KEYENCE

NEW **Digital Microscope**
VHX-2000

SUPER RESOLUTION
DIGITAL MICROSCOPE

SURPASSING THE LIMITS OF AN OPTICAL MICROSCOPE

VHX
DIGITAL MICROSCOPE

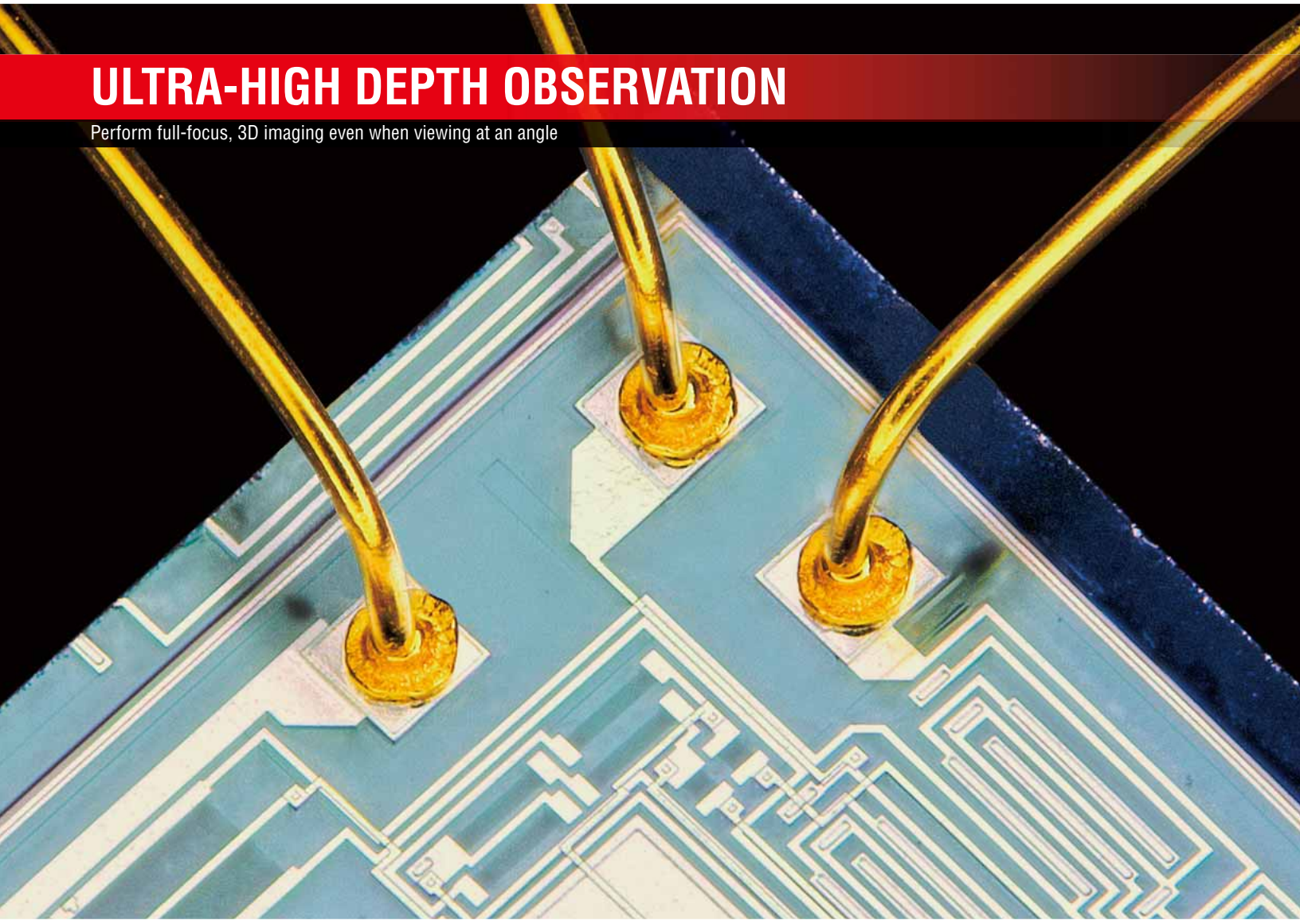
SUPER RESOLUTION

LARGE DEPTH-OF-FIELD & SUPER RESOLUTION IMAGING

With a depth-of-field and resolution that are unmatched by conventional optical microscopes, users can take imaging to a whole new level. Designed by KEYENCE in its entirety, the VHX Series achieves the highest level of observation through the integration of a lens, camera, and graphics engine.

ULTRA-HIGH DEPTH OBSERVATION

Perform full-focus, 3D imaging even when viewing at an angle



Wire bonding (300×)

BASIC FUNCTIONS

VHX
DIGITAL MICROSCOPE

Digital Microscope **VHX-2000E**

SUPER RESOLUTION IMAGING

Capture images with super resolution by employing a blue filter to control the wavelength of light

IC pattern (500×)

ADVANCED FUNCTIONS - WORLD'S FIRST

Why do over 10,000 companies worldwide use the VH Series?

People choose the VH Series next generation microscope system because of the following four main features.

1 LARGE DEPTH-OF-FIELD

Easily capture fully-focused, high-resolution images

Conventional Microscope

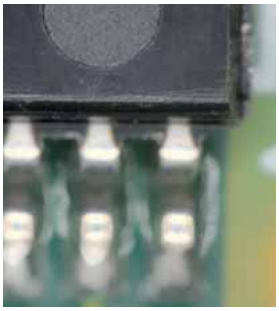
Focus on only a part of a target

VHX Series

Sharp focus on the entire target

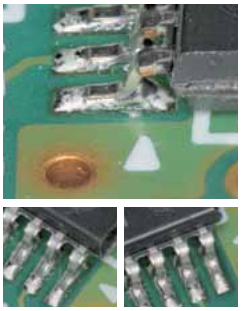
Observe an object from any angle

Conventional Microscope



No other choice but to observe from directly above

VHX Series



Freely observe from various angles

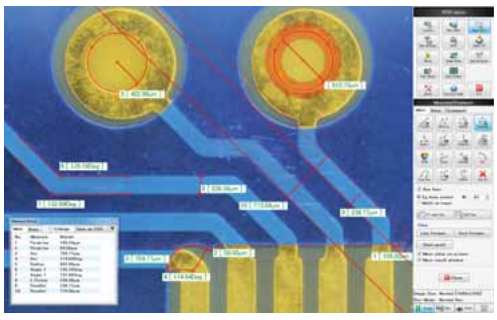
2 VERSATILE & HIGHLY ACCURATE DIMENSIONAL MEASUREMENT

Conventional

The dimensions of the target cannot be measured in real-time...

A conventional microscope setup does not provide users with the ability to perform measurements on a target while being viewed, making particle counting or rapid size estimation of features difficult.

VH Series



Real-time measurements on-screen PC board (60×)

VHX
DIGITAL MICROSCOPE

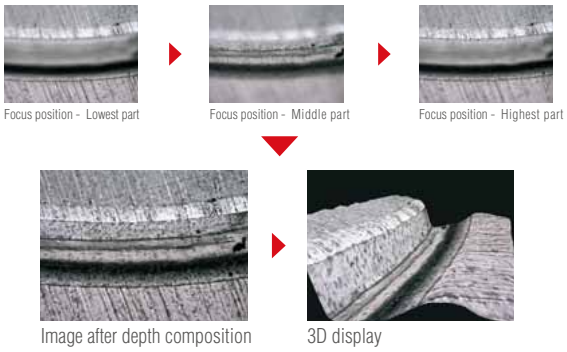
3 EASY-TO-USE SYSTEM WITH SIMPLE ONE-PUSH OPERATION AND RECORDING

With just the push of a button

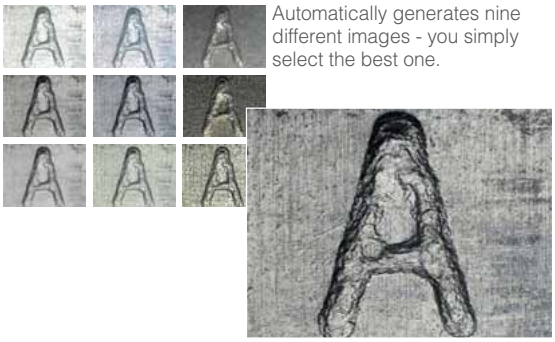
Save captured images to HDD

The main unit has been equipped with a large-capacity HDD. Files can also be saved to a network or USB.

Depth composition & 3D observation



View the optimal image



Automatically generates nine different images - you simply select the best one.

4 COST-EFFECTIVE SOLUTION 4 MICROSCOPES IN A SINGLE SYSTEM

UNPARALLELED CLARITY AND DEPTH-OF-FIELD

A depth-of-field that is over 20 times greater than that of an optical microscope

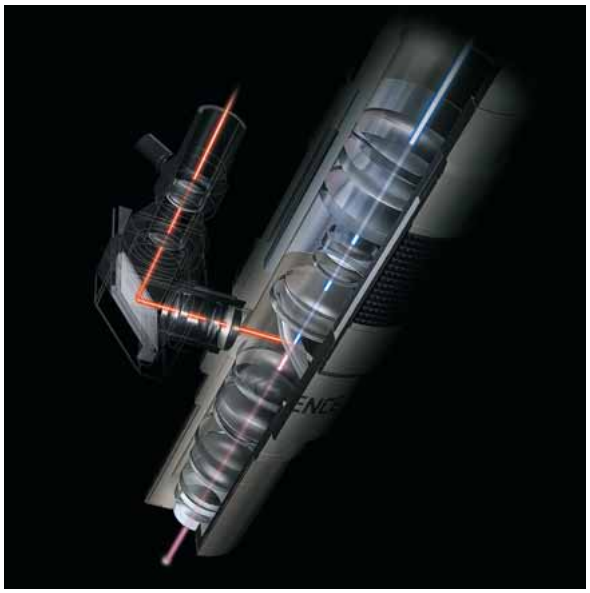
Through an advanced zoom lens design and integrated setup, KEYENCE VH Microscopes are able to achieve a 20 times greater depth-of-field when compared to a typical optical microscope. This allows objects with large variations in surface topography to be focused and accurately observed in a single image, which is impossible to do with conventional microscope optics.

Conventional Microscope

VHX Series

Designed and developed by KEYENCE for total system integration

In optics, there is a trade-off between resolution and depth-of-field. Since the VH Series has been entirely designed by KEYENCE, the lens, camera and graphics engine integrate seamlessly to produce a system optimized for digital image capture.

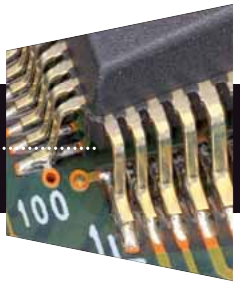


Highest resolution zoom lenses in the industry

RZ LENS
Real Zoom Lens

The design of the lens is the greatest contributing factor in achieving high-resolution and large depth-of-field imaging. KEYENCE has developed zoom lenses with the highest resolution in the industry. These lenses minimize chromatic aberrations and distortions, while also offering superior telecentricity.

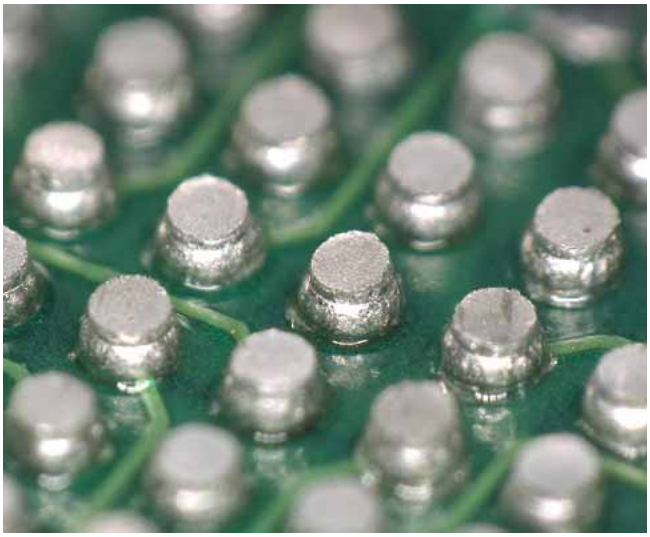
Information on advanced functions can be found on **P.22-25**



KEYENCE Microscopes are designed to emphasize both high-resolution and depth-of-field.

Full-focus images even at high magnification

With any microscope, as the magnification is increased the depth-of-field will decrease. To overcome this issue, KEYENCE has developed an image composition function to obtain a fully-focused image even when the depth-of-field is limited.



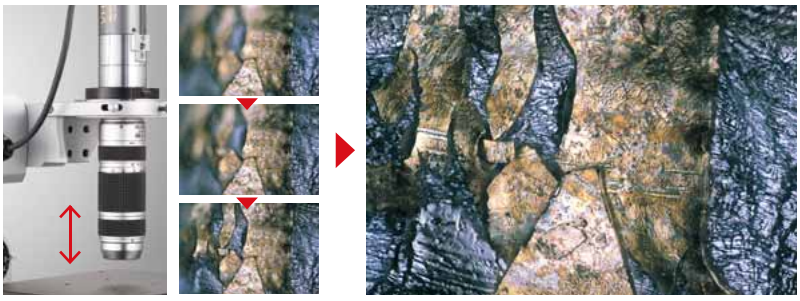
Conventional Microscope

VHX Series

Quick Depth Composition function

ONE PUSH

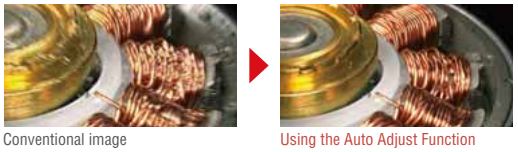
With just a single push of a button, the lens will automatically scan throughout the range of an object and dynamically compile every in-focus pixel, generating a fully-focused image.



Fractured metal surface (1000×)

Auto Adjust function prevents blurring during depth composition

Edge displacement and image blurring, caused by vibration and/or a non-telecentric lens, are automatically corrected and a comprehensive, fully-focused image is constructed. This method is five times faster and more accurate than conventional position correction methods and obtains accurate information even for easily distorted, low magnification areas.



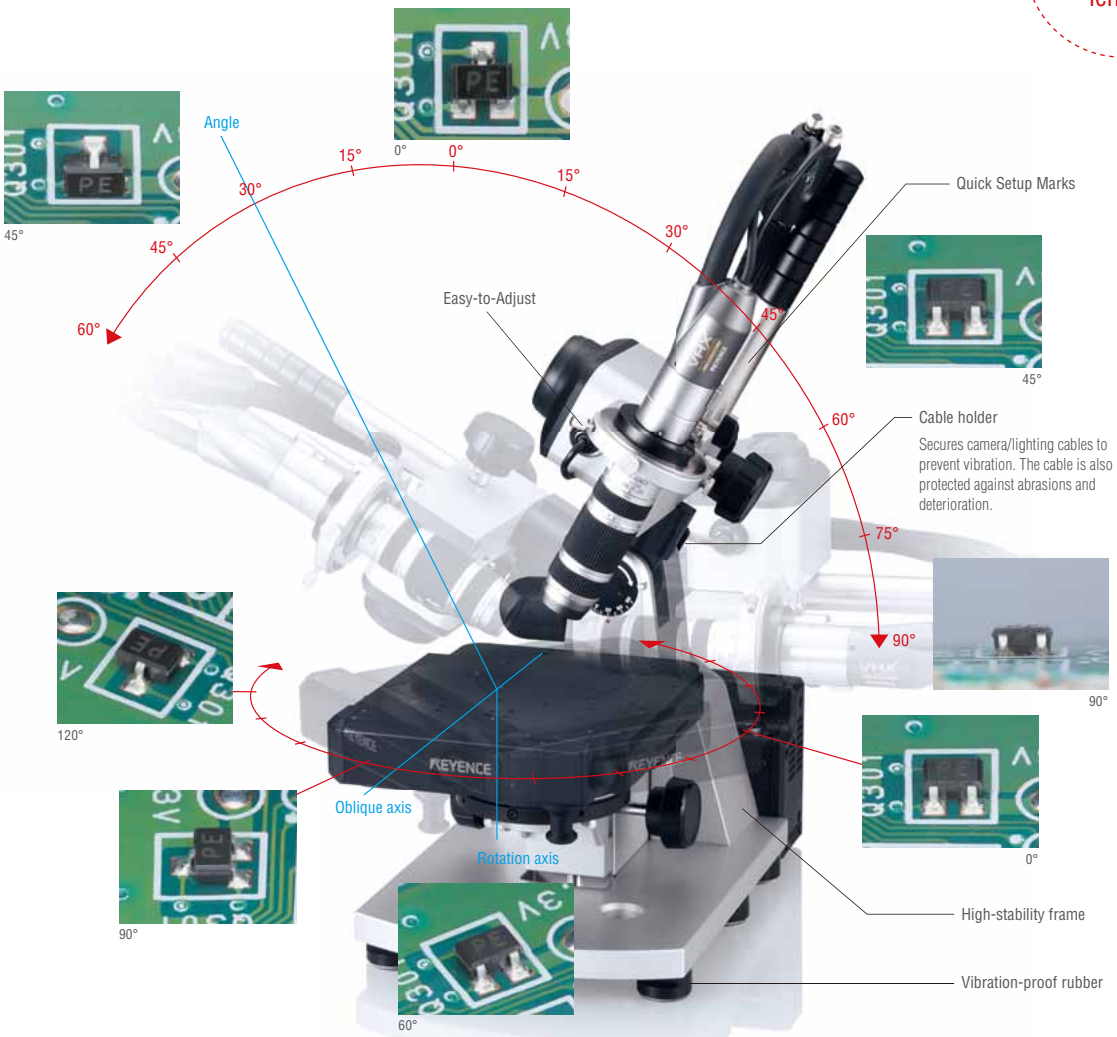
Conventional image

Using the Auto Adjust Function

HIGH-RESOLUTION OBSERVATION FROM ANY ANGLE

Free-angle observation system (XYZ motorized) **VHX-S90F/S90BE**

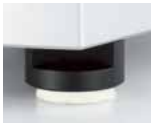
Supports 0.1 to 5000× lenses



Easy-to-Adjust

Easy focus adjustment, X-Y stage movement, rotation and oblique axis motion. A custom mechanism allows the target to stay centered in the field-of-view, even when the lens unit is inclined or rotated.

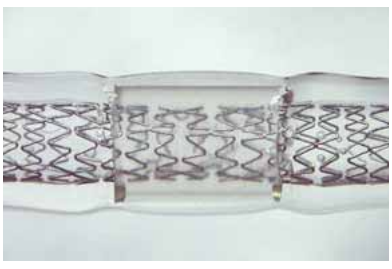
Stability/Vibration-proof rubber



The aluminum die-cast main body provides a highly rigid structure with a low center of gravity. Each stand is equipped with four rubberized feet, which are designed to absorb low to high frequency vibrations. This allows observation, even at high magnifications, without interference from environmental vibration.

Objects that cannot fit onto the stage or that require a large working distance can still be imaged easily

Scene of observation



Stent (100×)

Portable, hand-held observation

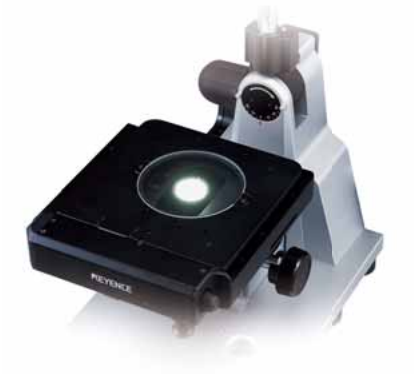
While most microscopes are limited to viewing objects on a fixed stand, the VH Series is capable of performing hand-held imaging due to the compact design of the camera and lens. Users can view large samples simply by placing the lens directly against the target.

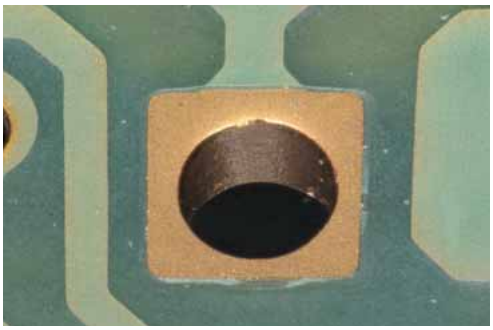
Hand-held observation

Observe whenever and wherever you wish

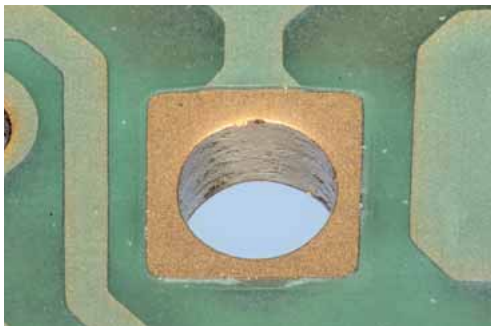
LED transmitted illumination Standard equipped

LED transmitted illumination is standard with the XY motorized stage for the free-angle system. With light that produces consistent brightness, vivid observation is possible from low to high magnification. In addition to transmitted illumination, it is also possible to use the LED lighting in conjunction with vertical illumination from the lens. The light can be adjusted for each type of illumination, making it possible to perform observation with an optimum balance of light intensity.





Vertical illumination



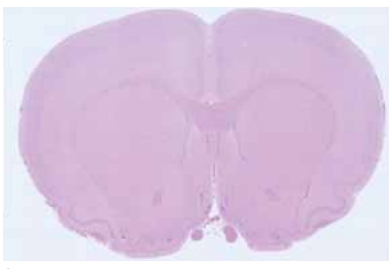
Vertical + transmitted illumination

PCB through-hole (100×)

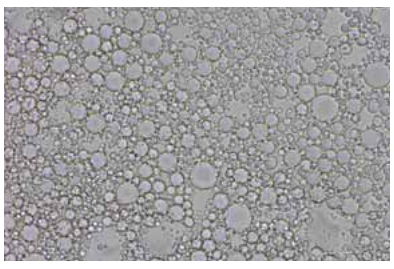
Observation with transmitted polarized light is also possible

OP-87428

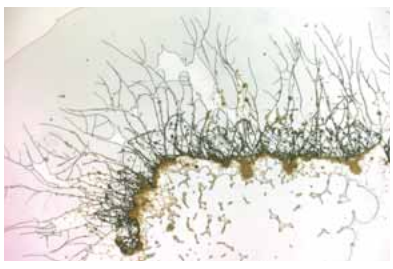
Transmitted light applications



Slice of brain tissue (200×, composite of 120 images)



Emulsion (1000×)



Mold hyphae (1000×)

XYZ MOTORIZED CONTROL AND HIGH-SPEED IMAGE STITCHING FUNCTION

Industry's First

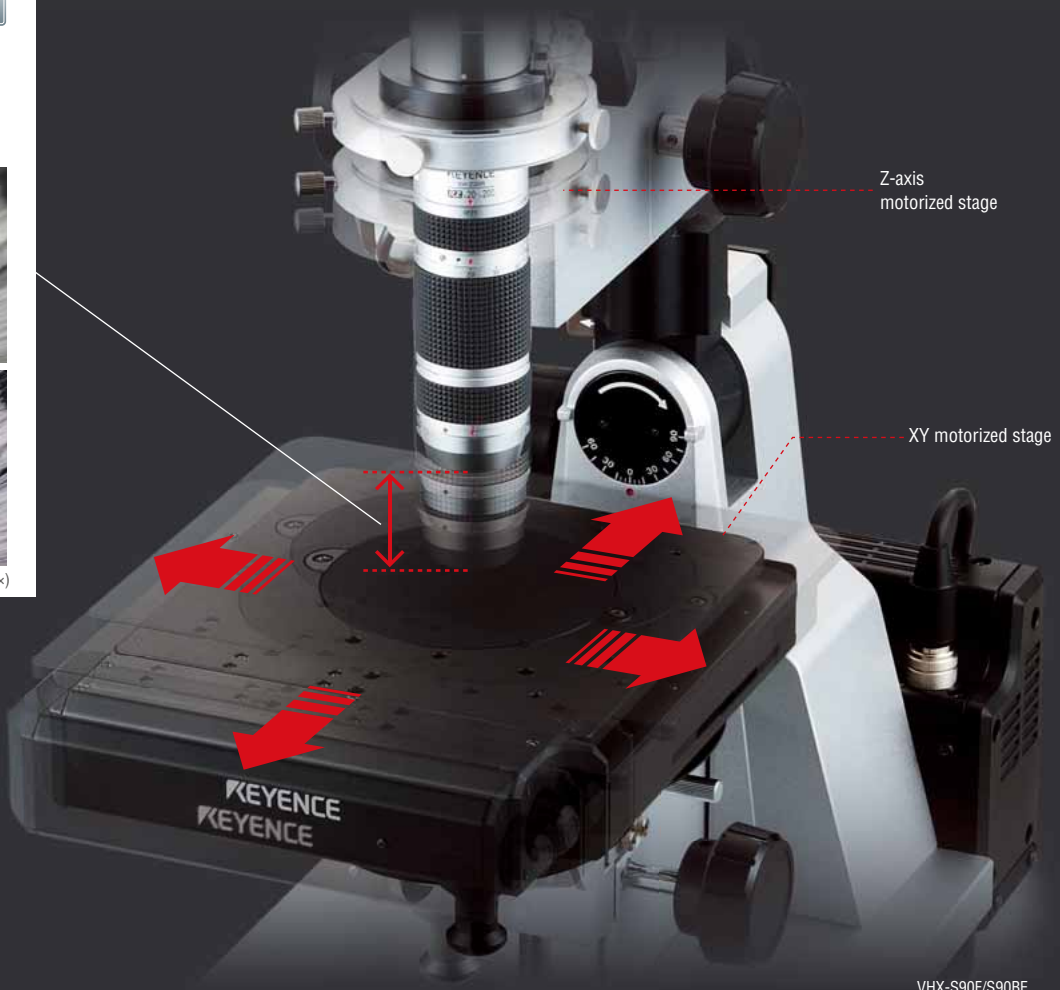
Simple operation using 3-axis (XYZ) motorized control

The microscope stand can be equipped with a motorized XY stage that is easily controlled using a joystick. Also, with the automatic lens/magnification recognition function (DOUBLE'R), movement in the X, Y, and Z axes will automatically adjust to provide the appropriate speed based on the magnification being used.

Auto Focus Function

A built-in auto-focus algorithm can be executed with the push of a button, eliminating complex focus adjustments and user subjectivity.

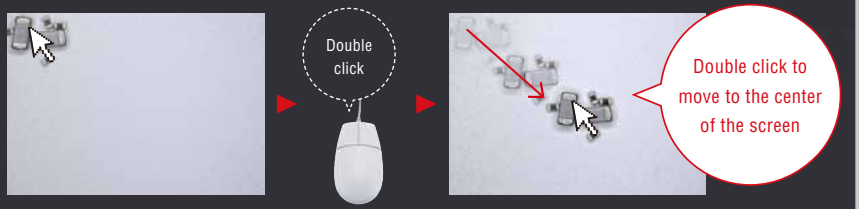

Fiber (50×)



VHX-S90F/S90BE

Field-of-view adjustments with just a click of a mouse

Users can effortlessly move around on an object by clicking and dragging the mouse in the direction of travel. Double-clicking a location on the screen will automatically move that area to the center of the screen.



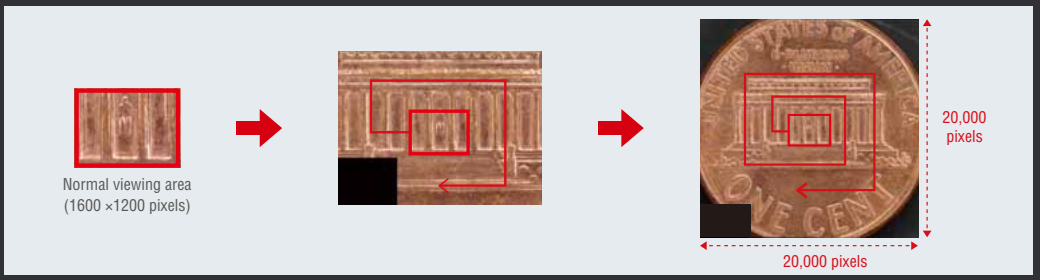
World's First

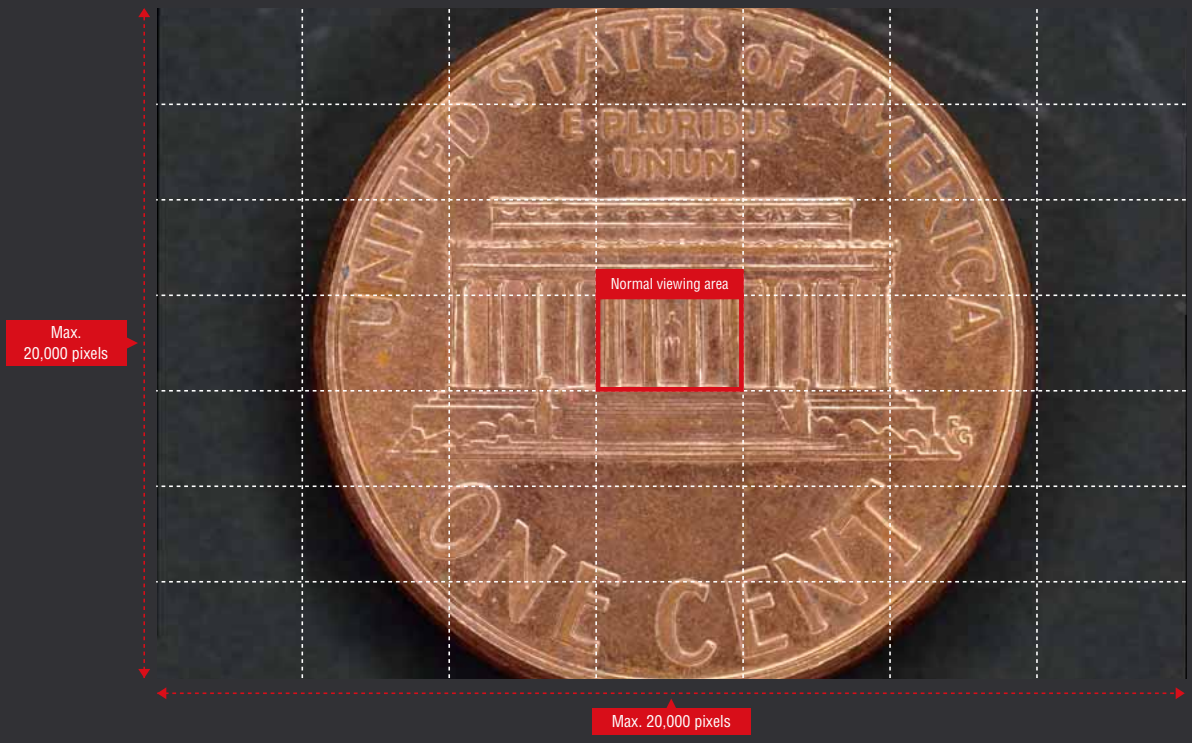
Ultra high-speed image stitching function

ONE PUSH

Once the image stitching function has been activated, the XY stage will automatically move in a clockwise pattern and capture images at each location. After an image is captured, it will be stitched together with the previous image in real-time before the stage moves to the next location. This will provide users with a large (up to 20,000 x 20,000 pixels), overall view of the target, while preventing any misalignment typically associated with other stitching techniques.

Observation area expanded up to 200 times





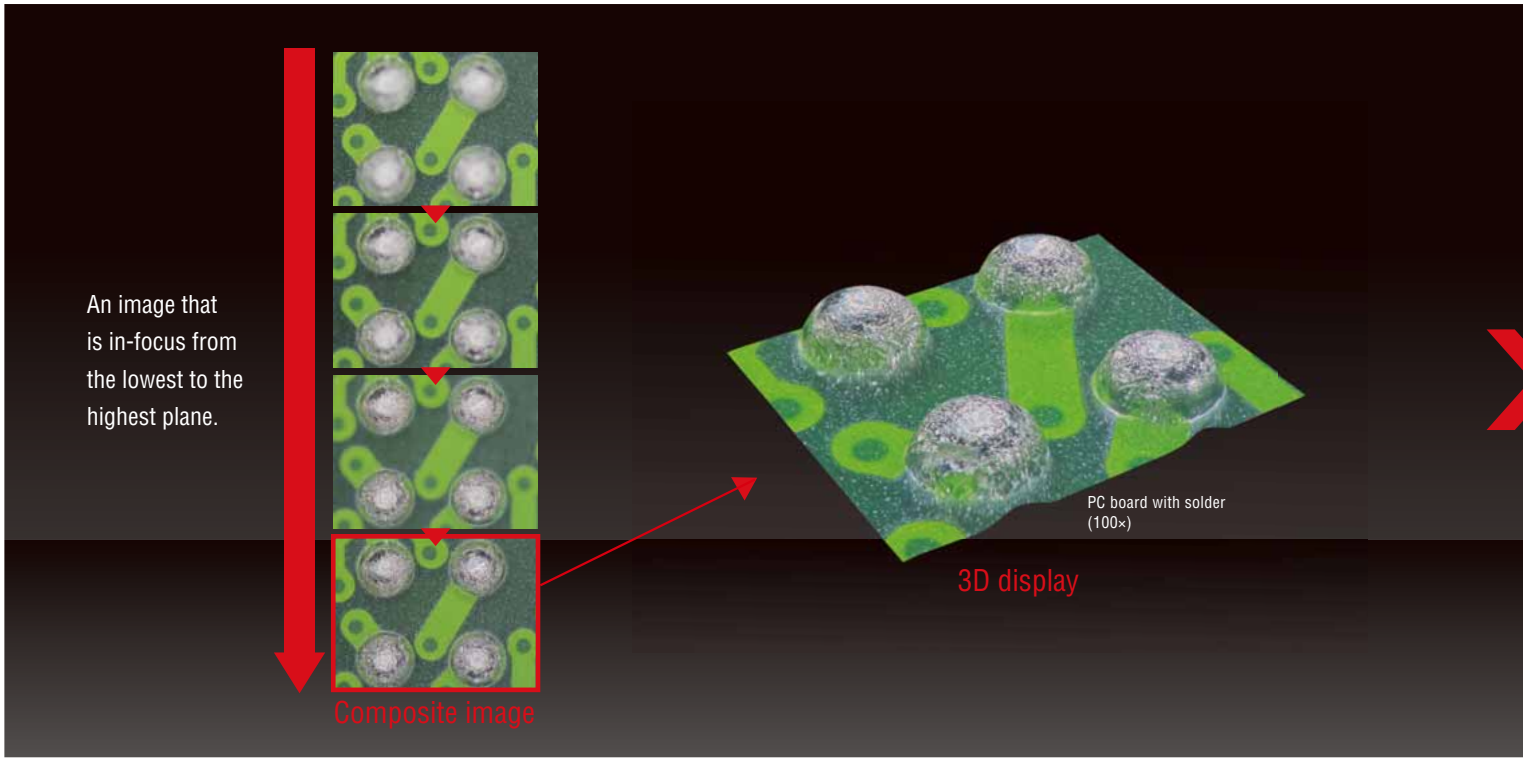
World's First **Navigation function**

The stitched image can be utilized as a navigation screen. Clicking on the position that you wish to observe will automatically move the stage to the selected location. The current field-of-view is outlined in a yellow frame and the previously viewed field-of-view is outlined in a red frame, making it easier to maneuver the stage. Also, when performing high magnification observation, this function is extremely useful for understanding which area of the target is being observed.

ONE PUSH

Navigation screen

3D DISPLAY & MEASUREMENT



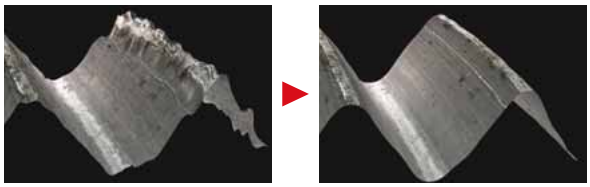
Fully-focused images and 3D observation with the push of a button

ONE PUSH

Even when a target has an uneven surface, a fully-focused image can be obtained instantly by compiling images at different focal planes. After creating the composite image, the focal position data can then be used to construct a 3D model. When the Z-axis motorized stage is used, this 3D image can be displayed easily by just pushing a button on the console.

ACCURATE D.F.D. METHOD

We have developed a new algorithm that uses the fine changes in texture to estimate height data. Building on the Depth Up feature, through which a fully-focused image can be constructed from a small number of images, the D.F.D. method facilitates the accurate construction of a 3D model allowing for all-around observation in three dimensions.

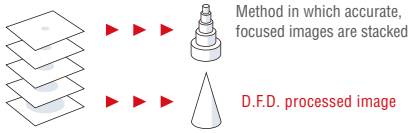

Conventional image

Accurate D.F.D. method

Bolt

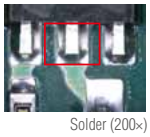
D.F.D = DEPTH FROM DEFOCUS

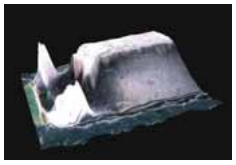
The D.F.D. method is the process by which the VHX can 1.) Compile a completely in-focus image, and 2.) Generate data to compile a 3D model. The D.F.D. method analyzes the level of contrast, or focus, at each point of the target. By analyzing the degree of blurring, the D.F.D. method can calculate height information for each pixel, thereby enabling the compilation of a 3D model and a completely in-focus image. Even if a pixel cannot be captured in perfect focus, a calculation is made to generate height data. The D.F.D. method exponentially increases the efficiency of 3D construction.



By combining the Glare Removal and the Quick 3D Display functions, even highly reflective objects can be imaged in 3D

Once applicable only to still images, the Glare Removal function has now been enabled to be used on live images and 3D display. By removing the reflectivity, it is possible to create an accurate 3D display of the surface of a target.


Solder (200×)


Conventional image

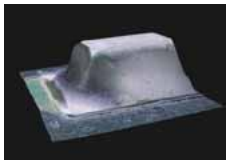
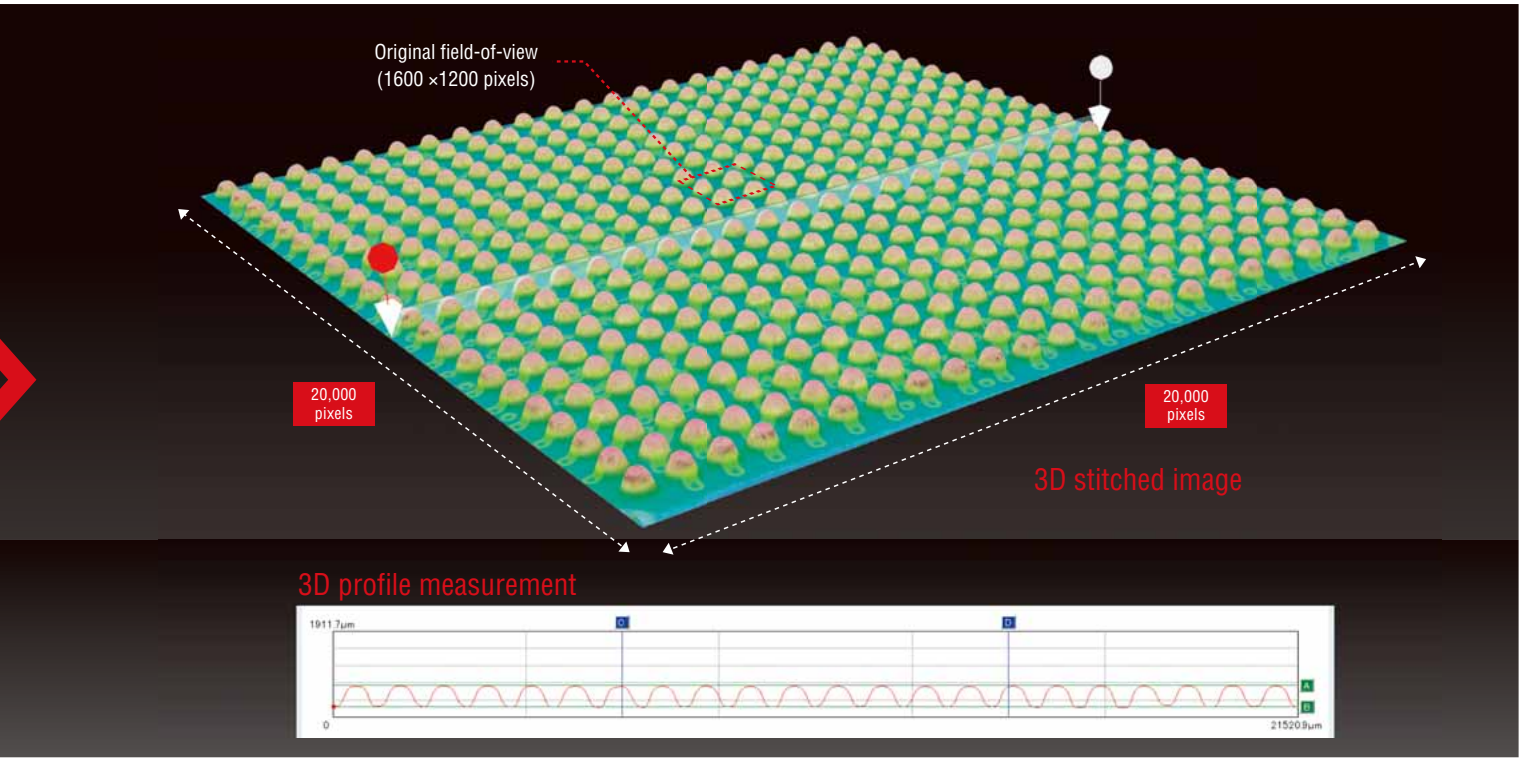


Image subjected to Glare Removal and Quick 3D Display processing

WIDE-FIELD 3D IMAGE STITCHING & MEASUREMENT FUNCTION

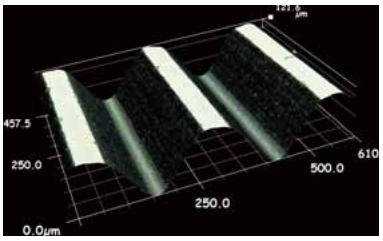


3D Measurement Function

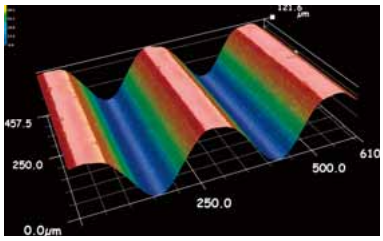
Once a 3D image has been created, data can be easily collected to calculate the profile, height and volume for any area within the field-of-view. When used in conjunction with the image stitching function, a wide-field 3D image can be generated to allow users the ability to understand the topography of a surface over a large area.

HEIGHT COLOR/SCALE DISPLAY

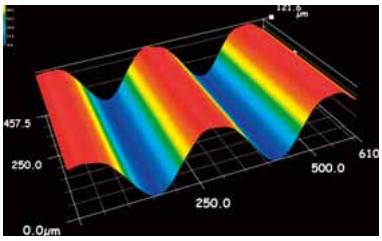
Color bars that indicate height are displayed on a 3D image. The highest position is displayed in red and the lowest position is displayed in blue, allowing you to see height differences clearly at a glance. The height data can be superimposed on a raw image. Furthermore, the X-axis, Y-axis and Z-axis scales are calculated automatically and displayed according to the image size and the 3D rotation angle.



3D raw image



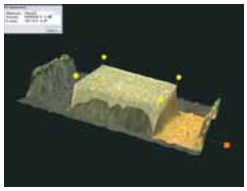
3D raw image + topographic image



3D topographic image

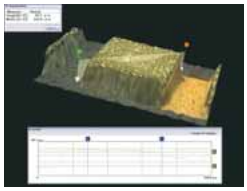
Electronic die component (500×)

Volume



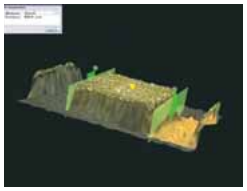
The volume within the selected rectangle on the 3D image can be measured.

Cross section profile



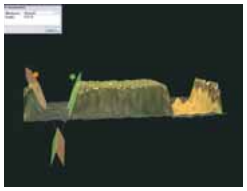
A selected cross-section of the 3D image can be displayed as a profile line.

Plane distance



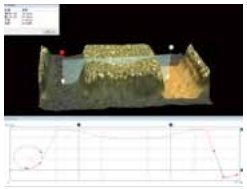
A distance between two parallel planes in the 3D image can be measured.

Plane angle



A cross section angle of two chosen planes in the 3D image can be measured.

Radius/angle



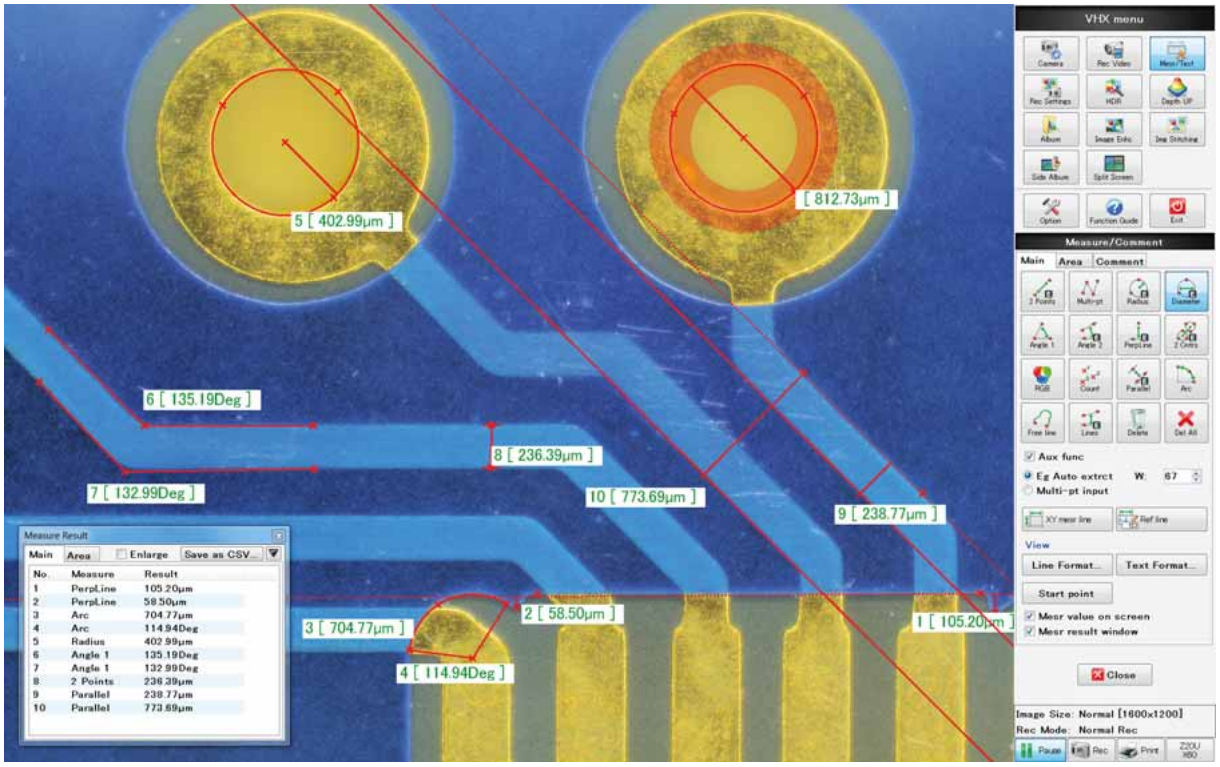
Measures the radius and angle of any area on the 3D image.

FLEXIBLE AND HIGHLY ACCURATE MEASUREMENTS

Real-time measurement during observation

Data output is possible

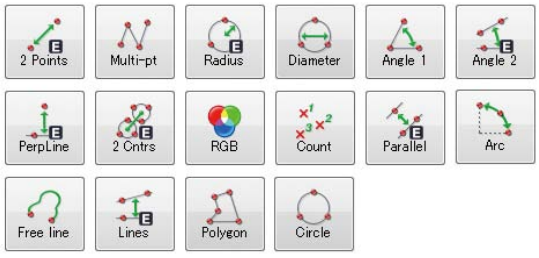
The system allows users to complete all measurements directly on the screen in real-time with just a few clicks of a mouse. This is significantly easier and faster than systems that require a user to capture images and import them to a PC to then use external software to complete measurements on the sample.



PC board (60×)

A multitude of measurement functions

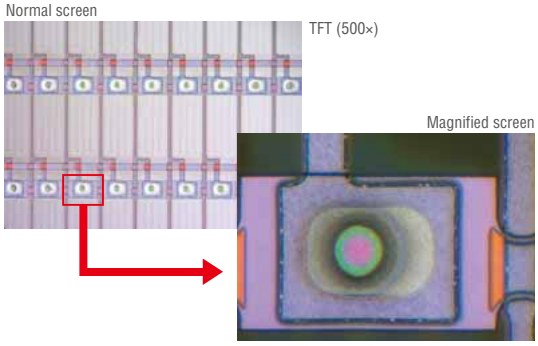
The quantity and variety of measurement tools has been increased to a total of 19, including 16 basic measurements and 3 automatic measurement tools. Also, with the measurement point re-positioning function or measurement-free display function, ease-of-use has been dramatically increased as well.



High-resolution measurements

Accurate measurements are possible with the high-resolution (4800 x 3600 pixels) image. With the multi-scan method, it is possible to specify a measurement area on a captured image that is 9 times larger than a standard image, thus making it possible to perform measurements with greater accuracy. Also, because emphasis has been placed on operability, once you have finished specifying the measurement area, it is then possible to automatically return to the original image size and continue observation or image capture.

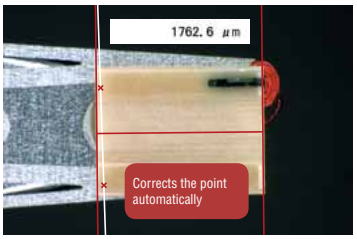
Normal screen



Information on advanced functions can be found on **P.26-27**

Auto Edge Selection function

Even when the measurement point selected on the image is not perfectly on the edge of the target, the Auto Edge Selection function will automatically re-adjust the measurement point to the correct edge location. This helps to improve the accuracy of measurements and reduce the possibility of human error.



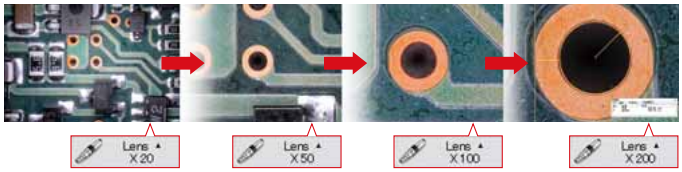
Read head of hard disk (70×)

Automatic Lens/Zoom Recognition function DOUBLE'R

By combining KEYENCE's advanced sensor technology and accumulated microscopy/optical expertise, a brand new technology has been formed. Now it is possible for the VHX to not only recognize which lens is mounted to the camera, but also the magnification currently in use all in real time. Calibration is not required every time magnification is changed. In addition, the magnification setting, required for 3D observation, is unnecessary. Typical mistakes that are made when selecting magnification will not occur, resulting in a much smoother, more accurate measurement process.

DOUBLE'R

New system having both lens and zoom recognition [Double Recognize]



Lenses compatible with DOUBLE'R: VH-Z00W/VH-Z20W/VH-Z20UW/VH-Z100W/VH-Z100UW/VH-Z250W/VH-Z500W/VH-Z50W
* Using the DOUBLE'R with the VHX-500FE requires the purchase of OP-84263 (optional DOUBLE'R unit).

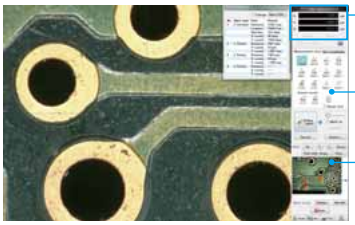
FUSION OF A DIGITAL MICROSCOPE AND A MEASURING MICROSCOPE

Moving the manual stage allows you to measure a target in sizes of up to 100 mm × 100 mm 3.94" × 3.94". Measurements can even be completed over an area that exceeds the field-of-view of the lens being used, allowing you to perform both observation and measurement of a larger target with a single microscope.

Supports traceability

The X-Y measurement system ensures highly reliable measurements based on a traceability system that complies with international standards.

Measurement software for further improved usability **VHX-H1M1**



Real-time screen display
The XYD measurement results are displayed on the monitor screen in real time.

Various measurement modes
Distance, radius, angle and other measurement modes are included.

Wide image capture
Once a wide-field image captured under low magnification is registered, the current measurement point is always indicated even after the field-of-view is changed under higher magnification. The measurement point can be easily checked for an entire image.

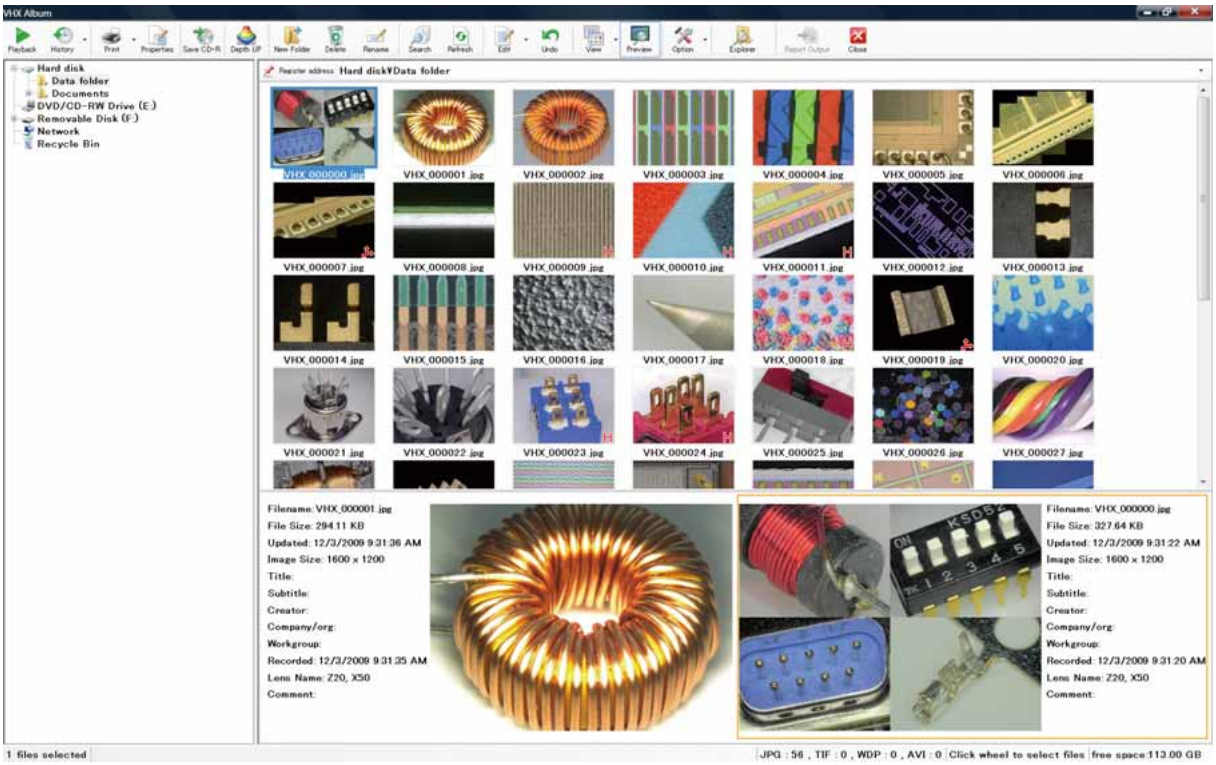
EASILY RECORD AND MANAGE IMAGE FILES

SUPPORTED FILE FORMATS

JPEG | TIFF | WDP [Windows Media Photo]

Save captured images to HDD

The main unit has been equipped with a large-capacity hard disk drive, so images can be easily recorded on-site just as they are viewed. Our original high-speed filing system ensures effortless handling of a high-volume of images. File names, titles, organization names, lenses and comments can be registered, providing for quick image searches.



▶ VIDEO RECORDING FUNCTION

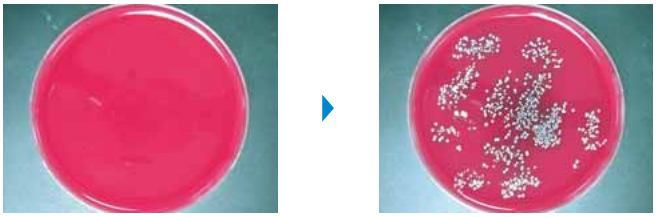
Accurately capture an object's motion by recording a video at 15 or 28 frames per second with recording times of up to one hour. Users can fast forward, advance a single frame, and capture a still image from the video file. Each video is saved as an AVI file that can be played on the VHX-2000 or a separate computer.

Video recording up to 1 hour long

Ant (50×)

▶ TIMER CAPTURE FUNCTION

The VHX-2000 can be programmed to capture images based on a given time interval in order to monitor a process over a given period of time. An automatic lamp shut off feature, which turns off the halogen lamp between capturing images, is included to help prolong the lifetime of the light source.

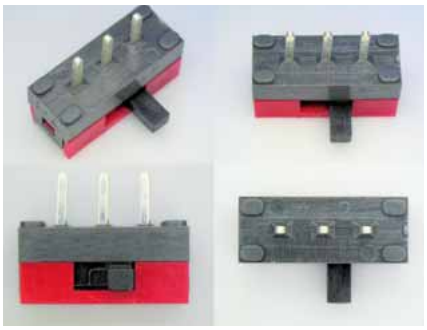


Bacterial growth

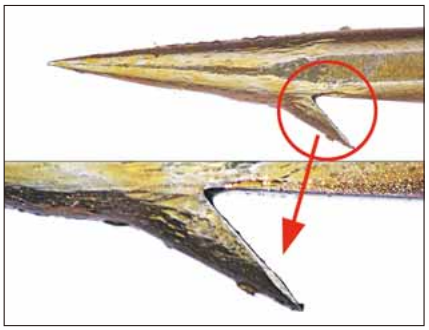
Split screen/Comment entry function

The viewing window on the built-in monitor can be split horizontally, vertically, or in to quadrants. This can be used to quickly perform side-by-side image comparison of good and bad parts or when viewing a low-magnification and high-magnification image. Comments and scale bars can also be inserted into the image.

Vertical two-part split



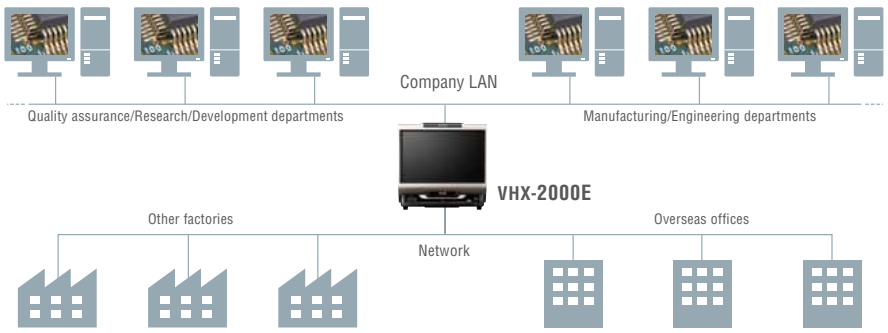
Quarter split



Comment entry

Network compatible

The VHX-2000 can be connected to a network via LAN to allow quick and easy sharing/transfer of images with other departments or remote locations. This image and data sharing ensures speedy and accurate action in urgent situations.



PC mode

With the PC mode, it is possible to install various drivers for peripheral equipment on the microscope itself, including drivers for Microsoft Word, Excel, and printers. This makes it possible to use the microscope in a way that best fits your operating environment.

Report function (report preparation)

Instantly create reports by installing Microsoft Word or Excel and then setting up a standard template. This function automatically records details such as the capture date, lens, and magnification and attaches the captured image as well.

Anti-virus software

Users can install anti-virus software onto the VHX as needed (when operating in PC mode) and use external USB storage devices without having to worry about the transfer of viruses.

VARIETY OF USEFUL FUNCTIONS THAT SUPPORT OBSERVATION

Reliable support functions

FUNCTION GUIDE

A built-in function guide located within the menu offers explanations and illustrations for a range of functions, from basic operations such as how to turn the device on/off to practical functions such as 3D observation.

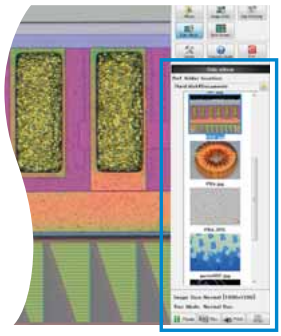
NAVIGATION WINDOW

Provides an explanation on how to operate the different functions of the microscope as they are being used. This is extremely useful in situations where the manual is not on-hand.

Observation condition reproduction function

Saves previously captured conditions such as the brightness during observation or capture settings for the camera. It is possible to perform observation under the same conditions as a previously captured image just by loading the file and then pressing the reproduce settings button.

Shutter Speed	Light Shift	White Balance
Gain	Edge Enhance	Lamp Lighting



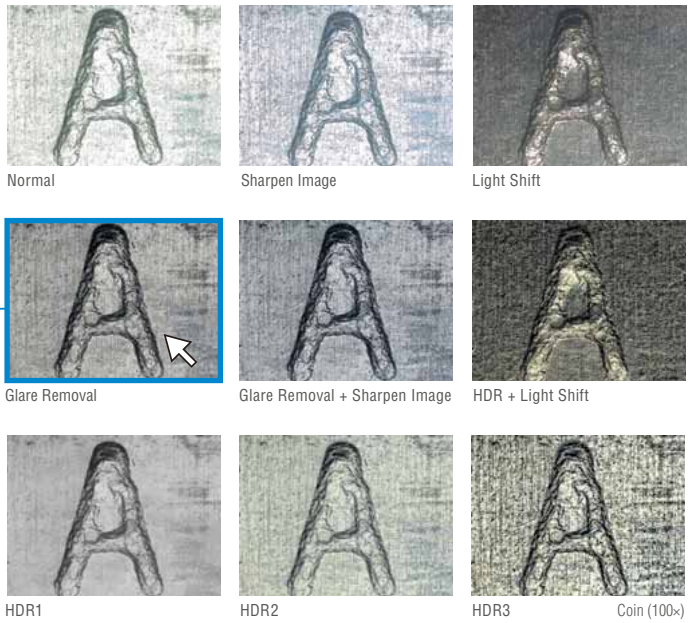
Side album

Freedom and flexibility with the console and joystick

The console is designed to help perform observation more quickly and easily. Equipped with a joystick that controls the stage and shortcut buttons for frequently used functions, the VHX-2000 achieves clear observation of any target with just a push of a button. It is possible to adjust the stage and perform observation just by manipulating the joystick.

Optimal Image function

By simply pushing the Optimize button, nine different lighting scenarios are displayed. From there, you can quickly select the image that is ideal for observing your target. Since the images are automatically generated, users can repeatedly produce the same image conditions.



Light Shift function

Simply pushing the Light Shift button on the console instantly changes the illumination mode. The lighting can be switched from full illumination, to partial illumination that enhances the projections and depressions of the target.

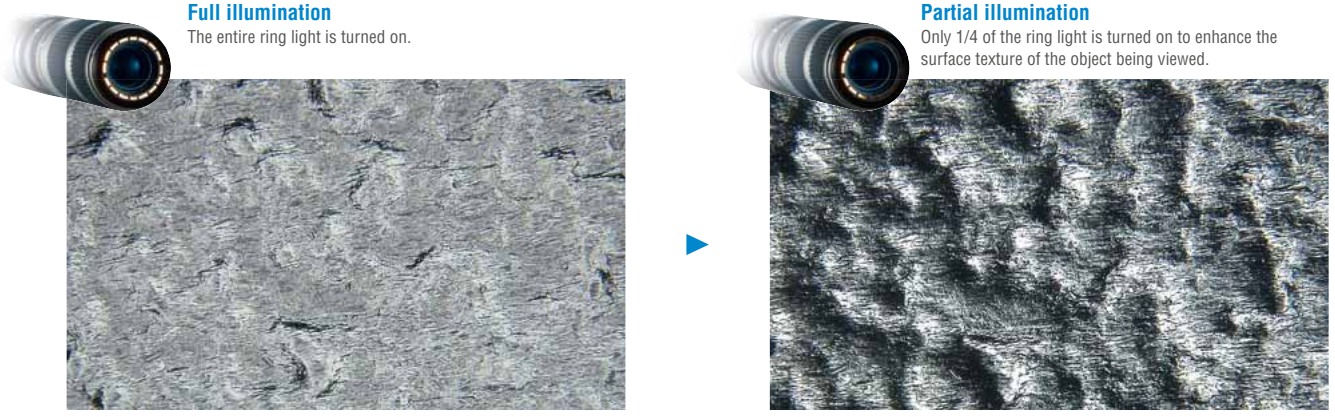
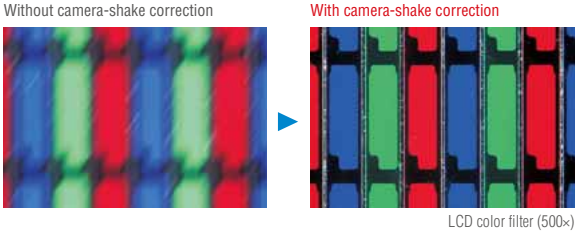


Image Stabilization function

Through advanced image processing, the VHX-2000 is able to correct for position misalignments in an image at the sub-pixel level. This function makes it possible to perform high-magnification observation without being affected by environmental vibration.



ALL-IN-ONE DESIGN

All functions for Observation, Recording and Measurement have been integrated into a single unit

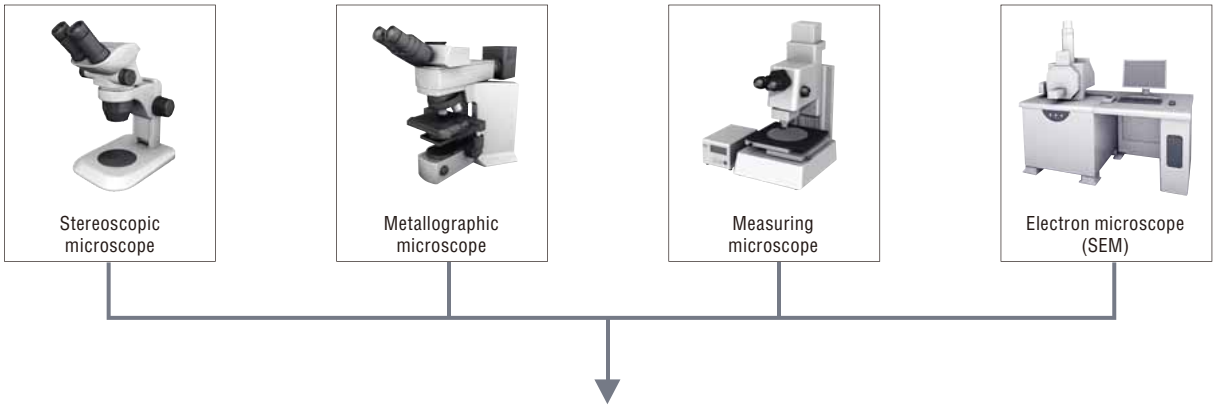
The VHX Digital Microscopes are stand-alone units, requiring less laboratory or tabletop space as compared to compound light microscopes and can even be used in the field as a portable system. Users also have the option of operating the microscope as a handheld or stand-mounted system, making it one of the most versatile microscopes on the market.

Just direct the lens toward the target.

Observation is possible anytime, anywhere.

Wide magnification range from 0.1× to 5000×

The VHX-2000 enables a wide range of observation from macro-scale stereoscopic imaging to the detailed analysis of an SEM. Many techniques are also supported including transmitted light observation, polarized light observation and differential interference observation.



RZ Lenses covering 0.1× to 5000× support every application.

Simultaneous observation by a large number of people

Magnified images are projected onto a large, high-resolution monitor, enabling several people to observe and discuss the images simultaneously on-site. Having many people to perform observation and analysis for urgent situations makes it possible to conduct a speedy response.

EXCEEDING THE RESOLUTION CAPABILITIES OF AN OPTICAL MICROSCOPE

World's First

Super Resolution Imaging

SUPER RESOLUTION

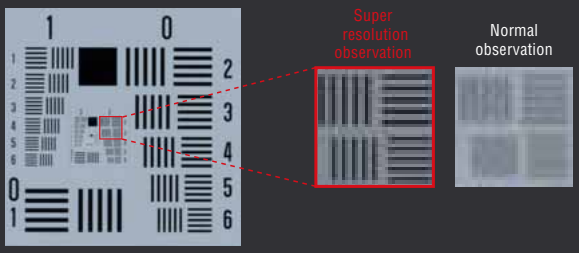
Increases the image resolution by changing the wavelength of light

Flexible PC board surface (400×)

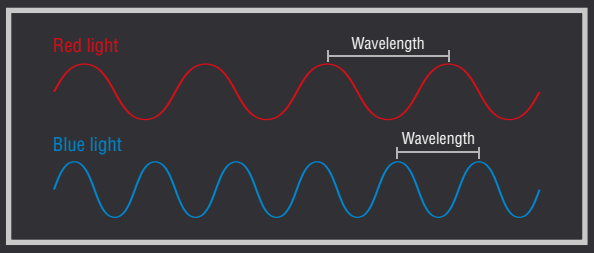
Combining a blue filter with pixel shift technology increases the resolution by 25%

Pixel shift technology

By using a blue-filter, it is possible to perform observation that maximizes the capabilities of an optical lens. Utilizing short-wavelength blue light, the VHX-2000 is capable of capturing super resolution images that are impossible to view with white light. This has been made possible by KEYENCE's original pixel shift technology.



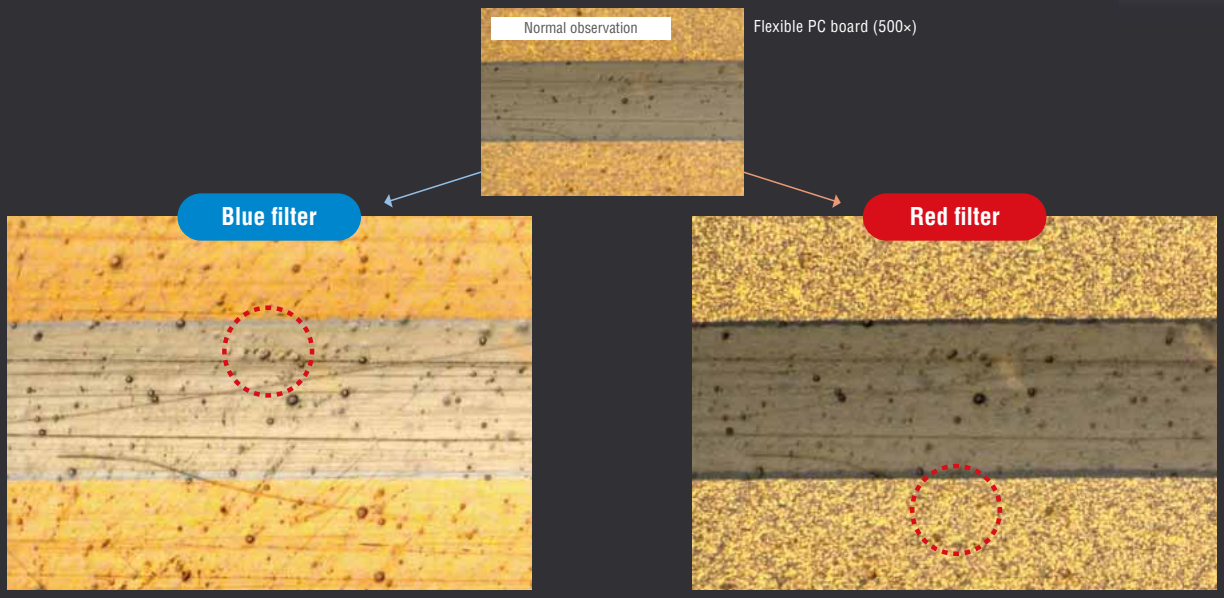
Chart



*The wavelength of the blue light is half the length of the wavelength for the red light

Optimized filter switching based on a target's surface

Based on the object being viewed, different wavelengths of light will bring out different features. With blue light, the short wavelength will provide detailed surface information. The long wavelength of the red filter will penetrate the surface coating and generate an image of layers below the top surface.



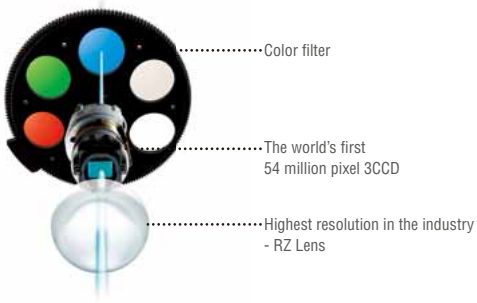
The surface condition of the film is easy to observe

Electrodes under the film are easy to observe

What is super resolution observation?

This new method of high-resolution imaging involves illuminating an object with short-wavelength blue light and capturing the image with KEYENCE's original pixel shift method. This is made possible by designing the camera, zoom lens, and graphics engine to work together.

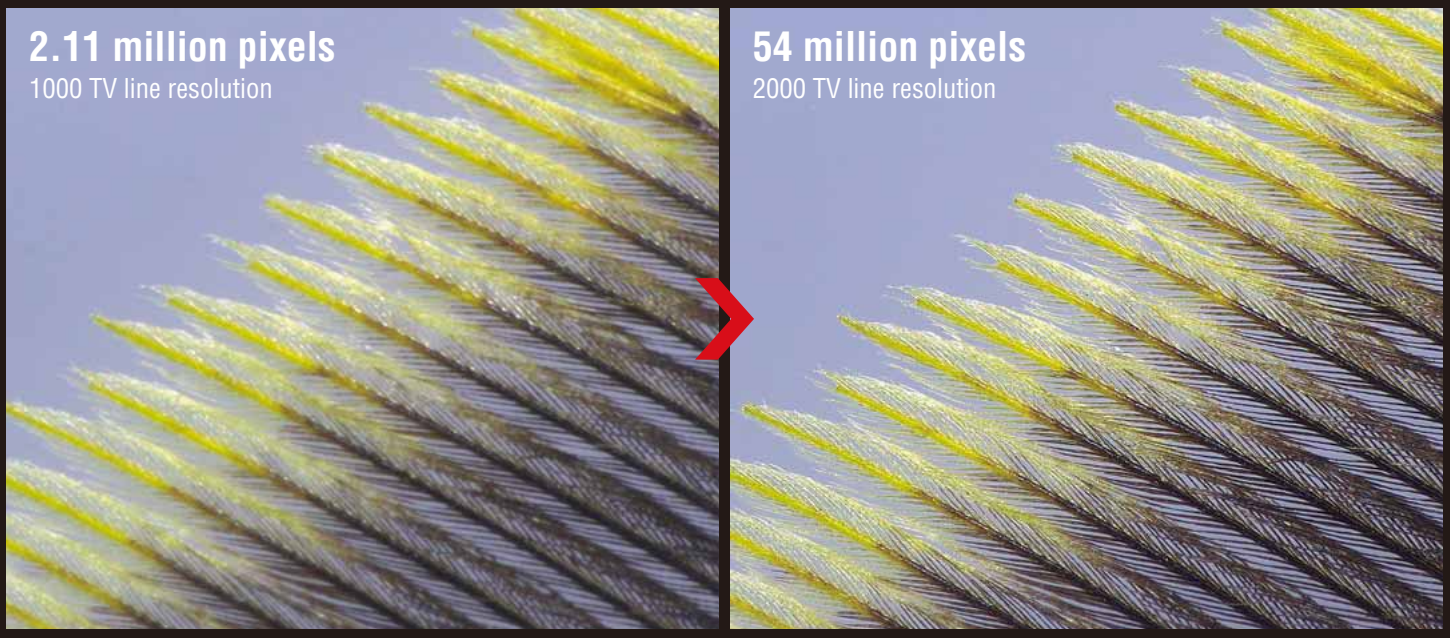
SUPER RESOLUTION



HIGH-DEFINITION IMAGING

World's First

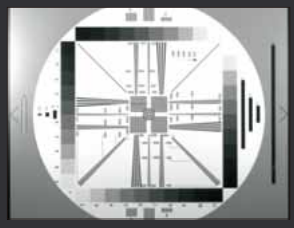
54 Million Pixel 3CCD Camera



Bird feather (100×)

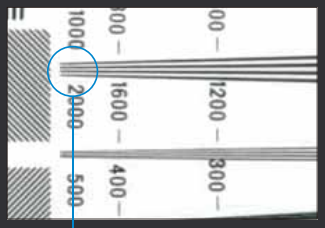
Equipped with the world's smallest drive mechanism, the VHX Series achieves the best resolution by capturing up to a 54 megapixel image through the pixel-shift method. The drive mechanism is able to shift the CCD in sub-pixel units and record images that have two times the resolution of conventional images.

*The 18 million pixels x 3CCD mode achieves both excellent color reproduction and high resolution images.



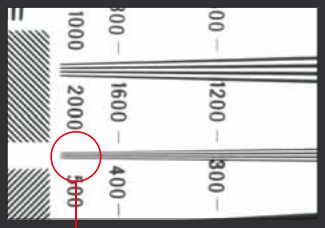
Resolution chart

2.11 million pixels



1000 TV line resolution

54 million pixels



2000 TV line resolution

Pixel shift method

This records a total of 9 images while physically moving the CCD both vertically and horizontally by 1/3 of a pixel. Furthermore, it obtains RGB data for each pixel, thus allowing for clear observation that excels in color reproduction. This technology is essential when performing super resolution observation.

High-speed processing graphics engine

With the ultra high-speed graphics engine, a vast amount of image capture information (texture/color information) is instantly calculated to construct high resolution images. With pixel shift technology, high-speed image processing is performed easily, even in situations when focus control is performed with super resolution/54 million pixel observation or when processing 16-bit observation data.

OPTIMIZING THE CONTRAST OF THE TARGET

High Dynamic Range [HDR] Function

ONE PUSH

Conventional [8 bit] HDR [16 bit] Printed material (400×)

HDR High Dynamic Range

The camera captures multiple color images at different brightness levels by varying the shutter speed, and then produces an image with high level gradation data. The range of obtainable brightness widens, resulting in the accurate representation of targets with glare as well as rendering detailed images of areas with low color gradation.

DISADVANTAGES

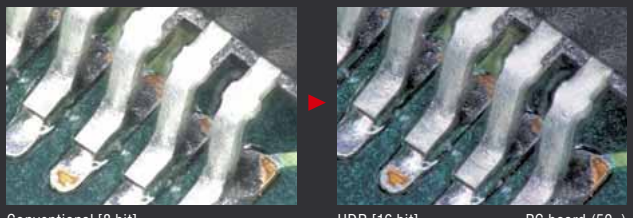
- The narrow range of brightness levels causes glare in areas that are oversaturated.
- Subtle changes in contrast cannot be rendered because of coarse resolutions.

ADVANTAGES

- A wider range of brightness levels diminishes the perceived glare.
- Enhances low contrast areas for improved detail.

Improves the image quality for a variety of targets

REMOVES GLARE



Conventional [8 bit] HDR [16 bit] PC board (50×)

OPTIMIZES CONTRAST

Conventional [8 bit] HDR [16 bit] Printing paper (100×)

ADVANCED AUTOMATIC MEASUREMENT FUNCTIONS

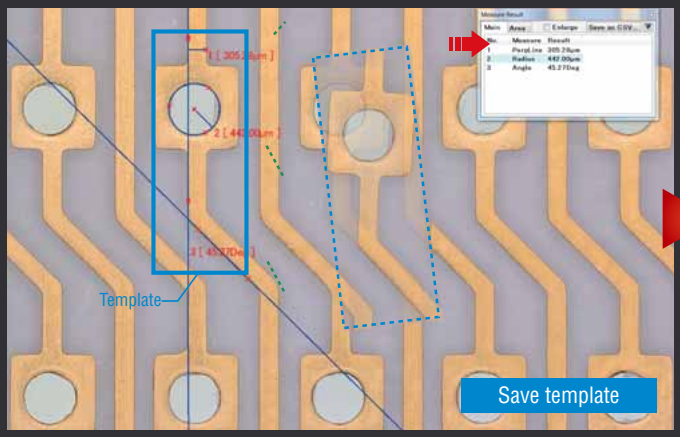
Industry's first

One-Click Auto-Measurement

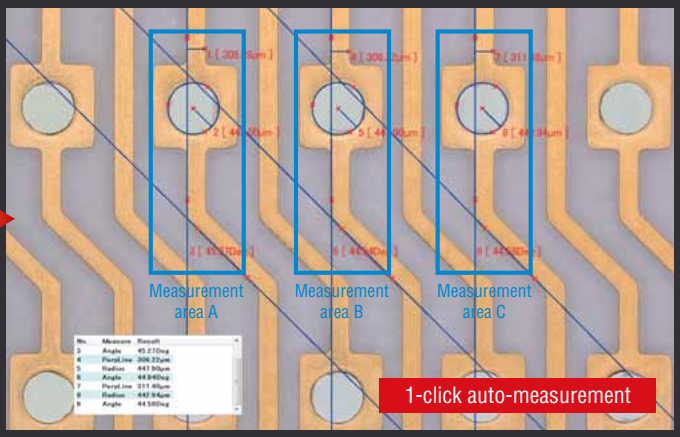
Automatic edge extraction

Save measurement templates

Until now, it was necessary to complete all measurements independently with the mouse. With the VHX-2000, multiple measurements are saved to a template (template data) and pattern matching technology is used to match the template to enable automatic batch measurement. Also, with the automatic edge extraction function, there is minimal variation in measurements from user to user. When performing the same measurement either multiple times on a single sample or a single measurement on multiple samples, it is possible to significantly reduce the time that is spent measuring.

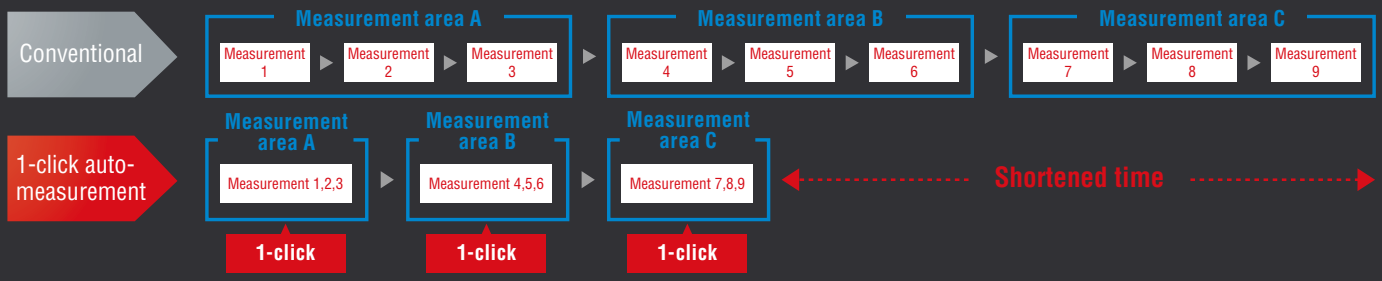


The appearance of the template searching for the recognition targets



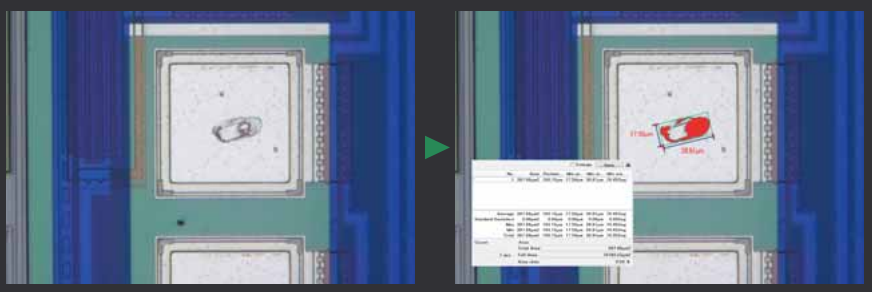
The appearance of auto-measurement

With template saving and automatic edge extraction



Maximum area measurement

Instantly measures the largest target area within a user-specified field by simply selecting the area with the mouse. Measurements can be performed with ease even when measuring complicated shapes.



Probe dent (1000×)

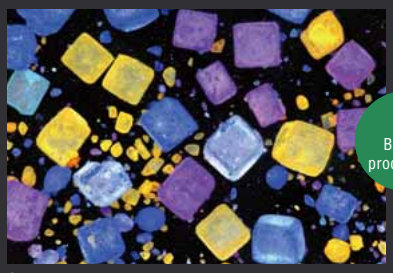
Extraction condition reproduction function

The system automatically saves the conditions that were used when performing extraction. When analyzing different targets, it is possible to implement extraction with the same conditions. Previously defined analysis can be saved and used again for future samples.

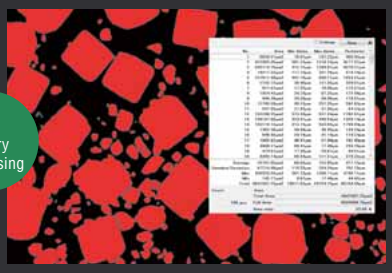
Automatic area measurement/count

Area Measurement | Binary conversion | Grain (colony) count

Easily perform area measurements or use the count tool for targets in a specified range. It is also possible to remove unnecessary items and separate overlapping items. Anyone can operate automatic measurement, making it possible to perform analysis with high accuracy.



Crystal (100×)

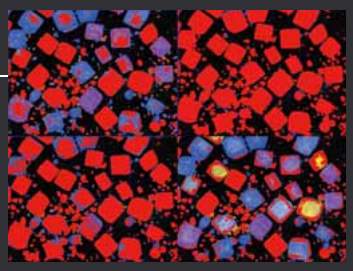


Measurement result list

Measurement result (histogram)

Binary conversion preview

Displays a preview with 4 types of binary conversion algorithms, making it possible to easily operate and make adjustments to reach the optimal binary converted image. Even when there is a captured image with uneven brightness, with the automatic shading correction function, it is possible to perform binary processing.



Industry's first

One push calibration

ONE PUSH

Conventionally, it was necessary to place the calibration scale in the correct position to then obtain proper focusing for calibration. With the VHX-2000, anyone can easily perform proper calibration with XYZ motorized control.

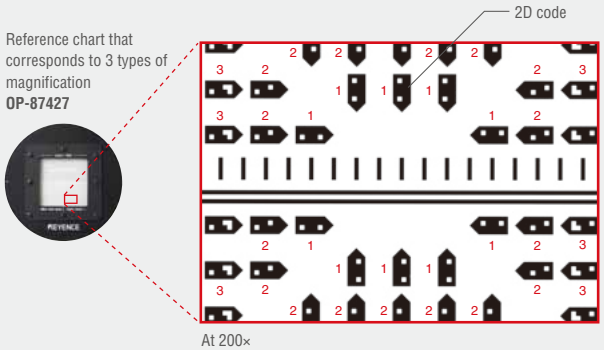
Focus adjustment & position alignment are unnecessary

Automatic calibration is possible just by settling the scale and pressing a button. Unlike conventional methods, there is absolutely no need to find the field-of-view and adjust the focus. With the DOUBLE'R function, calibration for each lens and each magnification can be performed with ease.

Auto-focus adjustment & auto-position alignment

Reading 2D codes

2D codes are embedded in a unique KEYENCE scale that when read, automatically move the XY stage to the correct location based on the magnification of the lens being used. Since the code is automatically detected by the system, there are no calibration errors, making this an essential function for accurate measurements.



KEYENCE OPTICAL LENSES

Continually Evolving

We make it our priority to continuously ask ourselves: “What can we do to provide the highest resolution images?” and “What features will ensure the best operability?” KEYENCE has invested many years in technology that deals with the design of light in "nano" areas. We aim to use all of the best and newest technologies in the development of our digital microscope lenses.

RZ LENS Real Zoom Lens — RZ Lenses – Highest Resolution in the Industry

High-Performance Low-Range Zoom Lens
VH-Z00R/Z00W

0 ▸ 50

Macro zoom lens

With a range from 0.1x - 50x magnification, 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/Z00W						
Magnification [1.]		0.1×	0.5×	1×	5×	10×	30×	50×
Field-of-view (mm inch)	Horizontal	3200 126"	640 25.2"	320 12.6"	61 2.40"	30.5 1.20"	10.2 0.40"	6.1 0.24"
	Vertical	2400 94.49"	480 18.9"	240 9.45"	45.5 1.79"	22.8 0.80"	7.6 0.30"	4.6 0.18"
	Diagonal	4000 157.5"	800 31.5"	400 15.75"	76.2 3"	38.1 1.5"	12.7 0.5"	7.6 0.30"
Working distance (mm inch)		Approx. 7700 303.1"	Approx. 1500 59.08"	Approx. 720 28.35"	95 3.74"			

1. Magnification on a 15-inch monitor

Ultra-Small, High-Performance Zoom Lens
VH-Z20R/Z20W

20 ▸ 200

Versatile lens provides high-resolution imaging with large depth-of-field

The VH-Z20R/Z20W offers high-resolution observation at general purpose magnifications of 20x - 200x. This lens has been designed to optimize both depth-of-field and resolution and can be used in handheld mode.

Model		VH-Z20R/Z20W					
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 0.08"	1.52 0.06"
	Vertical	11.40 0.45"	7.60 0.30"	4.56 0.18"	2.28 0.09"	1.52 0.06"	1.14 0.04"
	Diagonal	19.05 0.75"	12.70 0.50"	7.62 0.30"	3.81 0.15"	2.54 0.10"	1.91 0.08"
Depth-of-field [2.] (mm inch)		34 1.34"	15.5 0.61"	6.0 0.24"	1.6 0.06"	0.74 0.03"	0.44 0.02"
Working distance (mm inch)		25.5 1"					

1. Magnification on a 15-inch monitor
2. The value when the lens is set with priority to depth-of-field. The depth-of-field changes depending on the setting of the aperture ring.

The DOUBLE'R compliant VH-Z00W/Z20W lenses are fitted with Automatic Lens/Zoom Recognition units.

Wide-Range Zoom Lens
VH-Z100R/Z100W

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. Provides both ring light and bright field illumination.

Model		VH-Z100R/Z100W					
Magnification [1]		100×	200×	300×	500×	700×	1000×
Field-of-view (mm inch)	Horizontal	3.05 0.12"	1.53 0.06"	1.02 0.04"	0.61 0.02"	0.44 0.02"	0.30 0.01"
	Vertical	2.28 0.09"	1.14 0.04"	0.76 0.03"	0.46 0.02"	0.33 0.01"	0.23 0.01"
	Diagonal	3.81 0.15"	1.90 0.07"	1.27 0.05"	0.76 0.03"	0.54 0.02"	0.38 0.01"
Working distance (mm inch)		25 (20 [2]) 0.98" (0.79 [2])					

1. Magnification on a 15-inch monitor
2. When Triple Illumination Base Unit (OP-87270) and the Adjustable Illumination Adapter (OP-72402) are attached.

Dual Light High-Magnification Zoom Lens
VH-Z250R/Z250W NEW

250 ▸ 2500

Observe with both bright field and dark field at high-magnification

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

Bright-field

Dark-field

Model		VH-Z250R/Z250W						
Magnification [1]		250×	300×	500×	1000×	1500×	2000×	2500×
Field-of-view (mm inch)	Horizontal	1.22 0.05"	1.02 0.04"	0.61 0.02"	0.31 0.01"	0.2 0.01"	0.15 0.005"	0.12 0.004"
	Vertical	0.92 0.04"	0.76 0.03"	0.46 0.02"	0.23 0.01"	0.15 0.005"	0.11 0.004"	0.09 0.003"
	Diagonal	1.52 0.06"	1.27 0.05"	0.76 0.03"	0.38 0.01"	0.25 0.009"	0.19 0.007"	0.15 0.005"
Working distance (mm inch)		6.5 0.26"						

1. Magnification on a 15-inch monitor

High-Resolution Zoom Lens
VH-Z500R/Z500W

500 ▸ 5000

Our highest magnification/ resolution zoom lens

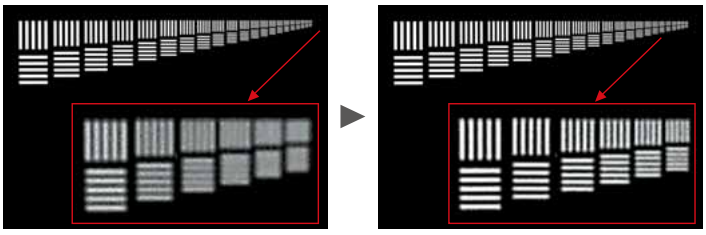
This zoom lens incorporates high-quality fluorite optics to provide the highest resolution in its class. With an N.A. of 0.82, achieve up to 5000x magnification with a 4.4 mm (0.17") working distance.

Model		VH-Z500R/Z500W				
Magnification [1]		500×	1000×	2000×	3000×	5000×
Field-of-view (μm Mil)	Horizontal	610 24.02	305 12.01	152 5.98	102 4.02	61 2.4
	Vertical	457 17.99	229 9.02	114 4.49	76 2.99	46 1.81
	Diagonal	762 30	381 15	191 7.52	127 5	76 2.99
Working distance (mm inch)		4.4 0.17"				

1. Magnification on a 15-inch monitor

Highest resolution in the industry approx. 2× conventional lenses

These lenses have achieved the highest resolution in their class by bringing together the know-how acquired during long-term microscope development and KEYENCE's optical technology. They complement the abilities of the microscope, which provides higher-quality CCD images.



Conventional lens

RZ lens

The DOUBLE'R compliant VH-Z100W/Z250W/Z500W lenses are fitted with Automatic Lens/Zoom Recognition units.

RZ LENS Real Zoom Lens — A single lens that can perform a variety of observations

Universal zoom lens
VH-Z20UR/Z20UW

NEW 20 ▸ 200

Optimal lighting with the touch of a button

This newly-designed lens has the ability to perform bright/dark field and DIC observation, even at lower magnification ranges. A unique illumination system allows users to switch between three different types of lighting by simply pressing a button.

- Bright-field
- Dark-field
- Partial
- Differential interference contrast

Model		VH-Z20UR/Z20UW					
Magnification [1]		20×	40×	80×	100×	160×	200×
Field-of-view (mm inch)	Horizontal	15.24 0.60"	7.62 0.30"	3.81 0.15"	3.05 0.12"	1.91 0.08"	1.52 0.06"
	Vertical	11.40 0.45"	5.70 0.22"	2.85 0.11"	2.28 0.09"	1.43 0.06"	1.14 0.04"
	Diagonal	19.05 0.75"	9.53 0.38"	4.76 0.19"	3.81 0.15"	2.38 0.09"	1.91 0.08"
Working distance (mm inch)		20.8 0.82" [2]					

1. Magnification with a 1/2 inch CCD camera on a 15-inch monitor.
2. With the wide-area illumination attachment equipped.

Universal Zoom Lens
VH-Z100UR/Z100UW

100 ▸ 1000

Differential Interference Contrast (DIC) lens

Bright/dark field, polarization, transmission and DIC observation can be performed with this lens. DIC observation makes it possible to clearly visualize surface topography of low-contrast and transparent objects - typically difficult with conventional bright field lighting.

- Bright-field
- Dark-field
- Polarization
- Differential interference contrast

Model		VH-Z100UR/Z100UW					
Magnification [1]		100×	200×	300×	500×	700×	1000×
Field-of-view (mm inch)	Horizontal	3.05 0.12"	1.53 0.06"	1.02 0.04"	0.61 0.02"	0.44 0.02"	0.30 0.01"
	Vertical	2.28 0.09"	1.14 0.04"	0.76 0.03"	0.46 0.02"	0.33 0.01"	0.23 0.01"
	Diagonal	3.81 0.15"	1.90 0.07"	1.27 0.05"	0.76 0.03"	0.54 0.02"	0.38 0.01"
Working distance (mm inch)		25 (20 [2]) 0.98" (0.79 [2])					

1. Magnification on a 15-inch monitor
2. When the Triple Illumination Base Unit (OP-87270) and the Adjustable Illumination Adapter (OP-72402) are attached.

Change illumination with a single button

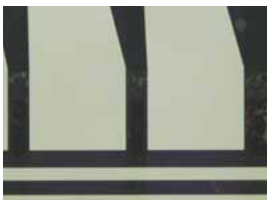
Easily switch the type of lighting being used by simply pushing a button - eliminating the need for complex lighting adjustments.

Coin (60x) Dark-field

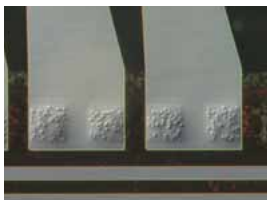
Bright-field

Observe sub-micron height changes

A special optical design (adopting the differential interference filter) allows for observation of minute height differences, which are generally impossible to see with conventional optical microscopes. This also allows for inspection over a wide area at low magnification.



Surface of ACF Bright-field



Differential interference

The DOUBLE'R compliant VH-Z20UW/Z100UW lenses are fitted with Automatic Lens/Zoom Recognition units.

LW LENS
Long Working Lens

Capture clear images from a distance

Long-Focal-Distance, High-Performance Zoom Lens
VH-Z50L/Z50W

50 ▶ 500

Long Range Lens with a 85 mm (3.35") Working Distance

Enables high-magnification observation while maintaining a long working distance. This lens is ideal for viewing objects that have highly-irregular surfaces or recesses that cannot be observed up close.

Model		VH-Z50L/Z50W					
Magnification [1]		50×	100×	200×	300×	400×	500×
Field-of-view (mm inch)	Horizontal	6.09 0.24"	3.05 0.12"	1.53 0.06"	1.02 0.04"	0.76 0.03"	0.61 0.02"
	Vertical	4.57 0.18"	2.28 0.09"	1.14 0.04"	0.76 0.03"	0.57 0.02"	0.46 0.02"
	Diagonal	7.62 0.30"	3.81 0.15"	1.90 0.07"	1.27 0.05"	0.95 0.04"	0.76 0.03"
Working distance (mm inch)		85.0 3.35"					

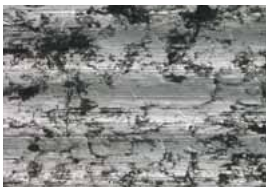
1. Magnification on a 15-inch monitor

The DOUBLE'R compliant VH-Z50W lens is fitted with an Automatic Lens/Zoom Recognition unit.

Long distance lens - 85 mm 3.35" working distance

With its cutting-edge optical design and advanced illumination technology, the LW lens achieves a maximum magnification of up to 500x and a working distance of 85 mm 3.35". The LW lens can capture deep recesses in the target clearly and offers ample working space for dramatically improved observation efficiency.

Easy observation of deep, recessed areas of the target



Aluminum surface (500×)

A rich variety of optical adapters

Supported lenses:VH-Z20R/Z20W/Z25/Z20UR/Z20UW/Z100R/Z100W/Z100UR/Z100UW

Variable illumination adapter

VH-K20

Using an original KEYENCE optical mechanism, it is possible to cover a range of illumination from vertical illumination to lateral illumination, without experiencing uneven illumination. With this adapter, the best illumination is achieved for a variety of targets.

Paper surface (200×)

Standard illumination

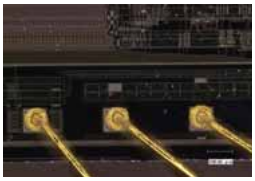
Variable illumination

Coaxial vertical illumination adapter

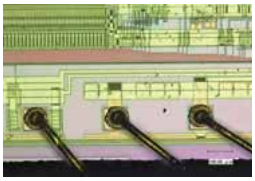
OP-35416

This adapter uses three lenses in two groups and an advanced mirror with a multi-coated prism. Using this adapter, the microscope can maintain sufficient light quantity without causing brightness deficiencies to occur. This adapter is useful for observation of metal structures, ICs, etc. in a bright visual field.

Wire bonding (300×)



When the adapter is not used (Dark field illumination)



When the adapter is used (bright-field)

Polarization illumination adapter

OP-87429

Effective for suppressing glare when observing through a transparent film or coating.

Light bulb (50×)

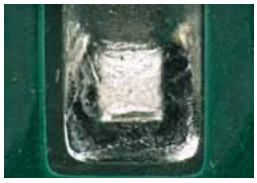
Standard illumination

Polarized illumination

Diffuse illumination

You can observe real surface conditions without the glare of a target.

Solder (200×)



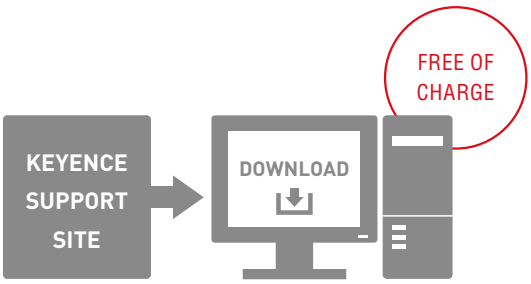
Standard illumination

Diffuse illumination

ALLOWS FOR OBSERVATION AND MEASUREMENT FROM A PC

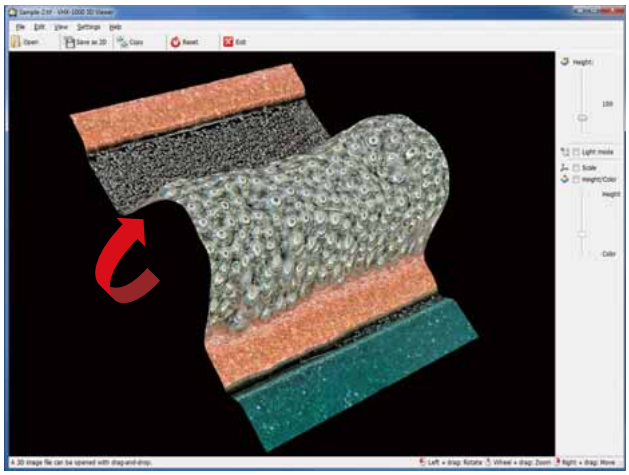
VHX-2000 Communication software

Allows you to display and edit all captured images on your PC. This means that analysis does not need to be completed on the microscope, freeing up the microscope for additional imaging.



2D, 3D image playback, editing

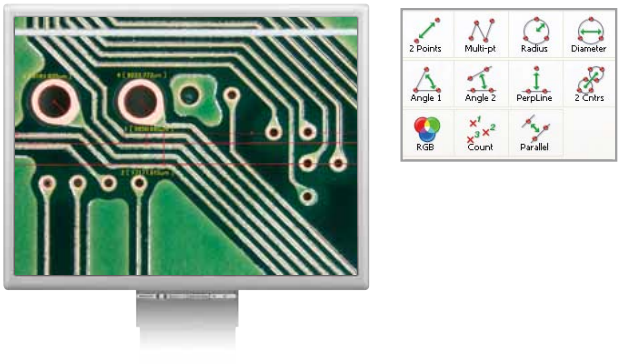
Captured 2D images can naturally be displayed in 3D. It is also possible to adjust the angle of a 3D image and then save the image.



Solder paste (300×)

2D measurement

It is possible to perform 2D measurement on captured images. This can also be used for a live demonstration of measurement in front of the customer at their location or when giving a presentation at a meeting.



The main functions of the digital microscope can be performed on your PC.

HDR image playback, editing

It is possible to store vast amounts of information that have exceeded the display limits for the monitor and display them on a PC. Individual items such as brightness, color, and texture (pattern) can be adjusted and then rendered in the way that the user would like to view their samples.

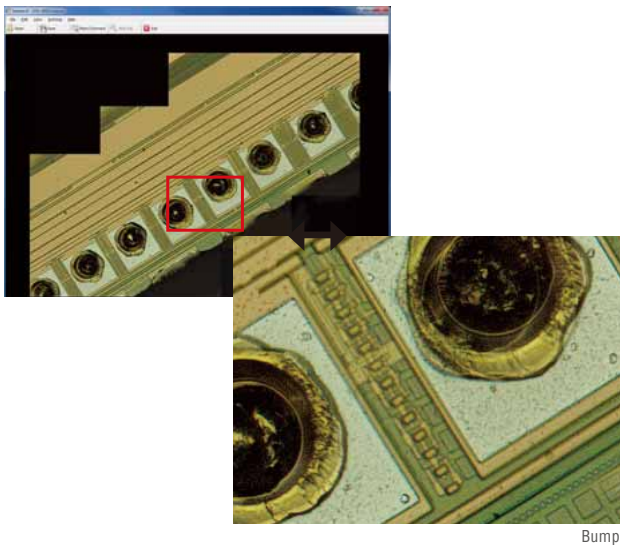
Printed material (400×)

Can perform observation according to application

Adjust contrast	Enhance texture (pattern)	Adjust hue

Stitched image view

Stitched wide-field images can be browsed with high-speed, making it possible to perform 2D measurement on stitched images in addition to zooming in and out.



Bump

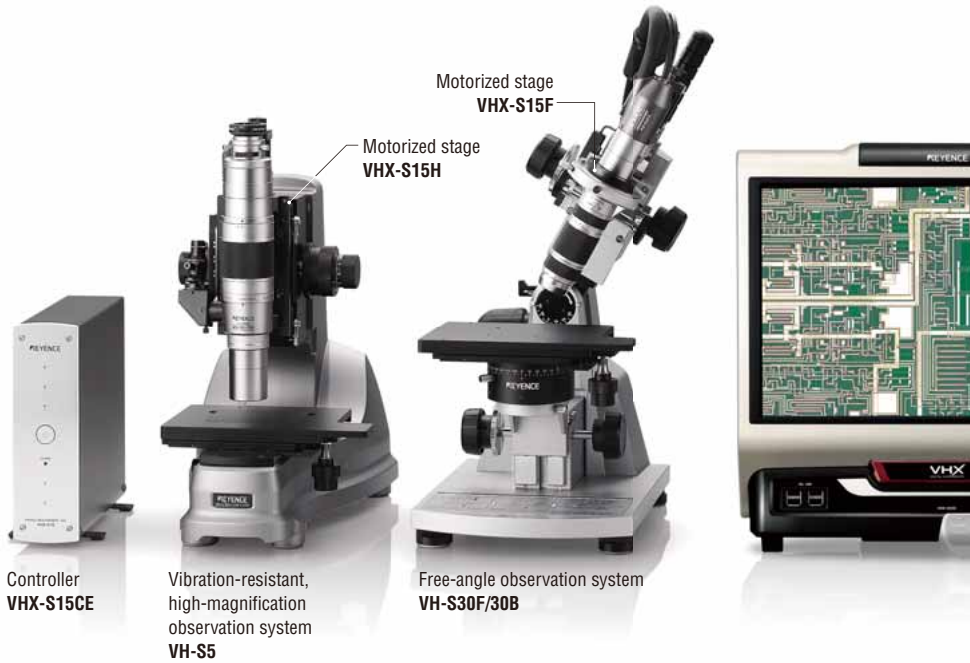
All-in-one 3D profile measurement system including a precision motorized stage for 3D measurement

The precision linear stage and newly-developed 3D measurement functions allow integrated operation of the VHX microscope. All of the steps from stage operation, magnified observation, 3D analysis to image saving can be controlled with the VHX unit. This integration significantly reduces image capture and analysis time.

Specifications

Model		VHX-S15CE/H (VHX-S15F) [2.]
Stage stroke distance		15 mm 0.59"
Motor		5-phase stepping motor
Resolution		0.05 µm 0.002 mil/pulse
Positioning accuracy [1.]		6 µm 0.23 mil
Repeatability [1.]		±0.5 µm ±0.02 mil
Ratings	Power supply voltage	100 to 240 VAC, 50/60 Hz
	Power consumption	70 VA
Ambient temperature		5 to 40°C 41 to 104°F
Relative humidity		35 to 80%, No condensation
Weight		VHX-S15CE (Controller): 3 kg, VHX-S15H (Electric stage): 1.3 kg, VHX-S15F (Electric stage): 3.2 kg
Load capacity		5 kg

1. Positioning accuracy and repeatability specifications apply to the motorized stage
2. The motorized stage for the VH-S30 is the VHX-S15F.



STANDARD MODEL VHX-500FE

All-in-one design allows **OBSERVATION, RECORDING AND MEASUREMENT**

The VHX-500FE allows users to leverage the main functions of the VHX Series such as the depth composition and 3D display, while offering the same image quality and measurement capabilities. This is a standard model of the VHX Series with a superb cost performance.

2.11 million pixel handheld camera

With 2.11 million pixels, this compact camera enables you to make crisp and clear observations easily, without having to perform destructive testing.

Depth composition

By simply turning the focus adjusting dial, you can bring the entire image into sharp focus, even for targets with highly uneven surfaces.

3D image display

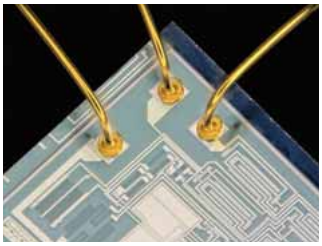
With our proprietary Accurate D.F.D. algorithm, you can construct 3D images, enabling you to readily understand phenomena that are difficult to grasp in two-dimensional images.

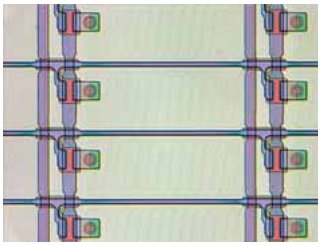
ABLE TO SUPPORT A WIDE-VARIETY OF APPLICATIONS

DIGITAL MICROSCOPE APPLICATIONS

Semiconductor Industry


Color filter (1000×)

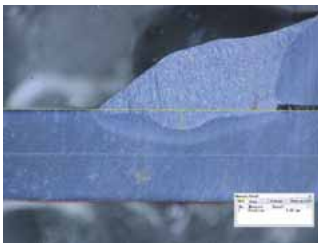

Wire bonding (300×)


ITO film (1000×)

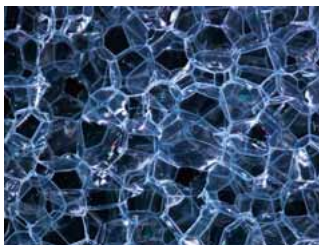
Metal Industry

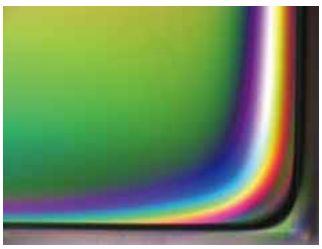

Metal structure (400×)

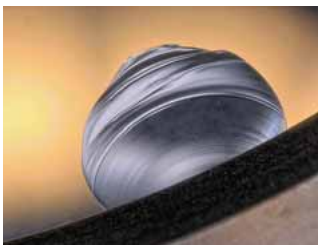

Metal fracture surface (200×)


Weld penetration (5×)

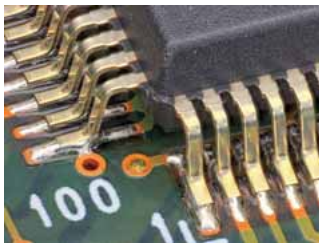
Raw Materials & Chemicals Industry


Heat insulating materials (100×)

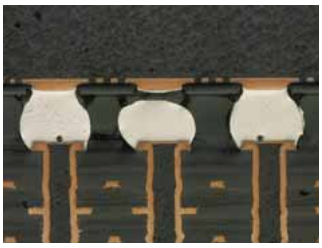

Residual stress (700×)


Glass bead (50×)

Electronics Industry



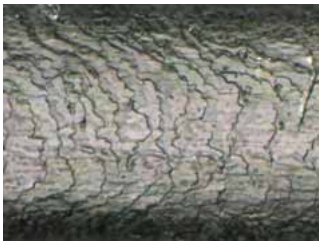
Electronic PC board (50×)

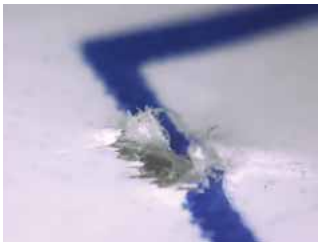

Solder ball cross-section (200×)


Solar cell (800×)

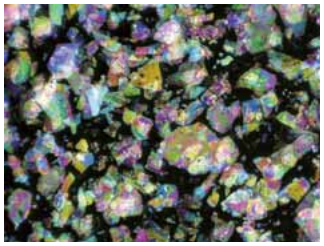
Pharmaceutical & Food Products Industry


Crystal (150×)

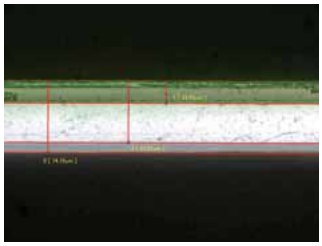

Hair (3000×)


A tear in wrapped packaging (100×)

Other Industries



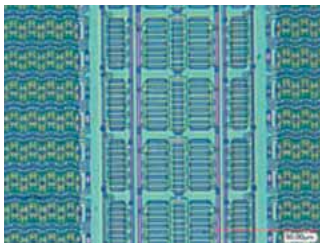
Mica (500×)



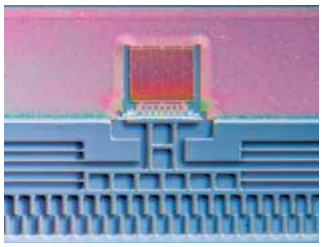
Cross-section of multi-layered film (1000×)

Human skin (50×)

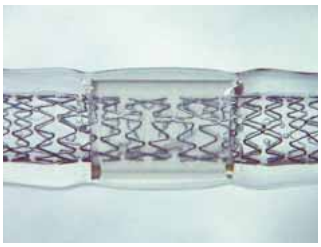
Universities



LSI (2000×)



MEMS red pitch variable guided-mode resonant grating (1000×)

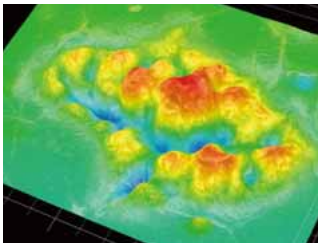


Stent (100×)

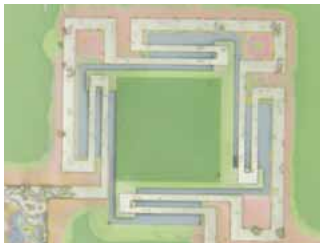
Cutting-Edge Functions/ Applications

Laser ablation (500×)

3D image

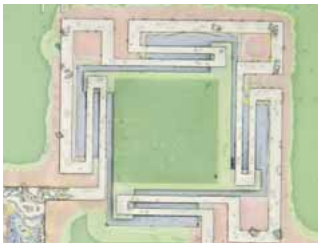


Height color image

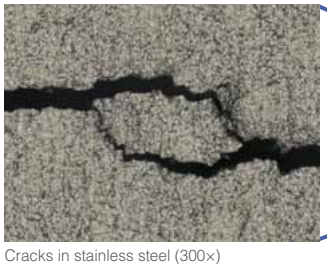


Photonic crystal filter (1000×)

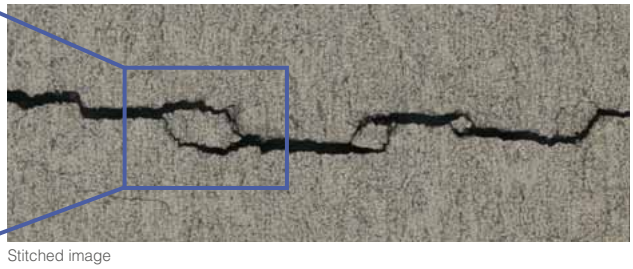
8-bit image



16-bit HDR image



Cracks in stainless steel (300×)



Stitched image

VHX SERIES SYSTEM LINEUP

Polarization illumination adapter
OP-51649

Contact adapter
OP-81880

Polarization illumination adapter
OP-72405 [4]
(OP-72407 is required for polarization)

OP-72407

Coaxial polarization adapter
OP-72406
(OP-72407 is required for polarization)

Dark-field illumination adapter
OP-72402

Adjustable illumination adapter
OP-72404

Wide area illumination adapter
OP-87298

Diffuse illumination adapter
OP-87299

Triple illumination base unit
OP-87270 [9]

Polarization observation set
OP-86927

Differential interference set
OP-86943

DIC prism and filter set
OP-87297

Adjustable illumination adapter
VH-K20

Super-diffuse illumination adapter
OP-42305

Polarized illumination adapter
OP-87429

Diffuse illumination adapter
OP-35324

Non-contact diffusion
OP-35414

Multi-diffuse adapter
OP-35469

Coaxial vertical illumination adapter
OP-35416

Adjustable illumination adapter
VH-K150

Free head contact adapter
OP-32348

Non-reflective illumination ring
OP-32009

RZ LENS [7]

High-resolution zoom lens
VH-Z500R/Z500W [1]
500x to 5000x

Dual-light High-magnification zoom lens
VH-Z250R/Z250W
250x to 2500x

Wide-range zoom lens
VH-Z100R/Z100W [1]
100x to 1000x

Universal Zoom Lens
VH-Z100UR/Z100UW [1]
100x to 1000x

Universal Zoom Lens
VH-Z20UR/Z20UW
20x to 200x

Ultra-small, high-performance zoom lens
VH-Z20R/Z20W
20x to 200x

High-performance low-range zoom lens
VH-Z00R/Z00W
0x to 50x

LW LENS [7]

Long-focal-distance, high-performance zoom lens
VH-Z50L/Z50W [1]
50x to 500x

ZOOM LENS

Zoom Lens
VH-Z25
25x to 175x

Long-focal-distance zoom lens
VH-Z35
35x to 245x

Middle-range zoom lens
VH-Z150
150x to 800x

LONG-FOCAL-DISTANCE LENS

VH-W50 (50x)

Lateral view adapter
OP-98535

VH-W100 (100x)

VH-W200 (200x)

FIXED-MAGNIFICATION LENS

VH-20 (20x)

VH-50 (50x)

VH-100 (100x)

VH-200 (200x)

BORESCOPE LENS [8]

VH-B100

VH-B55

VH-B18

VH-B40

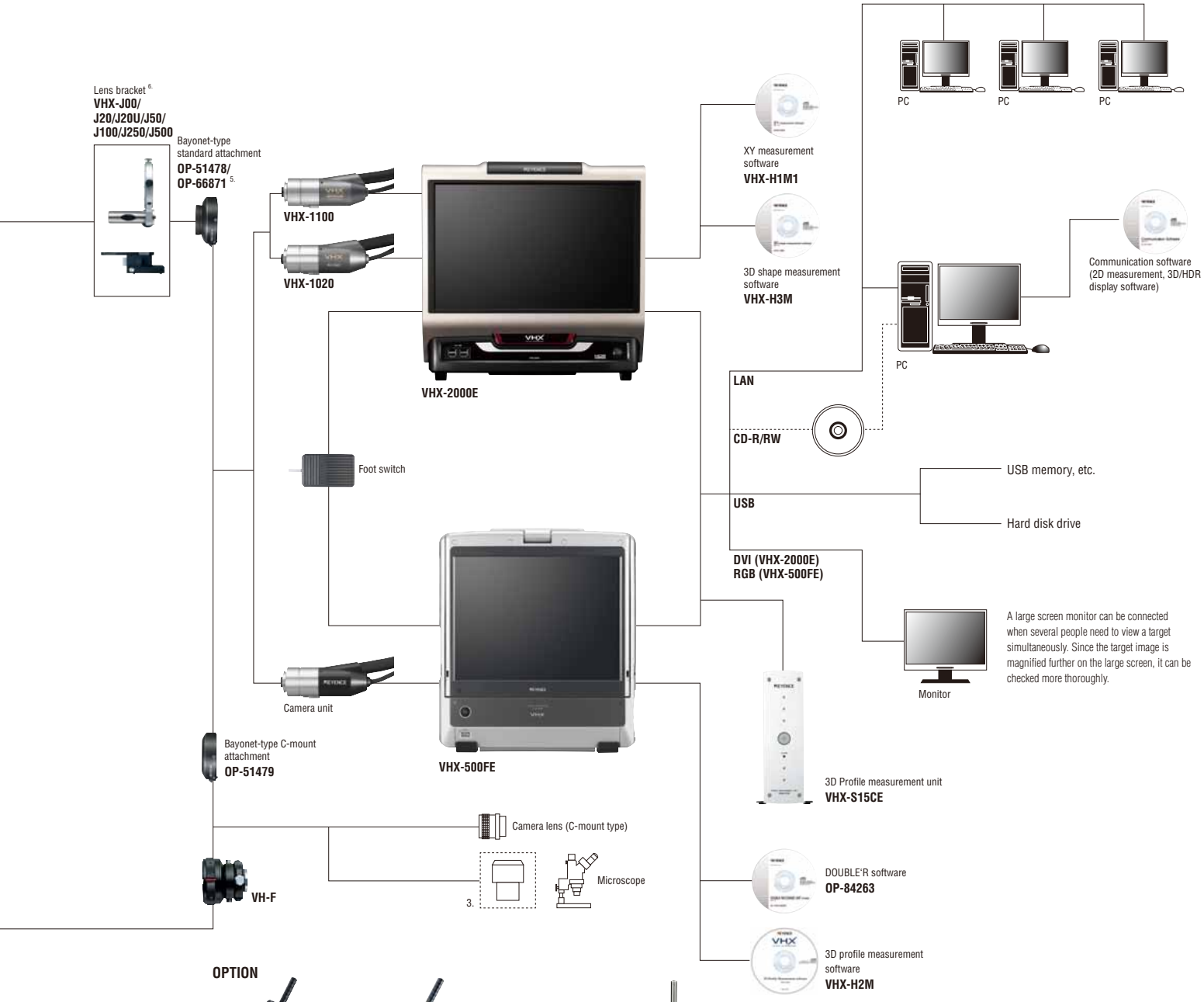
VH-B27

VH-BA

FIBERSCOPE [2]

VH-F61

VH-F111



OPTION

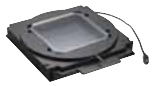
Free-angle observation system
VH-S30F/S30B

Free-angle observation
system (XYZ-axis automatic)
VHX-S90F/S90BE

High-precision
VH mounting stand
(with X-Y stage and
transmitted illumination)
VH-S5

VH lens mounting stand
(with XY stage)
OP-25539
OP-22124

X-Y measurement system
VH-M100E



Transmitted
illumination unit
OP-84484

Display unit
OP-84483

1. The optional light guide dedicated to the VHX Series is required. OP-51480: VH-Z100R/Z100UR/Z500R/Z50L
2. The optional light guide attachment (OP-51482) dedicated to the VHX Series is required.
3. A C-mount adapter suitable for the microscope is required.
4. OP-72407 and OP-72406 are required when using coaxial illumination.
5. OP-66871 is required when using the VH-Z00R(W), VH-Z20R(W) and VH-Z25.
6. OP-66871 is provided with the VHX-J00/VHX-J20.
7. DOUBLE'R compliant lenses VH-Z00W/Z20W/Z20UW/Z100W/Z100UW/Z250W/ Z500W/Z50W are fitted with Automatic Lens/Zoom Recognition units, respectively.
8. The optional bore fiber cable (OP-87201) is required.
9 . Included with the VH-Z20UR/Z20UW.

Controller

Model			VHX-2000E	VHX-500FE
Camera	Image receiving element		1/1.8-inch, 2.11 million-pixel CCD image sensor Total pixels: 1688 (H) × 1248 (V) Effective pixels: 1628 (H) × 1236 (V) Virtual pixels: 1600 (H) × 1200 (V)	1/1.8-inch, 2.11 million-pixel CCD image sensor Total pixels: 1688 (H) × 1248 (V) Effective pixels: 1628 (H) × 1236 (V) Virtual pixels: 1600 (H) × 1200 (V)
	Scan method		Progressive	Progressive
	Frame rate		15 frames/sec. and 28 frames/sec. selectable	15 frames/sec. and 28 frames/sec. selectable
	Resolution	2 million pixels	1600 (H) × 1200 (V) Approx. 1000 TV lines	1600 (H) × 1200 (V) Approx. 1000 TV lines
		6 million pixels [1, 3]	1600 (H) × 1200 (V) Approx. 1200 TV lines 2 million pixels × 3CCD mode (Excellent color reproducibility)	–
		8 million pixels [3]	3200 (H) × 2400 (V) Approx. 1600 TV lines	
		18 million pixels [3]	4800 (H) × 3600 (V) Approx. 2000 TV lines	
		54 million pixels [2, 3]	4800 (H) × 3600 (V) Approx. 2000 TV lines 18 million pixels x 3CCD mode (Excellent color reproducibility)	
	High Dynamic Range		16-bit resolution through RGB data from each pixel	–
	Gain		AUTO, NORMAL, PRESET	AUTO, NORMAL, PRESET
	Electronic shutter		AUTO, MANU, OFF, 1/15, 1/30, 1/60, 1/120, 1/250, 1/500, 1/1000, 1/2000, 1/5000, 1/9000, 1/19000	AUTO, MANU, OFF, 1/15, 1/30, 1/60, 1/120, 1/250, 1/500, 1/1000, 1/2000, 1/5000
	Supercharge shutter		0.2 sec. to 17 sec. Can be set in increments of 0.1 sec.	0.2 sec. to 17 sec. Can be set in increments of 0.1 sec.
	White balance		Auto, Manual, One-push set, Preset (2700K, 3200K, 5600K, 9000K)	Auto, Manual, One-push set, Preset (2700K, 3200K, 5600K, 9000K)
	Back-focus adjustment		Not required	Not required
LCD monitor [5]	Size		Color LCD (TFT) 17"	Color LCD (TFT) 15"
	Panel size		365.76 (H) × 228.6 (V) mm 14.40" (H) × 9.00" (V)	304.5 (H) × 228.4 (V) mm 11.99" (H) × 8.99" (V)
	Pixel pitch		0.1905 (H) × 0.1905 (V) mm 0.008" (H) × 0.008" (V)	0.1905 (H) × 0.1905 (V) mm 0.008" (H) × 0.008" (V)
	Number of pixels		1920 (H) × 1200 (V) (WUXGA)	1600 (H) × 1200 (V) (UXGA)
	Display color		Approx. 16,770,000 colors [6]	Approx. 16,770,000 colors [6]
	Brightness		270 cd/m^2 (typical)	200 cd/m^2 (typical)
	Contrast ratio		450 : 1 (typical)	500 : 1 (typical)
	Viewing angle		±80° (typical, horizontal), ±70° (typical, vertical)	±85° (typical, horizontal), ±85° (typical, vertical)
CD-R/CD-RW/DVD drive unit	Unit		DVD super-multi drive unit	CD-R/CD-RW drive unit
	Used disk		CD-R/CD-RW/DVD±R/DVD±R DL/DVD±RW/DVD-RAM	CD-R/CD-RW
	Storage capacity		4.7GB	700 MB, approx. 3500 images (When a 2 million-pixel image is compressed) to approx. 117 images (When a 2 million-pixel image is not compressed)
Hard disk drive unit	Storage capacity		500 GB (including 80 GB reservation area), approx. 2.1 million images (When a 2 million-pixel image is compressed) to approx. 70,000 images (When a 2 million-pixel image is not compressed)	80 GB, approx. 400,000 images (When a 2 million-pixel image is compressed) to approx. 13,334 images (When a 2 million-pixel image is not compressed)
Image format			JPEG/HD Photo (With compression), TIFF (No compression)	JPEG (With compression), TIFF (No compression)
Observable image size			20000 (H) pixels × 20000 (V) pixels (when stitched)	1600 (H) × 1200 (V) pixels
Light source	Lamp		12 V, 100 W, Halogen lamp	12 V, 100 W, Halogen lamp
	Lamp life		1000 hours (average)	1000 hours (average)
	Color temperature		3100 K (at maximum light intensity)	3100 K (at maximum light intensity)
Output	Video output		DVI (1920 × 1200 pixels)	Analog RGB (1600 × 1200 pixels)
	Scanning frequency	Special LCD monitor	75 kHz (H), 60 Hz (V)	75 kHz (H), 60 Hz (V)
		External monitor	75 kHz (H), 60 Hz (V)	75 kHz (H), 60 Hz (V)
Input	Mouse input		Supports USB mouse	MINI-DIN 6-pin connector (DOS/V-compatible PS/2 mouse)
	Keyboard input		Supports USB keyboards	MINI-DIN 6-pin connector (DOS/V PS/2)
	External remote input		Pause/ Recording, Non-voltage input (Contact/Noncontact)	Pause/ Recording, Non-voltage input (Contact/Noncontact)
Interface	LAN		RJ-45 (10BASE-T / 100BASE-TX / 1000BASE-T)	RJ-45 (10BASE-T / 100BASE-TX / 1000BASE-T)
	USB 2.0 Series A		8 types	4 types: Special printer port x 1, External storage connection port x 3
Power supply	Power-supply voltage		100 to 240 VAC, 50/60 Hz	100 to 240 VAC, 50/60 Hz
	Current consumption		340 VA	310 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%, No condensation	35 to 80%, No condensation
Weight	Controller		Approx. 11.6 kg	Approx. 12.5 kg
	Camera unit		Approx. 1.00 kg (VHX-1100), Approx. 0.90 kg (VHX-1020)	Approx. 0.88 kg
	Console		Approx. 0.40 kg	Approx. 0.25 kg
Dimensions (Excluding the projected areas)			420 × 416 × 181 mm 16.54" × 16.38" × 7.13" (when stored)	382 × 425 × 162 mm 15.04" × 16.73" × 6.38"

Stage

		Z stage		XY stage
Model		**VHX-S90F**	**VHX-S15F**	**VHX-S90BE**
Motor		2-phase stepping motor	5-phase stepping motor	2-phase stepping motor
Resolution		1 µm (typical) 0.04 mil	0.05 µm (typical) 0.02 mil	1 µm (typical) 0.04 mil
Z stroke distance		Electric: 29 mm 1.14", Manual: 33 mm 1.30"	Electric:15 mm 0.59"	–
XYθ stage size		–	–	Top surface 171 mm × 168 mm 6.73"× 6.61" (Center disc ø100 ø3.94")
XY automatic stage stroke distance		–	–	±20 mm ±0.79"
XY automatic stage movement speed		–	–	10 mm/sec (max)
θ rotation angle		–	–	±90°
Transmitted light-Compatible magnification		–	–	20× or more
Ratings	Power supply voltage	12 VDC 1.5A	100 to 240 VAC, 50/60 Hz	100 to 240 VAC, 50/60 Hz
	Current consumption	18 VA	70 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%, No condensation	35 to 80%, No condensation	35 to 80%, No condensation
Weight		2.2 kg	VHX-S15CE: 3 kg·VHX-S15F: 3.2 kg·VHX-S15H: 1.3 kg	14 kg (VHX-S90BE) 3 kg (XYθ stage only)
Load capacity		–	–	1 kg

SPECIFICATIONS (SOFTWARE/FUNCTIONS)

Model		VHX-2000E	Console compatible[8.]	VHX-500FE	Console compatible[8.]
Various controller functions	Super resolution image capture (RGB image capture)[3.]	Provided	✓	–	
	Ultra high-speed image stitching function(2D)[4.]	Provided	✓	–	
	Ultra high-speed image stitching function(3D)[4.]	Provided (VHX-S90F or VHX-S15 is required)	✓	–	
	HDR function	Provided	✓	–	
	Depth composition function	Real-time depth composition		Real-time depth composition	✓
		High-quality depth composition		High-quality depth composition	
	Accurate D.F.D. method 3D display function	Provided (Quick)	✓	Provided (Quick)	✓
	3D illumination simulation function	Provided		Provided	
	3D two-screen simultaneous comparison function	Provided (Combination/Comparison/ Difference display mode)		Provided (Combination/Comparison/Difference display mode)	
	Auto focus function	Provided (VHX-S90F and VHX-S15 are required)	✓	Provided (VHX-S15 is required)	
	Navigation function[4.]	Provided (VHX-90BE is required)	✓	–	
	Jog focus function	Provided (VHX-S90F and VHX-S15 are required)	✓	–	
	Quick HD image	Provided	✓	–	
	Real-time digital zoom	1.0× to 10.0× (100 steps)		1.0× to 10.0× (100 steps)	
	Lighting shift function (Height difference enhancement)	Provided (Full, Partial, and Flanking illumination modes)	✓	Provided (Full, Partial, and Flanking illumination modes)	✓
	e-Preview mode	Provided (Automatically lists of nine types of image modes, allowing selection of the optimal image)	✓	Provided (Automatically lists of four types of image modes, allowing selection of the optimal image)	✓
	Optimal contrast function	Provided		Provided	✓
	Glare removal function	Provided	✓	Provided	✓
	Vivid & sharp image mode	Provided		Provided	
	Supercharge shutter function	Provided	✓	Provided	✓
	Edge enhancement function	Provided (200 steps) for a moving image		Provided (200 steps) for a moving image	
	Gamma correcting function	Provided		Provided	
	Camera-shake correcting function	Provided (For a moving image)	✓	Provided (For a moving image)	✓
	Split function	Vertical split, Horizontal split, 4-part split		Vertical split, Horizontal split, 4-part split	
	Moving image recording/ reproducing function	28 frames/sec. (800 x 600), 15 frames/sec. (1600 x 1200)		–	
	Timer recording function	Provided		Provided	
	Side album function	Provided		–	
	Observation condition reproduction function	Provided		–	
	Sensitivity quick adjusting dial	Shutter speed and camera gain can be adjusted with one trimmer	✓	Shutter speed and camera gain can be adjusted with one trimmer	
Measuring function	DOUBLE'R function	Provided (Automatic Lens/Zoom Recognition function)		– (Extension is possible with OP-84263 option)	
	High-resolution dimensional measurement function	Provided		–	
	Distance, angle, radius, area, etc.	Various functions are provided		Various functions are provided	
	One-click auto-measurement	Provided		–	
	Automatic count/ measurement function	Provided (Enables distance/area measurement through brightness/ color extraction)		Provided (Enables distance/area measurement through brightness/ color extraction)	
	Maximum area measurement	Provided		–	
	Auto area measurement	Provided		–	
	Scale display	Various functions are provided	✓	Various functions are provided	
	One push calibration function[4.5.]	Provided	✓	–	
	Auto calibration	Full-auto (Numerical input is not required)		Full-auto (Numerical input is not required)	
	Measurement point replacement function	Provided		–	
	Measurement free display function	Provided		–	
	Specified dimension display function	Provided		–	
	Measurement auxiliary function	Provided (Automatic edge extraction, multi-point input)		Provided (Only automatic edge extraction)	
	CSV storage	Provided		Provided	
XY measurement system	XY stage measurement	Provided		–	
	Wide image display function	Provided		–	
Measuring function (Optional function)	3D height color/ scale display function	Provided (Enables X/Y/Z-axis height scale display and color bar display related to height)		Provided (Enables X/Y/Z-axis height scale display and color bar display related to height)	
	3D profile measurement	Provided		Provided	
	3D volume measurement	Provided		Provided	
	3D plane distance measurement	Provided		Provided	
	3D plane angle measurement	Provided		Provided	
	Ultra high-speed image stitching function(3D)[4.]	Provided		–	
Utility	Complete style covering Observation, Recording and Measurement	All-in-one system that enables all operations for Observation, Recording and Measurement without using a PC		All-in-one system that enables all operations for Observation, Recording and Measurement without using a PC	
	HD Photo compatible filing system	Provided		–	
	Bayonet-type attachment	Provided		Provided	
	Keyboard entry	Enabled		Enabled	
	Compatible with a foot switch	Enabled		Enabled	
	User settings	Provided		Provided	
	PC mode	Provided		–	
	Function guide	Provided		Provided	
Accompanying software	PC communication software	Image data transfer between the VHX and PC can be performed easily. (LAN)		Image data transfer between the VHX and PC can be performed easily. (LAN)	
	3D reproduction software for the PC (Available free of charge)	The PC can reproduce a 3D image saved in VHX. (Copy free)		The PC can reproduce a 3D image saved in VHX. (Copy free)	
	3D HDR play back software (Available free of charge)	Allows adjustment of brightness, contrast, and texture.		–	
	Image stitching playback software (Available free of charge)	Quickly processes captured wide-field images.		–	
	Measurement software (Available free of charge)	Allows dimension measurement on the PC.		–	

1. 2 million pixels × 3CCD mode 2. 18 million pixels × 3CCD mode 3. Supports only the multi-scan camera VHX-1100. 4. Possible when using the VHX-S90BE 5. OP-87426/OP-87427 is required. 6. Approximately 16,770,000 pixels are realized with the dithering processing of the display controller. 7. The LCD monitor provided in the VHX Series is based on extremely advanced technology. Rarely, an unlit part (black spot) or lit part (bright spot) may exist on the monitor screen. However, this is not an indication of the LCD monitor being defective. 8. Function can be used simply by pressing a button on the console. * Windows, Word and Excel are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

X-Y MEASUREMENT SYSTEM VH-M100E

Model		VH-M100E
Stage stroke distance		100 mm (3.94") in the X and Y directions
Display resolution		0.1 µm 0.004 mil
Movement accuracy		4 + 0.02L (µm)* 0.16 + 0.0008L (mil)
Ratings	Power supply voltage	100 to 240 VAC 50/60 Hz
	Current consumption	50VA
Environmental resistance	Ambient temperature	5 to 40°C 41 to 104°F
	Relative humidity	35 to 80%, No condensation
Weight		18kg
Load capacity		3kg

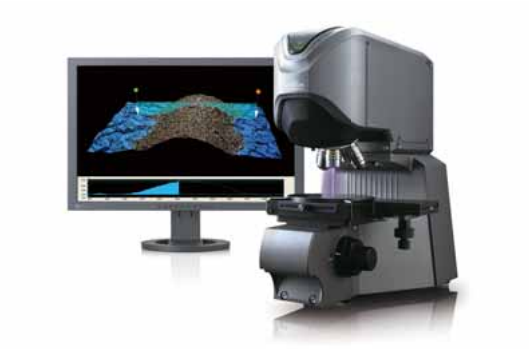
* "L" means movement distance (mm).

Providing non-contact profile and roughness measurements on nearly any material

NEW

3D LASER SCANNING MICROSCOPE
VK-X100/X200

- 200× - 24,000× magnification
- 0.5 nanometer Z-axis resolution on almost any material
- High-resolution, large depth-of-field observation
- Profile and roughness measurements with zero sample preparation
- Measures thickness and uniformity of clear layers
- Acquires data on angles approaching 90 degrees
- Perform measurements with just a single click of the mouse



All-in-one high-speed imaging solution

NEW

HIGH-SPEED MICROSCOPE
VW-9000

- Record at up to 230,000 frames per second
- Fully-integrated system with built-in light source and LCD
- Setup and record in minutes
- Error Monitoring Function automatically detects changes in motion
- Quantify and analyze moving objects
- Provides on-site, magnified observation with microscope functionality

KEYENCE

ООО "Микросистемы"
Москва
+7 (495) 234 23 32

info@microsystemy.ru
www.microsystemy.ru