KEYENCE

NEW Digital Microscope
VHX-500

VHX
DIGITAL MICROSCOPE

A single unit of the VHX-500 provides all functions, from “zoom observation” to advanced analyses.

Digital Microscope

“Clear” and “3-D” observation that is not available with conventional microscopes

All functions for “Observation”, “Recording” and “Measurement”, from observation to 3-D display, are condensed in the VHX-500 unit.

“Anyone who wishes to observe a target more easily, clearly and accurately in a shorter time”
The VHX-500 has been renewed to meet such a request.
The VHX-500 not only provides advanced functions that enable ultra-deep and high-definition observation, but it also can be operated easily by anyone.
The VHX-500 meets a variety of users’ requests for evaluation time reduction and quality improvement, from observation to analyzing steps.

NEW Digital Microscope VHX-500

Ease of operation superior to conventional microscopes ……P4-5

- Observation — Large depth of field
- Recording — Recording observed images on the spot
- Measurement — Enabling real-time measurement

1 Clear observation ……P6-8

- 18,000,000-pixel handheld camera with the highest resolution in its class
- High-resolution RZ lens
- Contrast optimization (First in the industry)

2 3-D observation ……P9-11

- Highest speed in the industry Real-time depth composition
- Highest speed in the industry Quick 3-D function (Hybrid D.F.D method)
- Various 3-D display and 3-D measurement modes

3 Easy operation ……P12

- Optimal observation with the push of a button

4 More accurate measurement …P13-15

- Wide-visual-field, automatic 2-point distance measurement (Industry-first)
- 3-D profile automatic measurement

Ease of operation superior to conventional microscopes

The VHX-500 provides ease of operation superior to conventional microscopes, in any of the steps of “Observation”, “Recording” and “Measurement”.
Anyone can observe targets easily and accurately.

“Observation”

Clear 3-D observation with a large depth of field

The VHX-500 provides a depth of field at least 20 times larger than optical microscopes. Thus, the VHX-500 can accurately observe a target (even with a large height difference) that could not be focused on with conventional microscopes. Furthermore, the number of steps required for observation including focus adjustment can be reduced considerably.

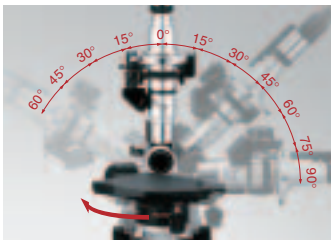
Image captured with an optical microscope

Image captured with a digital microscope

Enabling observation at all angles

You can freely observe a target with the lens unit held by hand or mounted to the stand. You can capture any phenomenon exactly without any oversights by changing the observation angle. Furthermore, the time required for observation can be reduced considerably.

Hand-held observation



Free-angle observation system

Enabling real-time image improvement

Through various digital processing functions, the VHX-500 can solve problems on displayed images caused by low contrast or darkness. With the KEYENCE-original graphic engine, the VHX-500 enables real-time observation while using the image improvement function, enabling accurate observation without overlooking any phenomenon.

Gold plating (100x)

Normal image

Improved image

“Recording”

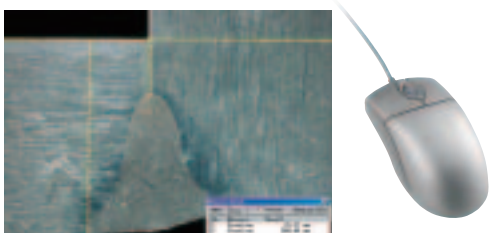
Recording observed images on the spot

The VHX-500 incorporates a large-capacity (160 GB) HDD, enabling image files to be loaded easily into your PC via LAN. Furthermore, the VHX-500 can be connected to various storage media, enabling saved images to be loaded instantaneously into your storage media. Since the VHX-500 can save moving images as well as still images, it can record a real change or minute motion of a target over time.

“Measurement”

Enabling real-time measurement

Through simple mouse operations, the VHX-500 enables real-time measurement of the distance, radius, angle and area of a target on the monitor screen. Unlike the system that executes measurement after loading a still image into a PC, the VHX-500 can measure a target repeatedly while changing the visual field. This function is useful for measurement at various positions of a target.

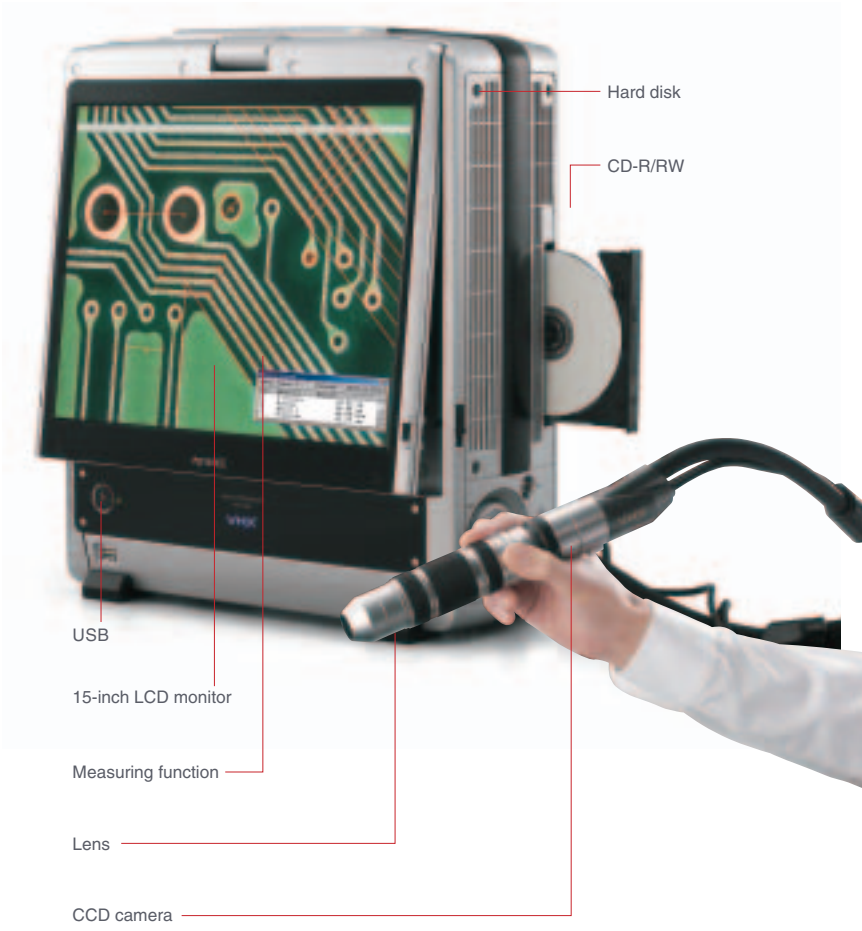


Weld penetration (50x)

All In One

All-in-one microscope incorporating “Observation”, “Recording” and “Measurement” functions

The VHX-500 provides a UXGA (1600 x 1200 pixels) high-resolution 15-inch LCD monitor, condensing all functions required for observation in the microscope unit. All functions for “Observation”, “Recording” and “Measurement” are available with a single unit of the VHX-500.



1
Clear observation

18 million pixels

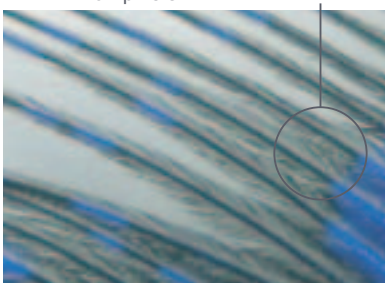
Class-highest resolution

With a high-precision multi-scan system, the VHX-500 realizes the 18,000,000-pixel handheld camera of the highest class in the industry.

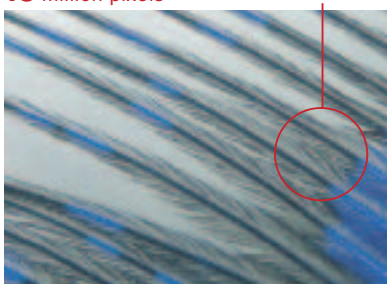
18,000,000-pixel handheld camera

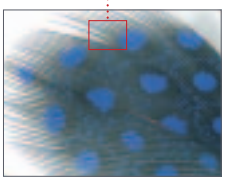
Although the VHX-500 is compact, it enables high-definition (18 million pixels max.) observation by using the CCD multi-scan system with a built-in actuator. Furthermore, with the progressive scanning method that eliminates glare, the VHX-500 enables texture expression and color reproduction like observation with the naked eye.

2.11 million pixels Resolution: 1000 TV lines



18 million pixels Resolution: 2000 TV lines





A peacock feather

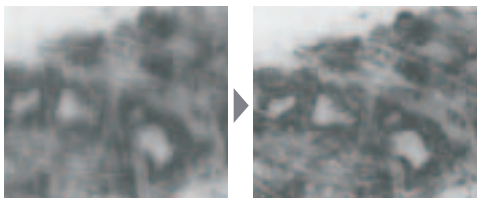
Selectable variations of resolutions suited for observation purposes

- 18,000,000-pixel ultra-high-definition mode (2000 TV lines)
- 8,000,000-pixel high-definition mode (1600TV lines)
- 2,000,000-pixel, 3-CCD mode (1200TV lines)
- 4,000,000-pixel-equivalent clear mode [Equivalent to moving image] (1200TV lines)
- 2,110,000-pixel normal mode (1000TV lines)

Industry-first

Camera-shake correcting function

Through further improvement of the processing capacity, the VHX-500 enables real-time camera-shake correction by sub pixel. This function enables high-magnification observation without being affected by environmental vibration.



Without camera-shake correction

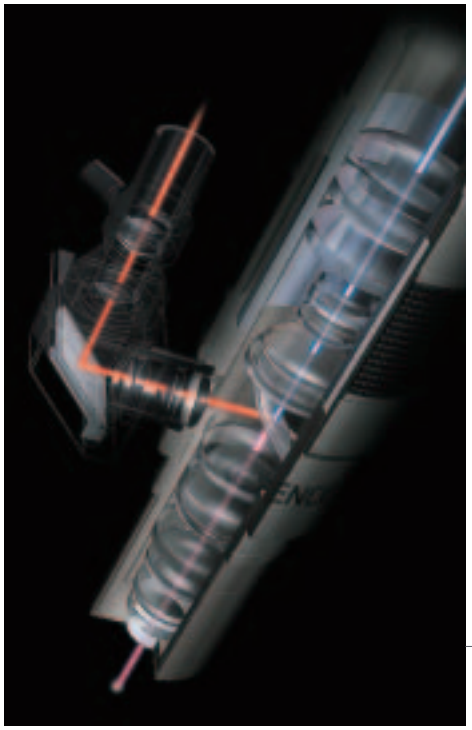
With camera-shake correction

Frame rate 15 F/sec

With a frame rate of 15 frames/second, the VHX-500 provides excellent tracking ability, enabling magnification change and focus adjustment to be performed smoothly.

High-resolution lens

With KEYENCE-original optical technologies, the VHX-500 provides class-highest resolution, enabling clear and accurate observation.



RZ LENS
Real Zoom Lens

The VHX-500 uses the RZ (real zoom) lens, or the high-performance lens that can correct chromatic aberration to an ideal value. Through the leading-edge optical design and advanced illumination technology, the VHX-500 can minimize aberration distortion. Furthermore, with the highly-telecentric lens design, the RZ lens can create extremely clear and perfect-depth composition images and 3-D images. By making the best use of the digital focus functions that are the essential feature of the VHX Series, the high-performance RZ lens enables “real” observation as its name expresses.

The lens unit is comprised of 24 lenses in total, including 8 groups of 13 lenses for the objective section, and 9 groups of 11 lenses for the zoom section. Using a silica lens, the VHX-500 can correct chromatic aberration almost ideally.

NEW

VH-Z20
20 > 200

Ultra-small, high-performance zoom lens
- Class-highest resolution. Providing a resolution approximately twice as high as conventional microscopes
- A depth of field at least twenty times larger than optical microscopes
- Optical 10x zoom covering 20x to 200x observation magnification

VH-Z100
100 > 1000

Wide-range zoom lens
- High-resolution lens. Providing 2.5 times higher resolution than conventional microscopes
- Optical 10x zoom covering 100x to 1000x observation magnification at a 0.98" (25 mm) observation distance
- Extremely large depth of field: Approx. twice as deep as conventional microscopes

VH-Z500
500 > 5000

High-resolution zoom lens
- High-resolution lens with a numerical aperture (NA) of 0.82
- Optical 10x zoom covering 500x to 5000x observation magnification
- Enabling observation under polarizing illumination

Optimal settings

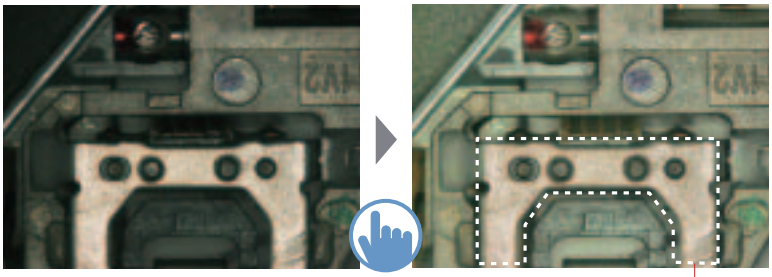
With the KEYENCE-original graphic engine, you can always observe a target with optimal settings. The VHX-500 enables accurate observation without overlooking any phenomenon.

Contrast

Optimal contrast Industry-first

Real-time correction according to the sensitivity of human eyes

With the original algorithm, the VHX-500 automatically adjusts dark and bright areas to the optimal contrast, without changing the area with proper sensitivity. You can even observe fine texture which cannot be expressed only with illumination adjustment.

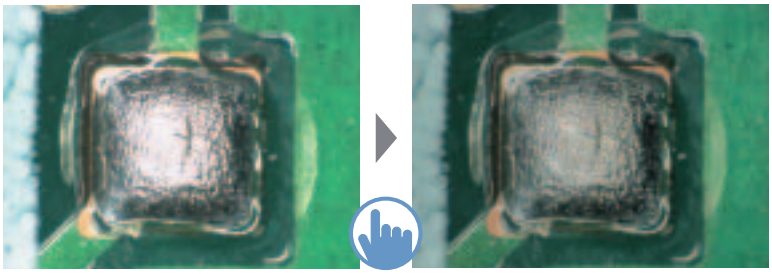


DVD mechanical component (30x)

Eliminating halation Industry-first

For a still image **Eliminating the glare of a target**

In addition to the contrast optimization, the KEYENCE-original halation eliminating function can suppress the glare of a target subjected to strong reflected light, enabling clear observation. This function can remarkably reduce the time required for illumination adjustment.



Solder(150x)

Image improvement function applicable to various targets

Supercharge shutter
When the displayed image is dark due to insufficient light quantity, the shutter time can be specified in 0.1-second steps up to 17 seconds (max).

Gamma correction
Provides contrast for a target without brightness difference.

Edge enhancement function
Enhances the edges of an observation area, enabling easy detection of a minute flaw.

Noise elimination
Eliminates noise components only, with original image data retained.

Lighting

Lighting shift function Industry-first

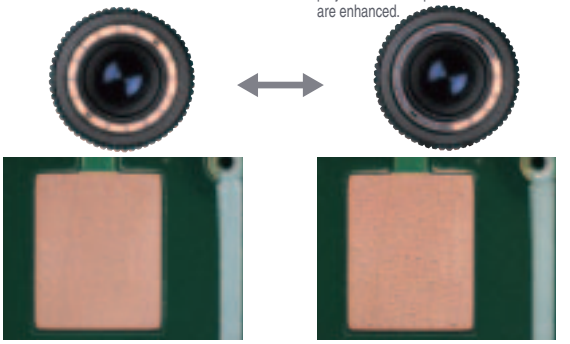
Simply with the push of a button

One-button control for enhancing projections and depressions

Simply by pushing the “Height Difference Enhancement” button on the console, the illumination mode is switched instantaneously to bijective illumination that enhances target edges.

Surjective illumination
All illuminations at the tip of the camera unit turn on.

Bijective illumination
Only one-fourth of the illuminations at the tip of the camera unit turn on. The projections and depressions are enhanced.



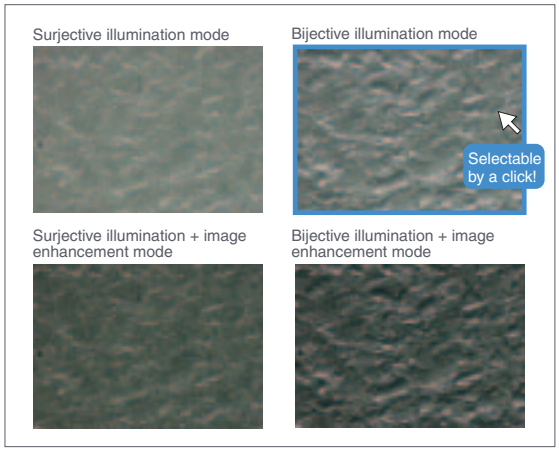
Gold plating(100x)

e-Preview mode Industry-first

Simply with the push of a button

One-click operation selects the image mode optimal for observation.

Simply by pushing the “Optimal Image” button, four types of image modes are listed. Then, you can click on an image suitable for your observation purpose.



Coating surface condition (500x)

Digital Focus

Even for a target with uneven surface conditions, the VHX-500 can remarkably reduce observation time by setting a focal distance to infinity.

Real-time depth composition Highest speed in the industry

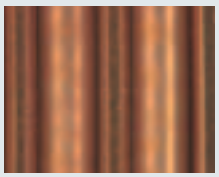
Effective for quick confirmation of the whole image (Approx. 5 times higher speed than conventional microscopes)

"Real-time depth composition" enables depth composition so quickly that you may not realize that you have executed composition. You can view the overall-in-focus image in real time simply by turning the focus adjusting dial while observing a target. With the KEYENCE-original graphic engine, the VHX-500 can quickly display a composed image on the large (UXGA) screen. Therefore, you can save a considerable amount of labor and time required for composition.

Observation at high magnification

The microscope cannot be focused on the whole image.

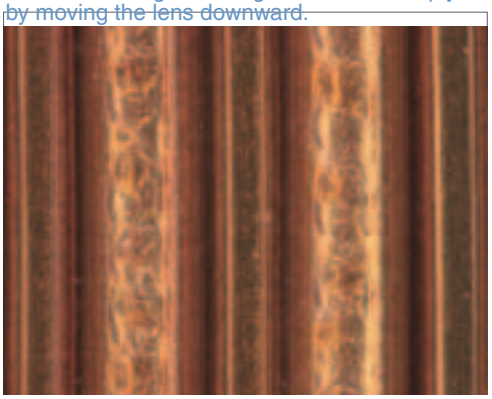
When a higher area is brought into focus



When a lower area is brought into focus

Observation using the VHX digital microscope

The whole image is brought into focus simply by moving the lens downward.



Coil (400x)

High-quality depth composition Industry-first

Composing sharp images with superior depth-of-field while correcting the edge deviations

With the KEYENCE-original hybrid D.F.D depth composition method, the VHX-500 can display a high-definition, overall-in-focus image without being affected by extraneous light. Furthermore, the VHX-500 provides the "position correction" function as a standard feature, which can correct edge displacement of a target image and magnification fluctuations caused by shift of the focus position. The VHX-500 can create a "high-quality" composed image as its name expresses.

Position correction

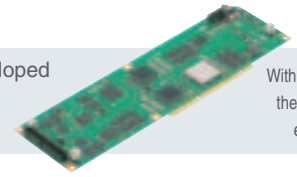
The VHX-500 corrects edge displacement caused by shift of the focus position of a non-telecentric optical lens.

When an image with different focus positions is captured with a non-telecentric optical lens, the edge of the target image will be displaced when the focus position is changed. The VHX-500 can correct such edge displacement automatically and display a highly perfect, overall-in-focus image.

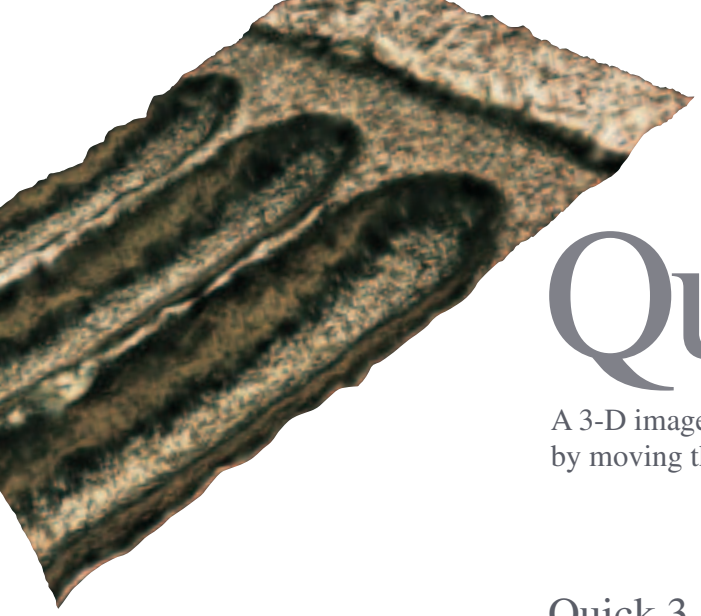
Component on board (90x)
Without position correction

With position correction

Originally developed graphic engine



With the special image processing board based on the KEYENCE-original architecture, the VHX-500 enables real-time processing of UXGA images.



Quick 3D

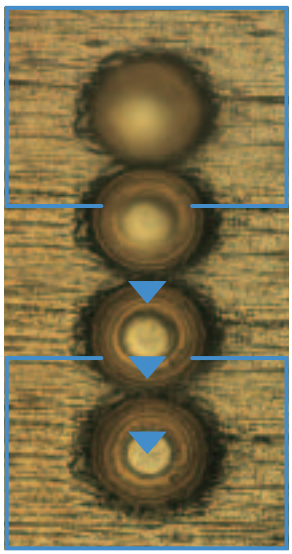
A 3-D image can be displayed instantaneously by moving the lens downward.

Quick 3-D display

Highest speed in the industry

Ultimate ease of operation

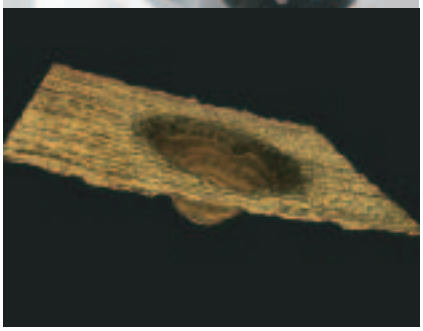
Through speed-up of the hybrid D.F.D method, the VHX-500 enables you to create a “high-quality” composed image instantaneously by turning the focus adjusting knob and proceeding directly to the 3-D display mode.



Focus on the highest point.Gradually shift the focus point downward.

High-quality composition is complete.

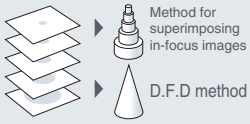
Proceed directly to the 3-D displa



The 3-D image can be rotated freely or zoomed through mouse operations.

Electrode hole (1000x)

The “D.F.D” method is an abbreviation of the “Depth from Defocus” method, a method for obtaining 3-D depth data through analysis of defocus of 2-D images. Even if a completely focused image cannot be captured, the VHX-500 series calculates a height difference of the target. Thus, the VHX-500 series enables depth composition and 3-D image display by using less sample images than conventional microscopes.
This method eliminates the need to load images on all focus positions, resulting in analysis efficiency improvement.

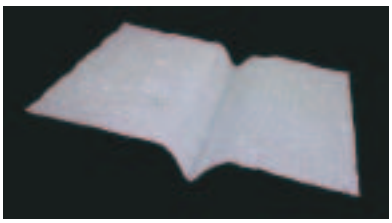


Furthermore, **the hybrid D.F.D method** provides the following features:

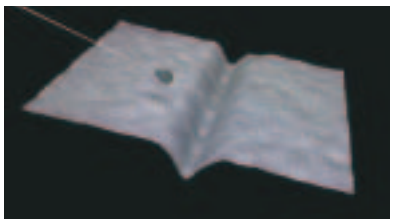
- Enables accurate composition even with a target that has a gentle slope and no remarkable unevenness. (A.D.I algorithm)
- Noise waveform generated on a target edge can be eliminated securely. (A.S.I filter)

3-D illumination simulation function

Since the illumination direction can be changed freely through mouse control, the VHX-500 series can capture optimal images according to the purpose of observation, such as observation of the profile and surface condition. This function is effective for observation of fine surface conditions.



Ceramic substrate (1000x) Normal 3-D image



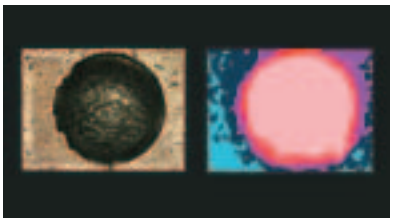
3-D illumination simulation image

3-D two-screen simultaneous comparative function

This function enables comparative observation with two different targets placed side by side, while changing the observation angle. Furthermore, the comparative difference display function has been newly added, which allows you to capture a profile difference visually with two types of 3-D data superimposed.

Two-screen simultaneous comparative function

Comparative difference display function

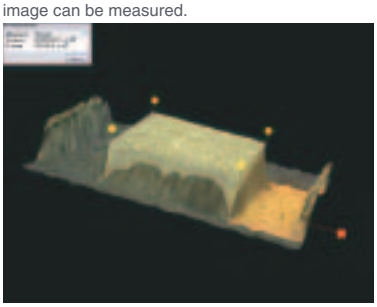


Various measurements on the 3-D image

New function *Function of the VHX-H2M

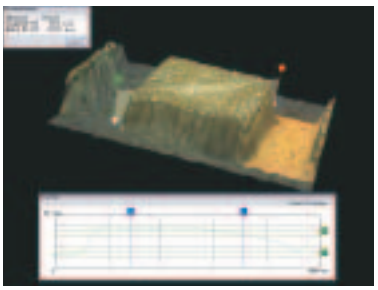
Volume measurement

A volume surrounded with the rectangle on a 3-D image can be measured.



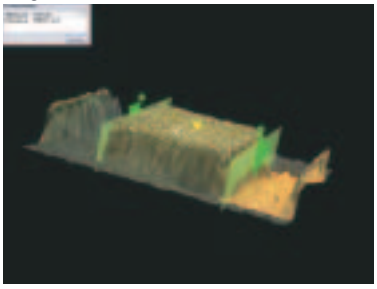
Cross-section profile measurement3

An arbitrary cross-section profile on a 3-D image can be measured.



Plane distance measurement

A distance between two parallel planes on a 3-D image can be measured.



Plane angle measurement

A cross-section angle of two arbitrary planes on a 3-D image can be measured.

3-D observation allows you to see such details

Simple operation

Optimal observation is enabled simply with the push of a button.

This console is intended to perform observation more quickly and easily. Only commonly used functions are provided on the console, enabling you to observe any target clearly with the push of a button.

Optimal contrast
Adjusts the contrast automatically according to the sensitivity of human eyes.

Height Difference Enhancement
The surjective and bijective illumination modes can be switched simply by pressing this button.

REC
Recording

PAUSE
Pause

Remove Halation
Eliminates the glare of a target surface caused by light reflection.

Optimal Image
Four types of images modes are listed, allowing you to select a suitable image according to the purpose of observation.

Real Digital Zoom
You can simultaneously zoom in on a desired observation spot.

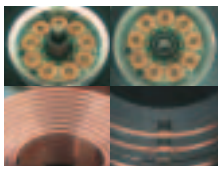
Camera-Shake Correction
Corrects minute vibration such as environmental vibration, ensuring stable observation.

Real-time depth composition
Simultaneously composes images of a target with a height difference.

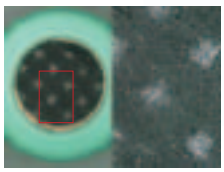
Quick 3-D display
Creates a 3-D image simply by moving the focus downward.

Useful observation functions

Split function
Screen-split function that simplifies comparative observation



Motor



Vertical two-part split　Electronic component

Horizontal two-part split　Razor (2000x)

Four-part split

Easy data recording/application

Compatible with USB2.0

The VHX-500 can be connected to various storage media (external memory devices) via the USB interface. (USB2.0) You can quickly take observation results by using your storage media.

* Some devices may not be compatible, depending on the specifications.

Compatible with LAN / FTP server

The VHX-500 provides a 1000baseT LAN port. You can take data from your PC browser or FTP software by setting a VHX IP address to use a FTP server.

* For connection to a FTP server, additional software is required.

VHX-500 communication software (Free software)

Dedicated software that can be used on your PC. This software enables data transmission/reception between the VHX and PC via LAN.
With the newly added high-speed transmission mode for LAN, data communication speed becomes three times higher than conventional models.
(Compatible OS: Windows XP/ 2000)

VHX-500 3-D display software (Free software)

This software reproduces a 3-D image captured with the VHX Series, allowing you to observe the 3-D image while changing the 3-D angle, as well as a still image. It is new report tool software that can convey analysis results correctly to associated people by giving impact on the visuals.

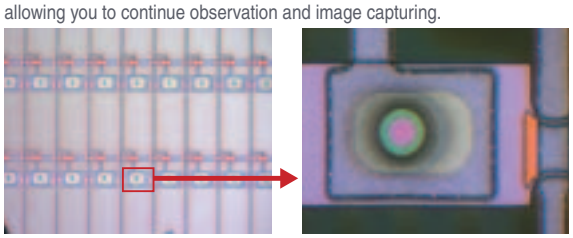
1.Windows XP/2000 are registered trademarks of Microsoft Corporation, U.S.A.

Real-time measurement on screen

High-resolution dimensional measurement function

Enables more accurate measurement on the 4800 x 3600 screen

You can specify a measuring point on an image captured in a size 9 times larger than conventional microscopes through the multi-scan system, enabling more accurate dimensional measurement. Furthermore, to place importance on operability, the VHX-500 automatically restores the enlarged screen to the original size after measuring point setup is completed, allowing you to continue observation and image capturing.



Normal screen TFT (500x) Enlarged screen

Wide-visual-field, automatic 2-point distance measurement function

Industry-first

Enables dimensional measurement by sub pixel

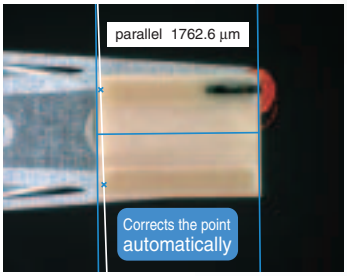
The VHX-500 automatically finds a specified image from a low-magnification, wide-visual-field image through pattern matching. This function enables wide-range, high-precision, automatic 2-point distance measurement.

Auto edge selection function

Industry-first

Ensuring more accurate observation by eliminating personal errors

Even when the measurement point specified by clicking the mouse on the screen is deviated, the edge of the target is detected to correct the measurement point automatically. This function realizes accurate and highly reliable dimension measurement by eliminating the reading errors of operators.



Read head of hard disk (70x)

Auto calibration

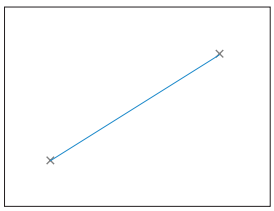
Industry-first

A special glass scale enables automatic calibration.

Automated calibration according to the observation magnification can be performed using the special glass scale (op-51483), enabling accurate dimension measurements without significant measurement errors.

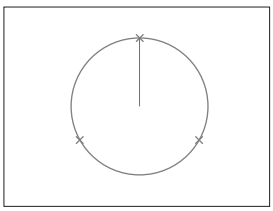
Various measurement modes

Distance



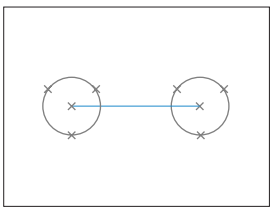
The distance between two points on the screen can be measured by specifying the points with the cursor.

Radius



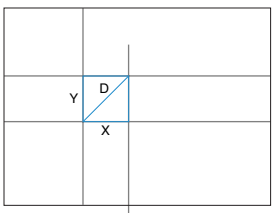
The radius of the circle can be measured by specifying the desired three points on the screen.

Center distance



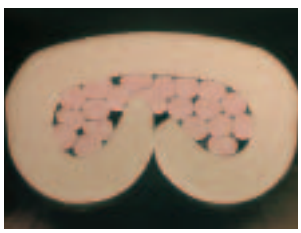
Specify three points on the circumference to find the coordinate of the circle center. The distance between two circle centers can be measured by specifying two circles sequentially.

X-Y distance



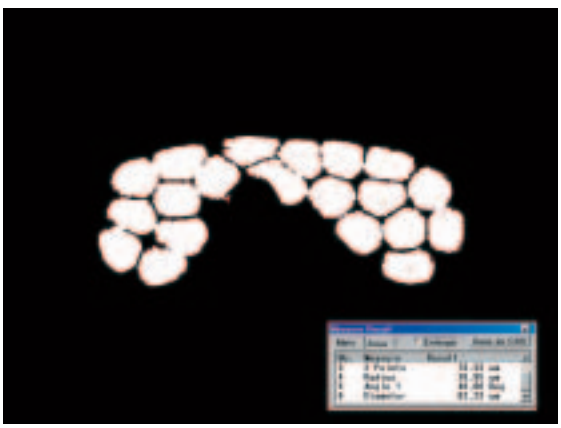
The longitudinal (X-direction), transversal (Y-direction), and diagonal (D-direction) distances of a rectangle formed by four coordinate axes (two in the X-direction and two in the Y-direction) can be measured at one time.

Area/Count/Auto measurement



Connector crimp (100x)

The target of the measurement can be extracted automatically by differentiating the brightness and colors in the image. The area and the perimeter length are measured. The number of extracted areas can be counted automatically as well.



Distance between parallel lines

The shortest distance between two parallel lines can be measured by specifying two arbitrary points that draw a line and another line parallel to the first line.

Length of perpendicular line

The shortest distance (perpendicular line) between a line specified with two arbitrary points and another arbitrary point can be measured.

Angle

The angle determined by three arbitrary points on the screen can be measured.

Bar/Mesh/Cross

Bar, mesh, cross and other various shapes can be displayed as a scale. These can be conveniently used as the reference scale for simplified measurement or for printing the images.

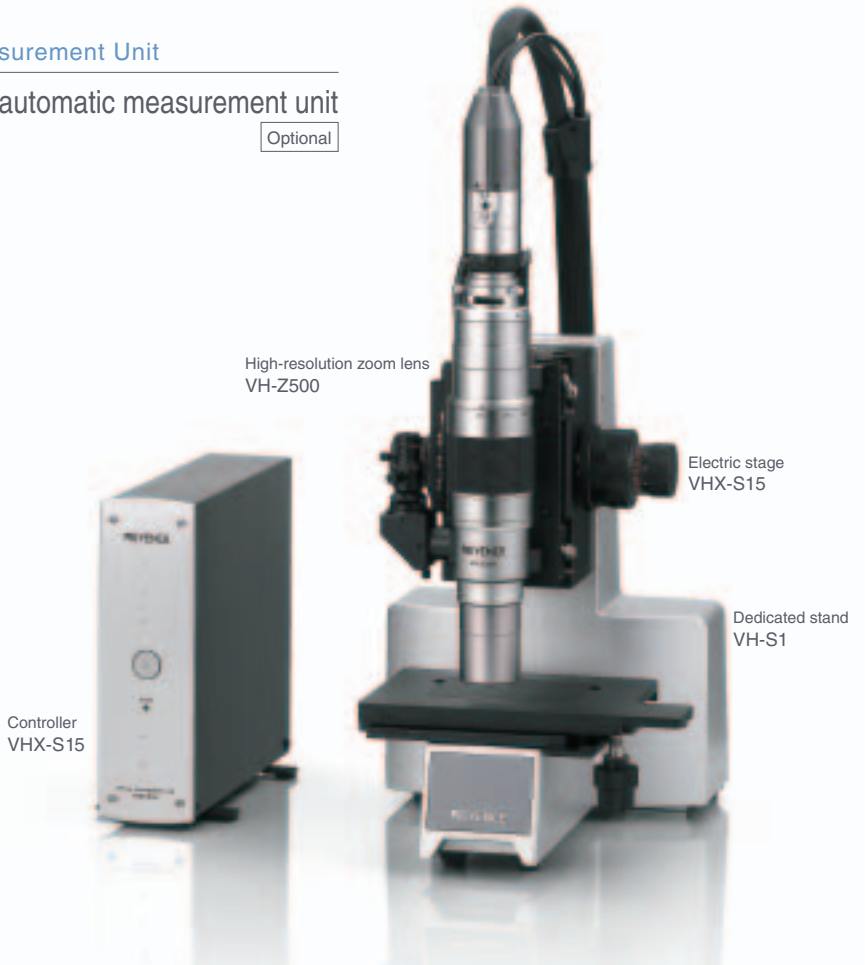
3-D profile measurement using a microscope

With the high-precision electric linear stage and the newly-developed profile measurement function, the VHX-500 integrates all steps from zoom observation to 3-D profile automatic measurement. The VHX-500 enables further advanced analyses over zoom observation.

Profile Measurement Unit

3-D profile automatic measurement unit

Optional

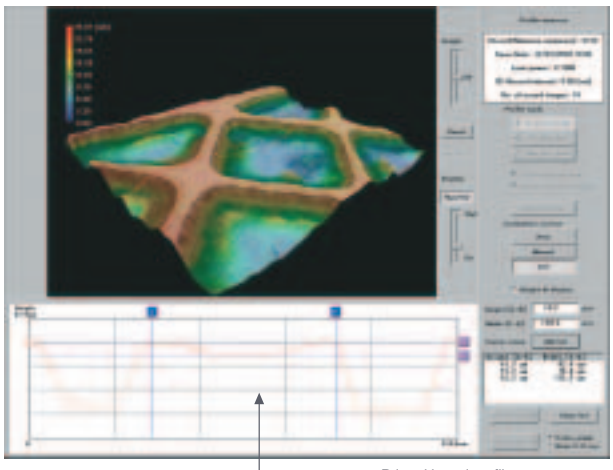


3-D profile measurement software
VHX-H2MK

3-D profile measurement

* Function of the VHX-H2MK

The VHX-500 creates a 3-D image based on automatically captured images, and it calculates height profile data on a desired measuring line. Height, width and height difference data on the measuring line are plotted on a graph. Since the profile graph is related to the cursor position in the image display area, you can see the current measuring point easily.



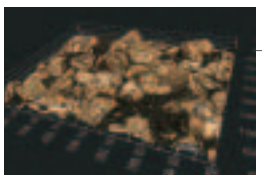
Printed board profile measurement

With the horizontal/vertical cursor, the height and width can be measured. The 2-line comparative mode can simultaneously display profile data on two parallel lines, enabling comparative analysis.

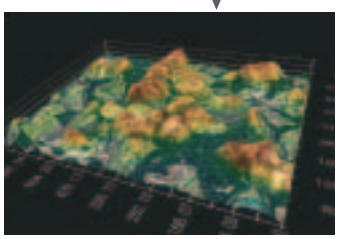
Height color/scale display

* Function of the VHX-H2MK

Color bars that indicate height are displayed on a 3-D image. The highest position is displayed in red, and the lowest position is displayed in navy blue, allowing you to see a height difference 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 3-D rotation angle.

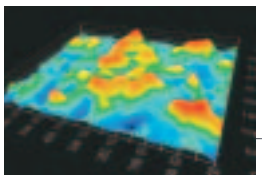


3-D raw image



3-D raw image + rainbow image

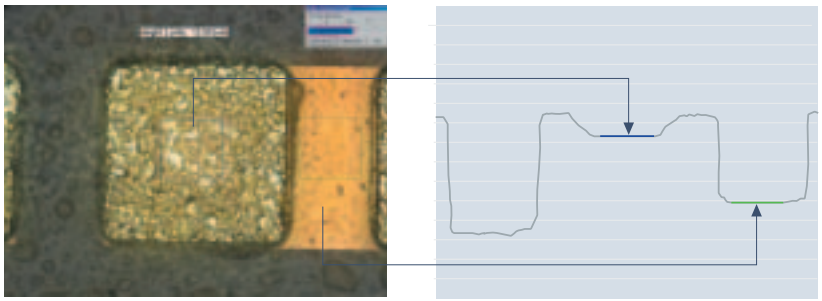
Grind stone (500x)



3-D rainbow image

2-point height difference measurement

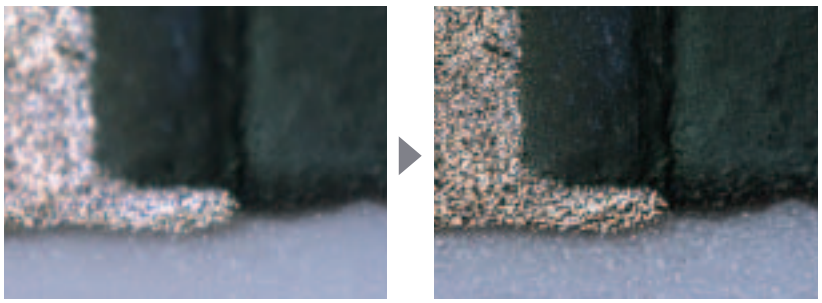
The VHX-500 can quickly and automatically measure a height difference between specified windows in the automatic measurement mode. In the manual measurement mode, you can measure a height difference between two points while monitoring a focus condition of details.



Bump (3000x)

Auto focus function

This function enables anyone to perform high-magnification focus adjustment quickly and accurately. The auto focus function can be applied even to a target with uneven surface conditions, since the focusing area can be specified on the screen.

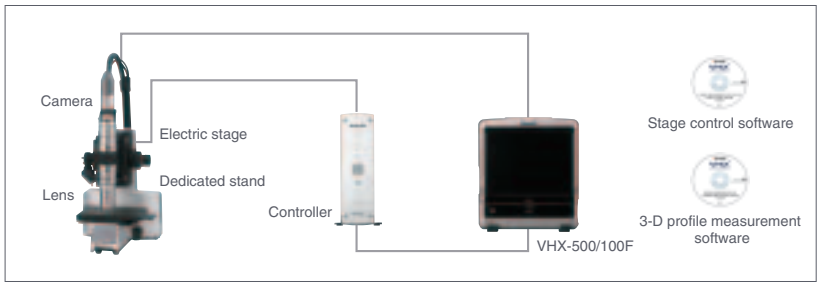


Chip resistor (500x) Before focusing After focusing

All-in-one system

Centralized control of stage operation, observation and analysis

All steps from stage operation, zoom observation and 3-D analysis to image-saving and network connection are enabled in the VHX unit. You do not need a device or PC for stage operation or analysis. This system saves space and provides high operating efficiency.



Specifications

Model		VHX-S15
Applicable lens		VH-Z500, VH-Z450, VH-Z100, VH-Z75
Stage stroke distance		0.59" 15 mm
Motor		5-phase stepping motor
Resolution		0.002 Mil 0.05 µm/pulse
Positioning accuracy *		0.23 Mil 6 µm
Repeatability *		±0.02 Mil 0.5 µm
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% RH (No condensation)
Weight		Controller: 3 kg, Electric stage: 1.3 kg
Load capacity		5 kg

*Typical value of electric stage single unit

Option

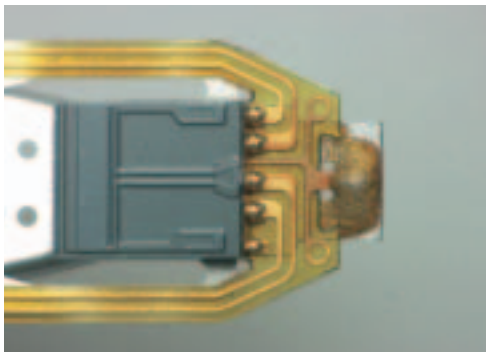
Digital indicator set
OP-51610

Digital indicator for direct measurement of the lens stroke distance, ensuring easy calibration

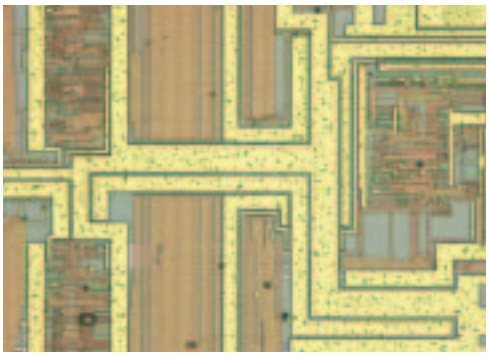
Application

Wide applications to meet the needs of various industries

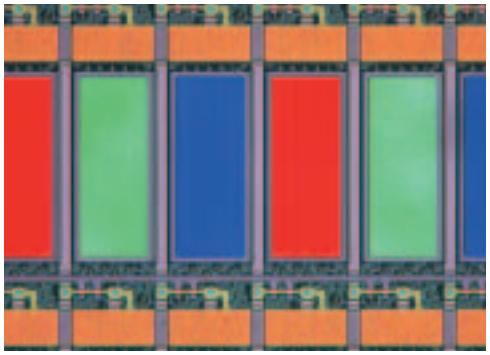
Electric/Electronics



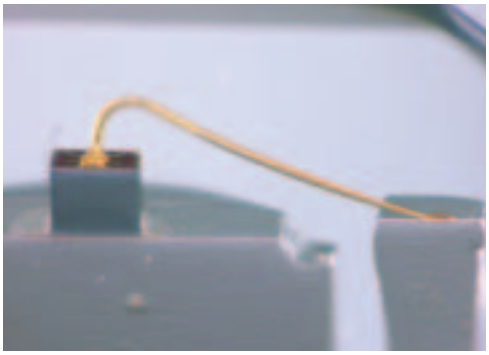
HDD head (100x)



IC pattern (1000x)

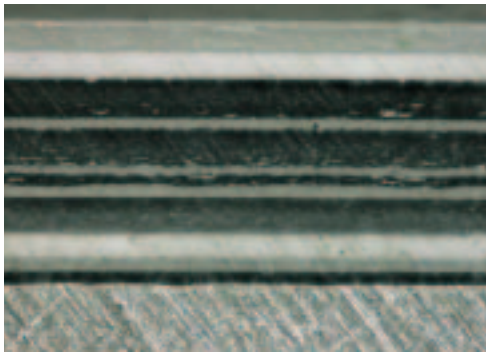


LCD (800x)

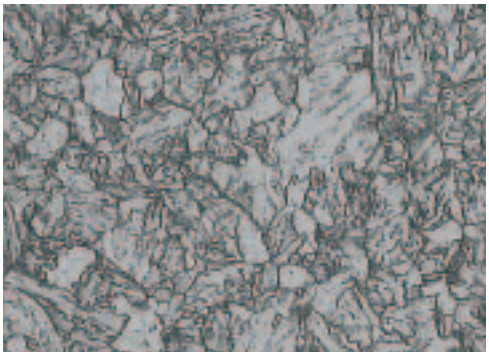


LED (200x)

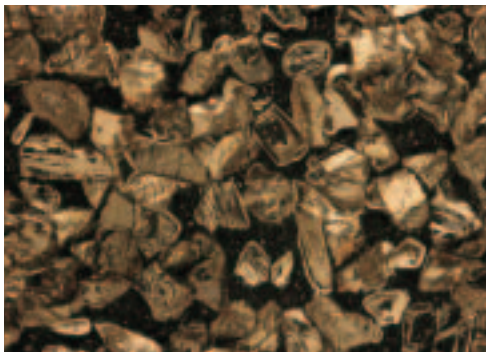
Transportation/Metal industries



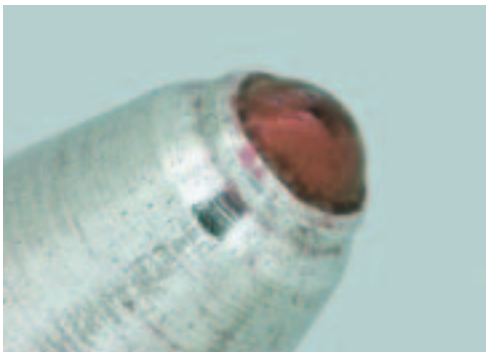
Fracture surface (500x)



Microstructure of metal (400x)

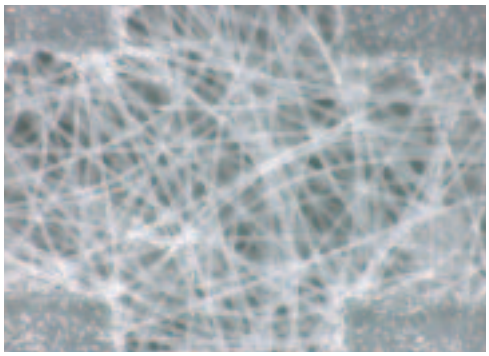


Grind stone (500x)

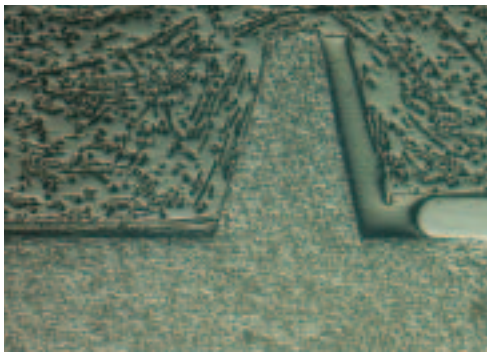


Tip of ballpoint pen (200x)

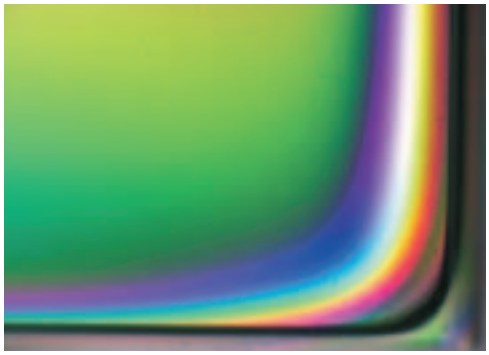
Material/Chemical industries



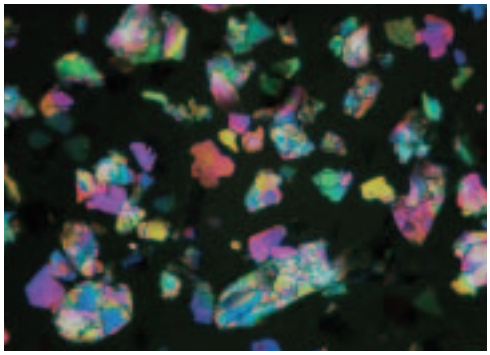
Non-woven fabric (150x)



Glass fiber (200x)

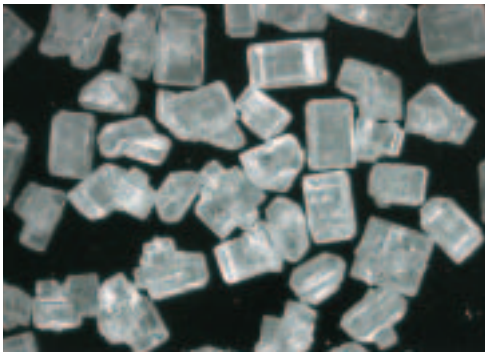


Residual stress on resin (100x)

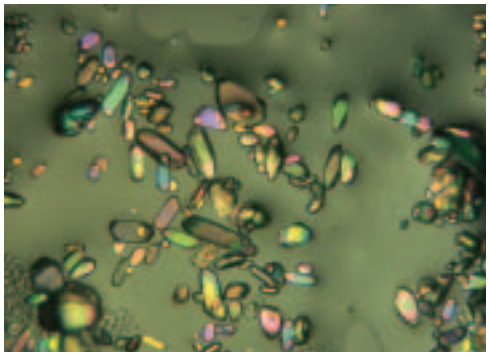


Mica (1000x)

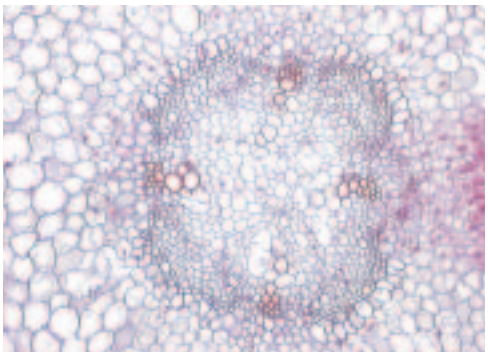
Other industries



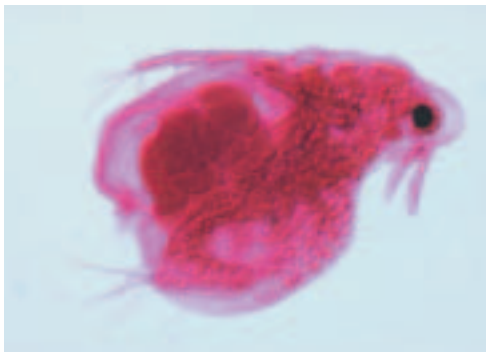
Food (Sugar) (50x)



Chemical (Liquid agent) (500x)



Plant (Broad bean) (300x)



Living thing (Water flea) (300x)

Peripheral equipment

Free angle System

NEW **Free-angle observation system** VH-S30

(Ucentric system)

Vibration Proof / Super High-accuracy

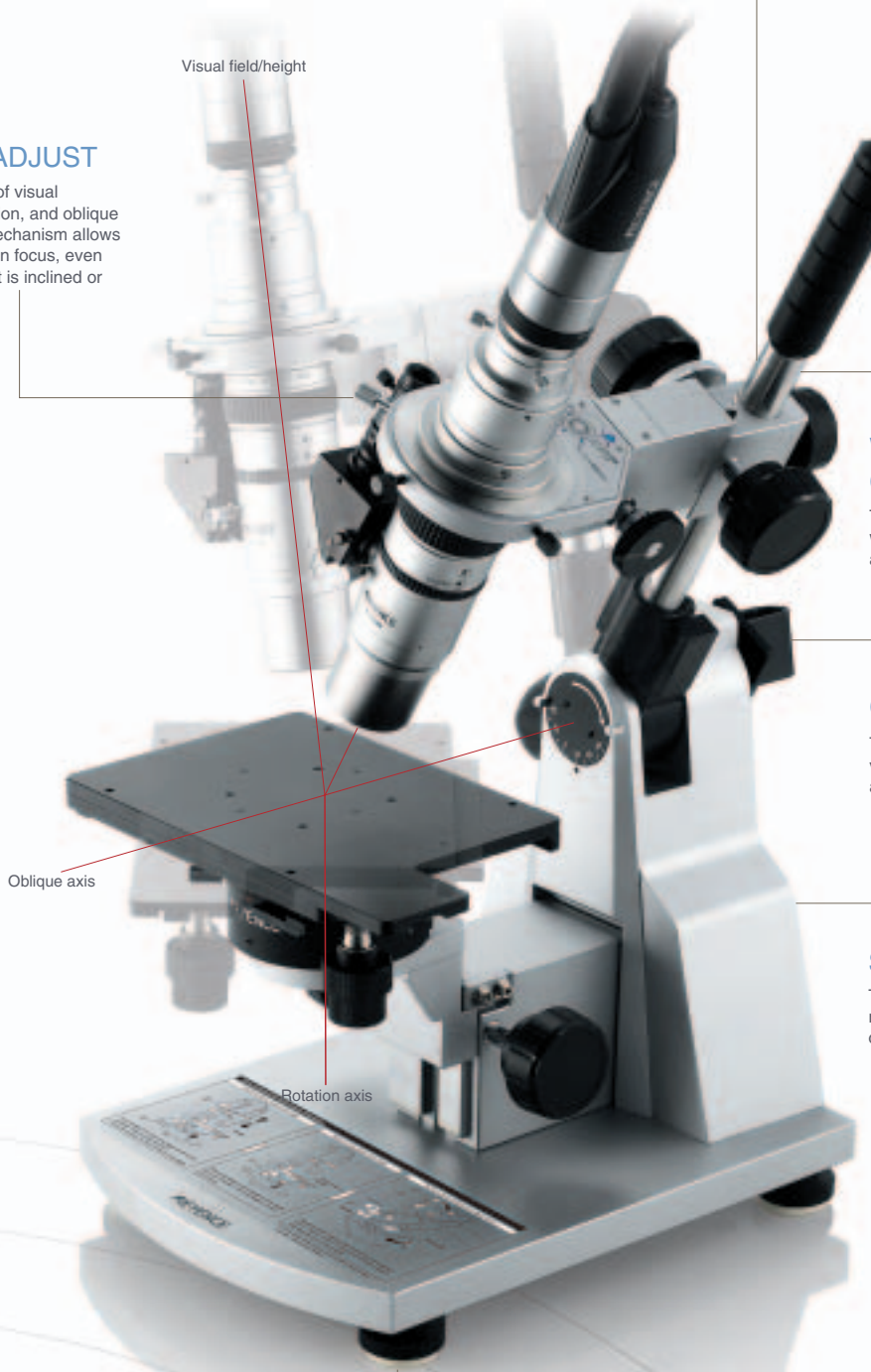
QUICK SETUP MARKS

The ideal setting position for different lenses is indicated on the arm.

Visual field/height

EASY-TO-ADJUST

Easy adjustment of visual field(height), rotation, and oblique axis. A custom mechanism allows the target to stay in focus, even when the lens unit is inclined or rotated.



WEDGE-SHAPED CHANNEL

The mounting arm is held in place with a wedge-shaped channel. This prevents the arm from moving during observations.

CABLE HOLDER

The cable is held in place, preventing vibration. The cable is also protected against abrasions and deterioration.

Oblique axis

STABILITY

The die-cast main body provides a highly rigid structure that allows for more stable observations.

Rotation axis

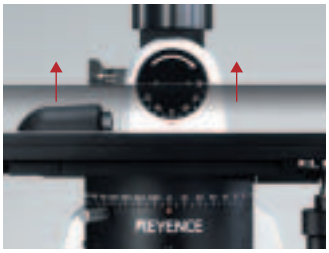
VIBRATION PROTECTION

Absorbs low to high frequency vibration, allowing for observation of specimens without interference.

Easy to operate

1 SIMPLE ADJUSTMENT

It is easy to adjust the optical axes by simply positioning the stage at the indicated height. The instructions are provided on the base of the stage, allowing new users to immediately begin using the VH-S30. (Patent pending)



Easy adjustment of axes by fixing the stage at the upper limit.

Instructions printed on the stage.

2 FLEXIBLE OPERATION

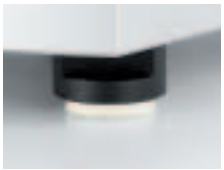
Observation can be performed from any angle without moving the lens. You can instantly find the best position to observe an object. Since the VH-S30 does not use a mirror, it enables the user to observe objects as they normally appear. (Patent pending)

Observation from various angles by moving the pole.

360° observation.

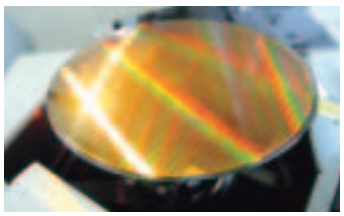
Excellent vibration protection

A special vibration proof material has been selected to insulate the VH-S30. It is designed to absorb a broad range of vibrations in order to provide stable images of highly magnified objects.



Vibration-protective material

The vibration protective rubber is the same material used for vision inspections systems and high-accuracy measurement devices in the semiconductor, R&D, and automotive industries.



Ultra precise mechanism

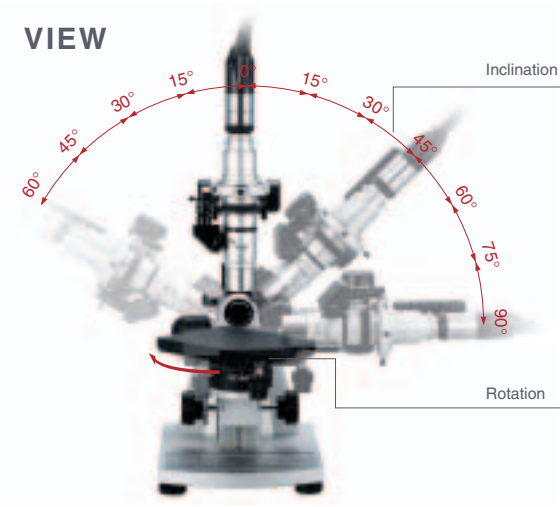
The stage combines the flexibility and ultra precision that are critical to a wide range of applications.

Super fine adjustment dial

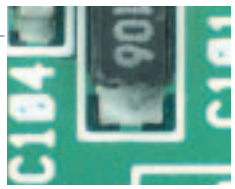
In addition to the course adjustment dial, the super fine adjustment dial can be adjusted in 5 μm steps.

Ultra precise bearing

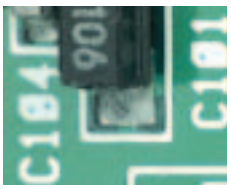
The oblique axis uses an ultra precise bearing to accurately position the central axis.



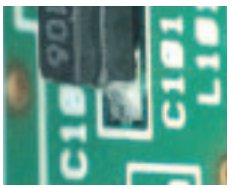
Mounting components/solder (50x)



Right above

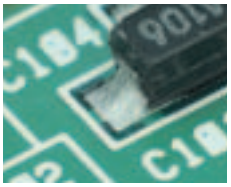


30°

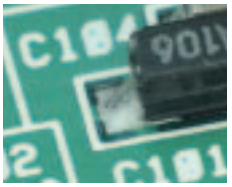


60°

20°



60°



80°

Lineup of three types of high-resolution, high-performance RZ lenses

Providing high resolution in ultra-small size
Ultra-small, high-performance zoom lens

RZ LENS
Real Zoom Lens

NEW

Ultra-small, high-performance zoom lens 20 ▸ 200

VH-Z20

The VH-Z20 enables high-resolution observation at general-purpose magnifications of 20x to 200x. Furthermore, the "large depth of field", which is the feature of the conventional VHX series, has been further intensified.

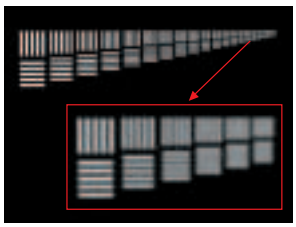
Model		VH-Z20					
Magnification [1]		20x	30x	50x	100x	150x	200x
Monitoring range (inch mm)	Horizontal	0.60" 15.24	0.40" 10.16	0.24" 6.10	0.12" 3.05	0.08" 2.03	0.06" 1.52
	Vertical	0.45" 11.40	0.30" 7.60	0.18" 4.56	0.09" 2.28	0.06" 1.52	0.04" 1.14
	Diagonal	0.75" 19.05	0.50" 12.70	0.30" 7.62	0.15" 3.81	0.10" 2.54	0.08" 1.91
Depth of field (inch mm) [2]		1.34" 34	0.61" 15.5	0.24" 6.0	0.06" 1.6	0.03" 0.74	0.02" 0.44
Monitoring distance (inch mm)		0.00" 25.5					

1. Magnification on a 15-inch monitor
2. When priority is given to the depth of field. The depth of field varies depending on the diaphragm ring.

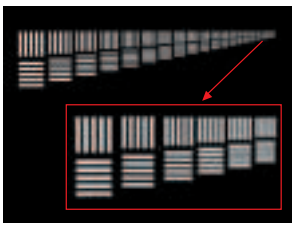
Features of the VH-Z20/Z100

Class-highest resolution: Approx. twice as high as conventional lenses

As a result of concentrating the expertise cultivated for microscopes over many years and the essence of KEYENCE optical technologies, the VH-Z20/Z100 provides class-highest resolution. The VH-Z20/Z100 lens maximizes the capacity of the microscope that tends toward advanced CCD imaging.



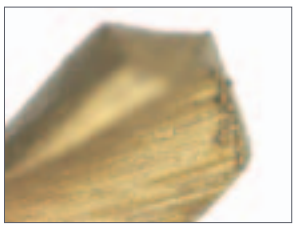
Conventional lens



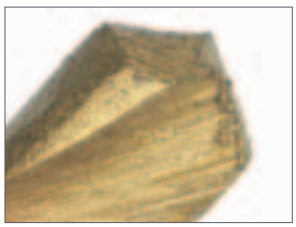
RZ lens

Excellent depth of field: Approx. twice as large as conventional lenses

The "large depth of field", which is the greatest feature of the VHX Series microscope, has been intensified further. The VH-Z20/Z100 provides a larger depth of field than conventional lenses. You can observe a target easily with uneven surface conditions.



Drill tip (Optical microscope) (100x)



Drill tip (RZ lens) (100x)

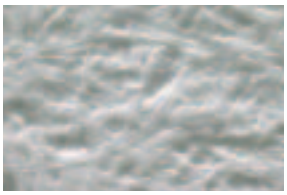
Optical adapter for the VH-Z20 (Z25)/Z100

Variable illumination adapter

With the KEYENCE-original optical mechanism, the variable illumination adapter covers both vertical illumination and lateral illumination without irregularity in the illuminating conditions. It enables optimal illumination for various targets.

VH-K25

Paper surface (200x) Standard illumination



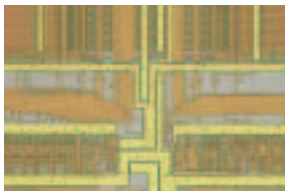
Variable illumination

Coaxial vertical illumination adapter

The coaxial vertical illumination adapter uses two groups of three lenses and a high-performance mirror multi-coated prism. Using this adapter, the microscope can retain sufficient light quantity for illumination. This adapter is useful for observation of metal microstructures, IC, etc. in a bright visual field.

OP-35416

IC (1000x) When the adapter is not used (Dark visual field)



When the adapter is used (Bright visual field)

* The above photo is the optical adapter for VH-Z20(Z25).

Wide-range zoom lens offers high resolution and large depth of field

RZ LENS
Real Zoom Lens

Wide-range zoom lens

100 ▸ 1000

VH-Z100

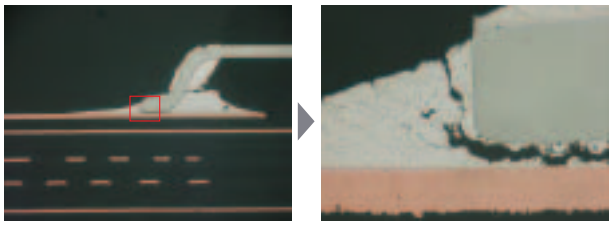
This innovative lens was developed to satisfy the contradictory needs of high resolution and high depth of field for magnified observation.

Model		VH-Z100					
Magnification [1]		100x	200x	300x	500x	700x	1000x
Monitoring range (inch mm)	Horizontal	012" 3.05	0.06" 1.53	0.04" 1.02	0.02" 0.61	0.02" 0.44	0.01" 0.30
	Vertical	0.09" 2.28	0.04" 1.14	0.03" 0.76	0.02" 0.46	0.01" 0.33	0.01" 0.23
	Diagonal	0.15" 3.81	0.07" 1.90	0.05" 1.27	0.03" 0.76	0.02" 0.54	0.01" 0.38
Monitoring distance (inch mm)		0.98" (0.79 [2]) 25 (20 [2])					

1. Magnification on a 15-inch monitor
2. When the ring illumination adapter is attached

Wide range zoom: Optical zoom at 10x magnification

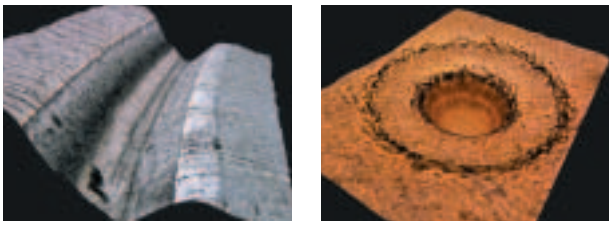
The VH-Z100 is designed for a wide zoom range, seamlessly covering from the whole image to an enlarged view of a target. Since the VH-Z100 retains a constant observation distance throughout the zoom range, it can improve operating efficiency. It is an all-around zoom lens applicable to any scene.



Solder cross-section (100x) (1000x)

Highly-telecentric zoom lens

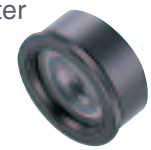
With the highly-telecentric lens design, the RZ lens can create extremely clear and perfect depth composition images and 3-D images. The RZ lens can make the best use of the digital focus functions that are the essential feature of the VHX Series.



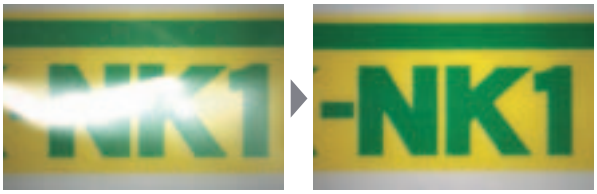
Battery safety valve (700x) Electrode hole (1000x)

Polarization illumination adapter

Effective for suppressing glare during observation through a transparent film or coating.



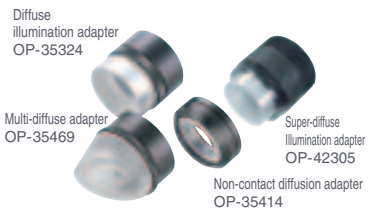
OP-35415

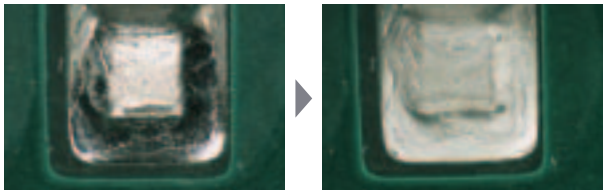


Printed material (30x) standard illumination polarizing illumination

Diffuse illumination

You can observe real surface conditions without the glare of a target. The diffuse illumination adapter covers both vertical illumination and lateral illumination, enabling optimal illumination for various targets.





Solder (200x) standard illumination diffuse illumination

High-resolution zoom lens is the pinnacle of optical lenses

RZ LENS
Real Zoom Lens

High-resolution zoom lens 500 ▸ 5000

VH-Z500

This zoom lens provides class-highest resolution. This is the advent of a new zoom lens that can skillfully express advanced 3D images and disproves common practice in observation.

Model		VH-Z500				
Magnification [1]		500x	1000x	2000x	3000x	5000x
Monitoring range (inch mm)	H (Horizontal)	24.02" 610	12.01" 305	5.98" 152	4.02" 102	2.4" 61
	V (Vertical)	17.99" 457	9.02" 229	4.49" 114	2.99" 76	1.81" 46
	D (Diagonal)	30" 762	15" 381	7.52" 191	5" 127	2.99" 76
Observation distance (inch mm)		0.17" 4.4				

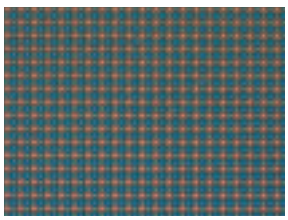
1. Magnification on a 15-inch monitor

Features of the VH-Z500

Numerical aperture (N.A.) of 0.82 at a distance of 0.17" (4.4 mm)

The VH-Z500 is equipped with 24 high-performance lenses in total, which are supported by advanced grinding technology. In addition, the VH-Z500 uses a large-diameter spherical lens, providing an observation distance of 0.17" (4.4 mm). The VH-Z500 is an ideal zoom lens that provides both high resolution and high operability.

HDD head (1500x)

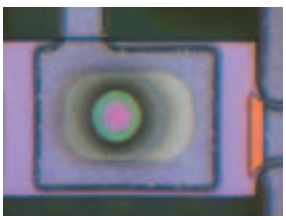


CCD (2000x)

Optical 10x zoom from 500x to 5000x magnification

The development of this high-resolution lens with almost no optical aberration easily provides a zoom range 10 times wider than conventional models. High-resolution images with minimum distortion can be obtained within the entire zoom range.

TFT (500x)



TFT (5000x)

Polarizing illumination mechanism Option

The polarizing illumination mechanism prevents unnecessary reflected light from an observation target to adjust the light quantity to an optimal level. It is suitable for shooting a target through a transparent film.

Zoom lens

Zoom lens | VH-Z25 25 ▸ 175

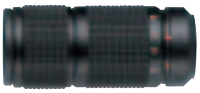
A single lens unit covers 25x to 175x magnifications.

The VH-Z25 can continuously change magnification from 25x to 175x without the need for lens replacement. You can quickly find an observation point at low magnification and then directly zoom in on the observation point. The VH-Z25 provides two types of illumination heads (contact type and non-contact type) as standard equipment. The non-contact type illumination head provides an observation distance of 1.00" (25.5 mm), improving your operating efficiency.

When many illumination adapters are attached, the zoom lens is applicable to various observation purposes. (See p. 24.)

Model		VH-Z25			
Magnification [1]		25x	50x	100x	175x
Monitoring range (inch mm)	Horizontal	0.48" 12.20	0.24" 6.10	0.12" 3.05	0.07" 1.74
	Vertical	0.36" 9.10	0.18" 4.55	0.09" 2.28	0.05" 1.30
	Diagonal	0.60" 15.24	0.30" 7.62	0.15" 3.81	0.09" 2.18
Depth of field (inch mm)		0.51" 13.0	0.12" 3.0	0.03" 0.7	0.01" 0.3
Monitoring distance of the non-contact type illumination head (inch mm)		00.0" 25.5			

1. Magnification on a 15-inch monitor



Low-range zoom lens | VH-Z05

0 ▸ 40

0x to 40x magnification for viewing the entire target

This low-range zoom lens provides a magnification of between 0x and 40x, enabling the entire target to be monitored as well as providing a magnified view. You can easily capture an image of the whole target without using an external camera, perfect for inserting into your report or reference document. The monitoring distance is 3.74" (95 mm) or more, ensuring improved workability.

Long-focal-distance zoom lens | VH-Z35

35 ▸ 245

35x to 245x magnification at a distance of 2.13" (54 mm)

With a monitoring distance of 2.13" (54 mm) and extremely high depth-of-field, this lens provides a convenient way to monitor a target with height differences on the surface. This wide working space greatly increases monitoring efficiency. With a single lens, you can monitor from a low magnification (35x) to a high magnification (245x), allowing the desired point to be quickly enlarged.

Middle-range zoom lens | VH-Z150

150 ▸ 800

150x to 800x magnification, enabling a bright image to be monitored

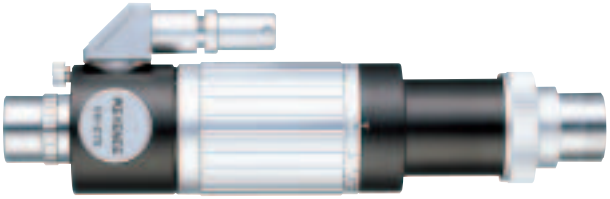
This middle-range zoom lens allows continuous changes in magnification of between 150x and 800x. It can be used to monitor at a distance 0.47" (12 mm) at 800x magnification. The illumination head can be switched to a coaxial vertical illumination type to enable detailed observation of Microstructure of metal or a semiconductor surface.

High-range zoom lens | VH-Z450

450 ▸ 3000

450x to 3000x magnification, enabling monitoring with vertical/penetration illumination.

This high-range zoom lens allows continuous changes in magnification of between 450x and 3000x. The high-resolution lens and optical edge enhancement function ensure higher reproduction than a conventional microscope.
The lens provides a magnification of 3000x at a monitoring distance of 0.29" (7.3 mm), ensuring improved workability. A special stand with penetration illumination is also available, further expanding the applications of this lens.



HD middle-range zoom lens | VH-Z75

75 ▸ 750

75x to 750x magnification

This lens allows continuous changes in magnification between 75x and 750x. The high-quality lens offers excellent resolution. The monitoring distance of 1.82" (46.2 mm) at 750x greatly improves workability. This lens achieves high performance surpassing conventional microscopes in both image quality and workability.

Non-reflective illumination ring (Optional)
OP-32009

Model		VH-Z05						
Magnification [1]		0.1x	0.5x	1x	5x	10x	20x	40x
Monitoring range (inch mm)	Horizontal	125.98" 3200	25.20" 640	12.60" 320	2.40" 61.0	1.20" 30.5	0.60" 15.3	0.30" 7.6
	Vertical	94.49" 2400	18.90" 480	9.45" 240	1.79" 45.5	0.90" 22.8	0.45" 11.4	0.22" 5.7
	Diagonal	157.48" 4000	31.50" 800	15.75" 400	3.00" 76.2	1.50" 38.1	0.75" 19.0	0.37" 9.5
Monitoring distance (inch mm)		Approx. 25.3" 7.7m	Approx. 4.9" 1.5m	Approx. 28.35" 720mm	3.74" 95mm			

1. Magnification on a 15-inch monitor

Coaxial vertical illumination adapter (Optional)
OP-35416

Model		VH-Z35					
Magnification [1]		35x	50x	100x	150x	200x	245x
Monitoring range (inch mm)	Horizontal	0.34" 8.71	0.24" 6.10	0.12" 3.05	0.08" 2.03	0.06" 1.53	0.05" 1.24
	Vertical	0.26" 6.5	0.18" 4.55	0.09" 2.28	0.06" 1.52	0.04" 1.14	0.04" 0.93
	Diagonal	0.43" 10.89	0.30" 7.62	0.15" 3.81	0.10" 2.54	0.07" 1.90	0.06" 1.56
Depth of field (inch mm)		0.33" 8.3	0.20" 5.0	0.04" 1.0	0.20" 0.5	0.02" 0.4	0.01" 0.3
Monitoring distance (inch mm)		2.13" 54.0					

1. Magnification on a 15-inch monitor

Adjustable illumination adapter (Optional)
VH-K150

Model		VH-Z150			
Magnification [1]		150x	200x	500x	800x
Monitoring range (inch mm)	Horizontal	0.08" 2.03	0.06" 1.53	0.02" 0.61	0.02" 0.38
	Vertical	0.06" 1.52	0.05" 1.14	0.02" 0.46	0.01" 0.28
	Diagonal	0.10" 2.54	0.08" 1.90	0.03" 0.76	0.02" 0.48
Monitoring distance (inch mm)		0.47" 12.0 [2]			

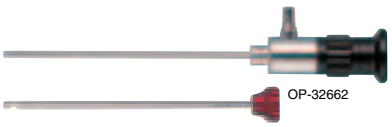
1. Magnification on a 15-inch monitor
2. 0.25" (6.5 mm) when the coaxial vertical illumination ring is attached.

Model		VH-Z450						
Magnification [1]		450x	500x	1000x	1500x	2000x	2500x	3000x
Monitoring range (inch mm)	Horizontal	0.03" 0.68	0.03" 0.61	0.01" 0.31	0.01" 0.20	0.01" 0.15	0.004" 0.12	0.003" 0.10
	Vertical	0.02" 0.51	0.02" 0.46	0.009" 0.23	0.006" 0.15	0.004" 0.11	0.004" 0.09	0.003" 0.08
	Diagonal	0.03" 0.85	0.03" 0.76	0.01" 0.38	0.01" 0.25	0.007" 0.19	0.006" 0.15	0.005" 0.13
Monitoring distance (inch mm)		0.29" 7.3						

1. Magnification on a 15-inch monitor

Model		VH-Z75					
Magnification [1]		75x	150x	300x	450x	600x	750x
Monitoring range (inch mm)	Horizontal	0.16" 4.07	0.08" 2.03	0.04" 1.02	0.03" 0.68	0.02" 0.51	0.02" 0.41
	Vertical	0.12" 3.04	0.06" 1.52	0.03" 0.76	0.02" 0.51	0.01" 0.38	0.01" 0.30
	Diagonal	0.20" 5.08	0.10" 2.54	0.05" 1.27	0.03" 0.85	0.03" 0.64	0.02" 0.51
Monitoring distance (inch mm)		1.82" 46.2					

1. Magnification on a 15-inch monitor



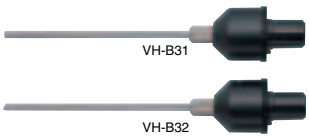
Borescope lens | OP-32662/32663/32664/32665/32666

Two observation directions (direct view and lateral view) are enabled with a single unit.

The borescope unit provides a 90° lateral view attachment as standard equipment, enabling observation directions to be switched between direct view and lateral view. Five types of bore diameters ø0.16", ø0.22", ø0.31", ø0.39" and ø0.55" (ø4, ø5.5, ø8, ø10 and ø14) are available, allowing you to select an appropriate diameter according to your observation purpose. The monitoring magnification is 80x to 360x, 1.2 to 5 times larger than conventional models. You can clearly observe even minute targets that cannot be observed with conventional models.

Model	Borescope	OP-32662	OP-32663	OP-32664	OP-32665	OP-32666
	Lens attachment	OP-32681				
Outer diameter (inch mm)		ø0.16" ø4.0 / ø0.17" ø4.4	ø0.22" ø5.5 / ø0.23" ø5.9	ø0.31" ø8.0 / ø0.33" ø8.5	ø0.39" ø10 / ø0.42" ø10.5	ø0.55" ø14 / ø0.59" ø15
Effective length (inch mm)		5.31" 135	9.84" 250	9.84" 250	9.84" 250	16.53" 420
View direction		0° (direct view) / 90° (Lateral view)	0° (direct view) / 90° (Lateral view)	0° (direct view) / 90° (Lateral view)	0° (direct view) / 90° (Lateral view)	0° (direct view) / 90° (Lateral view)
View angle		35°	40°			
Observation distance (inch mm)		0.10" to ∞ 2.5 to ∞	0.11" to ∞ 2.7 to ∞	0.14" to ∞ 3.5 to ∞	0.11" to ∞ 2.7 to ∞	0.39" to ∞ 10 to ∞
Maximum observation magnification		230x	360x	175x	190x	80x
Minimum view range		0.04" 1.1	0.03" 0.7	0.06" 1.5	0.06" 1.4	0.13" 3.3
Ambient temperature		Sleeve: 0 to 40°C except for sleeve: 0 to 40°C				

1. 0°: When the direct-view standard lens is attached. 90°: When the lateral-view attachment is attached
2. Magnification around the center of the 15-inch monitor screen
3. Horizontal view range



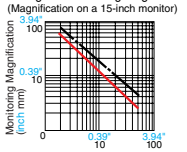
Borescope lens | VH-B31/B32/B61/B64

ø3-mm sleeve for viewing inside a narrow gap

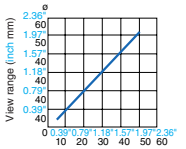
The 3-mm sleeve diameter enables you to easily monitor inside a narrow gap or complicated shape. Select from two types of end shapes: Direct-view and oblique-view. Only the lens is contained in the sleeve, enabling excellent resolution. The borescope lens is completely waterproof for underwater observation.

*In addition to the above, many size variations are available. For more information, contact the nearest KEYENCE sales office.

Change of monitoring magnification (Magnification on a 15-inch monitor)

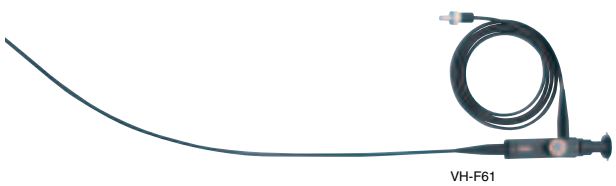


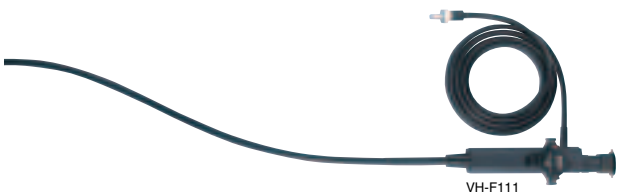
Change of view range



Model	Borescope	VH-B31	VH-B32	VH-B61	VH-B64
	Lens attachment	VH-B			
Outer diameter (inch mm)		ø0.12" ø3 (Protective tube: ø0.16" ø4)		ø0.24" ø6	
Effective length (inch mm)		4.13" 105	4.21" 107	11.81" 300	11.97" 304
View direction		0° (direct view)	30° (oblique view)	0° (direct view)	70° (oblique view)
View angle		55°			
Observation depth (inch mm)		0.08" to 1.97" 2 to 50			
View range (inch mm)		ø0.08" to ø2.05" ø2 to ø52			
Protection		Sleeve: Waterproof			
Ambient temperature		0 to +40°C (32 to 104°F) (in air/water)			

VH-B31/B32
VH-B61/B64

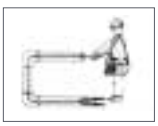




Fiberscope | VH-F61/F111

Monitoring a complicated shape

The fiberscope allows you to monitor places where conventional lenses cannot be used, such as the inside of a complicated machine or a narrow, bending pipe. You can even monitor blind spots by changing the angle of the top of the fiberscope remotely.

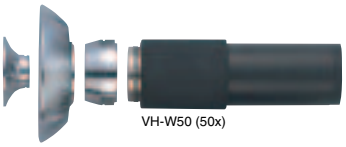


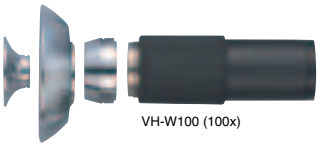
Inspection of piping

Inspecting the inside of a photocopier

Model	Fiberscope	VH-F61	VH-F111
	Lens attachment	VH-F	
Outer diameter (inch mm)		ø0.24" ø6.1	0.43" ø11
Effective length (inch mm)		39.37" 1000	59.06" 1500
View direction		Direct view	
View angle		65°	55°
Observation depth (inch mm)		0.39" to ∞ 10 to ∞	0.79" to ∞ 20 to ∞
Bendable sleeve angle		120° up/down	120° up/down, 100° right/left
Ambient temperature		+10 to +80°C (+50 to +176°F)	
Operating atmospheric pressure		1 atm	
Oil & waterproof		Machine oil and light oil	

Fixed lens


VH-W50 (50x)


VH-W100 (100x)


VH-W200 (200x)


Non-reflective illumination ring (Optional) OP-32009

Long-focal-distance lens | VH-W50/W100/W200

Working while monitoring target

The long-focal-distance lens provides a long monitoring distance of 2.36" to 3.07" (60 to 78 mm), allowing you to continue working while monitoring a target. You can view clear images even when close monitoring is impossible, such as a target in a recess or the presence of a glass plate between the lens and target.

Model		VH-W50	VH-W100	VH-W200
Magnification [1]		50x	100x	200x
Monitoring range (inch mm)	Horizontal	0.24" 6.10	0.12" 3.05	0.06" 1.53
	Vertical	0.18" 4.55	0.09" 2.28	0.04" 1.14
	Diagonal	0.30" 7.62	0.15" 3.81	0.07" 1.90
Depth of field (inch mm)		0.12" 3.1	0.02" 0.6	0.01" 0.3
Monitoring distance (inch mm) [2]		3.07"(3.03") 78(77)	2.36" (2.32") 60(59)	2.36" (2.32") 60(59)

1. Magnification on a 15-inch monitor
2. Figures in parentheses are applicable when a non-reflective illumination head is used.


VH-V100(100x)


VH-V200(200x)

Hyper-view lens | VH-V100/V200

Easy monitoring of a glossy target with minimum halation

The hyper-view lens suppresses halation (reflection) from a glossy surface, enabling detailed monitoring. You can easily detect a flaw, stain or crack on metal, glass or ceramic surfaces that are difficult to detect using conventional microscopes.

Model		VH-V100	VH-V200
Magnification [1]		100x	200x
Monitoring range (inch mm)	Horizontal	0.12" 3.05	0.06" 1.53
	Vertical	0.09" 2.28	0.04" 1.14
	Diagonal	0.15" 3.81	0.07" 1.90
Depth of field (inch mm)		0.04" 1.0	0.02" 0.4

1. Magnification on a 15-inch monitor


VH-C501


VH-C1001

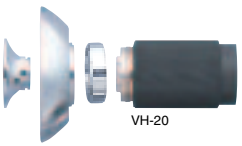
Vertical-illumination lens | VH-C501/C1001

Monitoring metal surfaces

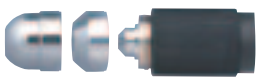
The vertical-illumination lens utilizes our original optical system to give it a thin body. You can clearly monitor Microstructure of metal or a semiconductor surface, which are hard to see using conventional lateral illumination. Two models are available with magnification factors 500x and 1000x.

Model		VH-C501	VH-C1001
Magnification [1]		500x	1000x
Monitoring range (inch mm)	Horizontal	0.02" 0.61	0.01" 0.31
	Vertical	0.02" 0.46	0.01" 0.23
	Diagonal	0.03" 0.76	0.01" 0.38
Depth of field (inch mm)		0.002" 0.06	0.001" 0.03
Monitoring distance (inch mm)		0" to 0.08" 0 to 2.0	0" to 0.08" 0 to 2.0

1. Magnification on a 15-inch monitor


VH-20


VH-50


VH-100


VH-200


VH-501


VH-1001

Fixed-magnification lens | VH-20/50/100/200/501/1001

Lens selection based on desired magnification

Select your desired magnification from between 20x and 1000x. These fixed-magnification lenses provide a larger depth-of-field than conventional microscopes, enabling you to obtain a sharp 3-D image. Two types of illumination heads are included: Contact and non-contact (except for VH-20).

Model		VH-20	VH-50	VH-100	VH-200	VH-501	VH-1001
Magnification [1]		20x	50x	100x	200x	500x	1000x
Monitoring range (inch mm)	Horizontal	0.60" 15.25	0.24" 6.10	0.12" 3.05	0.06" 1.53	0.02" 0.61	0.01" 0.31
	Vertical	0.45" 11.38	0.18" 4.55	0.09" 2.28	0.04" 1.14	0.02" 0.46	0.01" 0.23
	Diagonal	0.75" 19.05	0.30" 7.62	0.15" 3.81	0.07" 1.90	0.03" 0.76	0.01" 0.38
Depth of field (mm)		0.47" 12.0	0.26" 6.5	0.04" 1.0	0.02" 0.4	0.002" 0.06	0.001" 0.03
Monitoring distance (inch mm)		2.76"(2.44") 70(62) [2]	0.50" 12.5	0.43" 11.0	0.14" 3.5	0.14" 3.5	0.14" 3.5

1. Magnification on a 15-inch monitor
2. The figure in parentheses is applicable when a non-reflective illumination head is used.

Peripheral equipment

Keyboard

Useful for entry of detailed observation data for recording files

Comments and observation conditions (lens and magnification data used for recording files) can be entered with the keyboard. Your DOS/V PS2 type keyboard can also be connected.

Footswitch

Foot operation is enabled even if your hands are full.

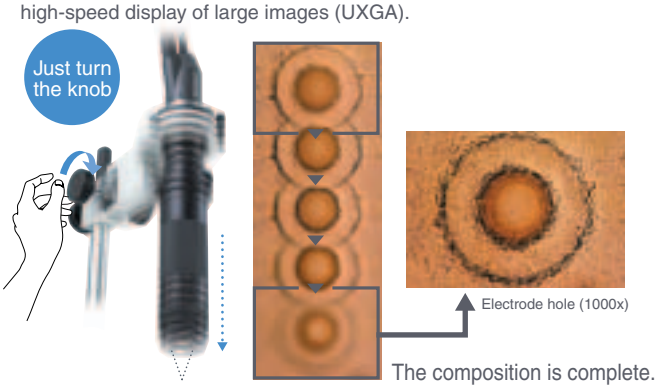
During handheld operation, you can stop and record an image with the foot switch, even if both hands are full or you cannot reach the operation panel. (Commercially available)

VHX-100 Standard Model All-in-one system incorporating “Observation”, “Recording” and “Measurement” functions

Ultimate depth of field

Quick, high-quality depth composition

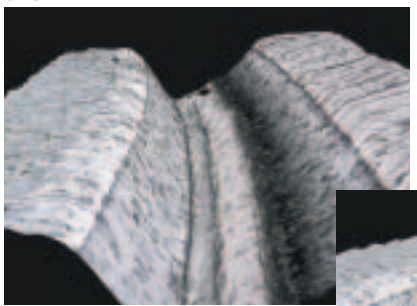
An image of the desired area with poor focus can be composed automatically by simply turning the focus-adjustment knob while observing the real-time image on the screen. As a result, the time and labor required for composing images can be reduced dramatically. In addition, KEYENCE’s original image-processing technology enables high-speed display of large images (UXGA).



Extensive expression ability

D.F.D 3-D display function

The VHX-500 employs "hybrid D.F.D. method", an enhancement of the conventional D.F.D. method. It also employs the state-of-the-art digital technologies while preserving the function that can create 3D images using a small number of images where their focal positions differ.



Battery safety valve(700x)

The 3-D display function provides visual expression of projections and recessions in a 3-D image, allowing you to detect a phenomenon that cannot be seen in a 2-D image. This function enables accurate analysis and persuasive image capturing.

Digital Photo Printer

Digital Photo Printer DP-500

This next-generation printer satisfies the needs of research, development and manufacturing fields.

5 million-pixel, high-definition printing (Automatically compresses 18 million-pixel images.)

This printer provides image quality of 385-dpi, which is close to film photographs. The maximum printing size is 2564 x 1920 pixels 6.65" x 5.00" (169 x 127 mm) with a print quality of 5 million pixels. The DP-500 boasts an excellent printing quality that enables the detailed recognition of precise images.

Colors will not fade. Over-coated printing is supported as standard.

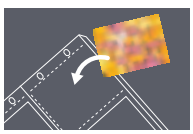
Over-coated printing with excellent light, heat, and moisture resistance is provided as standard. Durability of 100 years or longer is ensured for printouts stored in albums. Colors will not deteriorate, enabling accumulation of an accurate database.

High capacity and small footprint. 1.5 times greater capacity and 50% smaller footprint.

200 L-size prints can be printed consecutively. While providing a large capacity, a sleek stand-up design is realized with approximately one half of the footprint (compared to KEYENCE conventional models). The DP-500 is easy to install in a limited space such as laboratories for providing printouts on the spot when needed.

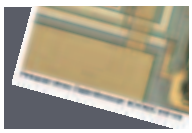
Easy storage. Fits nicely into albums.

The sheet size is small enough to fit into off-the-shelf albums or refill pocket sheets for photographs. Unlike conventional printers, there is no need to cut the photograph to a smaller size. The printed photograph can be filed as is, further eliminating the time and labor required for conventional models.

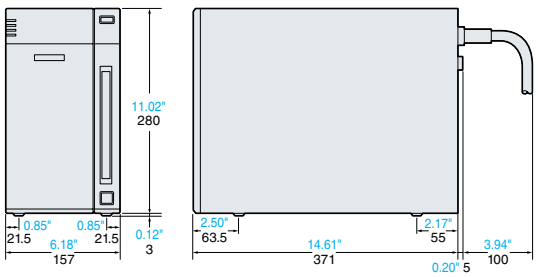


Notes are printed simultaneously. Photographs can be sorted out accurately and easily.

Comments appended to the image can be printed on the margin when printing images, eliminating the time and labor required for writing the descriptions afterward. A database that is easy to access for anyone can be constructed easily.



Dimensions



Specifications

Model	DP-500
Print method	Sublimate thermal print
Resolution	385 dpi, 2564 x 1920 pixels max. (2L size)
Tone level	256 levels for Y, M, and C respectively, full color of approx. 16,770,000 colors
Sheet/print size	Standard: 5.00" x 4.02" 127 x 102 mm (1920 x 1544 pixels) L: 5.00" x 3.74" 127 x 95 mm (1920 x 1444 pixels) 2L: 6.65" x 5.00" 169 x 127 mm (2564 x 1920 pixels) L-print: 5.00" x 3.42" 127 x 89 mm (1920x 1348 pixels)
Printing time	Approx. 40 seconds (L size)
Paper feed method	Machine-glazed paper system
Interface	USB1.1
Supporting OS	Windows® XP/2000/Me/98 Second Edition[1]
Power supply	100 to 240V AC 50/60 Hz
Current consumption	250 VA max. during printing
Ambient temperature	5 to 40°C (41 to 104°F), No condensation
Relative humidity	20 to 80%, No condensation
Dimensions	6.18" (W) x 11.02" (H) x 14.61" (D) 157 x 280 x 371 mm
Weight	11kg

1.Windows XP/2000/Me/98 Second Edition are registered trademarks of Microsoft Corporation, U.S.A.

VHX Series System Line Up

System configuration

Polarization illumination adapter
OP-51649

Standard illumination adapter
OP-72402

Diffuse illumination adapter
OP-72403

Ring illumination base unit
OP-72400

Adjustable illumination adapter
OP-72404

Head
OP-72407

Polarization illumination adapter [4.]
OP-72405

Adjustable illumination adapter
VH-K25

Super-diffuse Illumination adapter
OP-42305

Polarization illumination adapter
OP-3541

Diffuse illumination adapter
OP-35324

Non-contact diffusion adapter
OP-35414

Multi-diffuse adapter
OP-35469

Free head [6.]
OP-32348

Coaxial vertical illumination adapter
OP-35416

Adjustable illumination adapter
VH-K150

Non-reflective illumination ring
OP-32009

RZ LENS

High-resolution zoom lens — VH-Z500 [1.] — 500x to 5000x

Wide-range zoom lens — VH-Z100 [1.] — 100x to 1000x

Ultra-small, high-performance zoom lens — VH-Z20 — 20x to 200x

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

Low-range zoom lens — VH-Z05 — 0x to 40x

High-range zoom lens — VH-Z450 [1.] — 450x to 3000x

HD middle-range zoom lens — VH-Z75 [1.] — 75x to 750x

HYPER-VIEW LENS

VH-V100 (100x) VH-V200 (200x)

VERTICAL-ILLUMINATION LENS

VH-C501 (500x) VH-C1001 (1000x)

BORESCOPE LENS

VH-B31 VH-B32 VH-B61 VH-B64 — VH-B

BORESCOPE LENS

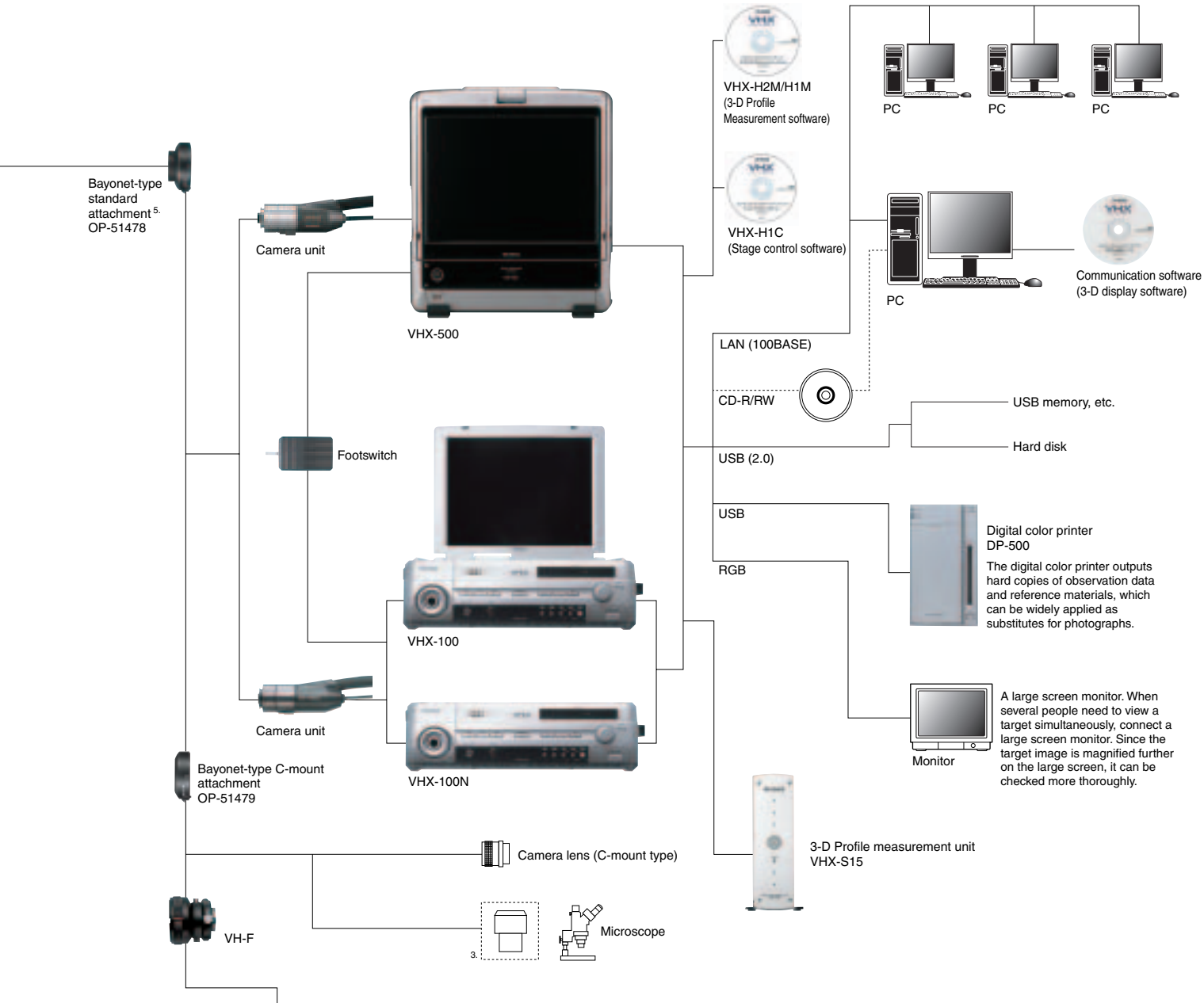
OP-32666 OP-32662 OP-32665 OP-32663 OP-32664 — OP-32681

LONG-FOCAL-DISTANCE LENS

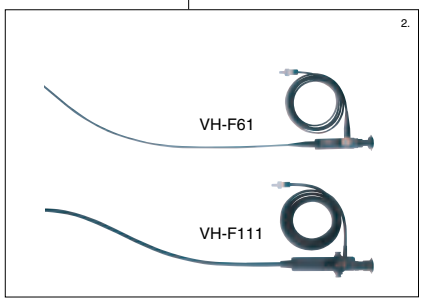
VH-W50 (50x)
VH-W100 (100x)
VH-W200 (200x)
Lateral view adapter OP-98535

FIXED-MAGNIFICATION LENS

VH-20 (20x) VH-200 (200x)
VH-50 (50x) VH-501 (500x)
VH-100 (100x) VH-1001 (1000x)



FIBERSCOPE



■Option

Free-angle observation system
VH-S30

VH lens mounting stand

VH lens mounting stand
(with XY stage)

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

Vertical illumination head
(for VH-200)

Side-view adapter
(for VH-W100/W200)

Variable illumination
adjustor (for VH-Z25/Z05)

1. The optional light guide dedicated to the VHX Series is required.
2. The optional light guide attachment dedicated to the VHX Series is required.
3. A C-mount adapter suitable for the microscope is required.
4. For coaxial illumination, OP-72407 and OP-72406 are required.
5. For the VH-Z100/Z450/Z500, OP-51647 is required.
6. OP-32348 is the special adapter for the VH-Z25.

Specifications (Basic function)

Model			VHX-500	VHX-100	VHX-100N [3]
Camera	Image receiving element		1/1.8-inch, 2.11 million-pixel CCD image sensor	1/2-inch, 2.11 million-pixel CCD image sensor	
			Total pixels: 1688 (H) x 1248 (V)		
			Effective pixels: 1628 (H) x 1236 (V)	Effective pixels: 1636 (H) x 1236 (V)	
			Virtual pixels: 1600 (H) x 1200 (V)		
	Scan method		Progressive	Interlace	
	Frame rate		15 frames/sec. and 28 frames/sec. selectable	7.5 frames/sec. and 30 frames/sec. selectable	
	Resolution	2 million pixels	1600 (H) x 1200 (V) Approx. 1000 TV lines		
		4 million pixel equivalent	1600 (H) x 1200 (V) Approx. 1200 TV lines		
		2 million pixels x 3 CCD mode	1600 (H) x 1200 (V) Approx. 1200 TV lines ( )	–	
		8 million pixels	3200 (H) x 2400 (V) Approx. 1600 TV lines		
		18 million pixels	4800 (H) x 3600 (V) Approx. 2000 TV lines or more		
	Gain		AUTO,NORMAL,PRESET	AUTO, NORMAL, MANUAL	
	Electronic shutter		AUTO, MANU, 1/15, 1/30, 1/60, 1/120, 1/250, 1/500, 1/1000, 1/2000, 1/5000	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.		
	White balance		Auto, Manual, One-push set, Preset (2700K, 3200K, 5600K, 9000K)		
	Back-focus adjustment		Not required	–	
LCD monitor [2]	Size		Color LCD (TFT) 15"		Without an LCD monitor
	Panel size		11.99" (H) x 8.99" (V) 304.5 (H) x 228.4 (V) mm	12" (H) x 9" (V) 304.8 (H) x 228.6 (V) mm	
	Pixel pitch		0.008" (H) x 0.008" (V) 0.1905 (H) x 0.1905 (V) mm		
	Number of pixels		1600 (H) x 1200 (V) (UXGA)		
	Scan frequency		–	75 kHz (H), 60 Hz (V)	
	Display color		Approx. 16,770,000 colors [1]		
	Brightness		200 cd/m [2] (typical)		
	Contrast ratio		500 : 1 (typ)	400: 1 (typical)	
	Viewing angle		±85° (typical, horizontal), ±85° (typical, vertical)		
CD-R/ CD-RW drive unit	Speed		24x Write, 10x Re-write, 24x Read		
	Used disk		CD-R/CD-RW		
	Storage capacity		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		160 GB (including 45 GB reservation area), approx. 575,000 images (When a 2 million-pixel image is compressed) to approx. 19,000 images (When a 2 million-pixel image is not compressed)	40 GB, approx. 200,000 images (When a 2 million-pixel image is compressed) to approx. 6667 images (When a 2 million-pixel image is not compressed)	
Image format			JPEG (With compression), TIFF (No compression)		
Light source	Lamp		12 V, 100 W, Halogen lamp	12 V, 100 W, Halogen lamp (OP-91641)	
	Lamp life		1000 hours (average)		
	Color temperature		3100 K (at maximum light intensity)		
Output	Video output		Analog RGB (1600 x 1200 pixels)		
	Scanning frequency	Special LCD monitor	75 kHz (H), 60 Hz (V)		
		External monitor	75 kHz (H), 60 Hz (V)		
Input	Mouse input		MINI-DIN 6-pin connector (DOS/V-compatible PS/2 mouse)		
	Keyboard input		MINI-DIN 6-pin connector (DOS/V PS/2)		
	External remote input		Pause/ Recording, Non-voltage input (Contact/Noncontact)	Non-voltage input (Contact/Noncontact)	
Interface	LAN		RJ-45 (10BASE-T / 100BASE-TX / 1000BASE-T)	RJ-45 (10BASE-T)	
	USB2.0 Series A		4 types: Special printer port x 1, VHX-S15 port x1, External storage connection port x 2	2 types: Special printer port x 1, External storage connection port x 1	
	USB2.0 Series B		–	PC connection port	
Power supply	Power-supply voltage		100 to 240VAC, 50/60Hz	85 to 132 VAC, 170 to 265 VAC, 50/60 Hz	
	Current consumption		310VA	260 VA	
Environmental resistance	Ambient temperature		+5 to 40°C (41 to 104°F), No condensation		
	Relative humidity		35 to 80%, No condensation		
Weight	Controller		Approx. 11.9 kg	Controller: Approx. 13 kg (with LCD monitor), Approx. 11.5 kg (without LCD monitor), Camera unit: Approx. 0.85 kg	
	Camera unit		Camera : Approx. 250 g, Cable : Approx. 600 g All-in-one		
	Console		Approx. 250 g		
Dimensions (Excluding the projected areas)			15.04" (W) x 16.73" (H) x 6.38" (D) 382 x 425 x 162 mm	15.75" (W) x 5.12" (H) x 15.16" (D) 400 x 130 x 385 mm	15.75" (W) x 4.53" (H) x 15.16" (D) 400 x 115 x 385 mm

1. Approximately 16,770,000 pixels are realized with the dithering processing of the display controller.
2. 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.
3. The VHX-100N model does not feature the integrated special LCD monitor.
4. The VHX-H2M and VHX-H1M are the software dedicated to the VHX-500 and VHX-100F (VHX-100FN), respectively.

Specifications (Various functions)

Model		VHX-500	VHX-100	VHX-100N
Various controller functions	Depth composition function	Real-time depth composition High-quality depth composition	Quick depth composition High-quality depth composition	
	Hybrid D.F.D 3-D display function	Provided (Quick)	Provided	
	3-D illumination simulation function	Provided	–	
	3-D two-screen simultaneous comparison function	Provided (Combination/Comparison/Difference display mode)	–	
	Saving a 3-D 360°-rotation image	Enabled (3-D 360°-rotating observation after saving an image)		
	Real-time digital zoom	1.0x to 10.0x (100 steps)		
	Optimal contrast function	Provided	–	
	Halation eliminating function	Provided	–	
	Noise eliminating function	Provided	–	
	Supercharge shutter function	Provided		
	Edge enhancement function	Provided (200 steps) For a moving image		
	Wide range view function	Provided		
	Gamma correcting function	Provided		
	Camera-shake correcting function	Provided (For a moving image)	Provided	
	Split function	Vertical split, Horizontal split, 4-part split		
	Moving image recording/reproducing function	28 frames/sec. max. Moving image size (800 x 600), Actual moving image size (800 x 480)	–	
	Timer recording function	Provided		
Measuring function	Automatic unit VHX-S15 control function	Provided	–	
	High-resolution dimensional measurement function	Provided		
	Wide-visual-field automatic 2-point measurement	Provided	–	
	Distance, angle, radius, area, etc.	Various functions are provided		
	Automatic count/measurement function	Provided (Enables distance/area measurement through brightness/color extraction)		
	Scale display	Various functions are provided		
	Automatic edge detection	Provided		
	Auto calibration	Full-auto (Numerical input is not required)		
	3-D profile measurement	Provided (Enables height profile display along an arbitrary line on the 3-D screen)		
Measuring function (Optional function)[4]	3-D height color/scale display function	Provided (Enables X/Y/Z-axis height scale display and color bar display related to height)		
	2-point height difference measurement function	Provided		
	Auto-focus function	Provided		
	Cross-section profile measurement	Provided	–	
	3-D volume measurement	Provided	–	
	3-D plane distance measurement	Provided	–	
	3-D plane angle measurement	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		
	Mail transmission function	Provided		
	Pop-up guide	Provided		
	Bayonet-type attachment	Provided		
	Keyboard entry	Enabled		
	Compatible with a foot switch	Enabled		
	Function guide	Provided		
Console/Front panel (One-touch operation)	Pause	Provided		
	Recording	Provided		
	Shutter speed adjustment	Provided		
	Supercharge shutter	Provided		
	One-touch 2x zoom	Provided		
	Depth composition function	Provided		
	Quick 3-D display function	Provided	–	
	Frame rate switching	Provided (15 frame/sec. or 28 frame/sec.)	Provided (7.5frame/sec. or 30frame/sec.)	
	Light shift function (Height difference enhancement)	Provided (Surjective/Bijective/Lateral illumination)		
	e-preview mode	Provided (Automatically lists 4 types of image modes, allowing selection of the optimal image)		
	Camera-shake correcting function	Provided	–	
	Optimal contrast function	Provided	–	
	Halation eliminating function	Provided	–	
	Sensitivity quick adjustment dial	Shutter speed and camera gain can be adjusted with one trimmer		
	Halogen lamp light intensity adjustment	Provided		
Accompanying software	PC communication software	Image data transfer between the VHX and PC can be performed easily. (LAN)		
	3-D reproduction software for the PC (Available free of charge)	The PC can reproduce a 3-D image saved in VHX. (Copy free)		

Analyzing capacities of SEMs and roughness meters are easily available, as if you are handling optical microscopes

Ultra-deep color 3-D profile measurement microscope
VK-9500

- Observation magnification: 200x to 18000x
- High resolution and large depth of field comparable to SEMs
- Z-axis measurement resolution: 10 nm
- Abundant analyzing functions, including profile and roughness
- Applicable to large-size samples
- Provides an image combination function that enables wide-visual-field analysis

Total information site for microscopes
You can check the latest functions in animation.
www.digitalmicroscope.com

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California	N.California	**Illinois**	Chicago	**Michigan**	Detroit	**New Jersey**	New Jersey	**Oregon**	Portland	**Texas**	Dallas
	Los Angeles	**Indiana**	Indianapolis		Grand Rapids	**North Carolina**	Charlotte	**Pennsylvania**	Philadelphia	**Virginia**	Richmond
Florida	Tampa	**Kentucky**	Louisville	**Minnesota**	Minneapolis	**Ohio**	Cincinnati	**Tennessee**	Nashville	**Washington**	Seattle
Georgia	Atlanta	**Massachusetts**	Boston	**Missouri**	St. Louis		Cleveland		Knoxville		

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