KEYENCE

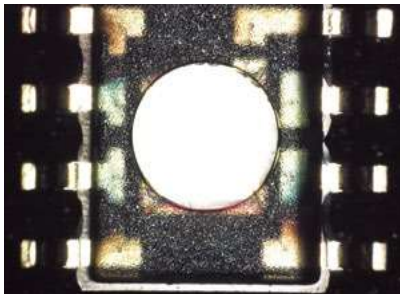
Digital Microscope
VHX-6000 Series

SUPERIOR ANALYSIS THROUGH CLEARER OBSERVATION

VHX
DIGITAL MICROSCOPE

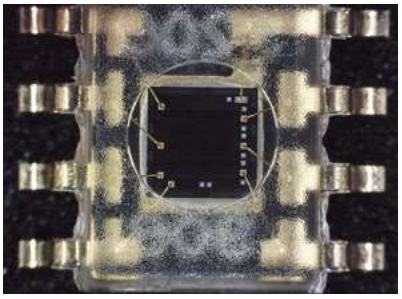
Built-in brightfield, darkfield, and mixed lighting to view any sample

Combines the lighting techniques of a metallurgical microscope (brightfield) and stereoscope (darkfield) so that optimal lighting can be achieved for any sample. Exact lighting conditions can be saved and recalled later for fast, reproducible imaging.



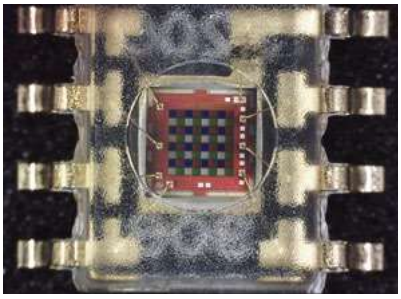
BRIGHTFIELD

The surface of the package area reflects too much light, and it cannot be seen clearly.



DARKFIELD

The light is scattered and not enough light is received by the lens to observe the sensor.



MIXED LIGHTING

Combining brightfield and darkfield lighting allows for clear observation of the entire sample.

Easy observation, even at an angle

The compact design of the dual objective zoom lens along with the flexibility of the free-angle stand means that you can easily view your sample from any angle, at any magnification.

Model		VH-ZST					
Magnification*1		20×	100×	200×	500×	1000×	2000×
Field-of-view (mm inch)	H (Horizontal)	15.24 0.60"	3.05 0.12"	1.52 0.0598"	0.61 0.0240"	0.30 0.0118"	0.15 0.0059"
	V (Vertical)	11.4 0.45"	2.28 0.0898"	1.14 0.0449"	0.46 0.0181"	0.23 0.0091"	0.11 0.0043"
	D (Diagonal)	19.05 0.75"	3.81 0.15"	1.91 0.0752"	0.76 0.0299"	0.38 0.0150"	0.19 0.0075"
Working distance (mm inch)		15 0.59"					

*1 Magnification using a 1/2-inch CCD camera and 15-inch monitor.

Industry-Leading High-Resolution RZ Lenses

RZ LENS Real Zoom Lens

TRIPLE'R-compliant lenses are fitted with Automatic Lens/Zoom Recognition units.

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

0.1 › 50

Macro zoom lens

With a magnification range from 0.1× to 50×, a target can be viewed from its entirety down to more in-depth observation. This macro lens excels in workability and high performance with click-style magnification adjustment, an aperture mechanism, and a viewing distance of 95 mm 3.74" or more.

Model		VH-Z00R/Z00T						
Magnification*		0.1×	0.5×	1×	5×	10×	30×	50×
Field of view (mm inch)	Horizontal	3200 126.98"	640 25.20"	320 12.60"	61 2.40"	30.5 1.20"	10.2 0.40"	6.1 0.24"
	Vertical	2400 94.49"	480 18.90"	240 9.45"	45.5 1.79"	22.8 0.90"	7.6 0.30"	4.6 0.18"
	Diagonal	4000 157.48"	800 31.50"	400 15.75"	76.2 3.00"	38.1 1.50"	12.7 0.50"	7.6 0.30"
Working distance (mm inch)		Approx. 7700 303.15"	Approx. 1500 59.06"	Approx. 720 28.35"	95 3.74"			

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

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

20 › 200

High-resolution imaging with a large depth-of-field

The VH-Z20R/Z20T offers high-resolution observation at general purpose magnifications of 20× - 200×. This lens has been designed to optimize both depth-of-field and resolution and can also be used in handheld mode.

Model		VH-Z20R/Z20T					
Magnification*1		20×	30×	50×	100×	150×	200×
Field of view (mm inch)	Horizontal	15.24 0.60"	10.16 0.40"	6.10 0.24"	3.05 0.12"	2.03 0.0799"	1.52 0.0598"
	Vertical	11.40 0.45"	7.60 0.30"	4.56 0.18"	2.28 0.0898"	1.52 0.0598"	1.14 0.0449"
	Diagonal	19.05 0.75"	12.70 0.50"	7.62 0.30"	3.81 0.15"	2.54 0.10"	1.91 0.0752"
Depth of field (mm inch)*2		34 1.34"	15.5 0.61"	6.0 0.24"	1.6 0.0630"	0.74 0.0291"	0.44 0.0173"
Working distance (mm inch)		25.5 1.00"					

*1 Magnification on a 15-inch monitor with a 1/2-inch CCD camera.
*2 This value is for when the priority is set to depth of field. The depth of field changes depending on the set aperture.

Wide-Range Zoom Lens VH-Z100R/Z100T

100 › 1000

High-performance lens with long working distance

This innovative lens was developed to satisfy the need for high-resolution, long working distance, and large depth-of-field.

Brightfield | Darkfield | Polarization

Model		VH-Z100R/Z100T					
Magnification*1		100×	200×	300×	500×	700×	1000×
Field of view (mm inch)	Horizontal	3.05 0.12"	1.53 0.0602"	1.02 0.0402"	0.61 0.0240"	0.44 0.0173"	0.30 0.0118"
	Vertical	2.28 0.0898"	1.14 0.0449"	0.76 0.0299"	0.46 0.0181"	0.33 0.0130"	0.23 0.0091"
	Diagonal	3.81 0.15"	1.90 0.0748"	1.27 0.0500"	0.76 0.0299"	0.54 0.0213"	0.38 0.0150"
Working distance (mm inch)		25 0.98" (20 0.79"*2)					

*1 Magnification on a 15-inch monitor with a 1/2-inch CCD camera.
*2 With triple illumination adapter attached

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

250 › 2500

Observe with both brightfield and darkfield at high-magnification

Easily switch between ring and coaxial illumination with just the touch of a button. View objects at up to 2500× magnification while still maintaining a 6.5 mm 0.26" working distance.

Brightfield | Darkfield

Model		VH-Z250R/Z250T						
Magnification*		250×	300×	500×	1000×	1500×	2000×	2500×
Field of view (mm inch)	Horizontal	1.22 0.0480"	1.02 0.0402"	0.61 0.0240"	0.31 0.0122"	0.2 0.0079"	0.15 0.0059"	0.12 0.0047"
	Vertical	0.92 0.0362"	0.76 0.0299"	0.46 0.0181"	0.23 0.0091"	0.15 0.0059"	0.11 0.0043"	0.09 0.0035"
	Diagonal	1.52 0.0598"	1.27 0.0500"	0.76 0.0299"	0.38 0.0150"	0.25 0.0098"	0.19 0.0075"	0.15 0.0059"
Working distance (mm inch)		6.5 0.26"						

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

High-Resolution Zoom Lens VH-Z500R/Z500T

500 › 5000

Our highest magnification/ resolution zoom lens

This zoom lens incorporates high-quality fluorite optics to provide the highest resolution in its class. With an N.A. of 0.82, achieve up to 5000× magnification with a 4.4 mm 0.17" working distance.

Model		VH-Z500R/Z500T				
Magnification*		500×	1000×	2000×	3000×	5000×
Field of view (μm)	Horizontal	610	305	152	102	61
	Vertical	457	229	114	76	46
	Diagonal	762	381	191	127	76
Working distance (mm inch)		4.4 0.17"				

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

Basic functions: Controller

Model			VHX-6000	VHX-950F
Camera	Image sensor		1/1.8-inch CMOS image sensor Virtual pixels: 1600 (H) × 1200 (V)	1/1.8-inch CMOS image sensor Virtual pixels: 1600 (H) × 1200 (V)
	Scanning system		Progressive	Progressive
	Frame rate		50 F/s (max.)	50 F/s (max.)
	Image resolution	Normal	1600 (H) × 1200 (V), Approx. 1000 TV lines	1600 (H) × 1200 (V), Approx. 1000 TV lines
		3CMOS*1*3	1600 (H) × 1200 (V), Approx. 1200 TV lines or more (2 million pixels × 3CMOS mode, Excellent color reproducibility)	Not available
		High resolution*3	3200 (H) × 2400 (V), Approx. 1600 TV lines	
		Super Fine*3	4800 (H) × 3600 (V), Approx. 2000 TV lines or more	
		Super Fine × 3CMOS*2*3	4800 (H) × 3600 (V), Approx. 2000 TV lines or more (18 million pixels × 3CMOS mode, Excellent Color reproducibility)	
	High Dynamic Range		16-bit intensity range through RGB data from each pixel	Not available
	Gain		Auto, Manual, Preset	Auto, Manual, Preset
	Electronic shutter		Auto, Manual, 1/60, 1/120, 1/250, 1/500, 1/1000, 1/2000, 1/5000, 1/9000, 1/19000	Auto, Manual, 1/60, 1/120, 1/250, 1/500, 1/1000, 1/2000, 1/5000, 1/9000, 1/19000
	Supercharge shutter		0.02 to 4 s	0.02 to 4 s
	White balance		Push set, Auto, Manual, Preset (2700K, 3200K, 5600K, 9000K)	Push set, Auto, Manual, Preset (2700K, 3200K, 5600K, 9000K)
	Back-focus adjustment		Not required	Not required
LCD monitor*5	Size		Color LCD (IPS) 23"	Color LCD (IPS) 23"
	Screen size		509.184 (H) × 286.416 (V) mm 20.05"(H) × 11.28"(V)	509.184 (H) × 286.416 (V) mm 20.05"(H) × 11.28"(V)
	Pixel pitch		0.2652 (H) × 0.2652 (V) mm 0.01"(H) × 0.01"(V)	0.2652 (H) × 0.2652 (V) mm 0.01"(H) × 0.01"(V)
	Number of pixels		1920 (H) × 1080 (V) (FHD)	1920 (H) × 1080 (V) (FHD)
	Display colors		Approx. 16770000 colors*4	Approx. 16770000 colors*4
	Brightness		300 cd/m² (Center 1 Point, typical)	300 cd/m² (Center 1 Point, typical)
	Contrast ratio		1000:1 (typical)	1000:1 (typical)
	Field of view		±89° (typ., horizontal), ±89° (typ., vertical)	±89° (typ., horizontal), ±89° (typ., vertical)
CD-R/CD-RW/DVD drive unit	Unit		DVD-ROM super-multi drive unit	DVD-ROM super-multi drive unit
	Applicable disk		CD-R/CD-RW/DVD±R/DVD±R DL/DVD±RW/DVD-RAM	CD-R/CD-RW/DVD±R/DVD±R DL/DVD±RW/DVD-RAM
	Storage capacity		8.7 GB (when using DVD±R DL)	8.7 GB (when using DVD±R DL)
Hard disk drive unit	Storage capacity		500 GB (including 165 GB reserved area) Approx. 1680000 images (when a 2-million-pixel image is compressed) to approx. 55000 images (when a 2-million-pixel image is not compressed)	500 GB (including 165 GB reserved area) Approx. 1680000 images (when a 2-million-pixel image is compressed) to approx. 55000 images (when a 2-million-pixel image is not compressed)
Image format			JPEG (with compression), TIFF (without compression)	JPEG (with compression), TIFF (without compression)
Observable image size			20000 (H) × 20000 (V) pixels (when stitched)	1600 (H) × 1200 (V) pixels
Light source	Lamp		High-brightness LED	High-brightness LED
	Lamp life		40000 hours (reference)	40000 hours (reference)
	Color temperature		5700K (typical)	5700K (typical)
Video output	Output method		DVI-I (1920 × 1080 pixels)	DVI-I (1920 × 1080 pixels)
	Scanning frequency	Special LCD monitor	66 kHz (H), 60 Hz (V)	66 kHz (H), 60 Hz (V)
		External monitor	66 kHz (H), 60 Hz (V)	66 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 (Contact/Noncontact)	Pause/Recording, Non-voltage input (Contact/Noncontact)
Interfaces	LAN		RJ-45 (10BASE-T/100BASE-TX/1000BASE-T)	RJ-45 (10BASE-T/100BASE-TX/1000BASE-T)
	USB 2.0 Series A		6 types	6 types
	USB 3.0 Series A		2 types	2 types
Power supply	Power voltage		100 to 240 VAC, 50/60 Hz	100 to 240 VAC, 50/60 Hz
	Power consumption		280 VA	280 VA
Environmental resistance	Ambient temperature		+5 to 40°C 41 to 104°F	+5 to 40°C 41 to 104°F
	Relative humidity		35 to 80% RH (No condensation)	35 to 80% RH (No condensation)
Weight	Controller		Approx. 12.5 kg	Approx. 12.5 kg
	Camera unit		Approx. 1.2 kg (VHX-6100/6020)	Approx. 1.2 kg (VHX-6020)
	Console		Approx. 0.5 kg	Approx. 0.5 kg
Dimensions (Excluding the projected areas)			550 (W) × 470 (H) × 200 (D) 21.65"(W) × 18.50"(H) × 7.87"(D) (when stored)	550 (W) × 470 (H) × 200 (D) 21.65"(W) × 18.50"(H) × 7.87"(D) (when stored)

*1. Compared with the standard mode, resolution and color reproducibility are improved.
*2. Compared with the high-resolution HD mode, color reproducibility is improved.
*3. Supported only with the VHX-6100 multi-scan camera.
*4. Approx. 16.77 million colors can be reproduced with the FRC processing of the display controller.
*5. The LCD monitor provided with the VHX Series is based on advanced technology. Rarely, an unlit pixel (black spot) or lit pixel (bright spot) may exist on the monitor screen. However, this is not an indication of the LCD monitor being defective.

Basic functions: Stage

		VHX-S660E	VHX-S650E	VHX-S600E	VH-S300	VH-S30F/S30B
XYθ stage	XY stage: Motorized/Manual	Motorized	Motorized	Manual	Manual	Manual
	XY-motorized stage motor	2-phase stepping motor	2-phase stepping motor	–	–	–
	XY-motorized stage resolution	1 µm (typ.)	1 µm (typ.)	–	–	–
	XY-motorized stage movement speed	20 mm 0.79"/sec (max.)	10 mm 0.39"/sec (max.)	–	–	–
	XY-stage movement range	±50 mm ±1.97"	±20 mm ±0.79"	±35 mm ±1.38"	±35 mm ±1.38"	X: ±37.5 mm ±1.48", Y: ±25 mm ±0.98"
	θ rotation angle	–	±90°	360°	360°	360°
	XYθ stage size	Top surface: 233 × 185 mm 9.17" × 7.28" (Center disc: ø168 ø6.61")	Top surface: 171 × 168 mm 6.73" × 6.61" (Center disc: ø100 ø3.94")	Top surface: 198 × 150 mm 7.80" × 5.91" (Center disc: ø136 ø5.35")	Top surface: 190 × 150 mm 7.48" × 5.91"	Top surface: 180 × 136 mm 7.09" × 5.35"
	Transmitted lighting	Provided	Provided	Provided	–	–
Z stage	Z stage: Motorized/Manual	Motorized	Motorized	Motorized	Manual	Manual
	Z-motorized stage motor	5-phase stepping motor	5-phase stepping motor	5-phase stepping motor	–	–
	Z-motorized stage resolution	0.1 µm (typ.)	0.1 µm (typ.)	0.1 µm (typ.)	–	–
	Z-motorized stage travel speed	17 mm 0.67"/sec (max)	17 mm 0.67"/sec (max)	17 mm 0.67"/sec (max)	–	–
	Z-stage movement range	49 mm 1.93"	49 mm 1.93"	49 mm 1.93"	53 mm 2.09"	28 mm 1.10"
Ratings	Power voltage	100 to 240 VAC, 50/60 Hz	100 to 240 VAC, 50/60 Hz	–	–	–
	Power consumption	60 VA	60 VA	50 VA	–	–
Environmental resistance	Ambient temperature	+5 to 40°C 41 to 104°F	+5 to 40°C 41 to 104°F	+5 to 40°C 41 to 104°F	–	–
	Relative humidity	35 to 80% RH (No condensation)	35 to 80% RH (No condensation)	35 to 80% RH (No condensation)	–	–
Weight		Approx. 20 kg	Approx. 18 kg	Approx. 17.2 kg	Approx. 17.4 kg	Approx. 12 kg
Load capacity		5 kg	5 kg	5 kg	1 kg	1 kg

Other functions

Model		VHX-6000	Console compatibility	VHX-950F	Console compatibility
Observation functions	Auto-focus function	Available	✓	Available	✓
	Focus amount display function	Available		Available	
	Lighting switch function (Uneven surface enhancement)	Available (Full, partial, lateral, darkfield, brightfield, combination lighting)	✓	Available (Full, partial, lateral, darkfield, brightfield, combination lighting)	✓
	Multi-lighting function	Available	✓	Not available	
	Camera-shake correcting function	Available	✓	Available	✓
Display function	Full-screen display	Available	✓	Available	✓
	Screen segmentation function	Vertical, horizontal, 2 × 2 split, 3 × 3 split, linked display function		Vertical, horizontal, 2 × 2 split, 3 × 3 split, linked display function	✓
	Real-time digital zoom	1.0× to 10.0×		1.0× to 10.0×	✓
	Comment display function	Available		Available	
Image quality improvement function	Glare removal function	Available	✓	Available	✓
	Ring removal function	Available	✓	Not available	
	HDR function	Available	✓	Not available	
	High-resolution HDR function	Available	✓	Not available	
	Optimize mode (9 types) (Optimal image)	Available (Automatically lists 9 image modes, allowing optimal image selection)		Available (Automatically lists 9 image modes, allowing optimal image selection)	
	Fine-shot function	Available	✓	Available	✓
Stitching function	2D image stitching	Available	✓	Not available	
	3D image stitching	Available	✓	Not available	
	Navigation function	Available		Not available	
3D function	Real-time depth composition	Available	✓	Not available	
	Quick composition & 3D function	Available	✓	Available	✓
	High-quality depth composition	Available		Available	
	3D display function	Available		Available	
	3D shape correction function	Available (Slope/Sphere/Cylinder)		Available (Slope/Sphere/Cylinder)	
	3D comparison function	Available (Combination/Comparison/Difference display mode)		Available (Combination/Comparison/Difference display mode)	
Recording function	Report output (Excel/Word)	Available		Available	
	Capture setting reproduction function	Available		Available	
	Timer capture function	Available		Available	
	Video recording/playback function	50 frames/sec. max. (Image size: 1600 × 1200, 800 × 600, 640 × 480)		30 frames/sec. max. (Image size: 1600 × 1200, 800 × 600, 640 × 480)	
Measuring functions	Distance, angle, radius, area, etc.	Variously available		Variously available	✓
	Automatic edge detection	Available		Available	
	Scale display	Variously available	✓	Variously available	✓
	Automatic count and area measurement function	Available (Enables distance/area measurement through brightness/color extraction)		Available (Enables distance/area measurement through brightness/color extraction)	
	Automatic area measurement	Available		Not available	
	Grain size analysis	Available		Not available	
	Contamination analysis	Available		Not available	
	One-click measurement	Available		Not available	
	Auto measurement	Available		Not available	
	Automatic lens/zoom recognition function (TRIPLE'R)	Available		Available	
	Auto calibration	Available (No input of values required)		Available (No input of values required)	
	One push calibration function	Available (No scale position adjustment required)		Not available	
	CSV storage	Available		Available	
3D measurement function (VHX-H4M/ VHX-S15 optional function)	3D profile measurement	Available		Available	
	Point height measurement	Available		Available	
	3D volume measurement	Available		Available	
	Roughness measurement	Available		Available	
Manual XY measurement system (VHX-H2M2 optional function)	XY stage measurement	Available		Available	
	Wide image display function	Available		Available	
Utilities	Simple mode	Available	✓	Available	✓
	Space-saving all-in-one design	Available		Available	
	Foot switch compatibility	Available		Available	
	User-specific setting memory	Available		Available	
	System protection setting	Available		Available	
	PC mode	Available		Available	
	Network connection function	Available (Communication software / File sharing / FTP)		Available (Communication software / File sharing / FTP)	
	Function guide	Available		Available	
	Video help	Available		Available	
PC software (Available free of charge)	Communication software	Easily transmits image data between the VHX and the PC. (LAN)		Easily transmits image data between the VHX and the PC. (LAN)	
	3D image playback software for the PC	Plays back 3D images saved on the VHX using the PC.		Reproduces 3D images saved on the VHX using the PC.	
	Multi-lighting playback software	Allows for the direction of lighting to be adjusted after an image has already been captured.		Not available	
	HDR playback/measurement/stitched image playback software	Adjusts HDR parameters, plays back stitched images, and performs measurement.		Performs measurement using the PC.	
	One-click measurement compilation software	Collects one-click measurement results and exports the results to Excel.		Not available	

VHX-6000/950F (Module details)

Module	Video recording module	Allows recording/playback of videos.
	High-quality depth composition module	Captures multiple images focused on different heights from which a single image is composed
	Area measurement module	Measures an area of a 2D image.
	Timer capture module	Captures images automatically at specified time intervals.
	Screen splitting module	Displays vertical, horizontal, or four-division split screens.
	Comment input module	Allows inputting and displaying of comments such as characters and markers on an image.
	Image touch-up module	Provides image processing functions for modifying images to make observation easier.

KEYENCE

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SAFETY INFORMATION
Please read the instruction manual carefully in order to safely operate any KEYENCE product.

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