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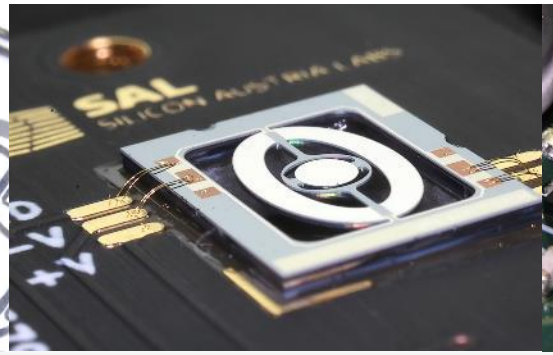
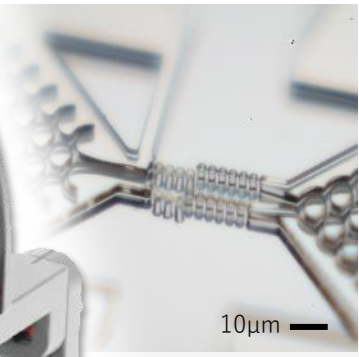
MRCL700 | 3D Imager Pro

Motorized 2D/3D microscope and modular imaging system





Microqubic AG
Feldpark 29, 6300 Zug, Switzerland
contact@microqubic.com

PCT patent pending

Designed and manufactured in SWITZERLAND

Technical specifications

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- Imaging from centimeters to micrometers
- 7 actuators with position feedback
- 5 innovative illumination sources
- Modular and reconfigurable design
- Programmable and smart
- Focus stacking and HDR
- Powered from USB TYPE-C

Designed and manufactured in SWITZERLAND

PCT patent pending

*

- Operating voltage..... 5V/DC (USB TYPE-C), 15W
- Standby current..... <1mA
- Dimensions (base), weight..... 23cm×28cm, ~3Kg
- Operating conditions..... 10 - 40 °C, <80% rel. humidity
- Camera.... 1/1.7" image sensor, USB3.0 FullHD @60fps, 4K @30fps
- Motorized modules (7 modules):
  - X and Y axes (sample manipulation).... Linear (70mm range)
  - Rotation (sample manipulation)..... Rotary (360°)
  - Z-axis and Camera (focus/zoom)..... Linear (120mm range)
  - Tilt-A..... Rotary (-90 to 90°), Tilt-B..... Rotary (-120 to 120°)
- Illumination modules (5 modules):
  - Curved LED matrix.....160 LEDs with digital column selection
  - High-power LED with mechanical diffuser insert
  - Ring LED..... 8 RGBW LEDs, individually addressable
  - Close-up LED used with the high-zoom lens
  - Coaxial illumination with RGBW LEDs
- Optical resolution: 1µm
- The software runs on a Windows (10/11) computer

* Laptop is shown for illustrative purposes only and is not included

Product video: https://youtu.be/KLfmvEl_tuo

MRCL Viewer software (included)

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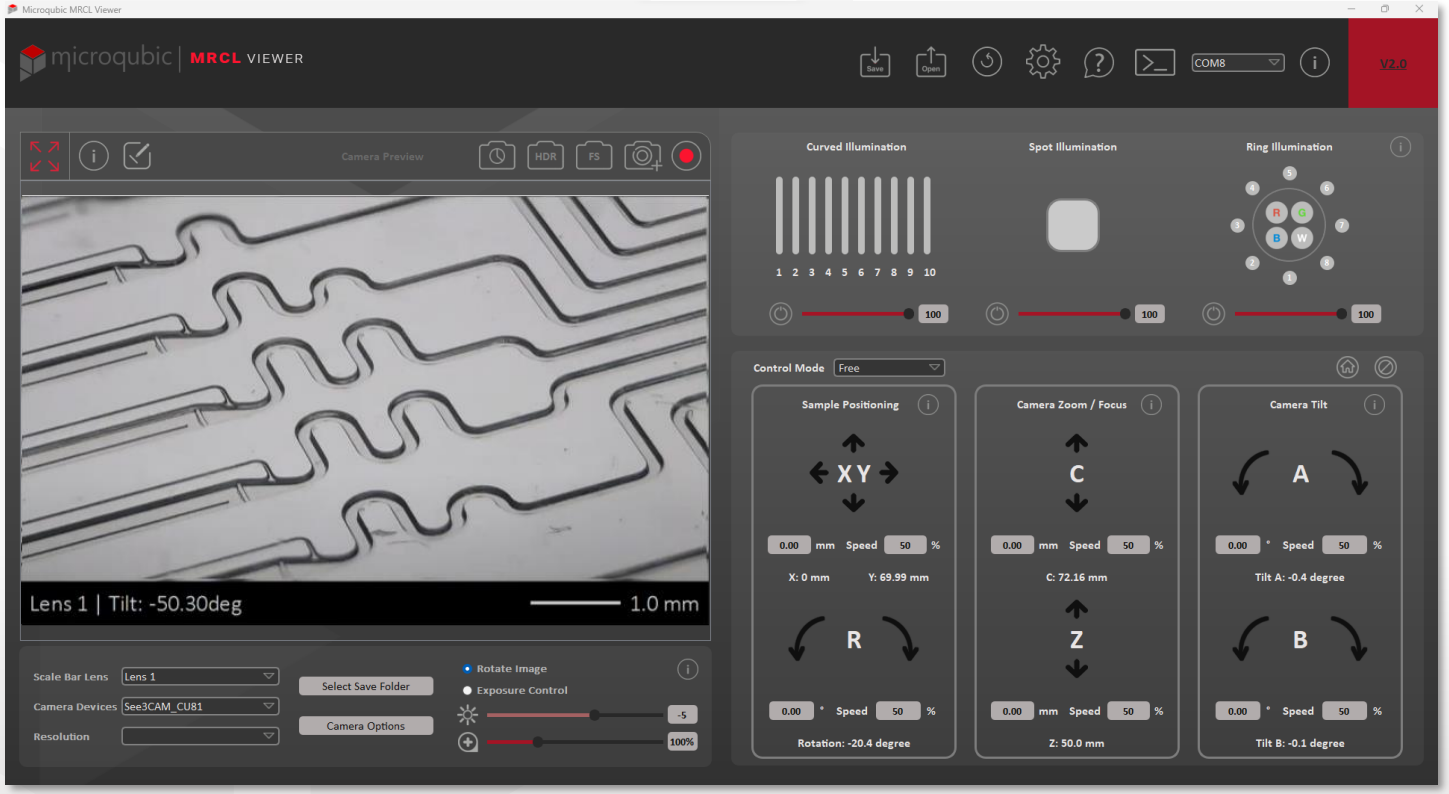
- The microscope is provided with dedicated software to capture microscope images and videos, and control the microscope hardware.

- The software supports advanced features like:
  - Automatic focus stacking
  - Dynamic scale bar integration
  - Live measurements
  - HDR imaging, Timelapse, 4K video
  - Motorized point-of-interest centering by mouse click

- More features like automation support and image stitching are currently being developed.



Video: https://youtu.be/lPodmc0dF1I

Unmatched versatility

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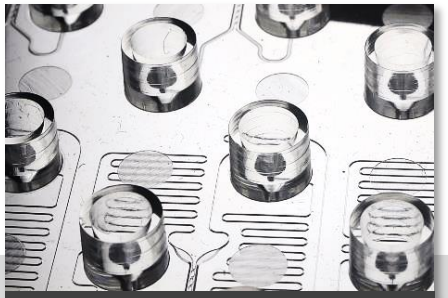
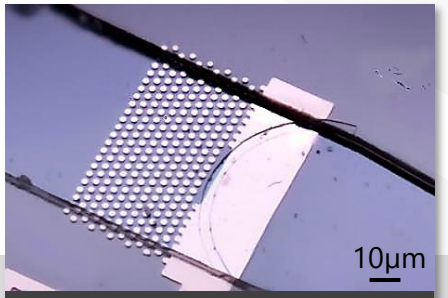
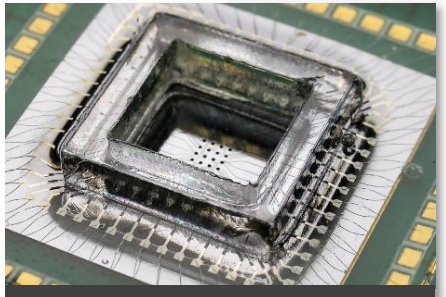

microfluidic ChipShop, Germany

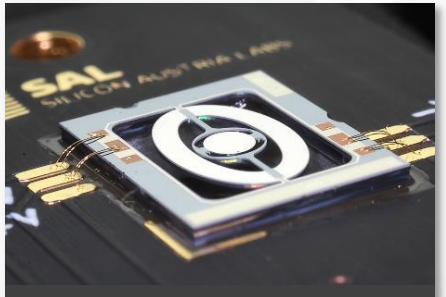


IBM Research - Zurich

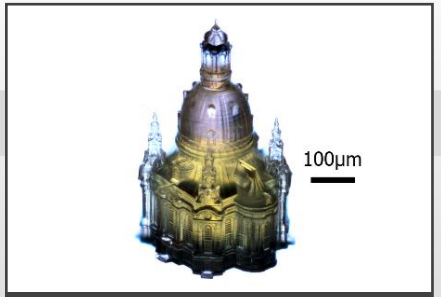
KLOE, France


Microbritt, UK


TU Delft, Netherlands



Silicon Austria Labs



Heteromerge, Germany


Heidelberg Instruments

Microfluidics, MEMS, semiconductor chips, precision manufacturing, watchmaking, 3D printing, biology, circuit boards, holograms, quality control, macro photography, marketing videos, and more...

Comparison of 3D microscopes

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Microqubic's 3D microscope	State-of-the-art 3D microscopes
	
<USD10'000	> USD60'000
4K camera with replaceable lenses (down to 1µm resolution)	Advanced optics with auto-focus and image processing, sub-µm resolution
7-axis motorized actuation (X, Y, R, Zoom, Focus, dual-axis tilt)	Not all actuators are motorized (e.g., tilting is manual)
2D/3D measurements (height, depth, width)	3D measurements, full 3D characterization, and modeling
Ultra compact, low-power, and portable	Bulky, not portable
Reconfigurable and modular at no additional cost	Limited modularity, reconfiguration with separately sold accessories
Optimized for research applications	Some features may not be needed for research applications

Why choose Microqubic systems?

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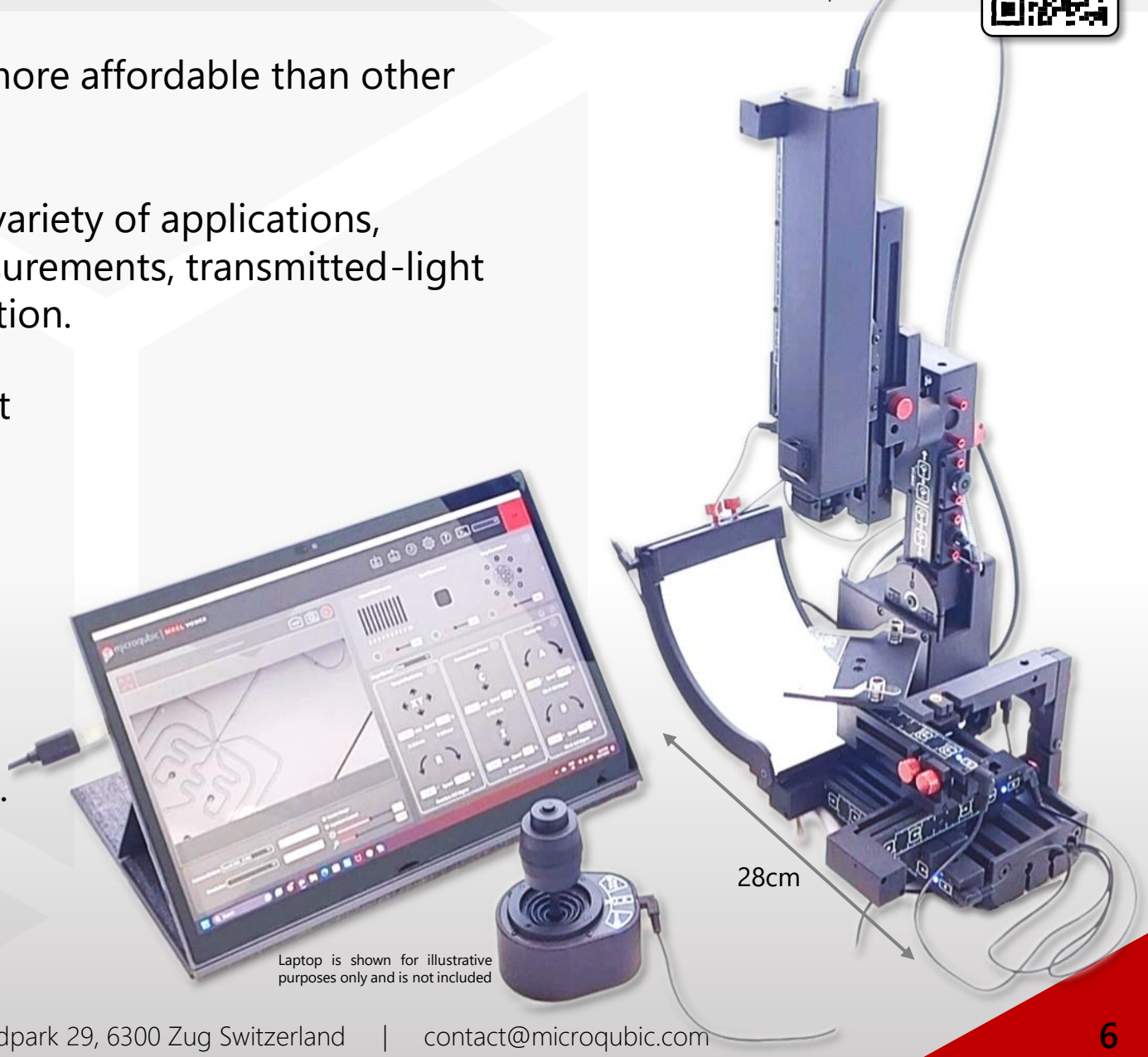
- **Price:** At under $10’000, Microqubic systems are more affordable than other 3D or tilting imaging systems.
- **Versatility:** The same system can be utilized for a variety of applications, including macro photography, contact angle measurements, transmitted-light and reflected-light imaging, and 360° sample rotation.
- **Modularity:** Users can adapt the microscopes to fit their experiments and samples rather than adjusting their experiments to fit the microscopes (compatible with 3D printing).
- **Programmability:** Fully motorized with position feedback, the systems allow users to control and program sample position, magnification, and tilt angle easily from the joystick or software interface.
- **Portability:** Ultra-compact and foldable, the system occupies minimal space in the lab.



Imaging modes

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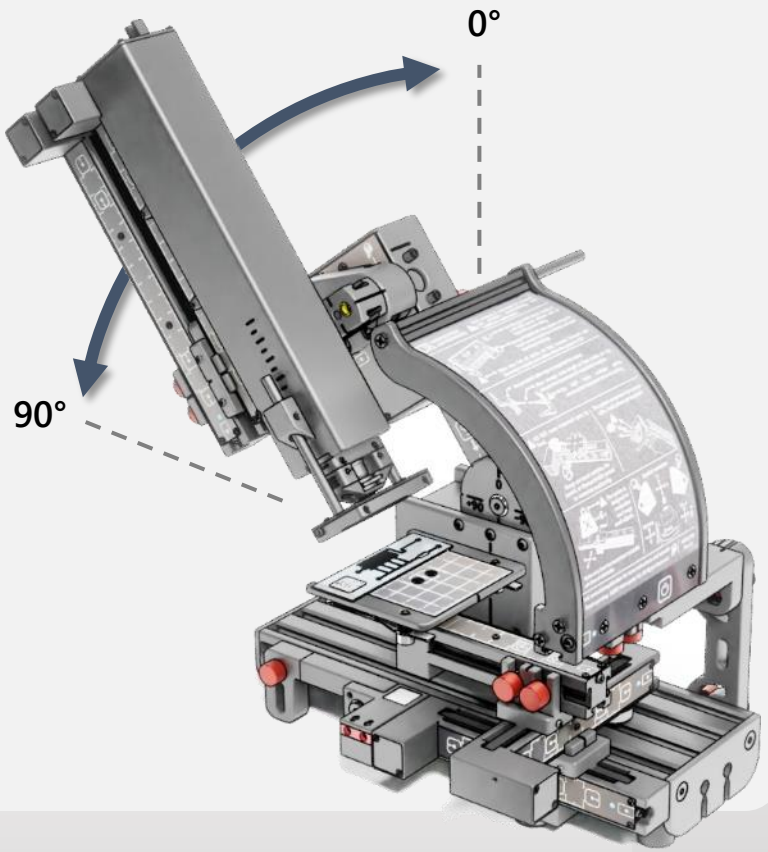
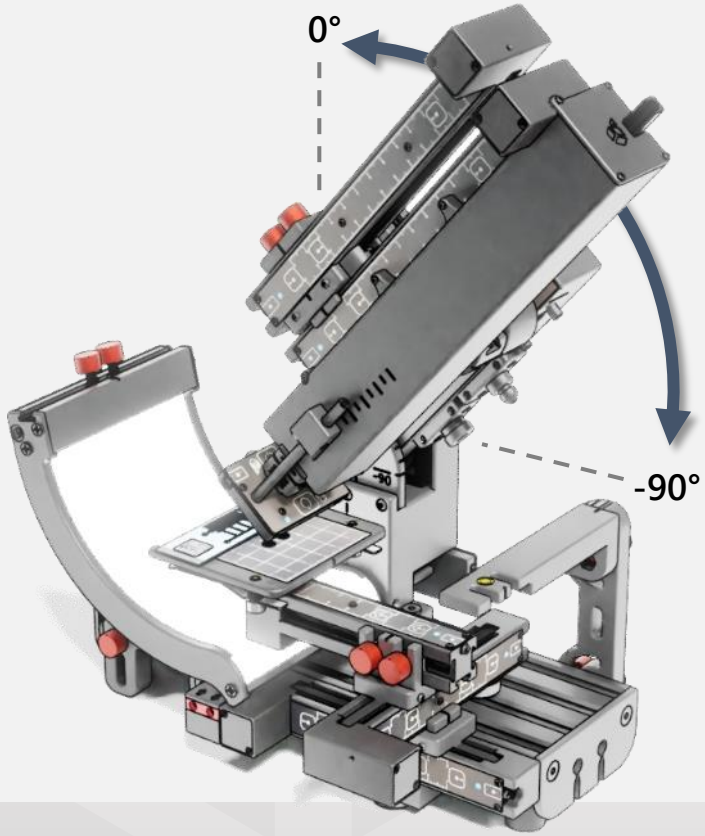
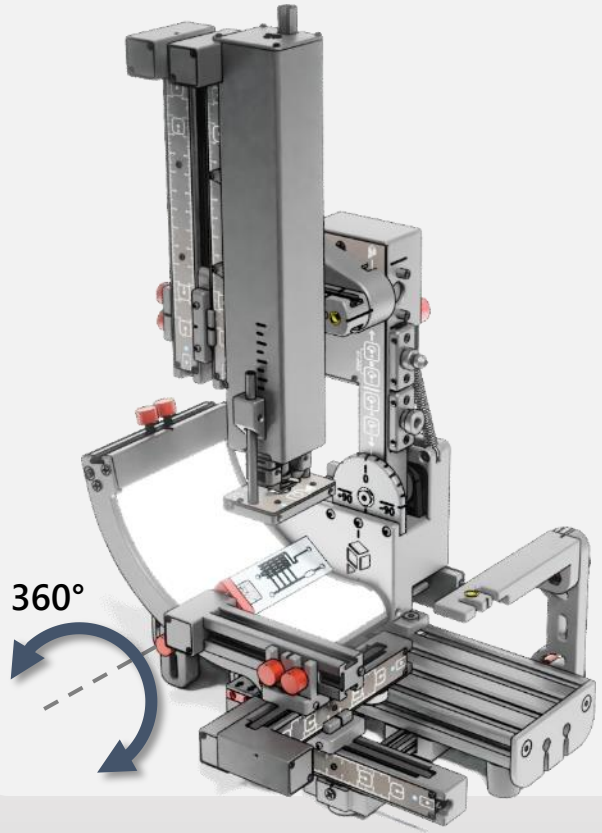
Reflected-light microscopy



Transmitted-light microscopy



360° tilting of the sample



The system is also suitable for cross-sectional analysis, contact angle measurement, and macro photography.

LED illumination sources (included)

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Curved LED matrix
3D imaging of reflective and transparent samples

Coaxial RGBW* illumination
2D imaging of reflective samples

Spot illumination
High-power LED with a removable diffuser

Ring RGBW* illumination
8 individually addressable LEDs

Close-up illumination
High-magnification imaging of reflective samples

Imaging modes: https://youtu.be/N6X3q_MrgFI

RGBW
red-green-blue-white LED

Objective lenses (included)

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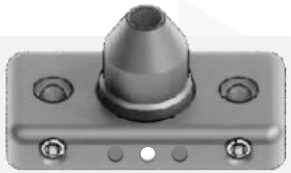
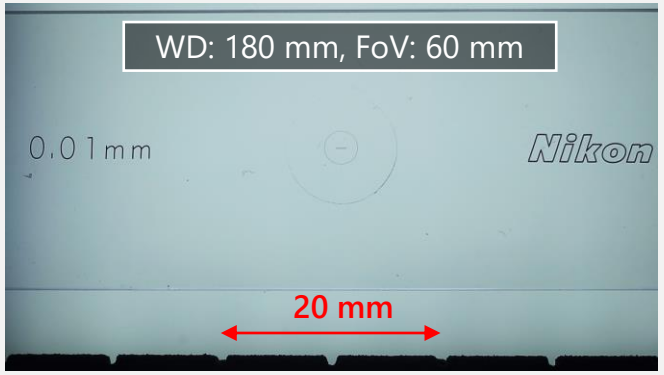
Imaging from tens of centimeters down to micrometer resolution with three lenses and motorized zoom

- **Medium-zoom lens (default):** wide magnification range and large working distance.

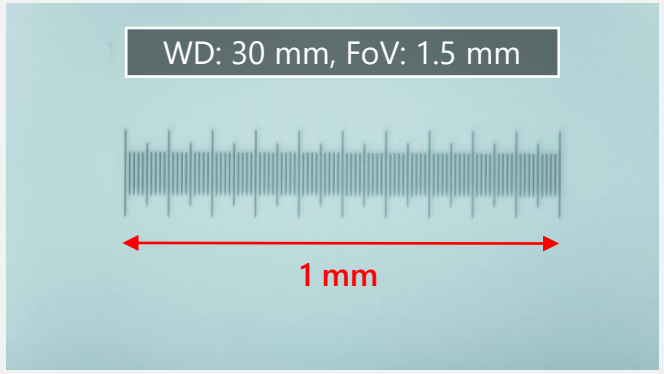


LENS 1

Min. Zoom



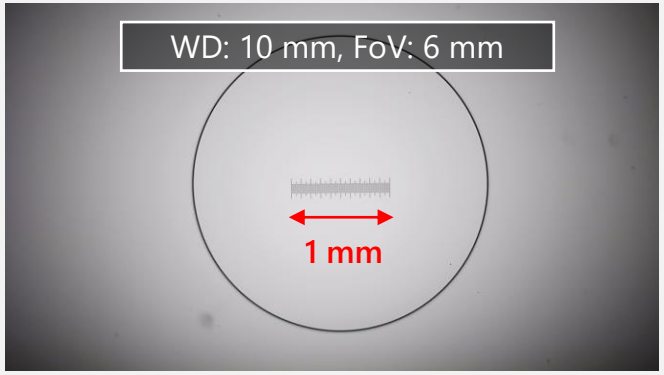
Max. Zoom



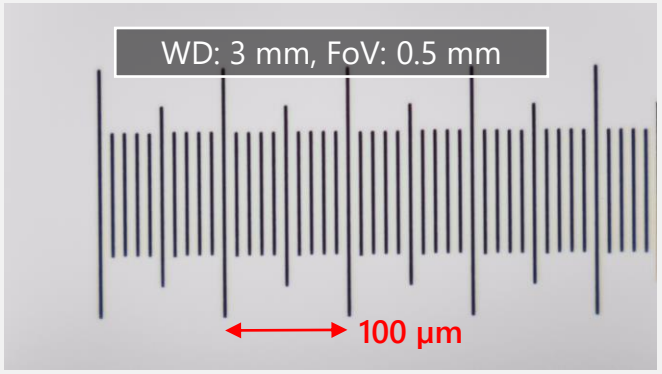
- **High-zoom lens:** high magnification but limited range and short working distance.

LENS 2

Min. Zoom



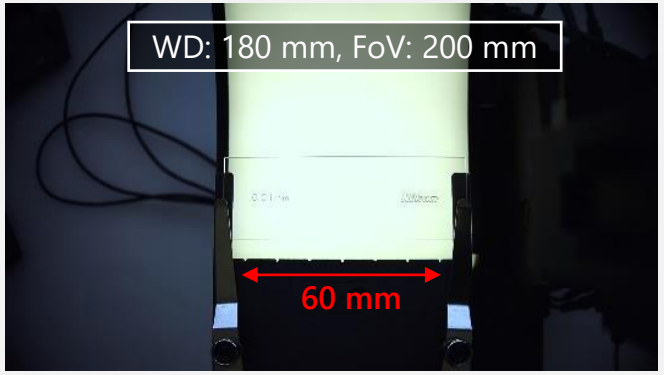
Max. Zoom



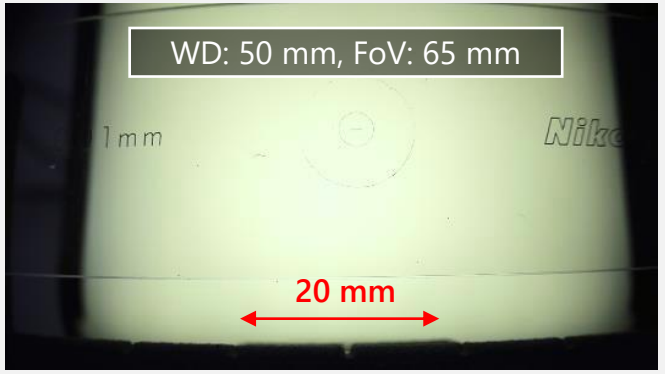
- **Wide-angle lens:** used to image larger samples.

LENS 3

Min. Zoom



Max. Zoom



WD: working distance, **FoV**: field-of-view in X-direction

Maximum magnification

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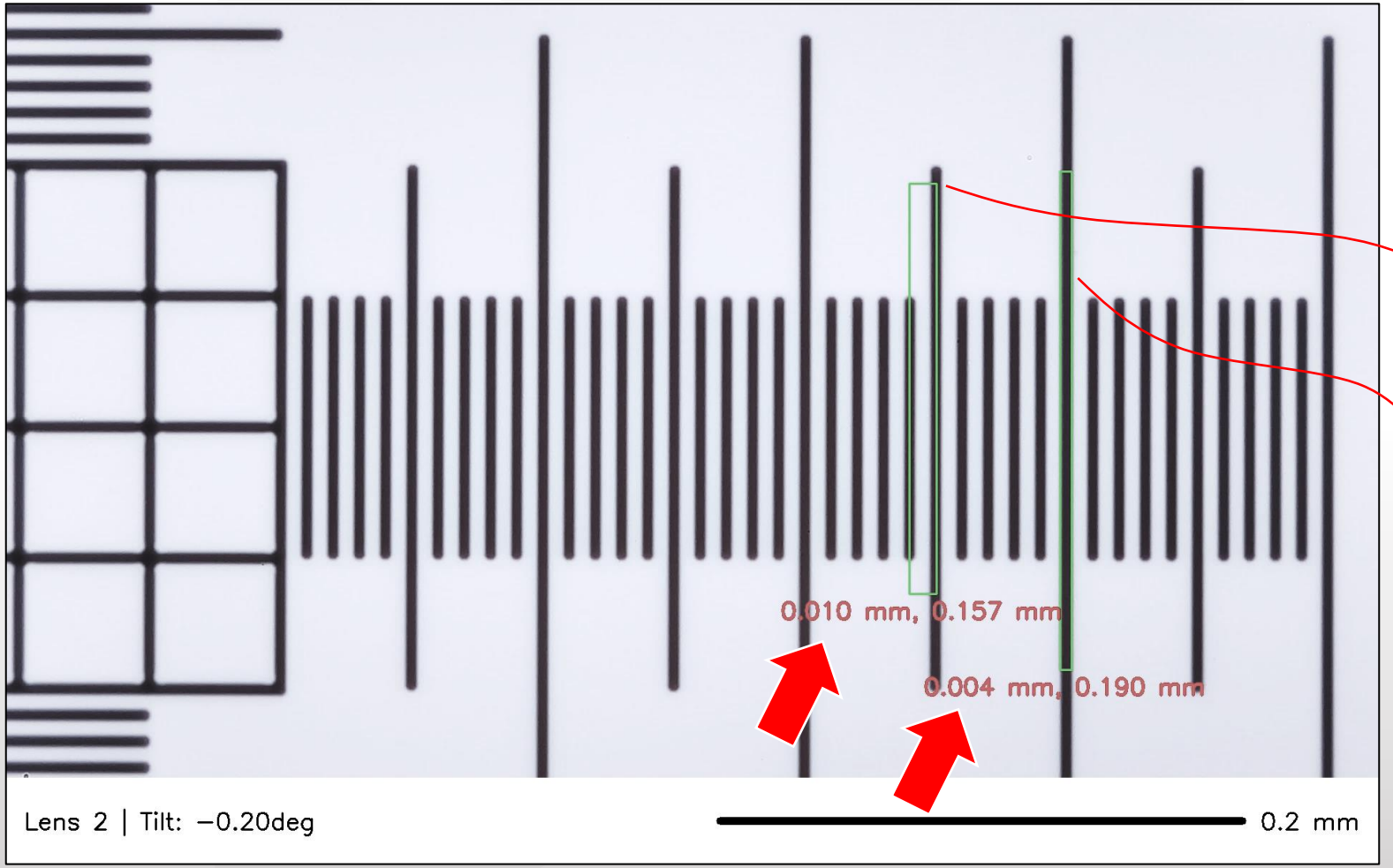
Camera resolution: 8MP, **Objective lens:** High-zoom (Lens 2)

Optical resolution and measurement accuracy: ~1µm



10µm spacing

4µm line width

Measurement annotations

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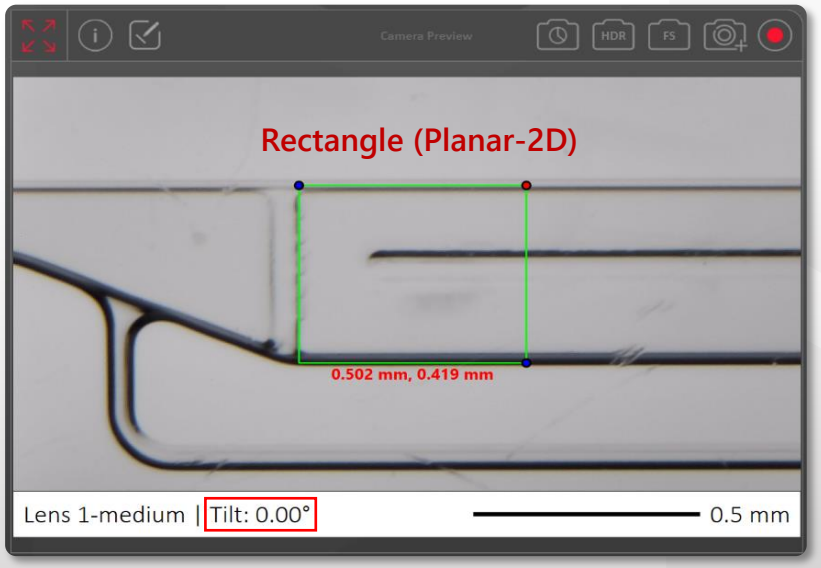
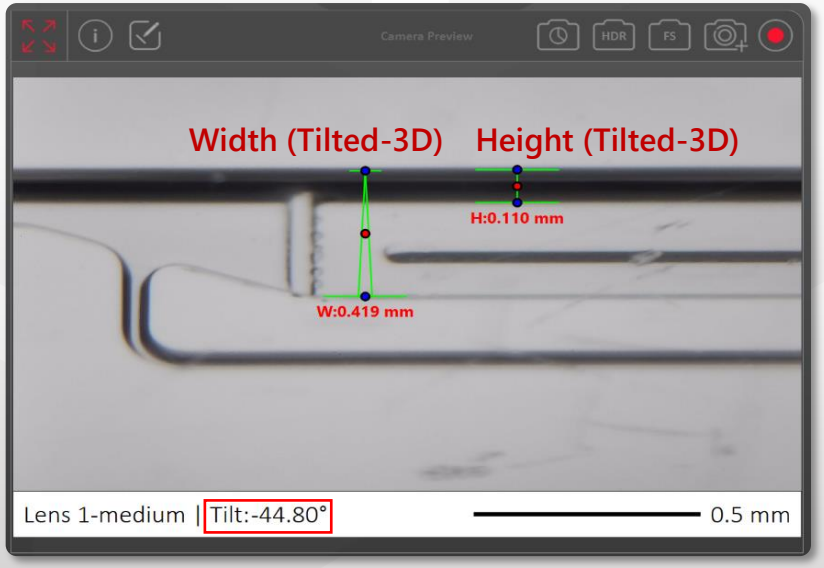
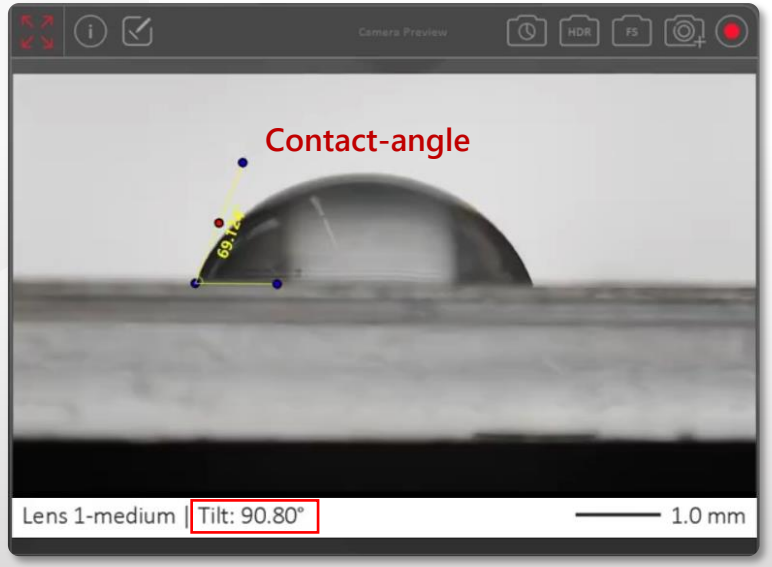
- Rectangle (Planar - 2D)
- Width (Tilted - 3D)
- Height (Tilted - 3D)
- Line
- Circle
- Angle
- Calibration
- Crosshair

- **Top-view (2D)** and **tilted (height, depth)** measurements with automatic tilt-angle correction.
- Annotations for **circle**, **line**, and **angle** measurements.
- Simple calibration process with the included calibration pattern.







Video tutorials

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YouTube Playlist: https://www.youtube.com/playlist?list=PL828aHLewNoX1nsitb6mJbq9sCXzS_v5N

or click on the thumbnail below for a specific video

1 Introduction and Guidelines

00:00 General introduction
00:15 Introduction to software
01:15 Hardware components
02:30 Motorized actuators
03:05 Operating and safety guidelines

2 Setup and Storage

00:20 Packing list
01:15 Electrical connections
01:45 Software setup
03:20 Camera module installation
04:35 Illumination sources and the joystick
05:40 Software settings
06:50 Objective lenses and accessories

3 Operating Instructions

00:25 Software connection
01:55 Joystick control
02:40 Zoom and focus adjustments
03:30 Reflected-light microscopy
05:05 Transmitted-light microscopy
06:30 360 imaging
08:25 Wide-angle imaging
09:00 Aperture control

4 Software User Guide

00:50 Connecting to microscope
02:10 Camera settings
03:20 Scale bar integration
04:00 Tilt angle overlay
04:15 Illumination control
05:00 Actuator control
06:45 Saving/Opening microscope parameters
07:35 Focus stacking and HDR
09:10 Serial terminal window

5 Measurement Annotations

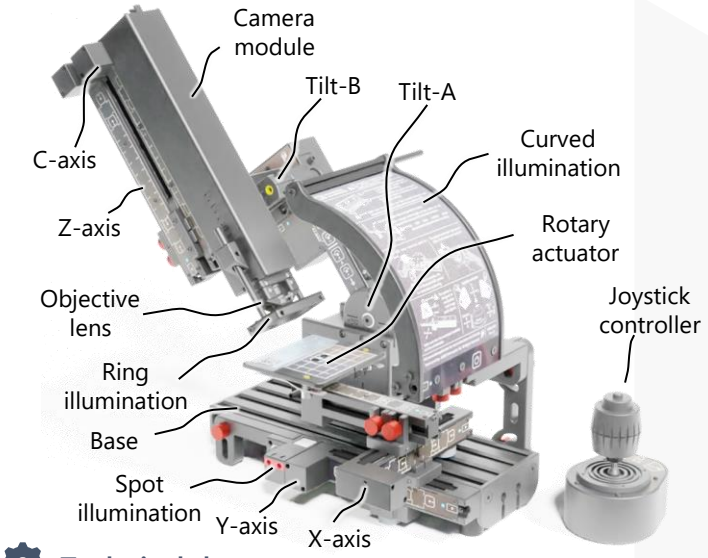
00:10 Crosshair mark at the center
00:30 Circular measurements
01:00 Angular measurements (also water contact angle)
01:30 3D height and width measurements
04:05 Dual images with and without annotations

6 Lens Calibration

00:20 Preparations
01:10 Calibrating lens 1 (medium zoom)
02:50 Calibrating lens 2 (high zoom)
03:40 Saving calibration data
04:15 Validating the calibration
05:10 Hardware calibration

Please consider subscribing to **Microqubic's Youtube channel** to get notified about new videos: www.youtube.com/@microqubic

Intended use: This motorized and digital microscope is designed to manipulate and image small objects for applications related to scientific research and precision manufacturing. **It is NOT intended for diagnostics or healthcare applications.**



Technical data

- Operating voltage..... 5V/DC (USB TYPE-C), 15W
- Standby current..... <1mA
- Dimensions (base), weight..... 23cm×28cm, ~3Kg
- Operating conditions..... 10 - 40 °C, <80% rel. humidity
- Camera.... 1/1.7" image sensor, USB3.0 FullHD @60fps, 4K @30fps
- Motorized modules (7 modules):
  - X and Y axes (sample manipulation).... Linear (70mm range)
  - Rotation (sample manipulation)..... Rotary (360°)
  - Z-axis and Camera (focus/zoom)..... Linear (120mm range)
  - Tilt-A..... Rotary (-90 to 90°), Tilt-B..... Rotary (-120 to 120°)
- Illumination modules (5 modules):
  - Curved LED matrix.....160 LEDs with digital column selection
  - High-power LED with mechanical diffuser insert
  - Ring LED..... 8 RGBW LEDs, individually addressable
  - Close-up LED used with the high-zoom lens
  - Coaxial illumination with RGBW LEDs
- The software runs on a Windows (10/11) computer (not provided)

Safety instructions and warnings

- This device is not a toy. Therefore, adult supervision is required for children when using this product.
- The device must be used in dry, indoor locations.
- The device comprises high-power LEDs. Do not look directly at the light beam. This may cause eye injuries.
- Avoid exposing the device to high temperatures, high humidity, direct sunlight, liquids (including water), vapors, and solvents.
- The device comprises delicate mechanical, electrical, and optical components. Always handle them carefully, and avoid impacts or falls (even from a low height).
- Keep the device away from strong magnetic and electrical fields to avoid interference.
- Do not leave multiple cables unconnected to prevent short-circuiting.
- Never force mechanical modules beyond their limits. Do not place heavy objects on moving parts.
- Do not disassemble any part of this device. This will not only affect the calibration but may cause permanent damage.
- The device does not detect collision with the sample. Therefore, always watch the motorized movements and TURN the system OFF immediately in case of an undesired movement or unusual motor sound.
- The device can be affected by strong vibrations, especially at high zoom levels. Consider placing it on an antivibration/isolation table if this is the case.
- Clean the device using a soft cloth or compressed air, do not use solvents or detergents.

Statement of warranty

- The product is covered under a limited warranty for two years for errors related to manufacturing and material defects from the date it is delivered.
- Being a new product provided to a limited number of users, some parts may show minor differences in appearance and unexpected issues. However, Microqubic AG commits to providing support and updates to solve potential problems.
- The following cases are excluded from the warranty: 1. Normal wear and tear, 2. Damage arising from improper use, 3. Disassembling the device or its parts, 4. Modification or repair on the hardware/software/firmware.
- Microqubic AG reserves the right to inspect and decide the cause of the defect.

Declaration of Conformity

We, Microqubic AG, confirm that this product complies with the essential requirements of Low-Voltage Directive 2014/35/EU, EMC Directive 2014/30/EU, and RoHS Directive 2011/65/EU.

This device has been found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules.

The symbol on the left indicates that this device should not be disposed to domestic household waste.

contact@microqubic.com