

# GEM Series



**Stereozoom Microscopes For Gemology**

## GEM Series

As a leading company in the supply of gemological microscopes, OPTIKA offers 3 series of microscopes purposely designed for this sector by using both brightfield and darkfield methods, SZM-GEM-1 / SZM-GEM-2, OPTIGEM-1 / OPTIGEM-2 and OPTIGEM-3 / OPTIGEM-4. Every microscope has been designed and manufactured in order to satisfy the requests of a very demanding industry; brightfield/darkfield, immersion analysis, light color temperature: no detail has been left to chance.

### Specifically Designed for Specialists

Gemological stereomicroscopes are meant to help with stone inspection. Jewels and gems have a variety of grades (or quality levels), which ultimately influence their value and cost on the market; therefore it is important to have solutions that are purposely designed for gemology. These stereomicroscopes are equipped with iris and darkfield condenser on the bottom light source, and with a set of on stage tweezers to hold the stone in place.

### Much More Than Gemological Stereomicroscopes

**OPTIGEM-1 & OPTIGEM-2** are two-in-one gemology instruments that can be used both in vertical and horizontal position in a very easy way, just by turning one knob (no disassembling and re-assembling operations are required). The horizontal position extends the use of a gemological microscope, giving the possibility to perform immersion analysis by submerging a sample in liquid. If the stone's refractive index is close to the liquid's one, immersion makes the interior more visible by reducing the effects of refraction and surface reflection. This enables you to see a gem's inclusions or color distribution more easily.

Immersion is also necessary to see crystal growth structures, which might help you separate natural from synthetic corundum. Features like curved growth striae in flame-fusion synthetics, or separation planes in assembled stones, are often far easier to see when the stone is immersed.



**Vertical position for standard gem analysis with darkfield illumination and polarizing technique**



**Horizontal position for immersion gem analysis**

### Incredibly Versatile Operations

**OPTIGEM Series** offers multiple options for illumination and contrast techniques, such as incident, transmitted and oblique brightfield darkfield, polarization and immersion analysis only on Optigem 1 & 2. They come with a special optical condenser configuration to ensure real, perfect darkfield application (see the dedicated chapter for further information).

# Stereozoom Microscopes For Gemology

## Ultrabright LED Condenser for Optimized Illumination

An ultrabright LED-based electronic condenser with intensity control allows to switch from brightfield to darkfield; it also produces perfectly the colour of daylight. The condenser uses a new optical configuration especially created in order to obtain a perfect darkfield application.

With darkfield observation, the unscattered beams from the image are excluded: as a result, the field around the specimen is generally dark.

An additional flexible arm and velvet-field slider produce extra contrast for crisp and vibrant images. The illumination of OPTIGEM microscopes is greatly performing and this brings this series to be ideal for precious stones and jewels evaluation.



## Get the most out of our accessories

A wide range of optional accessories completes these instruments: from gemology clip, iris aperture diaphragm, polarization analysis kit, optical unit to switch the darkfield from a "sharp" (gem exhibition) to a "soft" (diamond analysis) mode, translating cell holder with vacuum pick-up and quartz immersion cells complete and enhance the OPTIGEM-1 & OPTIGEM-2 performances. All the accessories can be stacked, in any order, while using the microscope both horizontally and vertically.



**ST-202**

### ST-202 - Polarizing analysis kit

Polarization technique allows to quickly determine if the stone at hand is isotropic or anisotropic or, at best, to determine the optic character of gemstones (twin planes, strain, pleochroism, etc.). It is also the preferred tool for separating synthetic Quartz from its natural counterparts. In addition, the polarizing microscope may be very useful for distinguishing solid inclusions from negative inclusions as well as for spotting polysynthetic twinning.

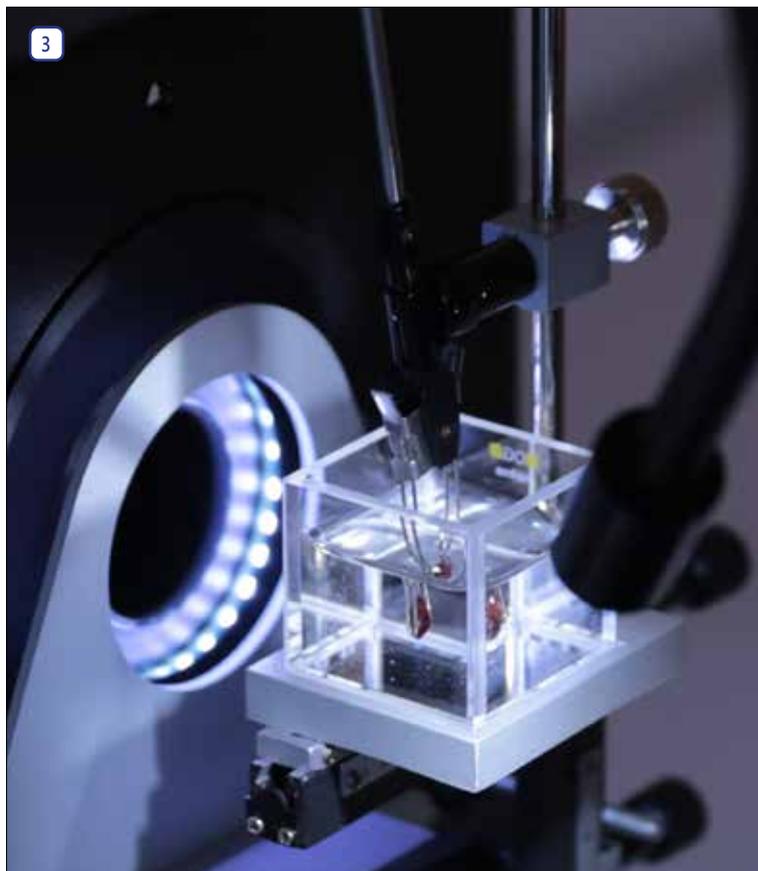
# GEM Series

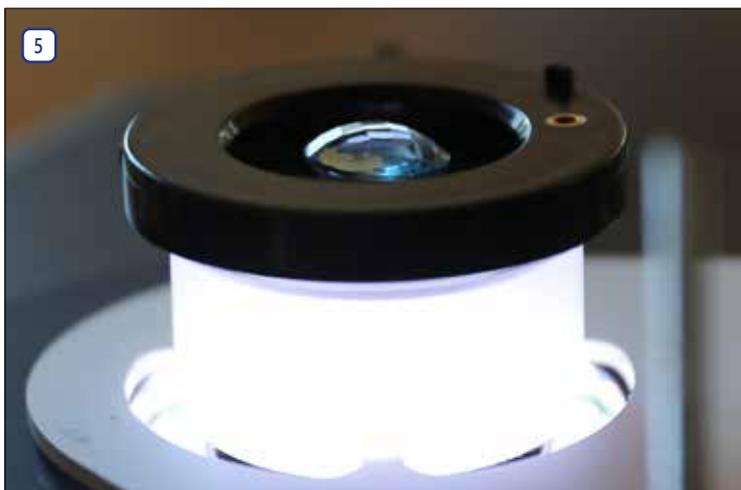
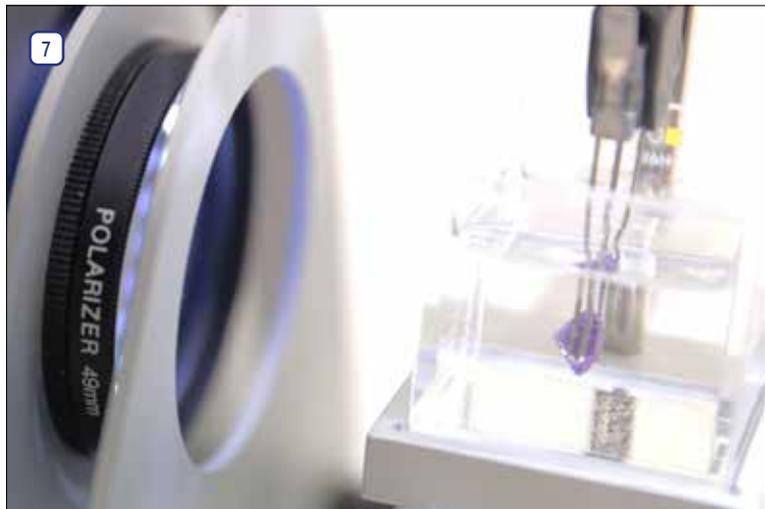
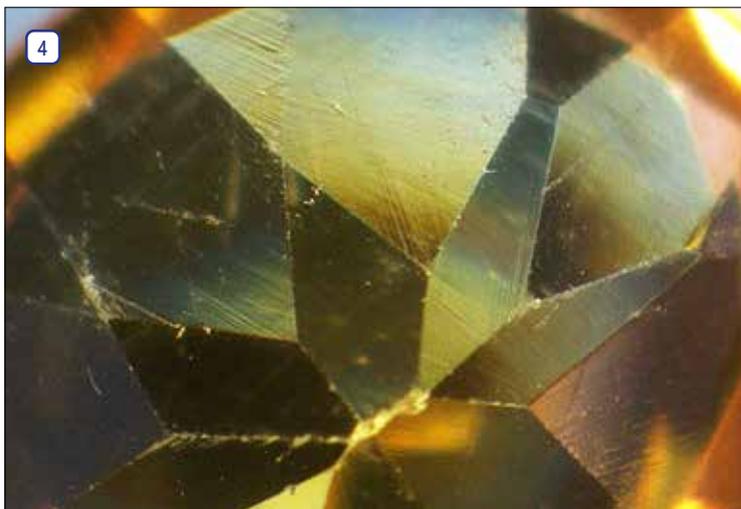
## Applications

Some application examples demonstrating the performance of OPTIGEM Series, especially designed to observe samples of precious stones and jewels and provided with specific features for gemological needs.

## Legend

1. Inspection of stones with SZM-GEM-1.
2. Inspection of stones with pure white darkfield illumination.
3. Immersion cell (ST-203) on a translating support (ST-204).
4. Sample of Citrine.
5. ST-201 accessory creates a soft darkfield illumination ideal for diamond analysis.
6. Optigem can be easily rotated to a horizontal working position.
7. ST-201 accessory for analysis under polarized light.
8. Working with Optigem and its accessories (they can be stacked for increased functionality).





# GEM Series - Range

## OPTIGEM 1

-  21
-  0.7x-4.5x
-  X-LED
-  3W LED
-  4W LED
-  DF



Binocular gemological stereomicroscopes for brightfield and darkfield applications with special side-emitting **LED** illumination ring for true darkfield illumination. Equipped also with an incident **LED** flexible arm and a diffusive **LED** disc for transmitted illumination. The instrument can be easily tilted horizontally for immersion analysis.

**Observation mode:** Brightfield, darkfield.

**Heads:** Binocular, 45° inclined, 360° rotating.

**Interpupillary distance:** Adjustable between 51 and 75 mm.

**Dioptric adjustment:** On both eyepiece tubes.

**Eyepieces:** WF10x/21 mm, high eye-point.

**Objective:** Parfocal achromatic zoom 0.7x...4.5x (zoom factor 6.43:1).

**Working distance:** 100 mm.

**Specimen stage:** Gemological stage, with clamp for holding gems.

**Focusing:** Rack and pinion mechanism controlled by a pair of knobs.

**Stand:** Fixed arm stand with tilting system (with position lock control). It can be totally overturned and rotated allowing in this way to obtain a 2-in-one instrument: an instrument for standard observations and one for observation of water-immersed gems.

**Darkfield illumination:** Equipped with a state-of-the-art illuminator for darkfield observation. It consist of an innovative side-emitting LEDs ring with an emission angle of 38°. With brightness control.

**Transmitted light illumination:** Equipped with a LED illuminator, located under the stage. With brightness control.

**Incident illumination:** Equipped with a flexible gooseneck-arm LED illuminator. With brightness control.

**Color temperature:** Pure white 6,300 K

## OPTIGEM 2

-  21
-  0.7x-4.5x
-  X-LED
-  3W LED
-  4W LED
-  DF



Trinocular gemological stereomicroscopes for brightfield and darkfield applications with special side-emitting **LED** illumination ring for true darkfield illumination. Equipped also with an incident **LED** flexible arm and a diffusive **LED** disc for transmitted illumination. The instrument can be easily tilted horizontally for immersion analysis.

**Observation mode:** Brightfield, darkfield.

**Heads:** Trinocular, 45° inclined, 360° rotating.

**Interpupillary distance:** Adjustable between 51 and 75 mm.

**Dioptric adjustment:** On both eyepiece tubes.

**Eyepieces:** WF10x/21 mm, high eye-point.

**Objective:** Parfocal achromatic zoom 0.7x...4.5x (zoom factor 6.43:1).

**Working distance:** 100 mm.

**Specimen stage:** Gemological stage, with clamp for holding gems.

**Focusing:** Rack and pinion mechanism controlled by a pair of knobs.

**Stand:** Fixed arm stand with tilting system (with position lock control). It can be totally overturned and rotated allowing in this way to obtain a 2-in-one instrument: an instrument for standard observations and one for observation of water-immersed gems.

**Darkfield illumination:** Equipped with a state-of-the-art illuminator for darkfield observation. It consist of an innovative side-emitting LEDs ring with an emission angle of 38°. With brightness control.

**Transmitted light illumination:** Equipped with a LED illuminator, located under the stage. With brightness control.

**Incident illumination:** Equipped with a flexible gooseneck-arm LED illuminator. With brightness control.

**Color temperature:** Pure white 6,300 K

## OPTIGEM 3



Binocular gemological stereomicroscopes for brightfield and darkfield applications. The darkfield condenser uses a typical optical configuration, based on halogen illumination and a classic reflecting system. A flexible arm with a fluorescent tube simulates the color of daylight for accurate color grading. The stand can be inclined backward by 45° for to increase comfort and ergonomy.

**Observation mode:** Brightfield, darkfield.

**Heads:** Binocular, 45° inclined, 360° rotating.

**Interpupillary distance:** Adjustable between 51 and 75 mm.

**Dioptric adjustment:** On both eyepiece tubes.

**Eyepieces:** WF10x/23 mm, high eye-point.

**Objective:** Parfocal achromatic zoom 0.67x...4.5x (zoom factor 6.7:1).

**Working distance:** 110 mm.

**Specimen stage:** Gemological stage, with clamp for holding gems.

**Focusing:** Rack and pinion mechanism controlled by a pair of knobs.

**Stand:** Fixed arm stand with tilting system. It can be inclined up to 45°

**Darkfield illumination:** Equipped with a 30W halogen illuminator and a darkfield condenser. With brightness control.

**Transmitted light illumination:** Selectable by using a specific darkfield/brightfield switching control, it uses the same halogen source of darkfield illuminator. With brightness control.

**Incident illumination:** Equipped with a flexible gooseneck-arm with fluorescent tube. With brightness control.

**Color temperature:** Pure white 6,300 K

## OPTIGEM 4



Trinocular gemological stereomicroscopes for brightfield and darkfield applications. The darkfield condenser uses a typical optical configuration, based on halogen illumination and a classic reflecting system. A flexible arm with a fluorescent tube simulates the color of daylight for accurate color grading. The stand can be inclined backward by 45° for to increase comfort and ergonomy.

**Observation mode:** Brightfield, darkfield.

**Heads:** Trinocular, 45° inclined, 360° rotating.

**Interpupillary distance:** Adjustable between 51 and 75 mm.

**Dioptric adjustment:** On both eyepiece tubes.

**Eyepieces:** WF10x/23 mm, high eye-point.

**Objective:** Parfocal achromatic zoom 0.67x...4.5x (zoom factor 6.7:1).

**Working distance:** 110 mm.

**Specimen stage:** Gemological stage, with clamp for holding gems.

**Focusing:** Rack and pinion mechanism controlled by a pair of knobs.

**Stand:** Fixed arm stand with tilting system. It can be inclined up to 45°

**Darkfield illumination:** Equipped with a 30W halogen illuminator and a darkfield condenser. With brightness control.

**Transmitted light illumination:** Selectable by using a specific darkfield/brightfield switching control, it uses the same halogen source of darkfield illuminator. With brightness control.

**Incident illumination:** Equipped with a flexible gooseneck-arm with fluorescent tube. With brightness control.

**Color temperature:** Pure white 6,300 K

# GEM Series - Range

## SZM-GEM-1 / SZM-GEM-2



**SZM-GEM-1**  
Gemological microscope  
with binocular head



**SZM-GEM-2**  
Gemological microscope  
with trinocular head

**Gemological stereomicroscopes with pillar stand and illuminated stage for brightfield and darkfield applications with special LED illumination ring for true darkfield illumination.**

**Observation mode:** Brightfield, darkfield.

**Heads:** Binocular or trinocular, 45° inclined, 360° rotating.

**Interpupillary distance:** Adjustable between 51 and 75 mm.

**Dioptric adjustment:** On both eyepiece tubes.

**Eyepieces:** WF10x/21 mm, high eye-point.

**Objective:** Parfocal achromatic zoom 0.7x...4.5x (zoom factor 6.43:1).

**Working distance:** 100 mm.

**Specimen stage:** Gemological stage, with clamp for holding gems.

**Focusing:** Rack and pinion mechanism controlled by a pair of knobs.

**Stand:** Pillar stand 32 mm diameter and 250 mm high, base: 260x200x60h mm.

**Darkfield illumination:** Equipped with a state-of-the-art illuminator for darkfield observation. It consist of an innovative side-emitting LEDs ring with an emission angle of 38°. With brightness control.

**Transmitted light illumination:** Equipped with a LED illuminator, located under the stage. With brightness control.

**Incident illumination:** Dichroic halogen lamp 12V/15W. With brightness control.

**Color temperature:** Pure white 6,300 K

**SZM-GEM-1:** Equipped with binocular head.

**SZM-GEM-2:** Equipped with trinocular head.

## GEM Series - Comparison chart

Model	Head	Eyepieces	Objective	Stand	Illumination
<b>OPTIGEM-1</b>	Binocular, 360° rotating, 45° inclined	Wide Field 10x/21mm	0.7 .... 4.5x Zoom	Gemological stand	<b>Incident illumination:</b> LED flexible arm with brightness adjustment. <b>Transmitted illumination:</b> Diffusive LED disc for observation in brightfield and side-emitting LED ring for observation in darkfield.
<b>OPTIGEM-2</b>	Trinocular, 360° rotating, 45° inclined	Wide Field 10x/21mm	0.7 .... 4.5x Zoom	Gemological stand	<b>Incident illumination:</b> LED flexible arm with brightness adjustment. <b>Transmitted illumination:</b> Diffusive LED disc for observation in brightfield and side-emitting LED ring for observation in darkfield.
<b>OPTIGEM-3</b>	Binocular, 360° rotating, 45° inclined	Wide Field 10x/23mm	0.67 .... 4.5x Zoom	Gemological stand	<b>Incident illumination:</b> flexible arm with fluorescent tube 7W (pure white). <b>Transmitted illumination:</b> 30W halogen bulb and a dedicated reflecting system for observation with brightfield and darkfield.
<b>OPTIGEM-4</b>	Trinocular, 360° rotating, 45° inclined	Wide Field 10x/23mm	0.67 .... 4.5x Zoom	Gemological stand	<b>Incident illumination:</b> flexible arm with fluorescent tube 7W (pure white). <b>Transmitted illumination:</b> 30W halogen bulb and a dedicated reflecting system for observation with brightfield and darkfield.
<b>SZM-GEM-1</b>	Binocular, 360° rotating, 45° inclined	Wide Field 10x/21mm	0.7x...4.5x zoom	Pillar stand	<b>Incident illumination:</b> dichroic halogen lamp 12V/15W. <b>Transmitted illumination:</b> Diffusive LED disc for observation in brightfield and side-emitting LED ring for observation in darkfield.
<b>SZM-GEM-2</b>	Trinocular, 360° rotating, 45° inclined	Wide Field 10x/21mm	0.7x...4.5x zoom	Pillar stand	<b>Incident illumination:</b> dichroic halogen lamp 12V/15W. <b>Transmitted illumination:</b> Diffusive LED disc for observation in brightfield and side-emitting LED ring for observation in darkfield.

# GEM Series - Optical Performance

## OPTIGEM-1 / OPTIGEM-2 - Optical performance

Eyepiece	10x (ST-081)		15x (ST-082)		20x (ST-083)	
Field number (mm)	21		15		10	
Objective	Total magnification	Field of View (mm)	Total magnification	Field of View (mm)	Total magnification	Field of View (mm)
0.5x (W.D. 165 mm)	3.5x-22.5x	60.00-9.23	5.25x-33.75x	42.86-6.67	7x-45x	28.57-4.44
0.75x (W.D. 117 mm)	5.25x-33.75x	40.00-6.22	7.875x-50.625x	28.57-4.44	10.50x-67.5x	19.05-2.96
1x (W.D. 100 mm)	7x-45x	30.00-4.66	10.5x-67.5x	21.43-3.33	14x-90x	14.29-2.22
1.5x (W.D. 47 mm)	10.50x-67.5x	20.00-3.11	15.75x-101.25x	14.29-2.22	21x-135x	9.52-1.48
2x (W.D. 33 mm)	14x-90x	15.00-2.33	21x-135x	10.71-1.67	28x-180x	7.14-1.11

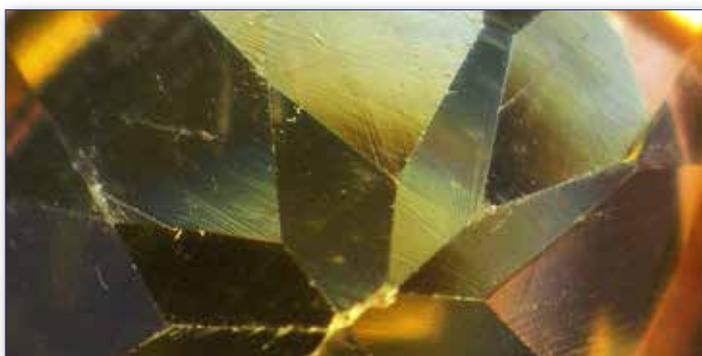
## OPTIGEM-3 / OPTIGEM-4 - Optical performance

Eyepiece	10x (ST-301)		15x (ST-302)		20x (ST-303)		25x (ST-144)	
Field number (mm)	23		16		12		9	
Objective	Total magnification	Field of View (mm)						
0.3x (W.D: 287 mm)	2.01x-13.5x	114.43-17.04	3.02x-20.25x	79.60-11.85	4.02x-27x	59.70-8.89	5.025x-33.75x	44.78-6.67
0.5x (W.D: 177 mm)	3.35x-22.5x	68.66-10.22	5.02x-33.75x	47.76-7.11	6.7x-45x	35.82-5.33	8.375x-56.25x	26.87-4.00
0.75x (W.D: 120 mm)	5.02x-33.75x	45.77-6.81	7.54x-50.63x	31.84-4.74	10.05x-67.5x	23.88-3.56	12.5625x-84.375x	17.91-2.67
1x (W.D: 110 mm)	6.7x-45x	34.33-5.11	10.05x-67.50x	23.88-3.56	13.4x-90x	17.91-2.67	16.75x-112.5x	13.43-2.00
1.5x (W.D: 47 mm)	10.05x-67.5x	22.89-3.41	15.08x-101.25	15.92-2.37	20.1x-135x	11.94-1.78	25.125x-168.75x	8.96-1.33
2x (W.D: 26 mm)	13.4x-90x	17.16-2.56	20.10x-135.00x	11.94-1.78	26.8x-180x	8.96-1.33	33.5x-225x	6.72-1.00

## SZM-GEM-1 / SZM-GEM-2 - Optical performance

Eyepiece	10x (ST-081)		15x (ST-082)		20x (ST-083)	
Field number (mm)	21		15		10	
Objective	Total magnification	Field of View (mm)	Total magnification	Field of View (mm)	Total magnification	Field of View (mm)
0.5x (W.D. 165 mm)	3.5x-22.5x	60.00-9.23	5.25x-33.75x	42.86-6.67	7x-45x	28.57-4.44
0.75x (W.D. 117 mm)	5.25x-33.75x	40.00-6.22	7.875x-50.625x	28.57-4.44	10.50x-67.5x	19.05-2.96
1x (W.D. 100 mm)	7x-45x	30.00-4.66	10.5x-67.5x	21.43-3.33	14x-90x	14.29-2.22
1.5x (W.D. 47 mm)	10.50x-67.5x	20.00-3.11	15.75x-101.25x	14.29-2.22	21x-135x	9.52-1.48
2x (W.D. 33 mm)	14x-90x	15.00-2.33	21x-135x	10.71-1.67	28x-180x	7.14-1.11

## GEM Series - Contrast method comparison



Citrine - OPTIGEM-2 - 0.7x zoom - Brightfield



Citrine - OPTIGEM-2 - 0.7x zoom - Darkfield

# GEM Series - Accessories

## Eyecups & Eyepieces

- ST-081 EW10x/21 eyepieces (pair), high eyepoint, with rubber cup (except for OPTIGEM-3 & OPTIGEM-4)
- ST-082 WF15x/15 eyepieces (pair), high eyepoint (except for OPTIGEM-3 & OPTIGEM-4)
- ST-083 WF20x/10 eyepieces (pair), high eyepoint (except for OPTIGEM-3 & OPTIGEM-4)
- ST-084 WF10x/21 micrometric eyepiece, high eyepoint, with rubber cup (except for OPTIGEM-3 & OPTIGEM-4)
- ST-144 WF25x/9 eyepieces (pair), high eyepoint, focusable, with rubber cup (only for OPTIGEM-3 & OPTIGEM-4)
- ST-301 WF10x/23 eyepieces (pair), high eyepoint, focusable, with rubber cup (only for OPTIGEM-3 & OPTIGEM-4)
- ST-302 WF15x/16 eyepieces (pair), high eyepoint, focusable, with rubber cup (only for OPTIGEM-3 & OPTIGEM-4)
- ST-303 WF20x/12 eyepieces (pair), high eyepoint, focusable, with rubber cup (only for OPTIGEM-3 & OPTIGEM-4)
- ST-305 WF10x/23 micrometric eyepiece, high eyepoint, focusable, rubber cup (only for OPTIGEM-3 & OPTIGEM-4)

## Objectives & Additional Lenses

- ST-086.1 Additional lens 1.5x (w.d. 45mm) with compensating disc (except for OPTIGEM-3 & OPTIGEM-4)
- ST-087 Additional lens 2x (w.d. 33mm) (except for OPTIGEM-3 & OPTIGEM-4)
- ST-105 Additional lens 1.5x (w.d. 47mm) (only for OPTIGEM-3 & OPTIGEM-4)
- ST-106 Additional lens 2x (w.d. 26mm) (only for OPTIGEM-3 & OPTIGEM-4)

## Condenser & Filters

- ST-202 Polarizing analysis kit (only for OPTIGEM-1 & OPTIGEM-2)
- ST-230 Polarizing analysis kit (only for SZM-GEM1 & SZM-GEM2)
- ST-231 Polarizing analysis kit (only for OPTIGEM-3 & OPTIGEM-4)

## Camera Adapters

- M-113.1 Ring adapter, 30mm (for monocular and binocular microscopes)
- M-115 0.35x C-Mount projection lens
- M-114 0.5x C-Mount projection lens
- M-118 0.75x C-Mount projection lens
- M-173 C-Mount projection lens for APS-C/full frame reflex cameras (trino)
- M-699 Universal adapter for C-Mount projection lens (trino)
- ST-090 0.35x focusable C-Mount adapter (stereomicroscopes)
- ST-090.1 0.5x focusable C-Mount adapter (stereomicroscopes)
- ST-090.2 0.65x focusable C-Mount adapter (stereomicroscopes)
- M-620.3 1x focusable C-Mount adapter (biological & stereomicroscopes)

## Miscellaneous

- 15104 Cleaning kit
- DC-002 Plastic dust cover, medium, 490(l)x490(h) mm
- M-005 Micrometric slide, 26x76mm, with 2 scales (1mm/100 & 10mm/100)
- M-621 Halogen bulb 6V/30W (only for OPTIGEM-3 & OPTIGEM-4)
- ST-092 Protective glass for stereohead
- ST-201 Iris aperture diaphragm for darkfield (only for OPTIGEM-1 & OPTIGEM-2)
- ST-203 Glass immersion cell (only for OPTIGEM-1 & OPTIGEM-2)
- ST-204 Translating cell holder (only for OPTIGEM-1 & OPTIGEM-2)
- ST-205 Vacuum pick-up (with electric vacuum pump) (only for OPTIGEM-1 & OPTIGEM-2)
- ST-207 Iris aperture diaphragm for brightfield (only for OPTIGEM-1 & OPTIGEM-2)

### 15104 - Cleaning kit

It cleans glass quickly and effectively, without leaving residue or odor. Ideal for precision lens or prism cleaning.



### How to connect the cameras to our microscopes.

Please refer to the Adapter reference list on Digital section.

Оптика® K



Microscope Experts since 1979

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