



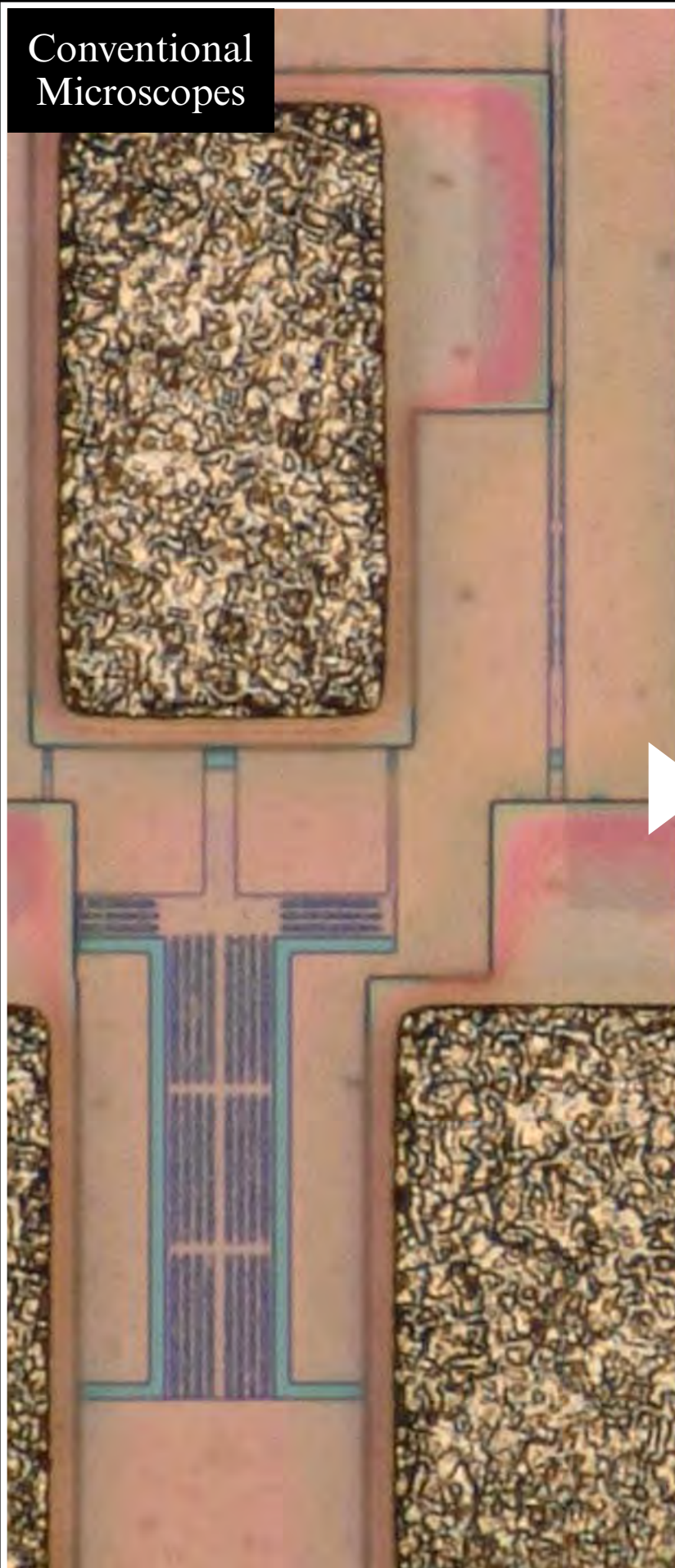
Digital Microscope

NEW VHX-7000 Series

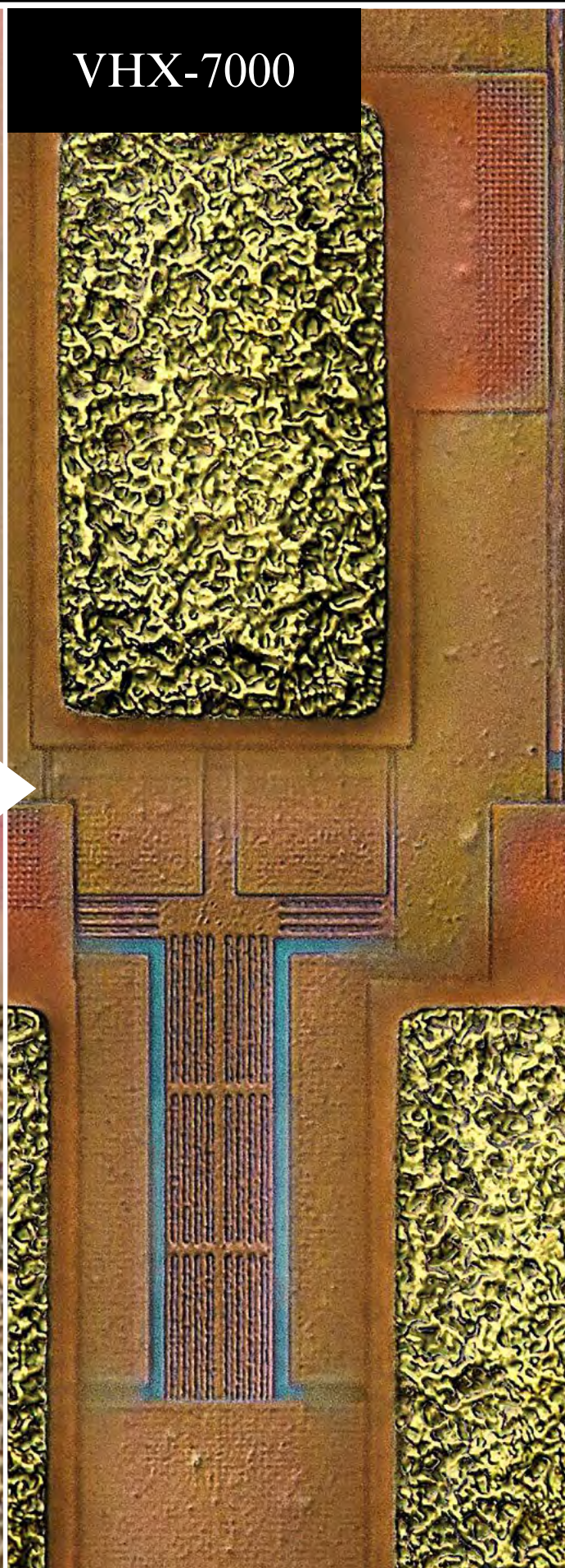


The World's First
4K Ultra-High Accuracy Microscope

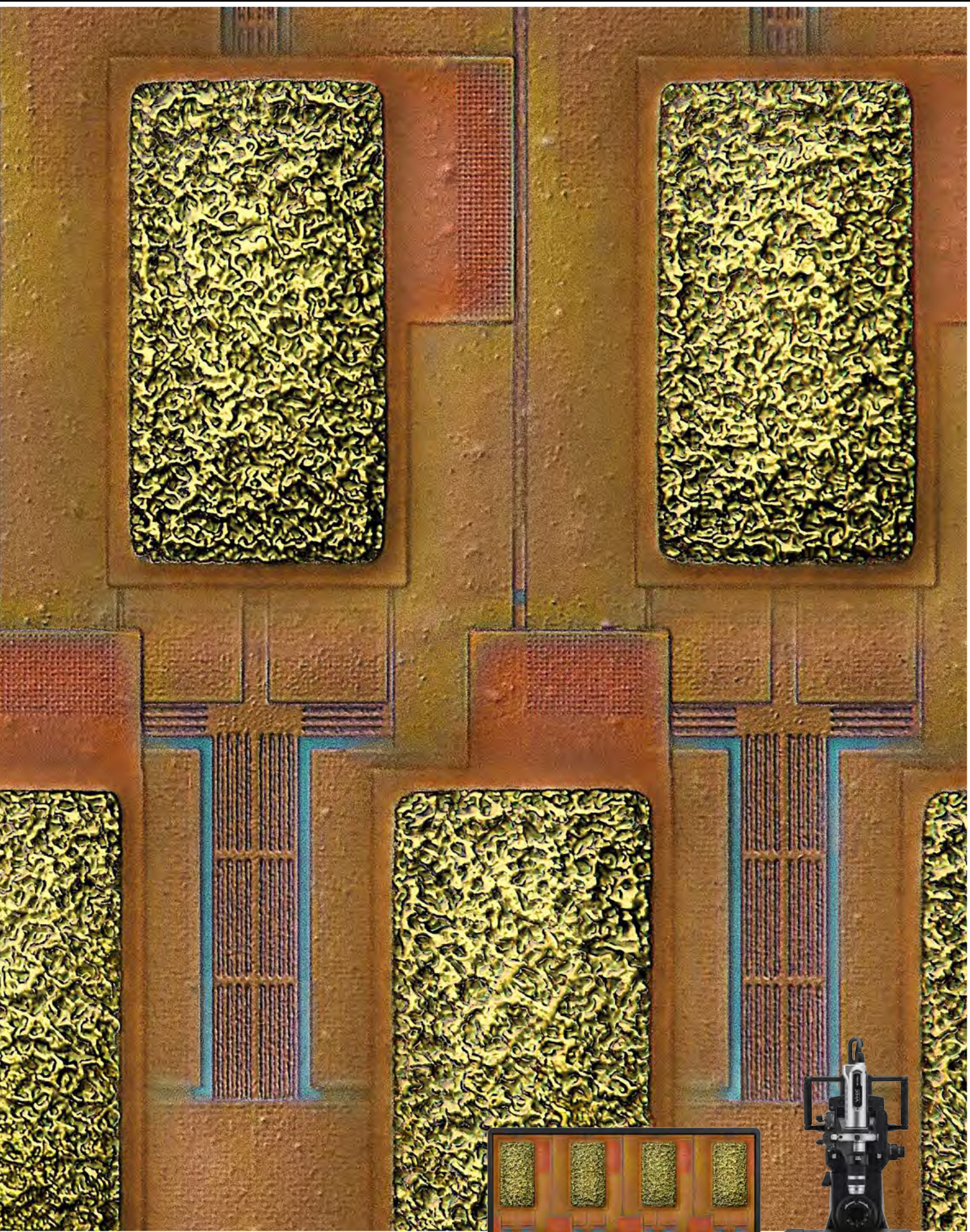
Conventional
Microscopes



VHX-7000



THE NEXT ERA OF DIGITAL MICROSCOPY



NEW Digital Microscope
VHX-7000 Series



Digital Microscope History

1990 -



VH-6000



VH-6300



VH-7000



VH-8000



VHX-100



VHX-200

1st Generation

New design eliminates
eye pieces

2nd Generation

Introduction of 3D
Observation

VHX
DIGITAL MICROSCOPE

Adopted by over 20,000 companies worldwide

VHX microscopes make observation simple and easy. KEYENCE has developed our new model to meet the needs of our customers. With the goal of developing the ideal digital microscope, we will continue to pursue the advancement of microscope technology.

5th Generation

NEW VHX-7000

The World's First
4K Ultra-High Accuracy Microscope

4K
FI HEAD



4th Generation

Introduction of advanced
focus and lighting techniques



VHX-500



VHX-600



VHX-900



VHX-1000



VHX-2000



VHX-5000



VHX-6000

3rd Generation

Introduction of
high dynamic range
(16-bit colour gradation)

VIEW



CAPTURE



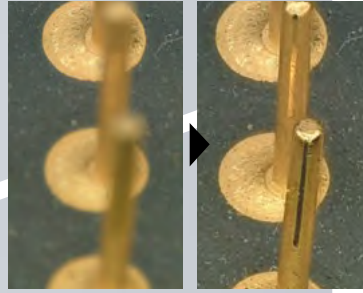
MEASURE



Observation with an optimal balance of brightness and clarity

The VHX Series has a depth-of-field that is 20 times greater than conventional optical microscopes. KEYENCE designs the lenses, cameras and graphic engine in-house, enabling observation with an optimal balance of depth and brightness. Even novice users can capture high resolution images with ease.

Large depth of field



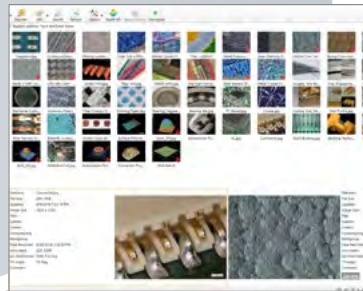
Hand-held observation



Images can be saved and shared easily

With a 1 TB hard drive, images are easily saved locally. Images can be shared over LAN or a USB drive. Reports can be automatically created and shared.

Easily save and recall images



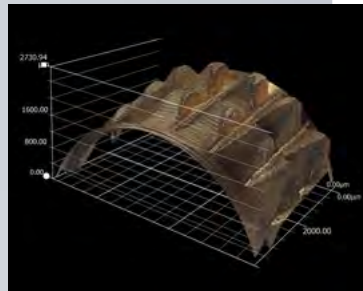
Automatically generate reports



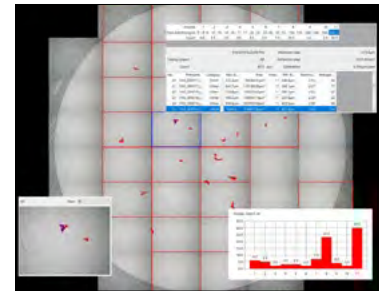
Perform a wide variety of measurements with just one device

Easily perform 2D and 3D measurements. Roughness, contamination, grain size, and other measurements can be performed with one tool.

3D measurement



Contamination analysis



The VHX Series offers observation that exceeds conventional imaging tools. With advanced measurement capabilities, this system enables a variety of analyses. Expanded memory capacity allows for storage of millions of images. Its easy to use interface can be used effectively by expert and novice users. The VHX Series is equipped with all of the features needed to enhance your analysis.



View, capture and measure with an all-in-one system

4K monitor



Easier Operation and Higher Resolution Images

The VHX-7000 represents a new era of digital microscopy

Delivering images that rival an SEM

Optical Shadow Effect Mode: See page 10

Optical Shadow Effect Mode makes subtle contours stand out and enhances uneven surfaces and stains with the push of a button.



Even novice users can capture optimal images

Advanced Operability: See page 12

The focus view feature paired with the motorised stage make focusing intuitive, and magnification can be changed by operating the handheld controller.

Highest definition in the history of microscopes

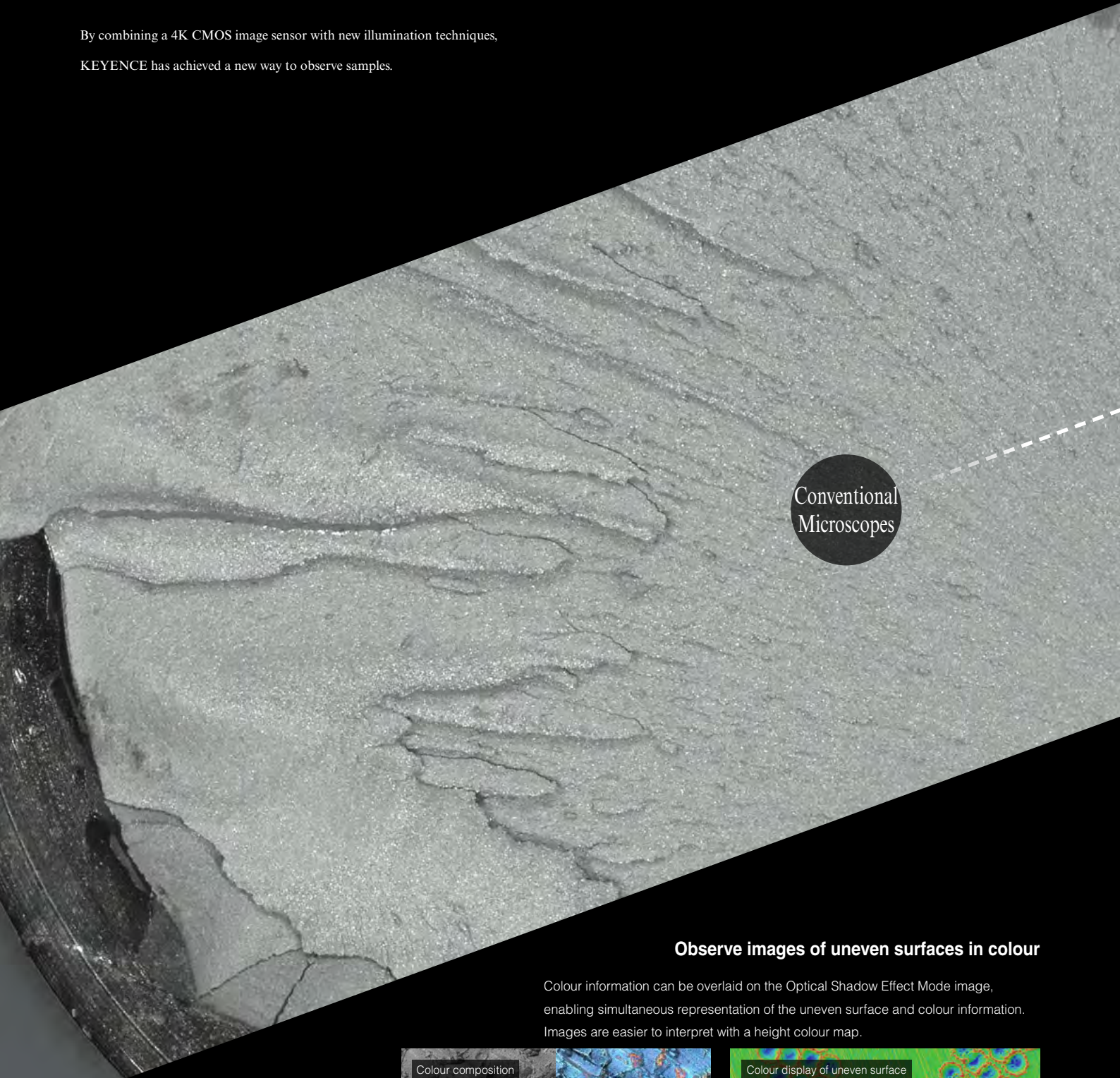
4K Fully-Integrated Head: See page 30

With a 4K CMOS image sensor and a newly-developed optical system, this VHX Series combines a large depth of field with high resolution to deliver a new level of observation.

Optical Shadow Effect Mode

Delivering images that rival an SEM

By combining a 4K CMOS image sensor with new illumination techniques, KEYENCE has achieved a new way to observe samples.



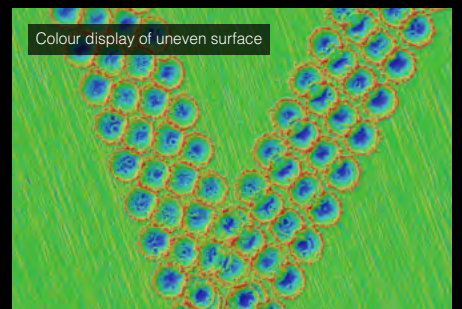
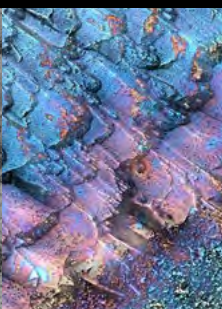
Conventional
Microscopes

Observe images of uneven surfaces in colour

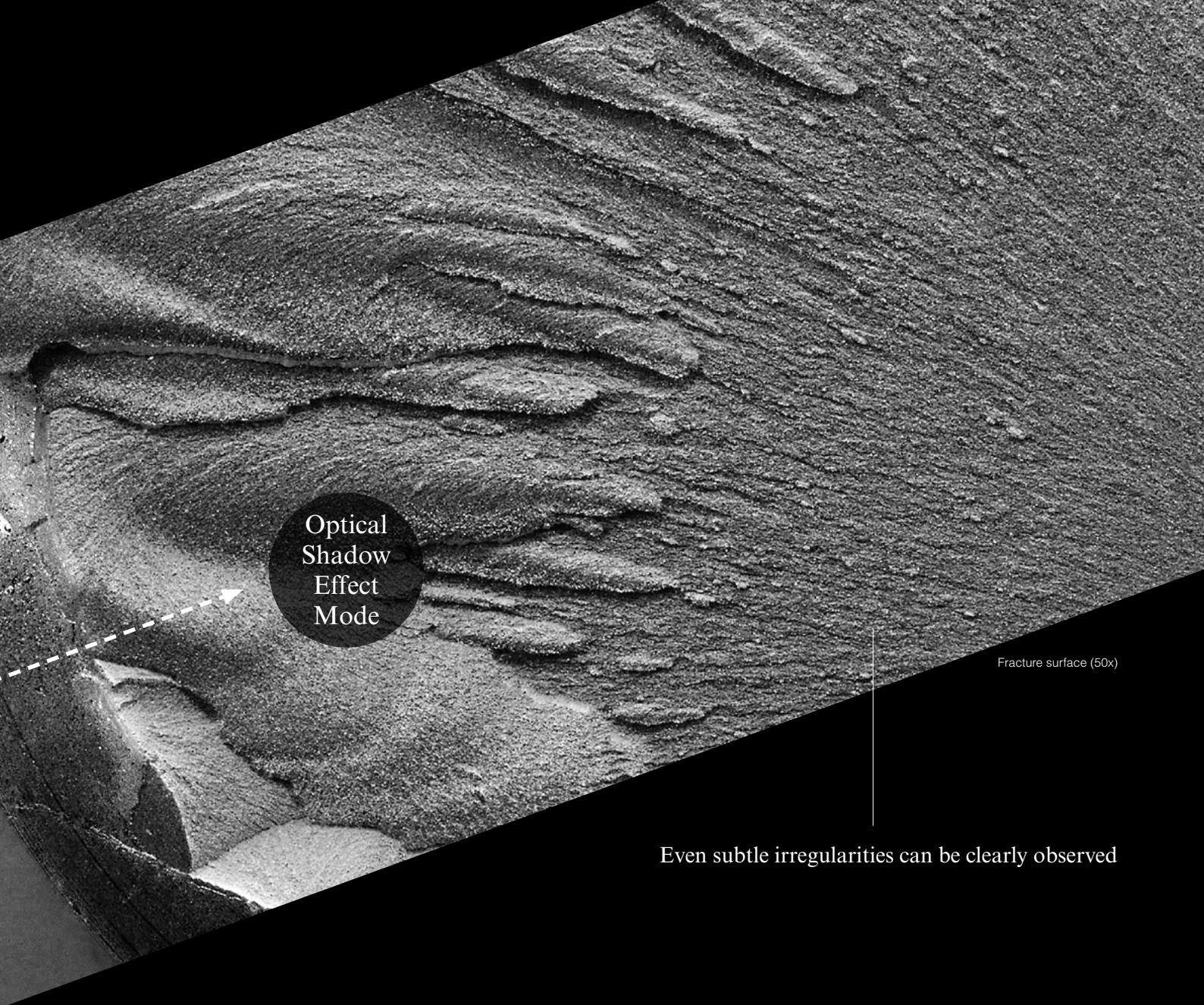
Colour information can be overlaid on the Optical Shadow Effect Mode image, enabling simultaneous representation of the uneven surface and colour information. Images are easier to interpret with a height colour map.



Metal crystals (1500x)



Laser printing (1000x)



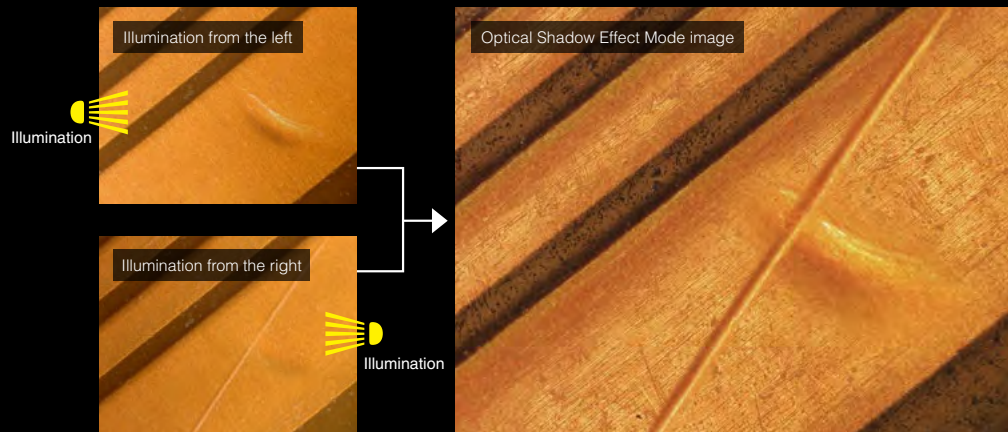
Optical
Shadow
Effect
Mode

Fracture surface (50x)

Even subtle irregularities can be clearly observed

Multi-directional lighting variation method

Varied illumination allows users to detect subtle irregularities on a sample.



*The image above is an illustration showing the Optical Shadow Effect Mode principle.



Controls are now even simpler and more convenient to operate

High-speed auto-focus stage

Focus view camera

Motorised eucentric stage

Full-control system enables even novice users to capture optimal images

The user simply places the target on the stage, and everything else – including alignment, focus adjustment, magnification switching and so on – is fully automatic. Even first-time users can perform observation perfectly on the desired area, with no stress at all.

All the controls are at your fingertips

Building on the high operability of previous models, this new VHX Series delivers intuitive focus adjustment using Focus View and a motorised stage. Additionally, magnification switching can now be performed using the handheld controller or the mouse.



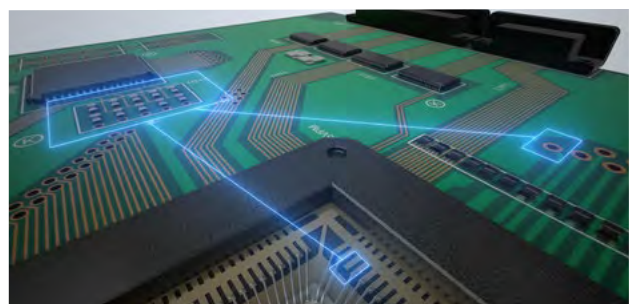
The Focus View function enables easy focus adjustment, viewed from the side

This is the first model to feature the Focus View function, which enables simultaneous viewing of the lens and the target. Thanks to the intuitive software interface, focusing can be carried out easily with just a click.



Automatic multi-point capture and measurement available

Using the Auto-Measurement Teaching function, repeated measurements can be performed automatically on identically-shaped samples. Not only XYZ coordinates, but also magnification and lighting settings are reproduced automatically.



Lighting and Observation Functions

Optimal lighting patterns are captured automatically

Omnidirectional lighting data is captured automatically

Multi-lighting

With the Multi-lighting function, omnidirectional lighting data is captured the click of a button. The image most suitable for observation can then be selected from among this data. This eliminates the need to endlessly adjust the lighting settings in order to obtain a clear image.

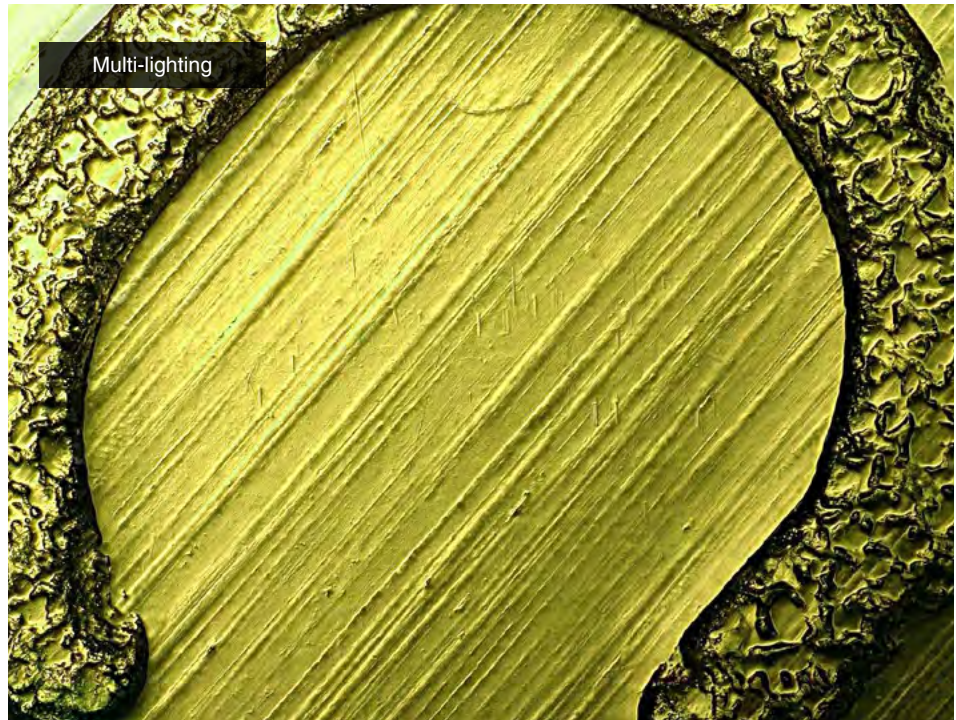
Lighting can be changed flexibly even after recording

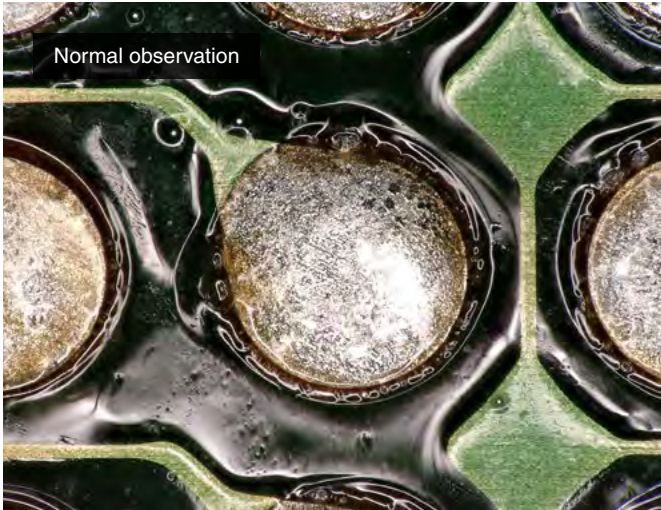
The lighting data is retained with the saved image. The lighting can be changed by using the mouse to move the lighting icon.



Lighting can be changed even after saving the image to a PC

Polished metal surface (1000x)

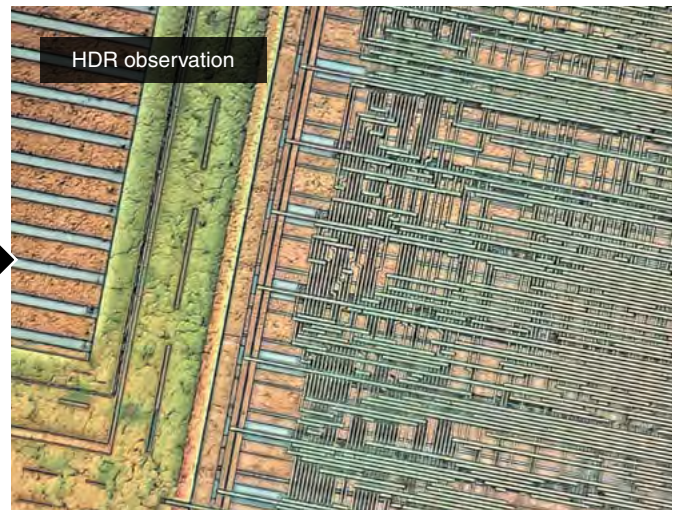
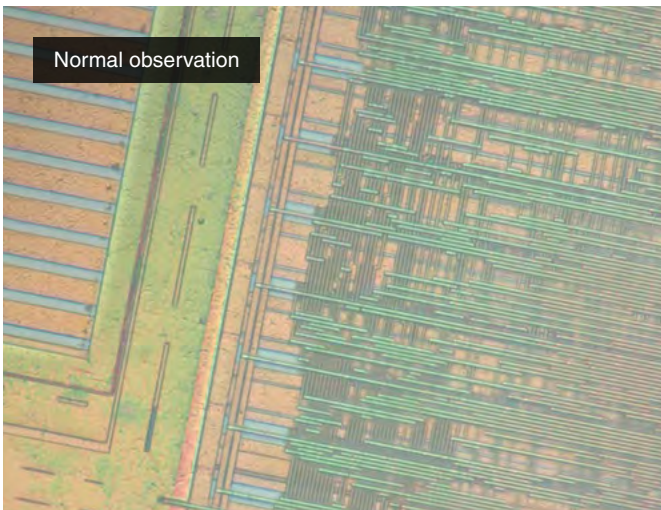




Eliminating glare

Ring removal

By capturing multiple images with different lighting, an image free of glare can be obtained. It has historically been difficult to remove the ring-shaped reflections that can appear on the target surface. With the VHX-7000, these rings can be removed at the click of a button.



Enhanced Colour and Contrast

HDR observation

The High Dynamic Range (HDR) imaging function captures multiple images at varying shutter speeds to obtain an image with high colour gradation. This enables observation at previously unattainable levels of accuracy and contrast.

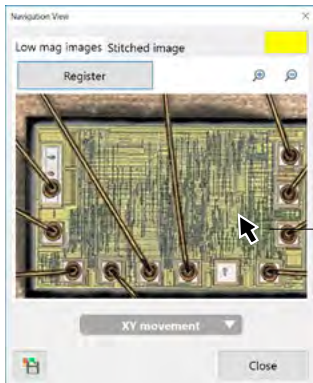
Depth Composition and Image Stitching

Always view your target fully in focus

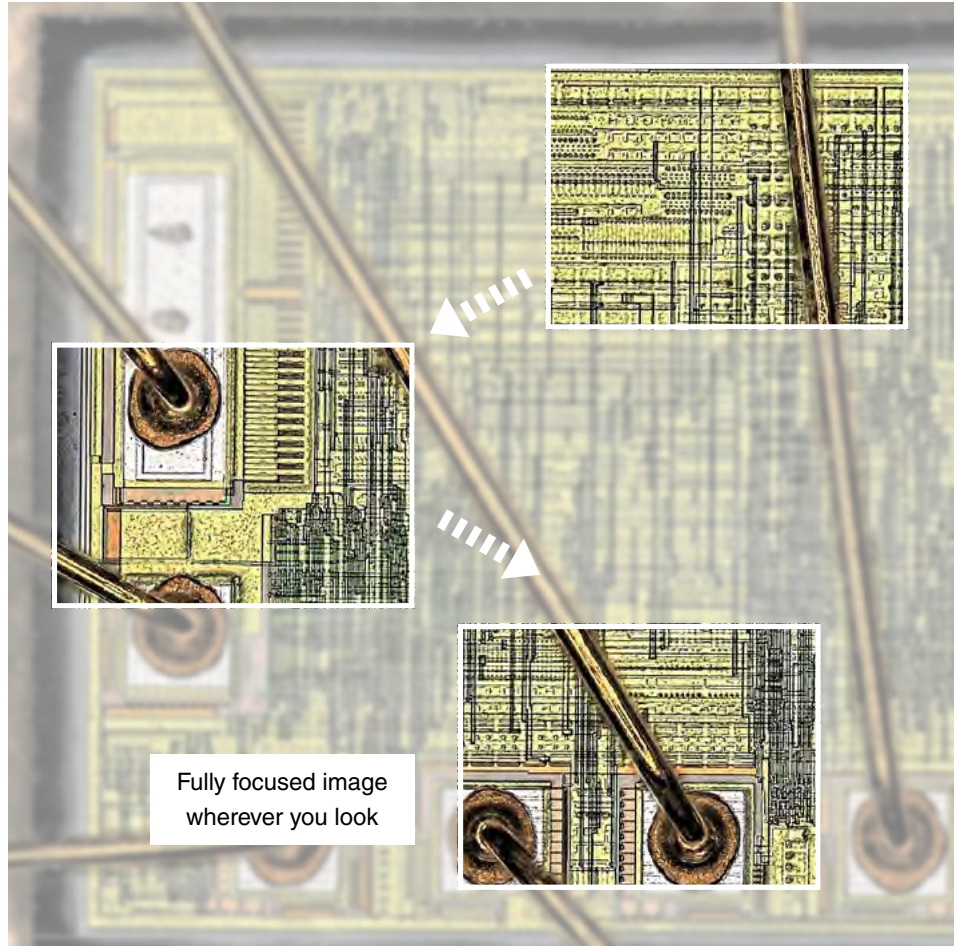
Fully focused imaging
anywhere on your sample

Real-time composition interface

On an overall image of the target, simply click on the area you wish to view. The stage will then automatically move to the selected location, and depth composition will be carried out until the area is in focus. All the manual adjustments required in conventional systems have been eliminated, dramatically reducing the time and effort required for observation.



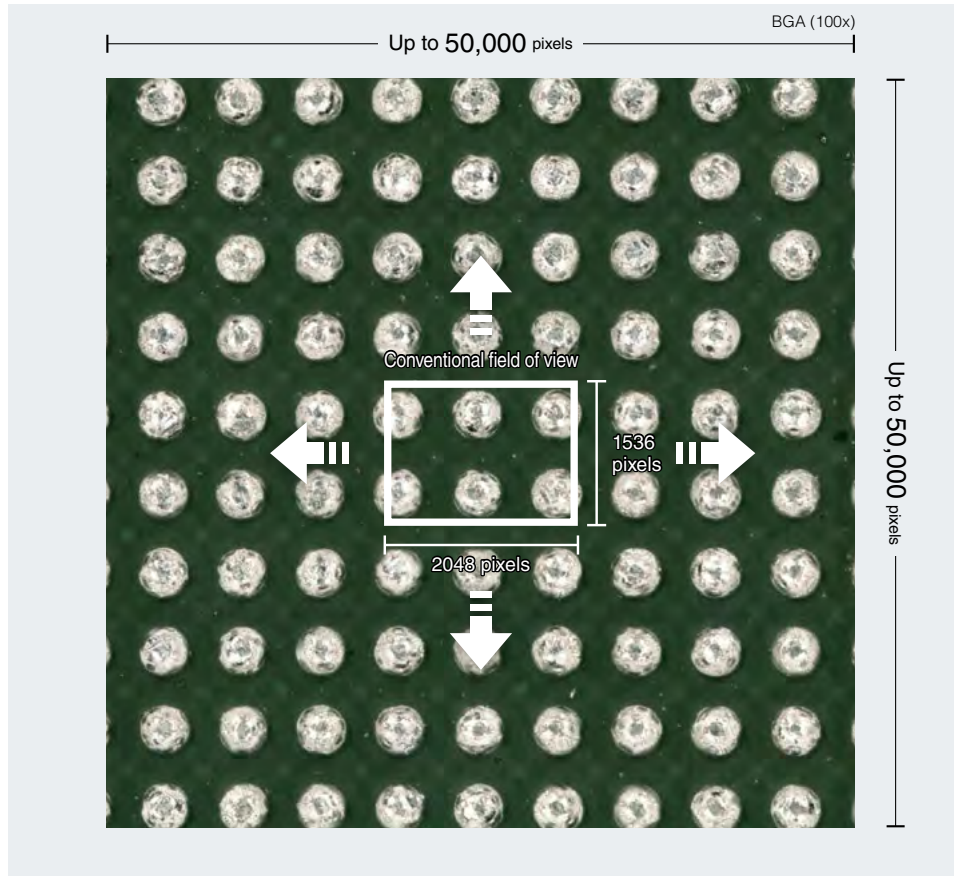
In the Navigation window
(wide field, low magnification),
click on the area you want to view



High-magnification observation range is now 800 times larger

High-speed image stitching (with up to 6 times more data than conventional systems)

When you press the Image Stitching button, the image is automatically stitched together. Stitching can be performed quickly over large areas, and can be used to create a high resolution image of a wide area. Image stitching can handle up to 50 thousand pixels vertically by 50 thousand pixels horizontally.

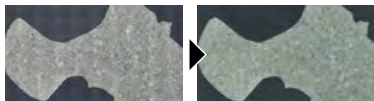


3D image stitching

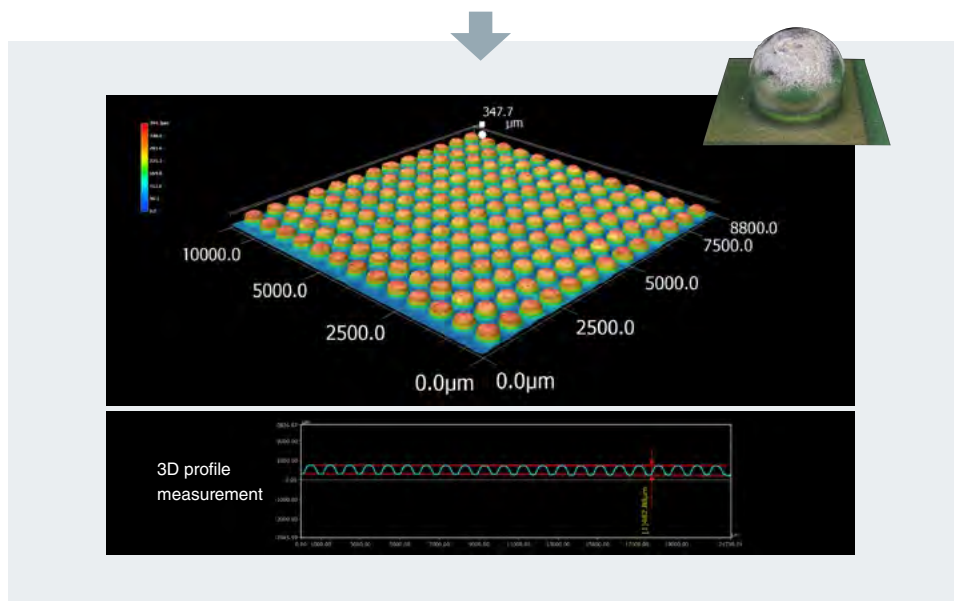
By capturing multiple images while the stage is moving, 3D data capture and stitching can be performed simultaneously. This makes it possible to view and analyse the overall contours of the target. Surface irregularities can also be measured.

Seamless stitching is possible

In the stitching process, conventional methods can have brightness variations across the resulting image. The VHX Series auto correction eliminates this variation for uniform lighting across the image.



Conventional image Image using Auto Correct



Recording Function

Capture parameters are stored with the image

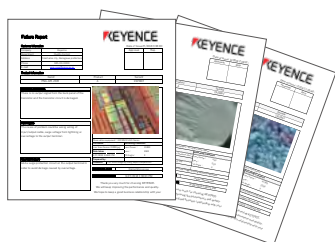
Data can be recorded at the touch of a button and shared instantly

Saving data

Your measurement data is safe no matter how much time passes, because you can save not only images, but also the measurement results, observation conditions and other data from when the images were captured. Also, by connecting your VHX system to a network, you can share data throughout your company, making the system even more useful.

Report function

You can install Excel on your VHX system just like on a PC. By setting up templates in advance, you can easily convert observed images and measurement results into reports.



Reproduction of image capture settings

Image capture settings can be reproduced by simply selecting the image from an album. Observation can be carried out again under the same conditions, and the results will be consistent even if it is performed by a different person at a later date.



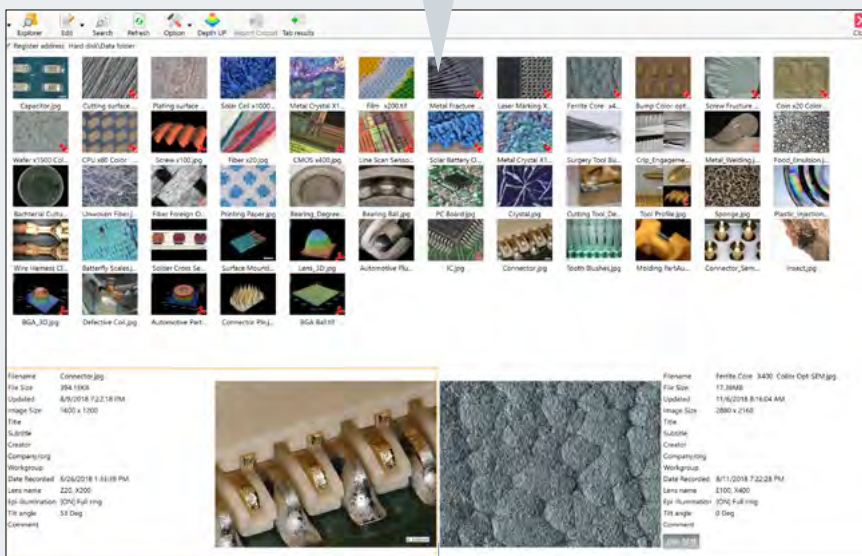
Don't just save the image: save the capture settings

Images

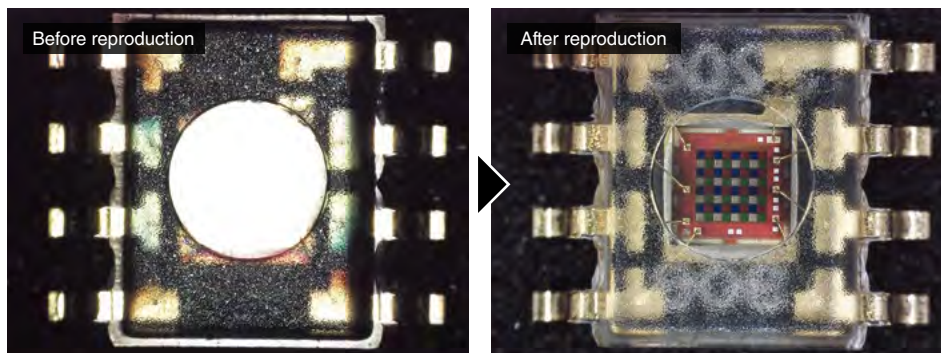
Video

Measured values

Settings



Settings used at the time of image capture can also be recorded for easy reproduction at a later date



- Lens magnification
- Shutter speed
- Gain
- Light shift
- Edge enhancement
- White balance
- Light adjustment conditions

Even the measurement magnification is automatically recorded

Automatic magnification recognition

Magnification must be accounted for when making measurements. So the magnification needs to be selected correctly at the time of observation. To eliminate selection errors, the VHX system recognises the magnification automatically. It also identifies the lens connected, and increases measurement accuracy with our calibrated lens.



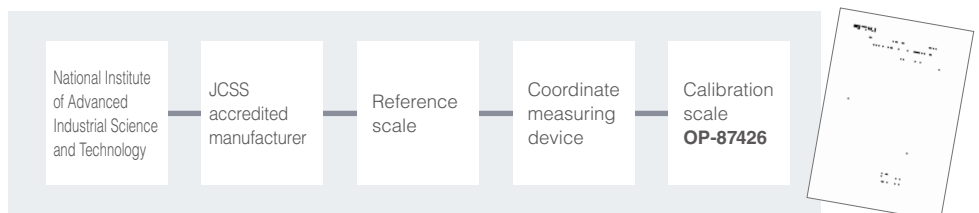
One-push calibration

Simply installing a dedicated scale and performing a one-click operation automatically calibrates each lens. This operation is simple and can be carried out correctly even by novice users, ensuring accurate calibration.



Traceability

Certification is available for our dedicated calibration scale, providing confidence in your operation.



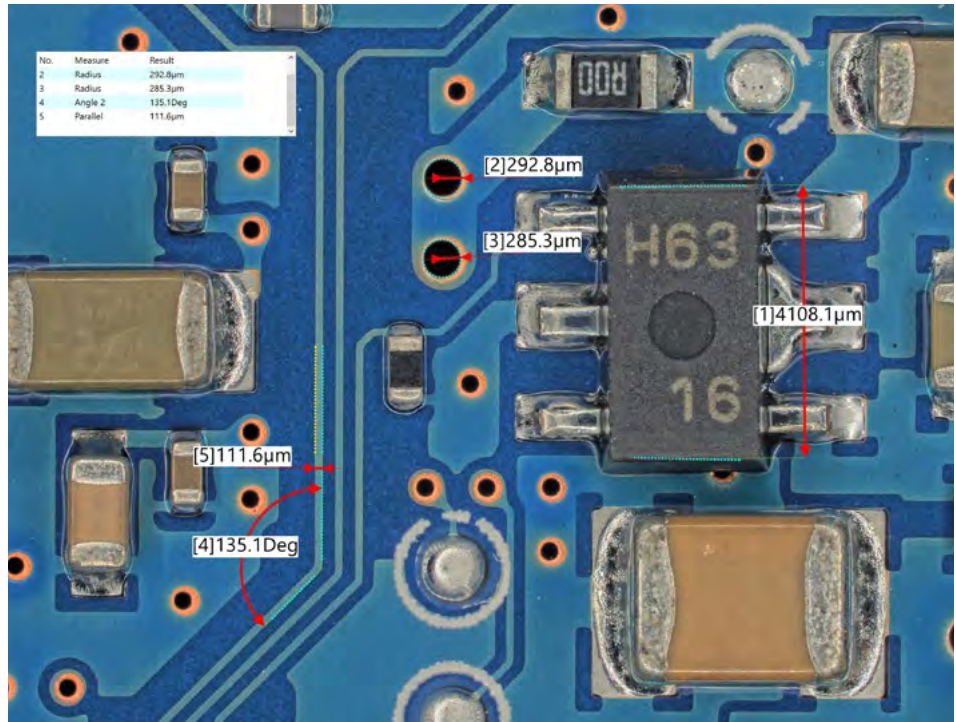
Measurement Functions

Measure as you view

A variety of easy, accurate measurement functions

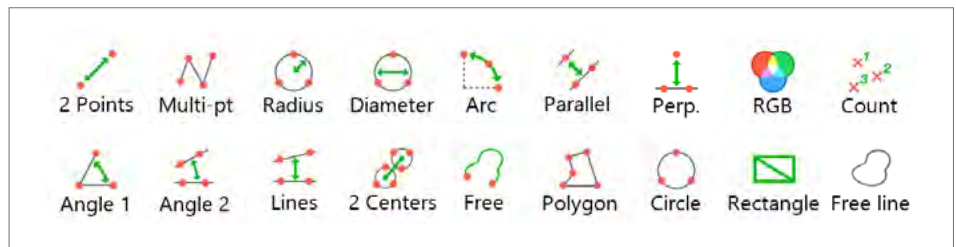
2D measurement

Using simple mouse operations, a wide range of measurements – including distance between 2 points, angle, diameter, parallel lines, area and so on – can be performed on the screen in real time. Once the image has been saved, additional features can be measured at a later time. With free communication software, anyone can use the measurement functions with ease on their own PC.



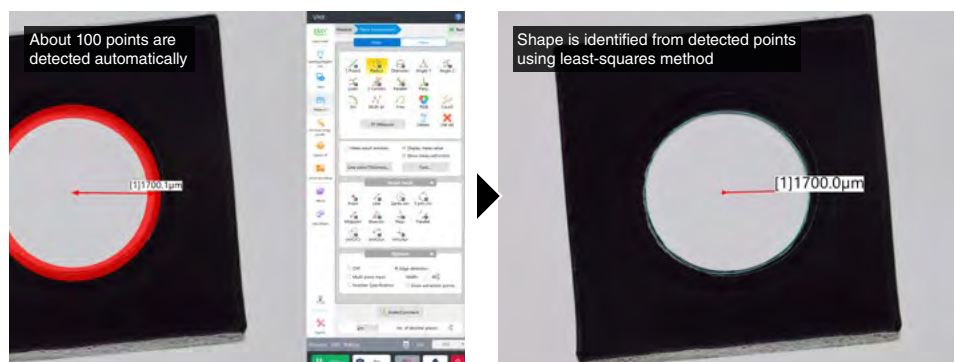
Wide variety of measurement tools

18 basic measurements plus 11 advanced measurement tools are provided.



Automatic edge detection eliminates human error

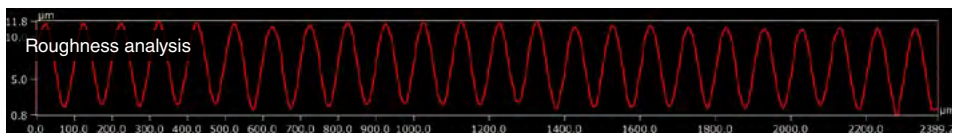
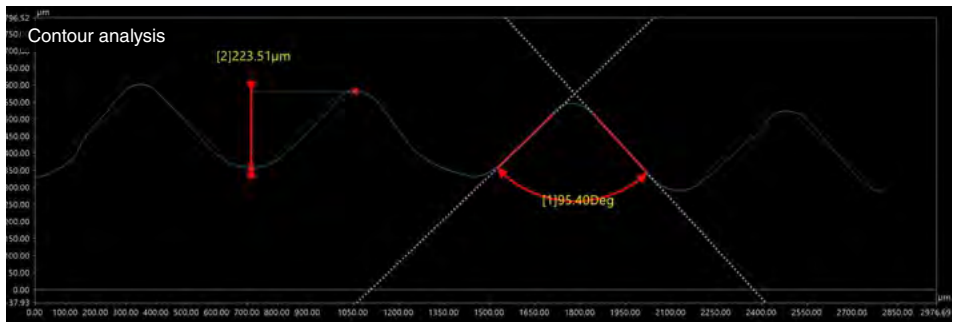
In a conventional system, the user has to determine the edge alignment, and each individual will do it slightly differently. The VHX-7000 uses the latest automatic edge detection function to eliminate variation in manual measurements. The shape is identified using contrast allowing for consistent measurements between individuals.



Easy measurement of everything from 3D contours to surface roughness

3D measurement

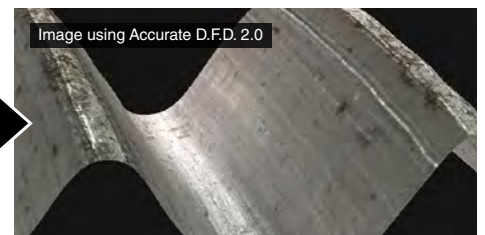
Even when the target has an uneven surface, a fully-focused image is obtained instantly, composed from multiple images with varying focus positions. Additionally, 3D display can be used to observe surface contours.



Screw thread (100x)

High-accuracy conversion to 3D using KEYENCE's Accurate D.F.D. 2.0 method

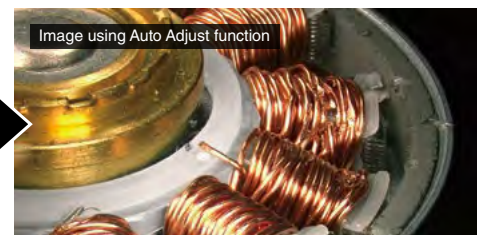
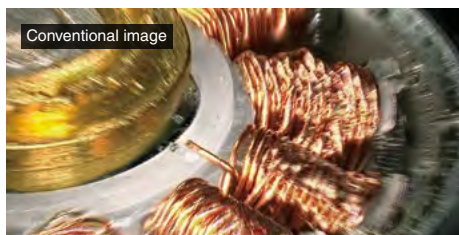
By estimating height based on subtle variations in texture, a 3D image is constructed. KEYENCE's noise elimination software allows for accurate shape production.



Bolt

Auto Adjust function allows depth composition even when imaging at an angle

When images are captured, the Auto Adjust function automatically compensates for the edge displacement and vibration that can occur during image capture. The system then goes on to construct a highly-comprehensive, fully-focused image. The composition can include images captured from an angle.



Coil (20x)

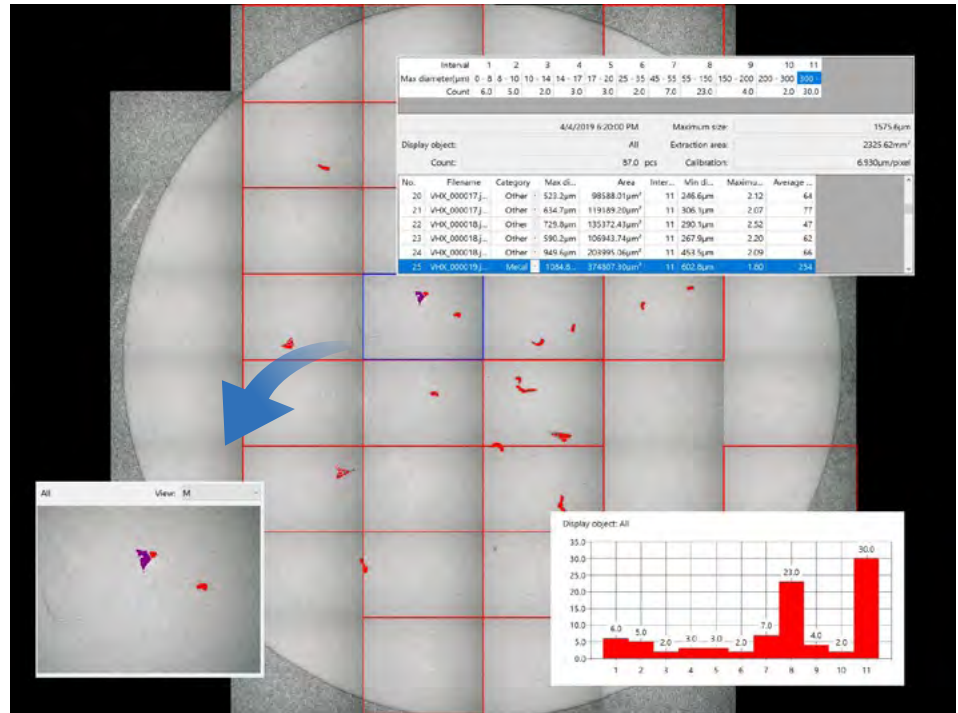
Measurement Functions

Full automation ensures that even novice users can perform complex measurement correctly

Contamination analysis compliant with ISO 16232 and VDA 19

Contamination analysis

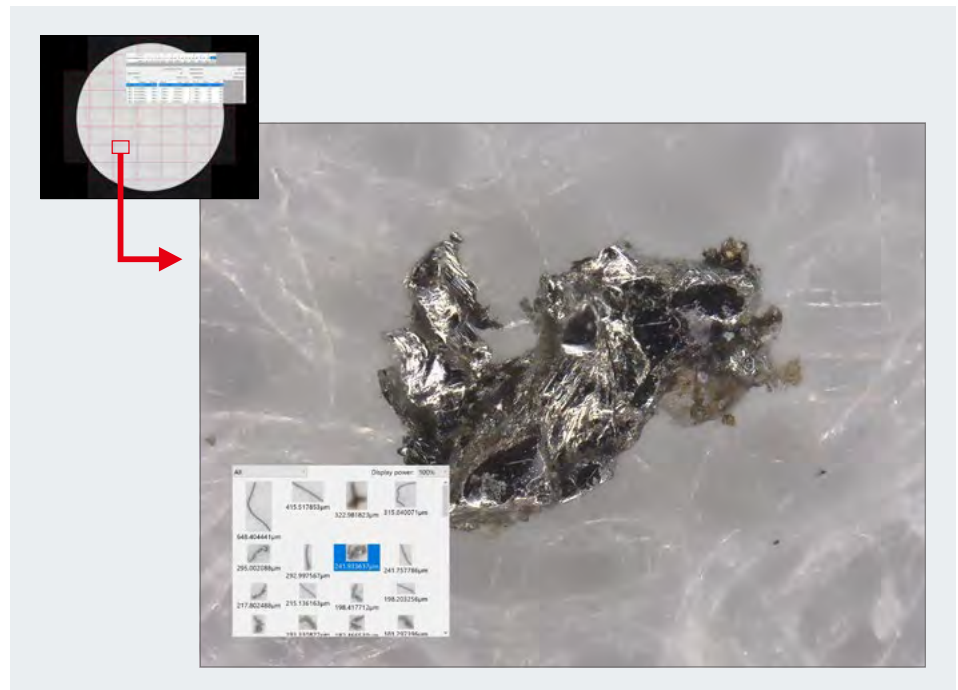
The VHX-7000 Series enables you to carry out contamination analysis compliant with the ISO 16232 and VDA 19 cleanliness inspection standards covering the automotive industry. Large depth-of-field images captured at high resolution using the VHX-7000 can be analysed enabling accurate measurement even when the target has an uneven surface.

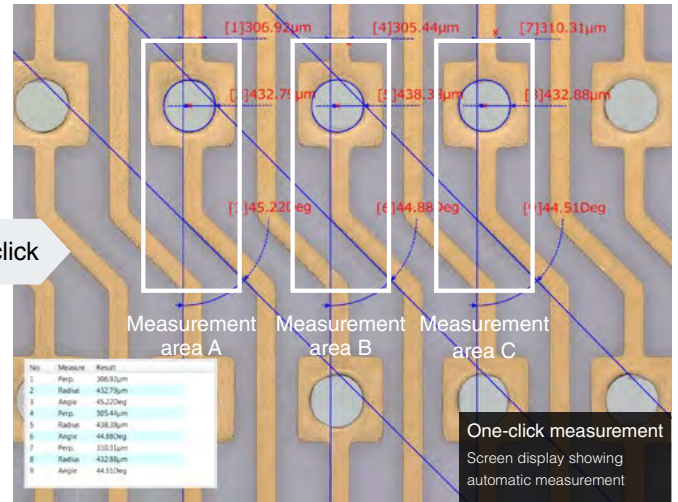
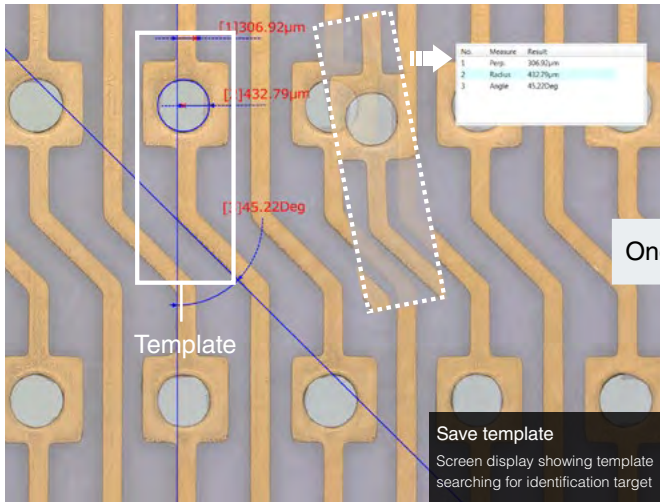


Membrane filter (50x)

Detailed Analysis mode

When a particular contamination area is selected on an image of the whole filter, the stage automatically moves to that area. The magnification can be increased instantly to allow detailed observation, simplifying the process of identifying foreign particles and making the operation more efficient. This mode can also be used for depth composition and 3D height measurement.

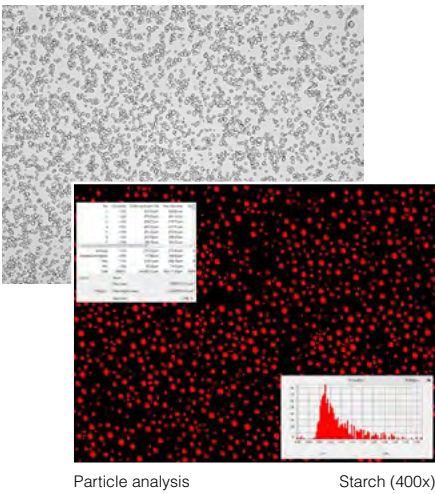




The same operation can be executed with one click

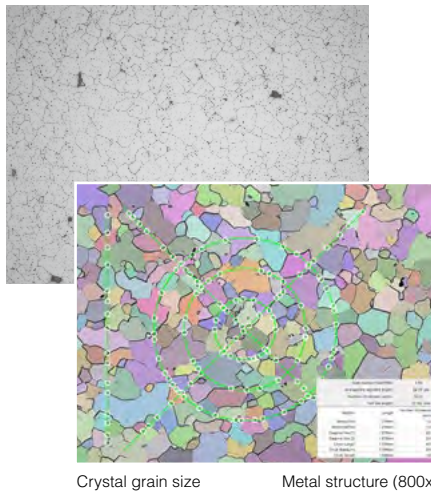
One-click auto-measurement

Auto-measurement can now be carried out with one click. Multiple measured items are saved in a template (pattern data), and automatic batch-measurement is performed by pattern-matching the areas identical with the template, also enabling aggregation.



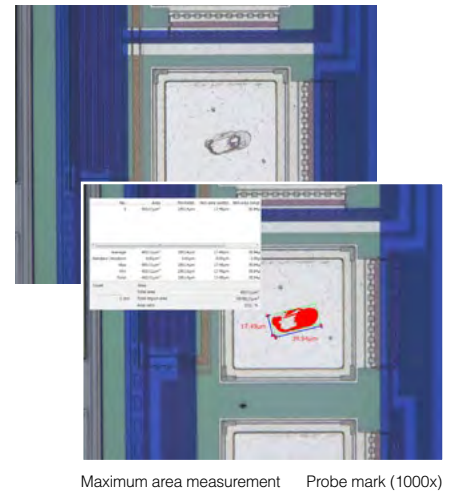
Particle analysis

Starch (400x)



Crystal grain size measurement

Metal structure (800x)



Maximum area measurement

Probe mark (1000x)

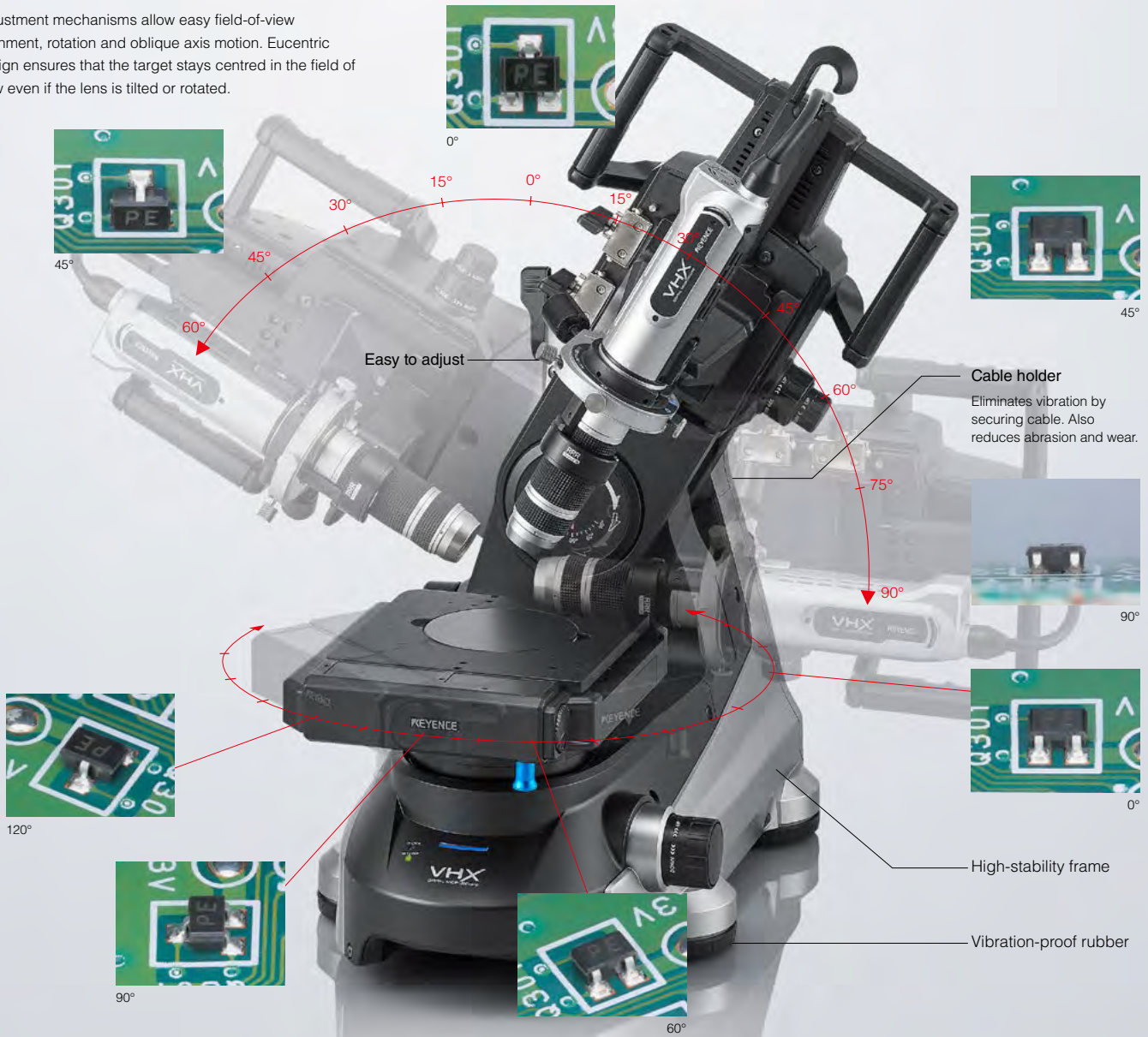
Advanced image analysis is fully automatic

Automatic area measurement/count

In an easy operation, area measurements and counts can be carried out within a specified range on the target. Targets that are not required can be excluded, and overlapping targets can be separated. Even when performed by novice users, the operation will still yield highly-accurate analysis results.

Free-angle observation system
with XYZ motorised stage
VHX-S750E

Adjustment mechanisms allow easy field-of-view alignment, rotation and oblique axis motion. Eucentric design ensures that the target stays centred in the field of view even if the lens is tilted or rotated.



LED transmitted illumination

LED-transmitted illumination is provided as standard, enabling clear observation throughout the range from low to high magnification.



Rotation sensor

The built-in rotation sensor identifies the rotation position from the stage. Even when rotated, the stage moves in the direction shown on the screen.



Handheld controller

The handheld controller makes it easy to move the stage on the XY axes and on the Z axis.

100 × 100 mm large
XYZ motorised stage
VHX-S770E

To meet the need for larger observation ranges and to accommodate large samples, we have released a 100 × 100 mm large XYZ motorised stage.



In response to customer requests, this system is now compatible with several special large-scale stages.

*The special stages shown below are not KEYENCE products.



XY measurement system
compliant with traceability
standards

VH-M100E

This XY measurement system ensures highly-reliable measurements based on a traceability system underpinned by Japan's national standards.

Additionally, the manual stage can be moved to extend the measurement range beyond the maximum 100 × 100 mm field of view.

Backlighting unit
OP-84484

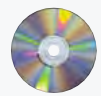
Clearly projects the edges of the target.



Display unit
OP-84483

This is useful when the travel range cannot be viewed on the main unit screen.

Measurement module
delivering even greater
ease of use
VHX-H3M3

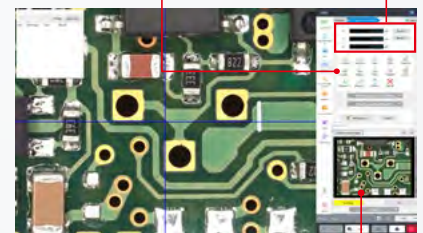


Wide range of measurements

Includes distance between 2 points, radius, angle and other measurements.

Real-time screen display

Displays XYZ measurement results on the monitor in real time.



Wide-area image capture

A wide-area image, captured at low magnification and recorded, can be used as a reference when navigating at high magnification, allowing the measurement points to be tracked across the entire image.

A new Fully-Integrated Head offering
the highest picture quality
in the VHX Series



Newly-developed
imaging engine
NEO REMAX

4K CMOS
image sensor

High-NA (0.9)
HR lens

Motorised revolver

4K Fully-Integrated Head

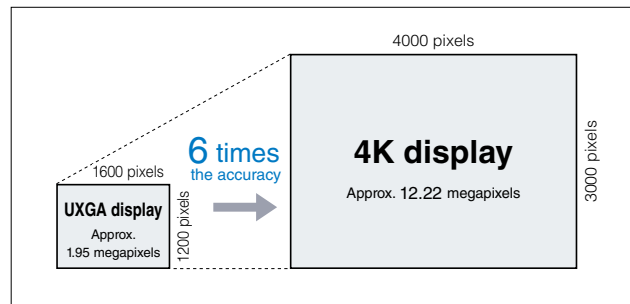
Highest definition in the history of digital microscopes

Thanks to a 4K CMOS image sensor and a newly-developed optical system, the VHX-7000 combines a large depth of field with high resolution. A wide range of observation modes – Bright-field, Dark-field, polarisation, Differential Interference Contrast (DIC) and more – are covered, enabling automatic handling of all sorts of targets.

4K
FI HEAD

4K CMOS image sensor delivers highest resolution

The 4K CMOS image sensor ensures high resolution and low noise. This mobilizes the full image-capture power of the 4K monitor and High resolution lens, enabling high-resolution observation.



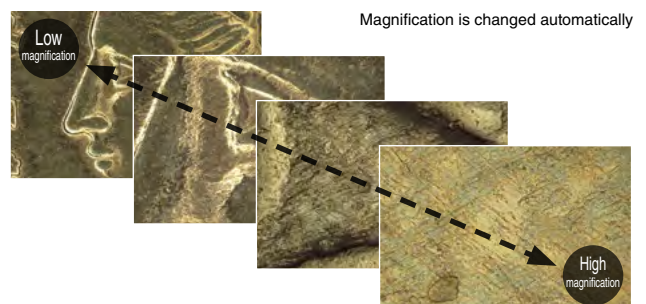
High-resolution (NA 0.9) HR lens

Combining resolution high enough to support 4K image quality with a large depth of field, these new dedicated lenses for digital microscopes push the envelope of optical performance.



Automatic zoom from 20x to 6000x

Observation can be carried out automatically at magnifications from 20x to 6000x without changing the lens. Magnification-switching can also be carried out quickly using either the mouse or the handheld controller.



VHX-7100



Fully-Integrated camera and High resolution lens delivering the highest image quality at magnifications from 20 to 6000x

Fully-Integrated (FI) Head VHX-7100

With four dedicated objective lenses and built-in lighting (motorised aperture), this unit combines high (NA 0.9) resolution with a large depth of field and is designed for even more outstanding operability.

Bright-field	Dark-field	Mixed Lighting	Polarised Light	DIC
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High-Resolution (HR) Lenses

High-Resolution, Low-Magnification Objective Lens VHX-E20



Model	VHX-E20					
Magnification	20x	30x	40x	50x	80x	100x
Image capture range (mm)						
H (Horizontal)	15.24	10.16	7.62	6.10	3.81	3.05
V (Vertical)	11.4	7.6	5.7	4.56	2.85	2.28
D (Diagonal)	19.05	12.7	9.53	7.62	4.76	3.81
Observation distance (mm)	30 (22.9")					

*1 When OP-88323 is mounted

High-Resolution, Medium-Magnification Objective Lens VHX-E100



Model	VHX-E100					
Magnification	100x	150x	200x	300x	400x	500x
Image capture range (mm)						
H (Horizontal)	3.05	2.03	1.52	1.02	0.76	0.61
V (Vertical)	2.28	1.52	1.14	0.76	0.57	0.46
D (Diagonal)	3.81	2.54	1.91	1.27	0.95	0.76
Observation distance (mm)	24					

VHX-E20



VHX-E100



VHX-E500



VHX-E2500



High-Resolution, High-Magnification Objective Lens VHX-E500



Model	VHX-E500					
Magnification	500x	700x	1000x	1500x	2000x	2500x
Image capture range (mm)						
H (Horizontal)	0.61	0.44	0.31	0.20	0.16	0.12
V (Vertical)	0.46	0.33	0.23	0.15	0.11	0.09
D (Diagonal)	0.76	0.54	0.38	0.25	0.19	0.15
Observation distance (mm)	6					

High-Resolution, Highest-Magnification Objective Lens VHX-E2500



Model	VHX-E2500			
Magnification	2500x	4000x	5000x	6000x
Image capture range (mm)				
H (Horizontal)	0.12	0.08	0.06	0.05
V (Vertical)	0.09	0.06	0.05	0.04
D (Diagonal)	0.15	0.1	0.08	0.06
Observation distance (mm)	1			

Dual-objective Zoom Lens VH-ZST



Allows observation at magnifications from 20x to 2000x without changing lenses

Covers a wide magnification range without the need to change lenses. Observation can be tailored to the target using mixed lighting with main-unit control, or versatile lighting using various optical adapters.

Model	VH-ZST ^{*2}					
Magnification ^{*1}	20x	100x	500x	1000x	2000x	
Image capture range (mm)						
H (Horizontal)	15.24	3.05	1.52	0.61	0.30	0.15
V (Vertical)	11.4	2.28	1.14	0.46	0.23	0.11
D (Diagonal)	19.05	3.81	1.91	0.76	0.38	0.19
Observation distance (mm)	15					

*1 Magnification with a 1/2-inch CCD camera, on a 15-inch monitor

*2 Because of the flared shape, coaxial illumination undergoes circular polarisation.

Bright-field	Dark-field	Mixed Lighting	Polarised Light
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Long-Working-Distance, High-Performance Zoom Lens VH-Z50L/Z50T



Long-range lens with observation distance of 85 mm

Perform observation at high magnification further away from the target. We created a long-range lens that enables observation on areas that were previously inaccessible.

Model	VH-Z50L/Z50T					
Magnification [*]	50x	100x	200x	300x	400x	500x
Image capture range (mm)						
H (Horizontal)	6.09	3.05	1.53	1.02	0.76	0.61
V (Vertical)	4.57	2.28	1.14	0.76	0.57	0.46
D (Diagonal)	7.62	3.81	1.90	1.27	0.95	0.76
Observation distance (mm)	85					

*Magnification with a 1/2-inch CCD camera, on a 15-inch monitor





High-Performance, Low-Range Zoom Lens VH-Z00R/Z00T

0.1 ▶ 50

Handles everything from an entire-target image to enlarged detail

With a magnification range from 0.1x to 50x, this lens allows observation of anything from an entire-target image to enlarged detail. Featuring click-style magnification adjustment, an aperture mechanism and an observation distance upwards of 95 mm, this macro lens delivers high performance and excellent operability.

Model	VH-Z00R/Z00T							
Magnification ¹	0.1x	0.5x	1x	5x	10x	30x	50x	
Image capture range (mm)	H (Horizontal)	3200	640	320	61	30.5	10.2	6.1
	V (Vertical)	2400	480	240	45.5	22.8	7.6	4.6
	D (Diagonal)	4000	800	400	76.2	38.1	12.7	7.6
Observation distance (mm)	Approx. 7700	Approx. 1500	Approx. 720	95				

¹Magnification with a 1/2-inch CCD camera, on a 15-inch monitor



Ultra-Small, High-Performance Zoom Lens VH-Z20R/Z20T

20 ▶ 200

Delivers high resolution

Delivers high-resolution observation at magnifications of 20x to 200x, making it ideal for general-purpose use.

Model	VH-Z20R/Z20T						
Magnification ¹	20x	30x	50x	100x	150x	200x	
Image capture range (mm)	H (Horizontal)	15.24	10.16	6.10	3.05	2.03	1.52
	V (Vertical)	11.40	7.60	4.56	2.28	1.52	1.14
	D (Diagonal)	19.05	12.70	7.62	3.81	2.54	1.91
Depth of field (mm) ²	34	15.5	6.0	1.6	0.74	0.44	
Observation distance (mm)	25.5						

¹ Magnification with a 1/2-inch CCD camera, on a 15-inch monitor

² Number when depth of field is prioritised Depth will vary according to aperture ring.



Wide-Range Zoom Lens VH-Z100R/Z100T

100 ▶ 1000

Combines high resolution with outstandingly large depth of field

A lens that offers magnified observation with high resolution, combined with a large depth of field. These contradictory needs are met by this innovative zoom lens.

Model	VH-Z100R/Z100T						
Magnification ¹	100x	200x	300x	500x	700x	1000x	
Image capture range (mm)	H (Horizontal)	3.05	1.53	1.02	0.61	0.44	0.30
	V (Vertical)	2.28	1.14	0.76	0.46	0.33	0.23
	D (Diagonal)	3.81	1.90	1.27	0.76	0.54	0.38
Observation distance (mm)	25 (20 ²)						

¹ Magnification with a 1/2-inch CCD camera, on a 15-inch monitor

² With triple illumination adapter mounted



Dual-Light High-Magnification Zoom Lens VH-Z250R/Z250T

250 ▶ 2500

Switching between coaxial and ring illumination takes just one touch of a button

Allows illumination to be selected to suit the target, and enables darkfield observation at magnifications up to 2500x. Surface condition, colouring and other factors can be observed clearly.

Model	VH-Z250R/Z250T							
Magnification ¹	250x	300x	500x	1000x	1500x	2000x	2500x	
Image capture range (mm)	H (Horizontal)	1.22	1.02	0.61	0.31	0.2	0.15	0.12
	V (Vertical)	0.92	0.76	0.46	0.23	0.15	0.11	0.09
	D (Diagonal)	1.52	1.27	0.76	0.38	0.25	0.19	0.15
Observation distance (mm)	6.5							

¹Magnification with a 1/2-inch CCD camera, on a 15-inch monitor

Bright-field

Dark-field



High-Resolution Zoom Lens VH-Z500R/Z500T

500 ▶ 5000

Observation distance of 4.4 mm throughout magnification range of 500x to 5000x

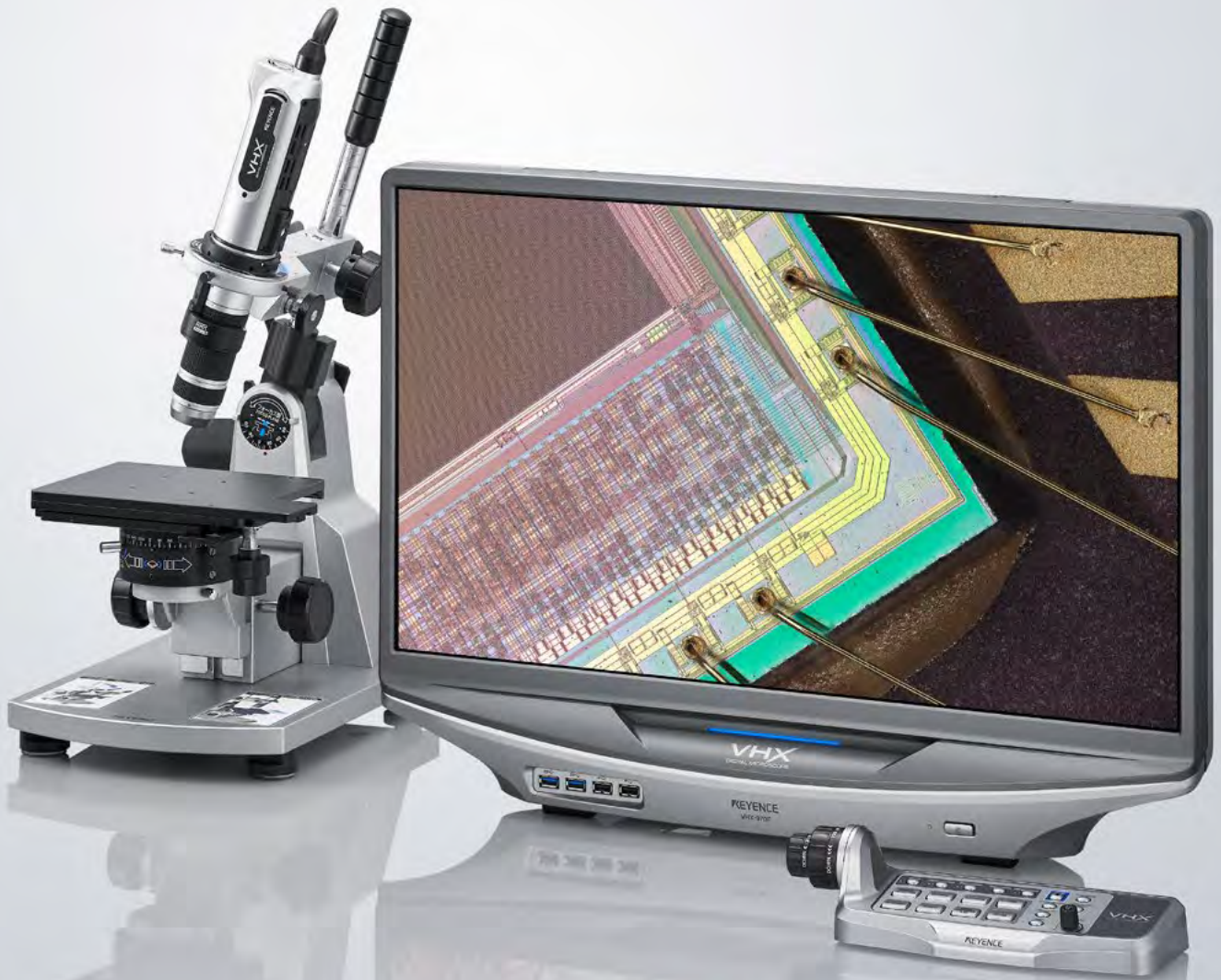
Delivers high resolution and enables observation at up to 5000x. With its intelligent approach to 3D display, this zoom lens defies the conventional wisdom of microscope observation.

Model	VH-Z500R/Z500T					
Magnification ¹	500x	1000x	2000x	3000x	5000x	
Image capture range (mm)	H (Horizontal)	610	305	152	102	61
	V (Vertical)	457	229	114	76	46
	D (Diagonal)	762	381	191	127	76
Observation distance (mm)	4.4					

¹Magnification with a 1/2-inch CCD camera, on a 15-inch monitor

Base model
VHX-970F

Functions for viewing, capturing, and measuring are easy-to-use so that even novice users can operate the VHX-970F.



Large Depth of Field

Provides 20 times the depth-of-field compared with optical microscopes.

View, Capture, and Measure with just One Device

By integrating the optics, camera, electronics, and software; users can perform complete inspection and analysis with a single device.

Free-Angle Observation

Tilt and adjust the position of the lens and camera to easily view an object from any angle.

Depth Composition and 3D Display Functions

Capture fully-focused images, even for targets with uneven surfaces.

Free-angle observation system VH-S30F/S30B

Easy Adjustment

Easy X-Y stage movement and rotation. Our eucentric design ensures that the target stays centred in the field of view even if the lens unit is tilted or rotated.

Quick Setup Marks

The lens setting positions, which vary between lenses, are indicated by guide marks. This enables quick lens changes.

Cable Holder

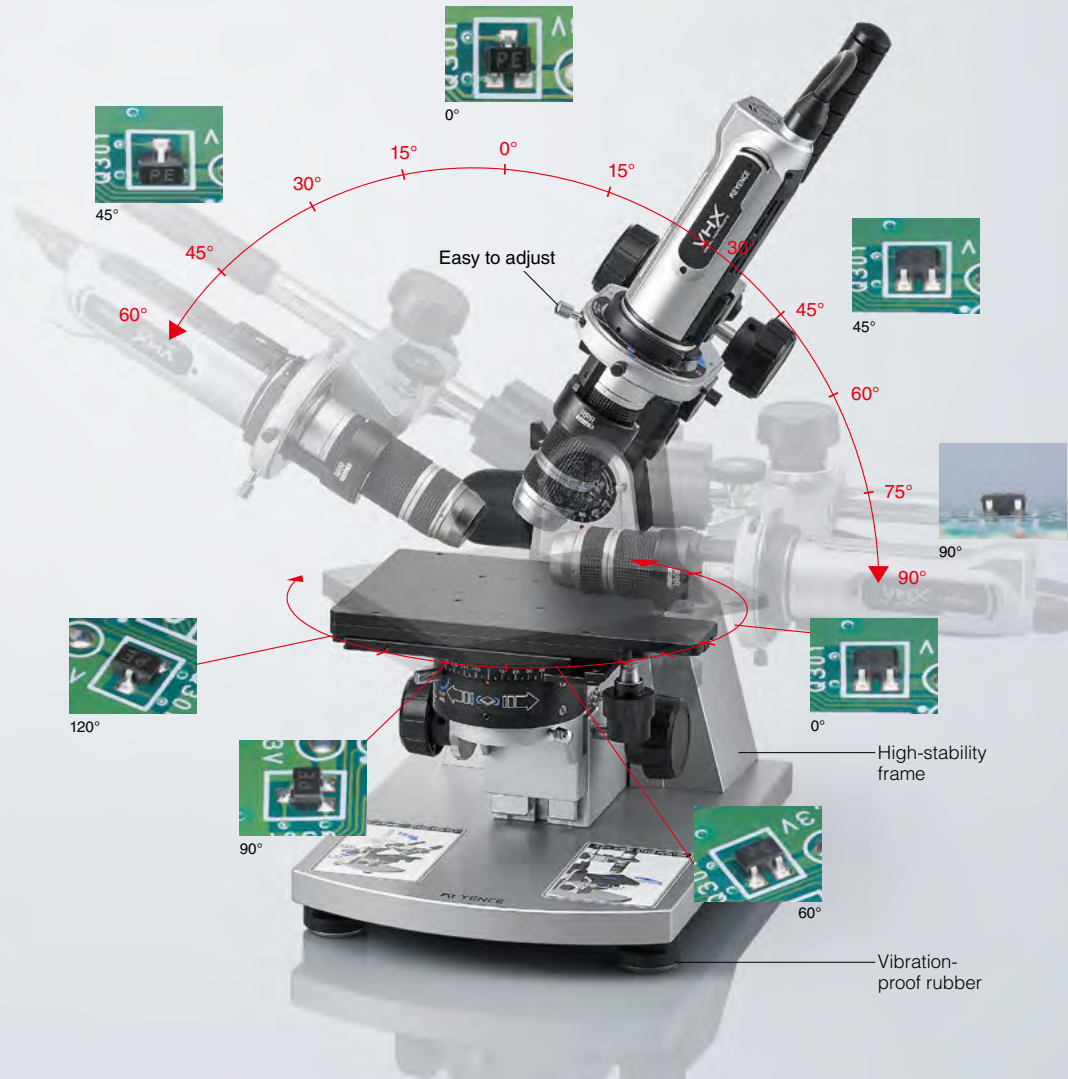
Eliminates vibration transmitted from the cable. Also secures cable, decreasing abrasion and wear on cable.

Vibration-Proof Rubber

Absorbs low-to-high frequency vibrations so users can perform stable imaging at all magnifications.

High-Stability Frame

The die-cast main body provides a high-rigidity structure with a low center of gravity that allows for highly stable observations.



Focus on the lowest area ...



"Depth composition" completed

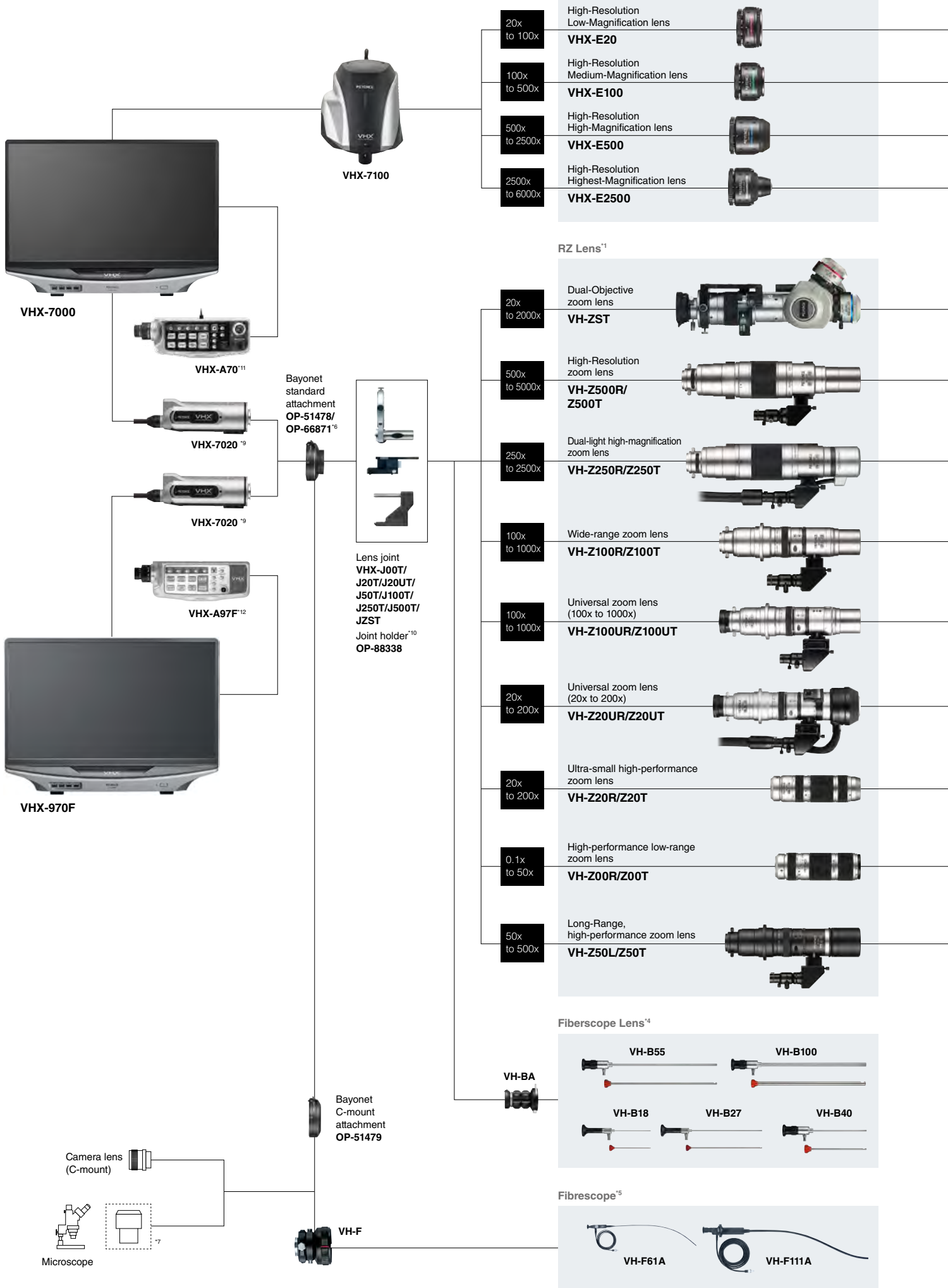
Depth Composition and 3D Display Functions

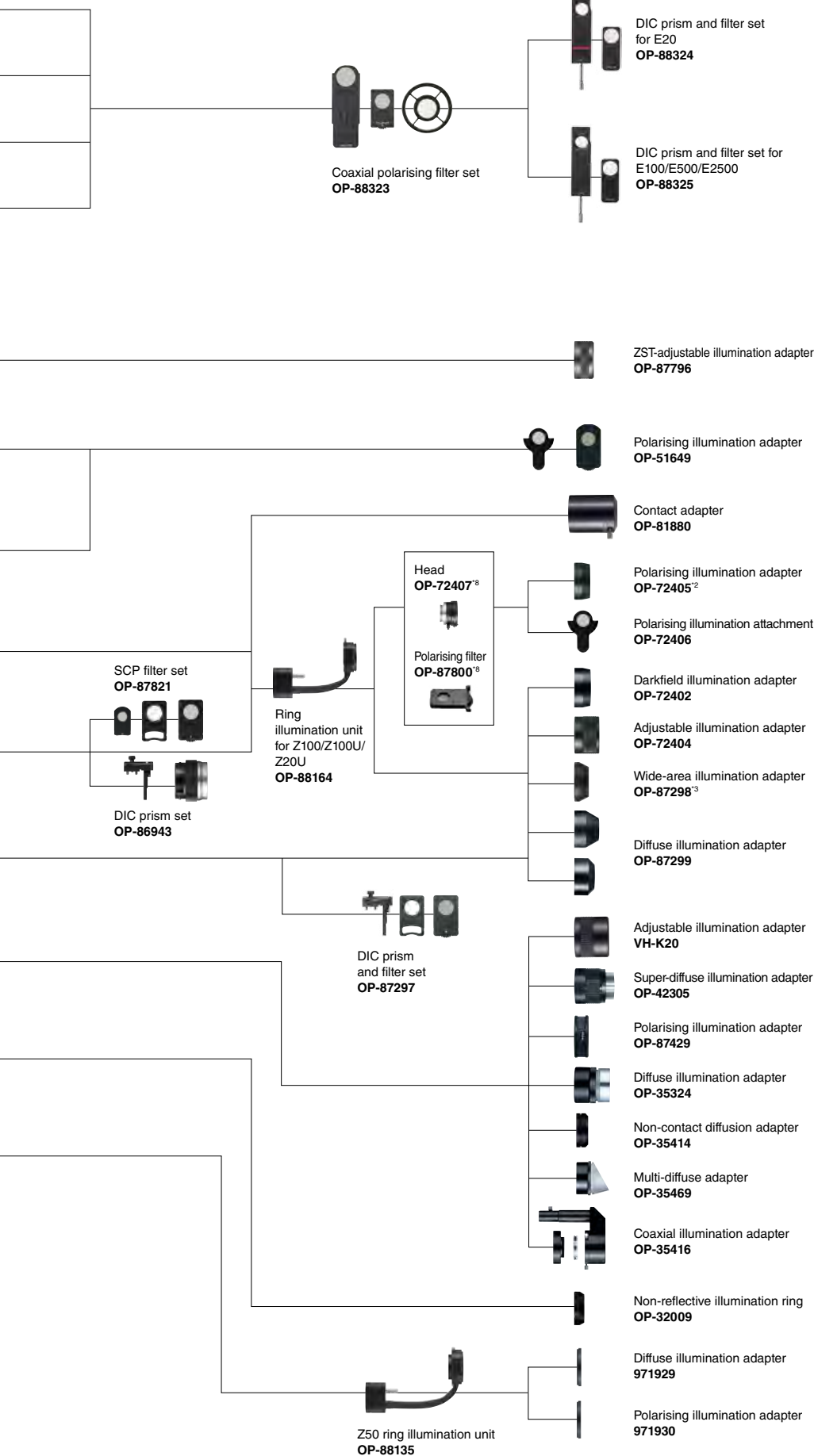
Capture a fully-focused image and 3D display in seconds to gain a more complete understanding of an object or surface.



3D display

System Configuration Diagram: VHX Series System Lineup





■ Stages



Free-angle observation system
VHX-S750E
(XYZ motorised stage, Z motorised focus)



Large free-angle observation system
VHX-S770E
(XYZ motorised stage, Z motorised focus)



Free-angle observation system
VHX-S650E
(XYZ motorised)
VHX-S600E
(Z motorised)



Large free-angle observation system
VHX-S660E
(XYZ motorised)



Free-angle observation system
VH-S300
(manual)



Free-angle observation system
VH-S30F/S30B



VH lens mounting stand
OP-25539
XY stage
OP-22124



XY measurement system
VH-M100E



Z-axis motorised stage
VHX-S700F/S600F
(Z motorised head only)



Vibration-resistant high-magnification observation system
VH-S5

■ Modules



3D profile measurement module
VHX-H5M
XY measurement module
VHX-H3M3

*1 VH-Z00T/Z20T/Z20UT/Z50T/Z100UT/Z100T/Z250T/Z500T/ZST TRIPLE R-compliant lenses are fitted with automatic lens-magnification recognition units and connection recognition mounts. *2 For coaxial lighting, OP-72407 and OP-72406 are required. *3 Included as standard with the VH-Z20UR/Z20UT. *4 The real-bore cable (OP-87201) is required. *5 The dedicated light-guide attachment (OP-87790) is required. *6 When the VH-Z00R or Z20R is used, the OP-66871 is required. *7 A C-mount adapter suitable for the microscope is required. *8 For the VH-Z100R, use the OP-72407. For the VH-Z100T/VH-Z100UR/VH-Z100UT, use the OP-87800. *9 The lighting unit (OP-88329) is required for mounting the VH-ZST, VH-Z500T, VH-Z250T or VH-Z100T on the VHX-7020. *10 When mounting the RZ lens on the VHX-S750E/770E, the OP-88338 (joint holder) is required. *11 Models may vary according to the instrument language. VHX-A70 (Japanese) / VHX-A70E (English) / VHX-A70D (German) / VHX-A70C (Simplified Chinese) / VHX-A70W (Traditional Chinese) / VHX-A70F (French) / VHX-A70K (Korean) / VHX-A70M (Spanish) / VHX-A70T (Thai) / VHX-A70I (Italian) / VHX-A70Z (Czech) / VHX-A70H (Hungarian) / VHX-A70P (Polish). *12 Models may vary according to the instrument language. VHX-A97F (Japanese) / VHX-A97FE (English) / VHX-A97FD (German) / VHX-A97FC (Simplified Chinese) / VHX-A97FW (Traditional Chinese) / VHX-A97FF (French) / VHX-A97FK (Korean) / VHX-A97FM (Spanish).

Basic Functions: Controller

Model		VHX-7000	VHX-970F		
Camera	Image receiving element	1/1.8 inch, 3.19 megapixel CMOS image sensor Total pixels: 2064 (H) × 1554 (V); virtual pixels: 2048 (H) × 1536 (V)	1/1.8 inch, 3.19 megapixel CMOS image sensor Total pixels: 2064 (H) × 1554 (V); virtual pixels: 2048 (H) × 1536 (V)		
	Scanning system	Progressive	Progressive		
	Frame rate	50 F/S (max.)	50 F/S (max.)		
	Resolution	Standard	2048 (H) × 1536 (V)	2048 (H) × 1536 (V)	
		High accuracy	6144 (H) × 4608 (V) ¹	-	
	High dynamic range	16-bit intensity range through RGB data from each pixel	-		
	Gain	Manual, Preset	Manual, Preset		
	Electronic shutter	Auto, Manual, 1/60, 1/120, 1/250, 1/500, 1/1000, 1/2000, 1/5000, 1/9000, 1/19,000	Auto, Manual, 1/60, 1/120, 1/250, 1/500, 1/1000, 1/2000, 1/5000, 1/9000, 1/19,000		
	Supercharge shutter	Can be set in 0.01 s increments from 0.02 to 16 s	Can be set in 0.01 s increments from 0.02 to 16 s		
	White balance	Push-set, Manual, Preset (2700K, 3200K, 5600K, 9000K)	Push-set, Manual, Preset (2700K, 3200K, 5600K, 9000K)		
	Back-focus adjustment	Not required	Not required		
	Built-in light source	Type	High-intensity LED	High-intensity LED	
		Service life	40 thousand hours (reference value)	40 thousand hours (reference value)	
	Camera	Image receiving element	1/1.7-inch, 12.22-megapixel CMOS image sensor; total pixels: 4168 (H) × 3062 (V); virtual pixels: 4024 (H) × 3036 (V)	-	
		Scanning system	Progressive	-	
		Frame rate	30 F/S (max.)	-	
		Resolution	Fast	2048 (H) × 1536 (V)	-
			Standard	2880 (H) × 2160 (V)	-
High-resolution (4K Mode OFF)			2880 (H) × 2160 (V)	-	
High-resolution (4K Mode ON)			4000 (H) × 3000 (V)	-	
High accuracy		12,000 (H) × 9000 (V) ¹	-		
High dynamic range		16-bit intensity range through RGB data from each pixel	-		
Gain		Manual, Preset	-		
Electronic shutter		Auto, Manual, 1/30, 1/60, 1/120, 1/250, 1/500, 1/1000, 1/2000, 1/5000, 1/9000, 1/19,000	-		
Supercharge shutter		Can be set in 0.01 s increments from 0.03 to 4 s	-		
White balance		Push-set, Manual, Preset (2700K, 3200K, 5600K, 9000K)	-		
Back-focus adjustment		Not required	-		
Built-in light source		Type	High-intensity LED	-	
		Service life	40 thousand hours (reference value)	-	
LCD monitor		Size	Colour LCD (IPS type), 27-inch ⁵	Colour LCD (IPS type), 27-inch ⁵	
		Screen size	596.736 (H) × 335.664 (V) mm	596.736 (H) × 335.664 (V) mm	
	Pixel pitch	0.1554 mm (H) × 0.1554 mm (V)	0.1554 mm (H) × 0.1554 mm (V)		
	Number of pixels	3840 (H) × 2160 (V)	3840 (H) × 2160 (V)		
	Display colours	Approx. 1.07 billion colours ²	Approx. 1.07 billion colours ²		
	Brightness	350 cd/m ² (Centre 1 Point, typical)	350 cd/m ² (Centre 1 Point, typical)		
	Contrast ratio	1300:1 (typical)	1300:1 (typical)		
	Viewing angle	±89° (typical, horizontal), ±89° (typical, vertical)	±89° (typical, horizontal), ±89° (typical, vertical)		
Hard disk drive unit	Storage capacity	1 TB (including 350 GB reserved system space) Approx. 2.16 million images (when 3 megapixel images are compressed) to approx. 71.1 thousand images (when 3 megapixel images are not compressed)	1 TB (including 350 GB reserved system space) Approx. 2.16 million images (when 3 megapixel images are compressed) to approx. 71.1 thousand images (when 3 megapixel images are not compressed)		
	Image format	JPEG (with compression), TIFF (without compression)	JPEG (with compression), TIFF (without compression)		
Observable image size	50 thousand (H) × 50 thousand (V) pixels (with stitching)	2048 (H) × 1536 (V) pixels			
Video output	Output method	Display port: 3840 × 2160 pixels	Display port: 3840 × 2160 pixels		
	Scanning frequency	Special LCD monitor	132 kHz (H), 60 Hz (V)	132 kHz (H), 60 Hz (V)	
		External monitor	132 kHz (H), 60 Hz (V)	132 kHz (H), 60 Hz (V)	
Input	Mouse input	USB mouse supported	USB mouse supported		
	Keyboard input	USB keyboard supported	USB keyboard supported		
	External remote input	Pause/recording non-voltage input (with and without contact)	Pause/recording non-voltage input (with and without contact)		
Interface	LAN	RJ-45 (10BASE-T/100BASE-TX/1000BASE-T)	RJ-45 (10BASE-T/100BASE-TX/1000BASE-T)		
	USB 2.0 series A	6 ports	6 ports		
Power supply	USB 3.0 series A	2 ports	2 ports		
	Power voltage	100 to 240 VAC ±10%, 50/60 Hz	100 to 240 VAC ±10%, 50/60 Hz		
Environmental resistance	Power consumption	430 VA	430 VA		
	Operating ambient temperature	+5 to 40°C ³	+5 to 40°C ³		
Weight	Operating ambient humidity	35 to 80% RH (no condensation) ⁴	35 to 80% RH (no condensation) ⁴		
	Controller	Approx. 12.0 kg	Approx. 12.0 kg		
Dimensions (excluding the projected areas)	Camera unit	Approx. 0.6 kg (VHX-7020), approx. 5.0 kg (VHX-7100)	Approx. 0.6 kg (VHX-7020)		
	Handheld controller	Approx. 0.45 kg	Approx. 0.45 kg		
		625 (W) × 460 (H) × 180 (D) mm (when stored)	625 (W) × 460 (H) × 180 (D) mm (when stored)		

¹ When using the high-resolution function by means of the motorised stage shift. ² 8-bit + 2 FRC display ³ 5°C to 35°C for hand-held observation with a standard camera
⁴ If the ambient operating temperature exceeds 40°C, use the product under conditions where the relative humidity is not more than 70%.
⁵ The LCD monitor provided with this system has been manufactured using extremely advanced technology. In very rare cases, an unlit pixel (black spot) or a lit pixel (bright spot) may be present on the screen. However, this is not indicative of a fault.

Basic Functions: Stage

Model		VHX-S750E	VHX-S770E	VH-S300	VH-S30F/VH-S30B
XYθ stage	XY stage: Motorised/Manual	Motorised	Motorised	Manual	Manual
	XY motorised stage motor	2-phase stepping motor	2-phase stepping motor	-	-
	XY motorised stage resolution	1 μm (typical)	1 μm (typical)	-	-
	XY motorised stage movement speed	10 mm/sec (max)	20 mm/sec (max)	-	-
	XY-stage movement range	±20 mm	±50 mm	±35 mm	X: ±37.5 mm, Y: ±25 mm
	θ rotation angle	±90°	-	360°	360°
XYθ stage size	Top surface: 171 mm × 168 mm (centre disk: ø100)	Top surface: 233 mm × 185 mm (centre disk: ø168)	Top surface: 190 × 150 mm	Top surface: 180 × 136 mm	
Focus Z axis	Transmitted lighting	20x or higher	20x or higher	-	-
	Z stage: Motorised/Manual	Motorised	Motorised	Manual	Manual
	Z motorised stage motor	5-phase stepper motor	5-phase stepper motor	-	-
	Z motorised stage resolution	0.1 μm (typical)	0.1 μm (typical)	-	-
	Z motorised stage travel speed	17 mm/sec (max)	17 mm/sec (max)	-	-
Stage Z axis	Z stage travel range	49 mm	49 mm	-	-
	Z stage: Motorised/Manual	Motorised	Motorised	Manual	Manual
	Z motorised stage motor	2-phase stepping motor	2-phase stepping motor	-	-
	Z motorised stage resolution	1 μm (typical)	1 μm (typical)	-	-
	Z motorised stage travel speed	10 mm/sec (max)	10 mm/sec (max)	-	-
Side camera	Z stage travel range	50 mm	50 mm	53 mm	28 mm
	Yes, VGA	Yes, VGA	No	No	
Ratings	Power voltage	100 to 240 VAC ±10%, 50/60 Hz	100 to 240 VAC ±10%, 50/60 Hz	-	-
	Power consumption	130 VA	130 VA	-	-
Environmental resistance	Operating ambient temperature	+5 to 40°C	+5 to 40°C	-	-
	Operating ambient humidity	35 to 80% RH (no condensation)	35 to 80% RH (no condensation)	-	-
Weight		23.8 kg	25.3 kg	Approx. 17.4 kg	Approx. 12 kg
	Load capacity	5 kg	5 kg	1 kg	1 kg

Other Functions

Model		VHX-7000	VHX-970F
Observation functions	Auto-focus function	Yes	Yes
	Focus view function	Yes	No
	Lighting switch function (uneven surface enhancement)	Yes (Full, Partial, Lateral, Dark-field, Bright-field, Mixed Lighting)	Yes (Full, Partial, Lateral, Dark-field, Bright-field, Mixed Lighting)
	Multi-lighting function	Yes	No
	Optical Shadow Effect Mode function	Yes	No
Display function	Camera-shake correcting function	Yes	Yes
	Full-screen display function	Yes	Yes
	Split-screen function	Functions for tiling screens horizontally, vertically, into quarters, into ninths, and interlocking display	Functions for tiling screens horizontally, vertically, into quarters, into ninths, and interlocking display
	Real-time digital zoom	1.0x to 10.0x	1.0x to 10.0x
Image enhancement function	Comment display function	Yes	Yes
	Glare removal function	Yes	Yes
	Ring-reflection removal function	Yes	No
	HDR function	Yes	No
	Fine-Shot function	Yes	Yes
Stitching function	2D image stitching	Yes	No
	3D image stitching	Yes	No
	Navigation function	Yes	No
3D function	Real-time depth composition function	Yes	No
	Quick composition & 3D function	Yes	Yes
	High-quality depth composition	Yes	Yes
	3D display function	Yes	Yes
	3D shape correction function	Yes (Slope/Sphere/Cylinder)	Yes (Slope/Sphere/Cylinder)
Recording function	3D comparison function	Yes (Combination/Comparison/Difference display mode)	Yes (Combination/Comparison/Difference display mode)
	Report output (Excel)	Yes	Yes
	Capture condition reproduction function	Yes	Yes
	Timer capture function	Yes	Yes
	Video recording/playback function	Max speed: 50 FPS; *Video size when using VHX-7020 (2880 × 2160, 2048 × 1536, 800 × 600, 640 × 480)	Max. speed: 30 FPS; Video size (2048 × 1536, 800 × 600, 640 × 480)
Measuring functions	Distance, angle, radius, area etc.	Yes, various	Yes, various
	Automatic edge detection	Yes	Yes
	Scale display	Yes, various	Yes, various
	Automatic count, area measurement function	Yes (length/area can be measured using brightness/colour extraction)	Yes (length/area can be measured using brightness/colour extraction)
	Automatic area measurement	Yes	No
	Grain size analysis	Yes	No
	Contamination analysis	Yes	No
	One-click measurement	Yes	No
	Auto-measurement teaching	Yes	No
	Auto measurement	Yes	No
	Automatic lens/zoom recognition function (Triple 'R)	Yes	Yes
	Auto-calibration	Yes (numerical input not required)	Yes (numerical input not required)
	One push calibration function	Yes (scale position adjustment not required)	No
3D measurement function (VHX-H5M optional function)	CSV storage	Yes	Yes
	3D profile measurement	Yes	Yes
	Point height measurement	Yes	Yes
	3D volume measurement	Yes	Yes
Manual XY Measurement System (VHX-H3M3 optional function)	Roughness measurement	Yes	Yes
	XY stage measurement	Yes	Yes
Utilities	Wide image display function	Yes	Yes
	Easy menu	Yes	Yes
	Space-saving single unit	Yes	Yes
	Foot switch compatibility	Yes	Yes
	User-specific setting memory	Yes	Yes
	System protection setting	Yes	Yes
	PC mode	Yes	Yes
	Network connection function	Yes (communication software, file sharing, FTP)	Yes (communication software, file sharing, FTP)
	Function guide	Yes	Yes
	Video help	Yes	Yes
PC software (available free of charge)	Communication software	Enables easy transmission of image data between VHX system and PC. (LAN)	Enables easy transmission of image data between VHX system and PC. (LAN)
	3D image playback software for the PC	Enables 3D images saved on VHX to be played back in 3D on the PC.	Enables 3D images saved on VHX to be played back in 3D on the PC.
	Optical Shadow Effect Mode playback software	Enables parameter adjustment on Optical Shadow Effect Mode images saved on the VHX system.	No
	Multi-lighting playback software	Multi-lighting images saved on the VHX can be played back later with the lighting direction changed.	No
	HDR playback, measurement, stitched image playback software	Enables HDR parameter adjustment, display of stitched images, measurement.	Enables measurement on the PC.
One-click measurement compilation software	Enables one-click measurement result compilation and export to Excel.	No	



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