



High-Speed Video Microscope

High-speed imaging for micro-droplet dynamics

The high-speed video microscope from Mengel Engineering is designed especially for microfluidics. With its high-brightness, long working distance zoom optics and miniature CMOS high-speed camera with the fastest frame rate over USB3 in the industry, it is ideal for analysis of fast phenomena in microfluidics systems. It hooks up to any PC with USB3 port for high-speed, high-resolution microscopy of microfluidic dynamics.

Applications

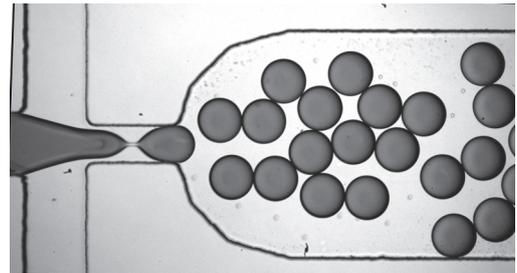
- Droplet production
- Droplet switching
- Micromixing
- Flow instabilities

The 2.3 Megapixel CMOS camera is able to record at a full 170 frames/second at full resolution with exposure time down to 35 μ sec, giving crisp, clear images of even the fastest events without motion blur. Frame rates up to 3000fps is available with reduced image resolution.

Unique triggering and automation features allows you to synchronize to external events like pump action or magnetic detection. When an event is detected, you can save video back in time to see the run-up to the event.

The microscope is supplied with a manual translation stage with 100x100mm travel, ideal for advanced, large-area microfluidic devices with high functionality.

Fully motorized stages and focusing is available for remote control, enabling the use inside an incubator chamber.



Benefits

- High-brightness 6.5X zoom optics with 33mm working distance
- Incident, transmitted or EPI fluorescence light illumination
- Manual stage with 105x105mm travel, optional motorized stage and focus
- Vibration-free operation without cooling fans
- Monochrome or colour 2.3 Megapixel camera with 170fps at full resolution
- Captures up to 3000fps video at reduced resolution
- Exposure time down to 35 μ s for capture of fast-moving objects
- Powerful and easy to learn video acquisition software
- Long-time recording at high speed, limited only by hard disk capacity
- Flexible trigger and marker options for synchronizing to external events
- Image based triggering for capturing only when image is changing
- Pre-post triggering: capture an event after it has happened
- Time stamp on every image for accurate reference to external events
- Future proof: Will support newer, faster cameras as they become available

Microscope Optics

The microscope is fitted with high-brightness 6.5X zoom optics and a microscope objective with 33mm working distance. The long working distance allows high-resolution imaging of the fluidic channels in a chip with attached fluid ports or tubing that would prevent you from getting close enough with a normal microscope objective.

Zoom optics is essential for matching the field of view to the area of interest when adjusting the camera speed.

The microscope is supplied with a manual stage with 105x105mm travel and a glass plate insert and additional mounting threads for your own insert.

Fully motorised stage and focus adjustments are available as options.

LED illumination

High-speed video recording needs more light than conventional still image recording due to shorter exposure time, so you need to pay extra attention to illumination light efficiency.

Droplet dynamics can be recorded with either incident or transmitted light, and by far the most forgiving configuration in terms of light efficiency is transmitted light. However, chips with opaque substrate or chips mounted on a temperature regulated platform can only be imaged with incident light.

Both incident and transmitted light options are available using high-power LEDs. The LED is available in UV, colour, white or NIR versions.

Fiber optic HMI fluorescence lights can also be used.

High-speed Camera

The standard camera supplied with the microscope is the **MG2000-170**, using a 2.3 Megapixel 2/3" CMOS sensor with a speed of 170fps at full resolution, and up to 3000fps with reduced image resolution.

The camera is available in colour or monochrome. Monochrome cameras are more light-sensitive and give sharper images, while colour cameras add extra information and give visually more attractive images.

The data rate from the camera is close to the maximum capacity of the USB3 bus. The system can be supplied with substantially faster, but more expensive cameras that connect through a PCIe plug-in card.

Recording software

The recording software is designed especially for high-speed video streaming and includes features normally not available in microscope video software.

The software records directly to hard disk at full speed in raw or real-time compressed format with GPU acceleration, removing any restriction on video sequence duration. Record continuously for hours or days without missing a single event.

The software includes multiple trigger options to start or stop recording by software, external signal or motion analysis of the video stream. The built-in video buffer allows you to trigger on an event after it has happened. Automation features include auto-file naming, auto-export to just about any video format, time-lapse recording, and much more.

The software is continually updated with support for new cameras as they become available.



Optical magnification	5X lens: 2.3 - 15X, 34mm WD (option) 10X lens: 4.6X - 30X, 33mm WD 20X lens: 9X - 60X, 20mm WD (option)
Field of view	5X: 4 mm - 0.7 mm, 10X: 2.1mm - 0.4 mm 20X: 1 mm - 0.2 mm
Illumination	5W LED, UV, blue, green, red, white or NIR
Stage	Manual, 105 x 105 mm travel, with glass plate or slide holder insert
Camera sensor	1920x1200 2/3" (10.8mm diagonal) Colour or monochrome
Frame rate	170fps @ 1920x1200 220fps @ 1280x1024 2800fps @ 512x88
Exposure time	Down to 35µs
Camera control	Frame rate, image size, video gain, exposure time, dynamic range (8 - 12bits), trigger input
Camera dimension	29x29x39mm
Cable	USB3.0 up to 5m
Recording time at full resolution and full speed	uncompressed 15 minutes (320GB disk) Compressed up to 10 hours (1.5TB disk)
Trigger	Software, External switch, TTL input, motion detection
Automation	Auto-save, auto-name, auto-export video files
Video format	AVI, MP4, H.264, HEVC, BMP, TIFF, Jpeg, etc.
Time stamp	PC system time stamped on each image
Software compatibility	Windows 7, 8 or 10, 32 or 64 bit (64 bit recommended)
Software Language	English, French, German, Spanish, Chinese, Korean