminator for ORTHOLUX-POL on bracket with vertical interchange slide, tube slot at 45° for inserting compensators, Berek compensating prism and plane glass on rapid changer, horizontally adjustable collimator, illuminated field iris diaphragm, removable rotating prism polarizer, and 5 objective changing collars. Detachable auxiliary collector with central stop changing slide, half-stop vertically adjustable aperture iris diaphragm (13·55·– ·–) OPARK

Vertical illuminator for PANPHOT-POL, as above, but inclusive of illuminating tube OPORN

Box for OPARK or OPORN QDIIC



Vertical illuminator for PANPHOT-POL, as above, but with illuminating tube OPORN. Vertical illuminator as supplied for ORTHOLUX-POL and PANPHOT-POL



Path of rays in the ULTROPAK, incident light illuminator

Immersion Caps for Microscopy in Incident Light

In incident light microscopy image quality as regards freedom from reflections and maximum contrast can be greatly improved with the aid of immersion caps. This method is particularly effective with methylene iodide immersions in place of the usual oil immersions. The ordinary oil immersion objectives have proved wholly satisfactory for the wide field of applications as regards the microscopic examination of peat and soft brown coal.

However, for studying hard brown coal, as one outstanding example, the methylene iodide immersion will be found superior to the ordinary oil immersion.

Our dry objectives for incident light
P 4.3/0.12
P 8 /0.18
P 16.5/0.40
can be supplied with immersion caps for cedar wood oil or synthetic oil (refractive index 1.515) and also for methylene iodide. These caps can also be fitted subsequently to existing objectives of the above types except those of older construction. Best results with these objectives will be obtained when they are used in conjunction with 10x eyepieces.

(a) Immersion caps with front plate for oil n = 1.515 (with a black identification ring)
Immersion cap for objective P 4.3/0.12 IKDUJ
Immersion cap for objective P 8/0.18 IKEHN
Immersion cap for objective P 16.5/0.40 IKELS

(b) Immersion caps with front plate for methylene iodide n = 1.74 (with a blue identification ring)
Immersion cap for objective P 4.3/0.12 IKDAD
Immersion cap for objective P 8/0.18 IKDEF
Immersion cap for objective P 16.5/0.40 IKDOH

ULTROPAK Incident Light Illuminator

This equipment furnishes dark field illumination for the examination of opaque specimens. It is equally suitable for the study of inclusions, etch figures and surface structures as well as examinations on living objects in biological and medical work. The supplementary polarizer used in conjunction with the analyser in the top of the microscope causes an image formation solely by the light rays irregularly reflected and depolarized on the structures of the specimen. Alternative illumination by transmitted light and also combined illumination can be established by the simultaneous use of a substage condenser.

Constructional features

The ULTROPAK illuminator consists of a metal housing with built-in inclined deflecting mirror with central aperture, illuminating attachment and bayonet changing mount for a set of special UO objectives with vertically adjustable ring condensers. The arrangement of the various components and the path of rays is shown in the above illustration.

The most favourable adjustment of the condenser depends on the kind of specimen and particularly on its surface structure. A graduation enables condenser settings to be read for future reference thus facilitating the later examination of materials of a similar surface structure requiring the same condenser setting.

A filter polarizer can be readily inserted in a holder rotating through 90°. With the ULTROPAK for the LABORLUX-POL and DIALUX-POL microscopes the centring and horizontally adjustable illuminant with 6 volt 15 watt lamp is rigidly attached, whereas with the ULTROPAK model for the ORTHOLUX-POL and PANPHOT-POL use is made of the built-in light sources of these instruments. The set of ULTROPAK objectives comprises systems with long working distance from 3.8x up to 100x initial magnification.

Universal application is ensured not only by the suitably graded magnifications of the various objectives but also by the availability of objectives with the numerical apertures most frequently used in practical work. The UO objectives differ from ordinary microscope objectives in their bayonet mount and the ring condenser attached to it.

The low-power ULTROPAK objectives are fitted with a ring condenser specially matched in its focal length to that of the objective. Medium and high-power objectives (from 22x upwards) have a double ring condenser which is identical and could be interchanged on various systems. For practical use, however, it is recommended to purchase each objective complete with condenser to have it always ready for use and for rapid changeover from one objective and one magnification to another.

The objectives with their annular condensers around them are externally designated by engraved rings fitted to their metal mounts. Special lighting effects can be brought about by the use of adjustable sector diaphragms and colour filters fitting into a filter slot of the ULTROPAK light entrance tube. Drop-in funnel stops of various sizes can be used in the objectives proper if it is desired to increase the depth of focus. However, stopping down should not be carried too far since this will adversely affect to a certain extent the resolving power.

For examining moist material or materials in liquids, surface reflections must be eliminated to ensure perfect images. This is achieved by special dipping cones designed for the UO dry objectives and immersion caps for the UO immersion systems.

Ring condenser for relief observations

Relief condenser with one intermediate collar and a funnel stop, as required, without objective, in case (state type of UO objective with which the condenser is to be used)	UBEEN
The following supplementary items are available	
Intermediate collar with funnel stop for objective UO 3.8	UAGEE
Intermediate collar with funnel stop for objective UO 5	UBIEE
Intermediate collar with funnel stop for objective UO 6.5	UCEEM
Intermediate collar with funnel stop for objectives UO 11–50	UCLEE
Case for storing a relief condenser complete with all intermediate collars and funnel stops	UEEAX

ULTROPAK objectives

		UO objectives Magnif./Aperture	Free working distance	Type of eyepiece[1]	Ring condenser	Supplementary equipment	Codeword
Achromats	Dry objectives	3.8/0.12	33	HO	K 3.8	Suitable for use with dipping cones	AHPEE
		5/0.15	27	HO	K 5		AIEES
		6.5/0.18	16	HO	K 6.5		AIREE
		11/0.25	57	HO	K 11		AKEER
		11 I.A./0.25[3]	–	HO	K 11	For use with dipping cone only	AKTEE[4]
		22 I.A./0.45[3]	–	HO	K 22–100		ALEEQ[4]
		22/0.45	2.1	HO	K 22–100		ALVEE
		32/0.55	1.0	PO	K 22–100		PAKAW
		50/0.65	0.7	HOPO	K 22–100		AMEEP
Fluorite systems	Water (W) and oil immersions	W 55/0.85	0.57	PO	K 22–100	Available with immersion caps if desired[2]	ANEEO
		W 75/0.90	0.45	PO	K 22–100		ANZEE
		W 90/1.0	0.42	PO	K 22–100		AOBEE
		Oil + W 23/0.55	0.65	PO	K 22–100		AOEFN
		Oil 60/0.85	0.57	PO	K 22–100		APDEE
		Oil 75/1.0	0.51	PO	K 22–100		APEEM
		Oil 100/1.0	0.48	PO	K 22–100		AOEEL

[1] HO = Huygens eyepiece, PO = periplanatic eyepiece recommended.
[2] See table below.
[3] The objectives UO 11 I.A. and UO 22 I.A. are limited in their use without dipping cone and require in this instance the application of the 5 mm. and the 3 mm. drop-in funnel stop respectively.
[4] The codewords of the UO 11 I.A. and 22 I.A. objectives include the dipping cones.

Dipping cones and immersion caps

Dipping cones and immersion caps		Remarks	Codeword
Dipping cones	3.8	for dry objective UO 3.8	AREEK
	5	for dry objective UO 5	ARHEE
	6.5	for dry objective UO 6.5	ASEEI
	11	for dry objective UO 11	ASKEE
	11 I. A.*)	for dry objective UO 11 I. A. (for direct observations on moist material)	ATEEH
	22 I. A.*)	for dry objective UO 22 I. A. (for direct observations on moist material)	AUOEE
Imm. caps	EZ 23–100	for UO immersion objectives 23–100, with 6 object slides, 50 cover slips and a tube of cover gloss cement	AWSEE

* already included in code words AKTEE and ALEER

Reflecting condenser 22–100, suitable for use with all UO objectives of the 22–100 range, producing flat incident sharply defined illumination. Specially recommended for the examination of the deep-seated structure of an object in which structural details above the area to be examined must not be illuminated at the same time — AQFEE

Specification



ULTROPAK illuminator on bracket fitting the microscopes ORTHOLUX-POL and PANPHOT-POL

ULTROPAK *illuminator* for DIALUX-POL and LABORLUX-POL with rigidly built-in inclined mirror with central aperture as light guidance element for the ring condenser of the UO objectives, bayonet changing mount for the latter, rigidly attached 6 volt 15 watt lamp with slot for the accommodation of filters, sector diaphragms and a slip-in rotating filter polarizer (7·22·–·35), in case — PEULT

ULTROPAK illuminator, as described, but without lamp unit, for use on the ORTHOLUX-POL (13·18·–·–) — PABAM

ULTROPAK *illuminator*, as described, but with light-screening sleeve in place of the lamp unit, for use on the PANPHOT-POL (13·19·–·–) — PABEN

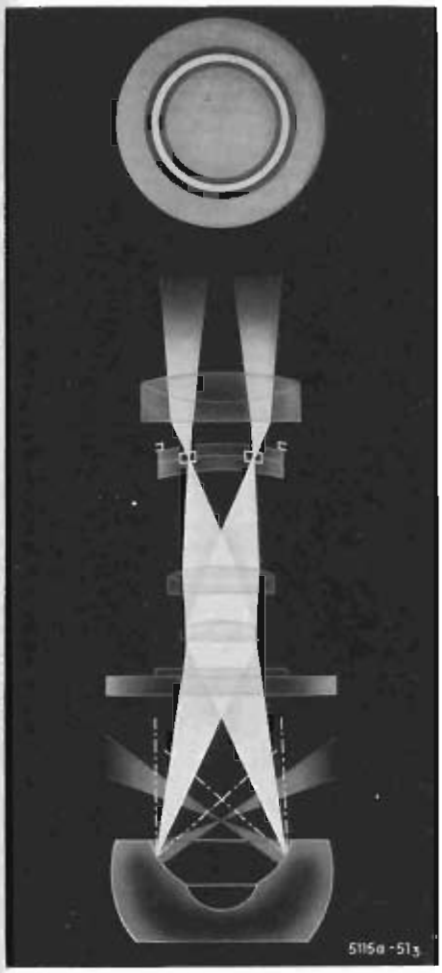
Case for PABAM or PABEN — IQHZI



ULTROPAK illuminator with lamp unit and dovetail slide holder for use on the LABORLUX-POL, DIALUX-POL and EPILUX-POL

Accessories

First-order red compensator in special mount fitting the holder of the ULTROPAK	KARAM
The application of a separate light source in place of the 6 volt 15 watt unit requires an attachable collector	PEHEG
Set of (6) drop-in funnel stops to increase the depth of focus of UO objectives	AXUEE



LEITZ Phase Contrast Equipment with Heine Condenser for Transmitted Light

Numerous structures of microscopic specimens differ from their surroundings only by their refractive index and thickness but not in their light transmission so that they remain unnoticeable to the human eye which is only sensitive to differences in colour and light intensity but not to phase differences. Here the phase contrast method of examination (after Zernicke) is greatly aiding the microscopist in that it transforms phase differences in the object into amplitude differences, i. e. differences of light intensity in the image. With the aim of making minute differences of thickness and refractive index visible, the phase contrast method has been successfully introduced into many field of science and technology, including dust investigations, the study of crystal growth, determination of the refractive index by embedding the materials in immersion fluids etc.

◀ Path of rays in the Heine condenser adjusted for phase contrast illumination



Technical Description

The phase contrast equipment consists of the Heine condenser with vertical adjustment of the built-in mirror body (of 0.25–0.70 N. A.) and a screw-on immersion cap for examinations with immersion objectives whereby the condenser aperture is raised to 0.50 up to 1.40. The vertical adjustment yields a continuous change of illumination from bright field to phase contrast and dark field and vice versa.

The equipment requires special phase contrast (Pv) objectives as listed at the right with suitably selected apertures and magnification factors. These objectives can be used at will on a revolving nosepiece with built-in centring devices or on objective centring clutch.

The LEITZ phase contrast equipment is supplied in two models differing in the form of their interchange fitting. The phase contrast condenser with dovetail slide fits the microscopes LABORLUX-POL, DIALUX-POL, ORTHOLUX-POL and PANPHOT-POL while for the SM-POL the condenser is supplied with a cylindrical sliding mount.

Phase contrast objectives

Type	Designation Magnific./Aperture	Free working distance mm.	Type of eyepiece [1]	Cover glass correction [2]	Codeword	Designed with absorption of [3]		
						75±5%	88±2%	88±2%
Dry system	Pv 10/0.25	5.8	PO	DO	PHALZ	n	h	–
	immersion attachment Pv 10/0.25	0.3			PHAWK	–	–	–
Dry system	Pv 20/0.45	2.0	HO (PO)	D	PHANC	n	h	–h
Dry system with specially long working distance	Pv Apo L 40/0.70 Correction mount with automatic focusing compensation	0.38	PO	DI	PHASG	n	h	–h
Dry system with specially long working distance	Pv Apo L 63/0.70 Correction mount with automatic focusing compensation	0.35	PO	DI	PHERG	n	h	–h
Water dipping objective	Pv WE 22/0.60	0.05	PO	O	PHESH	n	h	–
Water dipping objective	Pv WE 50/0.70	0.05	PO	O	PHEWL	n	h	–
Water dipping objective	Pv WE 80/1.00	0.06	PO	O	PHEYN	n	h	–
Oil Immersion	Pv FI Oil 70/1.15	0.20	PO	DO	PHELB	n	h	–h
Oil immersion	Pv Apo Oil 90/1.15	0.12	PO	DO	PHATH	n	h	–

[1] HO = Huygens eyepiece, PO = periplanatic eyepiece recommended.
[2] D = for use with cover glasses 0.17 ± 0.05 mm. thick.
O = without cover glass, DO = with and without cover glass
DI = cover glass thickness 0.17 ± 0.01 mm. to be strictly adhered to.
[3] n = normal absorption for positive phase contrast
h = high absorption for intensified phase contrast
–h = high absorption for negative phase contrast.

Equipment for phase contrast work

Heine phase contrast condenser with rack and pinion vertical adjustment for the mirror body and screw-on immersion cap	PHAKY
Filter holder with daylight and photographic filter	PHAFT
Auxiliary magnifier (not required for microscopes with Bertrand lens)	PHADS
Case for storing the condenser and 4 objectives	PHAMB
Phase contrast condenser Nr. 74 on slide	PFAHT
Phase contrast condenser Nr. 75 in cylindrical mount	PFAGS

Accessories

Revolving nosepiece with 4 centring devices to hold matched Pv objectives; with horizontal dovetail slide for DIALUX-POL and LABORLUX-POL (7·34·– ·–)	PEZUC
Revolving nosepiece with 4 centring devices to hold matched Pv objectives, with vertical dovetail bracket for ORTHOLUX-POL and PANPHOT-POL (13·34·– ·–)	PEZIZ

LEITZ Phase Contrast Equipment for Examination in Incident Light

(for use on ORTHOLUX-POL and PANPHOT-POL)



Phase contrast equipment for incident illumination for use on ORTHOLUX-POL and PANPHOT-POL

The most important field of application of phase contrast microscopy in incident light is the representation of the fine surface pattern of materials. To those engaged on metallurgical, mineralogical, petrographic or ceramics research or routine examinations will often obtain quick and surprisingly revealing results when studying corrosion, polishing, etching and other processes in phase contrast illumination.

Technical Description

The vertical illuminator is of a modified design to meet the special requirements of phase contrast image formation. It includes a drum-shaped housing with rotating rear component carrying the ring diaphragms for the various magnifications and an iris diaphragm for bright field illumination.
Moreover, an arrangement is incorporated, which allows of a direct comparison between the phase contrast image and the bright field appearance of the specimen.

Specification

Vertical illuminator for phase contrast with bright-field-illumination, revolving nosepiece with 5 Pv objectives with built-in phase rings for 50x, 100x, 200x, 500x and 1000x total magnification, drum-shaped housing with rotating diaphragm carrier for phase contrast and bright field illuminator, on bracket for ORTHOLUX-POL	IIXVT
Vertical illuminator, as above, but inclusive of illuminating tube for PANPHOT-POL	IIYBE
Two eyepieces 10x with adjustable eyelens, one with graticule indicating the photographic image size	RZHII-RXIIL
Auxiliary magnifier	PHADS
Tilting object holder for levelling the specimen	IIXWV



Attachable mechanical stage — Object marker — Hand press

Attachable mechanical stage

The mechanical stage for displacing the specimen horizontally in two directions at right angles to each other can be fitted to the rotating stages of the polarizing microscopes on which it is secured by means of a screw. It is of a flat design with the controls set at an angle so that even in conjunction with a quintuple objective nosepiece no collision with objectives is to be feared. The traversing area is 40 x 20 mm., and scales and verniers allow of reading the movement correct to 0.1 mm.

Attachable graduated mechanical stage, in case	PIRAZ

Object marker

The object marker resembles a microscope objective but in place of optics it is fitted with a rotating, slightly excentrically set diamond tip. It fits the revolving objective nosepiece and also the objective centring clutch and by rotating its top it scribes a circle on the cover slip of a microscopic specimen so that an interesting point is clearly marked for later quick focusing and demonstration.

Object marker	MARKI

Object slides

100 object slides 48 x 28 mm. (Giessen size) of glass with bevelled edges	IIVYB
100 object slides 48 x 28 mm. with unbevelled edges	IIYEL
100 object slides 76 x 28 mm. (English size) of glass with bevelled edges	DOBAD
100 object slides 76 x 28 mm. with unbevelled edges	OBJEH
Metal object slide 48 x 36 mm.	IWMBI
Metal object slide 76 x 32 mm.	IVZDI

Hand press for opaque specimens

The hand press serves for levelling opaque polished specimens on an object slide with plasticine to have the surface to be examined at right angles to the optical axis of the microscope. The height of a series of specimens can be uniformly adjusted by a stop screw on the press, so that all specimens can be rapidly placed on the microscope stage and examined without any major adjustments being necessary except for a slight correction on the micrometer focusing.

Hand press with adjustable stop	RPIIT

Cover glasses

100 cover slips, square 15 x 15 mm.	DECCO
100 cover slips, square 18 x 18 mm.	DECKA
100 cover slips, square 20 x 20 mm.	DECUL
100 cover slips, rectangular 27 x 21 mm.	IIVXZ
100 cover slips, circular, 15 mm. dia.	DEREM
100 cover slips, circular, 18 mm. dia.	DERIL
100 cover slips, circular, 20 mm. dia.	DERYT
Cover glass thickness gauge (1 interval = 0,01 mm.)	DIMES
Immersion oil for oil immersion objectives, 10 g bottle	DOLEO
Combination bottle for immersion oil and xylol, with glass rod	OLBAD



Cover glass thickness gauge — Immersion oil — Combination bottle

LEITZ Universal Rotating Stages and Accessories



9514-55

Universal rotating stage UT 2



9515-55

Universal rotating stage UT 4



9519-55

Universal rotating stage UT 5 with centring base



9508-55

Parallel slide after Schmidt



9558-55 9511-55 9512-55

Auxiliary objective Supplementary condenser

The universal rotating stages are supplied in three models which differ in the number of their axes or directions of rotation and have received their designations accordingly: UT2, UT4 and UT5. The UT2 stage with only two axes of rotation is primarily intended for teaching purposes, but certain mineralogical routine work is also within its scope. This includes the determination of the refractive index of mineral grains after the embedding method or morphological and crystal-optical measurements on crystals with the aid of the hollow glass sphere after Waldmann (see pages 30 and 36).

For the optical investigation of crystals after the Fedorow method the UT4 and UT5 stages fulfil all the requirements. The latter surpasses the former in that it allows of setting the second plane of symmetry immediately after the first one has been found, thus facilitating the measuring process.

All universal rotating stages have a practical device for exchanging and mounting the thin sections and allow of a simple and rapid adjustment of the section surface into the intersection of the axes of rotation. For the analysis of specimen structures it is advantageous to equip the stages UT4 and UT5 with the auxiliary angular slide (FEGFU) for parallel movement of the specimen which, however, necessitates a special mount of the upper segment (FEGSE).

For the demonstration of the principle underlying the construction and use of the universal rotating stages indicatrix models of optically uniaxial and biaxial crystals can be accommodated on all types of UT stages where they take the place of the inner stage plate.

The application of the universal rotating stage methods necessitates the use of special UM objectives which are corrected for a uniform working distance (1.5 mm.) in relation to the UT stage segment and supplied with built-in iris diaphragm. The systems of higher numerical aperture, UM 20/0.33 and UM 32/0.30 call for a special condenser cap and are ideal for the determination of directions of reference in crystallographic work.

Specifications

Universal rotating stage UT 5 (5 axes of rotation), on centring base, with pair of segments $n_D = 1.55$, in case	ICGLI
Universal rotating stage UT 4 (4 axes of rotation), on centring base, with pair of segments $n_D = 1.55$, in case	FEDRO
Universal rotating stage UT 2 (2 axes of rotation), on centring base, with pair of segments $n_D = 1.55$, in case	ICHNI
Interchangeable pair of segments $n_D = 1.55$ (as included above)	KOSID
Interchangeable pair of segments $n_D = 1.649$	FEGNO
Interchangeable pair of segments $n_D = 1.516$	FEGMA
Segments with other refractive index on request.	
For the analysis of structurees of materials with the aid of the UT 4 or UT 5 stage the following is required:	
Parallel guiding slide after Schmidt, with mm. scale, for systematically displacing the thin section under the segment	FEGFU
The Schmidt slide necessitates a modification to the normal mount of the upper segments, extra for each segment	FEGSE
For checking the thickness of cover glasses we recommend:	
Cover glass thickness gauge (reading to 0.01 mm.)	DIMES
For general examination in thin sections on the UT stage without upper segment:	
Auxiliary stage clip	FEKLE

Objectives for universal stage methods

Built-in iris diaphragm, free working distance to top of segment 1.5 mm., magnification and aperture values apply to segment $n_D = 1.55$	
UM 5/0.10	ICNXI
UM 10/0.22	ICOZI
UM 20/0.33	ICPBI
UM 32/0.30	ICQDI
Auxiliary setting objective	PEHOJ
Objective changing ring (required for each objective when the microscope is to be used is equipped with an objective centring clutch)	PIZUT
Supplementary condenser for UM 20/0.33 and UM 32/0.30, taking the place of the normal swing-out condenser top	
(a) for UT 5	IITLC
(b) for UT 4 and UT 2	IITNG

LEITZ Universal Stage Conoscope



UMK objective



Condenser for universal stage conoscopy



Upper segment for universal stage conoscope

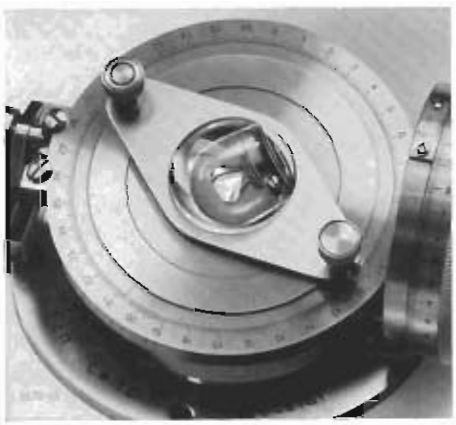
Speciol equipment hos been designed to supplement ony model of the universol rototing stoge for conoscopic work. The following items ore required to build up o universal stoge conoscope:

Condenser on doveloil slide with sleeve toking the polorizer (for use in ploce of the normol microscope condenser) ond objective UMK 32/0.60	KOSOF
Upper segment with small hemisphere (11.5 mm. dio.) refroctive index 1.516	KOREB
Upper segment with small hemisphere (11.5 mm. dio.) refroctive index 1.554	KORIC
Upper segment with small hemisphere (11.5 mm. dio.) refroctive index 1.649	KOROD
The lower segment is the same as that supplied for the UT stages:	
Lower segment with hemisphere 25 mm. dio., refroctive index 1.516	KORUF
Lower segment with hemisphere 25 mm. dio., refroctive index 1.554	KOSAP
Lower segment with hemisphere 25 mm. dio., refroctive index 1.649	KOSEC
Objective UMK 32/0.60	IIWUS
Objective UMK 50/0.60	PEHIH
(Special system for the conoscopic examination of small objects)	

The Waldmann Hollow Glass Sphere



Hollow glass sphere after Waldmann





Hollow glass sphere after Waldmann in position on the UT 2 stage. Case with all the accessories at the right

This occessory to the universol rototing stoges which con be mounted on our polorizing microscopes is for the morphologicol ond crystol-opticol exominotion of crystols ronging in diometer from 1 to 11 mm. It consists of o hollow sphere of optical gloss, 27 mm. in diometer ond with o 12 mm. bore. The spoce inside this sphere is filled up free from oir bubbles with o suitoble immersion fluid. The closure cop, with the object holder in ploce, seols the sphere without extending beyond its surfoce ot ony point. This renders the sphere copoble of being turned under the microscope wilhout limitotion in every direction.

Advontoges of the hollow gloss sphere:

- *Tronsporent crystols of ony to the stoted moximum size con eosily be brought into the centre of the sphere, where they con be exomined without the risk of domoge, ond without preporotory measures.*
- *In the exominotion of thin sections, os hos hitherto been customory, on initiol positian unfovouroble for mony components of the section is given by the plone of the section. By controst, the sphere with its unlimited ronge of rototion ollows o fovourable initiol position of the groin to be chosen, in oddition to which the object con olso be tronsposed on its holder.*
- *The ongulor spoce remoining occessible for observotion in o plone of symmetry of the cop (obout 26°), is considerobly lorger thon in ordinory segments, in which o spherical belt of less than 90° only con be fully utilized for tronsmitted light micrascopy.*
- *The conoscopic exomination method con olso be employed ot ony time.*



Left: closure cap with fixed glass pin

Centre: closure cap with radially movable glass pin

Right: closure cap with cross pincers

Three different types of closure caps are available for the Waldmann hollow glass sphere:

1. Closure cap with fixed glass pin on which the object to be examined is cemented.
2. Closure cap with radially movable glass pin allowing the object to be brought into the centre of the hollow sphere.
3. Closure cap with cross pincers for crystals of 5–11 mm. dia. The pincers are opened and closed by means of a key.

Specification:

Waldmann hollow glass sphere, with lamp, adapter ring and holder for use on UT stage, key for vertical adjustment of closure caps, 2 wooden rings as supports for the sphere, centring gauge and 3 closure caps, in case IIRUX

Universal Rotating Stage UTR 2 for Opaque Specimens

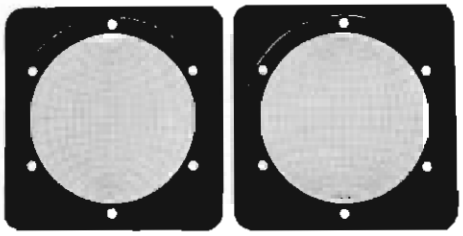


Universal rotating stage UTR 2 (as suggested by Prof. Ehrenberg) is a special model to meet the requirements of the study of structure distribution in ores and metals, the structure of minerals etc. for which only opaque polished specimens are available.

Specification:

Universal rotating stage UTR2 for polished opaque specimens, with 2 rotary axes A_1 and A_4, angle graduations with vernier reading to 0.1°, vertical stage adjustment, built-in mechanical stage with cross motion range 20 x 15 mm. with scales and clamping screws. 3 interchangeable insets with apertures 5 x 5, 10 x 10 and 15 x 15 mm., 2 object clips and 2 knurled screws for fixing the equipment to the microscope stage including centring base, in case PODUH

Accessories for Universal Stage Methods



Angle-true net ruling — Surface-true net ruling

For the evaluation of the measurements obtained with the aid of the universal stages the following accessories are available:

Angle-true stereographic net ruling (after Wulff) with rotating device (after M. Reinhard) for the tracing paper IVWXI

Angle-true stereographic net ruling, single sheet IZWLI

Surface-true net ruling (after Lambert) with rotating device (after M. Reinhard) for the tracing paper IVXZI

Surface-true net ruling, single sheet IZMYI

For the demonstration and explanation of the universal stage methods and the operations involved we supply, as suggested by M. Reinhard, the following indicatrix models of crystals which are accommodated on the universal stage after the stage inset has been removed:

Indicatrix model of an optically biaxial crystal ICSHI

Indicatrix model of an optically uniaxial crystal ICTKI



Indicatrix model of an optically biaxial crystal — Indicatrix model of an optically uniaxial crystal

(For details on the universal stage refractometer see p. 36)



Quarter-wave plate in subparallel position

Quarter-wave plate in subparallel position for $\lambda = 589$ mμ — KOMUB
Quarter wave plate in subparallel position for $\lambda = 540$ mμ — KONAX
Green filter for $\lambda = 540$ mμ — KONEY

Quarter-wave plates in subparallel position for shorter wave lengths are quoted for upon request.

The above plates can also be slightly turned away from their normal orientation, the range covered amounting to a few degrees. They are intended for the exact measurement of path differences after the Sénarmont method for which a revolving and accurately graduated analyser as well as a half-shadow device (Wright eye-piece with half-shadow plates) are required.

Johannsen quartz-gypsum compensator — KOJAN

The quartz wedge is combined with a gypsum plate so selected in its thickness that the path difference obtained on the edge of the wedge is 0. The same slide mount holds, separated from the wedge, a first-order red plate.

This accessary can only be used in conjunction with an objective centring clutch.



Quartz wedge I.–IV. order

Quartz wedge I.–IV. order — KORAZ

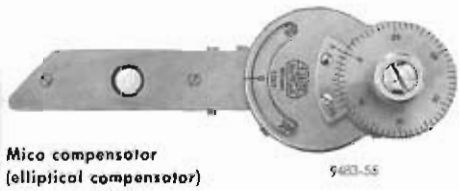
Berek rotary compensator (up to 4 orders) — BEREK

This equipment is based on the principle of the Biot-Bravais compensator which it surpasses by its considerably larger measuring range (4 orders). The values measured can be easily evaluated. For determining small and medium path differences this compensator is much more sensitive than those designed on the Babinet principle. The Berek compensator is supplied with directions, tables and calibration for 3 wave lengths as well as the conventional optical centre of gravity for white light.



Berek rotary compensator

Berek rotary compensator for more than 3 orders
(state measuring range required when ordering) — extra IBZXI



Mica compensator
(elliptical compensator)

Mica compensator with quarter-wave plate (elliptical compensator), fitting the tube slot, for wave length 589 mμ and for use in conjunction with a rotating analyser — ELIPT

Mica compensator, as above, for wave length 540 mμ — KOMAW
Green filter for wave length 540 mμ — KONEY
Mica compensators for other wave lengths on request.

Determination of the absolute optical character with the various types of compensators. The arrows show the direction of the displacement of the isochromates with increasing path variation in the compensator.



First-order red compensator 9479-55



Quarter-wave compensator 9052-55



First-order plate in subparallel position 9480-55

The following compensators are available for use in the tube slot of the polarizing microscopes:

The compensators with fixed path difference are preferably used for the diagnosis of interference colours, the determination of the direction of vibration and the character of double refraction.

First-order red compensador, in metal slide KOGIP

Quarter-wave compensator, in metal slide KOMER

First-order plate in subparallel position KONOB

Specimens of very weak double refraction can be succesfully examined for their direction of vibration with the aid of the first-order plate in subparallel position, which in this instance is more sensitive to slight colour variations than the ordinary first-order plate in diagonal position. The plate proper is slightly rotatable in its metal slide (a few degrees) in order to adjust it to the most favourable effect.



Quarter-wave plate in subparallel position

Quarter-wave plate in subparallel position for λ = 589 mμ KOMUB
Quarter wave plate in subparallel position for λ = 540 mμ KONAX
Green filter for λ = 540 mμ KONEY

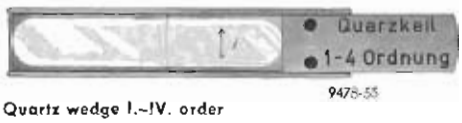
Quarter-wave plates in subporallel position for shorter wove lengths are quoted for upon request.

The above plates can also be slightly turned away from their normal orientation, the ronge covered amounting to a few degrees. They ore intended far the exact measurement af path differences after the Sénarmant method far which a revolving and accurately graduated analyser os well os a half-shadow device (Wright eye-piece with half-shadow plates) are required.

Johonnsen quartz-gypsum compensator KOJAN

The quartz wedge is combined with a gypsum plate so selected in its thickness that the path difference obtained on the edge of the wedge is 0. The same slide mount holds, separated from the wedge, a first-order red plate.

This accessory can only be used in conjunction with an objective centring clutch.



Quartz wedge I.–IV. order

Quartz wedge I.–IV. order KORAZ

Berek rotary compensator (up to 4 orders) BEREK

This equipment is based on the principle of the Biot-Bravois compensator which it surpasses by its considerably larger measuring ronge (4 orders). The values meosured can be easily evaluated. For determining smoll and medium path differences this compensator is much more sensitive than those designed on the Bobinet principle. The Berek compensator is supplied with directions, tables and colibration for 3 wave lengths os well as the conventionol opticol centre of grovity for white light.



Berek rotary compensator

Berek rotary compensator for more than 3 orders
(state measuring range required when ordering) extra IBZXI

Mico compensator with quarter-wave plate (elliptical compensator), fitting the tube slot, for wave length 589 mμ and for use in conjunction with o rotating analyser ELIPT



Mica compensotor
(elliptical compensator)

Mico compensotor, as above, for wave length 540 mμ KOMAW
Green filter for wave length 540 mμ KONEY
Mica compensators for other wave lengths on request.

These mica compensators are intended for measuring path differences in accordance with the Sénarmant method. They require a rotating analyser with accurate reading and o half-shadow arrangement for increasing the setting accurocy (Wright eye-piece with top analyser ond half-shadow plates). The mica plate rotates azimuthally in its maunt; the rotation can be read correct to 0.1°. Directions and a calibration table are supplied with the equipment.

Brace-Köhler compensator

with λ/10 plate KOMEX
with λ/20 plate KOMOZ
with λ/30 plate KONIZ

The Brace-Köhler compensator allows accurate measurements of very small path differences (up to the path difference of the compensator plate) by means of an azimuthally rotating mica plate.

The Wright universal eyepiece and the top analyser as described on page 22 make use of various compensators (doubly refracting wedges). This equipment is advantageous in that the object and the compensator are seen in focus simultaneously, so that, for instance, an orientation scale on the quartz wedge can be read in the course of observations.

Quartz wedge I.–IV. order, in metal slide PIARZ

Combination quartz wedge after Wright with orientation scale PIBIN

Quartz double wedge after Wright, in metal slide PIDOP

This consists of two quartz wedges arranged side by side but in opposite directions and of a plano-parallel quartz plate which is so combined with the wedges that the compensation band appears in the centre. When doubly refracting objects are superimposed this compensation band will simultaneously move to the left in one wedge and to the right in the other wedge.

Johannsen quartz-gypsum compensator, in metal slide (for details see above) PIJON

2. Determination of the Directions of Extinction

With the aid of half-shadow plates the determination of the directions of extinction can be carried out with a high degree of accuracy. These half-shadow plates are used in conjunction with the Wright universal eyepiece and the top analyser so that half-shadow plate and specimen will appear in focus simultaneously.

For the Wright universal eyepiece the following half-shadow plates are available:

Half-shadow plate after Nakamura, in metal slide — KONAK
This plate furnishes constant half-shadows obtained by two quartz plates arranged side by side and rotating in opposite directions.

Half-shadow wedge after Macé de Lépinay, in metal slide — KOLEP
This consists of two quartz wedges arranged side by side and rotating in opposite directions so that the sensitivity of the half-shadow setting can be varied by simply shifting the wedge.

Soleil double plate, in metal slide — PISOL
This accessory serves for ascertaining weak optical activity. Slight rotations of the plane of the polarized light are detected in colour differences in the two fields of the plate if white light is being used. This effect is achieved by a pair of plano-parallel quartz plates of opposite rotation and of suitably selected thickness.



Eyepiece dichroscope

3. Observation of Dichroism

Eyepiece dichroscope
The eyepiece dichroscope incorporates a Wollaston prism dividing the field of view in two halves the light of which is polarized at right angles to each other.

Eyepiece dichroscope fitting the microscope tube in place of standard eyepieces of 23.2 mm. dia. — KOROK



Metz opertometer

4. Determination of the Axial Angle

For the purpose of determining the axis angle a micrometer eyepiece (see p. 22) should be used and calibrated by means of a Metz opertometer. This device consists of a glass body, with scale and focusing markings fitted to a metal support for accommodation on the microscope stage. The microscope objective – a dry system or an oil immersion objective – is focused on to the line cross in the top opening of the apertometer, and the aperture values are read off the scale making use of the Bertrand auxiliary lens.

Metz apertometer — APTOL

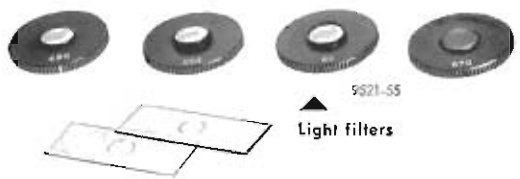
5. Determination of the Light Refraction



Auxiliary arrangement INDEX



Heating ring for the hemisphere



Plano-parallel cover plates, special eyepiece INDEX 8x



Universal Stage Refractometer

This equipment, also known as the Berek microscope refractometer, is designed for the determination of the refractive index of grain preparations after the embedding method and with the aid of a universal stage, the model UT 2 being particularly recommended.
The refractive index of the immersion is adapted to that of the grain by varying the temperature. After a changeover from transmitted to diffused incident light the refractive index results from the setting of total reflection on the UT-stage.

Specification:

Auxiliary arrangement INDEX comprising a lower segment, upper hemisphere with cavity and 3 plano-parallel cover plates, heating ring for the hemisphere with connecting cable, regulating transformer type RT 35 for 110/220 volts A. C. — IDCBI
Special eyepiece INDEX 8x (30 mm. dia.) with cross lines in helical focusing mount and adjustable eyelens — IDEFI
Objective UM 20/0.33 — ICPBI
Illuminating stand with opal glass plate fitting to the microscope foot — PEJEH

When using a filament lamp as source of light one of the following filters must be placed on the INDEX eyepiece or the top analyser:

Orange light filter	IDKQI
Colour filter 670	IDESI
Colour filter 550	IDUMI
Colour filter 480	IDNWI



Emmons circulation cell

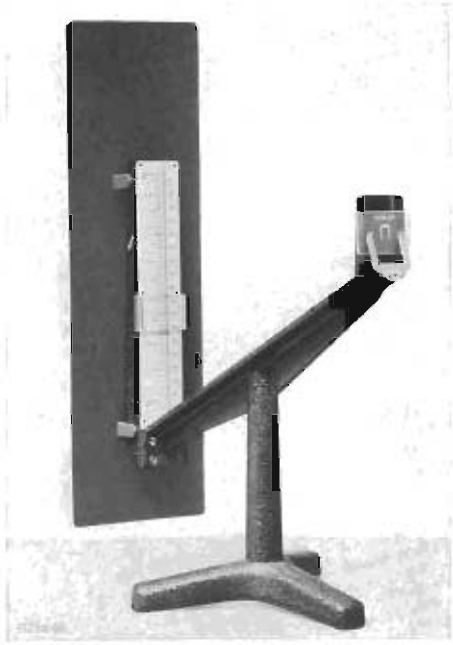
Circulation Cell after Emmons

This supplementary equipment is primarily offered for the determination of refractive indices after the double variation method ($\lambda - T$ method as described by Emmons).
The equipment consists of a special lower segment for UT stages and a circulation cell surrounding this segment for varying the temperature. A thermostat is also provided for the purpose. For λ variation when carrying out the $\lambda - T$ method the large high-power monochromator (see p. 55) must be employed.

Lower segment with circulation cell, in case — PEJAG

LEITZ Phase Contrast Equipment

The accuracy of the immersion method can be considerably improved upon by making use of a phase contrast equipment. Even variations in the 4th decimal place of refractive indices become apparent by differences in intensity or colour differences in the case of different dispersion.
For details on the LEITZ phase contrast equipment see p. 27



LEITZ-JELLEY micro-refractometer

LEITZ-JELLEY Micro Refractometer

The micro-refractometer is ideal for determining rapidly and correctly the refractive index of minute quantities of liquids. The measuring accuracy attainable is ± 0.001.
The model I micro-refractometer possesses a measuring scale calibrated for the D line of the spectrum. A filter fitted in front of the entrance slot of the instrument provides a suitable illumination. Its measuring range extends from $n_D = 1.333$ to $n_D = 1.92$.
The model II micro-refractometer has an additional millimeter scale for determining refractive indices between $n_D = 1.116$ and $n_D = 2.35$. The refracting numbers for this range are ascertained in a table.

Specifications:

LEITZ-JELLEY Micro-refractometer I

comprising a cast stand, light-screening shield, graduated scale with index slide, prism stage with clip, micro prism cemented to a plane glass plate for determining refractive indices of $n_D = 1.333$ up to 1.92 — JELOT
Complete outfit, as above, with illuminating device for direct connection to the mains (state voltage when ordering) — JEMAR

LEITZ-JELLEY Micro-refractometer II

comprising a cast stand, light-screening shield, graduated scale with index slide as well as millimeter scale, prism stage with clip, micro prism on plane glass plate, for determining refractive indices of $n_D = 1.333$ to 1.92, high-refracting micro prism on plane glass plate with table for determining refractive indices between 1.116 and 2.35 — JELAP
Complete outfit, as above, with illuminating device for direct connection to the mains (state voltage when ordering) — JEMES

Separate prices of micro prisms as contained in above outfits:
Micro prism on plane glass plate for $n_D = 1.333–1.92$ — JELUV
High-refracting micro prism on plane glass plate for $n_D = 1.116–2.35$, in container, with table — JELER
Z-prism on plane glass plate for n_D range 1.333–1.532 or 0–95% of dry substance content (sugar) — JENIV

Special equipment available on request:

Large two-component glass prism for determining refractive indices of from 1.116 to 2.35 — JELIS
Illuminating arrangement for sodium light (220 volts A. C.*) to replace the ordinary lamp equipment described above (suitable for alternate use) — JEMIT
Spare sodium burner — NAPO8

* Electrical equipment for other mains voltages quoted for on request.

Stage Micrometers

The following micrometers for use on the microscope stage are supplied for the determination of the micrometer value of an objective:

Stage micrometer with photographic scale 2 mm. = 200 divisions on glass, in container	OBMET
Stage micrometer with scale 1 mm. = 100 divisions, ruled on glass, in container	OBTER
Stage micrometer with scale 1 mm. = 100 divisions, ruled on metal, for work in incident light, in container	IIDMU

Eyepiece Micrometers and Micrometer Eyepieces

For measuring the object size under the microscope several types of micrometer eyepieces and a range of graticules which can be accommodated in these eyepieces are available and will be found described on page 22.



Screw-micrometer eyepiece

Screw-micrometer Eyepiece

The special design of the screw-micrometer eyepiece ensures a considerably higher degree of accuracy in measuring than the ordinary micrometer eyepieces. It incorporates a fixed scale of 12 intervals of 0.5 mm. each. A lateral micrometer head allows of moving a measuring line across the fixed scale. The graduated micrometer drum with 100 intervals is so designed that one complete revolution of the drum head coincides with one interval of the fixed eyepiece scale. One drum interval thus corresponds to $^1/_{100}$th of the 0.5 mm. scale interval. The eyepiece magnification is 12.5x.

Screw micrometer eyepiece (23.2 mm. dia.), in case (For more details and directions see pamphlet No. 51–17/Engl.)	OKNOR


Fibre measuring eyepiece

LEITZ Fibre Measuring Eyepiece

This equipment allows of determining the double refraction in fibres, which in many instances is an important characteristic in checking manufacturing processes of high-polymer fibre materials. It consists of a screw-micrometer eyepiece with top analyser rotating through 360°. The graduation can be read by means of an index. With this equipment thickness and path difference (after Sènormant) can be measured simultaneously, so that the double refraction can be easily calculated. The fibre measuring eyepiece is used either in conjunction with a sodium vapour lamp or a green filter for 540 mμ.

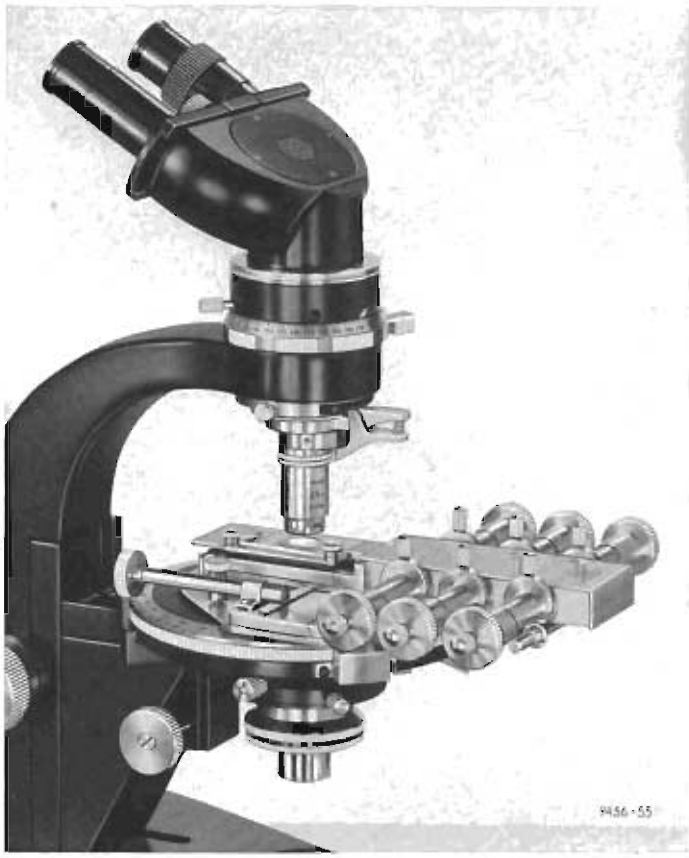
Specification:

Fibre measuring eyepiece with rotating top analyser, in case	FASOC
Quarter-wave plate subparallel for 540 mμ.	KONAX
Monochromatic filter for λ = 540 mμ.	KONEY

For work in sodium light

Sodium vapour lamp, ¼ wave plate, subparallel, for 589 mμ., see pages 57 and 35.

LEITZ Integrating Stage
for the Planimetric Analysis of Materials



Integrating stage in position on the DIALUX-POL microscope

The application of the planimetric analysis of materials extends to the fields of general petrography, coal-petrography, mineralogy and ore microscopy. The integrating stage can also be successfully used for most diverse tasks in industrial laboratories, as well as in biology and medicine.

The examinations are carried out in accordance with Rosiwal's method. This is based on the determination of the individual constituent of a material along a series of measuring lines across the surface of the specimen. The sum of the length components of a constituent corresponds to the surface distribution of that particular constituent and therefore to its content percentage.

The accuracy of this measuring method depends on the degree of differentiation of the various constituents in the specimen, the regularity of their distribution throughout the surface under examination and the number and distance of measuring lines applied. The structure of the specimen is decisive for the choice of a suitable separation of the measuring lines.

The LEITZ integrating stage allows of traversing for planimetric assessment an area of 18x18 mm. It is fitted with 6 independently working precision measuring spindles so that up to 6 different constituents of material can be determined under the microscope in one operation. The percentage content of the individual constituents is then easily calculated. Each spindle reads to 0.01 mm. and operates through approx. 25 mm.

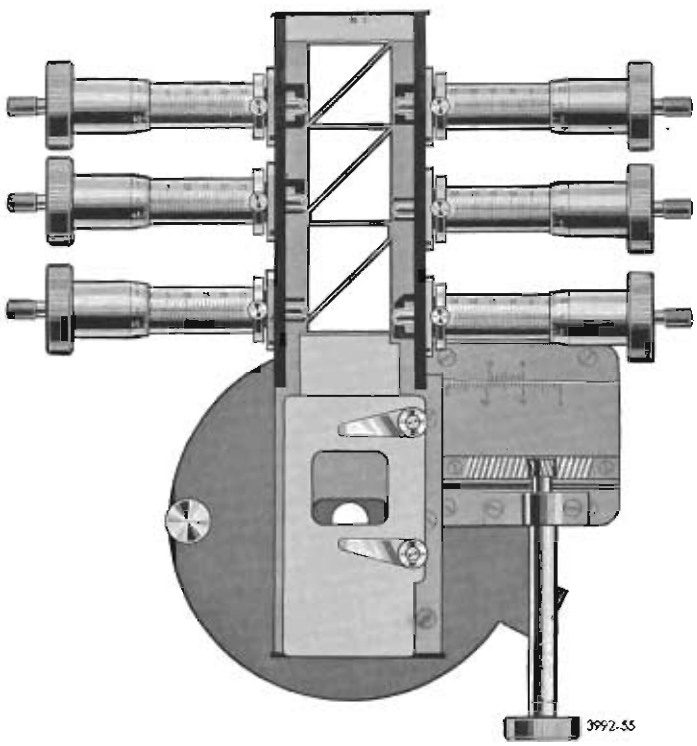


Diagram of the construction of the LEITZ integrating stage

Integrating stage with 6 spindles, fitting polarizing microscopes with centred rotating stage, in case — INTEG

Accessories

For work in transmitted light:
Quarter-wave plate in mount to screw to the substage in place of the swing-out condenser top of polarizing microscopes (also suitable for work in circularly polarized light in conjunction with a ¼ wave compensator) — IZBDI

Supplementary condenser lens fitting stage aperture for use with high magnifications — ISFEI

Old-type integrating stages supplied earlier than 1952 do not accommodate the ISFEI condenser. In this instance a special recess must be provided.
Cost of alteration — ITBKI

Set of 6 flexible extension shafts fitting the micrometer heads — IZCFI

For work in transmitted or incident light:
Small supplementary adjustable stage to bridge over gaps in the specimen by means of a rack and pinion adjustment through 20 mm. — IFPYI

For work in incident light only:
Large supplementary stage to bridge over gaps in the specimen by means of a 20 mm. rack and pinion adjustment and a further 40 mm. movement with clickstops at each 10 mm. interval. With this equipment a stop screw and milled counter nut are supplied to limit the range of the measuring spindles to 10 mm. — PODIF

With old-type integrating stages (supplied before 1952) the top cover plate must be replaced by a new one with thread for the stop screw.

LEITZ Integrating Eyepiece for the Planimetric Analysis

In contrast to the integrating stage the new integrating eyepiece permits planimetric examinations of materials at all magnifications including the highest ones and with the aid of all types of condensers required for this extended range of planimetric work. This measuring equipment makes use of adjustable cross lines which are moved across the image of the specimen which, in this instance, remains stationary. Since the measuring process is carried out within the magnified image area, a considerably higher accuracy can be expected than in the case of the integrating stage.

With this basis for precision measurements the integrating eyepiece has been successfully applied to planimetric work in the field of anatomic microscopy, particularly for quantitative determinations on physiological and pathological changes in organs, tissues, and cells. It goes without saying, that the integrating eyepiece also meets the requirements of planimetric studies in petrography, mineralogy, coal-petrography, ore microscopy, or the examination of ceramic and building materials.

The integrating eyepiece can be fitted to all LEITZ microscopes and is equally suitable for work in transmitted and incident light. The modern stands with fixed tube and the focusing arrangement operating the object stage are particularly suitable for mounting the integrating eyepiece with its 6 measuring spindles so that accurate measurements are ensured even when observing with high-power oil immersion objectives.

The optical equipment of the integrating eyepiece yields a magnification of 12.5x and allows of covering planimetrically an area of 10x10 mm. in the plane of the eyepiece intermediate image. The 6 spindles arranged at either side of the eyepiece housing are fully independent of each other so that 6 different constituents can be assessed. The range of the spindles is approx. 25 mm., and the graduations read to 0.01 mm. (1 interval of the scale equals 1/100 mm.).



LEITZ integrating eyepiece

Specification:

Integrating eyepiece 12.5x with 6 measuring spindles, clamping holder to fit wide or standard microscope tubes, in case	INTAF
Set of 6 flexible extension shafts for the spindles	IZCFI

For more particulars and directions of use see special leaflet.

Standard Slide Comparison Eyepiece

The standard slide comparison eyepiece is a most convenient means for comparing the structure of microscopic images with standard test plates arranged in the intermediate image plane of this eyepiece. A set of comparison slides is fitted to a revolving disc, and each slide can be moved into position so as to cover half of the image field viewed by the observer.

The revolving holder contains 8 slide discs and a free aperture for viewing the entire image field or for accommodating a micrometer plate. A lateral attachment with a low-voltage bulb and a regulating transformer allow of varying the intensity of the comparison image and of adapting it to that of the specimen under observation. The following sets of standard comparison slides are available:

1. Revolving disc with 8 comparison slides of polished coal specimens showing a fusit content of from 5-50% as well as a micrometer plate 10 mm. = 100 intervals (specially offered for the fusit analysis in coal research).
2. Revolving disc with 8 comparison slides of the structure of drawn or rolled brass, as well as a micrometer plate 10 mm. = 100 intervals.
3. Revolving disc with 8 honeycomb-pattern graticules covering half of the field of view as well as a micrometer plate 10 mm. = 100 intervals (specially offered for measuring grain sizes in cast iron etc.). The honeycomb-pattern graticules are of the following sizes.



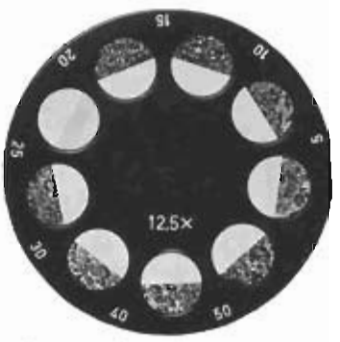
Comparison eyepiece for use with standard slides



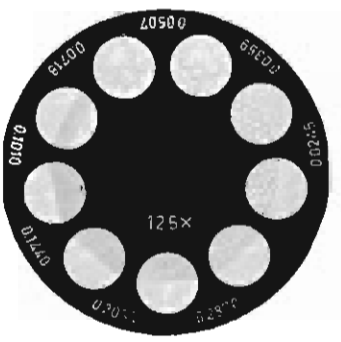
Comparison eyepiece for use with honeycomb-pattern graticules



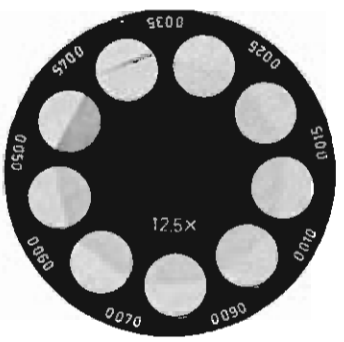
Revolving disc with 8 comparison slides of polished coal specimens and a micrometer plate (for the fusit analysis)



Revolving disc with 8 comparison slides of polished brass specimens and a micrometer plate



Revolving disc with 8 honeycomb-pattern graticules and a micrometer plate (for measuring grain sizes of cast iron)



Revolving disc with 9 honeycomb-pattern graticules (for measuring grain sizes on drawn or rolled brass)

0.0245 mm.
0.0359 mm.
0.0507 mm.
0.0718 mm.
0.1010 mm.
0.1440 mm.
0.2030 mm.
0.2870 mm.
Micrometer plate 10 mm. = 100 intervals.

4. Revolving disc with 9 honeycomb-pattern graticules (for measuring grain sizes of drawn or rolled brass) having the following dimensions:
0.010 mm.
0.015 mm.
0.025 mm.
0.035 mm.
0.045 mm.
0.050 mm.
0.060 mm.
0.070 mm.
0.090 mm.

Specifications:

Standard slide comparison eyepiece 10x, lamp attachment 8 volts 0.6 amps, swing-out prism for illuminating the comparison field, holding device for the interchangeable revolving discs, inclusive of the revolving disc for the fusit analysis, in container LIISB

Standard slide comparison eyepiece, as above, but with revolving disc for determining the constituents of bross LIHEG

Regulating transformer for connecting the 8 volt 0.6 amp lamp attachment to 110/220 volt A. C. mains BEEVY

Standard graticule comparison eyepiece 10x with holding device for the interchangeable revolving discs, inclusive of the revolving disc for measuring grain sizes of cast iron etc. LIHIN

Standard graticule comparison eyepiece, as above, but with revolving disc for measuring grain sizes of bross LIHUK

The honeycomb-pattern graticules can also be obtained separately.

7. The Determination of Absorption and Reflectance

Hand Spectroscopes



Hand spectroscope model V



Hand spectroscope model W

The hand spectroscopes are offered for a convenient and rapid observation of absorption and emission spectra.

Both models incorporate a triple Amici prism with linear path of rays as well as an achromatic lens. Model V is equipped with a comparison prism which is illuminated by an adjustable mirror and can be shifted out of operation. The C-F dispersion extends through approximately 5°. Model W features a wave length scale and a C-F dispersion of approx. 7°.

An optional accessory is a clamping device to hold flasks with coloured liquids.

Specifications:

Hand spectroscope model V
with comparison prism, in case SPMEE
Hand spectroscope model V
with detachable holding device for flasks SREET
Hand spectroscope model W
with wave length scale, in case HEWEX
Hand spectroscope model W
with holding device for flasks HEWOZ
For full particulars see special leaflet and directions for use.

LEITZ Microscope Photometer

The microscope photometer which is used in conjunction with the vertical illuminator has been designed for measuring the reflectance on polished surfaces of ores, coal, metals etc. It fits all polarizing microscopes with the exception of the simple SM-POL stand. A changing slide renders it possible to carry out microscopic examinations in incident light with instantaneous transition to the measurement of reflectance.

Technical Description

Photometer head: The top part of the photometer is fitted to the straight microscope tube (in place of the photographic eyepiece). It incorporates the photometer cube which leads together the measuring beam and the comparison beam. The intensity variation of the comparism beam to be measured is achieved by two polarizing prisms one of which is rotated and coupled with a measuring circle. Readings are made by means of a vernier correct to 0.1°. The measuring and comparison beams are observed in the inclined eyepiece with focusing eyelens; a slot is provided in the eyepiece for the insertion of filters. The eyepiece shows the fields of the two beams side by side so that the adjustment to equal intensity can be made very accurately. An auxiliary magnifier can be swung in position in front of the eyepiece to check the proper adjustment of the complete photometer setup.

Changing slide with light entrance tubes:
A changing slide carries the light entrance tubes for both the photometer and the vertical illuminator.
The photometer light entrance tube holds a slit diaphragm, a light dividing prism and the rotatable polarizing prism. The light entrance tube of the vertical illuminator is equipped with a revolving disc with central stops, a collector, aperture iris diaphragm, half-stop, and a rotatable polarizer. The changing slide is mounted on a bracket which fits the microscope. With the LABORLUX-POL and the DIALUX-POL the bracket is received by a dovetail fitting on the lamp carrier which for the use of the equipment for reflectance measurements is supplied in a specially long model. The ORTHOLUX-POL and the PANPHOT take the changing slide with the entrance tube equipment in their horizontal dovetail fitting underneath the bracket holding the interchangeable observation tube.



LEITZ microscope photometer in position on the DIALUX-POL

Specifications:

Photometer head, as described	IFGOV
Changing slide with light entrance tubes	IFGUW
Set of 3 light filters fitting eyepiece slot	IRDQI
Gray filter	IEEVP
Light-screening curtain	IFHAS
Totally reflecting calibration prism in mount	IEERM
10 calibration diaphragms	IEEPM
Equipment required for ORTHOLUX-POL and PANPHOT-POL	
Vertical illuminator for ORTHOLUX-POL, as described on page 25, but exclusive of front collector and polarizer	PEEHL
Vertical illuminator for PANPHOT-POL, exclusive of front collector and polarizer, but with illuminating tube (An existing polarizing vertical illuminator can be used; the polarizer must be detached.)	PEENS
Complete microscope photometer for ORTHOLUX-POL	IIWTQ
Complete microscope photometer for PANPHOT-POL	IIWZC
Equipment required for LABORLUX-POL and DIALUX-POL:	
Vertical illuminator, as described on page 24, but fitted to a specially long bracket, without collector and polarizer	PEELP
Complete microscope photometer for LABORLUX-POL and DIALUX-POL	IIWXY

8. Determination of Changes of Condition at Various Temperatures

LEITZ
Heating Microscope with Polarizing Equipment
(Model III P)

The observation of modification changes and phenomena in polarized light, the effects of strain and stress through considerable changes in temperature, these are some of the types of work which can be systematically carried out by means of the LEITZ heating microscope.

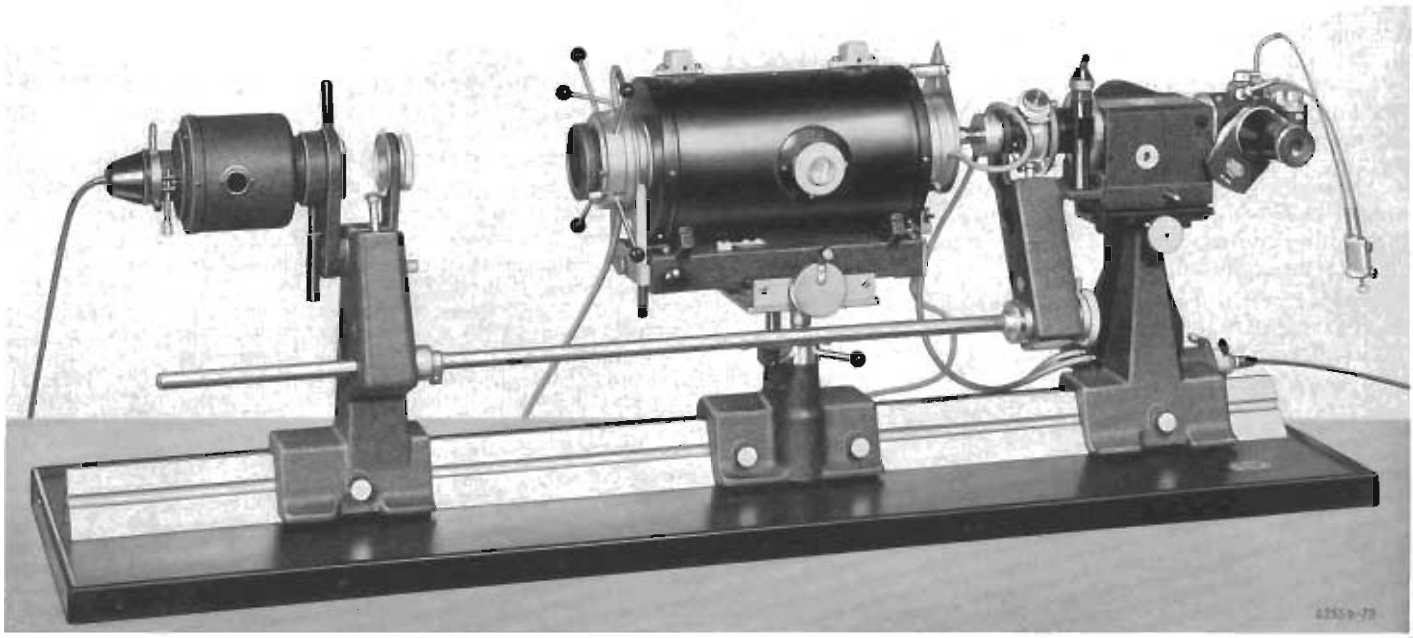
The outfit illustrated below includes a polarizer fitted to the illuminating stand and an analyser arranged in the microscope tube. These components can be rotated singly or jointly by means of a connection bar.

For the reception of compensators the tube is provided with two slots one of which is coupled with the synchronous rotation of polarizer and analyser so that the orientation of the compensator is retained when use is made of the synchronous adjustment of the polarizing elements.

Path differences up to 1 wave length are measured with the aid of a ¼ wave plate according to the Sénarmont method, while for higher path differences the Berek rotary compensator is recommended.

The analyser setting and that of the Berek compensator are read by vernier to 0.1°. These values and also the temperature scale appear on the ground glass screen and are automatically recorded when photographs are being taken. Examinations can be made over a wide temperature range since electrical furnaces are available in three models (up to 700°, 1100° and 1800° C respectively) to suit all requirements.

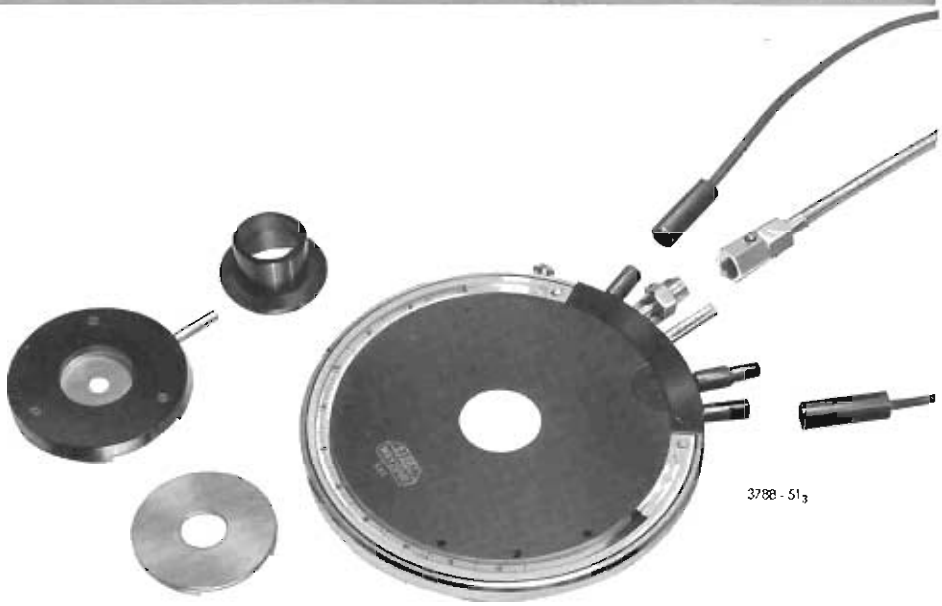
(For full particulars and prices see catalogue 73–3b/Engl.)



Heating microscope model III P with electrical furnace for temperatures up to 700° C

Microscope Heating and Cooling Stage – 20 to + 80° C with Automatic Thermo Control

The heating and cooling stage with automatic thermo control fits ordinary microscope stands for the examination of specimens unter cooling down to –20° C or heating up to +80° C. It is equally suitable for observations with continuously rising or falling temperatures.



Microscope heating stage with connecting cables, cooling tube connection, built-in thermometer, temperature stabilizing chamber (bottom left), nitrogen chamber (centre left) and protection tube (top left)

Specification:

Heating and cooling stage –20° to +80° C complete with temperature stabilizing plate, regulating transformer for 110/220 volts A. C. with ammeter and cable, connection piece and 2 rubber tubes for circulation cooling, metal tube with connection nuts, safety valve and adjustable locking valve for the carbon dioxide cylinder, washer, 3 hexagon spanners for fitting the metal tube. The base plate fits the rotating object stage of the microscope. In wooden case HEGAG

Heating stage +80° C, without freezing equipment, otherwise as described above HEGEH

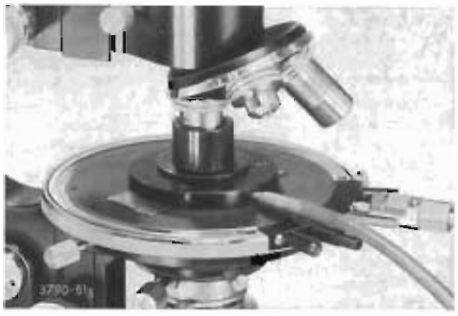
Freezing equipment to supplement the HEGEH outfit to a complete heating and cooling stage EEAHP

Nitrogen chamber and protection tube HEDEP

Thermometer with support to read the temperature on the specimen HECUH



Microscope heating stage with temperature stabilizing chamber in position



Microscope cooling stage with attached nitrogen chamber and protection tube for screening off air from the outside

LEITZ Microscope Heating Stage Model 350

This stage covers a temperature range of from –20° up to +350° C and features an ingenious arrangement for reading the temperature within the field of view of the eyepiece.

The apparatus consists of a base with built-in heating coil and the specimen chamber. A centring device allows of adjusting the specimen for adequate positioning. The heating coil is surrounded by a cooling chamber for circulating water or carbon dioxide. The specimen chamber is detachable and can therefore be replaced by other attachments.

The temperature is read in a most convenient and accurate manner within the eyepiece. The field in which the thermometer scale appears can be varied in size so as to enable observations to be made through smaller or greater temperature ranges without interrupting the observation of the specimen.

The heating and cooling stage model 350 can be accommodated on any microscope stage.

For routine work a special heating stage stand is available

The objectives 6/0.18, 10/0.25 as well as UM 20/03 B and UM 32/0.30 are particularly recommended for use with the heating stage.

Specification:

Microscope heating stage model 350

comprising base with built-in heating coil and circulation cooling arrangement, specimen holder on slide, quartz cover discs, 3 thermometers, 50 special object slides and 100 cover glasses, in case, regulating transformer with connecting cable for 110/220 volts A. C. HEBOF

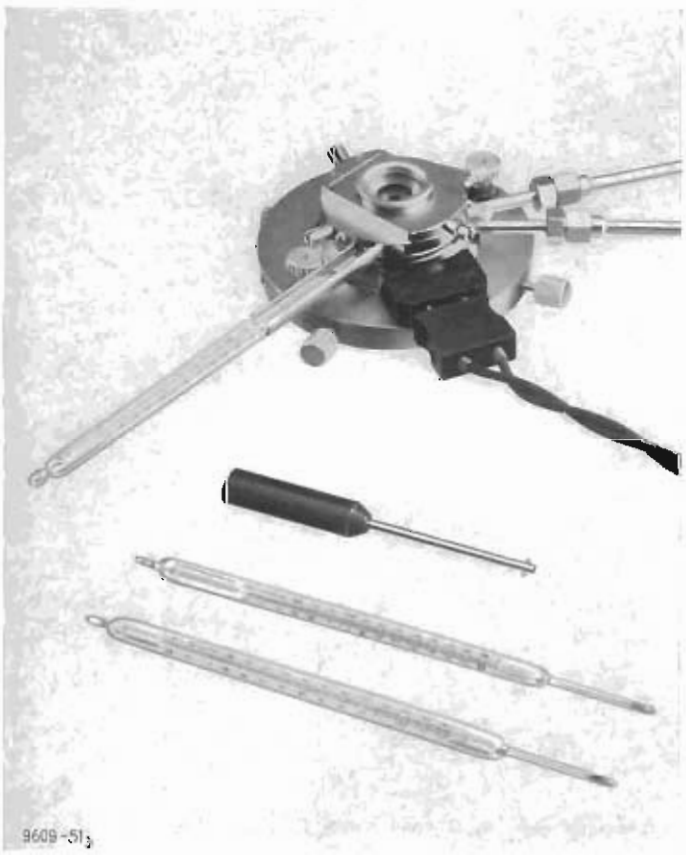
Ramsden eyepiece 10x with arrangement for temperature reading in the field of view, fitting the inclined observation tube 30 mm. through the interposition of an eyepiece adapter HEDOH-HEGOK

Recommended objectives for the model 350 heating stage:

When using a polarizing microscope with objective changer or vertical illuminator the low-power objectives for work in transmitted light up to and including the achromatic system P 10/0.25 can be successfully employed. For higher magnifications we recommend objectives of the series specially designed for use with heating stages (tube length ∞):

5/0.09 with free working distance 13.2 mm.	RVIIN
10/0.18 with free working distance 13.6 mm.	RVZII
H 20/0.40 with free working distance 8.3 mm.	HEFAF
H 32/0.60 with free working distance 5.7 mm.	HEFEG

The free working distance is measured inclusive of the quartz cover disc of the heating stage (1.8 mm. thick). A detailed catalogue is available free on request.





Microscope heating stage 350 mounted on special heating stage stand with eyepiece temperature reading (See catalogue 51—33/Engl. for full details)



LEITZ Microscope Heating Stage Model 1000

(for temperatures up to 1000° C)

This microscope heating stage offers all facilities for investigations at high temperatures in both transmitted and incident light. Its main field of application is in the microscopic detection of physico-chemical changes in materials such as silicates and the various types of glass.

The apparatus comprises a heating coil with cable connection (1), a metal body with cylindrical aperture to receive a quartz object slide of 6.9 mm. dia., a thermocouple with connection (4) for the galvanometer, a cooling chamber with connection tubes (3) for the water circulation, 2 cylindrical sleeves (2) to conduct protective gas through the specimen chamber, a top cover plate with screw thread and a revolving disc with 3 quartz windows and a free aperture. The heating coil is connected to a regulating transformer with fine adjustment.

The quartz windows in the revolving top plate are 1 mm. thick and moved on to the following one if in the case of steaming specimens moisture settles on the inside of the quartz window. The free aperture of the revolving disc is required for inserting the specimen into the heating chamber.

The lower part of the stage is fitted with two protruding centring screws for adjusting the specimen slide.

Specification:

Microscope heating stage model 1000

Heating coil (1000° C) with connection and 3 ft. cable, metal body to receive the object slide, cooling chamber with connections for water circulation, 2 tubes 4 x 6, 1250 mm. and 500 mm. long, 1 tube 10 x 14, 1250 mm. long, intermediate tube adapter, top cover with screw thread and revolving holder with 3 quartz windows an a free aperture, built-in platinum platinum + rhodium thermocouple with 2 compensating wires, tube sleeves for the conduction of protective gases, centring device and 2 fixing screws HATII

10 object slides of quartz 6.9 mm. dia., 1 mm. thick HBIIC

Case to hold the stage and its accessories HBVII

Complete heating stage model 1000 HEBII

Temperature reading instrument (galvanometer) with 1200° C scale HCIIN

Regulating transformer with built-in fine adjustment 0–15 volts, 300 VA, for connection to 100/220 volt A. C. mains REVOZ

Replacements:

Thermocouple platinum-rhodium 0.3 mm. dia., 95 mm. long HDZII

Quartz object slide 6.9 mm. dia., 0.7 mm. thick HDIIM

Quartz window 18 x 1 mm. for the revolving holder HFDII

Recommended objectives:

For temperatures up to 700° C:

Achromatic objective 6/0.18 ACEDU

Achromatic objective 10/0.25 ACORA

For temperatures up to 1000° C:

Objective UM 20/0.33 ICPBI

Objective UM 32/0.30 ICQDI

Low-power ULTROPAK objectives up to and including UO 6.5x

LEITZ Vacuum Heating Stage



Polished specimens of ores, metals, ceramic materials, hard coal etc. can be examined as to their behaviour under systematic heating up to +1050° C in a vacuum or any gaseous atmosphere by means of the vacuum heating stage.

The temperature is controlled by means of a regulating transformer and measured by means of a thermocouple and a galvanometer. Observations are possible at magnifications up to 200x.

The equipment suitable for work with this stage includes the objectives 6/0.18, UM 20/0.33 and UM 32/0.30.

Specification:

Vacuum heating stage equipped for heating specimens in a vacuum or a gaseous atmosphere up to 1050° C, with water circulation cooling, thermocouple and temperature reading instrument, regulating transformer for 110/220 volts A. C. Complete outfit HIIGU

Galvanometer, calibrated up to 1200° C HIICN

For full particulars see special catalogue.

C Other Instruments for Optical Examinations in Polarized Light

D Photomicrographic Equipment

E Special Light Sources

C. Other Instruments for Optical Examinations in Polarized Light

Binocular Prism Magnifiers

with polarizing equipment

Magnifications 3.5–10.5x and 10–30x.

The stereoscopic method of observation, the long free working distance and the wide field of view in which the object is seen in its normal position make these instruments ideal for all types of inspection and dissecting work.



Technical Description

There are two binocular magnifier bodies with built-in objectives and an identical set of 3 pairs of interchangeable eyepieces for total magnifications 3.5x, 7x, 10.5x and 10x, 20x, 30x respectively. These bodies incorporate a rack and pinion focusing motion with controls on both sides and a dovetail slide. With this they are mounted on a long and short handle respectively which in turn fit a stage with full equipment for observations in incident and transmitted light. The rear foot of the stage can be swung out of its normal position for inclining the stand as a whole. The polarizing equipment consists of a pair of filter analysers, a revolving stage and a filter polarizer. The filter analysers are mounted on a slide held in a carrier which fits over the magnifier objectives and has a slot for the insertion of compensators. The revolving object stage has lateral centring screws and a substage sleeve in which the polarizer is clamped.

Illuminating Equipment

For observations in both transmitted and incident light the MONLA microscope lamp with filament bulb 6 volts 30 watts will be found very satisfactory (for particulars see p. 57).

Optical Data

Magnifier body for low magnifications
Free working distance 144 mm. (approx.)

Pair of eyepieces	a 5	a 10	a 15
Magnification	3.5x	7x	10.5x
Diameter of the field of view (approx.)	45 mm.	30 mm.	21 mm.

Magnifier body for high magnifications
Free working distance 79 mm. (approx.)

Pair of eyepieces	a 5	a 10	a 15
Magnification	10x	20x	30x
Diameter of the field of view (approx.)	16 mm.	11 mm.	8 mm.

Outfits

Binocular prism magnifier for low magnifications
(3.5–7–10.5x) with polarizing equipment

Magnifier body for low magnifications with rack and pinion focusing motion having control heads on either side	LUDUD
Pair of eyepieces a 5 (for 3.5x magnification)	LUKUL
Pair of eyepieces a 10 (for 7x magnification)	LUKEN
Pair of eyepieces a 10 (for 10.5x magnification)	LUKAR
Interchangeable long handle	LONGA
Stage for transmitted light with inclinable foot, large illuminating mirror, attachable wooden hand rests	LUCAX
Revolving object-stage with polarizer and bracket with analyser fitting the magnifier body	LUPIM
Cabinet for the complete outfit	LUCUC
Complete binocular magnifier 3.5–10.5x, in cabinet	**LUGAB**

Optional Accessories

First-order red compensator 21 mm. dia.	LUPUP
Quarter-wave compensator 21 mm. dia.	LURAL

Binocular prism magnifier for high magnifications
(10–20–30x) with equipment for polarized light

Magnifier body for high magnifications with rack and pinion focusing motion having control heads on either side	LUBAW
Paired eyepieces a 5 (for 10x magnification)	LUKUL
Paired eyepieces a 10 (for 20x magnification)	LUKEN
Paired eyepieces a 15 (for 30x magnification)	LUKAR
Interchangeable short handle	LUBEX
Stage for transmitted light with inclinable foot, large illuminating mirror, attachable wooden hand rests	LUCAX
Revolving object stage with polarizer and bracket with analyser fitting the magnifier body	LUPON
Cabinet for the complete outfit	LUDOC
Complete binocular magnifier 10–30x, in cabinet	**LUGEC**

Optional Accessories

First-order red compensator 13 mm. dia.	LUREM
Quarter-wave compensator 13 mm. dia.	LURIN

A special leaflet on pillar stands for the magnifier bodies is available on request.



Stereoscopic microscope

Stereoscopic Microscopes with Polarizing Equipment

Magnifications 8–216x.

Stand for transmitted and incident light with dovetail fitting receiving either a stereo microscope body with changer for single pairs of objectives or a body with rapid changer for 3 pairs of objectives (two being interchangeable and one being a pair of 1x objectives permanently fitted).
Revolving and centring object stage with graduation in degrees and vernier, 2 stage clips, spring sleeve to receive a polarizer and a universally adjustable illuminating mirror with a white opaque disc at the back.
Rotating polarizer with ground glass disc in cylindrical mount fitting the sleeve underneath the object stage.

1. Stereo microscope body with slide changer for single pairs of objectives

The microscope body incorporates a rack and pinion focusing motion with controls on either side. A dovetail fitting receives a bracket with a pair of analysers. A slot is provided for the insertion of compensators (quarter-wave or first-order red plates). One pair of standardized objectives rigidly mounted as one unit is inserted at a time into the precision objective changer.

2. Stereo microscope body with rapid objective changer

This microscope body differs from the one described under 1. by its horizontal precision slide with 3 pairs of objectives which can be rapidly brought into position by operating a lateral control head. The objectives are so matched that the image remains in position when the changeover is made only a slight re-focusing may be necessary occasionally. Click stops are provided for the correct settings. 2 pairs of objectives can be interchanged for other systems while the third pair is a 1x equipment which is permanently mounted. The magnification range can thus be varied at will between 8 and 216x.

Specification:

Stereoscopic microscope for observations in polarized light

Stereo microscope body with inclined eyepiece tubes which can be set to the interpupillary distance and clamping collars for the eyepieces, objective changer for single pairs of objectives. Rack and pinion focusing motion with control heads on either side, dovetail fitting for mounting the body on various types of stands. Bracket with slide fitting to receive the analyser.

Stand for work in transmitted and incident light with universally adjustable large illuminating mirror and white opaque disc at the back. 2 stage clips. Attachable wooden hand rests. Detachable revolving and centring object stage on metal base, rotating polarizer, opal and black glass plates fitting the stand in place of the rotating stage for observation in ordinary incident light. Dovetail fitting taking the stereo microscope body.

Wooden cabinet with fittings to hold objectives and eyepieces, with lock and key

Complete stereo microscope, exclusive of objectives and eyepieces **GUVEB-GOZUC**

Optional accessories:

Slide with 2 wave plates (red 1st order) 13 mm. dia. GRAJS

Slide with 2 quarter-wave plates 13 mm. dia. GRAKT

Stereoscopic microscope with rapid objective changer and polarizing equipment

Stereo microscope body with inclined eyepiece tubes with adjustment to the interpupillary distance and clamping collars for the eyepieces, rapid objective changer for two interchangeable pairs of objectives and 1 permanently mounted pair with magnification factor 1x. Slide with analysers which can be put out of operation. Rack and pinion focusing motion with control heads on either side. Dovetail fitting to attach the microscope body to a stand.
Stand for observations in transmitted and incident light with large illuminating mirror with a white opaque disc at the back, 2 stage clips, one pair of attachable wooden hand rests. Revolving and centring object stage on metal base with which it can be removed from the stand for insertion of a opal or black glass plate for incident light observations without polarizing equipment. Dovetail fitting to receive the stereo microscope body. Wooden cabinet with fittings to accommodate objectives and eyepieces.
Complete stereo microscope, exclusive of objectives and eyepieces **GRAPY-GOZAX**

Extra for supplying the stereo microscope body with 180° rotation to the eyepiece tubes (which is essential when fitting the body to a pillar stand) GUZUK

Optional Accessories

Slide with first-order red plate, 30 mm. dia. GOZIZ

Slide with quarter-wave plate, 30 mm. dia. GOZEY

Paired objectives and eyepieces

Pair of objectives 1x (for microscope GUVEB only) GRIRC
Pair of objectives 2x GRERB
Pair of objectives 4x GRESC
Pair of objectives 8x GREWG
Pair of objectives 12x GRIGS
Pair of wide field eyepieces G 8x GRAVD
Pair of wide-field eyepieces G 12.5x GRAWF
Pair of wide-field eyepieces G 18x GREHS
One of the eyepieces can be supplied with an adjustable eyelens (for focusing eyepiece micrometers), extra GREJT
Pair of hard rubber eyepiece caps GOXIX
Pair of eyepiece caps of soft rubber with metal mount GOXOY

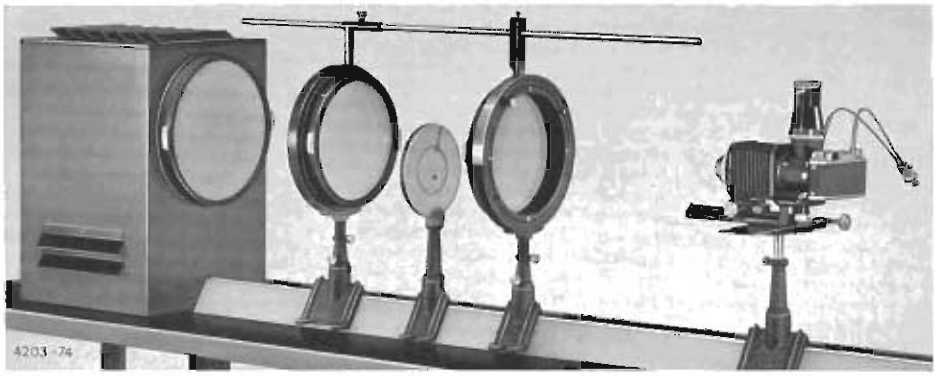
Eyepiece micrometers

for insertion under the eyelens (which should be adjustable as under GREJT)
Micrometer plate 10 mm. = 100 intervals YGEEQ
Micrometer plate 5 mm. = 100 intervals YHEEP
Micrometer plate 10 mm. = 200 intervals YMEEL
Line cross plate YSMEE
(For pillar stands etc. see special leaflet)

Magnifications, free working distances and fields of view

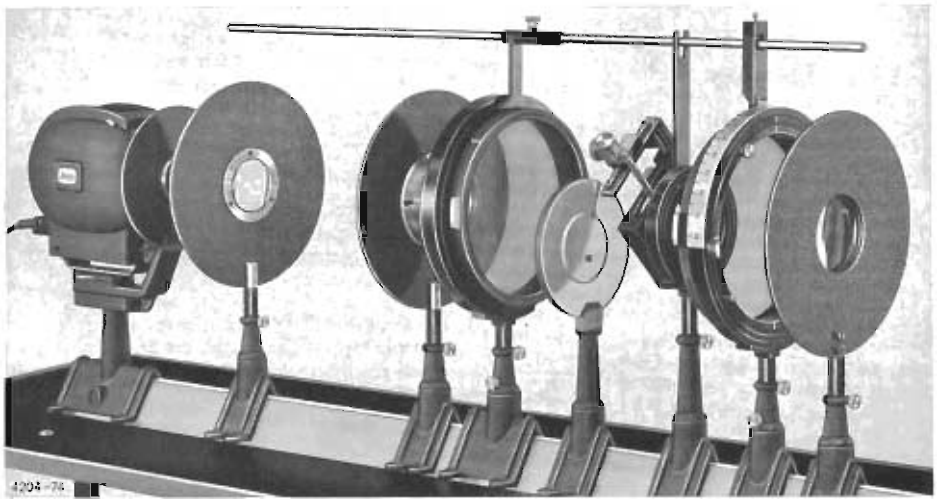
Objectives	Free working distance	Micrometer value with G 12.5 and 18 x	Eyepieces G 8 x Magnificat.	G 8 x Field of view mm.	G 12.5 x Magnificat.	G 12.5 x Field of view mm.	G 18 x Magnificat.	G 18 x Field of view mm.
1 x	105 mm.	100 µ	8	20	12,5	18	18	12
2 x	80 mm.	50 µ	16	10.0	25	9.0	36	6
4 x	47 mm.	25 µ	32	5	50	4.5	72	3
8 x	27 mm.	13 µ	64	2.5	100	2.3	144	1.5
12 x	18 mm.	8.6 µ	96	1.7	150	1.5	216	1

Large Polarizing Outfit for Strain and Stress Tests



▲ Outfit for examining two-dimensional states of strain and stress, with photographic equipment.

▼ Outfit for examining and measuring strain and stress, with BEREK compensator



The apparatus illustrated in two possible setups at the right is designed for examining and photographing states of strain and stress in models made of glass or suitable plastics or finished parts of these materials. Retardations are measured by means of the Berek rotary compensator and data ascertained as regards strain and stress.

Technical Description:

All parts necessary for carrying out strain and stress tests are fitted to saddle stands mounted on an optical bench; they include the light source, polarizing elements, condensers, objectives etc. The light source, either a 100 watt filament lamp for direct mains connection or a mercury vapour lamp, is accommodated in a lamp housing. The polarizer and analyser filters of large diameter can be rotated individually or synchronously by means of a coupling bar. The rotation can be read at intervals of 5°. Quarter-wave plates can be inserted with the appropriate orientation for examinations in circularly polarized light.

The equipment includes a saddle stand with vertically adjustable rod for which fixtures can be made to hold the objects to be tested.

The image of the object is projected on to a ground glass screen 24x24 cm. in size. For the measurement of retardations with the aid of the rotary BEREK compensator the large lamp housing is replaced by a special one on saddle stand which takes either a 100 watt low-voltage filament lamp or the mercury vapour lamp used in conjunction with an adjustable illuminating lens. In addition to the BEREK compensator the following accessories are required:

Collecting lens with filter holder, condenser and a projection lens.

The photographic equipment

To photograph stress or strain figures the ground glass screen is replaced by a LEICA 35 mm. camera with micro mirror reflex arrangement, focusing bellows and f/4.5 135 mm. HEKTOR lens. This equipment is fitted with a horizontal rack and pinion motion and mounted on a saddle stand.

Specification:

LEITZ polarizing outfit for strain and stress tests:
Prismatic bar, 2 m. long, with cm. scale, mounted on a wooden base with iron legs.
Saddle stands with equipment as follows:

No. 1 with lamp house and adjustable illuminating lens, low-voltage filament lamp 12 volts 100 watts with transformer for 110/220 volts A. C. and mercury vapour lamp CS 150 with reflector and starting equipment including connecting cables.
No. 2 with collecting lens and filter holder with green filters Nos. 200 b and 211.
No. 3 with illuminating objective 80 mm.
No. 4 with filter polarizer 8" dia. and ¼ wave mica plate. Both in rotating mounts.
No. 5 with Berek rotary compensator, rotating mount with rack and pinion motion.
No. 6 with filter analyser 8" dia. and ¼ wave plate, both in rotating mounts, operating through 180° with readings from 5 to 5°, coupling bar for synchronous rotation of the equipments of saddle stands Nos. 4, 5 and 6.
No. 7 with 80 mm. projection objective.
No. 8 with ground glass screen approx. 10" x 10" in wooden frame.
No. 9 with large lamp housing, ground glass disc and attachable green filter, filament lamp 100 watts for direct mains connection 110 or 220 volts, also with provision for fitting the mercury vapour lamp of saddle stand No. 1.
No. 10 with vertically adjustable rod for fitting a fixture to suit the type of specimen to be accommodated.

Large polarizing outfit for strain and stress tests, complete **SXIIN**

Supplementary photographic equipment
Saddle stand No. 11 with rack and pinion for horizontal lateral adjustment to take the photographic unit.
LEICA focusing bellows for using the f/4.5 135 mm. HEKTOR lens UXOOR-HE.
HEKTOR f/4.5 135 mm. lens to screw to the focusing bellows (exclusive of helical mount for rangefinder focusing).
Micro mirror reflex attachment with ground and clear glass focusing screens in revolving holder, 5x focusing magnifier, and double release (please state when ordering type of camera to be used) IFLEX
Photographic equipment (without LEICA camera) SYEII
Large polarizing outfit for strain and stress tests, inclusive of photographic equipment but exclusive of LEICA camera SYIIM
If no LEICA camera body is available we recommend the simple model Ig (without built-in rangefinder) OCEGO

Polarizing Attachment for the PRADO 250/500 Slide Projectors

The well-known LEITZ 2"x2" slide projector PRADO 250 or 500 can be effectively supplemented by a polarizing attachment for demonstrating polarization and double refraction phenomena for teaching purposes. With the aid of a set of selected specimens the equipment will produce excellent screen images to enable a large number of persons to see the fundamental features of polarization and methods of investigation based on it in mineralogy, petrography, crystallography and technology in general. The demonstrations include:



Equipped with the polarizing attachment the PRADO projector represents a fully efficient strain and stress testing apparatus.

For the projection of objects embedded in liquids, melting substances or specimens difficult to accommodate on the usual object holder the polarizing attachment can also be supplied in a vertical model with provision for horizontal specimen accommodation.

Projection distances and screen image sizes:

The diameter of the screen image depends on the projection distance and the focal length of the projection lens as well as the free aperture of the object stage which in this instance is 28 mm. in diameter.

Screen image diameters in feet with projection lenses

Projection distance in feet	85 mm.	100 mm.	120 mm.
6½	2	1½	1⅓
10	3¼	2½	2¼
13	4¼	3½	3
16½	5¼	4½	3½
20	6½	5½	4½
23	7½	6½	5¼
26		7¼	5¾
30			7
33			7½

The table values are approximate figures.

Birefringence and polarization in calcite,
Behaviour of anisotropic bodies in linearly and
circularly polarized light,
Dichroism,
Interference phenomena in polarized monochromatic and white light,
Double refraction by strain or stress,
Optical rotation power and rotation dispersion,
Determination of the relative size of refractive indices by the use of gypsum or mica plates (in the base of the lens sleeve).
Measurements of retardations with a quartz wedge, with a ¼ wave plate (Sénarmont's method), or with the BEREK rotary compensator,
Conoscopic images of uniaxial and biaxial crystals,
Determination of the optical character in the conoscopic image by means of a first-order red plate, a ¼ wave plate or the rotary BEREK compensator,
Measurement of the axial angle of a mica plate.

For the experiments and demonstrations outlined above the following specimens are supplied:

1. Calcite crystal with fixed pinhole stop
2. Anhydrite
3. Tourmaline
4. Gypsum of irregular thickness
5. Gypsum figure
6. Quartz wedge
7. Mica-quartz combination (white of 1st and higher orders)
8. Glass press
9. Strained glass
10. Quartz cut at right angles to the optic-axis, coalescence (left and right)
11. Soleil's double plate
12. Calcite cut at right angles to its axis
13. Aragonite vertical to 1st centre line
14. Muscovite (separation piece)
15. Topaz vertical to 1st centre line
16. Sugar vertical to one axis

Specifications of polarization equipment for the PRADO projector

Polarizing attachment, basic equipment, for horizontal use and orthoscopic demonstrations, comprising the attachment with long guiding rods, adjustable front support, air funnel, condenser and filter receptacle	KOUUF
Polarizer and analyser on clamping holders with connection bar for synchronous rotation	KQWUU
Rotating object stage on clamping holder	KRUUC
Lens sleeve on base with clamping screw and holder for quarter-wave or first-order plates	KUUPZ
Projection lens (as selected)	
HEKTOR f/2.5 85 mm.	UFOWU
HEKTOR f/2.5 100 mm.	UFSEU
DIMARON f/2.8 100 mm.	UEYSU
HEKTOR f/2.5 120 mm.	UFKOU
Complete attachment, horizontal model	KUUCT
Complete attachment, vertical model	KRYUU

Accessories for projecting conoscopic interference images: Condenser in centring mount and supplementary front lens on attachable holder	KSUUB

Accessories for demonstrations in circularly polarized light: Two quarter-wave plates in mount	KTCUU

Further accessories:

Slide with first-order red plate	KUUAS
Slide with quarter-wave plate	KUUBF
(These items fit the slot in the lens support)	
Rotary compensator after Berek on clamping holder and with detachable calcite plate	KUUDG
Mica plate* in sliding mount to replace the detachable calcite plate of the Berek compensator	KUUFH
Iris diaphragm, attachable to the lens	KUUGV
Green filter (540 μ)	KUUHI
Red filter (650 μ)	KUUIW
Set of 16 demonstration specimens, in case	KUULX
Carrying case for complete polarizing attachment	KUUML
If a PRADO projector 250 or 500 watts is not yet available the following basic apparatus is required for the polarizing attachment:	
PRADO 250 projector with aspherical condenser, reflector, heat-absorbing filter, lamp socket but exclusive of bulb, also without field condenser lens and slide front	UGYQU-O
Attachable blower unit (essential for 500 watt lamp)	UKMOU
Supplementary heat-absorbing filter for 500 watt lamp	UBMWU



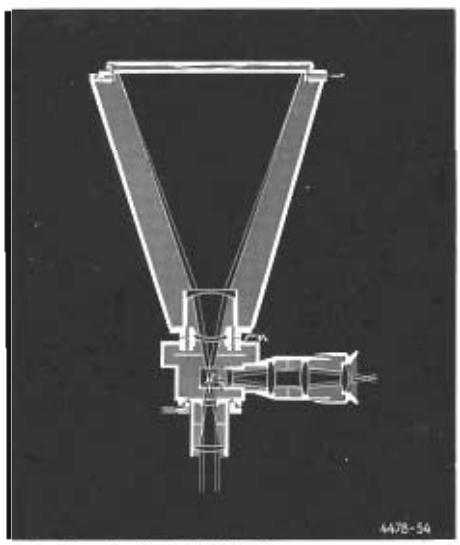
PRADO with polarizing attachment of vertical construction and BEREK rotary compensator in position

Micro-attachment with polarizing equipment for the PRADO projector

The PRADO projector fitted with a large micro projection attachment and a low-voltage filament lamp can be successfully supplemented for the projection in polarized light. Screen images of satisfactory brilliance can be obtained with magnifications up to approximately 1500x. Quotations for such equipment are gladly submitted upon request.

* Any air streaks which may be present in the mica plate do not adversely affect the demonstration. Since the selection of mica plates of this thickness (0.3 mm.) entirely free from air bubbles etc. would render them very much more expensive it was considered unnecessary to eliminate this insignificant defect.

The polarizing attachment fits all PRADO projectors, models 250 and 500 with serial numbers over 112,000. The ideal light source is the low-voltage filament lamp 250 watts 50 volts which necessitates a transformer or resistance but the ordinary 250 watt lamp for direct mains connection is also satisfactory. The projector should be equipped with a blower or a supplementary second heat-absorbing filter.



Path of rays in the MAKAM micro camera

D. Photomicrographic Equipment

All polorizing microscopes con be supplemented for photomicrographic work by means of relatively simple micro camera attachments (for 35 mm. film or quarter plates) or a large vertical camera with mirror reflex arrangement.



MIKAS micro attachment for the LEICA

The MIKAS Micro Attachment (for 35 mm. Film)

adapts any LEICA camera model for taking photomicrographs on 35 mm. black-and-white or colour films. The equipment includes a conical adapter with lens, a lateral focusing telescope which indicates the area photographed and enables the operator to view the specimen during the actual exposure, if necessary, a self-winding central shutter for B, T, and 1 to 125 sec. speed settings and flash synchronization. (When ordering please state the serial number or model designation of an existing LEICA camera to be used for this equipment.)

Specification

Micro attachment for the LEICA 35 mm. camera with conical adapter with lens 1/2x, lateral focusing telescope with swing-out prism, time and instantaneous shutter with flash synchronization, periplanatic eyepiece 10x, eyepiece clamping collar and two wire releases for prism and shutter operation, in case	MIKAS

Optional Accessories

Interchangeable intermediate adapter with lens 1/2x	GIIMW
Release coupler (for operating prism and shutter automatically in the correct sequence)	CALOS
LEICA camera Ig, without lens, viewfinder and film chamber	OCEGO
Wire release with fixing screw for the LEICA shutter	FINOT
Adapter with clamping collar for using the micro attachment on microscope tubes of 30 mm. dia.	GDIIK



Micro mirror reflex attachment IFLEX with LEICA

Micro Mirror Reflex Attachment IFLEX (for 35 mm. Film)

This equipment features ground glass observation and clear glass focusing by means of a 5x magnifier for all LEICA cameras fitted as shown in the illustration at the left. The focusing screens are mounted in a revolving holder. The possibility of observing the specimen during the actual time of exposure is also ensured by the lateral telescope with prism and central shutter. This equipment cannot be mounted directly on the microscope tube but requires a separate photographic stand such as the ARISTOPHOT fully described in a special catalogue. An illustration is shown on the following page.

Specification

Micro mirror reflex attachment for the LEICA with swing-out mirror, rotating rectangular diaphragm for setting the equipment for horizontal or vertical photographs, revolving holder with ground and clear glass screens, interchangeable 5x focusing magnifier and double release	IFLEX
Bracket with dovetail slide to fit the mirror reflex attachment to the prismatic bar of the ARISTOPHOT or PANPHOT cameras	EEXRL
Intermediate adapter 1/2x to screw between the central shutter and the mirror reflex housing	ZOIIL
Focusing telescope with swing-out prism, light-screening sleeve for the microscope, central shutter for time and instantaneous exposures, with flash synchronization, wire releases and release coupler for operating the prism and the shutter in the correct sequence	ZOCII



MAKAM camera attachment

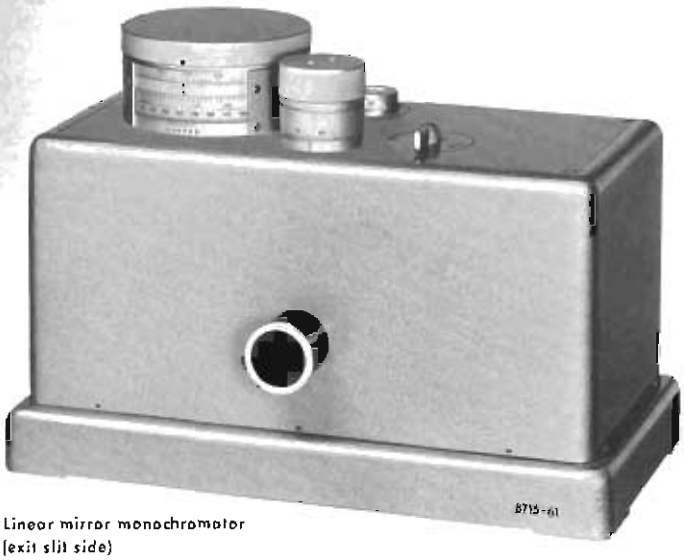
The MAKAM Camera Attachment (for Plates)

fits all microscopes and enables photomicrographs to be taken on plates 9x12 cm. or 3¼"x4¼". Focusing is achieved through a lateral telescope with image area graticule and a swing-out prism deflecting about 25% of the light of the image-forming rays for the purpose of focusing. It can be left in position even when the photograph is being taken at the expense of a longer time of exposure, of course. Two wire releases are supplied to operate the prism and the built-in time and instantaneous shutter.

Specification

Light-metal body with 2 darkslides, 1 ground-glass screen, central shutter for time and instantaneous exposures with flash synchronization, wire release, lateral observation and focusing telescope with swing-out prism and wire release, 10x periplanatic eyepiece of standard diameter and clamping collar for mounting the camera equipment on any microscope with vertical tube, in case	MAKAM
Intermediate adapter with clamping collar for fitting the MAKAM camera to microscope tubes of 30 mm. eyepiece diameter	GDIIK

Linear Monochromator for Ultraviolet and Visible Light



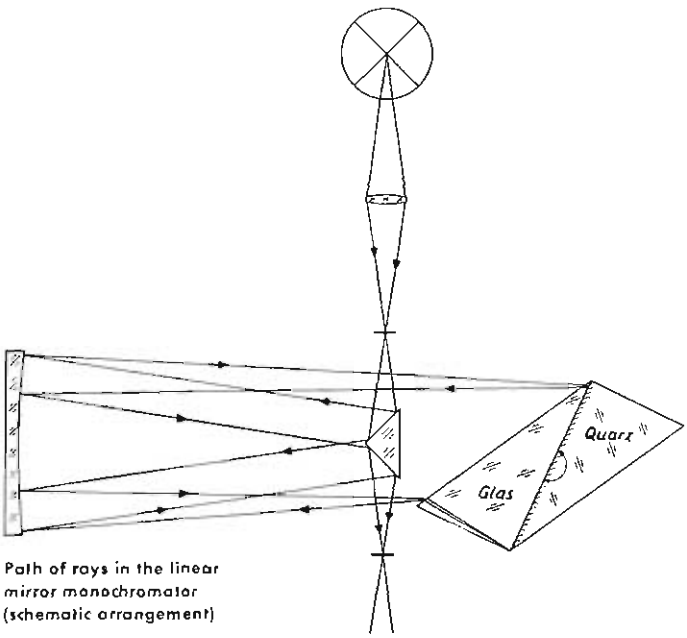
Linear mirror monochromator (exit slit side)

The LEITZ linear monochromator is built on the principle of a mirror monochromator in Littrow arrangement. The monochromatic beam leaves the instrument as if its optical axis was the linear extension of the axis of the illuminating cone. The aperture ratio is 1:4, and the focal length of the collimator and collector mirrors is 200 mm. The instrument incorporates 2 prisms which can be interchanged by simply operating an outside lever. The glass prism covers a wave length range from approximately 390 mμ. to 1100 mμ. while the second prism of homogenized Ultrosil covers the range 205 to 440 mμ. The required wave length is set by means of a drum head of 120 mm. diameter which has separate wave length scales for the two ranges and an additional evenly graduated scale with vernier. The entrance and exit slits are coupled and are usually set to the same width by means of the joint measuring drum head; a drum value of 10 corresponds to 0.2 mm. slit width. When for special purposes individual slit adjustment to different widths may be desirable, the coupling mechanism can be disengaged by lifting the measuring drum head.

An illuminating lens made of Suprasil quartz glass of high transmission for ultraviolet light is placed in front of the entrance slit. There are two interchangeable light sources, i.e. a 6 volt 30 watt filament lamp and a hydrogen lamp 80 volts 300 mA (type DL – 100). The latter is run through a special supply unit for connection to 220 volt mains which ensures a stabilized anode voltage with variations less than ± 1% of the mains voltage.

For special requirements the monochromator can be supplied with one prism and one light source only at a reduced figure. The rigid flat baseplate with which the monochromator is normally supplied can be unscrewed and replaced by a casting fitting on the prismatic bar of an optical bench.

A special form of the monochromator is made with an extended shaft which is coupled to the prism rotation to allow a continuous repetition of the complete working cycle of the prism throughout its spectral capacity. The outside shaft can be driven by a synchro motor or the driving unit of a recording instrument.



Path of rays in the linear mirror monochromator (schematic arrangement)

Specification:

Linear mirror monochromator with two prisms comprising the linear mirror monochromator in Littrow arrangement, aperture ratio 1:4, collimator and collector of 200 mm. focal length, glass prism for wave range 390–1100 mμ. and Ultrasil prism for wave range 205–440 mμ. with low-operated rapid changeover mechanism and lamp housing with 6 volt 30 watt filament bulb with prefocus base	IKAMS
Regulating transformer for the low-voltage lamp 110–220 volts A. C.	REDYX
Hydrogen lamp DL–100, 80 volts 300 mA with stabilized supply unit, complete for 220 volts A. C.	IKAHM
Complete linear monochromator (Quotations for equipment for other supply voltages on request)	**IKBAB**

MONLA Microscope Lamp



MONLA microscope lamp

For microscope stands without built-in illuminating system the MONLA microscope lamp is recommended as an efficient light source being equally suitable for all types of visual observation and photomicrography. It is particularly recommended for use with the binocular prism magnifiers as well as the stereoscopic microscopes. The lamphouse is adjustable in all directions on a pillar with heavy metal base and equipped with a centring lamp socket and a focusing illuminating lens. An iris diaphragm with filter frame can be clamped to the lens mount to provide most favourable illumination in the case of dark field observations. The type of bulb used is a 6 volt 30 watt filament lamp of high and even intensity as well as a very favourable spectral composition.

Specification:

MONLA microscope lamp with 6 volt 30 watt bulb, centring lamp socket with cable and plug, focusing aspherical illuminating lens, universal joint with clamping screws and supporting pillar on heavy base	DCBEE

Accessories:

Iris diaphragm with filter frame (50 x 50 mm.) to clamp to the mount of the illuminating lens	DEEMH
Heat-absorbing filter 50 x 50 x 3 mm.	LANEP
Special daylight filter	IFTAG
Monochromatic light filter for C line	IFACE
Monochromatic light filter for D line	IFADA
Monochromatic light filter for F line	IFOEF
Pillar stand for light filters	IFSTA
Regulating transformer for 100–220 volts A.C. with ammeter, cable and plug	REDYX
Regulating transformer for 160–250 volts A.C. with ammeter, cable and plug	REPOV

For D.C. supplies resistances, either fixed or regulating models, are quoted for on request.

Sodium Vapour Lamp

For microscopes with which the light of separate special light sources can be conducted to the illuminating equipment via an adjustable mirror, a sodium vapour lamp is available in a special model of the MONLA microscope lamp.

Specification:

MONLA lamp housing on pillar stand with special socket NARIB to receive a sodium burner	NAREZ
Sodium burner	NAPOB
Starting unit for 110 volts A.C.	NAPUL
for 220 volts A.C.	NARAY

Xenon discharge lamps and mercury vapour high-pressure lamps

can be supplied for special requirements and most exacting methods of microscopic work including fluorescence observations, photomicrography, micro-projection etc. They can be combined with any of our microscope models and will be quoted for with full details upon request. While the Xenon discharge lamp yields an intense light of an almost continuous spectral composition, the high-pressure mercury vapour lamp produces an illumination of spectral lines thereby making it particularly suitable for fluorescence work (see also page 18 on light sources for the PANPHOT camera microscope).

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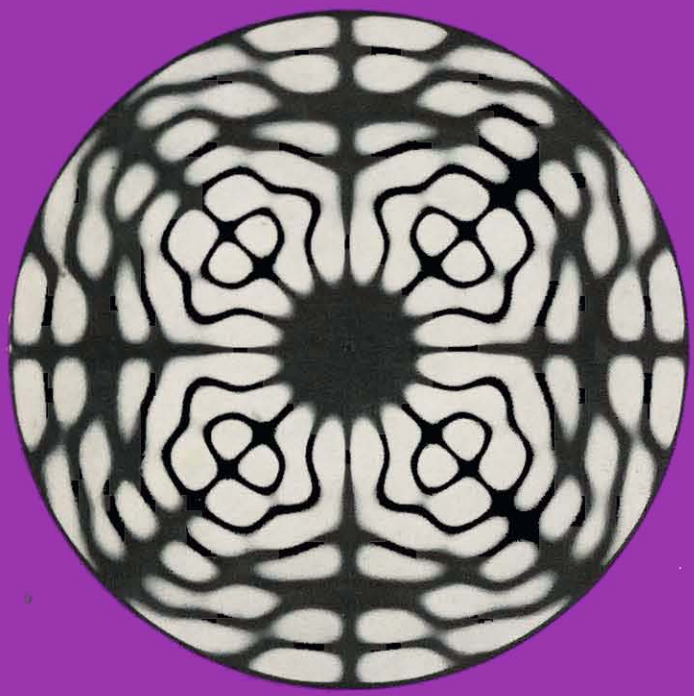
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List 55–20/Engl. Printed in Germany III / 60 / CX / L.

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PELIM-FE	$ 127.00
IIAXU	$ 39.00
IBLTI-IBXTI	$ 41.00
OBMET	$ 20.00
PUKAP	$ 28.00
IMJIT	$ 451.00
PEBOC	$ 113.00
PEBIB	$ 315.00
PEGAD	$ 374.00
PEHUK	$ 53.00
PEFIF	$ 90.00
PECOD	not available
PECIC(stage #38)	152.00
PEZUC	$ 107.00
PEXOY	$ 122.00
PEZOB	$ 79.00
RESEV	$ 42.00
RESUY	on request
LINOP	$ 3.00
NATEC	$ 143.00
NATAB	on request
NAPOB	$ 36.00
PEINT	on request
ISDEC	included with microscope

Page 12 Microscope DIALUX-POL

PEDEC	$1,754.00
PEBAY	$ 41.00
PETRI	$ 46.00
PECAZ	$ 109.00
PELIM-FE	$ 127.00
IIAXU	$ 39.00
IBLTI-IBXTI	$ 41.00
OBMET	$ 20.00
PUKAP	$ 28.00
IMJIT	$ 451.00
PEGOH	$2,205.00
PEGUJ	$2,233.00
PEPUS	$ 594.00
PEBUD	$ 91.00
PEBIB	$ 315.00
PEFOG	$ 412.00
PEHUK	$ 53.00
PEFED	$ 71.00
PEZUC	$ 107.00
PEXOY	$ 122.00
PEZOB	$ 79.00
PAZUR	$ 154.00
RESEV	$ 42.00
RESUY	on request
LINOP	$ 3.00
NATEC	$ 143.00
NATAB	on request
NAPOB	$ 36.00
PEIMS	on request
ISDEC	included with microscope

Page 13 Microscope EPILUX-POL

PEMAK	$1,371.00
IICVO	$ 41.00
IICYU	$ 74.00
IICXS	$ 131.00
IIDAX	$ 155.00
IIDCB	$ 207.00
IIAXU	$ 39.00
IIWRM	$ 41.00
IBLTI-IBXTI	$ 41.00
IIDMU	$ 31.00
IMJAR	$ 760.00
PEMEL	$2,131.00

Page 16 Microscope ORTHOLUX-POL

OLVAX(FS 45/237)	1,620.00
PEZIZ	$ 146.00
PEZAX	$ 120.00
OZARB	$ 44.00
EYMZE	$ 75.00
PEVIV	$ 343.00
REDYX	$ 67.00
PEBAY	$ 41.00
PETRI	$ 46.00
PECAZ	$ 109.00
PELIM-FE	$ 127.00
IIAXU	$ 39.00
IBLTI-IBXTI	$ 41.00
PEHUK	$ 53.00
OBMET	$ 20.00
PUKAP	$ 28.00
IMJOV	$ 504.00
OPARK	$ 428.00
OLTUB	$ 99.00
RPIIT	$ 41.00
IWMBI	$ 12.00
IICVO	$ 41.00
IICYU	$ 74.00
IICXS	$ 131.00
IIDAX	$ 155.00
IIDCB	$ 207.00
IIWRM	$ 41.00
IIDMU	$ 31.00
IMJUW	$ 680.00
OLVEY-REDYX	$2,773.00
OLVIZ-REDYX	$2,799.00
OLVOB-RERAS	$4,081.00
OLVUC-RERAS	$4,107.00
PEZIZ	$ 146.00
PEXUZ	$ 161.00
PEZAX	$ 120.00
OPARK	$ 428.00
PABAM	$ 136.00
IIXVT	$1,703.00
EYMZE	$ 75.00
OLTUB	$ 99.00
OLTAW	$ 174.00
REDYX	$ 67.00
REPOV	on request
RERAS	$ 115.00
REPIT	on request
LINID	$ 3.00
PEVIV	$ 343.00
PEVET	$ 644.00
IIWTQ	$1,681.00
EEVIB	$ 53.00
ISCIC	included with microscope

Page 20 Microscope PANPHOT-POL

PIBAC	$2,923.00
PEXUZ	$ 161.00
PEVET	$ 644.00
OZARB	$ 44.00
PEBAY	$ 41.00
PETRI	$ 46.00
PECAZ	$ 109.00
PELIM-FE	$ 127.00
IIAXU	$ 39.00
IBLTI-IBXTI	$ 41.00
PEHUK	$ 53.00
OBMET	$ 20.00
PUKAP	$ 28.00
IMJOV	$ 504.00
OPORN	$ 433.00
RPIIT	$ 41.00
IWMBI	$ 12.00
IICVO	$ 41.00
IICYU	$ 74.00
IICXS	$ 131.00
IIDAX	$ 155.00
IIDCB	$ 207.00
IIWRM	$ 41.00
IIDMU	$ 31.00
IMJUW	$ 680.00
PIBEL	$4,276.00
PIBIM	$4,235.00
PIBON	$5,442.00
PIBUP	$5,401.00
PEZIZ	$ 146.00
PEXUZ	$ 161.00
PEZAX	$ 120.00
PEVET	$ 644.00
OPORN	$ 433.00
PABEN	$ 141.00
IIYBE	$1,720.00
IIWZC	$1,686.00
NPIIL.(LILOM)	$ 9.00
REWOB	$ 90.00
LAZIC/110V	$ 918.00
LAZOD/110V	$2,022.00
LAZUF/110V	on request

NIIVR.....$ 17.00

NIIUD.....$ 317.00

Page 21 OBJECTIVES

PEART.....$ 44.00
PETTA.....$ 36.00
PEBAY.....$ 41.00
IAYWI.....$ 40.00
PETME.....$ 46.00
PETRI.....$ 46.00
PEAMP.....$ 55.00
PEAPS-FE.....$ 81.00
IAZYI-FE.....$ 81.00
PECAZ.....$ 109.00
PETIS-FE .....$ 97.00
IBAZY.....$ 127.00

IBHOI.....$ 106.00
PEWAT.....$ 139.00
IBCDI.....$ 79.00
IBDFI.....$ 104.00

PELIM-FE.....$ 127.00

PEFAM.....$ 159.00
PEFOX.....$ 200.00
PEFUN.....$ 207.00
IBEHI.....$ 233.00

PLAVS.....$ 94.00
PLABY.....$ 118.00
PLASP-FE.....$ 182.00
PLARN-FE.....$ 373.00

ICNXI.....$ 47.00
ICOZI.....$ 53.00
ICPBI.....$ 85.00
ICQDI.....$ 94.00
IIWUS.....$ 106.00
PEHIH.....$ 123.00

IIATS.....$ 39.00
IICVO.....$ 41.00
IIOPS.....$ 49.00
IICWQ.....$ 58.00
IIORT.....$ 84.00
IEOXI.....$ 86.00
IICYU.....$ 74.00
IICZW.....$ 100.00

IICXS.....$ 131.00
IIDAX.....$ 155.00
IIDBZ.....$ 198.00
IIDCB.....$ 207.00
IIDEF.....$ 230.00

ICNXI.....$ 47.00
ICOZI.....$ 53.00
ICPBI.....$ 85.00
ICQDI.....$ 94.00
IIWUS.....$ 106.00
PEHIH.....$ 123.00

Page 22 EYEPIECES

IIAWS.....$ 39.00
IBLTI.....$ 25.00
IBLTI-IBXTI....$ 41.00
IIAXU.....$ 39.00
IIWRM.....$ 41.00

IBUNI-OCBUH....$ 38.00
PIIWF.....$ 38.00
IIWSO-OCBUH....$ 38.00
PEPEN-OCBUH....$ 42.00
PATEG.....discontinued

PERIR.....$ 31.00
PEROS.....$ 41.00
PERUT.....$ 43.00
PESAP.....$ 45.00
PESER-OCASY....$ 67.00

PAZAL-OCBUH....$ 53.00
PEHUK.....$ 53.00
PAZEM-OCBUH....$ 53.00
PAZIN-OCBUH....$ 64.00
PAZOP.....discontinued
PESIS.....$ 62.00
PESOT.....$ 82.00
PESUV.....$ 86.00
PELOM-OCASY....$ 112.00

PEOHM.....$ 39.00
PEXAV.....$ 39.00
PERAN.....$ 44.00
PEOLS-OCASY....$ 66.00
PEOMT.....$ 61.00
PEORX.....$ 70.00

PEUCK.....$ 78.00
PEXEW.....$ 78.00
PEREP.....$ 88.00
PATAF-OCASY....$ 116.00
PEUHP.....$ 122.00
PEUKS.....$ 140.00

EYEPIECE RETICULES

OCATZ.....$ 16.00
OCASY.....$ 16.00
OCBAC.....$ 16.00
OCAMT.....$ 16.00

OCUFI.....$ 18.00
OCUME.....$ 18.00
OEEFK.....$ 18.00
OFPLA.....$ 18.00

OCBUH.....$ 16.00
OCBIF.....$ 16.00
IBXTI.....$ 16.00

OCCAD.....$ 18.00
OCBOG.....$ 18.00
OCCEF.....$ 18.00

OCALS.....$ 16.00
ICKRI.....$ 16.00
ICLTI.....$ 16.00
ICMVI.....$ 16.00
OCARX.....$ 51.00

OCNET.....$ 18.00
OCFOK.....$ 18.00
OCHAJ.....$ 18.00
OCHOM.....$ 18.00
OCIKT.....$ 54.00

WRIGHT EYEPIECE

ICUMI.....$ 138.00

ANTOP.....$ 76.00
PIBIN.....$ 121.00
PIARZ.....$ 79.00
PIDOP.....$ 114.00
PIJON.....$ 78.00
KONAK.....$ 67.00
KOLEP.....$ 90.00
PISOL.....$ 56.00

Page 23 CONDENSERS

PEVAS.....$ 141.00
PEWOX.....$ 219.00
PEVIV.....$ 343.00
PEVET.....$ 644.00

ORBER.....$ 152.00
IKOHR.....$ 125.00
ORAPU.....$ 23.00
IKNOS.....$ 42.00
IKMOR.....$ 34.00

ORCIX.....$ 84.00
Without Case
ORCIXSINE.....$ 77.00
CONCI.....$ 69.00
OBSOT.....$ 141.00
OBSUV.....$ 235.00
OREBK.....$ 92.00
Without Case
OREBKSINE.....$ 86.00
SEEBK.....$ 78.00
OBTOV.....$ 87.00

Page 24 VARIOCOLOR

LUXOW-LUYOX....$ 162.00
LUXOW-LUYOY....$ 148.00
LUXOW-LUYAT....$ 150.00

VERTICAL ILLUMINATORS

PEDAB.....$ 527.00
RESEV.....$ 42.00
PEHAF.....$ 500.00
PEHEG.....$ 16.00

Page 25

OPARK.....$ 428.00
OPORN.....$ 433.00
QDIIC.....$ 12.00

IMMERSION CAPS

IKDUJ.....$ 17.00
IKEHN.....$ 17.00
IKELS.....$ 15.00

IKDAD.....$ 13.00
IKDEF.....$ 13.00
IKDOH.....$ 12.00

Page 26 ULTROPAK

AHPEE.....$ 52.00
AIEES.....$ 58.00
AIREE.....$ 71.00
AKEER.....$ 86.00
AKTEE[4]).....$ 105.00
ALEEQ[4]).....$ 117.00

ALVEE.....$ 99.00
PAKAW.....$ 106.00
AMEEP.....$ 115.00

ANEEO.....$ 155.00
ANZEE.....$ 186.00
AOBEE.....discontinued
AOEEN.....$ 129.00
APDEE.....$ 182.00
APEEM.....$ 209.00
AQEEL.....$ 219.00

AREEK.....$ 25.00
ARHEE.....$ 25.00
ASEEI.....$ 23.00
ASKEE.....$ 20.00
ATEEH.....$ 20.00
AUOEE.....$ 20.00
AWSEE.....$ 21.00

AQFEE.....$ 86.00

UBEEN.....$ 86.00
UAGEE.....$ 7.00
UBIEE.....$ 7.00
UCEEM.....$ 7.00
UCLEE.....$ 7.00
UEEAX.....$ 6.00

PEULT.....$ 245.00
PABAM.....$ 136.00
PABEN.....$ 141.00
IQHZI.....$ 9.00

KARAM.....$ 23.00
PEHEG.....$ 16.00
AXUEE.....$ 5.00

Page 27 PHASE CONTRAST

PHALZ/N.....$ 59.00
PHALZ/H.....$ 59.00

PHAWK.....$ 12.00

PHANC/N.....$ 76.00
PHANC/H.....$ 76.00
PHANC-H.(neg)..$ 76.00

PHASG-FE/N.....$ 228.00
PHASG-FE/H.....$ 228.00
PHASG-FE-H.(neg) 228.00

PHERG-FE/N.....$ 232.00
PHERG-FE/H.....$ 232.00
PHERG-FE-H.(neg) 232.00

PHESH/N.....$ 108.00
PHESH/H.....$ 108.00

PHEWL/N.....$ 121.00
PHEWL/H.....$ 121.00

PHEYN/N.....$ 200.00
PHEYN/H.....$ 200.00

PHELB-FE/N.....$ 230.00
PHELB-FE/H.....$ 230.00
PHELB-FE-H.(neg) 230.00

PHATH-FE/N.....$ 288.00
PHATH-FE/H.....$ 288.00

Page 28

PHAKY.....$ 146.00
PHAFT.....$ 8.00
PHADS.....$ 31.00
PHAMB.....$ 15.00
PFAHT.....$ 200.00
PFAGS.....$ 192.00

PEZUC.....$ 107.00
PEZIZ.....$ 146.00

IIXVT.....$1,703.00
IIYBE.....$1,720.00
RZHII-RXIIL....$ 96.00
PHADS.....$ 31.00
IIXWV.....$ 21.00

Page 28 ACCESSORIES

PIRAZ.....$ 138.00

MARKI.....$ 18.00

IIVYB.....$ 3.00
IIYEL.....$ 2.00
DOBAD.....$ 4.00
OBJEH.....$ 2.00
Set of 6: IWMBI 12.00
Set of 6: IVZDI 12.00

RPIIT.....$ 41.00

DECCO.....$ 2.00
DECKA.....$ 2.00
DECUL.....$ 2.00
IIVXZ.....$ 3.00
DEREM.....$ 2.00
DERIL.....$ 2.00
DERYT.....$ 2.20
DIMES.....$ 25.00
DOLEO.....$ 1.00
OLBAD.....$ 2.00

Page 29 UT STAGES

ICGLI.....$ 776.00
FEDRO.....$ 616.00
ICHNI.....$ 345.00
KOSID.....$ 55.00
FEGNO.....$ 55.00
FEGMA.....$ 55.00

FEGFU.....$ 11.50
FEGSE.....$ 11.50
DIMES.....$ 25.00
FEKLE.....$ 3.00

ICNXI.....$ 47.00
ICOZI.....$ 53.00
ICPBI.....$ 85.00
ICQDI.....$ 94.00
PEHOJ.....$ 21.00
PIZUT.....$ 9.00
IITLC.....$ 9.00
IITNG.....$ 9.00

Page 30

KOSOF.....$ 193.00
KOREB.....$ 30.00

KORIC.....$ 30.00
KOROD.....$ 30.00

KORUF.....$ 23.00
KOSAP.....$ 23.00
KOSEC.....$ 24.00
IIWUS.....$ 106.00
PEHIH.....$ 123.00

Page 31

IIRUX .....$ 173.00

PODUH.....$ 532.00

IVWXI.....$ 36.00
IZWLI.....$ 1.00
IVXZI.....$ 36.00
IZMYI.....$ 1.00

ICSHI.....$ 16.00
ICTKI.....$ 18.00

Page 34 ACCESSORIES

KOGIP.....$ 14.00

KOMER.....$ 12.00

KONOB.....$ 31.00

Page 35

KOMUB.....$ 29.00
KONAX.....$ 29.00
KONEY.....$ 15.00

KOJAN.....$ 77.00

KORAZ.(long)...$ 75.00
IIVZD.(short)..$ 75.00

BEREK.....$ 113.00
IBZXI.(extra)..$ 3.00
ELIPT.....$ 196.00

KOMAW.....$ 196.00
KONEY.....$ 15.00

KOMEX.....$ 207.00
KOMOZ.....$ 207.00
KONIZ.....$ 207.00

PIARZ.....$ 79.00
PIBIN.....$ 121.00
PIDOP.....$ 114.00

PIJON.....$ 78.00

Page 36

KONAK.....$ 67.00

KOLEP.....$ 90.00

PISOL .....$ 56.00

KOROK.....$ 69.00

APTOL.....$ 51.00

IDCBI.....$ 283.00
IDEFI.....$ 46.00
ICPBI.....$ 85.00
PEJEH.....$ 53.00

IDKQI.....$ 5.00
IDESI.....$ 5.00
IDUMI.....$ 5.00
IDNWI.....$ 5.00

Page 37

PEJAG.....$ 76.00

JELOT.....$ 95.00
JEMAR .....$ 109.00

JELAP.....$ 131.00
JEMES.....$ 145.00
JELUV.....$ 17.00
JELER.....$ 20.00
JENIV.....$ 31.00

JELIS .....$ 21.00
110V JENET
(instead of JEMIT) 87.00
NAPOB.....$ 36.00

Page 38

OBMET.....$ 20.00
OBTER.....$ 23.00
IIDMU.....$ 31.00

OKNOR.....$ 170.00

FASOC.....$ 248.00
KONAX.....$ 29.00
KONEY.....$ 15.00

Page 39

INTEG.....$ 704.00

IZBDI.....$ 12.00
ISFEI.....$ 9.00
ITBKI.....on request
IZCFI.....$ 25.00

IFPYI.....$ 85.00

PODIF.....$ 138.00

Page 40

INTAF.....$ 805.00
IZCFI .....$ 25.00

Page 41

LIISB.....$ 294.00
LIHEG.....$ 297.00
BEEVY.....$ 46.00
LIHIN.....$ 283.00
LIHUK.....$ 283.00

SPMEE.....$ 135.00
SREET.....$ 145.00
HEWEX.....$ 230.00
HEWOZ.....$ 242.00

Page 42

IFGOV.....$ 791.00
IFGUW.....$ 552.00
IRDQI.....$ 31.00
IEEVP.....$ 10.00
IFHAS.....$ 10.00
IEERM.....$ 21.00
IEEPM.....$ 2.00

PEEHL.....$ 264.00
PEENS.....$ 269.00

IIWFQ.....$1,681.00
IIWZC.....$1,686.00

PEELP.....$ 393.00

IIWXY.....$1,810.00

Page 44

HEGAG.....$ 427.00
HEGEH.....$ 358.00
EEAHP.....$ 69.00
HEDEF.....$ 23.00
HECUH.....$ 9.00

HEBOF.....$ 365.00
HEDOH-HEGOK....$ 174.00

RVIIN.....$ 101.00
RVZII.....$ 62.00
HEFAF.....$ 163.00
HEFEG.....$ 235.00

Page 45

HATII.....$ 354.00
HBIIC.....$ 17.00
HBVII.....$ 10.00
HEBII.....$ 381.00

HCIIN.....$ 444.00
REVOZ.....$ 230.00

HDZII.....$ 16.00
HDIIM.....$ 2.00
HFDII.....$ 6.00

ACEDU.....$ 26.00
ACORA.....$ 25.00
ICPBI.....$ 85.00
ICQDI.....$ 94.00

HIIGU.....discontinued
HCIIN.(instead
HIICN)...$ 444.00

Page 48 BINOCULAR PRISM MAGNIFIERS

LUDUD.....$ 173.00
LUKUL.....$ 31.00
LUKEN.....$ 43.00
LUKAR.....$ 43.00
LONGA.....$ 21.00
LUCAX.....$ 81.00
LUPIM.....$ 216.00
LUCUC .....$ 30.00
LUGAB.....$ 638.00

LUPUP.....$ 46.00
LURAL.....$ 31.00

LUBAW.....$ 163.00
LUKUL.....$ 31.00
LUKEN.....$ 43.00
LUKAR.....$ 43.00
LUBEX.....$ 18.00
LUCAX.....$ 81.00
LUPON.....$ 216.00
LUDOC.....$ 30.00
LUGEC.....$ 625.00

LUREM.....$ 29.00
LURIN.....$ 25.00

Page 49 STEREOSCOPIC MICROSCOPES

GUVEB-GOZUC....$ 707.00

GRAJS.....$ 26.00
GRAKT.....$ 23.00

GRAPY-GOZAX....$ 904.00

GUZUK.....$ 33.00

GOZIZ.....$ 45.00
GOZEY.....$ 37.00

GRIRC.....$ 45.00
GRERB.....$ 41.00
GRESC.....$ 44.00
GREWG.....$ 45.00
GRIGS.....$ 45.00
GRAVD.....$ 44.00
GRAWF.....$ 46.00

GREHS.....$ 48.00
GREJT.....$ 7.00
GOXIX.....$ 2.00
GOXOY.....$ 5.00

YGEEQ.....$ 20.00
YHEEP.....$ 20.00
YMEEL.....$ 20.00
YSMEE.....$ 20.00

Page 52 PRADO ATTACHMENTS

KUUCT.(no lens)$ 228.00
KRYUU.(no lens)$ 271.00
Colorplan f/2.5 90mm without outer sleeve #19228..$ 48.00
Hektor f/2.5 100mm without outer sleeve #19222.....$ 39.00
Hektor f/2.5 120mm without outer sleeve #19223.....$ 69.00

KSUUB.....$ 83.00
KTCUU.....$ 37.00
KUUAS.....$ 30.00

KUUBF.....$ 23.00
KUUDC/KUUFH....$ 133.00
KUUGV.....$ 20.00
KUUHI.....$ 14.00
KUUIW.....$ 14.00
KUULX.....$ 173.00
KUUML.....$ 51.00

Basic PRADO 500 #19249.....$ 92.40

Page 53 PHOTOMICROGRAPHIC EQUIPMENT

MIKAS-M.....$ 146.00

GIIMW-M.....$ 24.00
CALOS.....$ 12.80
KOOCT.....$ 147.00
FONOT.....$ 1.20
GDIIK.....$ 8.00
IFLEX-M.....$ 168.50
EEXRL-III.....$ 19.00
ZOIIL.....$ 23.00
ZOCII.....$ 138.00

MAKAM.....$ 207.00
GDIIK.....$ 8.00

Page 54

MITIX.....$ 147.00

Page 55 SPECIAL LIGHT SOURCES

IDULI.....$1,755.00
AWLEE-REDYX....$ 165.00

IIBUN.....$ 41.00
IKANT.....$1,961.00

HOJAK.....$ 380.00

KOOCT.....$ 147.00
FONOT.....$ 1.20

Page 56

IKAMS.....$3,186.00*
REDYX.....$ 67.00
IKAHM.....$ 960.00*
IKBAB.....$4,213.00*
*Prices subject to confirmation on receipt of order.

Page 57

DCBEE.(replaced by BEECH....$ 53.00

DEEMH.....$ 14.00
LANEP.....$ 7.00
IFTAG.....$ 13.00
IFACE.....$ 13.00
IFADA.....$ 13.00
IFOEF.....$ 20.00
IFSTA.....$ 17.00
REDYX.....$ 67.00
REPOV.....on request

NAREZ.....$ 55.00
NAPOB.....$ 36.00
NAPUC.(instead NAPUL...$ 34.00
NARAY.....$ 34.00

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