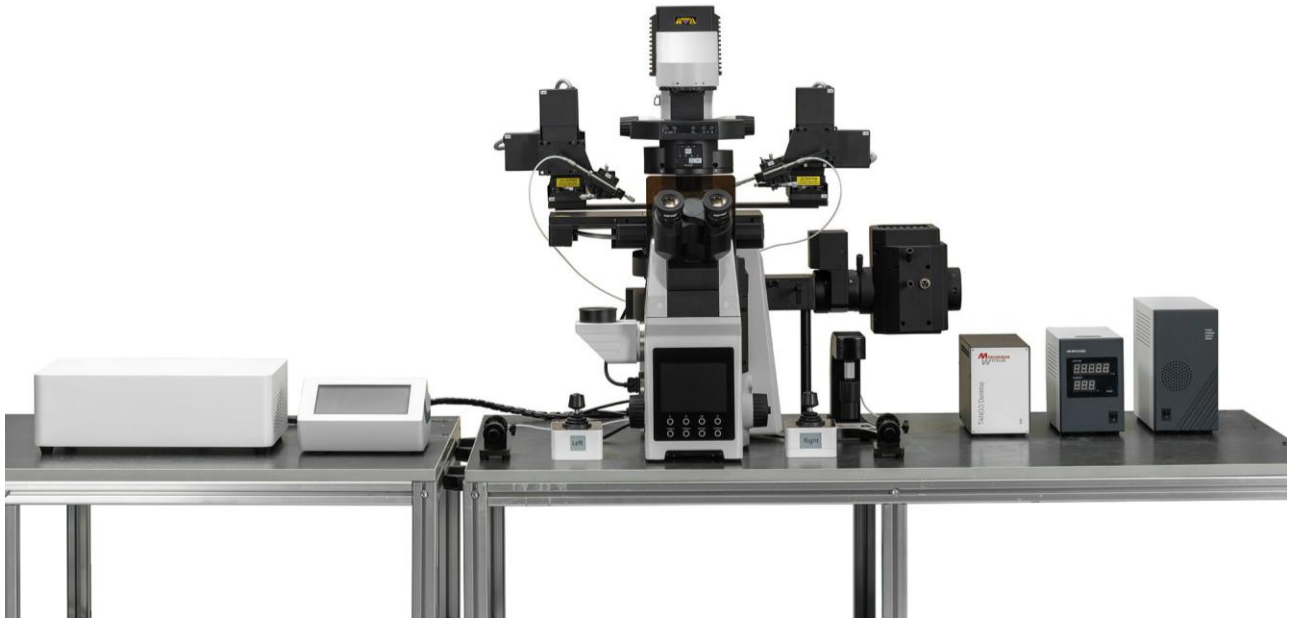


BS-2097MM Research Inverted Microscope with Micromanipulator Configuration



BS-2097MM

Introduction

As a highly scalable optical platform for living cell imaging, it combines excellent optical and mechanical properties, provides high-resolution, high-contrast microscopic images, the ergonomic design stand, bringing the researchers more convenient and comfortable. This new system can be widely used in cell biology, neurobiology, developmental biology, molecular biology, photobiology and other fields. BS-2097MM inverted system microscope will be your choice of live cell imaging now and in the future.

The Microscope Operation Console is a high-precision device with integrated software and hardware control. It enables precise and efficient microscopic injection, providing a diverse range of solutions for microscopic operations in the field of scientific research.

Feature

1. High Precision Control

Electric Control System: X-Y-Z three-axis electric control, stable and real-time response.

Nanometer-level precision: 20mm travel distance, 100nm movement precision, precise control, accurate operation.



2. Flexible and adjustable motion

Two control modes, joystick or software, are available. Both allow choosing the appropriate motion speed as needed. The R-axis and T-axis can be manually adjusted to meet various operational requirements, facilitating easy and high-precision displacement adjustments.



3. Convenient and efficient operating experience

The software features precise point-to-point and input displacement positioning, one-key return to zero, one-key needle finding, and position recording. It also includes one-key return to recorded positions. Additionally, it offers screen pointing for automatic positioning after point selection and macro-operation functions, streamlining experimental steps and enhancing work efficiency.



4. Advanced temperature control system

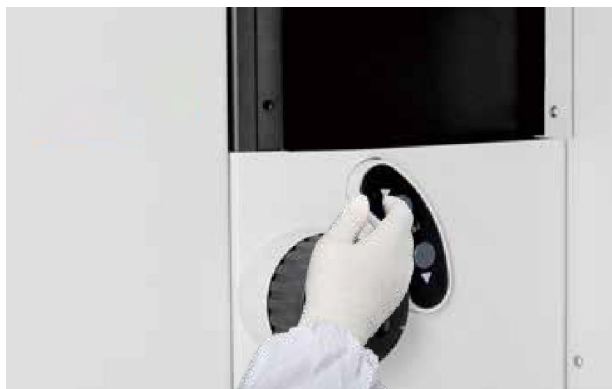
Utilizing PID control technology, the temperature control precision can reach ± 0.1 degrees, ensuring experiment stability and safety.

5. Elevation adjustable viewing head



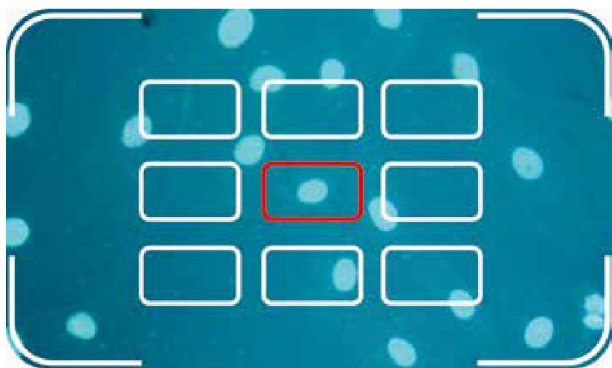
BS-2097MM is equipped with a 20-45° adjustable binocular viewing head, which can raise the eye point by 78mm (65mm interpupillary distance) as required. It can be observed easily and quickly even in a standing state, which is effective avoiding fatigue of eyes and limbs.

6. Integrated button



BS-2097MM retains the traditional coarse and fine adjustment mode, cancels the gear mechanism, integrates electric control technology, and realizes manual and automatic integration. The brightness, objectives, attenuator turntable and fluorescent turntable can be quickly switched or rotated through the corresponding buttons on the button panels on both sides.

7. Auto Focus



AF one-key auto focus can quickly adjust the Z-axis height according to the real-time image, and eliminates the need for fine-adjusting steps and improves work efficiency.

8. Tilting transmission lighting structure



The tilting structure of the transmission bracket ensures a large working space for users and facilitates the replacement of specimens.

9. Low-position platform handwheel



The low-position platform handwheel can be rotated 360°, which can effectively reduce the hand fatigue caused by long-term operation and is ergonomic and improves the convenience of operation.

10. Motorized Nosepiece



By using the buttons on the side of the rack or PC control, the objective lens can be quickly switched, improving operational convenience.

11. Waste liquid drainage structure



The drainage groove structure is designed under the objective nosepiece, which can prevent the optical components and modules from accidentally being wetted by the cell culture medium or soaking liquid, contaminating and damaging the microscope, simplifying maintenance.

12. Integrated panel control



BS-2097MM front digital display screen can display the status of multiple components such as microscope objective lens magnification, brightness, and fluorescence band in real time, and can complete the setting of all observation methods, the selection of optical port status, and the switch of fluorescence shutter, making repetitive experimental operations more convenient.

13. High scalability



BS-2097MM can flexibly configure single-layer / double-layer optical paths according to the application, providing possibility for system expansion. The double-layer optical path can be customized according to different needs, suitable for various modifications and self-developed.

14. Software

The software is able for fluorescence intensity analysis, real-time/automatic depth of field expansion, image stitching and so on.

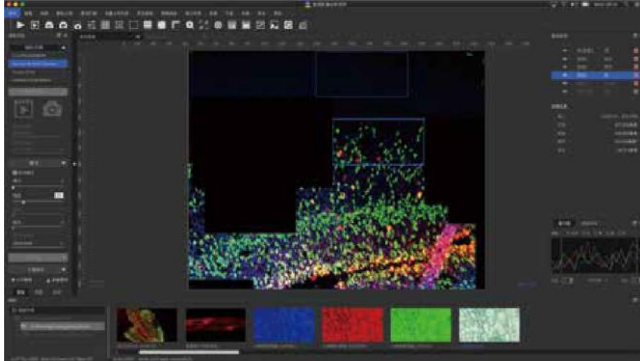
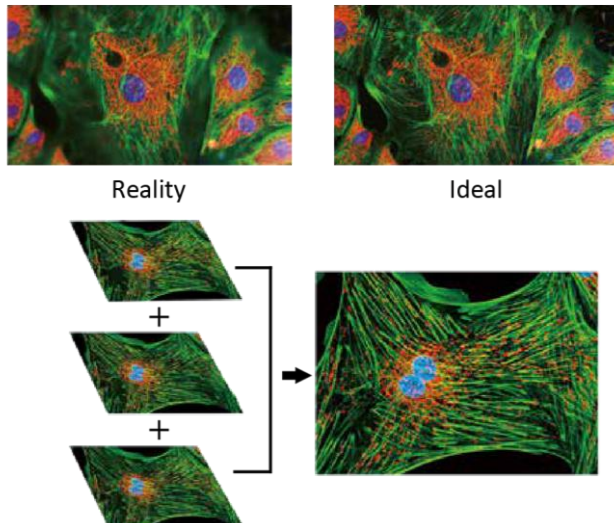


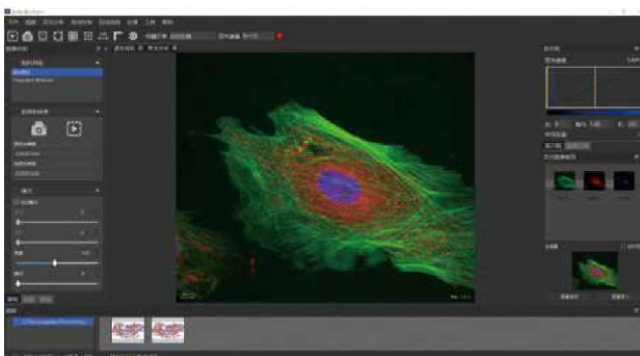
Image stitching

It is able to stitch the local image into a complete image.



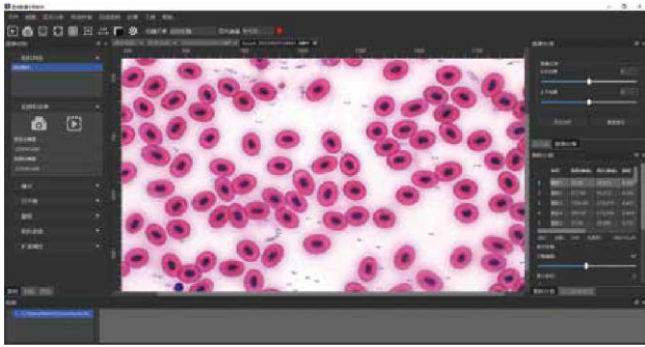
Focus stacking

Users can set up and down moving distances, as well as movement steps, to move the stage up and down, automatically capture images of different depths of field, and stack the images.



Fluorescent synthesis

The image from different fluorescent channels, are able to be synthesized automatically and kept separately. Each image is available to be adjusted and the final composited image would be auto updated.



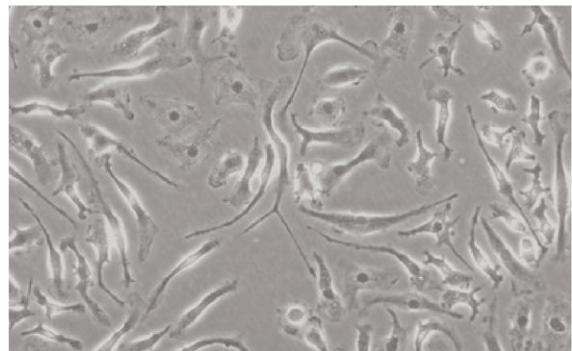
Cell counting

After clicking the cell counting menu button, segment the image in the current window, count cells based on the segmentation value, and display cell area, perimeter, and roundness.

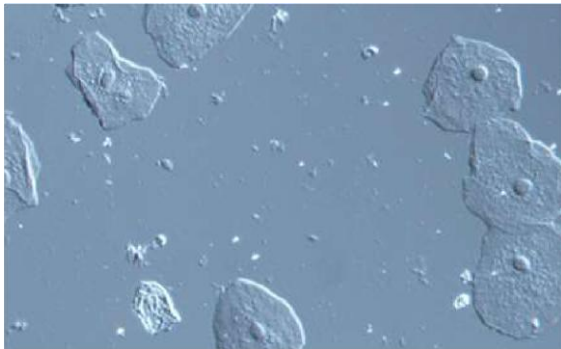
Application



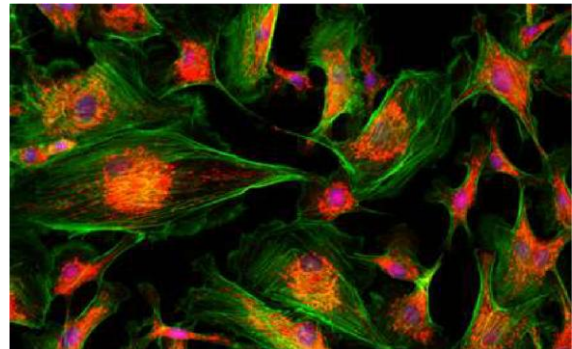
Bright Field



Phase Contrast



DIC



Fluorescence

Specification

Item	Specification		BS-2097MM
Optical System	Infinity Color Correction Optical System		●
Viewing Head	20-45 degree tilting binocular tube, interpupillary distance: 50-76mm		●
Eyepiece	High eye point wide field plan eyepiece PL10X/22mm, with adjustable diopter		●
Objectives	Long Working Distance Plan Semi-Apochromatic Objectives	4X/NA=0.13, WD=17mm	○
		10X/NA=0.3, WD=8.8mm	●
		20X/NA=0.45, WD=6.5-7.6mm, coverslip thickness: 0-2mm	●
		40X/NA=0.6, WD=2.85-4.05mm, coverslip thickness: 0-2mm	●
		60X/NA=0.7, WD=1.42-2.1mm, coverslip thickness:	○

		0-1.3mm	
	Long Working Distance Plan Semi-Apochromatic Positive Phase Contrast Objectives	4X/NA=0.13, WD=17mm	○
		10X/NA=0.3, WD=8.8mm	○
		20X/NA=0.45, WD=6.5-7.6mm, coverslip thickness: 0-2mm	○
		40X/NA=0.6, WD=2.85-4.05mm, coverslip thickness: 0-2mm	○
		60X/NA=0.7, WD=1.42-2.1mm, coverslip thickness: 0-1.3mm	○
	Infinity Plan Apochromatic Objectives	4X/NA=0.16, WD=12.8mm	○
		10X/NA=0.4, WD=3.2mm	○
		20X/NA=0.75, WD=0.6mm	○
		40X/NA=0.95, WD=0.15mm	○
		60X/NA=0.9, WD=0.26mm	○
		(Oil) 60X/NA=1.25, WD=0.14mm	○
		(Oil) 100X/NA=1.35, WD=0.13mm	○
	Infinity Plan Super Apochromatic Objectives	10X/NA=0.4, WD=3.1mm	○
		20X/NA=0.8, WD=0.6mm	○
		40X/NA=0.95, WD=0.18mm	○
		(Oil) 60X/NA=1.42, WD=0.17mm	○
		(Oil) 100X/NA=1.45, WD=0.13mm	○
	Long Working Distance Plan Semi-Apochromatic Relief Phase Contrast Objectives	10X/NA=0.3, WD=8.8mm	●
		20X/NA=0.45, WD=6.5-7.6mm, coverslip thickness: 0-2mm	●
		40X/NA=0.6, WD=2.85-4.05mm, coverslip thickness: 0-2mm	●
Microscope Body & Nosepiece	Low position coarse and fine coaxial motorized focusing mechanism, range: 10.5mm, precision: 1μm. Built-in electric left camera port, splitting ratio: 0:100 / 50:50 / 100:0, dual optical path, with fluorescent light barrier. Motorized bright field sextuple nosepiece with DIC slot.		●
	Base mounting bracket		○
	Right camera port, splitting ratio: 100:0 / 0:100, field of view: 16mm. Built-in 1X CTV, C-mount adapter		○
Illumination	Pillar tilt mechanism, Koehler transmission illuminator, adjustable condenser holder with 65mm stroke. 4 filters holders with LBD, Green filter, Neutral filter for halogen models or Neutral filter for LED models		●
	Color temperature transition filter kit, for BS20970035		○
	Green contrast filter kit, for BS20970035		○
	12V/100W halogen illumination, filament center preset		○
	12V/100W halogen lamp		○
	10W cool color LED light illumination, color temperature 5000K		●
Condenser & Iris	Manual septuple condenser, NA 0.55, WD=27mm. 3 holds for Φ30mm (phase contrast), 4 holds for Φ38mm (DIC), support for bright field/black field/simple polarization/phase contrast/DIC, with fluorescence light barrier. (BS20970038)		○
	4X Phase contrast annular iris (for BS20970038)		○
	10X Phase contrast annular iris (for BS20970038)		○
	20X/40X/60X Phase contrast annular iris (for BS20970038)		○

	4X/10X/20X Black field kit, for BS20970038	○
	Super long working distance manual condenser with 5 holes, NA 0.3, WD=73mm, support for 4X-60X phase contrast, simple polarizing observation and 10X-40X relief phase contrast observation. (BS20970043)	●
	4X Phase contrast annular iris (for BS20970043)	○
	10X Phase contrast annular iris (for BS20970043)	●
	20X/40X/60X Phase contrast annular iris (for BS20970043)	●
	10X Oblique iris (for BS20970043) for relief phase contrast observation	●
	20X Oblique iris (for BS20970043) for relief phase contrast observation	●
	40X Oblique iris (for BS20970043) for relief phase contrast observation	●
	360 degree rotatable polarizer (for BS20970043), mandatory for relief phase contrast observation	●
DIC	Transmitted DIC kit	○
	10X transmitted DIC ring (for BS20970038)	○
	20X transmitted DIC ring (for BS20970038)	○
	40X/60X transmitted DIC ring (for BS20970038)	○
	Analyzer kit (for BS20970038)	○
	Polarizer kit (for BS20970038)	○
Fluorescent Module	Fluorescence attachment with 8 holes, with manual shutter	●
	Cable 30cm, connecting the fluorescence attachment to the frame	●
	Dust cap	●
	B fluorescence filter cube	●
	G fluorescence filter cube	●
	UV fluorescence filter cube	●
	L type fluorescence attachment, with filter plugboard, ND25 attenuation piece, ND50 attenuation piece	●
	10W LED fluorescent illumination, brightness adjustable, with a designed lifespan over 20000 hours. 4 channel of 365/460/525/625, channel trigger control less than 500ms. Supporting SDK control.	○
	100W mercury lamp house	●
	Fluorescence power supply	●
	100W DC mercury lamp	●
	Extension accessory	●
	Fluorescence centering objective	●
Stage	Manual mechanical stage, size: 300mm(X)*240mm(Y), moving range: 135mm(X)*85mm(Y), stage thickness: 30mm. Right universal handle, X/Y axis limitable and lockable, moving range 50mm * 50mm after locked; with pressure clap for holding slices and culture flasks, with Φ110mm replaceable disc (inner Φ30), with metal stage plate with waist shaped hole.	●
Electric Control Box & PC	Electric control box, input voltage 90-265VAC wide voltage, output 12V100W or 12V10W. Digitally adjustable output voltage through CAN, in addition to three outputs of 24V5A/15V5A/5V5A, equipped with forced air cooling, including one 3C power cord.	●
	DB26 Cable 200cm, connecting the electric control box to the frame	●
	DELL PRECISIOM T3650 (I7 11700,16GB/256GB+1TB/P620) +P2722H	○
	DB9 Cable 200cm, connecting the PC to the electric control box	●
	USB-CAN card. When the customer purchases computer by themselves and requires	●

	computer to control microscope electric control, it must be paired.	
	PCIE-CAN card. When the customer purchases computer by themselves and requires computer to control microscope electric control, it must be paired.	○
Camera	8.9 mega-pixel, monochrome camera, SONY IMX267, frame rate 32fps@4096*2160, USB3.0, image size 1"	○
	5 mega-pixel, color camera, SONY IMX264, frame rate 35fps, USB3.0, image size 2/3"	●
	6 mega-pixel, color camera, SONY ICX695, frame rate 7.5fps, USB3.0, image size 1"	○
	6 mega-pixel, color cooling camera, SONY ICX695, frame rate 7.5fps, USB3.0, image size 1"	○
	6 mega-pixel, monochrome camera, SONY ICX695, frame rate 7.5fps, USB3.0, image size 1"	○
	6 mega-pixel, monochrome cooling camera, SONY ICX695, frame rate 7.5fps, USB3.0, image size 1"	○
Telescope	Telescope (Φ30)	●
C-mount Adapter	0.5X C-mount adapter, adjustable focus	○
	0.65X C-mount adapter, adjustable focus	●
	1X C-mount adapter, adjustable focus	○
Other Accessories	Fluorescent free oil 30ml	○
	Internal hexagonal Spanner M3 for phase contrast adjusting screw	●
	Internal hexagonal Spanner M4	●
	Internal hexagonal Spanner M5	●

Micromanipulator configuration

Left-handed Fully Automatic Micromanipulator	<p>1. Control mode: Joystick handle control and software control.</p> <p>2. XYZ axis: automatic control, stroke 20mm, precision 100nm.</p> <p>3. Movement speed: handle control 0-1000μm/s stepless speed change, software control three gears optional (high speed 1000μm/s, medium speed 200μm/s, low speed 20um/s).</p> <p>3. R-axis (angle) manual adjustment, stroke 20°-90°, precision 10'.</p> <p>4. T-axis (oblique) manual adjustment, the maximum stroke is 100mm.</p> <p>5. Accurate displacement function of jogging displacement and input displacement.</p> <p>6. One-key return to zero, one-key needle finding and position recording function (multiple positions can be recorded), and one key return to record position function.</p> <p>7. It has the function of taking points on the screen, that is, point out the desired position on the computer screen, and the injection needle can be automatically positioned.</p> <p>8. Software programming function: Various motion trace programs can be compiled and saved in the form of files. If you need to perform the same action next time, you can directly call the program. Equipped with a control handle: you can control the direction and speed of motion.</p> <p>Including Microscope Adapter, Motion Controller, Operating Handle and Software.</p>	●
Right-hand Fully Automatic Micromanipulator	<p>1. Control mode: Joystick handle control and software control.</p> <p>2. XYZ axis: automatic control, stroke 20mm, precision 100nm.</p> <p>3. Movement speed: handle control 0-1000μm/s stepless speed change, software control three gears optional (high speed 1000μm/s, medium speed 200μm/s, low speed 20um/s).</p> <p>3. R-axis (angle) manual adjustment, stroke 20°-90°, precision 10'.</p> <p>4. T-axis (oblique) manual adjustment, the maximum stroke is 100mm.</p> <p>5. Accurate displacement function of jogging displacement and input displacement.</p> <p>6. One-key return to zero, one-key needle finding and position recording function (multiple</p>	●

	<p>positions can be recorded), and one key return to record position function.</p> <p>7. It has the function of taking points on the screen, that is, point out the desired position on the computer screen, and the injection needle can be automatically positioned.</p> <p>8. Software programming function: Various motion trace programs can be compiled and saved in the form of files. If you need to perform the same action next time, you can directly call the program. Equipped with a control handle: you can control the direction and speed of motion.</p> <p>Including Microscope Adapter, Motion Controller, Operating Handle and Software.</p>	
Hydraulic injector	<p>1. Maximum injection capacity: 333 μL</p> <p>2. Manual momentum per revolution: 4.4 μL/r</p> <p>3. Manual per fine grid momentum revolution: 55nL</p> <p>4. Applicable glass capillary outer diameter: 1mm</p> <p>5. Applicable operation types: injection or extraction of cells</p>	●
Heating Stage	<p>The controllable temperature of the heating stage is 5-60$^{\circ}$C, with an accuracy of \pm 0.1$^{\circ}$C, PID control, 50W</p>	○

Note: ● Standard Outfit, ○ Optional

Accessories

1. Long Working Distance Semi-Apochromat Objectives

A complete set of long working distance semi-apochromatic objective lenses has been developed for cell observation. The objective lens with correction rings have a strong advantage in observing glass substrates and petri dished of different thicknesses, achieving precise focusing by correcting coverage differences.

Long Working Distance Plan Semi-Apochromatic Objectives



Long Working Distance Plan Semi Apochromatic Positive Phase Contrast Objectives



Long Working Distance Plan Semi-Apochromatic Relief Phase Contrast Objectives



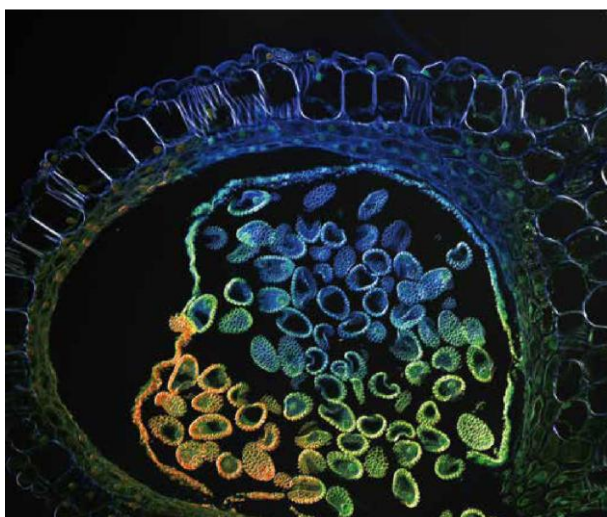
2. Infinite Plan Apochromatic Objectives



3. Infinite Plan Super Apochromatic Objectives

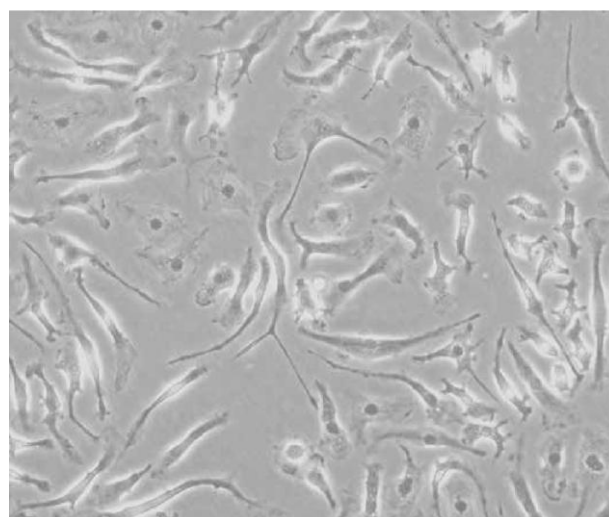


Sample Image



Anther of Lily

Fluorescence

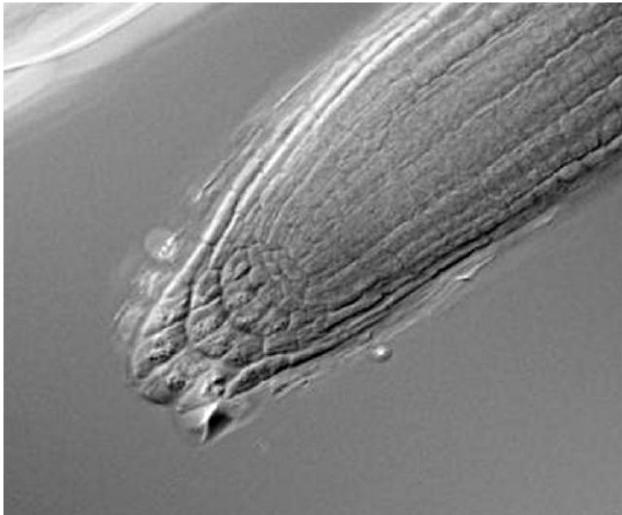


Normal rat kidney cells

Phase contrast



Mouse fertilized egg

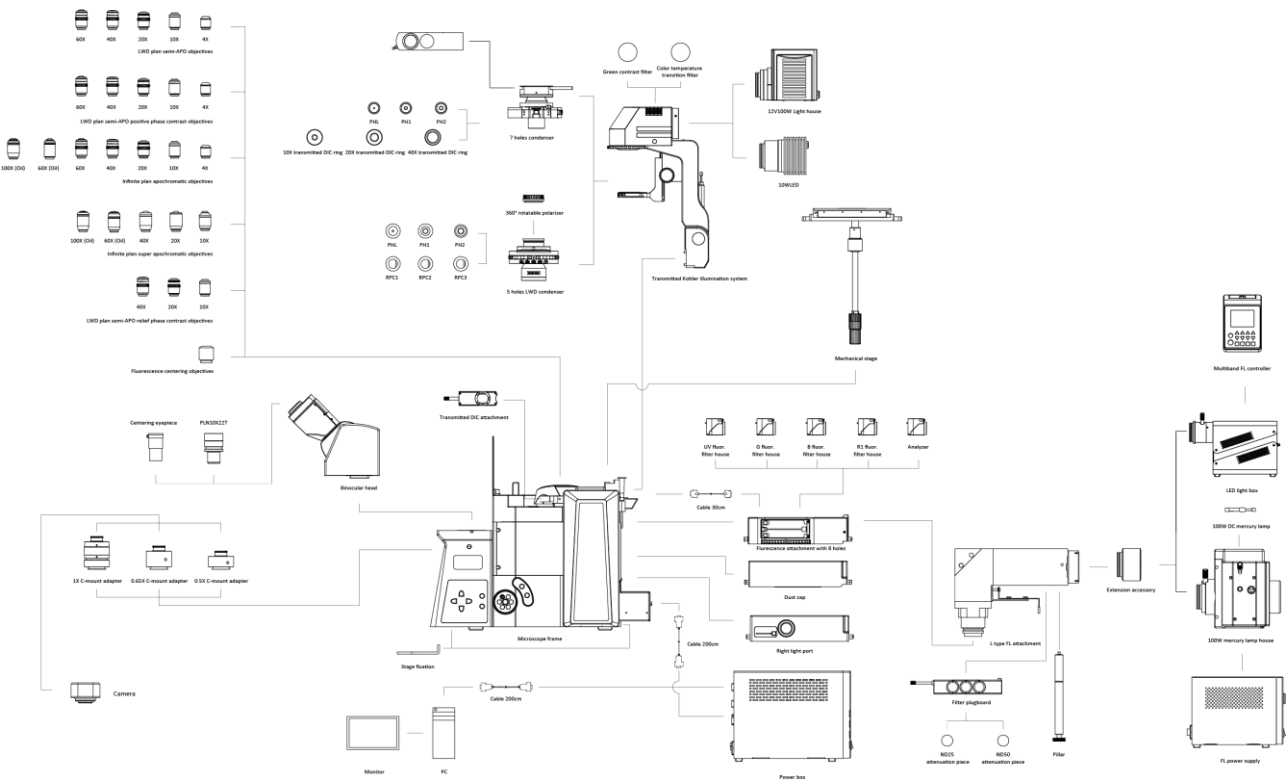


Arabidopsis roots

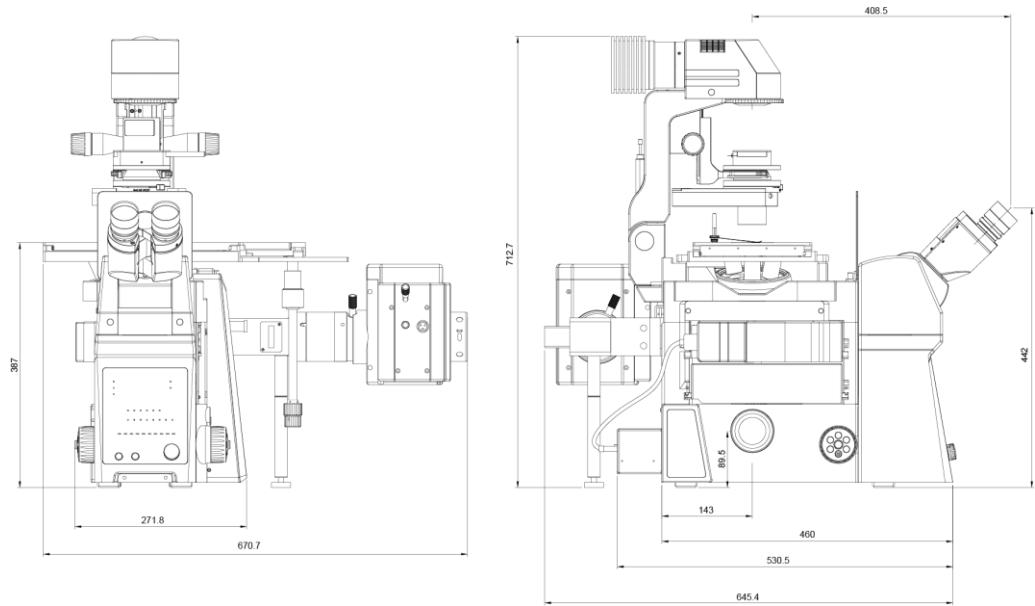
Relief phase contrast

DIC

System Diagram



Dimension



Unit:mm