

Usability one-step ahead freely
controlling the high functionality

KH-8700

HiROX
<http://www.hirox.com>



Hirox Co.,Ltd. <http://www.hirox.com>
2-15-17 Koenji Minami, Suginami-ku, Tokyo 166-0003, Japan
Tel: (+81) 3-3311-9911 Fax: (+81) 3-3311-7722 E-mail: tokyo2@hirox.com

Hirox-USA Inc. <http://www.hirox-usa.com>
100 Commerce Way, Hackensack, NJ 07601
Tel: (201) 342-2600 Fax: (201) 342-7322
Toll-Free: (866) HIROX-US E-mail: info@hirox-usa.com

Hirox China Co.,Ltd. <http://www.hirox.com.cn>
Room 809, 8th Floor, Fortune International Plaza,
No. 43 Guo-Quan Road, Shanghai 200433, China.
Tel: +86-21-6564-7772 Fax: +86-21-3362-5017 E-mail: info@hirox.com.cn

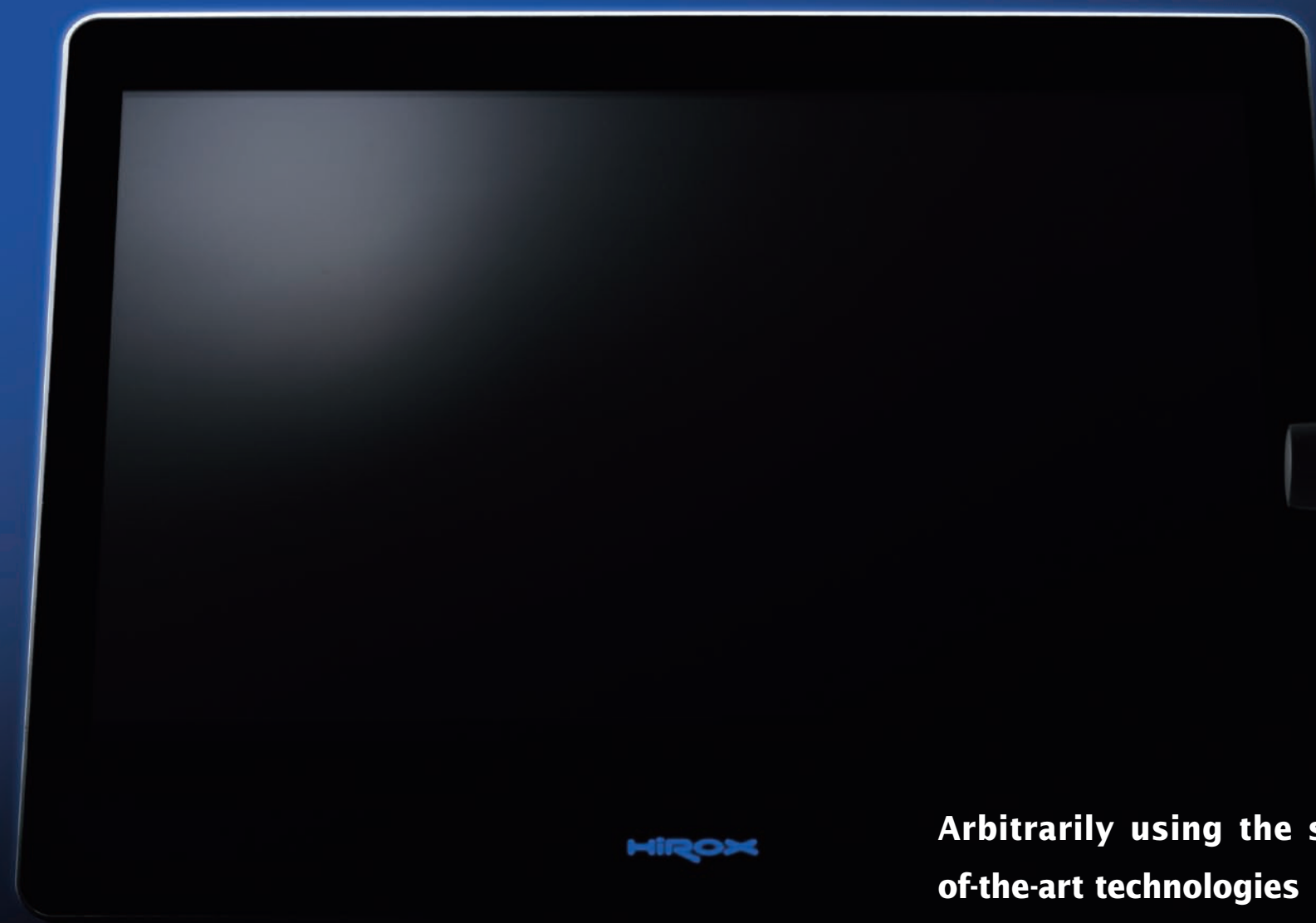
Hirox Korea Co.,Ltd. <http://www.hiroxkorea.com>
#719 Metrokhan Bldg, 1115 Bisan-dong, Dongan-ku, Anyang-city,
Gyeonggi-do, 431-058, Korea
Tel: +82-31-385-1130 Fax: +82-31-385-9730 E-mail: bgkim@hiroxkorea.com

Hirox Asia Ltd. <http://www.hirox-asia.com>
Unit 826, 8/F, Ocean Centre, Harbour City, 5 Canton Road, Tsimshatsui Kowloon, Hong Kong
Tel: +852 8198-9679 Fax: +852 3015-7657 E-mail: info@hirox-asia.com

Hirox Europe <http://www.hirox-europe.com>
Jyfel, 9 rue des Gantries, F-69130 Ecully, France
Tel: +33 426 25 03 40 Fax: +33 426 23 68 13 E-mail: info@hirox-europe.com

Contact

The products in this catalog may be changed at any time, without notice.



**Arbitrarily using the state-
of-the-art technologies**



More quickly and instinctively we deliver all the potentials to all the users based on user-oriented ideas.

Finer observation, measurement and imaging operations. The KH-8700 has further been evolved so that the users can arbitrarily use it without any expertise and special skills. Now, we are in an age when the users do not have to get used to the machines because the machines think from the viewpoint of the users. In various situations such as research and development, quality assurance, production engineering, designing and production, the KH-8700's high-level usability with intelligence creates comfortable environments where the users can concentrate on their main business.



Observation — Truly visualizing the object as it is.

P.06

The "GENEX Engine" that realizes the industry-fastest real-time image processing, the LED light having a long life of 30,000 hours, and the industry-first, superfine, full HD monitor provide you with high-dimensional observation that is precise and detailed.

Measurement — Realizes precise measurement with smart operation.

P.10

The KH-8700 digital microscope offers various functions for both planar and cubic measurements, corresponding to your objectives and objects. In addition, the usability has been improved by reviewing the human error factors in measurement to the utmost limit for speedier and more instinctive controllability.

Imaging — The high-resolution images deliver more than the reality.

P.14

Thanks to use of the state-of-the-art technologies, the KH-8700 digital microscope truly reproduces what is invisible. Furthermore, it even expresses the entire unknown world lying ahead. To offer another world that could not be expressed by the conventional optical microscopes, we are seeking further technologies, aiming to go ahead of the reality.

Observation

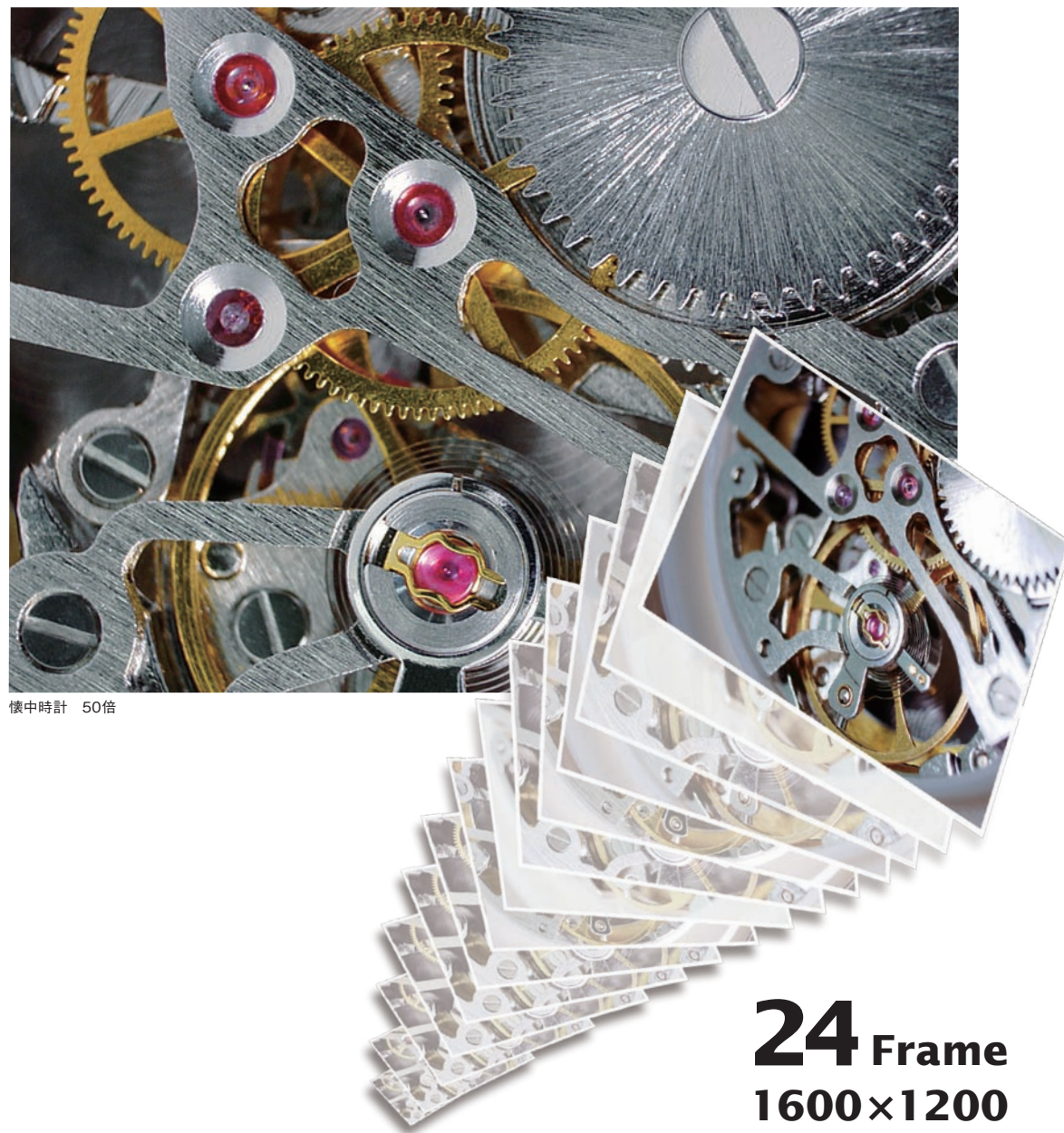
Truly visualizing the object as it is

Based on the core technologies we have developed for long years as an optical instrument manufacturer, we equipped the KH-8700 with the "GENEX Engine", which provides you with high performance and operability thanks to the industry-fastest, real-time image processing technology. The KH-8700 is also equipped with an LED lamp of a 30,000-hour life (reference value) and the industry-first, superfine, full HD monitor, offering a high-dimensional observation capability that gives a precise and efficient operation environment.

24 frames/second

Industry-fastest, real-time image processing

The basics of observation depend on the accuracy of superfine live image output. The newly developed "GENEX Engine" is equipped with a 2-megapixel CCD camera, realizing direct output at the fastest speed of 24 frames/second. Assuming various scenes and operations in observation, we attained this natural, comfort, easy-to-use and stressless digital microscope.



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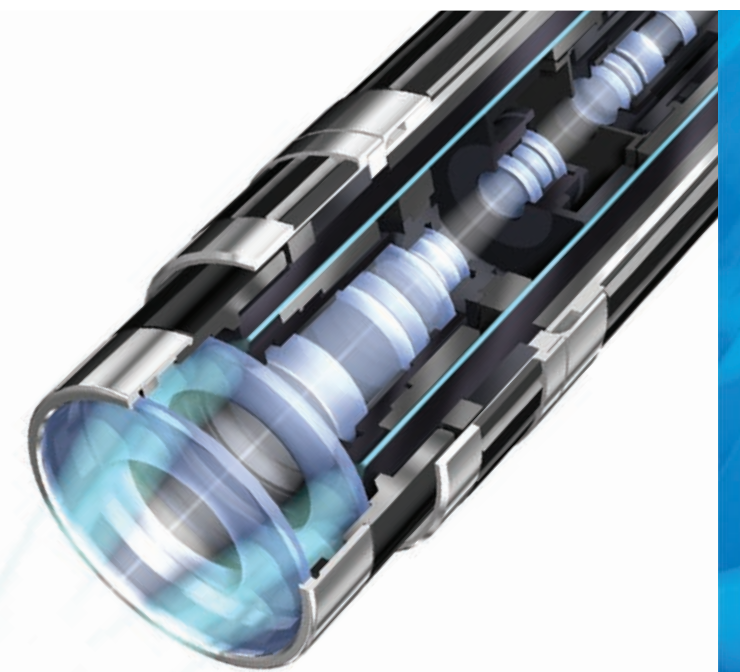
24 Frame
1600×1200

Using an LED lamp

30,000 hours, or a long life of about 10 years*

To draw the functionality of the newly developed GENEX Engine, we use an LED lamp with a high color rendering property (color temperature of 5700 K) to offer an important advantage for observation. When compared with conventional lamps, this LED lamp consumes one-fourth of power, has a 45-time longer life at maximum (comparison by Hirox), and emits less heat ray and ultraviolet, helping improve the work environment.

*LED life calculated based on 8 h/day.



More beautifully showing the clear images

Full HD monitor

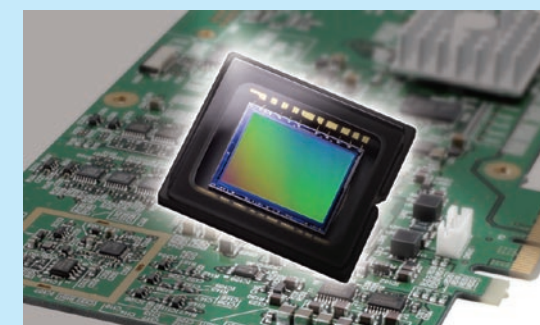
The 21.5-inch full HD monitor clearly shows the objects on its wide screen. Due to the advantage of a wide monitor (16:9), the operation panel is located on the right side of the screen. The reproducibility of 16.77 million colors and the brightness and contrast functions supported by the high definition technology offer wide-angle and clear images.



GENEX

Drawing the lens performance to the utmost limit
Equipped with the "GENEX" technology

Our new image engine or the "GENEX", mounted in the KH-8700, realizes high fineness, resolution and color reproducibility. Due to a high operation processing technology that supports the full HD imaging, the "GENEX" Engine offers the fastest, 24-fps images of a size of 1600 x 1200 pixels, drawing the performance of the Hirox's original lens to the utmost limit.

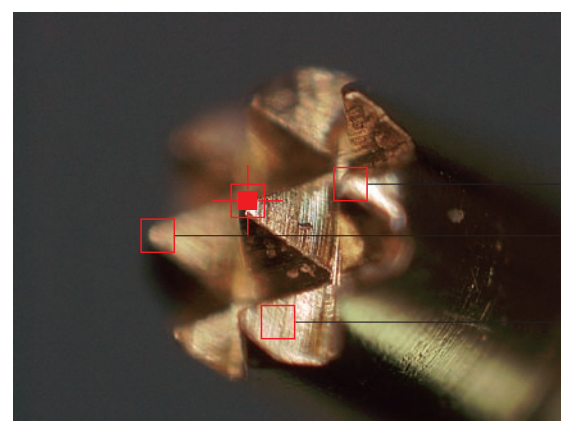




Autofocus

Focusing on the instant

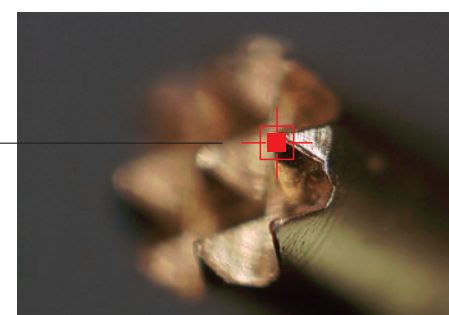
Combined with the powered stand, the digital microscope system focuses on any arbitrary point of the object precisely and instantaneously only by clicking there on the HD monitor. In addition, you can smoothly carry out fine focusing (Z-axis travel step accuracy of $0.05\ \mu\text{m}$) by remote device operation. Various functions are also available only by simple touch panel operation.



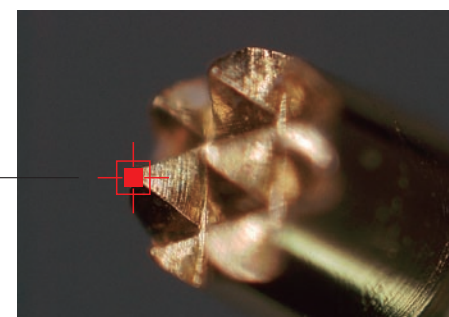
By obtaining focus information on the entire image, you can instantaneously focus on an arbitrary point only by simple mouse operation.



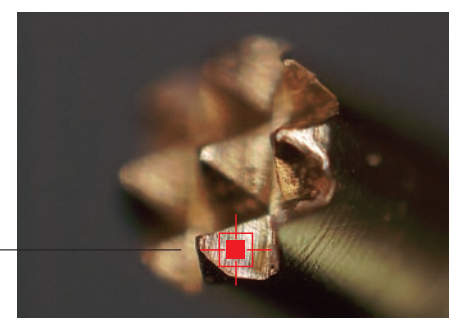
Focus information is always searchable with the focus indicator.



Contact probe, 200x



Focusing on the clicked point

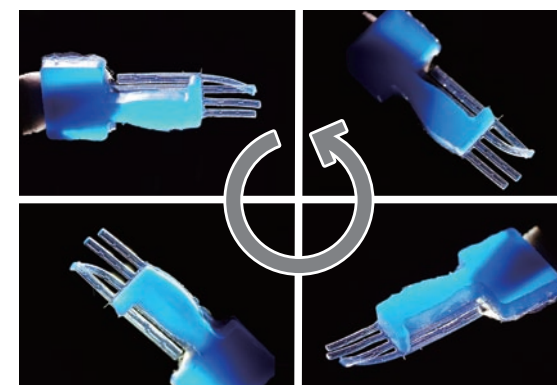


Focusing on the clicked point

High-level observation accuracy

Hirox's unique 3D observation technology

Thanks to the technological strength only attained by an optical instrument manufacturer, the KH-8700 digital microscope can observe the sides of the object without touching it. To observe the object from various angles, you have only to attach the rotary head adapter to the exclusive zoom lens. The KH-8700 digital microscope eliminates botheration to move the object while observing it at a high magnification.



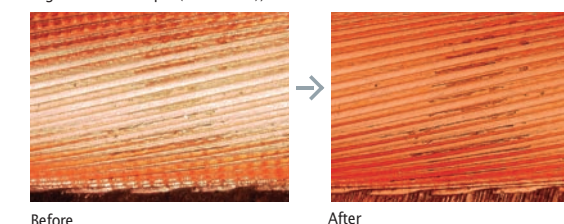
Microhand

HDR (High Dynamic Range)

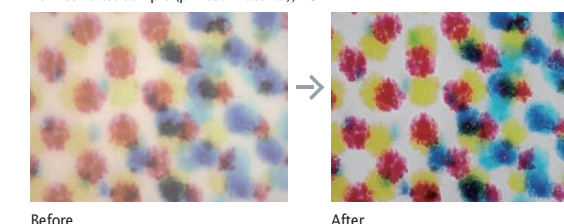
High-level image processing technology

By instantaneously recording and synthesizing two or more images having different exposure values, the KH-8700 digital microscope eliminates overexposure and underexposure that are likely to appear when imaging an object having extremely light and dark surfaces, so that the image can be processed to an appropriate luminosity. On the other hand, if the object has a small gradient range, making it difficult to clearly image the surface, the KH-8700 processes it for fine reproduction.

High-contrast sample (metal tube), 40x



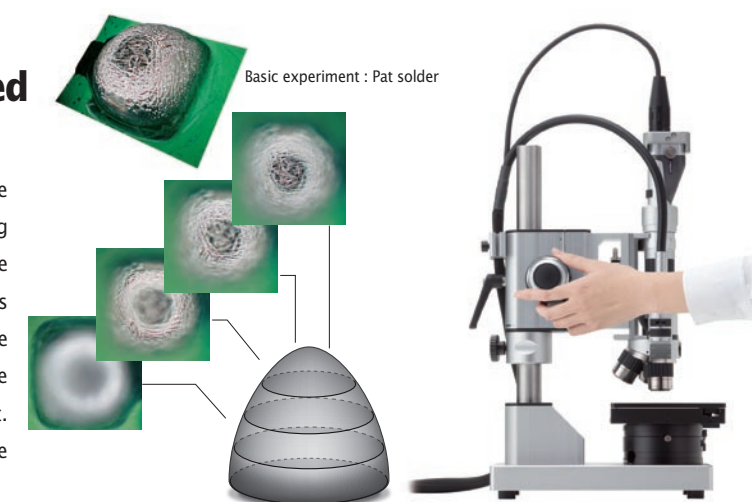
Low-contrast sample (printed material), 20x



Handy synthesizing

Synthesizes an all-focused image as you like

This function is helpful when you desire to have an all-focused or 3D image of an object having a height. To get an image on which the entire object is focused, you have only to move the lens upward and downward by turning the dial on the manual stand. Thereafter, only clicking one time presents a synthesized, 3D image of the object. The KH-8700 digital microscope reproduces the condition of the entire surface of the object.



Measuring

Smart operation makes accurate measurement available

Combining various measurement technologies including a highly accurate 3D measurement function, the KH-8700 digital microscope fully obtains various expressions of the object to answer your objectives and needs. In addition, the increased accuracy of the measurement functionality has improved the usability for smarter and simpler operation. The instinctive operation and stressless measurement environment greatly reduces the operator's burden.

ACS(Auto Calibration Select)

Instinctive operation improving the usability Hirox's unique ACS communication

The KH-8700 controls the moving speed by recognizing the information on the lens magnification. Measurement can be carried out on the monitor without consciousness. The digital microscope predicts and automatically decides the imaging conditions. The ACS Communication technology apprehends what the operator wants to do in advance to improve the operability. The fine tuning that the operators have so far made can be made more smoothly and instinctively. Never choosing the users, the KH-8700 can offer 100% performance of a digital microscope.



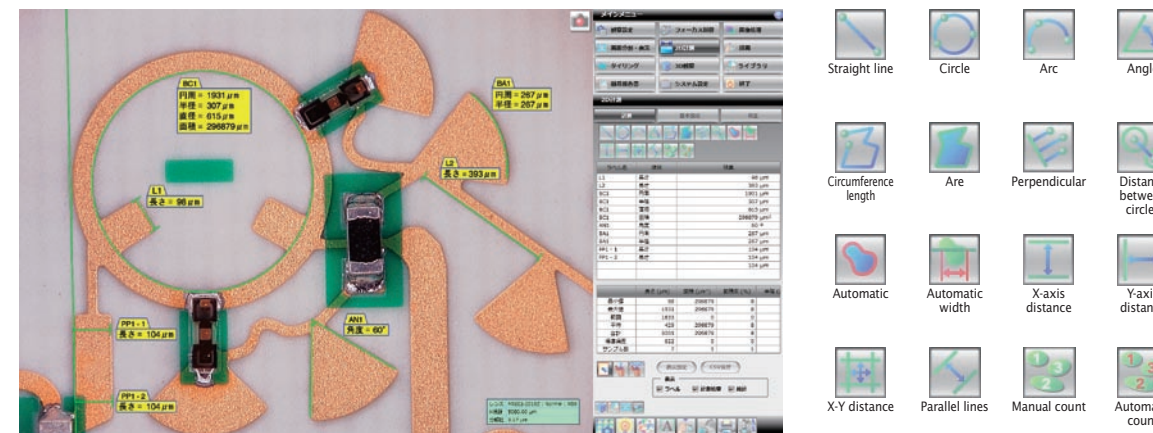
What is the ACS (Automatic Calibration System)?

Developed by combining the Hirox's utility technologies and usability, the ACS (Automatic Calibration System) recognizes information on magnification, field of view, resolution and depth of the recorded object image on a real-time basis so as to offer information required for the operator to carry out various tasks. The ACS selects the calibration values and controls the Z-axis moving speed, the moving steps and image input timing to offer a stressless environment.

2D measurement

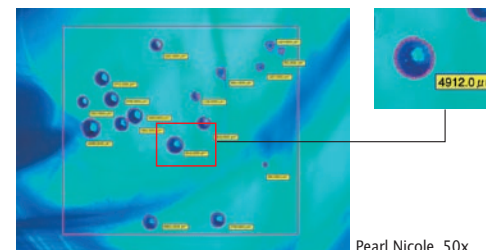
Accurate details obtained by various measurement tools

The KH-8700 digital microscope is equipped with 16 measurement tools that respond to various measurement demands including the objective's length, area, angle, etc. You can visually recognize these functions thanks to the easy-to-understand measurement icons. Because the ACS supports the operator to control the variety of information for measurement, the operator can operate the digital microscope on an instinctive basis. The KH-8700 can save the numerical data on the measurement list in the CSV format.



Automatic count

Automatically counts two or more selected fields within one image. You only have to specify some conditions such as particles, crystals, and microorganisms.



Statistic calculation

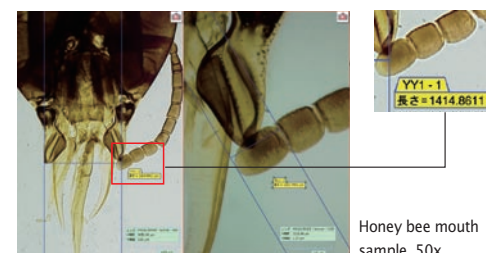
The KH-8700 can indicate the measurements by the measurement items as statistic data. The measurement items include minimum value, maximum value, scope, average, total, standard deviation, and number of samples.

項目	最小値 (μm)	最大値 (μm)	範囲 (μm)	平均 (μm)	標準偏差 (μm)	総和 (μm)	サンプル数
最小値	98	296879	0				
最大値	1931	296879	0				
範囲	1833	0	0				
平均	429	296879	0				
総和	3001	296879	0				
標準偏差	623	0	0				
サンプル数	7	1	1				

Statistic list

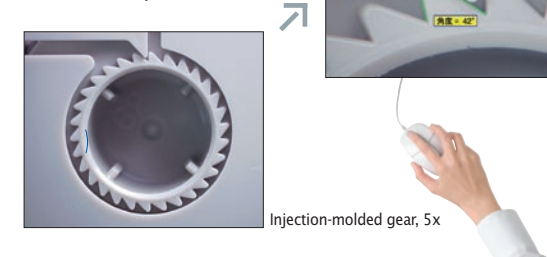
Screen separation measurement

Even when the screen is separated into two or four sections, which use different magnification values, 2D measurement is available in an appropriately-calibrated condition offered by the ACS.



Zoom

By turning the mouse wheel, you can zoom in an area on a real-time basis to accurately grasp the measurement point.



Calibration value information display

Displays information on the ACS calibration values that are registered in advance, including the magnification values of lenses and lens adapters. By simply imaging the verification reference, you can automatically set the calibration values and in addition, you also can manually calibrate the digital microscope.

Measurement basic setting

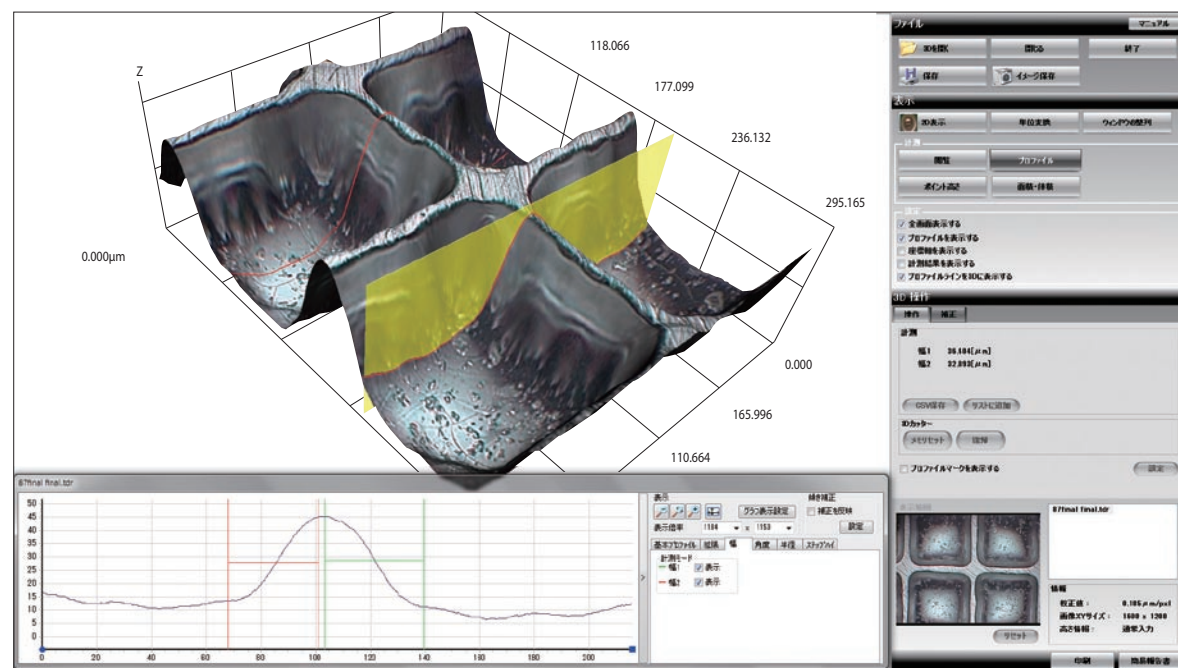
You can arbitrarily choose and display the measurement items based on your objective and necessity. You can change the font, the line size and the color.



3D measurement

More quickly and more finely

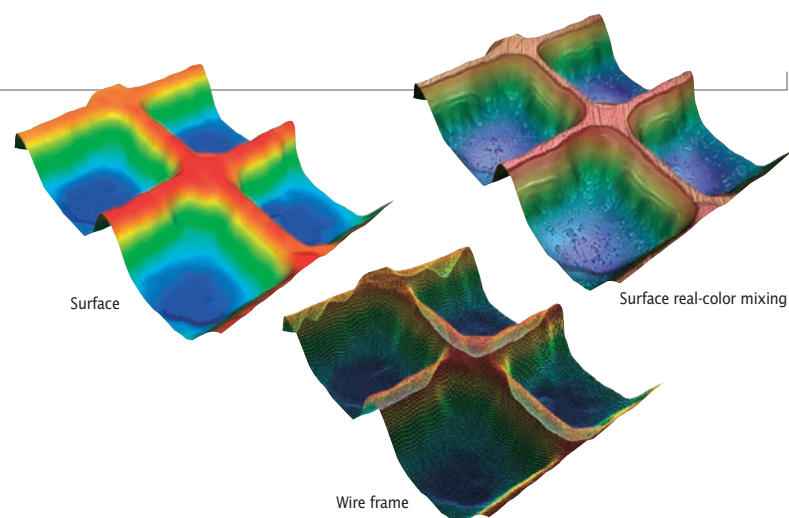
For planar (2D) observation of an object having a height, the KH-8700 digital microscope can offer the cubic (3D) observation function by which all the surface of the object are focused, so that the details can be expressed. When combined with the powered stand equipped with a Z-axis moving function of a 0.05- μm step accuracy at maximum offered by the ACS, the KH-8700 digital microscope realizes quick control based on information on the field of view, the magnification and the depth. It is three times quicker than before to carry out 3D configuration. In addition, the KH-8700 can offer higher-quality synthesized images.



3D viewer

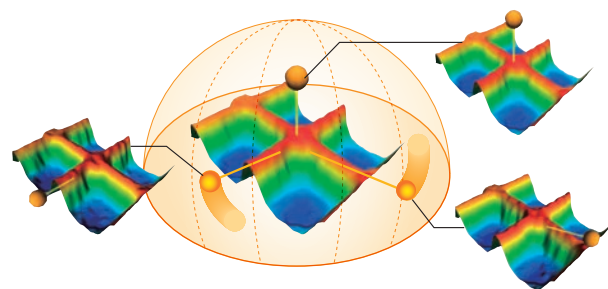
Rich expression functions

You can choose the 3D expression functions based on your demands. If desiring to express the height differences, you can use the "Pseudo-color display" to redden the highest area and blue the lowest. If desiring to check the length, the height, and/or the shape, you can choose the "Wire frame display". The texture expression is available.



Lighting

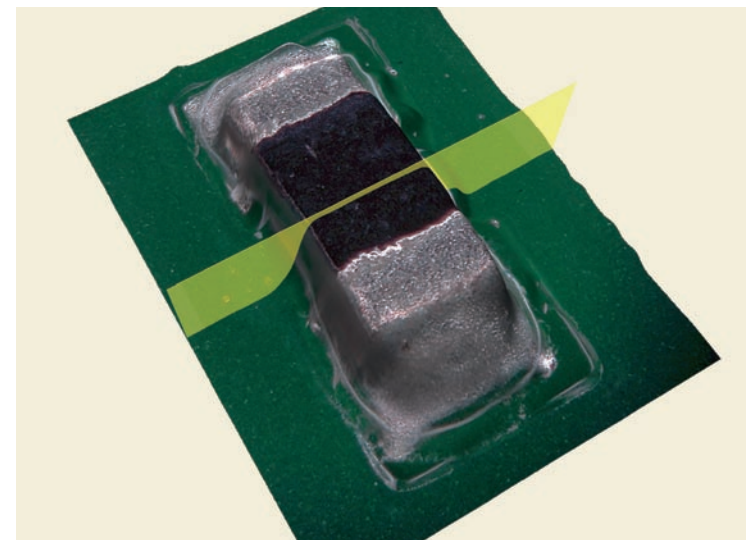
When desiring to emphasize the cubic structure of a 3D image, you can illuminate the object from arbitrary angles on the data. By changing the lighting angle, you can obtain the optimum surface shape in more detail according to your objective.



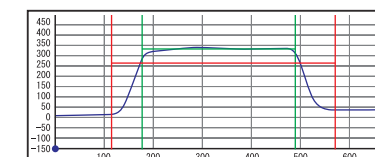
3D profile measurement

Numerical data supporting accurate analyses

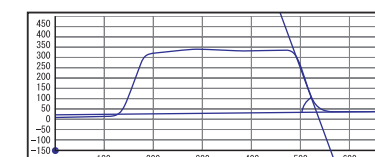
Using the XYZ data inputted in the process of 3D construction, the KH-8700 digital microscope can create a line profile data at an arbitrary height. In addition, by combining a 3D image, the KH-8700 measures lengths, heights, angles and arcs on the profile graph, so now you can easily obtain these numerical data that you could not get by means of a 2D image. The slicer history improves the visibility of the data values and the measured points.



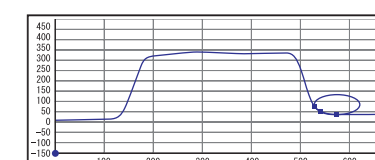
Mounted laminated ceramic chip resistor, 200x



Width and height measurement



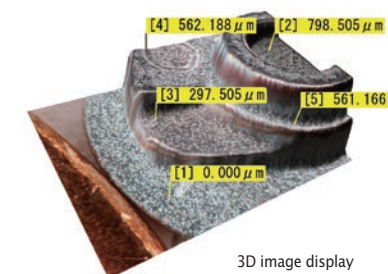
Angle measurement



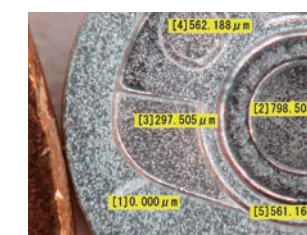
Radius measurement

Point height measurement

When you simply move the mouse pointer to an arbitrary point on a 2D/3D image, the height at the point is indicated automatically and on a real-time basis. Further, you can click on that point to paste the height data on the screen like a memo. It is also easy to measure the heights of two or more points.



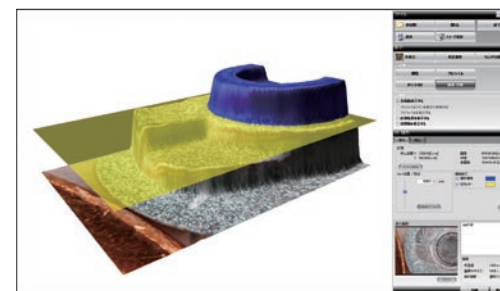
3D image display



2D image display

Volume and area measurement

Cutting a 3D image horizontally at an arbitrary height on the screen, the KH-8700 digital microscope can execute operation processing in a half or shorter time than conventional models to obtain the sectional area of the cut surface and the volumes of the upper and lower parts of the cut object. The operator can check the image of the measurement area on the screen while carrying out easy mouse operation, and thus can reduce his/her own burden.



3D roughness measurement function

The KH-8700 indicates roughness and crinkle curves for which the cutoff values are selectable on the profile so that you can measure the roughness parameters (roughness Ra, roughness Rz, and roughness Rzjis). The data is updated on a real-time bases corresponding to the 3D cutter.

Horizontal compensation

The KH-8700 corrects a slanting image data to a horizontal one. The slant correction can effectively work in such cases that you execute 3D synthesis with a slanting object.

Smoothing

If the image data contains noise and many height differences, the KH-8700 can eliminate them to smoothly indicate the image.

Noise elimination

Unnecessary noise can be eliminated. This function is especially usable for objects including halation, which are likely to make noise.

Photographing

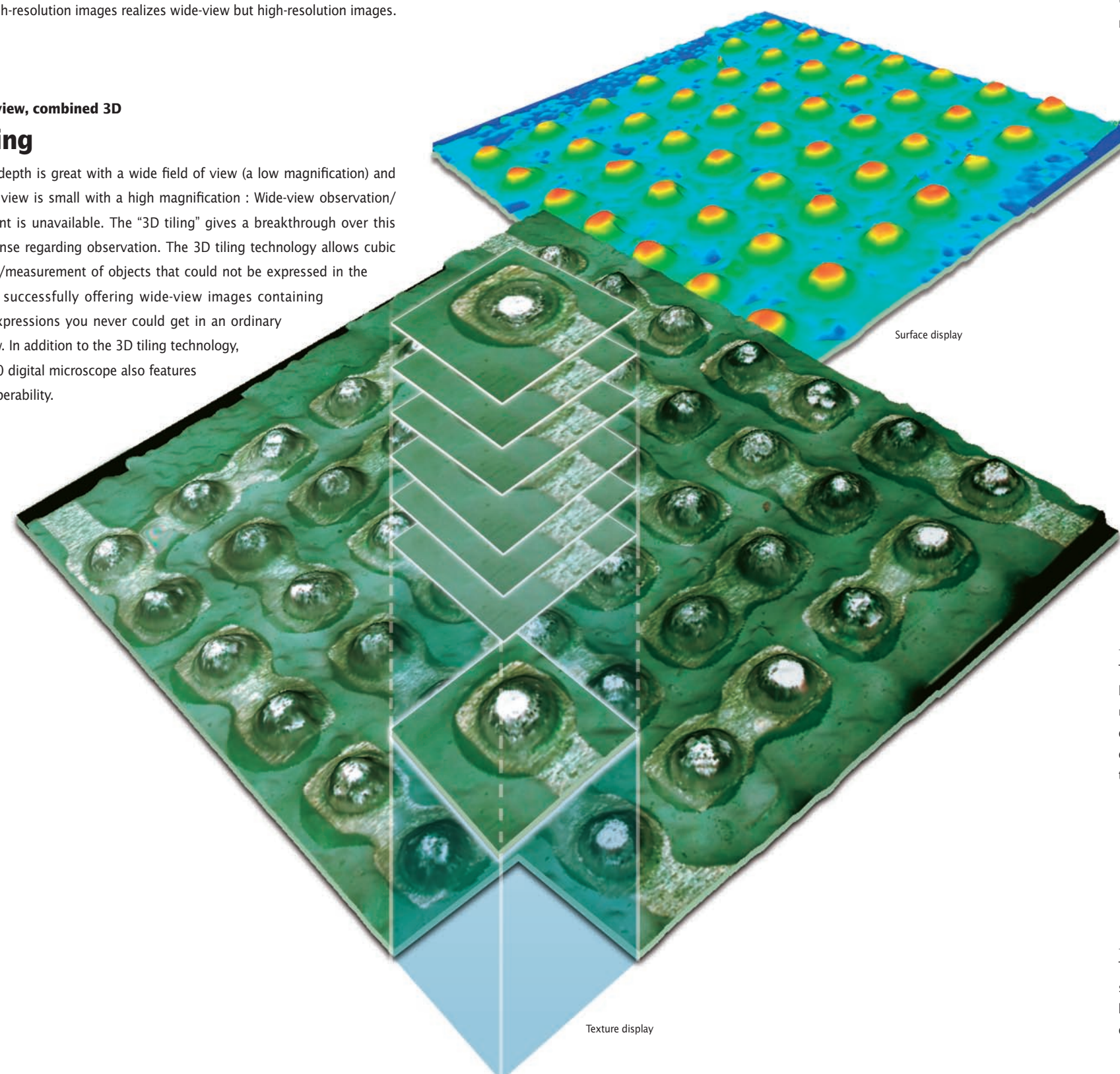
Combining images to widen the field of view at a high resolution

The tiling function realizes the ultimate ideal demanded for a digital microscope, that is, offering wide-view but high-resolution images. Ahead of the common sense with the optical microscope that a higher magnification makes the resolution higher but the field of view smaller, the KH-8700 digital microscope offers high-resolution and wide-view images. Hirox's high-level technology to combine high-resolution images realizes wide-view but high-resolution images.

Widening view, combined 3D

3D tiling

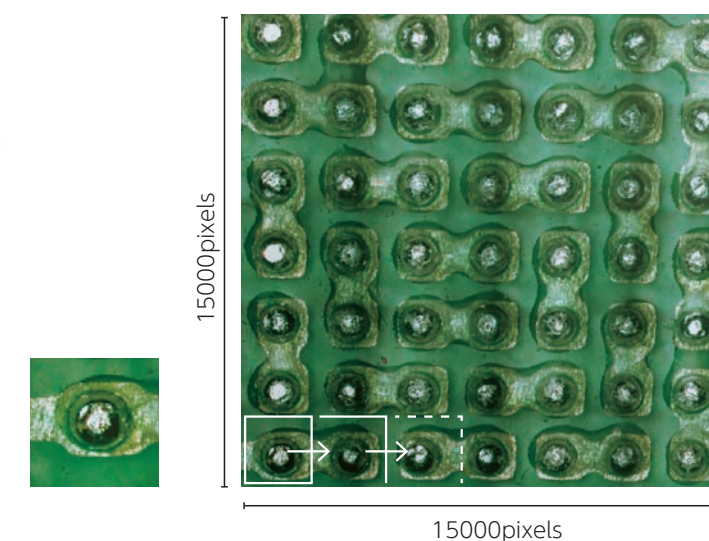
The object depth is great with a wide field of view (a low magnification) and the field of view is small with a high magnification : Wide-view observation/measurement is unavailable. The "3D tiling" gives a breakthrough over this common sense regarding observation. The 3D tiling technology allows cubic observation/measurement of objects that could not be expressed in the 3D format, successfully offering wide-view images containing excellent expressions you never could get in an ordinary field of view. In addition to the 3D tiling technology, the KH-8700 digital microscope also features a smooth operability.



Smoothly combining

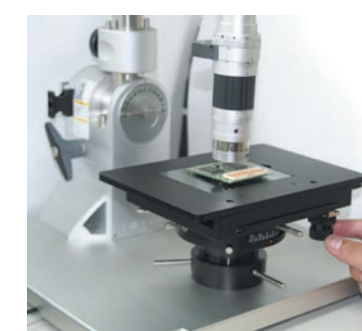
2D tiling

Just moving the stage causes the fields of view of the lens to be combined on a real-time basis, extended up to $15,000 \times 15,000$ pixels. Giving a breakthrough over the common sense of the relation between the field of view and the magnification, the new technology easily realizes wide and detailed observation and highly fine measurement with wide fields of view.



Easy operation

To respond to demands to easily use high-level functions, the KH-8700 offers the ultimate utility and usability : The operator can use the 2D tiling simply by focusing on the object and moving the stage and the 3D tiling by simple operation.



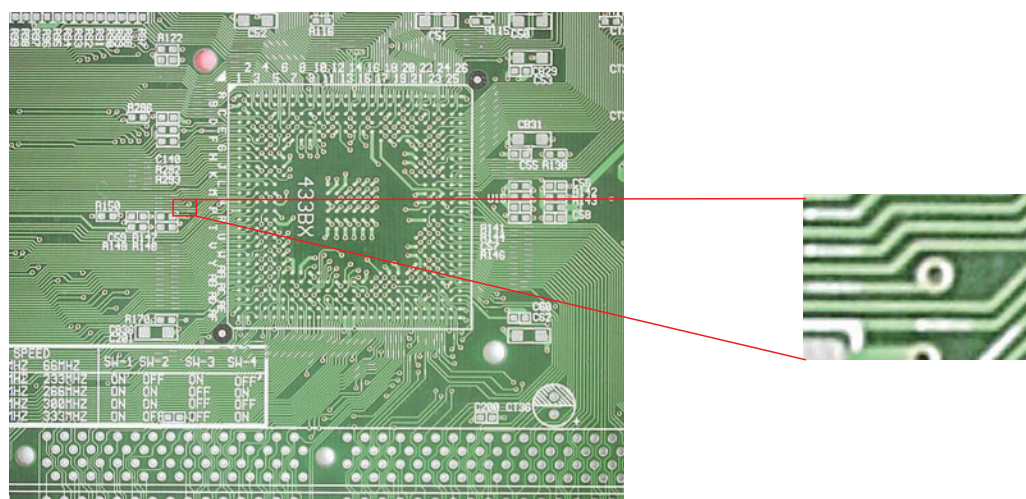
Moving the XY stage

High-speed processing technology

The 2D tiling function combines images on a real-time basis simply by moving the stage. The 3D tiling is available by automatically and appropriately controlling the Z axis based on the information given by the ACS. Operating two times more quickly than the conventional models, the KH-8700 greatly shortens the time before observation.

Industry-fastest, real-time image processing**Saving high-resolution images with 50 million pixels**

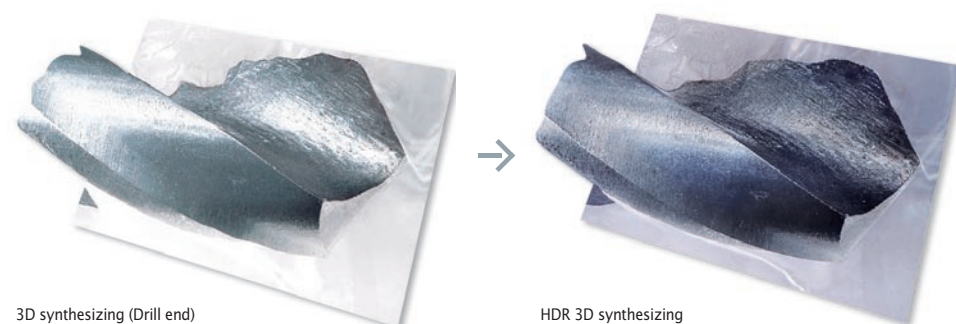
Thanks to Hirox's unique digital technology, the KH-8700 digital microscope features a noise reduction function that retains the images without quality deterioration. The KH-8700 can save high-resolution images up to a size of 8800 × 6600. The 50 million-pixel screen fully expresses the high-quality images, truly reproducing the fine textures.



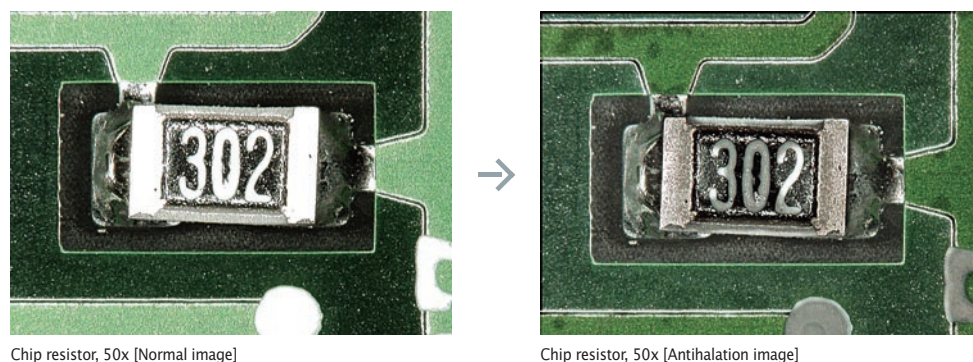
Printed circuit board

HDR

Simply making a 3D image of an object having great differences in brightness cannot express the details of the object surface due to halation and darkness. Thanks to the HDR technology to process the individual images used for 3D synthesizing, the KH-8700 digital microscope produces images that you have desired.

**Antihalation**

If the object has strong light reflection (halation), the KH-8700 digital microscope records multiple images while eliminating the halation to make up a 3D image. This is helpful for objects having strong halation, 3D images of which were difficult to express.

**Offering seamless observation, measurement and photographing****Remote device (CT-R01)**

The CT-R01 is a remote device that was developed aiming to freely operate the hi-tech functions in a simpler and more arbitrary way. The 4.3-inch monitor gives a touch panel only with the frequently used functions. Only by touching the LCD screen, you can instinctively operate the KH-8700 digital microscope as you like. With the CT-R01 remote device, you can also simply and smoothly control the camera functions including the shutter speed, the camera mode and the capture. Using the jog dial, you can control the powered stand Z-axis and the rotary head.

Large screen touch panel

The 4.3-inch LCD panel is highly visible and easy to operate.

Easy-to-understand menu

The menu indicated by both icons and texts never makes the operator hesitate.

Jog dial

With this jog dial only, you can control the powered stand z axis and the rotation speed of the rotary head.

Volume level knob

Controls the camera brightness. Only turning this knob changes the brightness of the image.

Remote device menu screen**Camera control area****Application area****Control area****Camera control area**

Offers the functions of white balance adjustment, screen image fixing, release switching, and shutter speed adjustment.

Set value indication area

Camera: Indicates the camera shutter speed value. Z axis position : Indicates the z-axis position value.

Application area

Offers simple operation buttons to execute functions by one-time clicking. Includes recording, movie recording, measurement, autofocus, HDR, halation elimination, 3D synthesizing, tiling, image stabilization, library and manual lens selection.

Control area

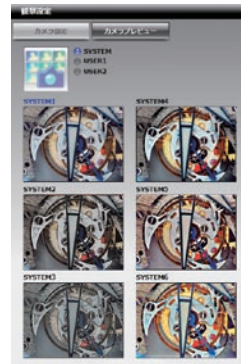
Switches the device to be controlled by the jog dial. You can select either the z-axis movement or the rotation speed of the rotary head.

Putting high performance and functionality together to respond to various needs

By putting technologies together, the KH-8700 digital microscope offers a sure level and quality to respond to all the objectives and needs including observation, measurement and photographing. In addition, the excellent usability of the KH-8700 offers more instinctive operability, creating an operation environment that goes one step ahead.

Camera preview function

The camera preview screen offers images with different camera settings. You can not only choose an image that you like but also newly discover fine surface conditions appearing due to the differences in the camera setting.



Screen separation function

The screen can display different images simultaneously in two horizontally or vertically separated areas or four separated areas. As one of the separated screen areas can display the live image, it is helpful to search the observation point. Measurement can also be carried out on the separated screen.

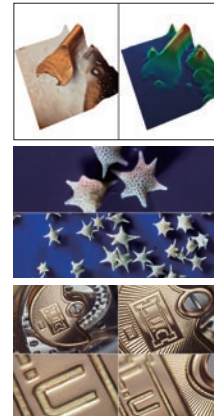
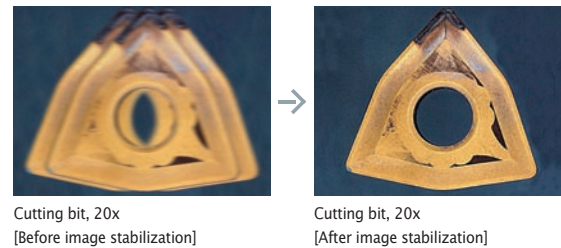


Image stabilization

Reduces disturbance due to camera shake and vibration. This is useful in a bad observation condition where vibration is likely to adversely affect observation and photographing.



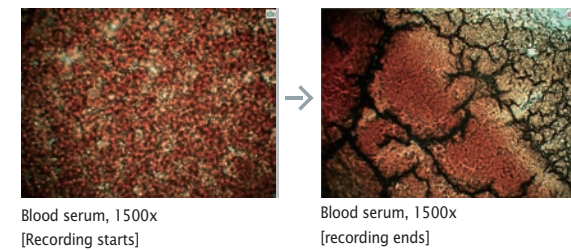
Real-time zoom

Turning the mouse wheel makes the camera accurately zooms in on the measurement point on a real-time basis.



Timer recording function

The KH-8700 can automatically save images taken at preset intervals and this is helpful, e.g., for a biotechnological object that needs long-time observation. When this function is used, the LED lamp goes on only when observation is executed, reducing unnecessary energy consumption.



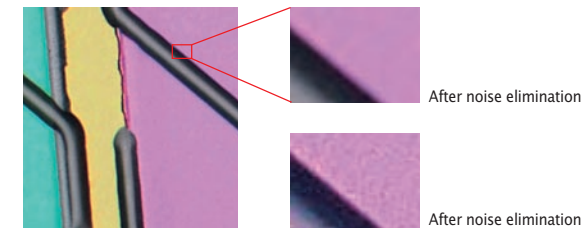
Real-time reverse / rotation

Real-time reverse and rotation are available not only in the still images but also in the movies. You can adjust the observation direction without moving the object, so you only need mouse operation for fine positioning and angle adjustment. Reversing by the lens can instantaneously be corrected for right display.



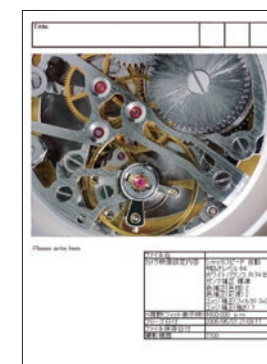
Noise elimination function

When you desire to eliminate disturbance by particles on the image, the KH-8700 digital microscope can reduce the noise while keeping the outline of the object. You can change an image of an object having extremely high contrast into an appropriate image. The noise elimination function may be used only in the specified area.



Report

Using the report creation function, you can freely write comments and draw figures on the image, measurement, magnification, and lens information, and therefore, you can easily create a report with the KH-8700 even without using a PC. In addition, the KH-8700 can save and control the created reports.



Launcher function

You can always display the functions necessary to observation in the task area so as to easily use them all the time. These functions include camera setting selection, brightness setting, library, comment, recording, lens selection, autofocus and printing.

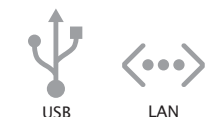


Printer connectable for immediate printing

Simply connecting a printer, you can have printed data including the measured values and images only by simple operation.

Equipped with extension function and six ports

The KH-8700 digital microscope is equipped with six SUB2.0 ports used for functional extension by linking with peripherals. In addition, it offers the display, LAN, analog RGB, RS232C and external ports as the standard specifications.



Library preview function

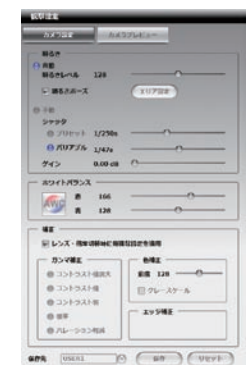
The library display can list all the still images and movies you have saved. As the images can be thumbnailed, you can quickly check the saved images.



Library display screen

Camera image setting and user camera registration

Up to 12 parameters with regard to camera setting can be registered. Only if registering a set of camera parameters for an object, the set of camera parameters can be reproduced only by selecting it. This function is useful for observation of objects under the same condition.



User management

When used in a department or by several persons, the KH-8700 can manage the system settings and image data for the individual persons. It can distinguish many unspecified users.

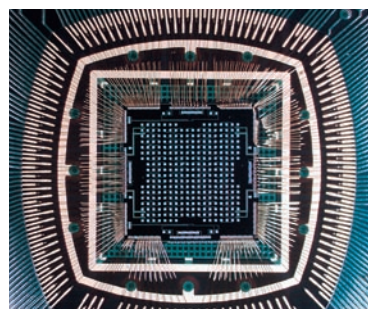
Preview function (HDR, antihalation and 3D synthesizing results)

The KH-8700 displays previews of the HDR, antihalation and 3D synthesizing results according to the setting patterns. You can choose a result that is appropriate to your own observation.

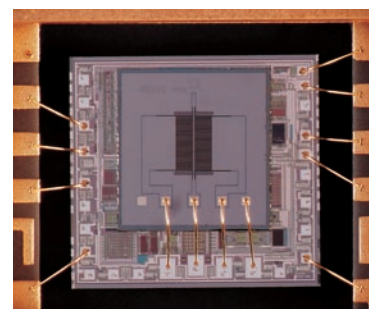
Sample images

Combining the newly developed GENEX Engine and the high-resolution lens for excellent performance, the KH-8700 digital microscope takes high-quality enlarged observation images as below. These are sample images to introduce the performance of the KH-8700 that satisfies various industries, needs, objectives and usages.

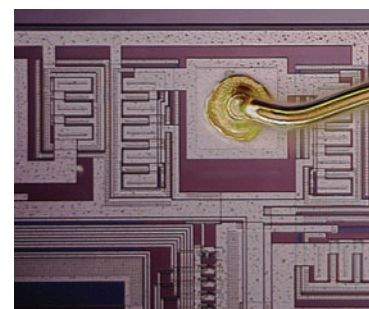
Semiconductor / SMT



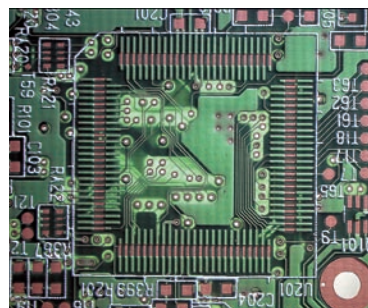
IC package, 50x



IC package, 100x



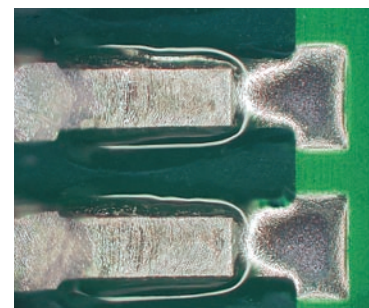
IC package, 1000x



Control device PCB, macro



0402 laminated ceramic pad, 200x



QFP fillet, 200x

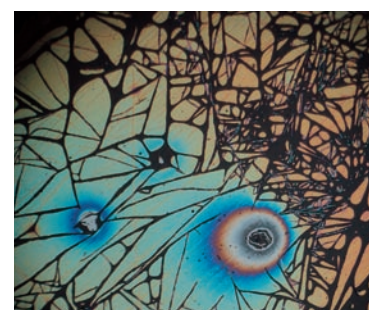
Automobile / nondestructive



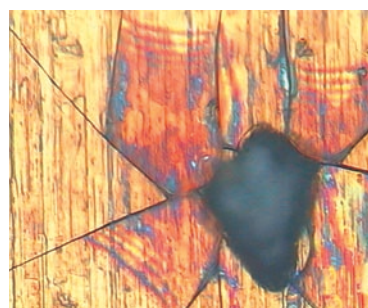
IC with a built-in LED, 1000x



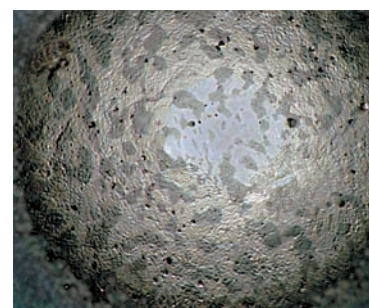
BGA, 150x



Carbon-base film, 1000x



Inside of cylinder, 1400x

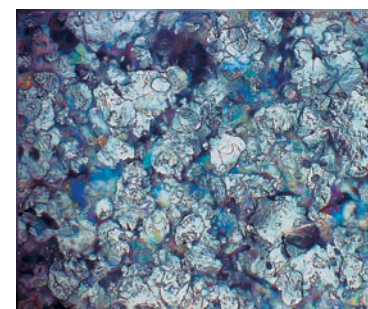


Flip-chip ball, 1000x



Metal texture, 2000x

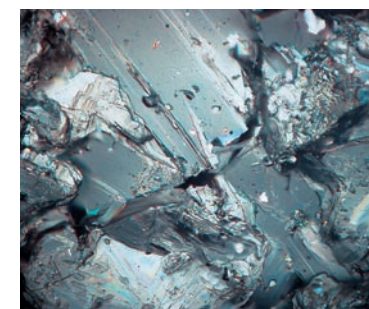
Machinery / material engineering / crime laboratory



Silver paint on cellular phone, 1400x



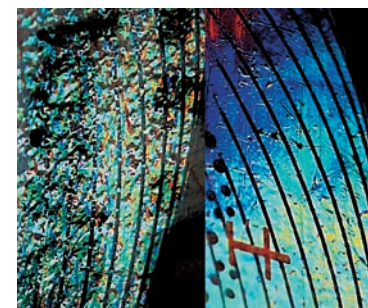
QFP fillet, 300x



Semiconductor monocrystal, 1000x



Hair cuticle, 2000x



Counterfeit bank note, 300x



Bullet impression, 50x

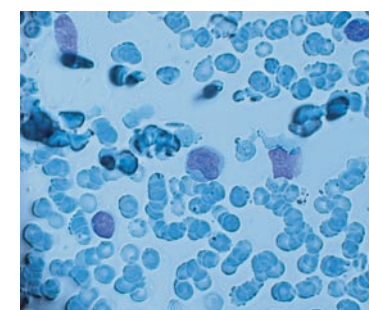
Biology / medicine



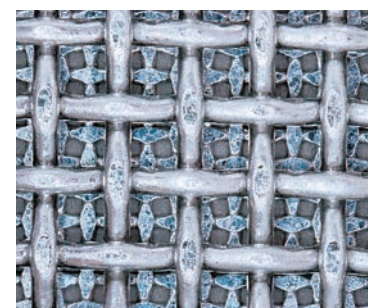
10.5-day old mouse embryo, 50x



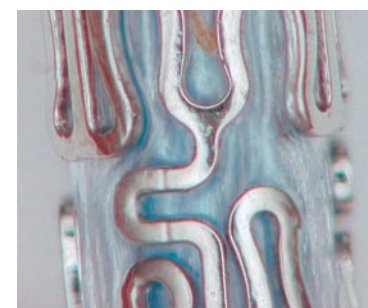
Fruit fly, 100x



Streptococcus, 2800x



Fine filter, 500x



Stent, 150x



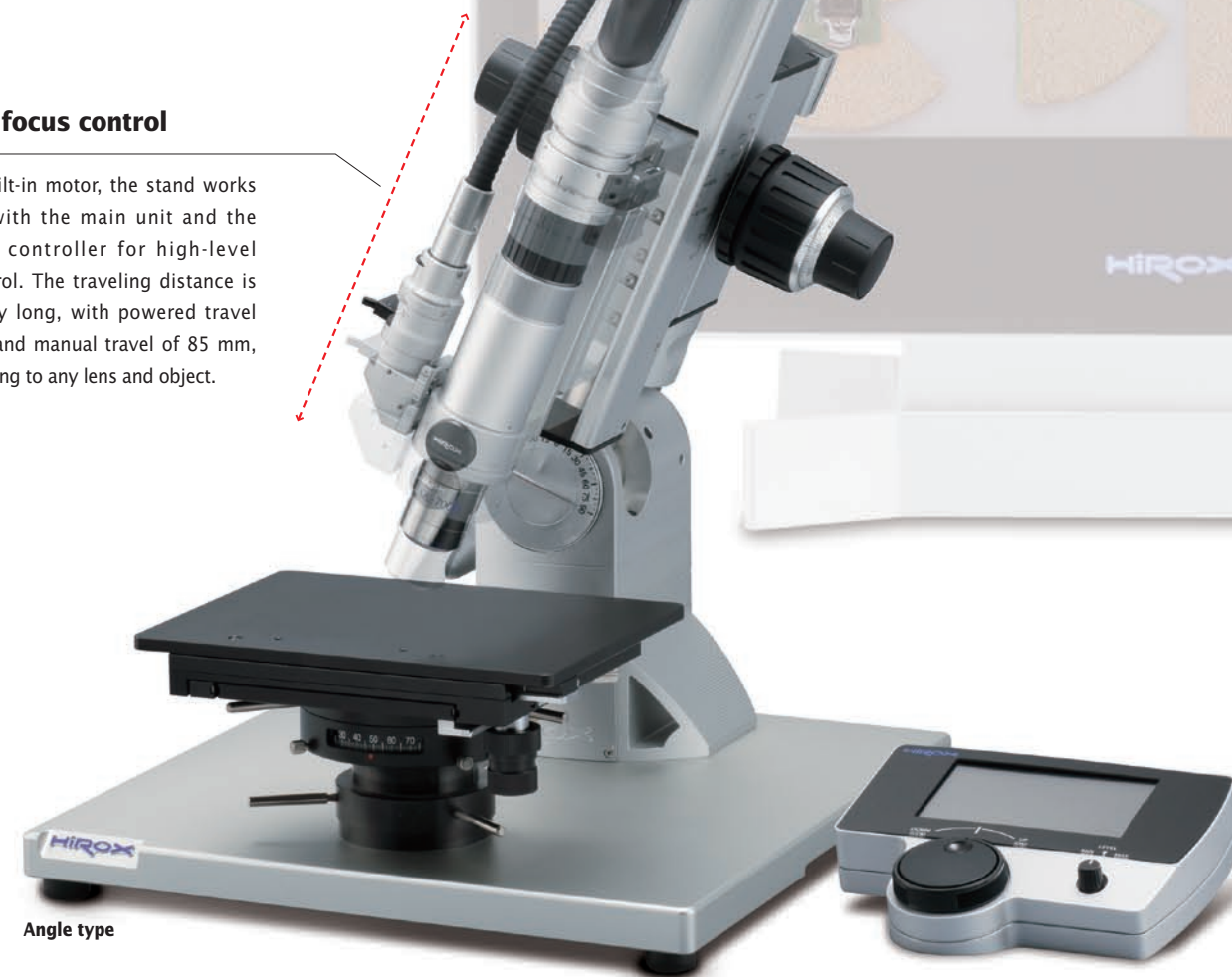
Protein crystal, 100x

Stand

Combined with the powered stand, the system enables you to precisely focus on any arbitrary point in a short time only by clicking there on the monitor. In addition, you can smoothly carry out fine focusing (Z-axis travel step accuracy of 0.05 μm) by remote device operation. Various functions are also available only by simple touch panel operation.

Smooth focus control

Using a built-in motor, the stand works together with the main unit and the dedicated controller for high-level focus control. The traveling distance is surprisingly long, with powered travel of 30-mm and manual travel of 85 mm, corresponding to any lens and object.



Angle type

Standard type

Manual block

Cable holder (rear side)

Rough movement dial

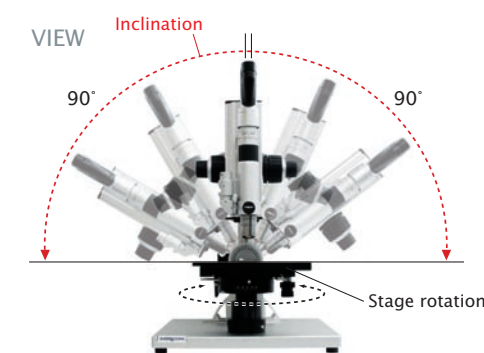
Height adjustment is smooth due to the rough movement dial controlling a stroke of 85 mm and the superfine movement dial adjusting the height so accurately by a 2- μm step.

Superfine movement dial

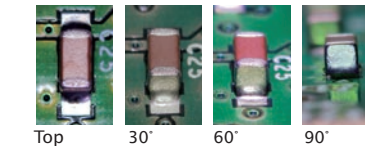
Block stop lever (rear side)



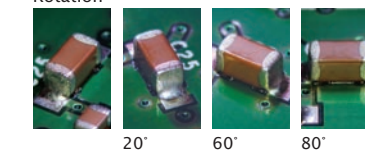
Stage unit



Inclination

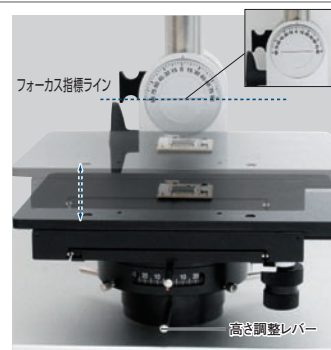


Rotation



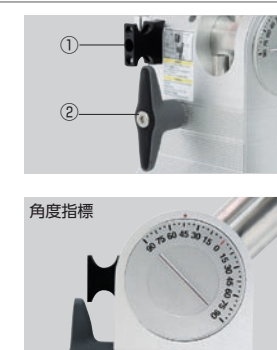
Moving stage corresponding to various observation demands Stage block/XY stage

When combined with the vertically moving pole block section, the rotating XY stage allows smooth observation area changes and easy axis adjustment. The flat stage and the transmitted-light unit accept various objects.



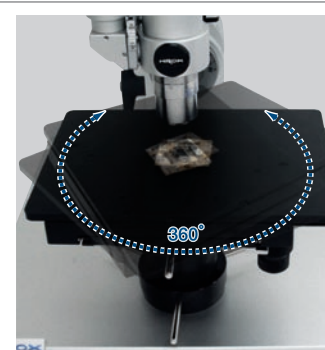
Pole inclination allowing observation from various angles Usability

The easily visible indices have clicks in 15-degree intervals for easy setting. If the pole is inclined more, it automatically locks at angle of 45° for safety. Draw the release lever to unlock the pole. (Inclination of 90° allowed in both right and left directions)



Center of axis easily settable with object fixed XY stage

You can easily adjust the axis only by turning the knob. The object never goes out of the field of view even when you rotate the stage.



Designed for stability, reducing vibration Base

Our seeking of a comfortable observation environment resulted in the base having a low center of gravity. The design considering the balance and the flexible, shift-preventive rubber legs minimize the vibration during observation.



Lenses

As an optical instrument manufacturer, Hirox offers original lenses with optimum lens adapters that answer to every need. With the "MXG" series lenses, the ACS controls the system to respond to the operator's instinctive demands. No bothersome setting is needed.

Macro zoom lens (with built-in lighting) **MXG-MACROZ VI / MX-MACROZ VI** **0-50x** **ACS**

This lens covers low-magnification areas. You can take photographs from the entire area of a large object that needs a camera to a field of view of 6 mm. The lens is equipped with built-in lighting to correspond to various environments.



Model	MXG-MACROZ VI / MX-MACROZ VI
Magnification	∞~5x 5~50x
Field of view	∞~6.1~61mm (H)
Operable distance	∞~90mm

Low-magnifying zoom lenses **MXG-2016Z / MX-2016Z** **20-160x (6-320x)** **ACS**

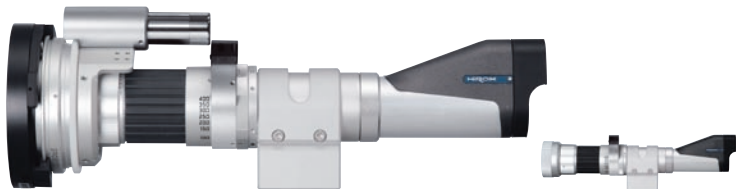
Optimum for observation of objects having large depths. If the object is too large to put on the stage, you can use the handy unit for easy observation.



Model	MXG-2016Z / MX-2016Z
Magnification	20~160x
Field of view	15.4~2.0mm (H)
Operable distance	44mm

Middle-magnifying zoom lens **MXG-5040RZ (SZ) / MX-5040RZ (SZ)** **50-400x (20-800x)** **ACS**

Equipped with unique optical adapters, this lens is usable for various usages. Attaching the rotary head allows 360-degree side observation. The observation angle is also changeable.



Model	MXG-5040RZ (SZ) / MX-5040RZ (SZ)
Magnification	50~400x
Field of view	6.1~0.78mm (H)
Operable distance	54mm (RZ) / 63mm (SZ)

Coaxial vertical-lighting, 10x zoom lens **MXG-10C / MX-10C** **35-7000x** **ACS**

Six types of object lenses are offered for optimum selection. Up to the industry-highest 7000x observation is available.



Model	MXG-10C / MX-10C					
	OL-35	OL-70 II	OL-140	OL-140 II	OL-350 II	OL-700 II
Magnification	35~350x	70~700x	140~1400x	140~1400x	350~3500x	700~7000x
Field of view	9.83~1.05mm (H)	4.42~0.47mm (H)	2.46~0.26mm (H)	2.21~0.23mm (H)	0.88~0.09mm (H)	0.44~0.04mm (H)
Operable distance	34mm	21mm	30.5mm	12mm	10.6mm	3.4mm

Revolver zoom lens **MXG-2500REZ** **35-2500x** **ACS**

Covers fields of views from 8.7 mm to 0.12 mm. The light selector can switch the illumination modes. In any lens range, the ACS functionality grasps the various lens data. The revolver zoom lens is designed for easy use.



Field of view (8 mm to 0.12 mm) zoom realizing magnification spectrum from 35x to 2500x

This lens corresponds to a wide zoom range from low magnification to superfine, high magnification. It offers an optical zoom range of 70 times, which exceeds the conventional zoom lens magnification area, eliminating the need of lens changes. The outstandingly easy-to-use lens only needs turning the revolver for operation. In any of the three zoom ranges, you do not need bothersome focus adjustment anymore. Needless to say, the ACS functionality is standardized.



Model	MXG-2500REZ		
	Low-Range	Mid-Range	High-Range
Magnification	35~250x	140~1000x	350~2500x
Field of view	8.71~1.22mm (H)	2.18~0.31mm (H)	0.87~0.12mm (H)
Operable distance	10.0mm	10.0mm	10.0mm



Lenses

Macro lens

A magnification range of 0x to 20x can be covered by altering the working distance. It offers high-level images while showing an excellent cost performance.



Model	MT-C16
Magnification	0x to 20x
Field of view	—
Operable distance	—

MT-C16

0-20x

Macro lens

A magnification range of 0x to 50x can be covered by altering the working distance. The dedicated ring illumination supports the excellent lens performance.



Ring illumination device attached

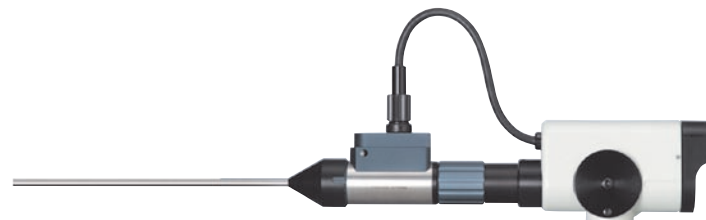
Model	MX-MACRO IV
Magnification	0x to 50x
Field of view	∞ ~ 6.1mm (H)
Operable distance	~21.4mm(0~50x) / 202.8mm(5x) / 97.5mm(10x) / 49.2mm(20x) / 35.9mm(30x) / 26.8mm(40x) / 21.0mm(50x)

MX-MACROZ IV

0-50x

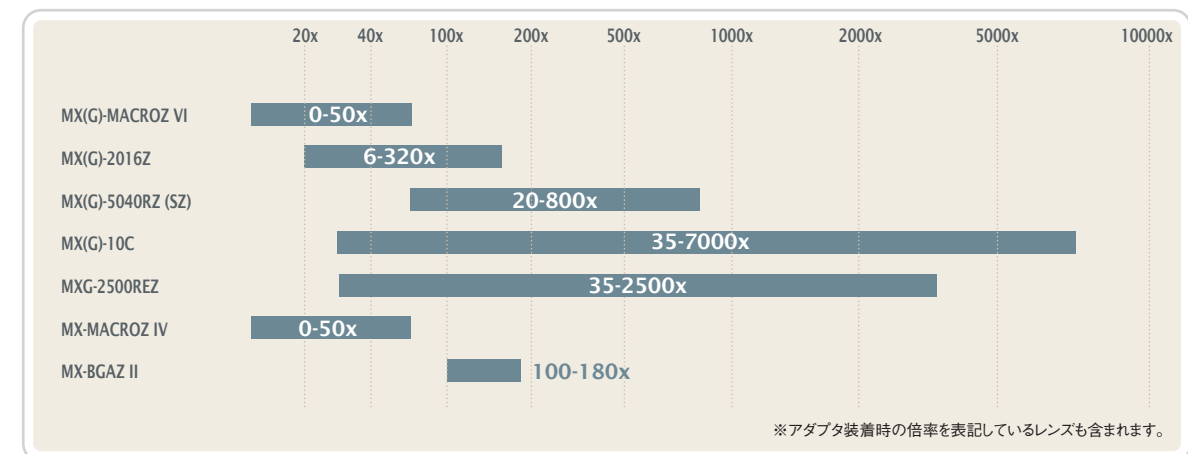
Straw-scope lens

Allowing observation of a congested point and inside a machine, this straw-scope lens can reach a deep point impossible for other lenses. The straw end offers straight view direction and side view direction selectable according to the usage.



Model	MX-STZ Lenses				
Model	AD-STZ28-125	AD-STZ40-120	AD-STZ40-245	AD-STZ58-135	AD-STZ58-275
Outer diameter	2.8mm	4.0mm	4.0mm	5.8mm	5.8mm
Effective length	125mm	120mm	245mm	135mm	275mm
View direction	Straight view	Straight view	Straight view	Straight view	Straight view
View angle	40°	40°	40°	40°	40°

MX-STZ Lens



BGA lens

NEW

This BGA lens incorporates Hirox's unique expertise and technologies to allow precise observation of BGAs from various angles. Using this lens, anyone can perform appropriate "outer appearance observation" like an expert engineer.



MX-BGAZ II

100-180x

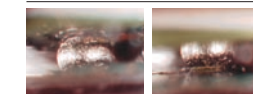
Model	MX-BGAZ II
Magnification	100x to 180x *1
Field of view	—
Operable distance	0.9~8.0mm *2

*1 With the mode switch ring set to Normal.

*2 Distance from BGA to tip of prism chip.

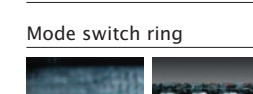
Rotating lens accepting large PCBs

Optical rotary ring



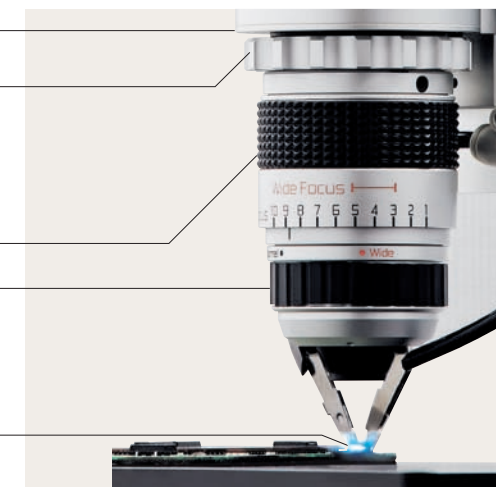
Upper contact Lower contact

Focus ring



Mode switch ring

Prism chip



Adapter

The Hirox's line of unique adapters responds to various observation scenes and gives you new approaches to image observation.

Variable lighting adapter

Effective for observation of damages and burrs. With this variable lighting adapter, you can arbitrarily change the lighting angle from vertical lighting to lateral lighting. It offers optimum lighting for the observation point.

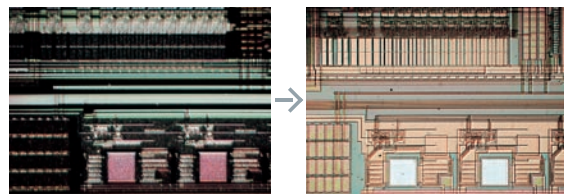


25-cent coin, 20x [Vertical lighting]

25-cent coin, 20x [Lateral lighting]

Coaxial vertical-lighting adapter

Effective for observing flat objects with highly reflective surfaces such as mirrored and polished surfaces. The adapter emits the light in parallel to the lens light axis to take photographs of right-angle reflection (lighting for light fields of view).



IC pattern, 1400x

[Lighting for light fields of view]

IC pattern, 1400x

[Lighting for dark fields of view]

Polarized lighting adapter

This adapter clearly reproduces the subject under the surface layer (coating, film, etc.) of the object. It suppresses reflection from the surface to detect only the light reflected from the point you desire to observe.

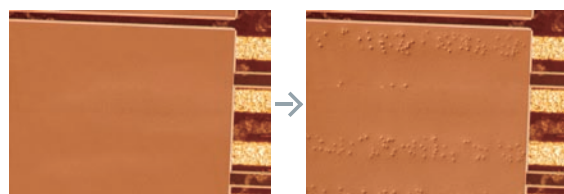


Skin spot, 50x [Vertical lighting]

Skin spot, 50x [Polarized lighting]

Differential interference contrast adapter

This adapter is effective for a low contrast object under the lighting for light fields of view. Using a prism, the adapter generates two polarized beams orthogonalized with the straight polarized beam and detects interferences generated by the phase differences between the beams as the contrasts of the subject.

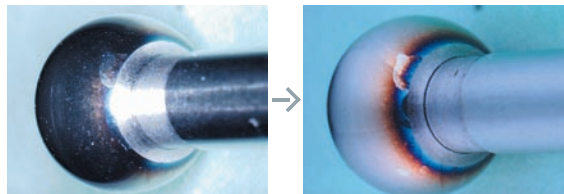


Impression of liquid crystal conductive ball, 200x [Lighting for light fields of view]

Impression of liquid crystal conductive ball, 200x [With the differential interference contrast adapter]

Diffuse lighting adapter

Effective for observation of reflective surfaces. It reduces the directional lighting to create diffused and softened illumination.

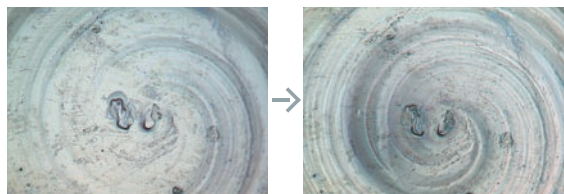


Ball joint, 40x [Vertical lighting]

Ball joint, 40x [Diffuse lighting]

Directional, coaxial lighting adapter

Effective for capturing minute roughness and crinkle on a mirrored surface. This adapter is equipped with the Hirox's unique "directional" function to reproduce even minute shapes of the mirrored surface.

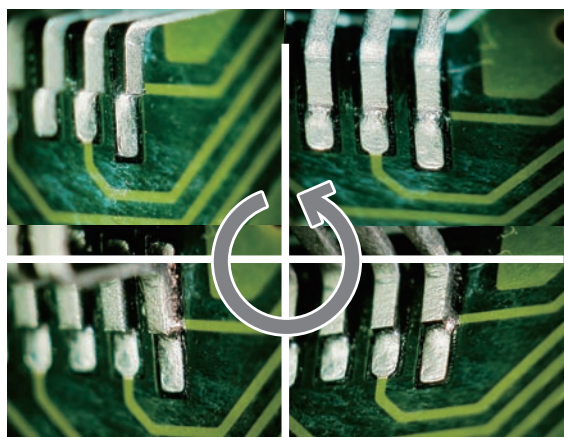


Can bottom surface, 250x [Vertical lighting]

Can bottom surface, 250x [Directional, coaxial lighting]

Rotary head adapter

Thanks to the technological strength only attained by an optical instrument manufacturer, the KH-8700 digital microscope can observe the sides of the object without touching it. To observe the object from various angles, you have only to attach the rotary head adapter to the zoom lens without touching the object, the lens and the stage. The KH-8700 digital microscope allows observation from various angles while eliminating botheration to move the object while observing it at a high magnification.



Specifications

Basic functions

Camera	Imaging device	1/1.8-inch, 2.11 mega-pixel CCD image sensor
	Total pixels	1688 (H) x 1248 (V)
	Effective pixels	1628 (H) x 1236 (V)
	Visual pixels	1600 (H) x 1200 (V)
	Scanning mode	Progressive scan
	Frame rate	24 frames/second
	Electronic shutter	AUTO (1/24 to 1/100000) MANUAL (8, 4, 2, 1, 1/2, 1/4, 1/8, 1/24, 1/60, 1/100, 1/250, 1/500, 1/1000, 1/2000, 1/4000, 1/8000, and 1/15000) Settable in range of 17 to 1/100000 sec.
	Gain	AUTO (0 to 6 dB), MANUAL (0, 3, 6, 9, and 12 dB), OFF
LCD monitor	White balance	Auto (One-time button pushing), MAUNAL (R, B)
	LCD monitor	21.5-inch full HD LCD (TFT type) *1
	Screen size	476.2 mm4 (H) x 268.11 mm (V)
	Pixel pitch	0.248 mm x 0.248 mm
	Number of pixels	1920 (H) x 1080 (V)
	Display colors	16.77 million
	Brightness	300 cd/m2
	Contrast ratio	1000:1 (typical)
Light source	Viewing angle	+/-85(horizontal), +/-80 (vertical)
	Light source	LED lighting
	Lamp life	30,000 hours (reference value)
Image output	Color temperature	5700 K (typical)
	Output mode	Analog RGB/display port (190 x 1080 pixels or more)
Input	Mouse and keyboard	USB2.0 (type A)
	ACS input	Supports MXG lens
	External remote input	Input signal from footswitch, etc.
Output	Z-axis motor output	Z-axis communication control: 5-layer stepping motor with a built-in driver
	Rotary output	Rotary head drive control (round, 6-pin)
Interface	LAN	10BASE-T/100BASE-TX/1000BASE-T
	USB2.0	6 ports (2 on side, 4 on rear)
	RS232C	General-purpose port (extension port)
	Remote device	Dedicated terminal
Recording	Recording medium	Built-in, 500-GB hard disk (recordable field : 300 GB)
	External recording medium	Supports external DVD drive (USB2.0), external HDD, CD-R/RW, DVD+R/RW, etc.
	Still image format	Non-compressed: TIFF and BMP; Compressed: JPEG
	Still image recording pixel	Supported pixel size: 15000 (H) x 15000 (V) pixels (tiling image)
		Ordinary recording:
		1600 x 1200, 1440 x 1080, 1200 x 960, 1024 x 768, 800 x 600, and 640 x 480
	Movie recording format	High-resolution recording:
		8800 x 6600, 6400 x 4800, 4800 x 3600, 3200 x 2400, and 2400 x 1800
Environment	Movie recording pixel	AVI (non-compressed) and WMV (compressed)
	Rated voltage	1600 x 1200 (15 fps) and 800 x 600 (24 fps)
	Power consumption	AC 100 V to 240 V, 50/60 Hz
	Ambient temperature	195 W
	Ambient humidity	5 to 40°C
	Ambient air	20 to 80% RH (no freezing and condensation)
Weight	Storage temperature	No corrosive gas
	Main unit	-15 to 50 (no freezing and condensation)
	Camera	Approx. 14 kg
Outer dimensions	Remote device	Approx. 1 kg
	Main unit	Approx. 0.5 kg
Outer dimensions	525 mm (W) x 442.5 mm (H) x 211 mm (D)	

*1: The LCD panel is manufactured with very fine technologies. It may have a few very small black dots and always-illuminating dots but these are not failures.

Individual functions

Observation settings	Camera preview function
	Camera image settings
	Saving of camera settings
	Optimization of camera settings
	Z-axis focus control
	Rotary head control
	Autofocus
	Focus indicator
	Digital zoom
	HDR processing
Screen separation /display	Anti-halation processing
	High-resolution recording
	Preview functions (HDR, anti-halation, 3D construction)
	Image adjustment functions (noise reduction, edge processing, etc.) (Movies supported)
2D measurement	Vertical separation, horizontal separation, 4-part separation
	*2D measurement available when screen is separated.
	Reversing and right/left 90-degree rotation
	Grid, scale, date, comment and image information
	ACS functionality
	Automatic calibration
	Measurement between two points (distance, angle, circle, radius, area, parallel, perpendicular, etc.)
	Automatic counting, automatic area measurement, and automatic distance measurement
	Display of measurements and statistics
	Scale display
3D observation/ measurement	High-resolution measurement
	Lens registration
	CSV saving
	Handy synthesizing
	Multi-focus function (semiautomatic synthesizing)
	Multi-focus function (fully automatic synthesizing)
	Multi-focus function (quick synthesizing)
	Multi-focus function (manual synthesizing)
	3D profile measurement function
	* Distance, angle, width, average height measurement, etc.
Tiling	3D area and volume measurement
	3D pseudo-color display
	3D lighting display
	3D roughness measurement
	3D height measurement and 3D point height measurement
	Noise reduction/cut
	3D inclination correction
	2D tiling (15000 x 15000 pixels)
	3D tiling (10000 x 10000 pixels)
	Still image recording
Recording	Movie recording
	Timer recording
	Cutout still image saving
Library	Library management
	Easy preview function
	Image stabilization (movies supported)
Other functions	Comment/figure insertion
	User management function
	Easy report
	Language selection (switching between Japanese and English)
	Network settings
	Password settings (for calibration values and user management)
	Printing
Other functions	Help function manual

System configuration sample

