LARGE DEPTH OF FIELD & CLEAR 3D IMAGING

THE 4TH GENERATION OF OUR VHX DIGITAL MICROSCOPE

DIGITAL MICROSCOPE VHX-5000 QUICK GUIDE

Focus Images in a matter of seconds
The VHX can recognise the focus information automatically when the field of view is moved and then create a depth composition image quickly. This allows intuitive and instant focusing on a point you want to observe.

Quick depth composition

Faster observation and better analysis using more sample data

No need for focus adjustment

No need for depth composition operation
**OBSERVATION BY JUST SELECTING A FIELD OF VIEW**

Once the position is set, a depth composition image is created in one second at the fastest. To observe another position, just move the stage and you can quickly observe a depth composition image of your desired point.

**Conventional KEYENCE product (using an XYZ manual stand)**

Select the field of view... adjust the position to start composition, move the stage in the range of composition, and then... Depth composition image

**VHX-5000**

Just select the field of view, and... Depth composition image

Depth composition image is created in 1 second at the fastest.

**HIGH SPEED DIGITAL IMAGING TECHNOLOGY**

The 50 frames per second camera captures a large amount of image data with different focus positions, and the REMAX V high-speed processing graphics engine processes it at high speed. We have developed a technology that adopts best focus data for each pixel to allow for clear, fully focused images to be observed on-screen.
OPTICAL RESOLUTION IMPROVED BY UP TO 25%*: HIGH DETAIL HDR

A high resolution image is obtained with single-wavelength light and the HDR (High Dynamic Range) function, that captures multiple images by varying the shutter speed, to produce a fine detail image. These two functions enable high resolution and high contrast observation.
AUTOMATIC SELECTION OF OPTIMAL WAVELENGTH FOR HIGHER RESOLUTION

PIXEL SHIFT TECHNOLOGY

Optimal wavelength is selected according to the lens characteristics to ensure capturing of clear images that is less affected by chromatic aberration. Such high resolution observation is enabled by the automatic selection of optimal wavelength and pixel shift technology.

HDR Plus function

The camera captures multiple colour images at different brightness levels by varying the shutter speed, and then produces an image with high level gradation data. This allows clear observation of even targets with glare or with low colour gradation. An algorithm that faithfully represents the colours of the target makes observation more similar to that with naked eye.

ADVANTAGES

- A wider range of brightness levels diminishes the perceived glare.
- Enhances low contrast areas for improved detail.
- Images can be captured in live colours similar to those seen with naked eye.

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.
- Colours can be different between the observation with naked eye and the captured image.

Gradations obtained by using a single shutter

Gradations obtained by using multiple shutters

8 bits
(256 levels)

16 bits
(65536 levels)

HDRV

HDR

Observation after contrast enhancement

Observation after glare is removed

Observation in colours similar to those seen with naked eye

Without HDR function [8 bits]

Without HDR function [8 bits]

Without HDR function [9 bits]

HDR [16 bits]

Plastic cap (50x)

Solar cell (50x)

PC board (50x)
**BASIC CONCEPT**

The VHX covers all basic analysis operations - “Observation, Capture, and Measurement” in a single unit and enables you to make observations quickly and efficiently.

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**EASE OF USE & FLEXIBILITY**

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**OBSERVATION**

**LARGE DEPTH OF FIELD**

It is one of the fundamental features of digital microscopes to provide usability. All of the lenses, camera, and graphics engine are internally designed to enable observation providing good balance between depth and brightness.

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**MULTI-ANGLE OBSERVATION**

The field of view does not change even when the lens is tilted or the stage is rotated. This allows observation from multiple angles. It is unnecessary to touch the target, which ensures high observation repeatability.
EASY MODE OFFERING QUICK ACCESS TO ADVANCED FUNCTIONS

The Easy mode contains frequently used menu items to enable analysis under optimal conditions. Even first time users can make the most of advanced functions.

CAPTURE

DIRECT SAVING OF OBSERVATION SCREENS

The built-in hard drive allows observation screens to be saved directly. The saved images can be used on a PC or other devices easily via Network or USB. It is also possible to use commercially available software to prepare template based reports automatically.

MEASUREMENT

REAL-TIME CALCULATION

Dimension measurement can be made on screen with mouse operation only. The measurement result can be saved together with the image and exported to other software.
**FREE-ANGLE OBSERVATION (XYZ MOTORISED)**

An adjustment mechanism that can easily adjust three axes of the field-of-view, rotation, and inclination. It has achieved eucentricity to let the target almost stay in the field-of-view, even when the lens unit is inclined or rotated.

**FASTER Z-AXIS MOVEMENT**

The maximum speed of the motorised Z-axis stage has become faster to 17 mm/sec. This greatly improves the speed of depth composition.

**0-DEGREE LOCKING MECHANISM**

A mechanism has been incorporated to lock the stage in the status where it is not inclined (0 degree). This improves observation repeatability.

**IMPROVED SEISMIC CAPACITY**

An aluminium diecast main frame has been employed. The reviewed stage structure has improved seismic capacity.

**INCLINATION ANGLE SENSOR INCORPORATED**

A built-in sensor detects the inclination angle of the stage. Now it is possible to display the angle on the observation screen or to save the condition during recording.
20000 X 20000 PIXELS: HIGH-SPEED IMAGE STITCHING FUNCTION

A wide area, high resolution image can be captured with just a button press on the console. Using the VHX XYZ-stage, images in a wide area can be stitched in short time without misalignment. This allows for a large field of view to be captured and observed at once. Images can be stitched up to 20000 (V) x 20000 (H) pixels.

NAVIGATION FUNCTION

A navigation overview can be created using image stitching. 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. When performing high magnification observation, this function is very helpful for quickly understanding which part of the target is being observed.

AUTO CORRECT FUNCTION

This function produces a high quality stitched image by automatically suppresses seams in the image resulted from uneven brightness that is why should we tell the customer about effects of lens aberration=-negative during image stitching.
ABLE TO SUPPORT A WIDE-VARIETY OF APPLICATIONS

<table>
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<tr>
<th>DIGITAL MICROSCOPE APPLICATIONS</th>
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**Semiconductor Industry**
- Colour fiber (1000×)
- Wire bonding (300×)
- ITO film (1000×)

**Metal Industry**
- Metal structure (400×)
- Metal fracture surface (200×)
- Weld penetration (5x)

**Raw Materials & Chemicals Industry**
- Heat insulating materials (100×)
- Residual stress (700x)
- Glass bead (50×)

**Electronics Industry**
- Electronic PC board (50x)
- Solder ball cross-section (200×)
- Solar cell (800×)

**Pharmaceutical & Food Products Industry**
- Crystal (150x)
- Hair (3000×)
- A tear in wrapped packaging (100×)
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)

Advanced Functions/ Applications

Laser ablation (500x)

3D image

Height colour image

Photonic crystal filter (1000x)

8-bit image

16-bit HDR image

Cracks in stainless steel (300x)

Stitched image
SAFETY INFORMATION

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