



SUPER RESOLUTION DIGITAL MICROSCOPE

SURPASSING THE LIMITS OF AN OPTICAL MICROSCOPE

VHX
DIGITAL MICROSCOPE

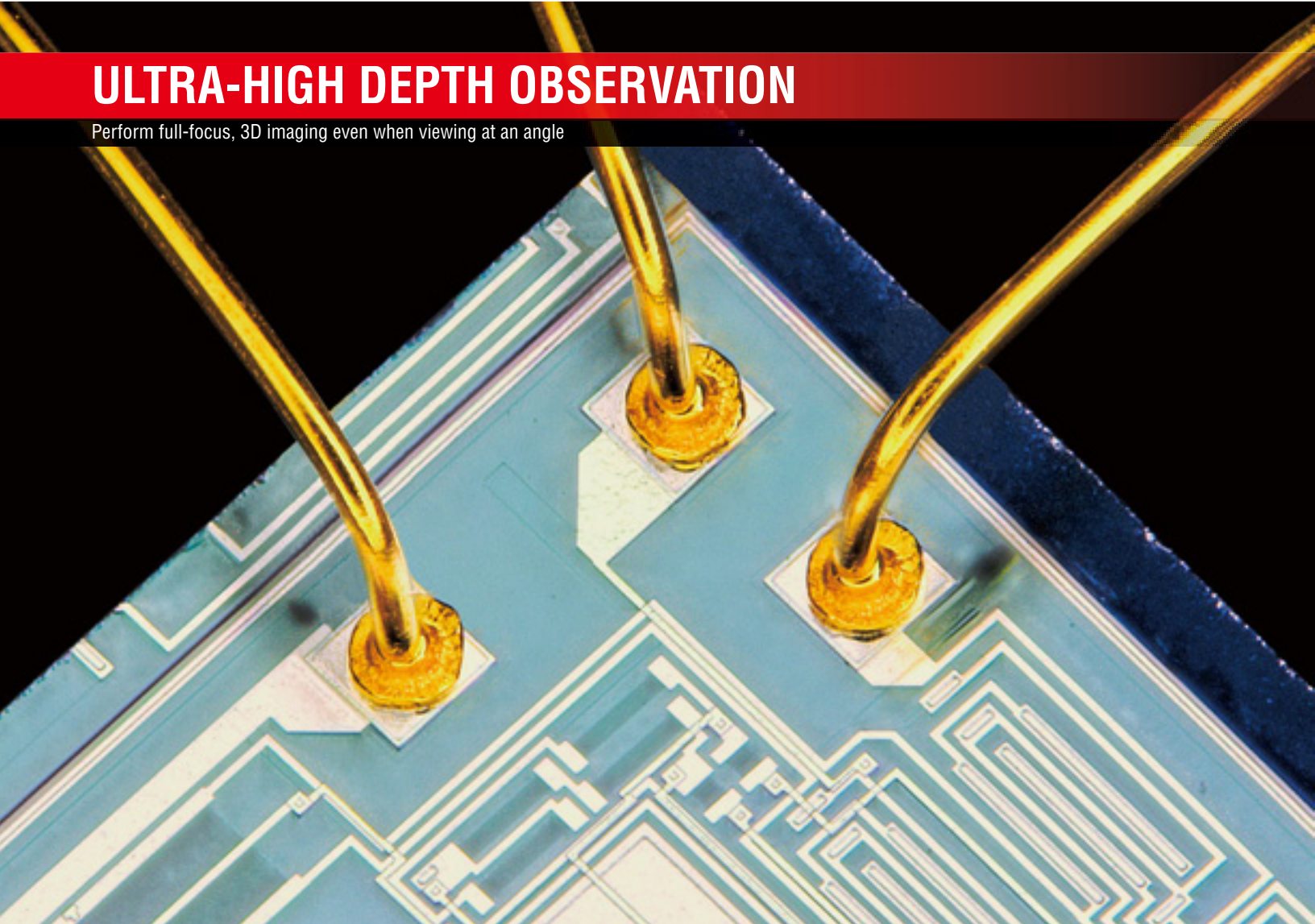


LARGE DEPTH-OF-FIELD & SUPER RESOLUTION IMAGING

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

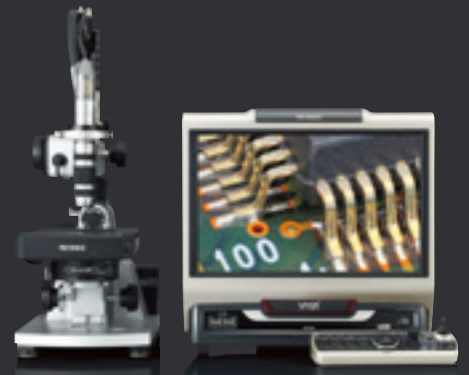
Perform full-focus, 3D imaging even when viewing at an angle



Wire bonding (300x)

BASIC FUNCTIONS

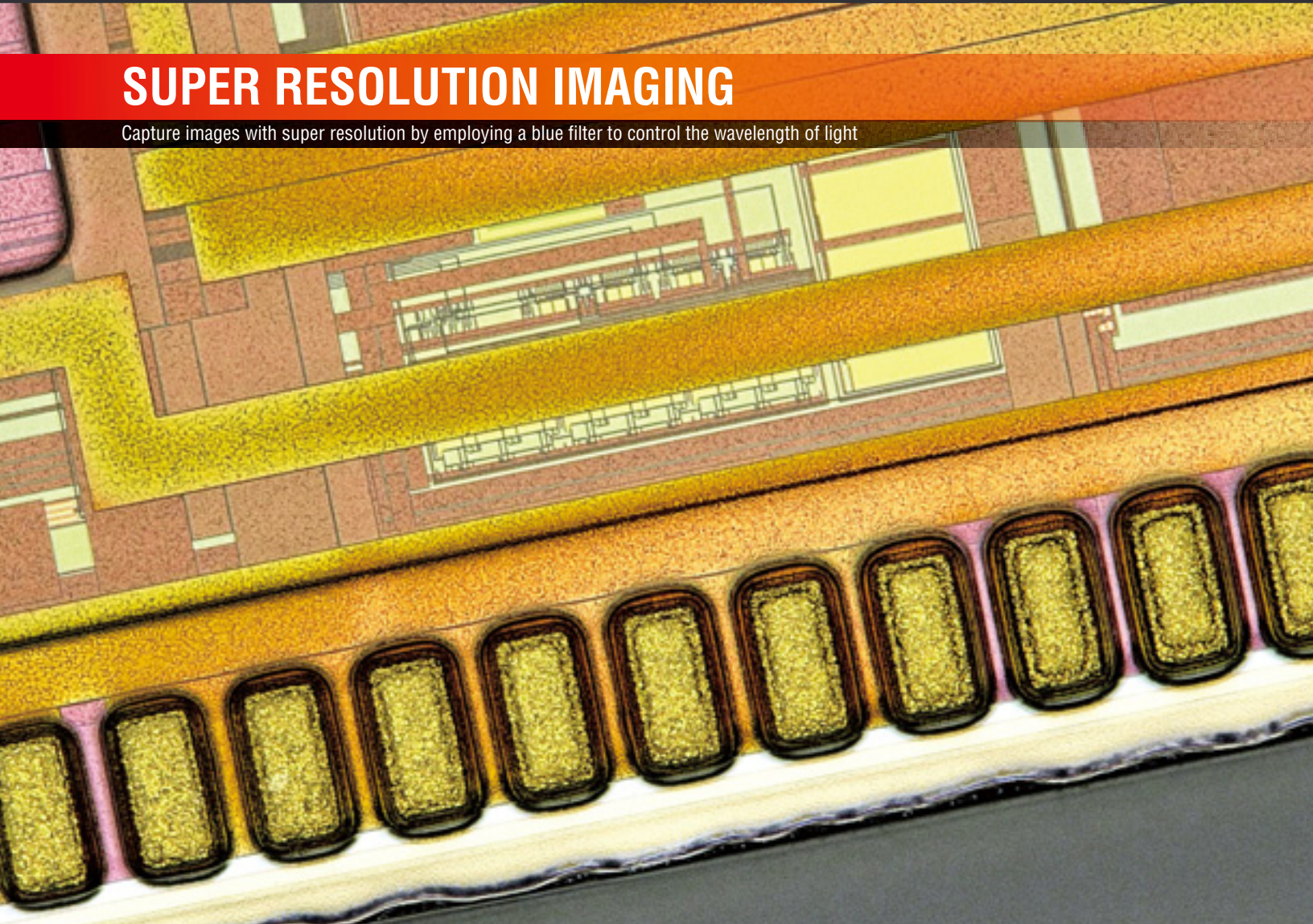
- Unparalleled clarity and depth-of-field P. 6
- Flexible and highly accurate measurements P. 14
- Easily record and manage image files P. 16



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 (500x)

ADVANCED FUNCTIONS - WORLD'S FIRST

- XYZ motorized control and high-speed image stitching function P. 10
- Exceeding the resolution capabilities of an optical microscope P. 22
- Advanced automatic measurement functions P. 26

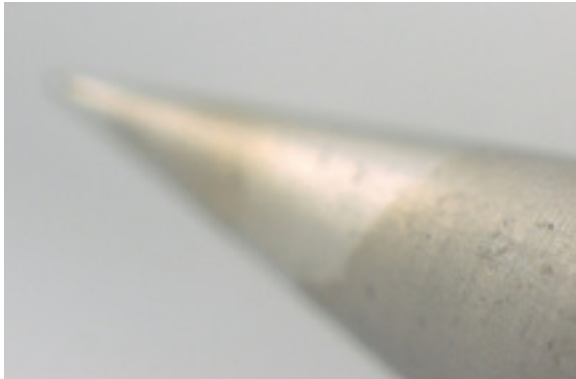
Why do over 10,000 companies worldwide use the VH Series?

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

1 LARGE DEPTH-OF-FIELD

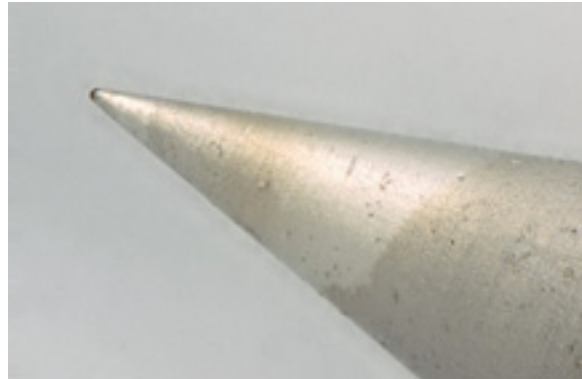
Easily capture fully-focused, high-resolution images

Conventional Microscope



Focus on only a part of a target

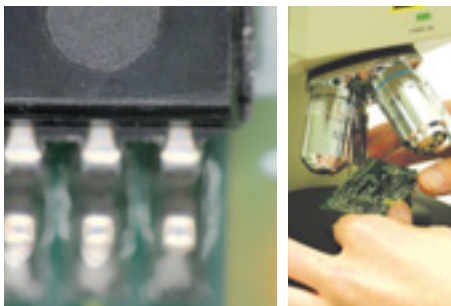
VHX Series



Sharp focus on the entire target

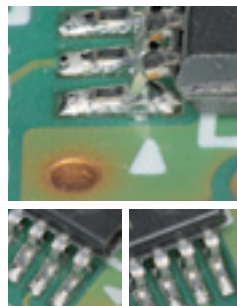
Observe an object from any angle

Conventional Microscope



No other choice but to observe from directly above

VHX Series



Freely observe from various angles



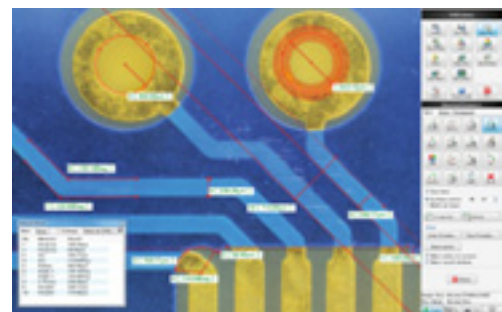
2 VERSATILE & HIGHLY ACCURATE DIMENSIONAL MEASUREMENT

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

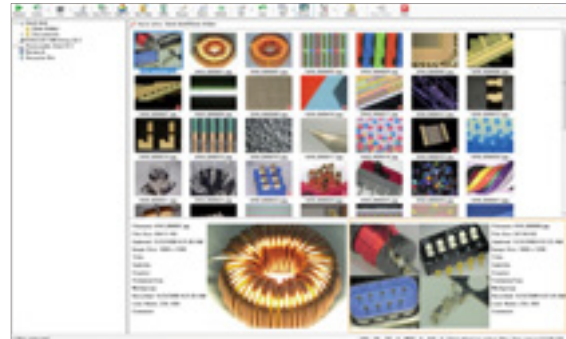
PC board (60x)

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



Focus position - Lowest part



Focus position - Middle part



Focus position - Highest part



Image after depth composition



3D display

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

Stereoscopic microscope



Metallographic microscope



Achieves 0.1 to 5000x with a single unit

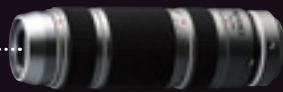
Electron microscope



Measuring microscope



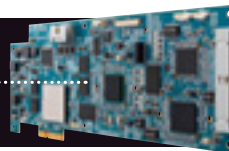
UNPARALLELED CLARITY AND DEPTH-OF-FIELD



RZ LENS



54 million pixel 3CCD



High-speed processing graphics engine

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

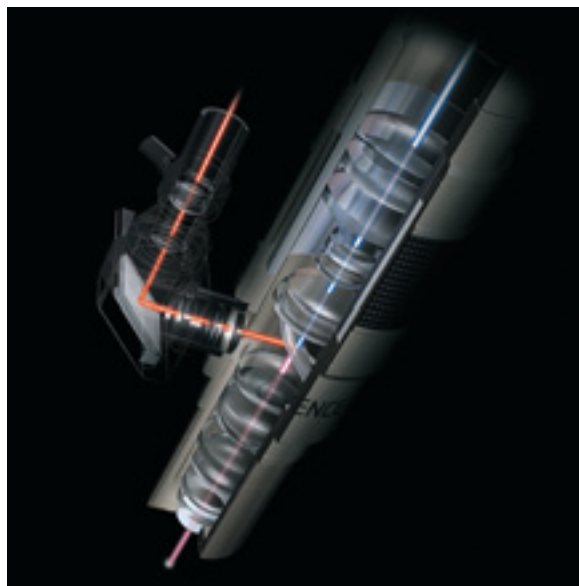
Designed and developed by KEYENCE for total system integration

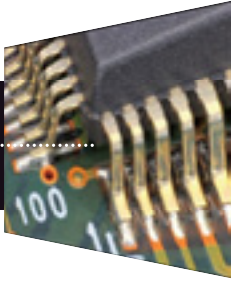
In optics, there is a trade-off between resolution and depth-of-field. Since the VH Series has been entirely designed by KEYENCE, the lens, camera and graphics engine integrate seamlessly to produce a system optimized for digital image capture.

Highest resolution zoom lenses in the industry



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.

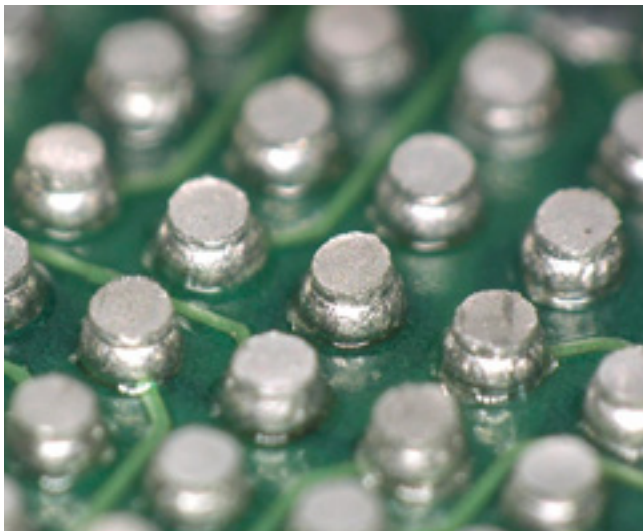




KEYENCE Microscopes are designed to emphasize both high-resolution and depth-of-field.

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

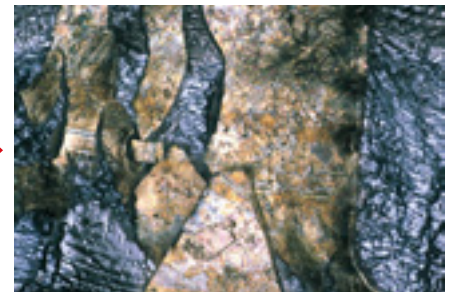
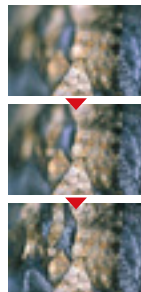


VHX Series

Quick Depth Composition function



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 (1000x)

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

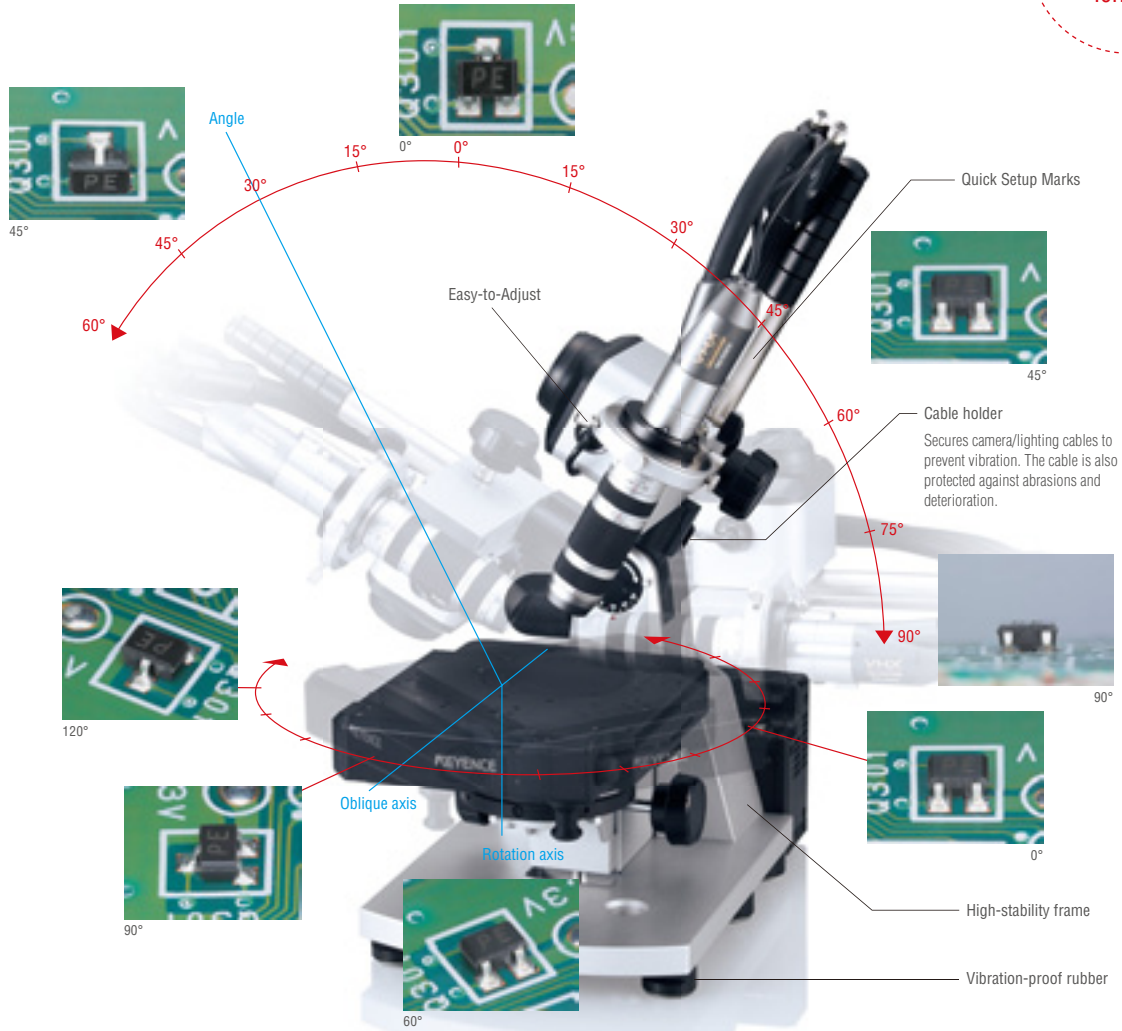


Using the Auto Adjust Function

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

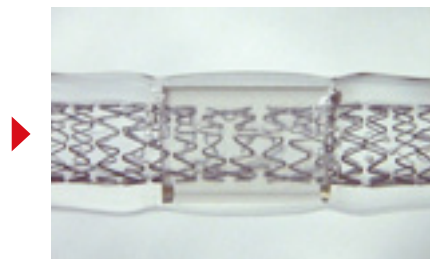
The aluminum die-cast main body provides a highly rigid structure with a low center of gravity. Each stand is equipped with four rubberized feet, which are designed to absorb low to high frequency vibrations. This allows observation, even at high magnifications, without interference from environmental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



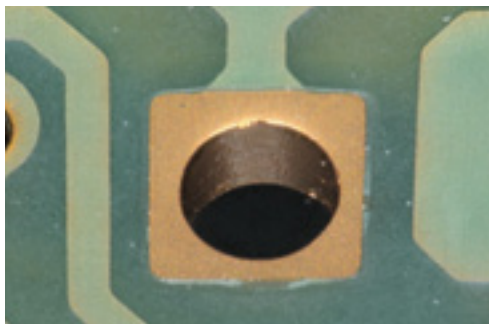
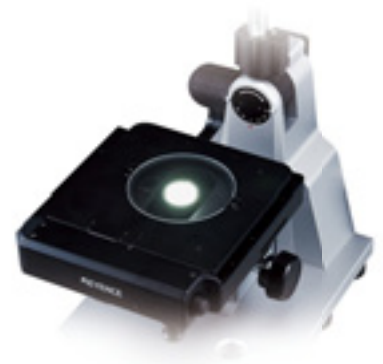
Hand-held observation



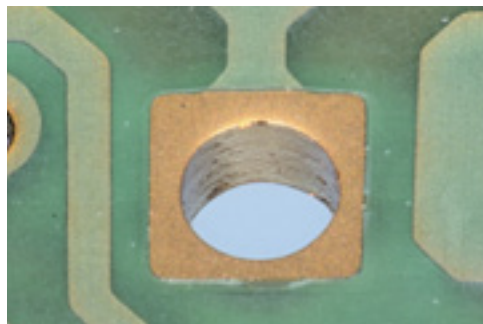
Observe whenever and wherever you wish

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

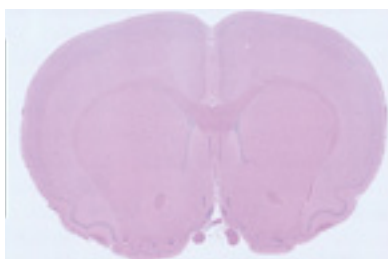
PCB through-hole (100x)

Observation with transmitted polarized light is also possible

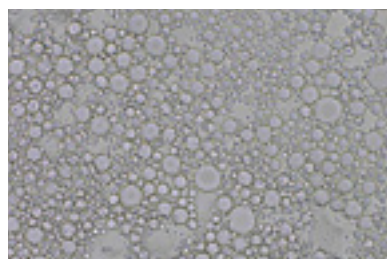


OP-87428

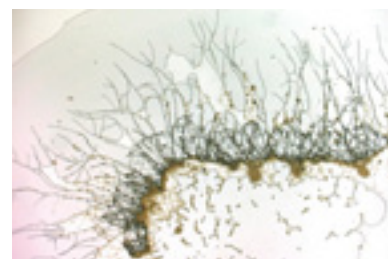
Transmitted light applications



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



Emulsion (1000x)



Mold hyphae (1000x)

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.



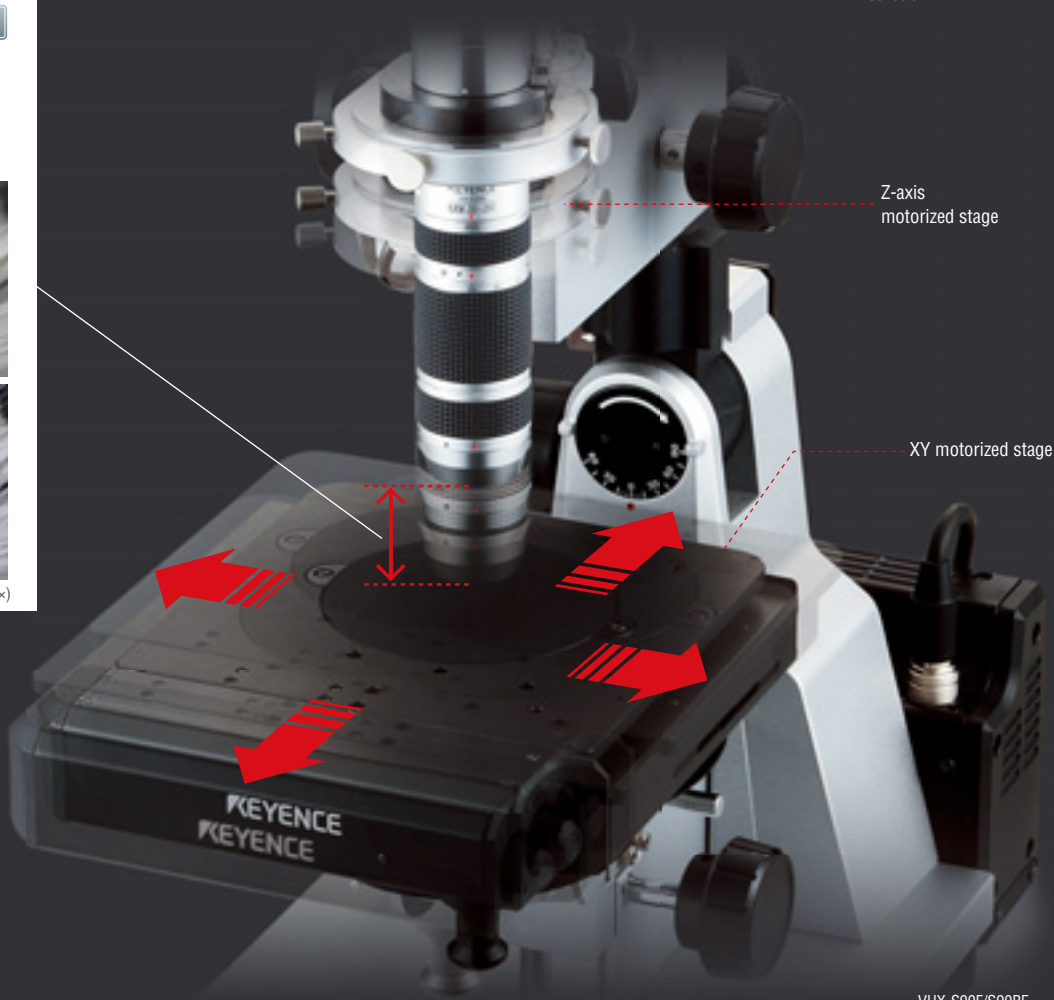
Auto Focus Function



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



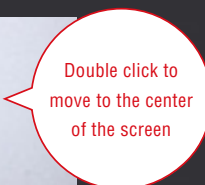
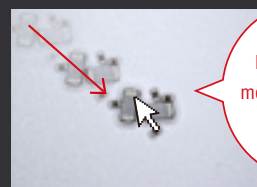
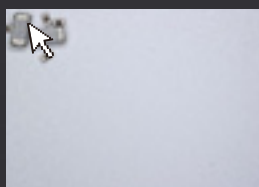
Fiber (50x)



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 will automatically move that area to the center of the screen.

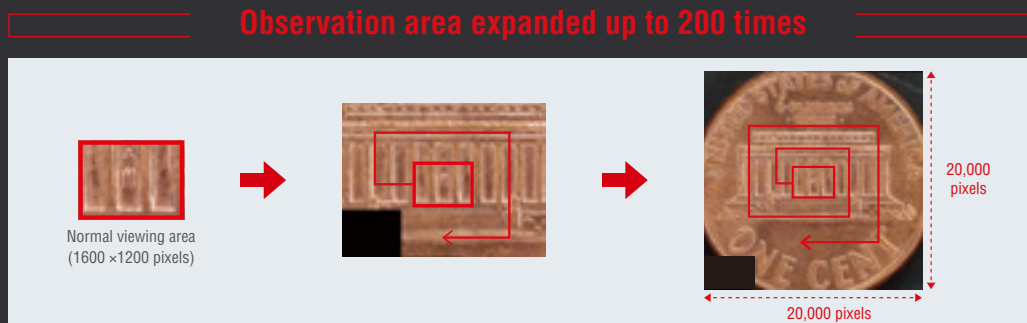


World's First

Ultra high-speed image stitching function



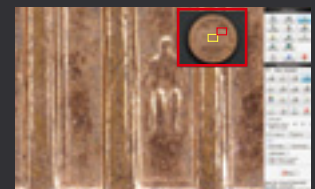
Once the image stitching function has been activated, the XY stage will automatically move in a clockwise pattern and capture images at each location. After an image is captured, it will be stitched together with the previous image in real-time before the stage moves to the next location. This will provide 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.



World's First Navigation function



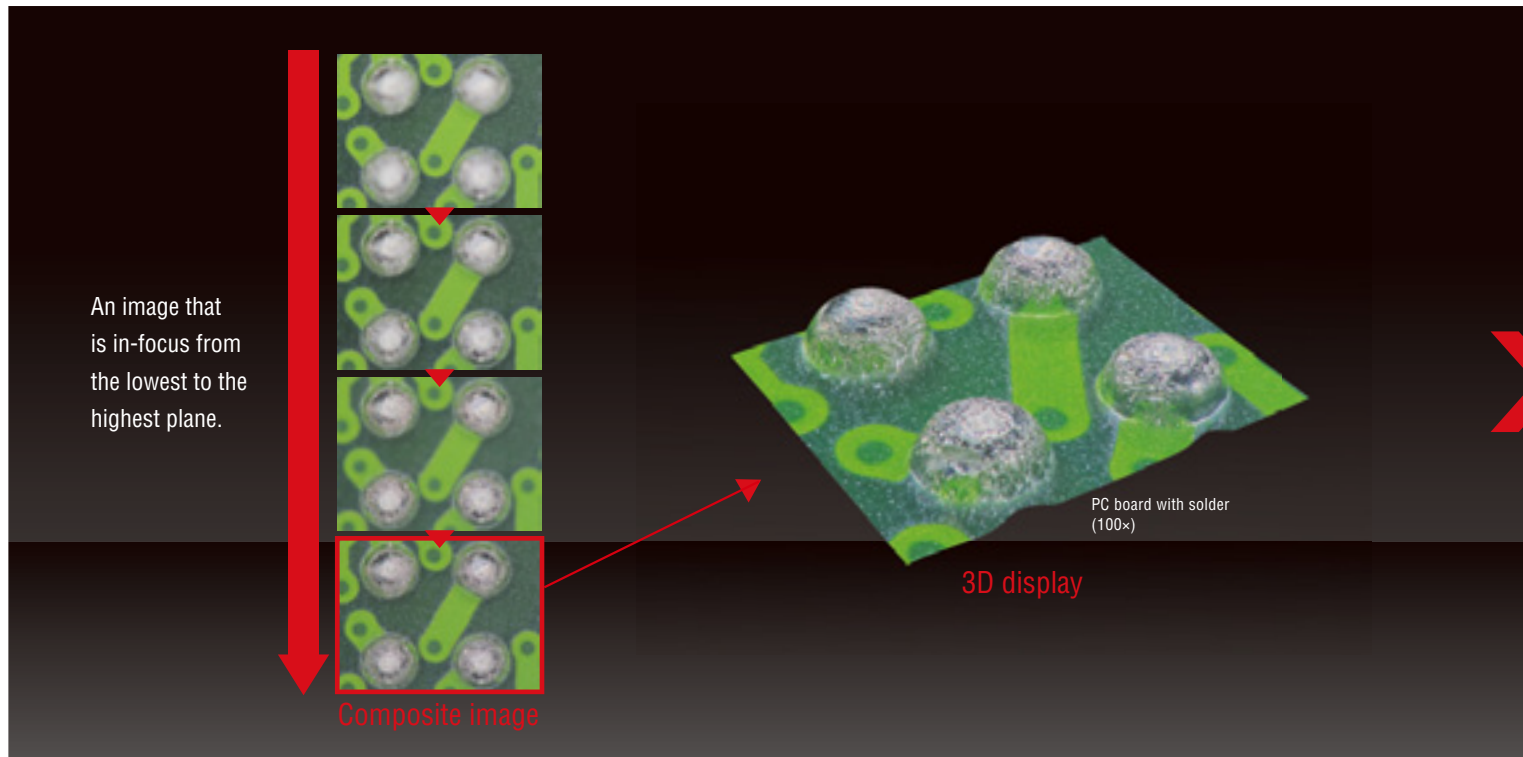
The stitched image can be utilized as a navigation screen. Clicking on the position that you wish to observe will automatically move the stage to the selected location. The current field-of-view is outlined in a yellow frame and the previously viewed field-of-view is outlined in a red frame, making it 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.



Navigation screen

OBSERVATION

3D DISPLAY & MEASUREMENT



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



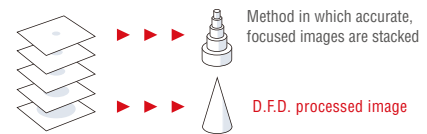
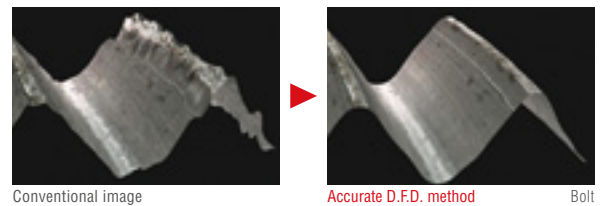
Even when a target has an uneven surface, a fully-focused image can be obtained instantly by compiling images at different focal planes. After creating the composite image, the focal position data can then be used to construct a 3D model. When the Z-axis motorized stage is used, this 3D image can be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

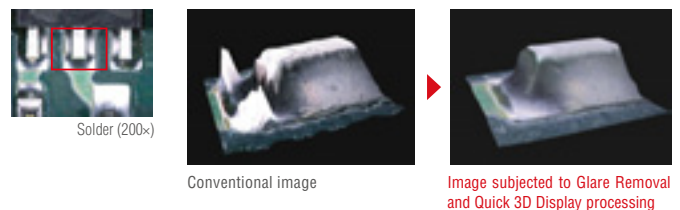
D.F.D = DEPTH FROM DEFOCUS

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.

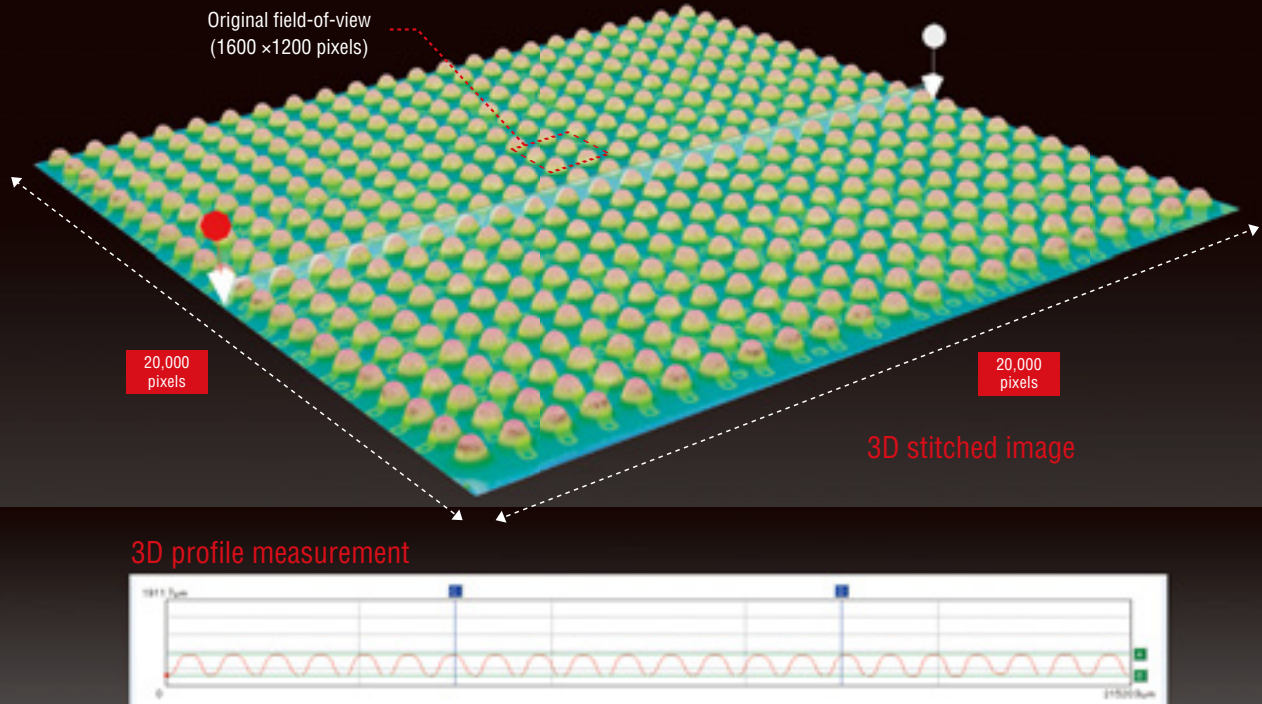


By combining the Glare Removal and the Quick 3D Display functions, even highly reflective objects can be imaged in 3D

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.



WIDE-FIELD 3D IMAGE STITCHING & MEASUREMENT FUNCTION



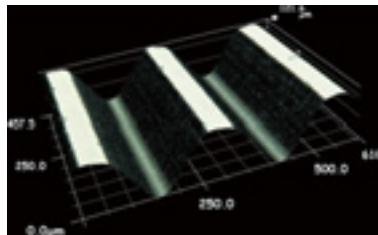
3D Measurement Function

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.

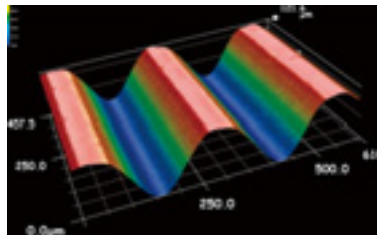


HEIGHT COLOR/SCALE DISPLAY

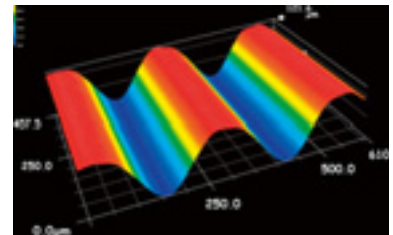
Color bars that indicate height are displayed on a 3D image. The highest position is displayed in red and the lowest position is displayed in blue, allowing you to see height differences clearly at a glance. The height data can be superimposed on a raw image. Furthermore, the X-axis, Y-axis and Z-axis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



3D raw image



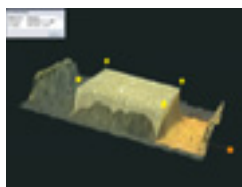
3D raw image + topographic image



3D topographic image

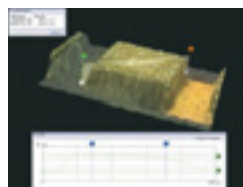
Electronic die component (500x)

Volume



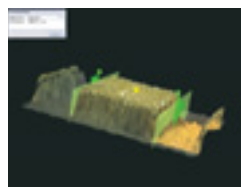
The volume within the selected rectangle on the 3D image can be measured.

Cross section profile



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

Plane distance



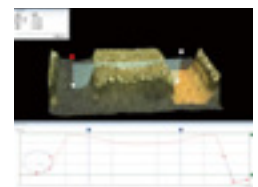
A distance between two parallel planes in the 3D image can be measured.

Plane angle



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

Radius/angle



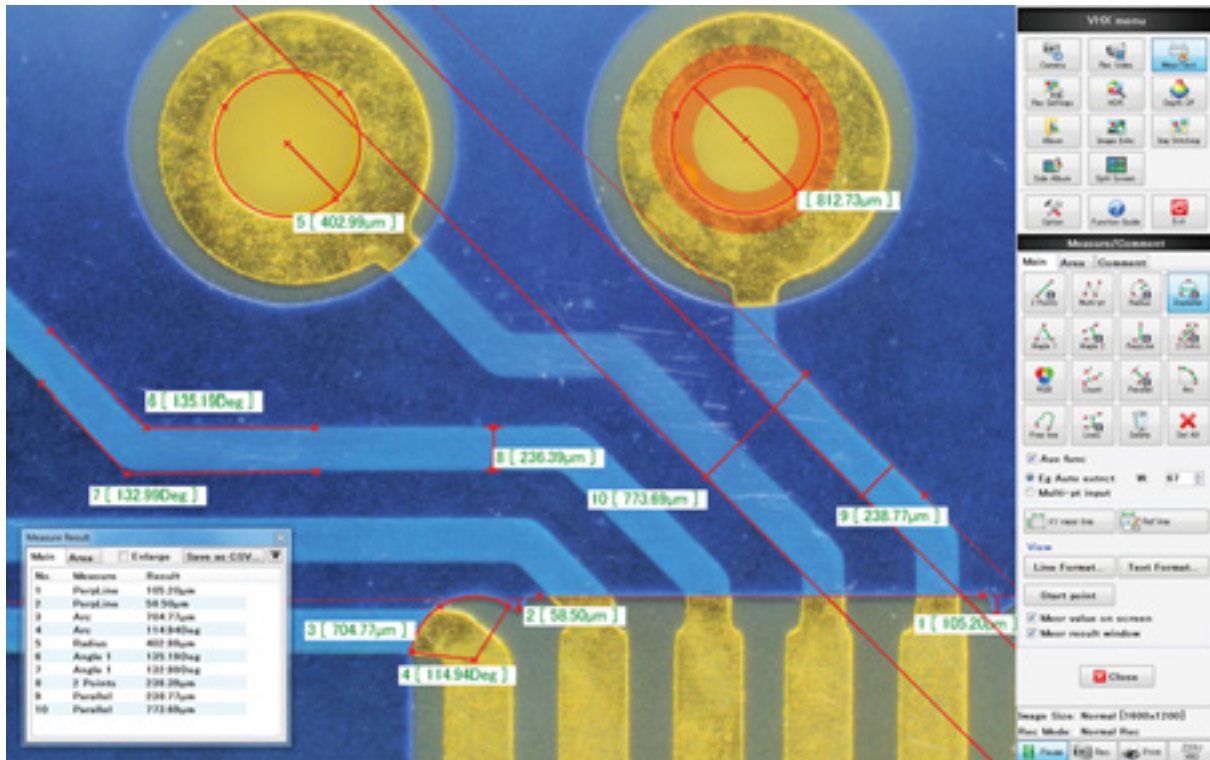
Measures the radius and angle of any area on the 3D image.

FLEXIBLE AND HIGHLY ACCURATE MEASUREMENTS

Real-time measurement during observation

Data output is possible

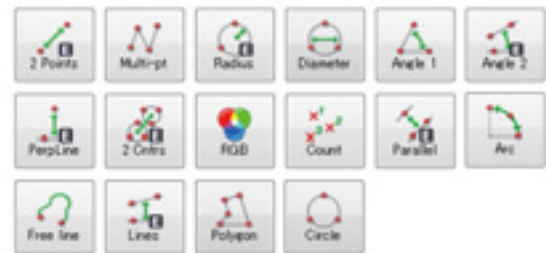
The system allows users to complete all measurements directly on the screen in real-time with just a few clicks of a mouse. This is significantly easier and faster than systems that require a user to capture images and import them to a PC to then use external software to complete measurements on the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



PC board (60x)

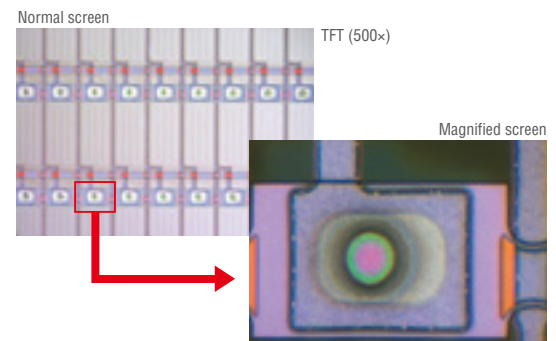
A multitude of measurement functions

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.



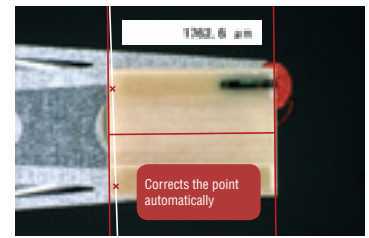
High-resolution measurements

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.



Auto Edge Selection function

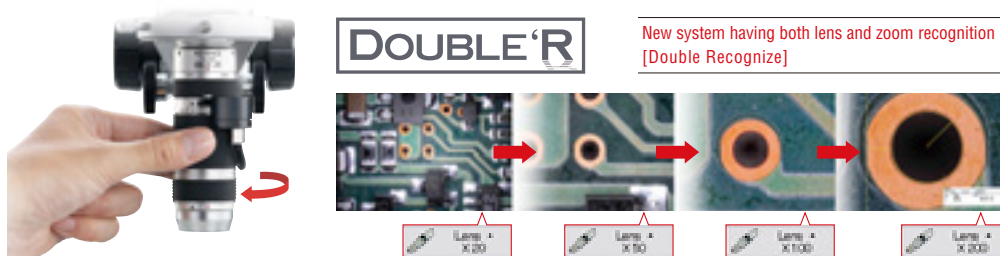
Even when the measurement point selected on the image is not perfectly on the edge of the target, the Auto Edge Selection function will automatically re-adjust the measurement point to the correct edge location. This helps to improve the accuracy of measurements and reduce the possibility of human error.



Read head of hard disk (70x)

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.



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.

X-Y measurement system
VH-M100E



Display unit OP-84483

The display unit is useful when the moved distance cannot be confirmed on the monitor.

Transmitted illumination unit
OP-84484

Clearly projects edges of a target

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

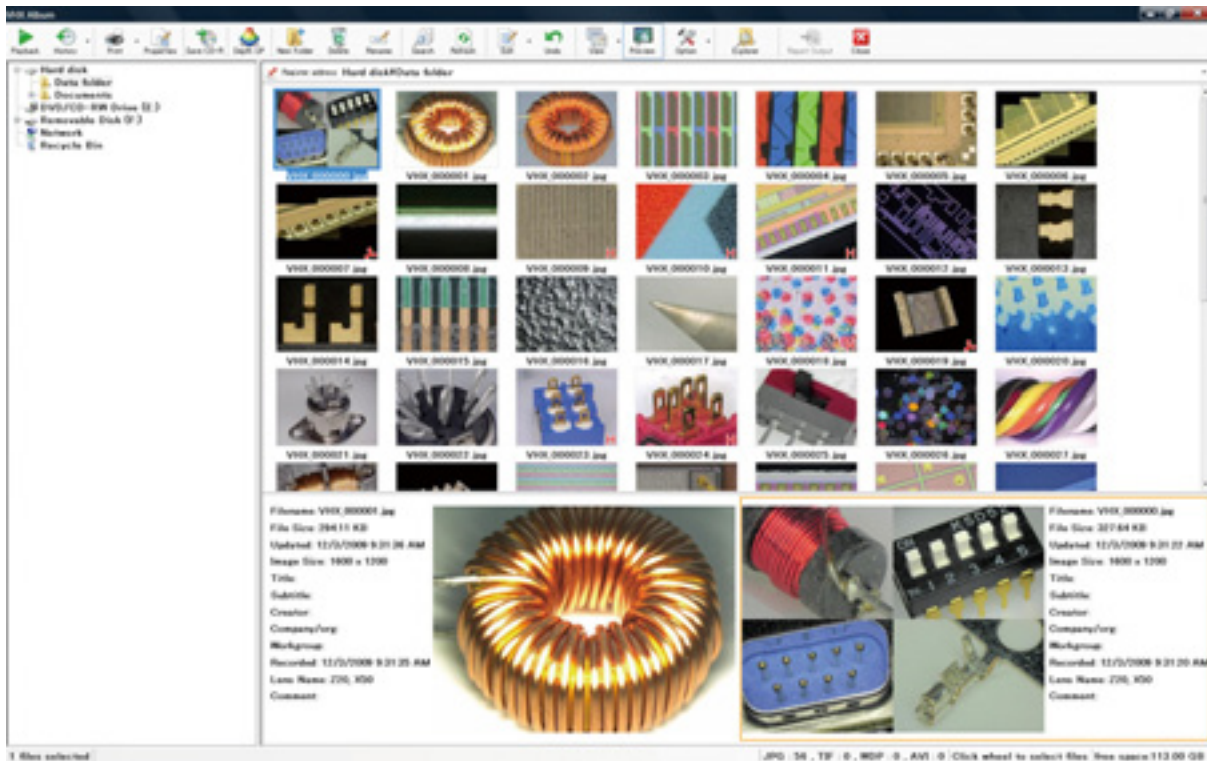
JPEG

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.



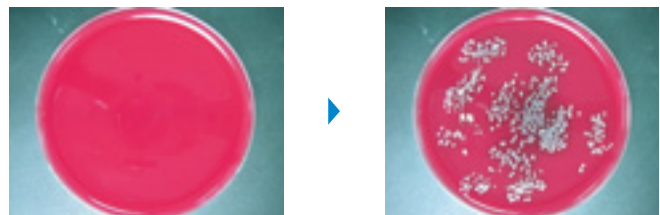
▶ VIDEO RECORDING FUNCTION

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.



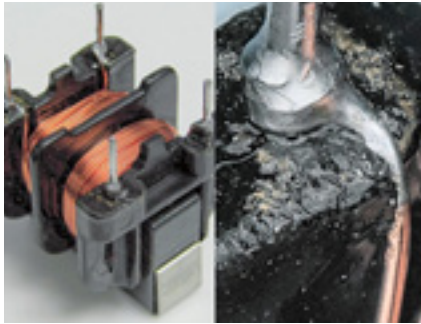
▶ TIMER CAPTURE FUNCTION

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.

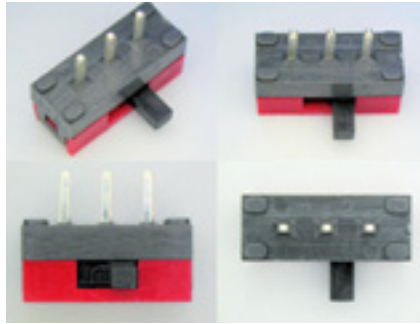


Split screen/Comment entry function

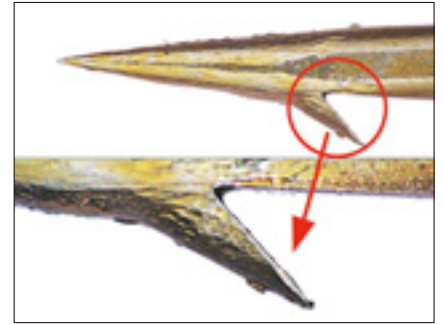
The viewing window on the built-in monitor can be split horizontally, vertically, or in to quadrants. This can be used to quickly perform side-by-side image comparison of good and bad parts or when viewing a low-magnification and high-magnification image. Comments and scale bars can also be inserted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



Vertical two-part split



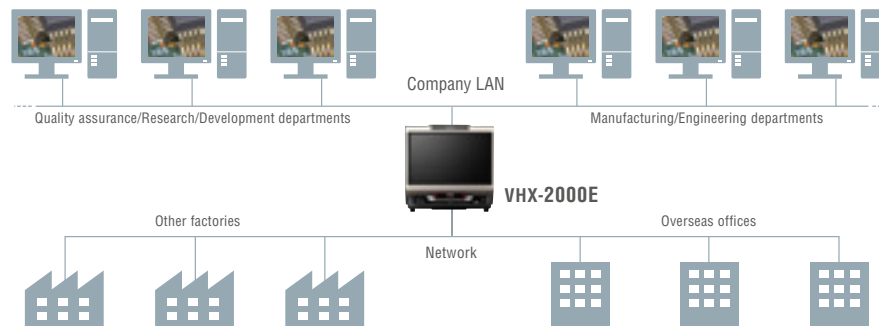
Quarter split



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.



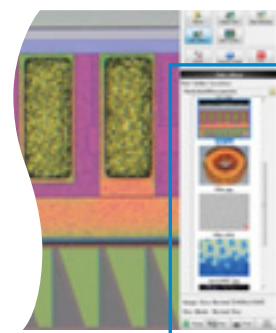
NAVIGATION WINDOW

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.

Labels for the console functions:

- Super resolution image capture
- RGB preview
- Measurement
- REC
- Quick composition and 3D
- Light shift
- Auto focus
- Jog dial (for Z-axis motor)
- LED transmitted illumination
- Optimum image
- Calibration
- Navigation window

XY-stage joystick

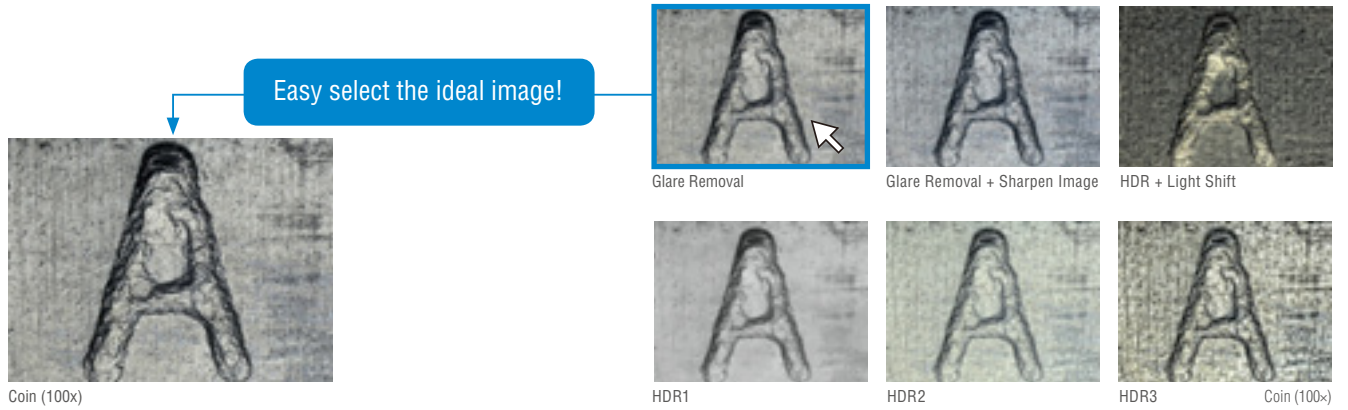
The stage moves in the angle that it's tilted in

XY motorized stage

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.

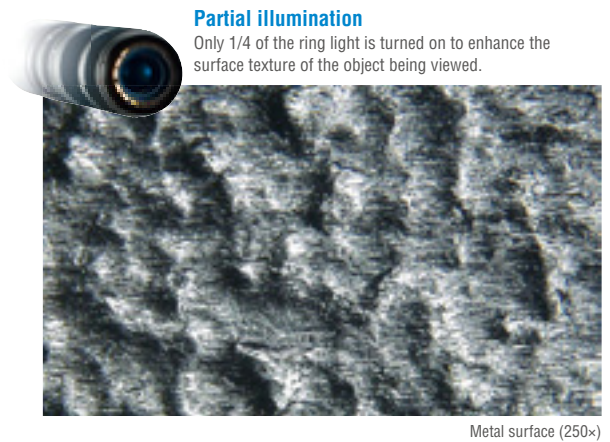
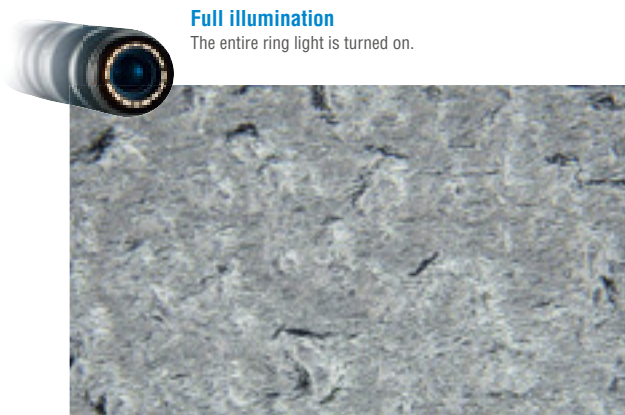
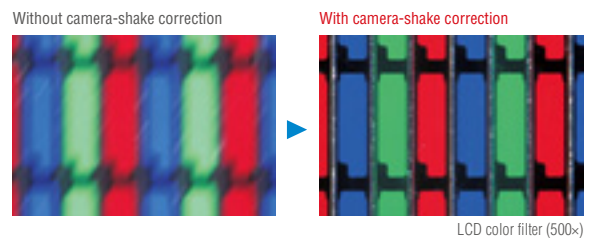


Image Stabilization function



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.



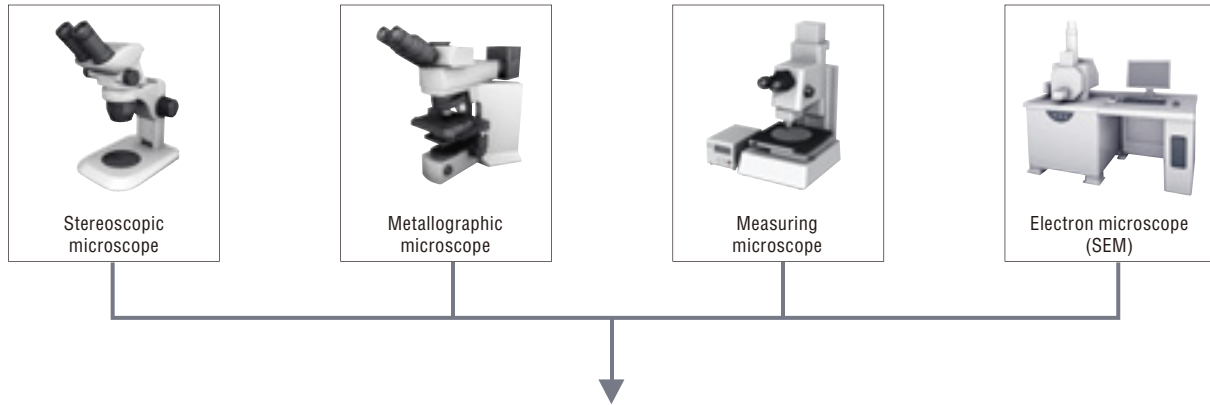
Just direct the lens toward the target.



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.



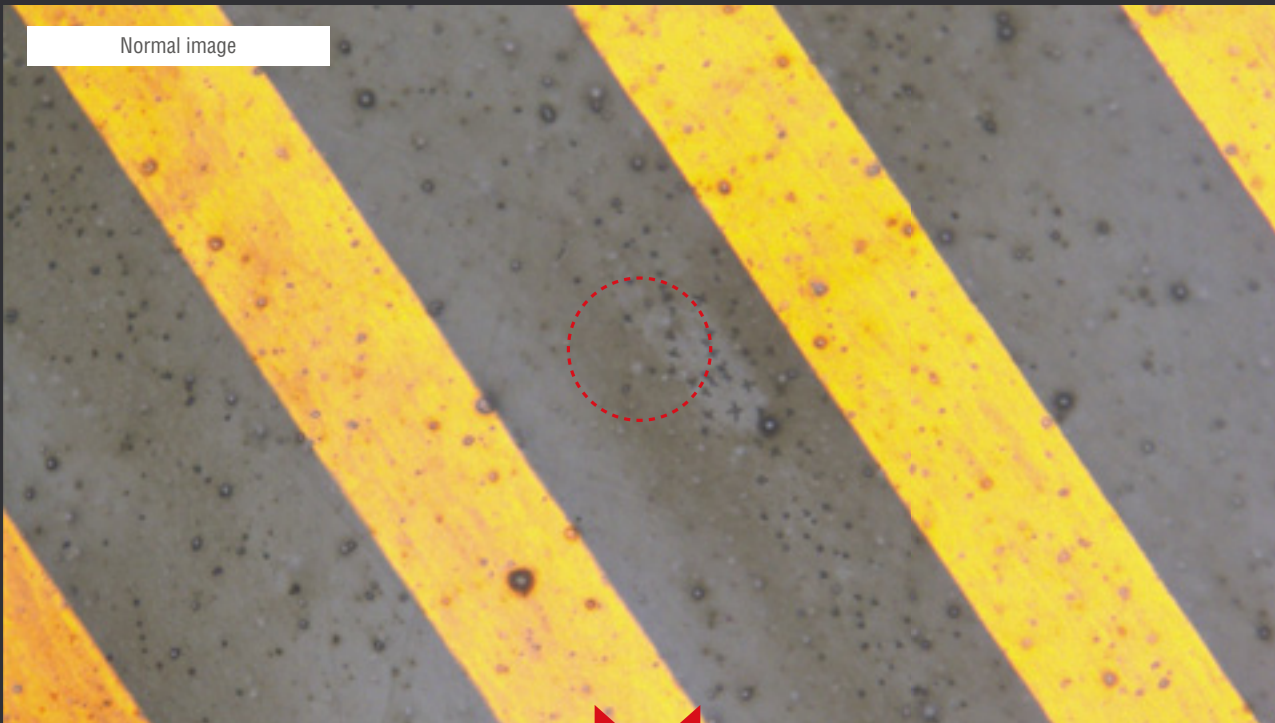
EXCEEDING THE RESOLUTION CAPABILITIES OF AN OPTICAL MICROSCOPE

World's First

Super Resolution Imaging



Increases the image resolution by changing the wavelength of light

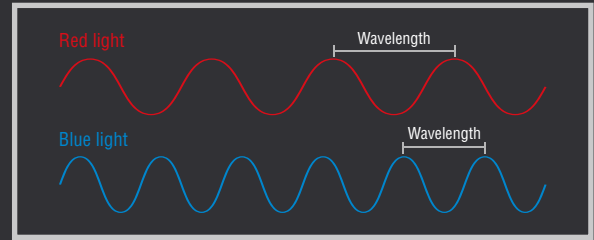
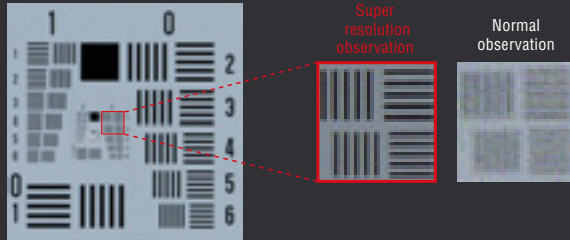


Flexible PC board surface (400x)

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

Pixel shift technology

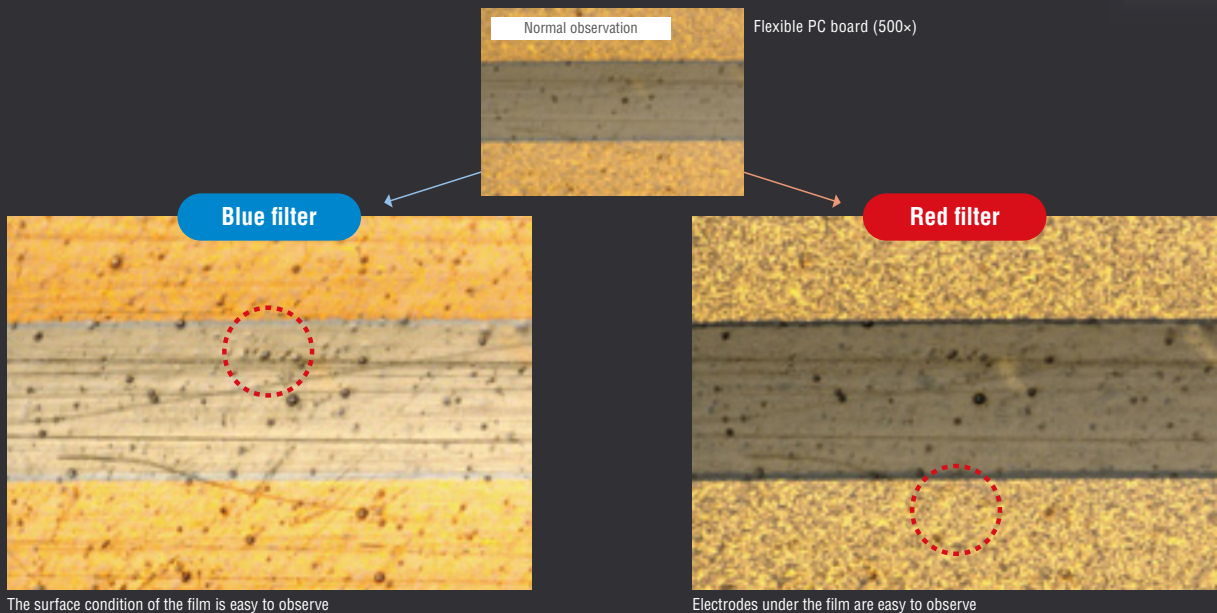
By using a blue-filter, it is possible to perform observation that maximizes the capabilities of an optical lens. Utilizing short-wavelength blue light, the VHX-2000 is capable of capturing super resolution images that are impossible to view with white light. This has been made possible by KEYENCE's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



*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.



Color filter

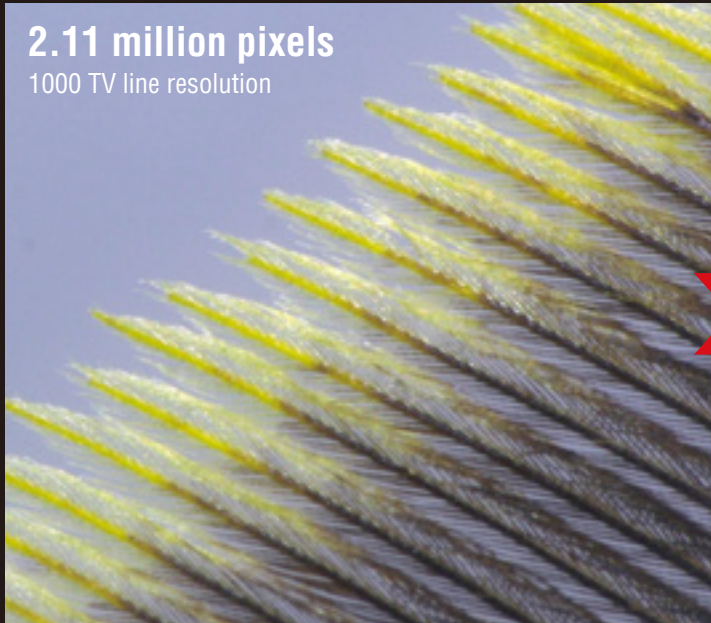
The world's first 54 million pixel 3CCD

Highest resolution in the industry - RZ Lens

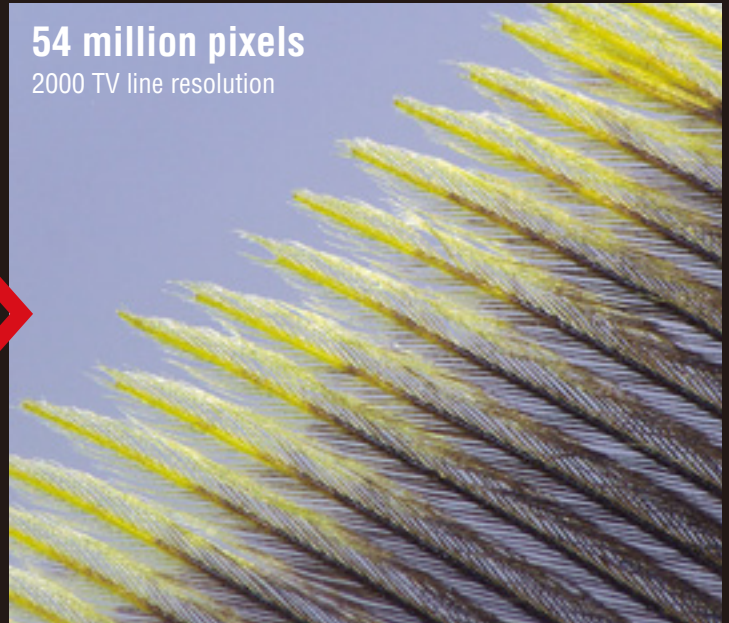
HIGH-DEFINITION IMAGING

World's First

54 Million Pixel 3CCD Camera



2.11 million pixels
1000 TV line resolution



54 million pixels
2000 TV line resolution

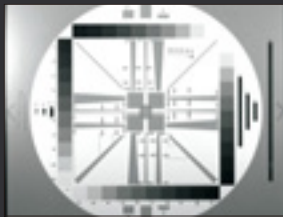
Bird feather (100x)

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.

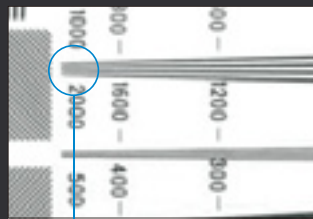
Pixel shift method

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.



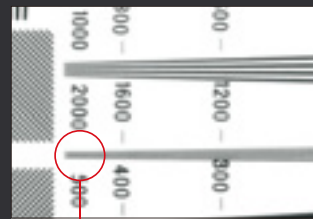
Resolution chart

2.11 million pixels



1000 TV line resolution

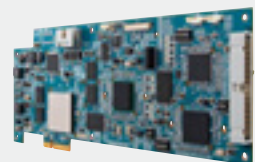
54 million pixels



2000 TV line resolution

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



Conventional [8 bit]

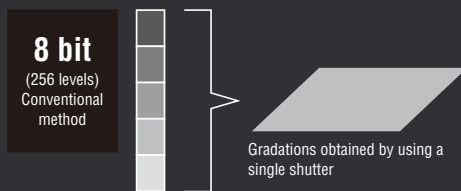


HDR [16 bit]

Printed material (400x)

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



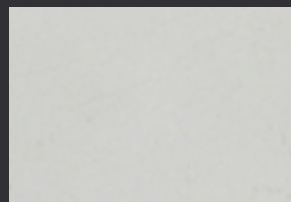
Conventional [8 bit]



HDR [16 bit]

PC board (50x)

OPTIMIZES CONTRAST



Conventional [8 bit]



HDR [16 bit]

Printing paper (100x)

ADVANCED AUTOMATIC MEASUREMENT FUNCTIONS

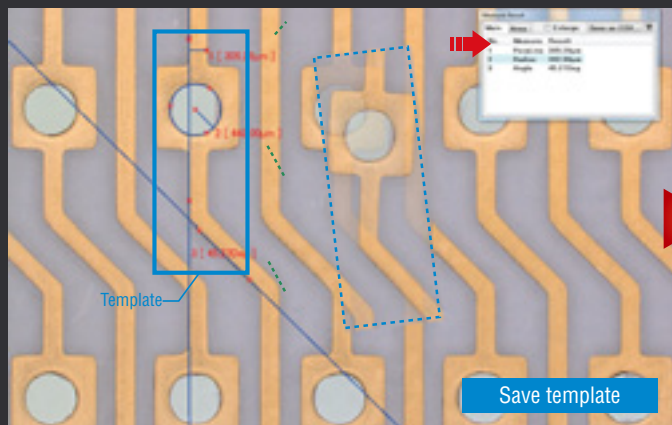
Industry's first

Automatic
edge
extraction

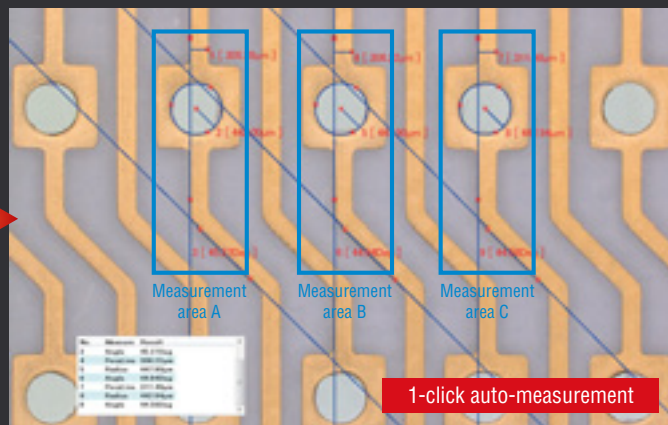
Save
measurement
templates

One-Click Auto-Measurement

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.

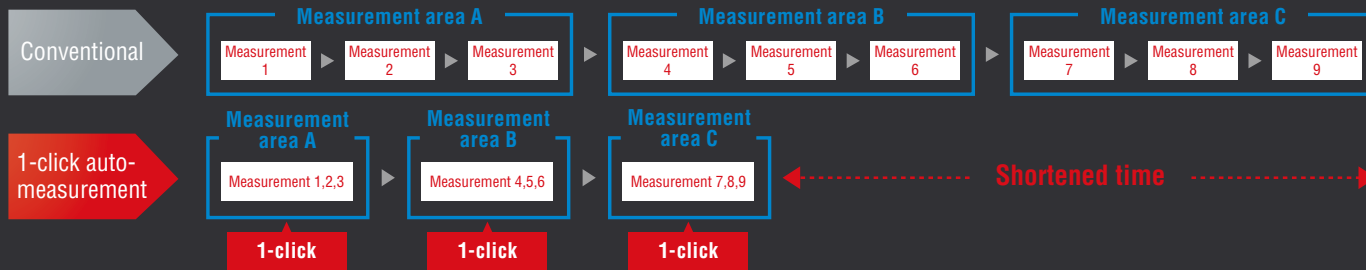


The appearance of the template searching for the recognition targets



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 (1000x)

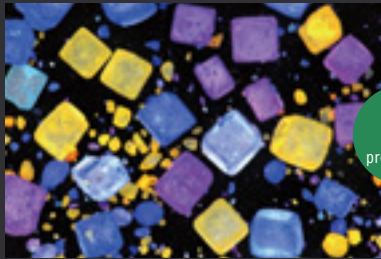
Extraction condition reproduction function

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.

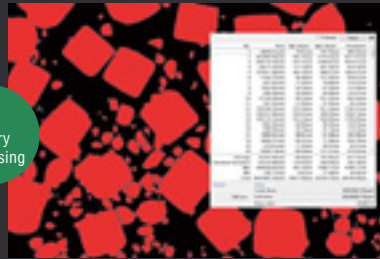
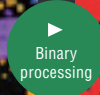


Automatic area measurement/count

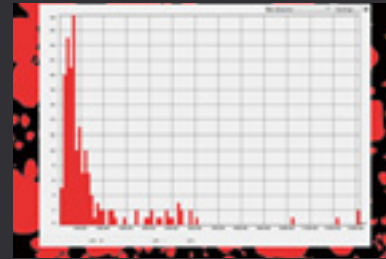
Easily perform area measurements or use the count tool for targets in a specified range. It is also possible to remove unnecessary items and separate overlapping items. Anyone can operate automatic measurement, making it possible to perform analysis with high accuracy.



Crystal (100x)



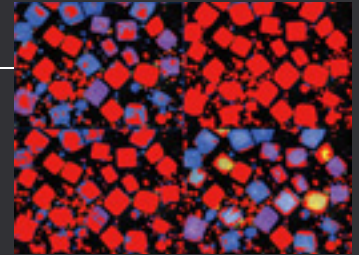
Measurement result list



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

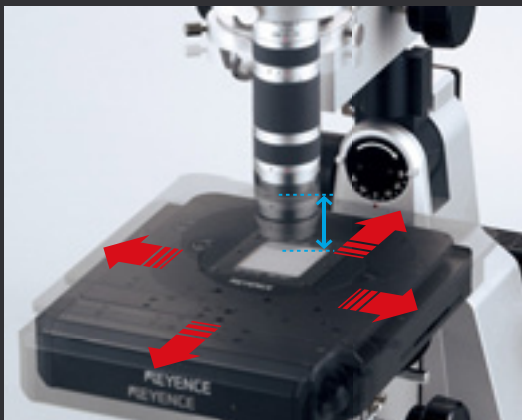
One push calibration



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

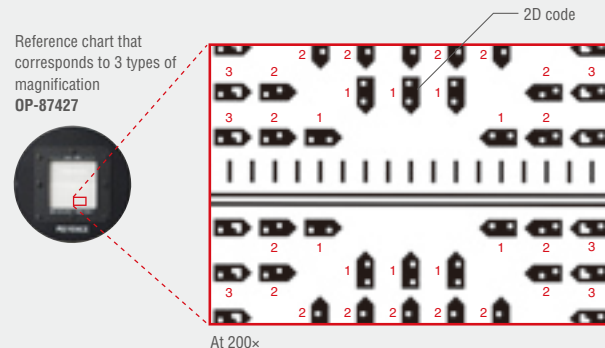
Automatic calibration is possible just by settling the scale and pressing a button. Unlike conventional methods, there is absolutely no need to find the field-of-view and adjust the focus. With the DOUBLE'R function, calibration for each lens and each magnification can be performed with ease.



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.



At 200x

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 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		0.1x	0.5x	1x	5x	10x	30x	50x
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		20x	30x	50x	100x	150x	200x
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.



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")					

1. Magnification on a 15-inch monitor

2. When the Dual Light Base Unit (OP-84430) 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

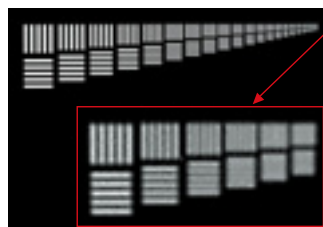
This zoom lens incorporates high-quality fluorite optics to provide the highest resolution in its class. With an N.A. of 0.82, achieve up to 5000x magnification with a 4.4 mm (0.17") working distance.

Model		VH-Z500R/Z500W				
Magnification ¹		500×	1000×	2000×	3000×	5000×
Field-of-view (µm/inch)	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"				

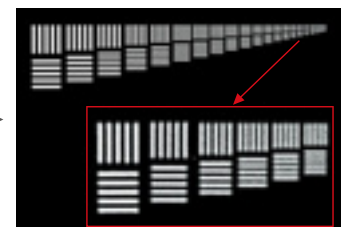
1. Magnification on a 15-inch monitor

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.



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		20x	40x	80x	100x	160x	200x
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" 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		100x	200x	300x	500x	700x	1000x
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 Dual Light Base Unit (OP-84430) 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.



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 (500x)

A rich variety of optical adapters

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

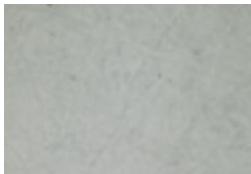
Variable illumination adapter

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.

VH-K20



Paper surface (200x)



Standard illumination



Variable illumination

Coaxial vertical illumination adapter

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.

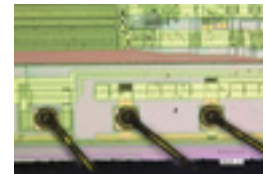
OP-35416



Wire bonding (300x)



When the adapter is not used (Dark field illumination)



When the adapter is used (bright-field)

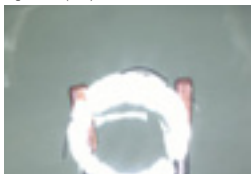
Polarization illumination adapter

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

OP-87429



Light bulb (50x)



Standard illumination



Polarized illumination

Diffuse illumination

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

Diffused illumination adapter
OP-35324



Non-contact diffuse adapter
OP-35414



Multi-diffuse adapter
OP-35469



Super-diffuse illumination adapter
OP-42305



Solder (200x)



Standard illumination

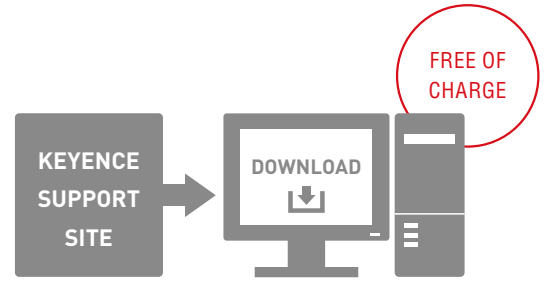


Diffuse illumination

ALLOWS FOR OBSERVATION AND MEASUREMENT FROM A PC

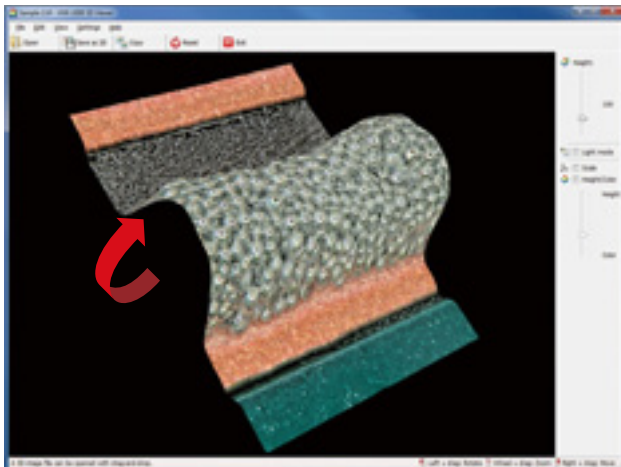
VHX-2000 Communication software

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

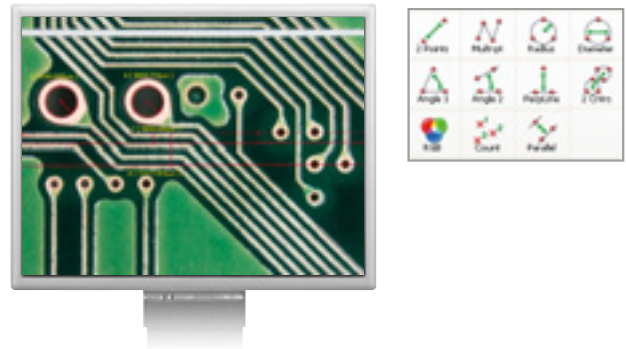
Captured 2D images can naturally be displayed in 3D. It is also possible to adjust the angle of a 3D image and then save the image.



Solder paste (300x)

2D measurement

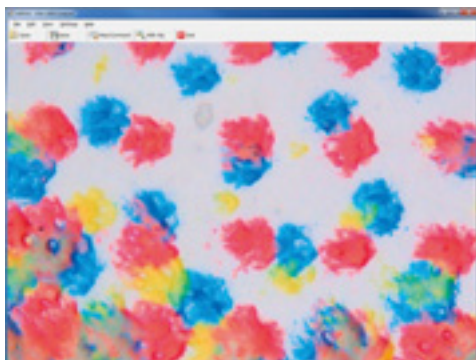
It is possible to perform 2D measurement on captured images. This can also be used for a live demonstration of measurement in front of the customer at their location or when giving a presentation at a meeting.



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 (400x)

Can perform observation according to application

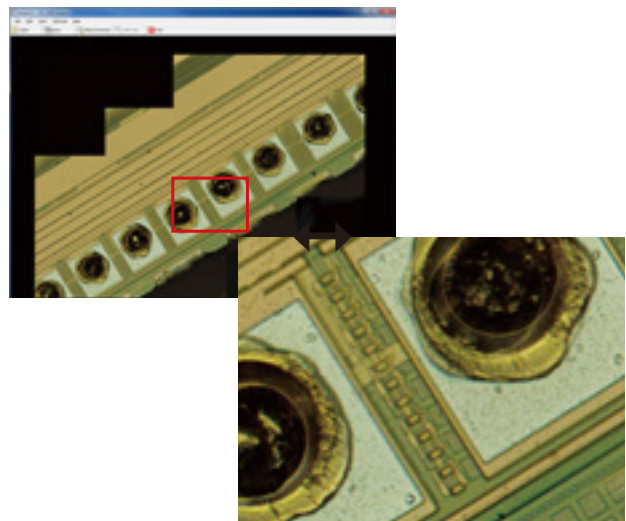
Adjust contrast

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

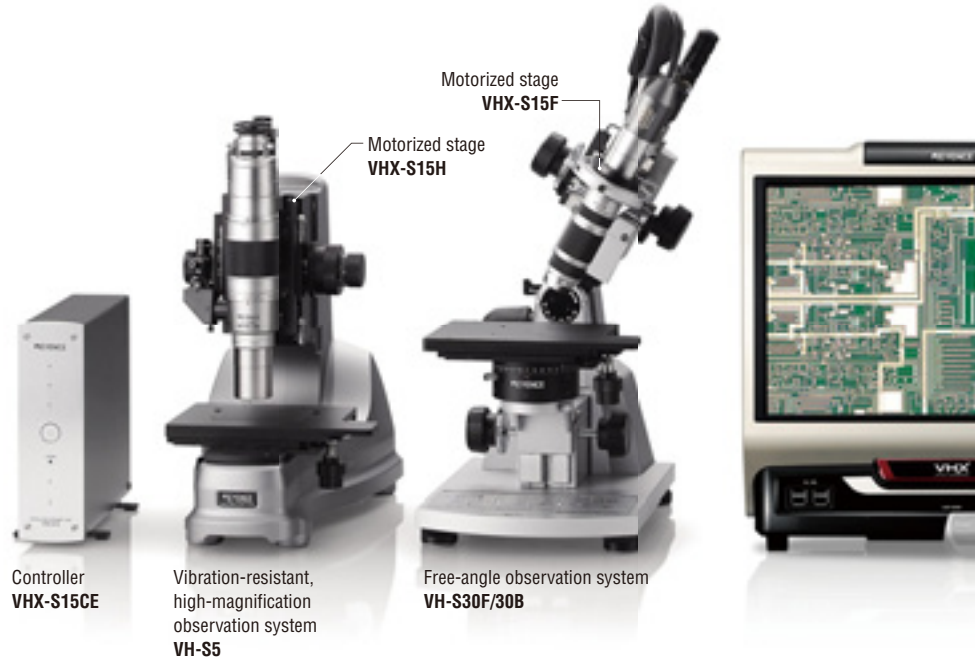
All-in-one 3D profile measurement system including a precision motorized stage for 3D measurement

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.

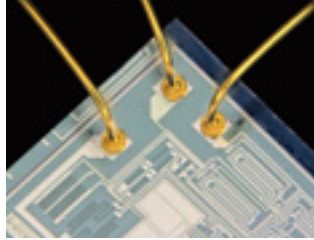
ABLE TO SUPPORT A WIDE-VARIETY OF APPLICATIONS

DIGITAL MICROSCOPE APPLICATIONS

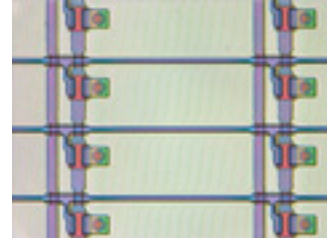
Semiconductor Industry



Color filter (1000x)

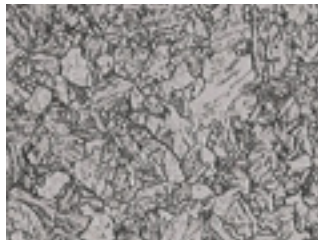


Wire bonding (300x)



ITO film (1000x)

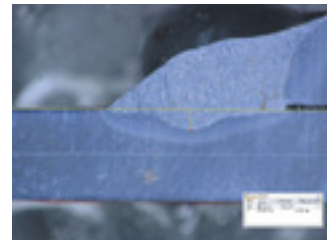
Metal Industry



Metal structure (400x)

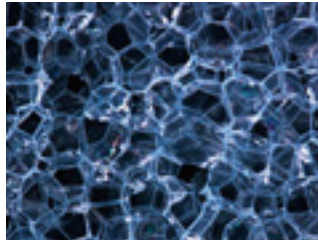


Metal fracture surface (200x)

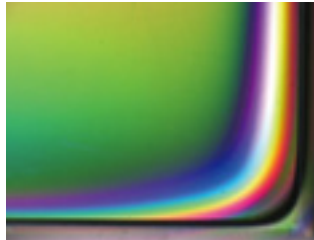


Weld penetration (5x)

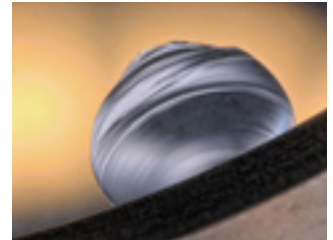
Raw Materials & Chemicals Industry



Heat insulating materials (100x)

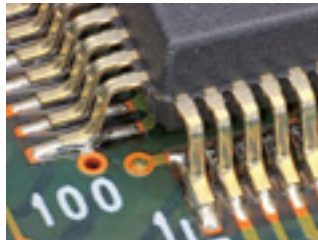


Residual stress (700x)

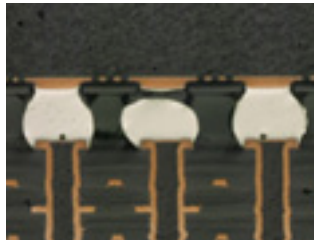


Glass bead (50x)

Electronics Industry



Electronic PC board (50x)



Solder ball cross-section (200x)

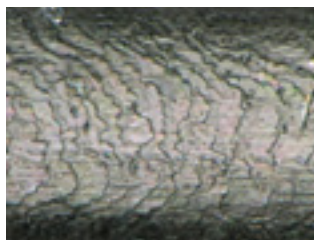


Solar cell (800x)

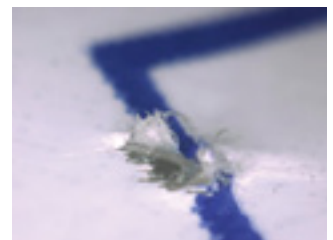
Pharmaceutical & Food Products Industry



Crystal (150x)

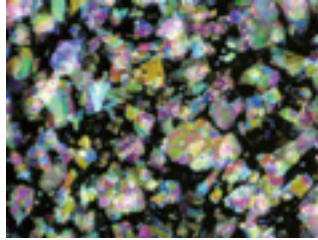


Hair (3000x)

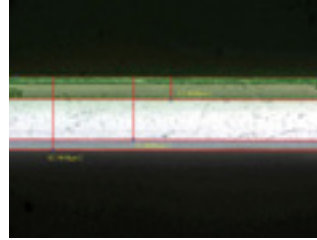


A tear in wrapped packaging (100x)

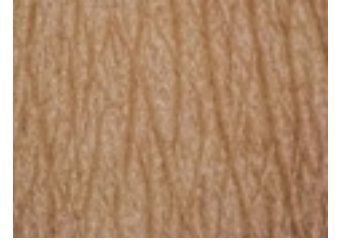
Other Industries



Mica (500x)

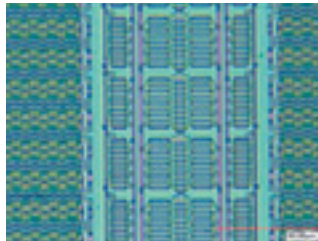


Cross-section of multi-layered film (1000x)

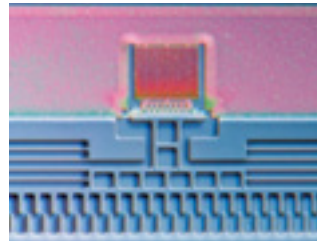


Human skin (50x)

Universities



LSI (2000x)

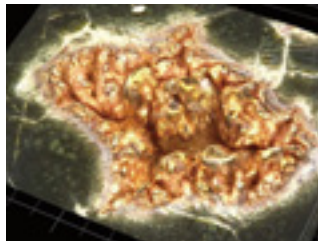


MEMS red pitch variable guided-mode resonant grating (1000x)

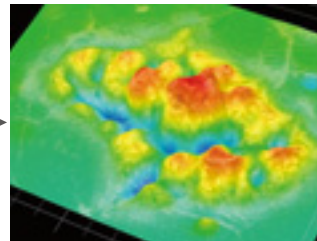


Stent (100x)

Cutting-Edge Functions/
Applications



Laser ablation (500x)



3D image

Height color image

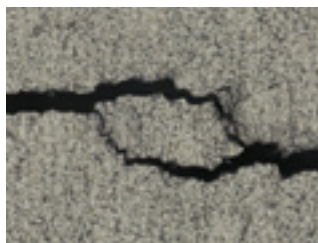


Photonic crystal filter (1000x)

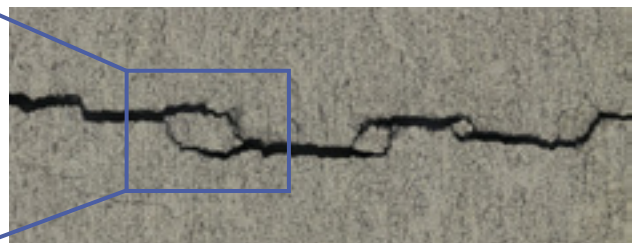
8-bit image



16-bit HDR image



Cracks in stainless steel (300x)



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



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



Triple illumination base unit
OP-87270 ⁸



DIC prism and filter set
OP-87297

Polarization observation set
OP-86927



Differential interference set
OP-86943



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



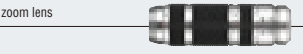
100x to 1000x

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

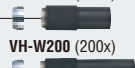
LONG-FOCAL-DISTANCE LENS



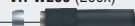
VH-W50 (50x)

Lateral view adapter
OP-98535

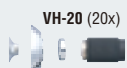
VH-W100 (100x)



VH-W200 (200x)



FIXED-MAGNIFICATION LENS



VH-20 (20x)



VH-50 (50x)

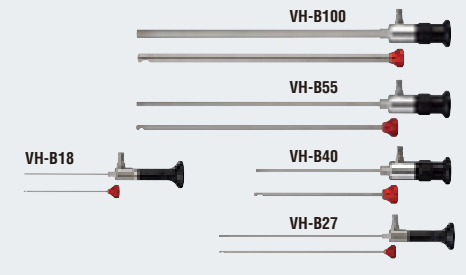


VH-100 (100x)



VH-200 (200x)

BORESCOPE LENS ⁸



FIBERSCOPE ²



Lens bracket⁵
**VHX-J00/
 J20/J20U/J50/
 J100/J250/J500**

Bayonet-type
 standard attachment
**OP-51478/
 OP-66871⁵**

VHX-1100

VHX-1020

VHX-2000E

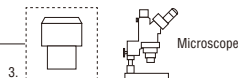
Foot switch

VHX-500FE

Camera unit

Bayonet-type C-mount
 attachment
OP-51479

Camera lens (C-mount type)



VH-F



XY measurement
 software
VHX-H1M1



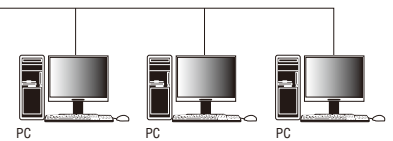
3D shape measurement
 software
VHX-H3M

LAN

CD-R/RW

USB

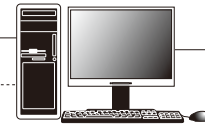
DVI (VHX-2000E)
 RGB (VHX-500FE)



PC

PC

PC



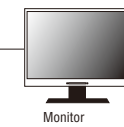
PC



Communication software
 (2D measurement, 3D/HDR
 display software)

USB memory, etc.

Hard disk drive

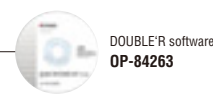


Monitor

A large screen monitor can be connected
 when several people need to view a target
 simultaneously. Since the target image is
 magnified further on the large screen, it can be
 checked more thoroughly.



3D Profile measurement unit
VHX-S15CE



DOUBLE'R software
OP-84263



3D profile measurement
 software
VHX-H2M

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/Z2250W/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.

SPECIFICATIONS (SYSTEM)

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 × 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 External monitor		
Input	Mouse input	Supports USB mouse	MINI-DIN 6-pin connector (DOS/IV-compatible PS/2 mouse)	
	Keyboard input	Supports USB keyboards	MINI-DIN 6-pin connector (DOS/IV 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

Model		Z stage VHX-S90F	VHX-S15F	XY stage 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"	—
XYØ 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 (XYØ 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	1.0x to 10.0x (100 steps)	–	1.0x to 10.0x (100 steps)	–
	Lighting shift function (Height difference enhancement)	Provided	–	Provided	–
		(Full, Partial, and Flanking illumination modes)	✓	(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-8426/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 unit 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	18 kg	
Load capacity	3kg	

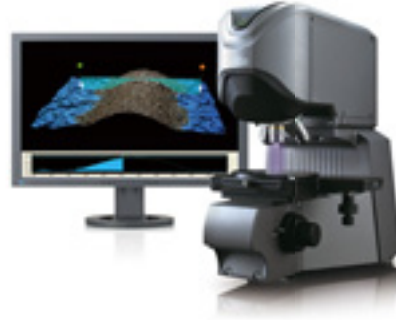
* "L" means movement distance (mm).

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

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