KEYENCE

NEW **Customizable Vision System**
XG-X Series

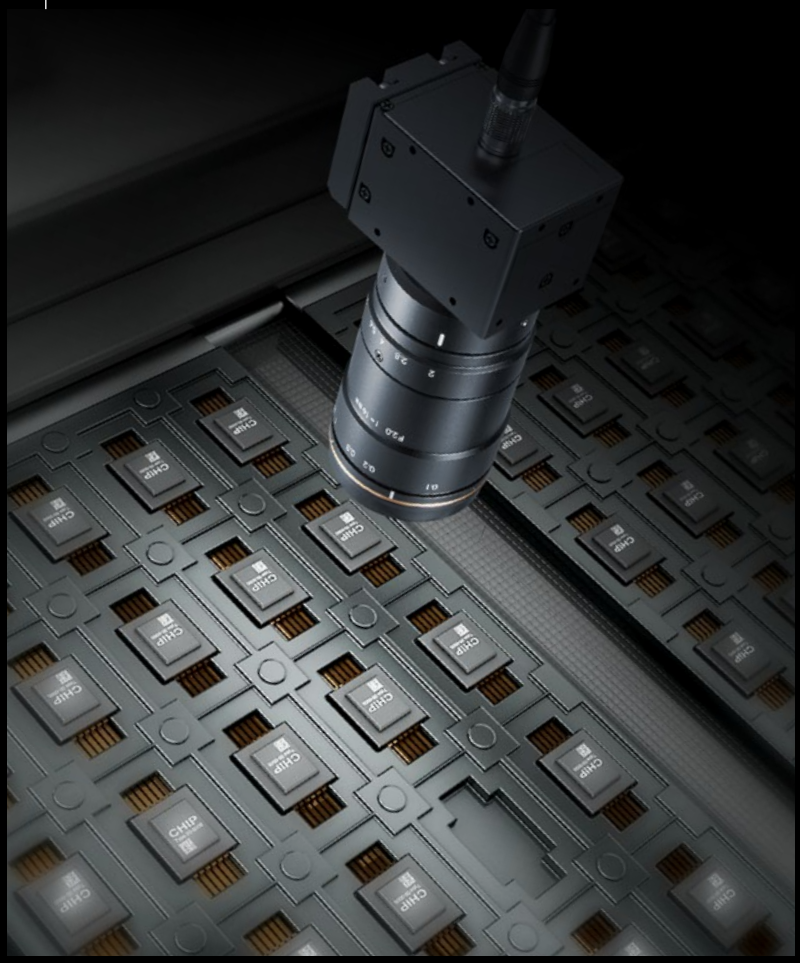
Covering Every Aspect of Image Processing With a Single Unit

XG-X Series

Meeting All Needs for Image Processing With a Single Unit

This one unit supports various camera connections and image capture methods. It has options perfectly suited for solving a wide-range of problems, so there is no need to change the hardware or software, providing powerful support for solving the problems faced by KEYENCE customers.

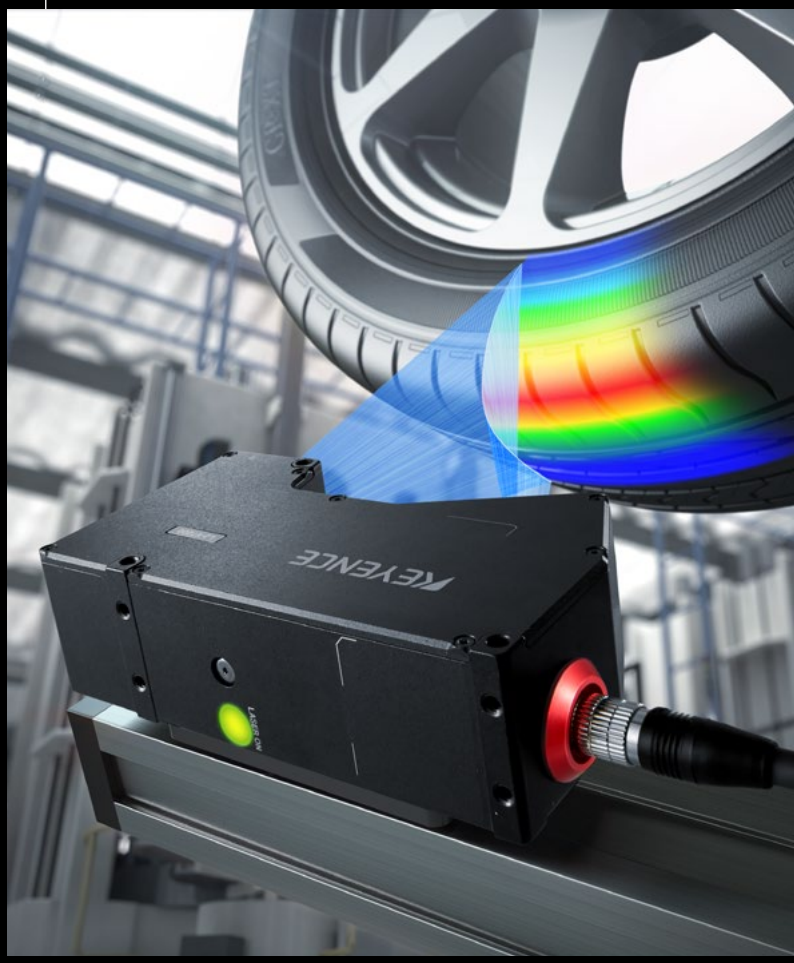
21 Megapixel Cameras



Multi-Spectrum Image Capture

LumiTrax™

Inline 3D Inspection

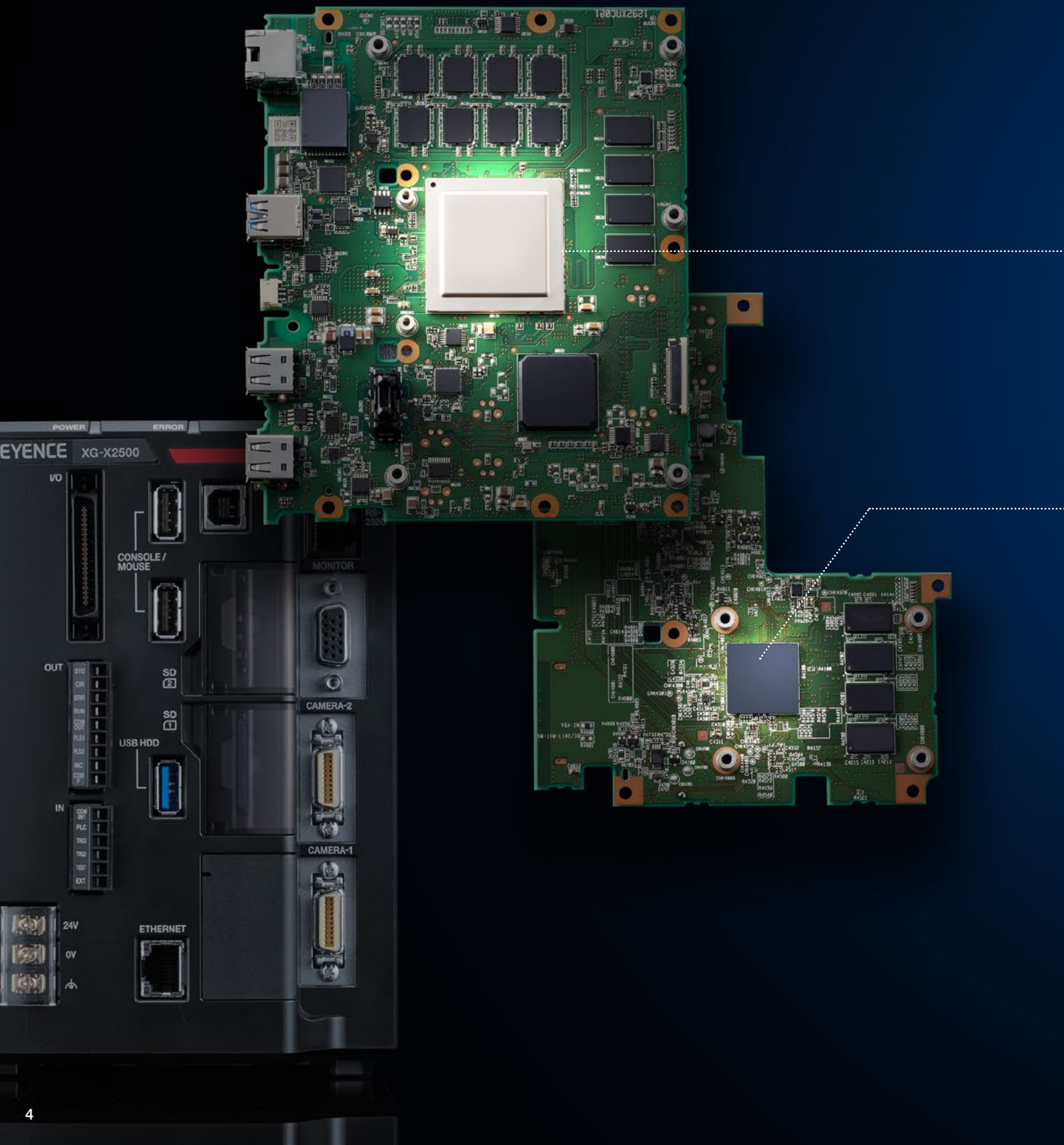


Line Scan Cameras

Vision-Guided Robots

Multi-Core Processors With the Highest Performance in the World Make It Possible to Link and Combine All Cameras and Lighting

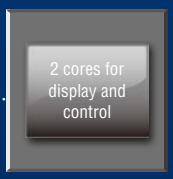
Becoming number 1 in application solving requires powerful hardware. Optimising the 14 cores has enabled stable, high-speed processing even of complicated inspections.



Stable, high-speed processing is made possible by parallel processing with 14* cores, the largest offering in the industry.

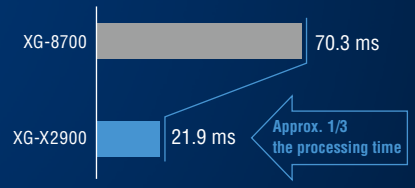
DSP + CPU

CPU



Abundant processing power is available even with multiple camera connections, including best-in-class 21 megapixel colour cameras, line scan cameras, and 3D inspection cameras. Furthermore, the largest-in-class image memory can store approximately 28,300 (uncompressed) images captured with VGA colour cameras and approximately 290 (uncompressed) images captured with 21 megapixel colour cameras.

21 megapixel colour camera flaw inspection processing speed



* XG-X2700/X2800/X2900 has 14 cores.
XG-X2000/X2200/X2500 has 8 cores.
XG-X1000/X1200/X1500 has 7 cores.

DSP + CPU cores

Compared with conventional models

3×

Processing speed

Compared with conventional models

3×

Memory capacity

Compared with conventional models

4×

Seamless Creation of Inspection Results with VisionEditor

Flowchart programming offers the flexibility to bring your concepts to life.

"XG-X VisionEditor" is software designed for quick development of vision inspection applications, creation of user interfaces, easy debugging, simulations, and more.

Flowchart view

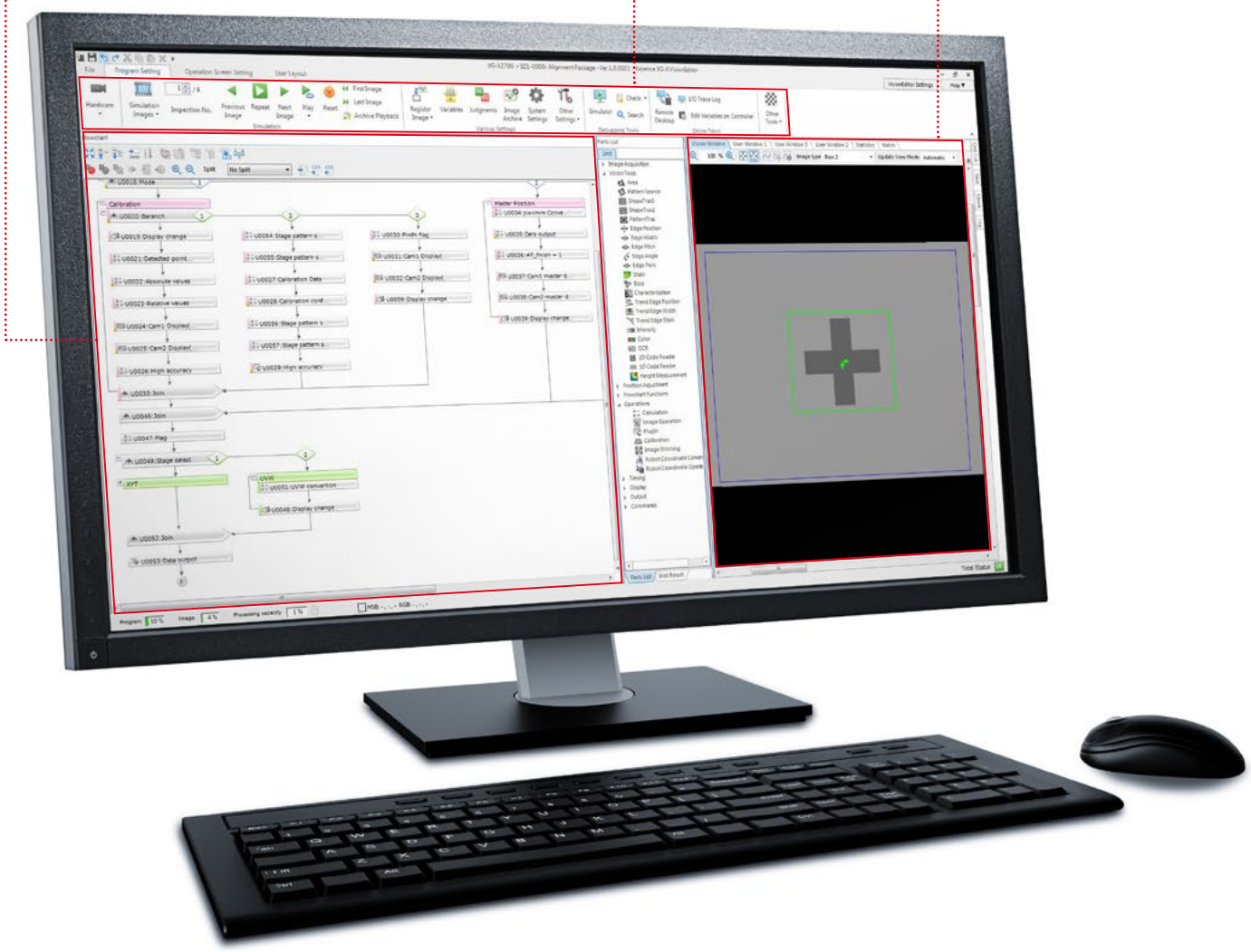
Flowcharts can be constructed easily just by dragging processing units from the parts list and dropping them here. In addition, error presences per unit can be displayed, allowing for simple debugging on the flowchart.

Ribbon

The large ribbon includes a collection of main operations. Frequently used functions can be added to the Quick Access toolbar. Simulations can also be performed easily on a PC.

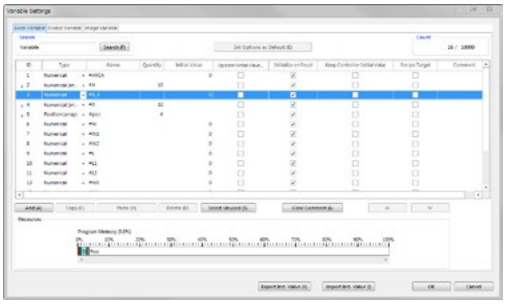
Vision window

In addition to displaying captured images, configured processing results, such as preprocessing filters, can be displayed in real time.



Variable processing

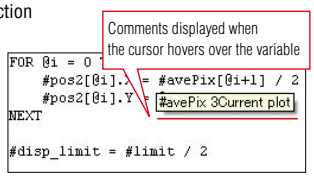
A wide range of variables can be defined, including image, positional, linear, numerical, and array-based. Variables are not limited to a single program and can be set for global use.



Variable setting screen

Variable comment function

Each variable can be assigned comments indispensable to debugging and program review. So, as the flowchart becomes large and complicated, variable selection becomes simple.

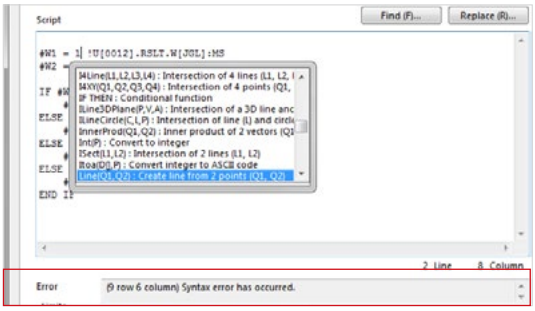


Flexible calculation & processing

Industry's widest variety

Calculations and scripts are also essential in customisation. The XG-X Series allows for over 150 different functions and commands that can be quickly created by dragging functions from the parts list. An auto-complete function and error location display help reduce troubleshooting time due to syntax errors.

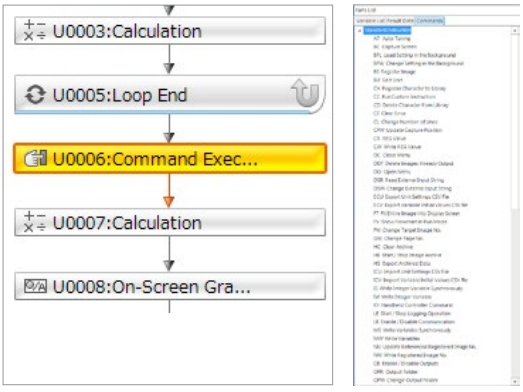
Up to 5000 characters per single calculation



Automatic and interactive command processing

Industry's widest variety

Control commands allow for seamless interaction between the vision system and a machine's controls or PLC. Commands like program switching, image capture, reset, start/stop operation log, changing to a different displayed image, zooming in on a defect based on an inspection result, or saving image data for a certain part failure are all possible. These commands can even be automated as part of the program flowchart, and custom commands can be created to combine specified built-in commands into a single command.



Command list

Examples of Built-in Commands

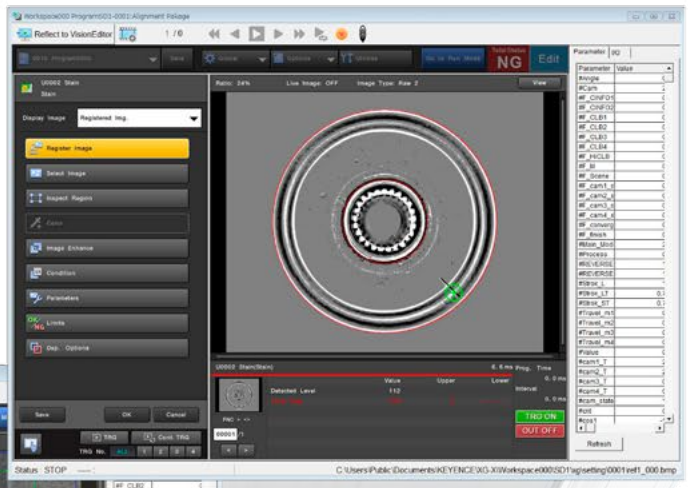
System control	Common commands include: program switching, image save, trigger input enable/disable, mode switching (run/stop), reset, write variables, clear history data, export history data, image capture, start/stop operation log
User interaction	Common commands include: open/close dialogue boxes, image switching, image zoom, image scroll, change password, switch user accounts

Advanced Interaction with Vision Controllers

Access interface designed for ease of use

Inspection flows created using VisionEditor can be uploaded to controllers with a single click.
In addition, remote connection to controllers allows for real-time monitoring of a process or adjusting settings directly on vision controller firmware, avoiding the necessity of travelling on-site or experiencing a particularly harsh factory automation environment.

Inspection tools setting menu



Flow editing menu

Main operation screen

Easier-to-use controllers

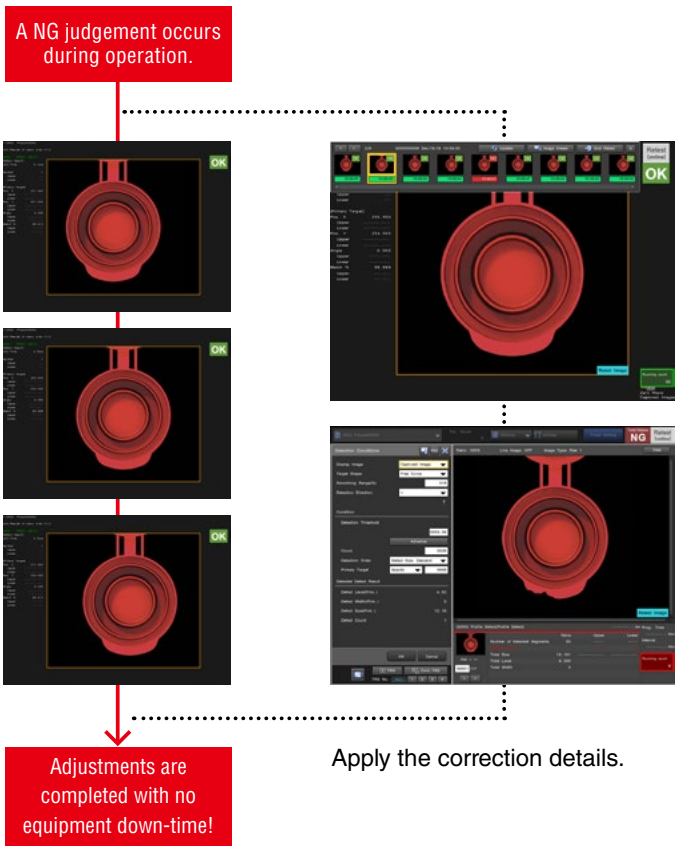
3-way operation using handheld controllers, a mouse, and touch panels.

* XG-X VisionEditor can only be used with XG-X Series products.
Only the XG-X Series offers compatibility with both a handheld controller and a mouse.

Even more stable configuration of settings

NEW [Retest and edit programs with no interruption]

The XG-X Series supports nonstop retesting, which can be used to retest images and make adjustments without stopping the inspection processing, even while the line is in operation. While retesting archived images, it is possible to apply adjustments to the program after checking that the details are optimal. This makes it possible to confidently troubleshoot problems, while minimising down-time and eliminating repeated part inspections.



Select images intuitively from the image bar to execute retests.

To investigate the cause of a malfunction, just select an image from the image bar to execute a retest. The success of any changes made to the program or the need for further adjustment can be immediately confirmed using the measured results of each unit.

Program correction during operation

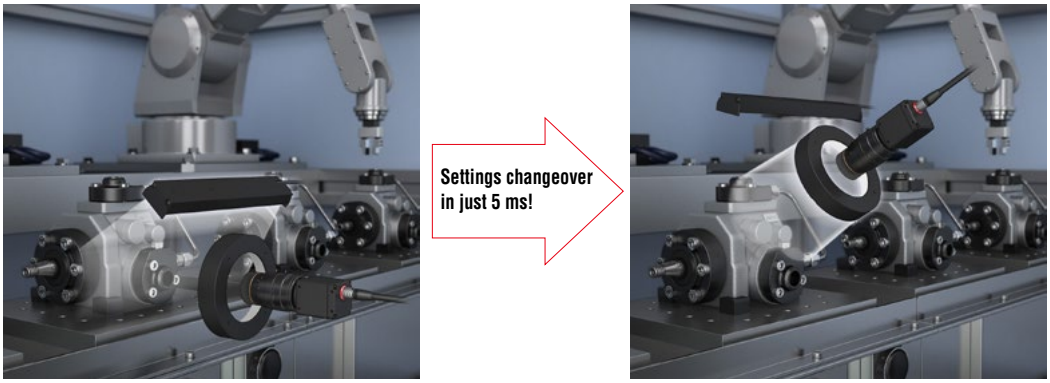
Program details can be edited using an archived image from the image bar as the input image. The inspection area and the setting parameters are accurately changed and checked.

Quick changeover

NEW [Background setting changes]

Program settings can be changed over in just 5 ms, the fastest in the industry.* Simplified configuration for fast program settings, including support for inspection of multiple product types or multiple inspection across large parts.

* Some restrictions apply when performing background settings changeover. Contact KEYENCE for details.
Frequent inspection settings changeovers can affect the service life of the SD card. Please back up settings regularly.

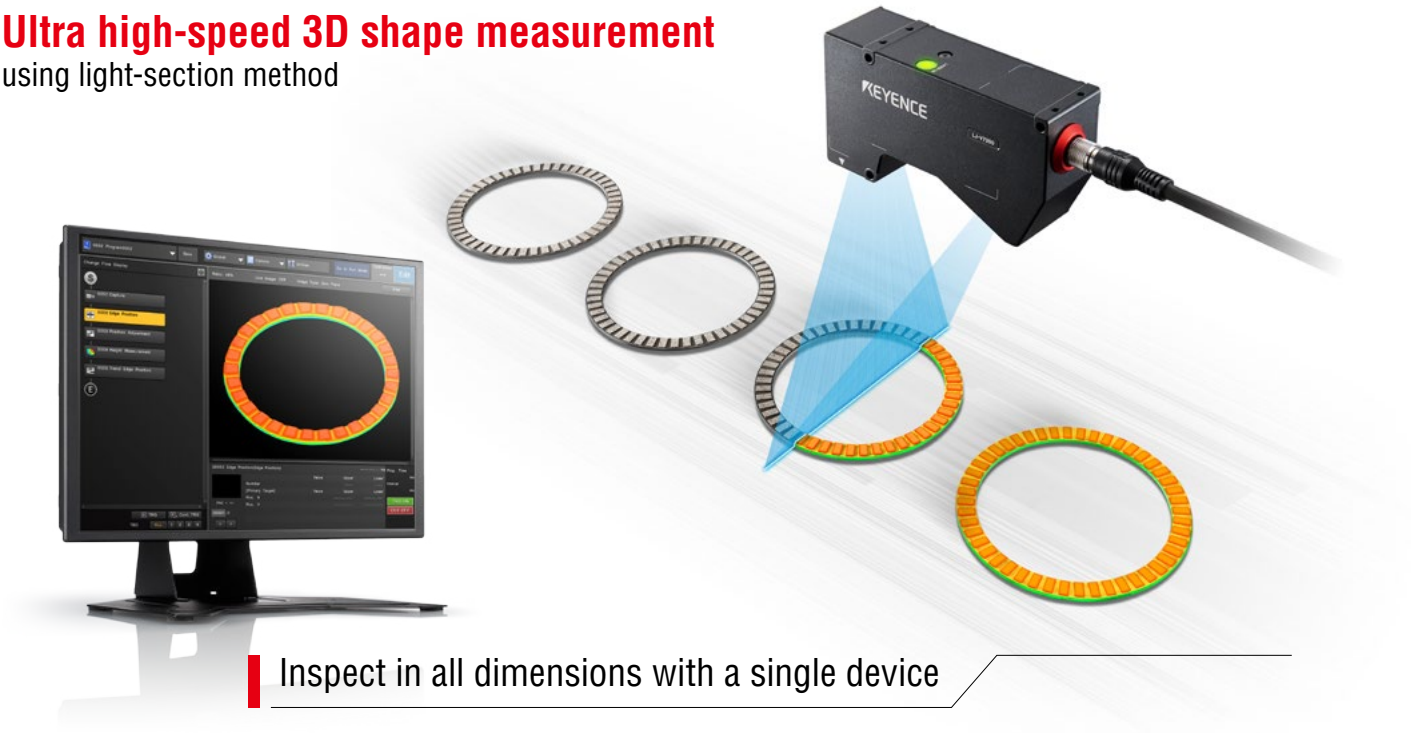


Program 0001 inspection with side-attached components

Appearance inspection of metal processed surfaces after settings changeover to Program 0002

New Solutions Made Possible through 3D Image Processing

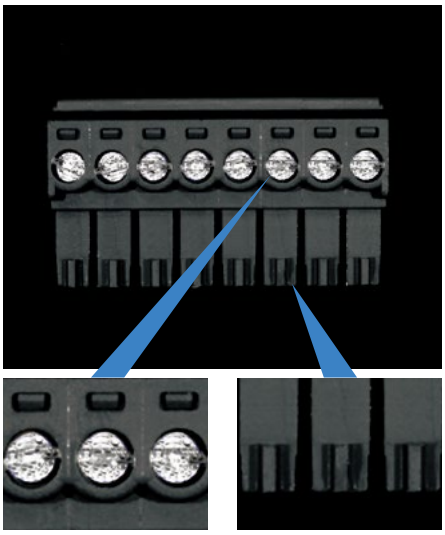
Ultra high-speed 3D shape measurement
using light-section method



Inspect in all dimensions with a single device

Stable inspection is possible using intensity information from the 2D image, as well as the 3D height information.

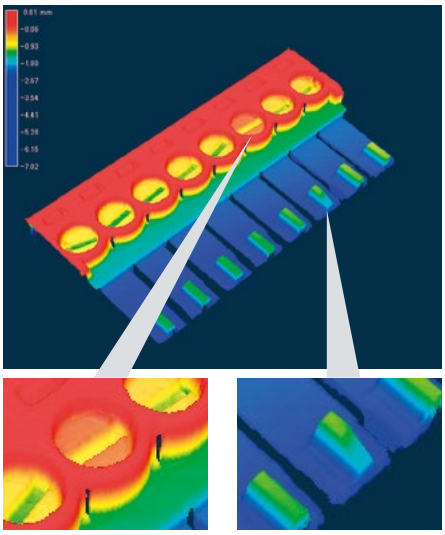
2D Greyscale Image
Some defects can be difficult to detect with the 2D image only.



Lifted screws

Chipped plastic

3D vision inspection
Defects based upon height inconsistency can be measured or extracted.

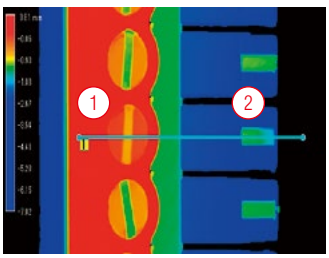


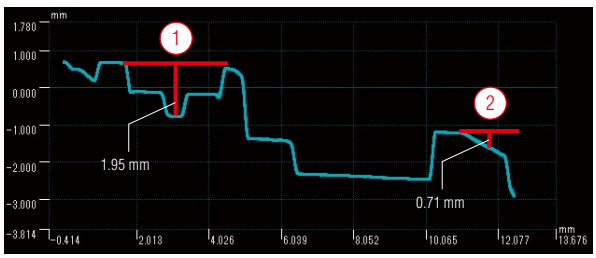
Lifted screws

Chipped plastic

Verification of height information

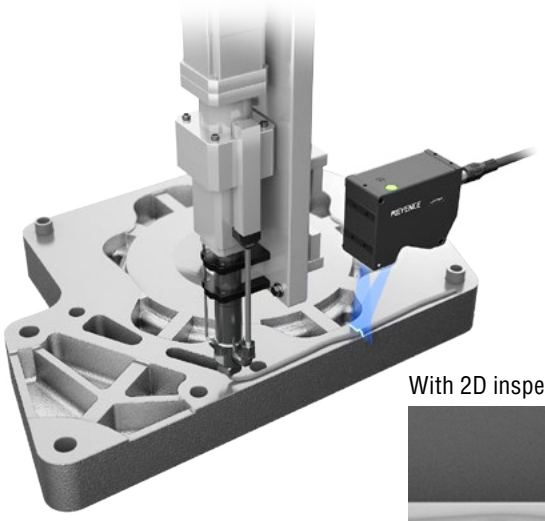
Setting tolerances for height measurements or relative heights across parts can be used to verify quality or reject nonconforming parts.





CONTACT YOUR NEAREST OFFICE FOR RELEASE STATUS

Applications



Low-contrast inspection

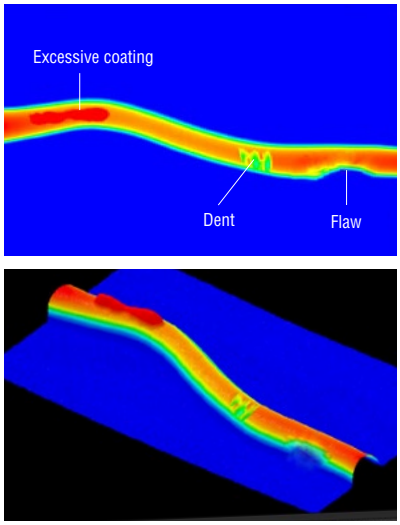
▮Coating or adhesive shape inspection

Changes in 3D shapes or volume can be easily detected, even when little or no contrast exists between the target and the background.

With 2D inspection

Depending on the background colour, stable inspection may not be possible.

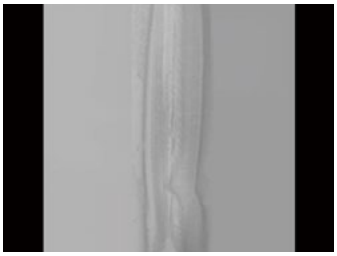
3D inspection capabilities

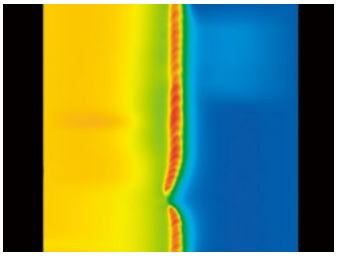


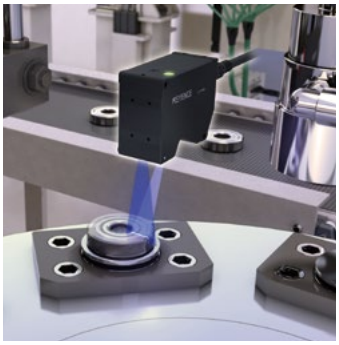
Defects not easily determined from contrast differences can be easily detected with this 3D solution.

▮Weld quality inspection

Inspection using traditional cameras can be difficult due to low contrast and random light reflection.
3D laser profile inspection provides stable inspection regardless of surface conditions.

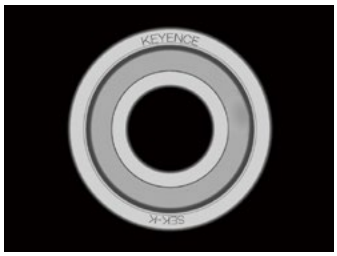


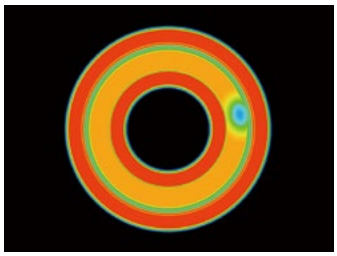




▮Bearing shield plate inspection

3D inspection makes it possible to identify markings and detect stains like as traditional camera, but can also detect small dents on the metal shield.





A fusion of 8-colour lights and an advanced algorithm

Completely New Colour Inspection Algorithm

NEW

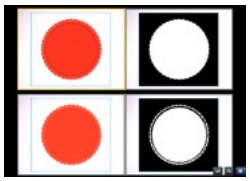
Using a high-speed monochrome camera in combination with 8-wavelength lighting provides vastly superior capabilities compared with colour inspection with conventional colour cameras (RGB).
This allows users to achieve accurate sorting, even of the slightest differences in colour.

Colour

Accurate Sorting Even between Slight Colour Differences

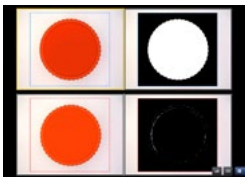
Inspection of Various Types of Plastic Caps

CONVENTIONAL COLOUR CAMERA



Although some differences are noticeable, the extracted colours are largely the same.

MULTI-SPECTRUM MODE



Differences in colour are clearly defined.

Appearance

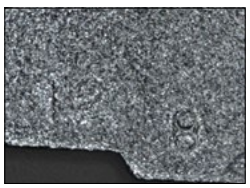
Detect Height Changes While Removing Glare

Stamped Character Inspection on Metal Casting

Problems with Conventional Imaging

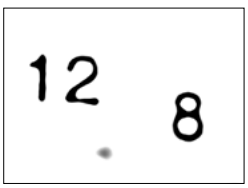
Difficult imaging conditions require trial and error for selecting the optimum light.

Conventional Cameras



The state of the surface makes extraction impossible.

LumiTrax™ MODE

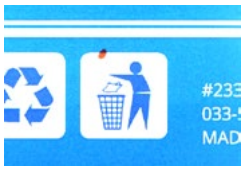


Extraction of only shape (irregularity) information regardless of surface conditions

Multiple Product Types

The combination of multiple images and lighting colours enable the optimum lighting colour for each inspection item.

Multi-Capture Imaging (Lighting Colour Variation)

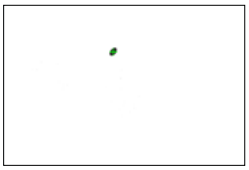


A red ink defect appears on a printing with a blue background.

1st image capture: Red LED

Illumination using a red LED capable of clearly viewing the pattern is performed for position shift correction.

2nd image capture: Blue LED



To erase the printed pattern for defect inspection, illumination using the same blue colour is performed.

Hardware and Software That Supports Inspection Stability

Built-In Dedicated Illumination Control Circuit

Ultra, High-Speed CMOS camera and Dedicated Control Circuit

Lighting Equipped with 8 High-Brightness LEDs of Different Wavelengths

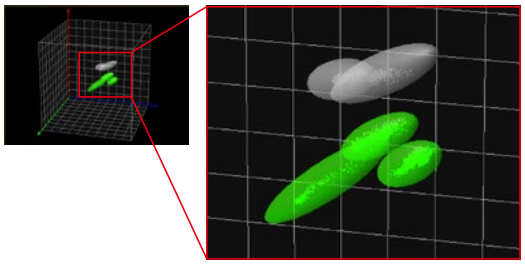
Photodiode and Real-Time Intensity Control Circuit

Greater Inspection Stability

3D Display Function for Registered Colours

The distribution of registered colours can be displayed in 3D, indicating how different the registered selected and excluded colours are and allowing visualisation of whether the inspection is stable and free from interference from other colours.

Green Oval : Extracted colour
Grey Oval : Excluded colour



Multi-Colour Registration (Support for Invalidation and Integration)

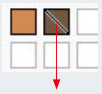
Registration of up to 32 extracted colours and 32 excluded colours is possible. This makes it possible to handle a variety of inspection targets through added colour extraction without losing existing colour information. In addition, the ability to integrate or invalidate colours later allows for optimisation while always checking results.

Addition And Invalidation

Added colour

Existing colour

Up to 32 individual colours can be stored. This makes it possible to perform adjustment even during operation while keeping the existing settings.

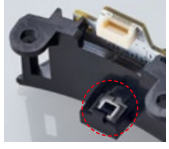


Invalidated colours are not used for inspection, but the colour information is saved.

Colours can not only be removed but also invalidated. This provides flexible testing without having to redo inspection.

Real-Time Intensity Feedback Function

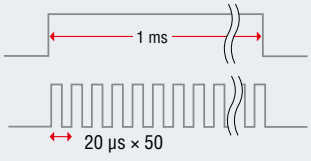
The photodiode and real-time intensity control circuit within the lighting is used for feedback control of the LED light intensity. Setting the current brightness to the regularly used brightness prevents drops in inspection capabilities due to deterioration caused by LED ageing.



Photodiode and correction circuit within the lighting

Illumination Time Chart

• With 1 ms (1/1000 sec) of illumination



For every illumination, monitoring and feedback are performed every 20 µs to adjust the brightness to a consistent intensity.

Integration of Camera, Lighting and Inspection Algorithm

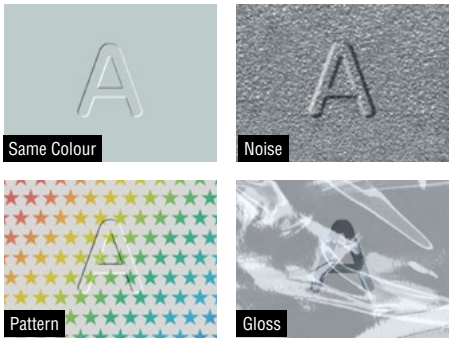
LumiTrax™

The newly developed LumiTrax™ system eliminates problems

Equipped with ultra high-speed imaging CMOS sensor and dedicated control IC	+	Equipped with ultra high-intensity LED and circuit for separate lighting control	+	Analyses multiple images instantaneously to create shape and texture images
High-Speed Camera		**Multi-Directional Lighting**		**Powerful Processing Algorithms**

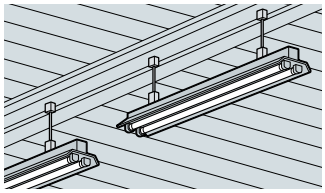
CONVENTIONAL IMAGING PROBLEMS

▮ Various surface conditions

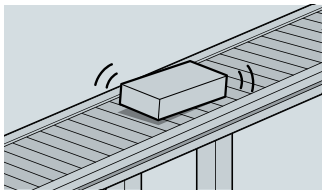


Trial and error must be performed to select the optimum light.

▮ Influence of the surrounding environments (ambient light)

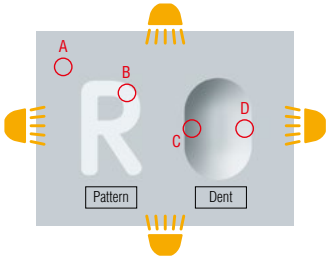


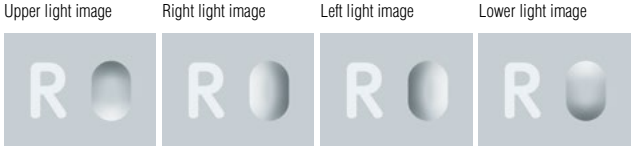
▮ Workpiece orientation changes caused by transfer conditions



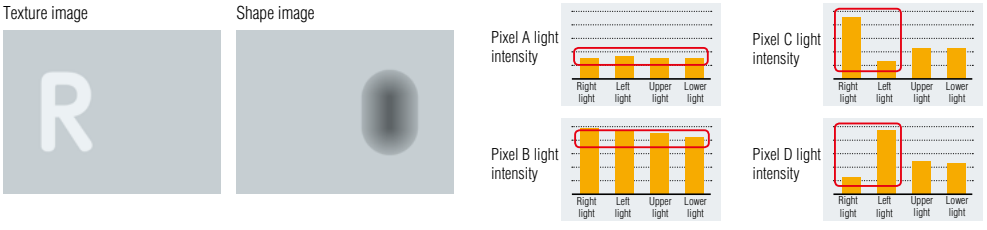
LumiTrax™ processing

1. Lights are lit from different directions and imaging is performed at ultra high speed.





2. The changes in light intensity of each pixel among the different images are analysed to split the shapes (irregularities) and textures (pattern) into separate images.

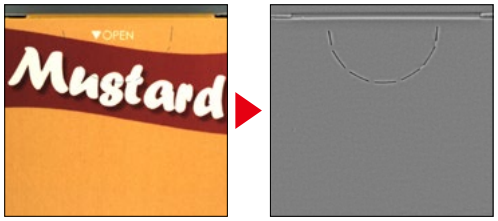


Applications in various industries solved with LumiTrax™

Stamped character inspection

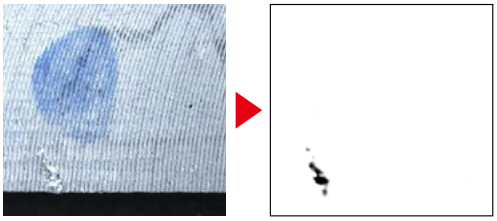
The stamped characters, which are bumpy, are inspected while ignoring the characters printed on the package.

Package opening perforation presence inspection



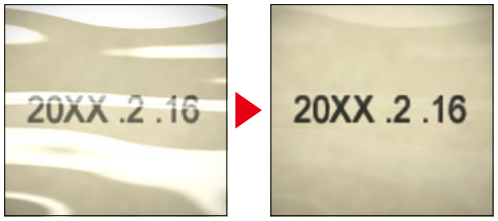
Even if a pattern is present in the background, inspection can be performed since it is possible to obtain the shape alone.

Chip inspection on a metal surface



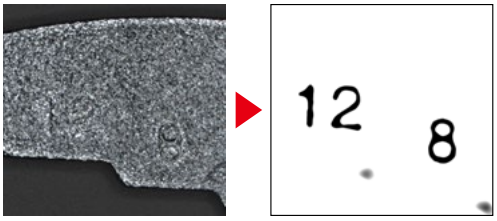
Factors such as remaining cleaning agent, dirt, and minor hairline fractures are cancelled so that only deep defects such as scratches and chips are detected.

Printed character inspection on a film surface



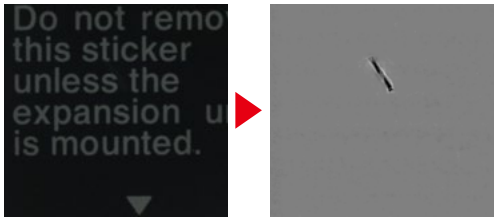
Glare, which affects inspections negatively, is eliminated to enable stable inspections.

Metal casting surface carved seal inspection



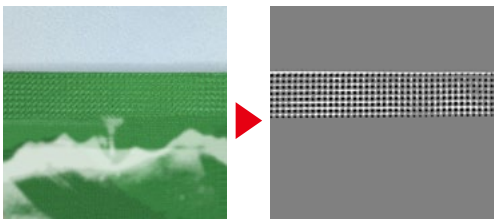
From a random casting surface, the carved seals with greater concave-convex information are emphasised.

Chip inspection on a printed surface



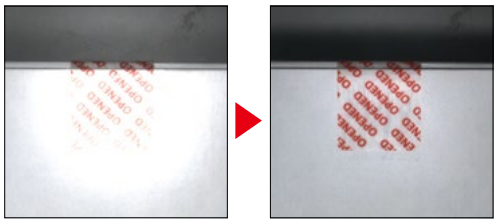
Images in which only the chips are extracted are created without being affected by the complex printed background.

Heat seal width inspection



The roughness information of sealed parts, for which changes are difficult to detect by means of colour or shading, are captured and extracted.

Tape presence inspection

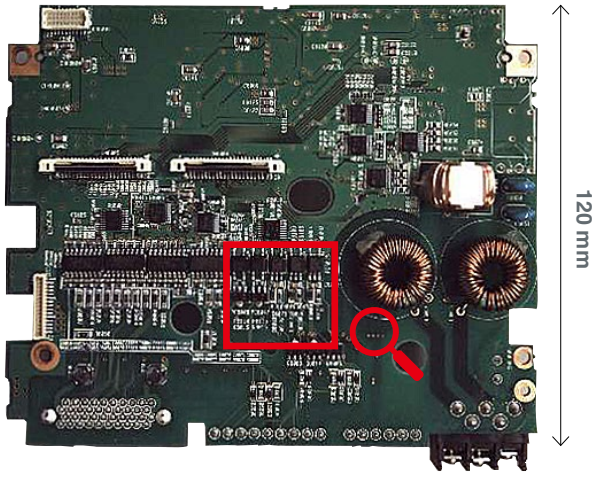


Even when unexpected specular reflection occurs due to workpieces being tilted, the glare can be cancelled, which makes it possible to perform stable inspections.

There is No Substitution for Resolution

21 megapixel cameras

High accuracy

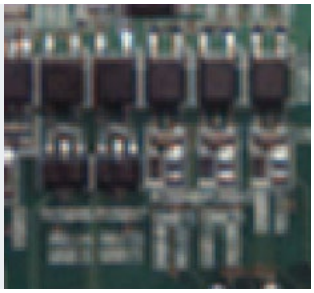


21 megapixel camera

Large-capacity images with a valid pixel count of 21 megapixels (5104 × 4092 pixels) are transmitted in 110 ms, 16 times faster than conventional models. This allows for detection of minute defects as well as detailed inspection of large parts where previously impossible with a single camera.

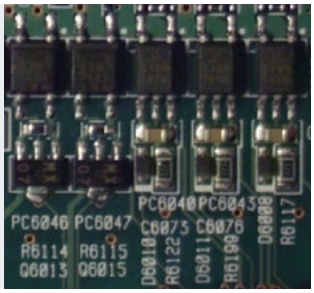
0.31 megapixels

The image is blurry, completely preventing determination of components.



5 megapixels

Chip contours are blurred, making accurate detection difficult.



21 megapixels

Even fine details appear clear, allowing for accurate inspection.

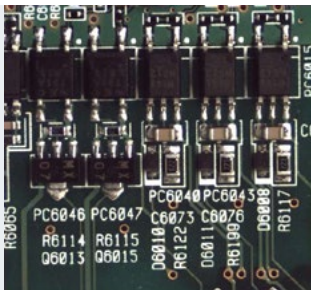
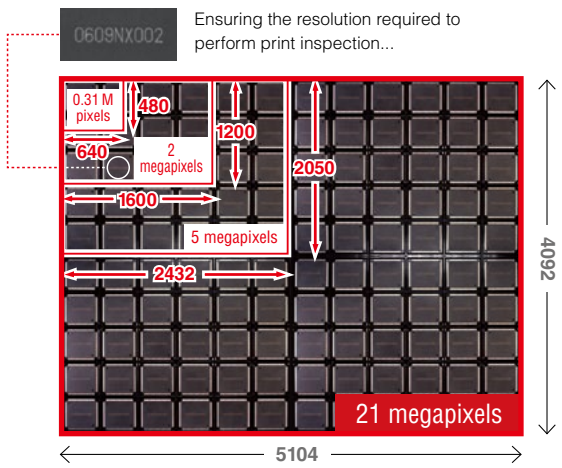


Image capture with a wide field-of-view

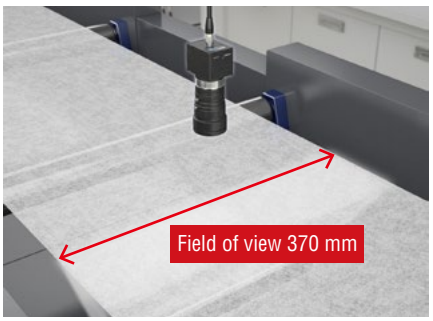
Print inspection of ICs on trays

With 21 megapixels, an inspection can be performed over a much larger field-of-view while maintaining the required resolution.

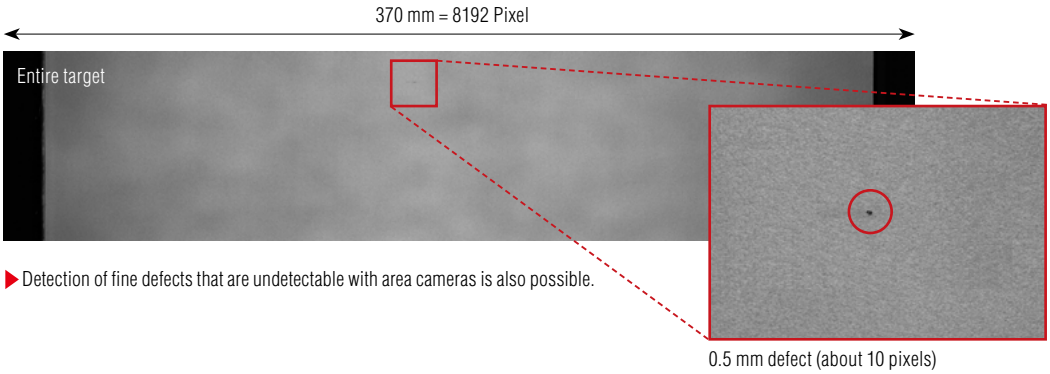


Line scan camera

Obtain up to 67 megapixel images with a single camera



Large-capacity images with a valid pixel count of 67 megapixels (8192 × 8192 pixels) are transmitted at 368 ms, 16 times faster than conventional models. Inspections requiring multiple area cameras can be performed with just 1 line scan camera and under uniform lighting conditions.

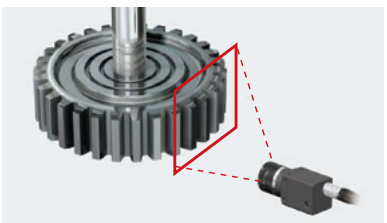


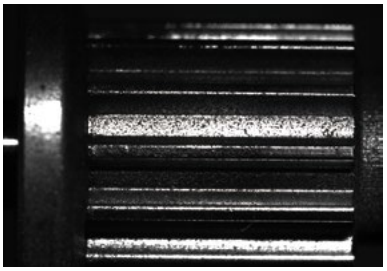
▶ Detection of fine defects that are undetectable with area cameras is also possible.

Allows for stable detection with even lighting

Area Cameras

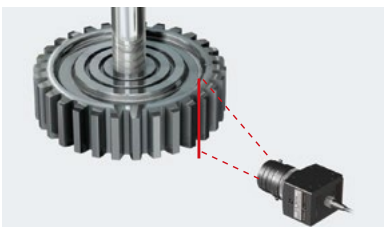
Area cameras cannot record optimum images due to the glare on the R part.

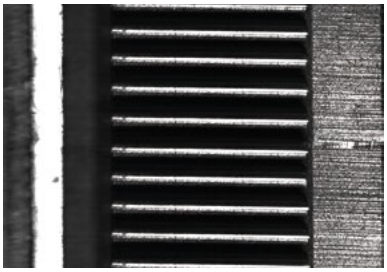




Line Scan Cameras

By recording images from an evenly lit part one line at a time, glare on the R part is eliminated.

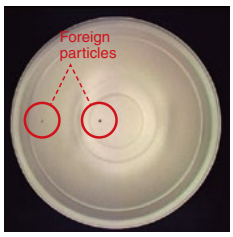




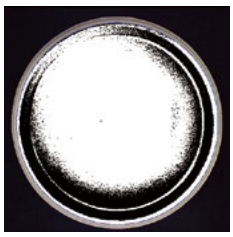
Ultimate Defect Detection Tool

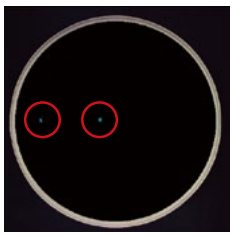
Defect Appearance inspection tool that offers superior detection stability

The defect tool detects flaws and other defects by checking for consistent intensity across a region.
In addition to high detection ability, the tool also features a function that will filter the desired defects to detect, by size, intensity difference, shape, and count.



Original image


Binary image (Blob/Area Tool)


Defect inspection tool (stability screen)

▮Foreign particle detection on the inside of a container

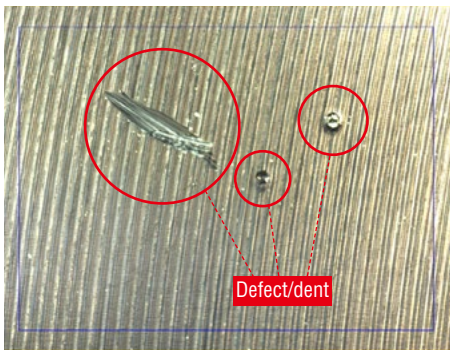
Conventional binary processing would not be able to detect the foreign particles as there is very little contrast between the particles and the dark portions of the container, however, defect inspection tool can compare the differences with the surroundings, allowing reliable detection of only the foreign particles.

Contrast view display

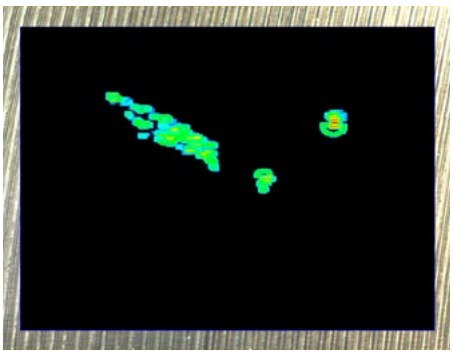
Using the colours blue, light blue, green, yellow and red, the contrast view display assigns a colour to defects according to the intensity difference between them and the surrounding area. The contrast view display updates in real time so you are able to see the defect position and intensity differences, allowing visual and intuitive confirmation of the differences between the defect you want to detect in comparison with the background or noise.

The relationship between contrast view colours and the stain level (guideline)

▮Defect detection for a metal plate



It is difficult to setup the defect tool parameters by values only on the standard camera image.

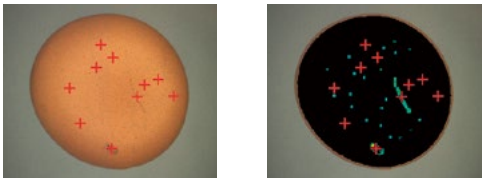

Using the contrast display, the intensity differences are clearly displayed in a colour coding so the parameters are easy to setup.

Grouping Filter Settings

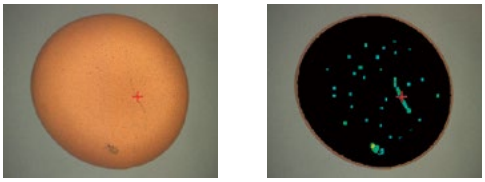
An Industry First

After taking images of flaw detections as an entire group, it is possible to extract only images of the defects that you want. If only long, thin defects need to be detected, quality evaluation based on the appearance of the target can be performed. Various parameters can be set, such as area, circularity, main axis length, acicularity, length of the equivalent elliptical main shaft and countershaft ratio of the equivalent elliptical main shaft.

▮Pill crack detection (before grouping filter setting)


Reacts to ingredient particles and defects other than long thin cracks.

▮Pill crack detection (after grouping filter setting)

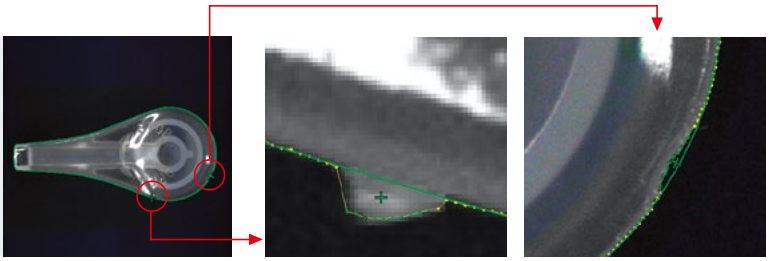

Only long thin cracks are detected by using the area filter and the acicularity filter.

Profile defect

Edge defect inspection tool optimised for burr and flaw inspection

This tool extracts a profile from the edges of a workpiece and recognises the sections that show a large difference from the profile as burrs or flaws. In addition to circles and straight lines, ovals and profiles with complex shapes consisting of free curves are supported, based on edge information of up to 5000 points.

Burr/flaw detection for a plastic mould
Automatically generates a reference line of the profile of a workpiece including curves.

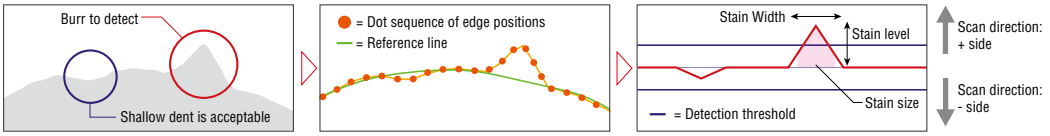


Detection of a burred section

Detection of a flawed section

Extensive Parameter Settings Support Various Defects

With a variety of parameters, you can distinguish defects you want to detect from the others. Settings can be optimised according to inspection category, such as +/- from the reference line (burrs/flaws) and width/size that exceeds a threshold.



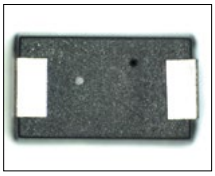
Characterisation tool

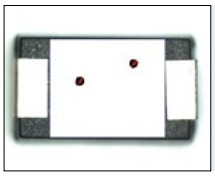
[Characteristics features × Intensity information = Defect extraction to meet any needs]

The characterisation tool allows targets to be identified and classified based on greyscale rather than binary data. This enables true characterisation and filtering of detected targets based on true image data. Additional information for classifying and identifying defects that cannot be obtained through binarisation such as volume and level of change is also possible with this tool.

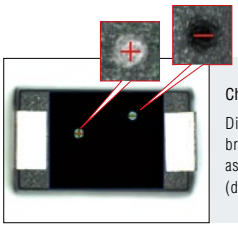
Differentiation of a variety of defects on a condenser

Light & dark defects Sorting bright and dark defects.



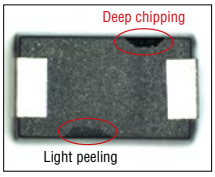


Blob (binary)
After binary conversion, both defects look alike.



Characterisation
Divides defects into bright (displayed as +) and dark (displayed as -).

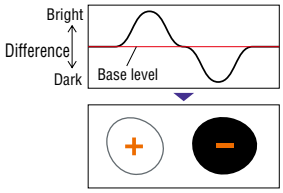
Shallow and deep defects Differentiating between deep chipping and light peeling.



Blob (binary): Area measurement
With area there is no noticeable difference.

Characterisation: Volume measurement
Differentiation is achieved by measuring the volume for each shade.

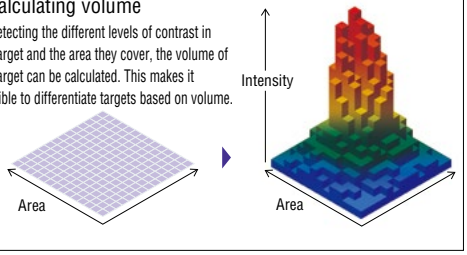
Sorting defects



The characterisation tool uses a base reference value and the contrast of the defect to sort targets into bright and dark types.

Calculating volume

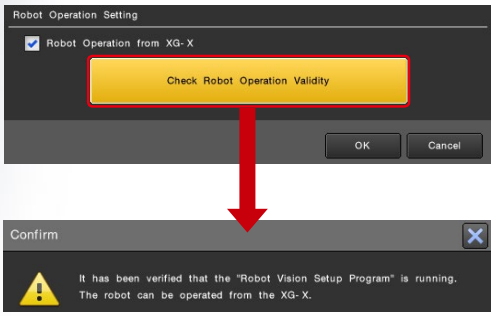
By detecting the different levels of contrast in the target and the area they cover, the volume of the target can be calculated. This makes it possible to differentiate targets based on volume.



Fusion of Image Processing and Robotics

Easy connection to robots

Programming for robots from various companies is available for creating a vision-guided robot system. This allows for seamless integration between the XG-X Series and robots.



Excellent compatibility that allows for use with any product

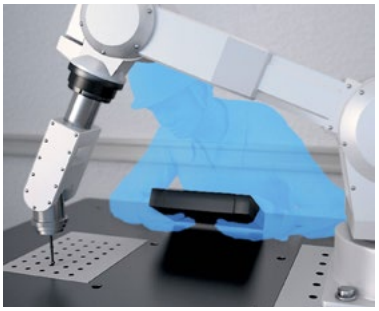
Simply selecting the manufacturer of the robot to use easily enables direct communication between the robot and the XG-X device. This allows for jog operations, auto-calibration, and other cooperation between the XG-X and the robot.

ABB	DAIHEN	DENSO
EPSON	FANUC	HIRATA
IAI	JANOME	KAWASAKI
KUKA	MITSUBISHI	NACHI
STAUBLI	TOSHIBA MACHINE	UNIVERSAL ROBOTS
YAMAHA	YASKAWA MOTOMAN	Custom

Automatic Calibration

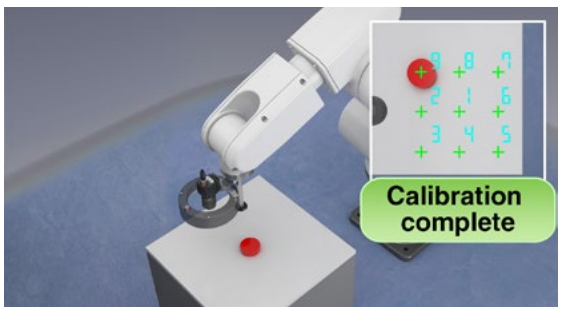
Problems with conventional methods
(manual method)

- Time-consuming manual configuration
- Accuracy varies between operators
- Readjustment is difficult if displacement occurs
- Reproduction at equipment delivery destinations takes time and effort

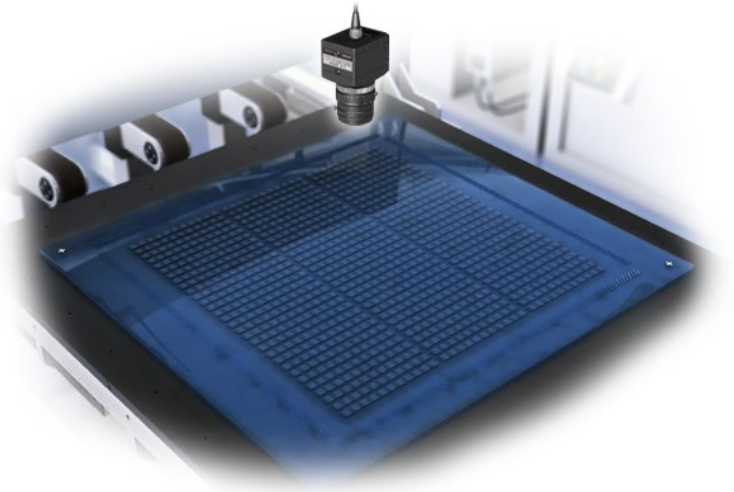


Benefits of KEYENCE's Vision-Guided Robots

- Easy, one-click operation
- Continuously high accuracy, no matter the user
- Immediate execution and restoration even with installation position deviations
- Quick, reliable reproducibility at any location



High-Accuracy Positioning through Easy Operation



High-resolution cameras

Highly accurate alignment over a wide field of view is possible with up to 21 megapixel cameras

Easy configuration

Easy-to-navigate step-type settings menu

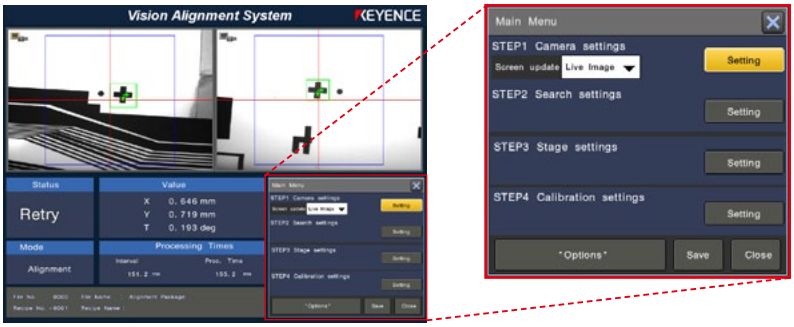
Flexible customisability

Customisation to suit equipment

High-accuracy alignment through easy operation

With KEYENCE's Alignment Sample Package Software*, high-accuracy alignment is possible just by following the step-type menu to configure settings.

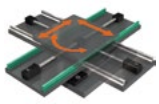
*Contact your sales representative for details.



Flexible customisation to suit equipment

A variety of calibration and alignment methods are available to best suit the configuration of equipment. In addition to a normal stage system, configurations with multiple cameras and multiple axes are also supported.

UVW stage

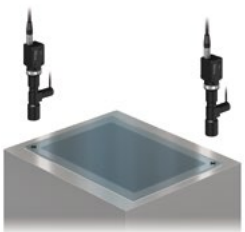


XYθ stage

Multi-camera, multi-stage

Applications

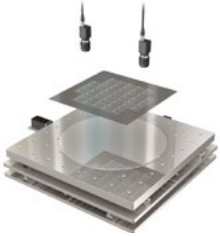
The XG-X can be used for various applications—from bonding to assembly and laser marking positioning—in a variety of industries and with a variety of equipment.



LCD and organic EL-related bonding

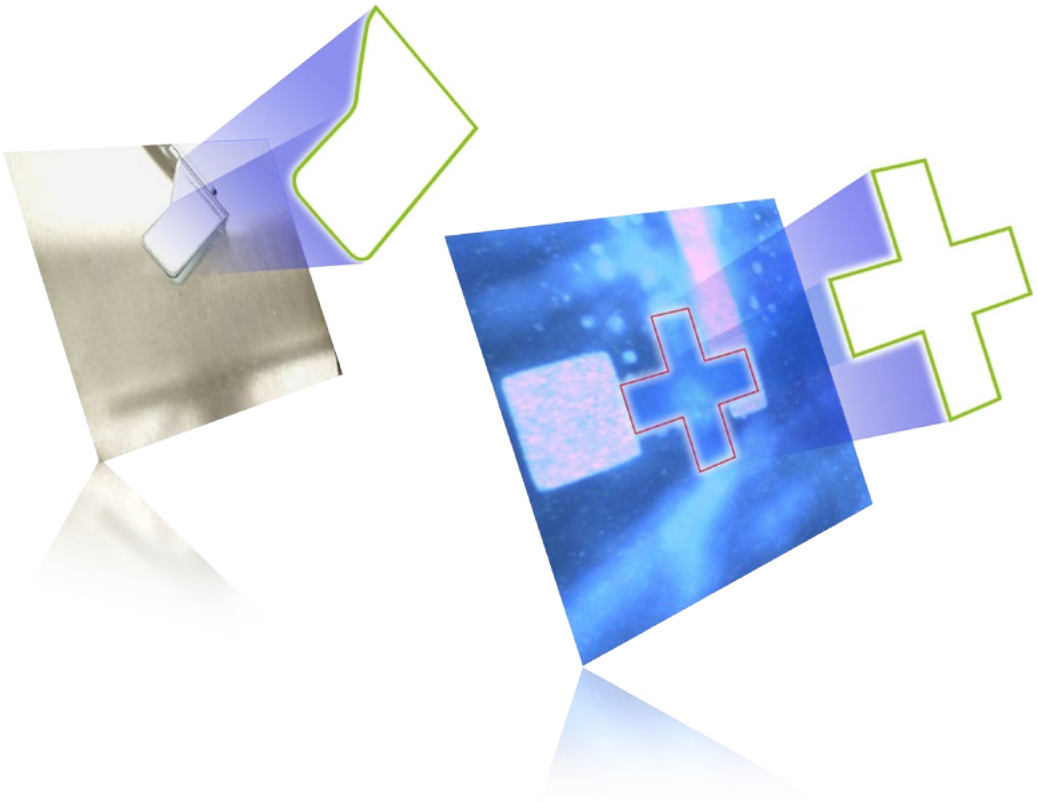
Electronic components assembly

Laser marking positioning



Semiconductor manufacturing process positioning

Perform Stress-Free, Fast, Applicable Searches



ShapeTrax™3

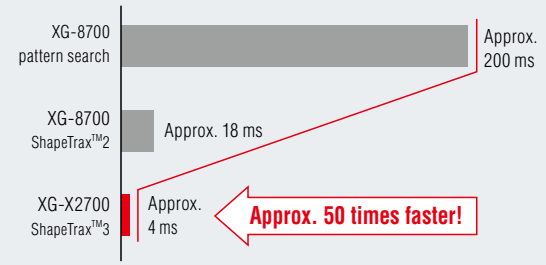
ShapeTrax™3 allows for accurate searches even under adverse conditions. Configuration of settings has also been simplified.

Even with unclear images and noisy images captured under low-contrast environments, noise and necessary information is determined automatically to achieve stable searches at high speeds.

Significantly increased processing speed

At a maximum of 50 times the conventional processing speed, a substantial increase in speed has been achieved by reexamining processing algorithms from the base level.

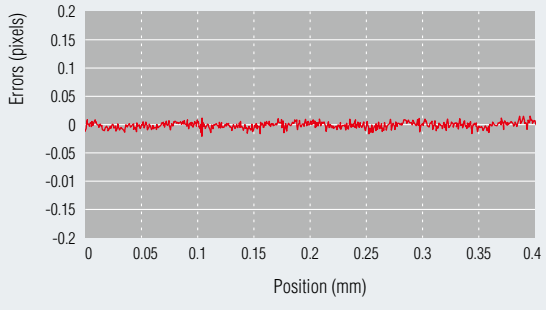
360-degree search with 5 megapixel camera



Ultra high accuracy

The linearity and repeatability are both 0.025 pixels, the highest level in the industry.
This tool satisfies demand for improved search accuracy by searching targets more finely and accurately.

Linearity data (typical example)



Newly developed automatic feature extraction algorithm

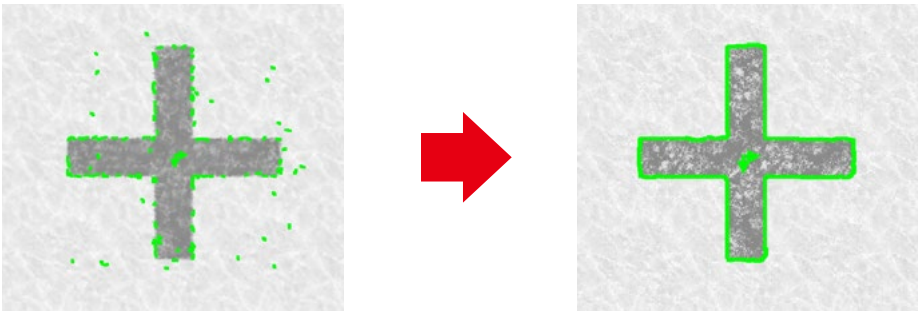
Whereas conventionally workers needed to be familiar with workpieces in order to extract contours, the XG-X automatically optimises settings, allowing menus and operation to be kept simple. Any worker is able to harness the full power of ShapeTrax™3 for any workpiece.

Conventional

With noisy markings, suitable contour extraction required an understanding of complex parameters.

ShapeTrax™3

Image noise is analysed automatically, making it possible to extract contours just as envisioned. Regardless of who configures the settings, searches that take full advantage of the device's performance can be performed.



The industry's first "applied-skill" search

Rotation direction-added search

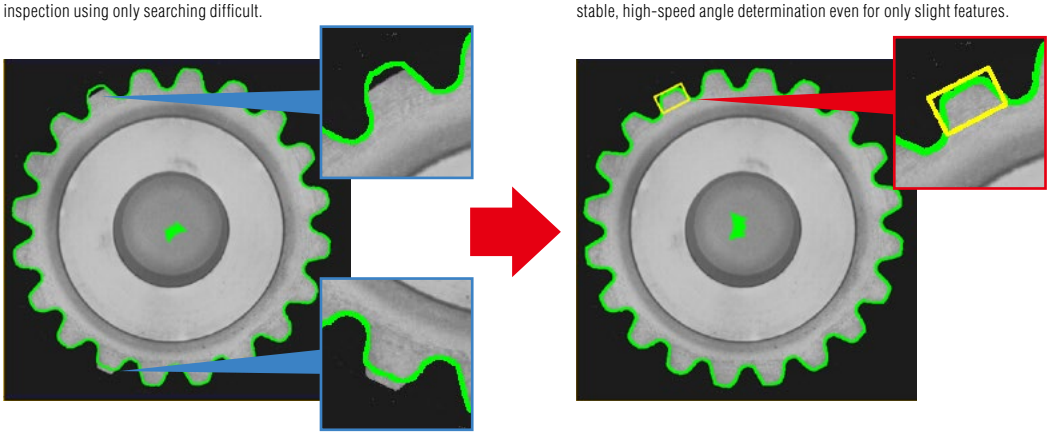
This new algorithm allows for both stabilised detection and faster speeds for circular, regular polygonal, and other shaped workpieces with partial features in the direction of rotation.

Conventional

Even when trying to accurately determine angles where teeth are short, the percentage of features for the entire workpiece is small, making stable inspection using only searching difficult.

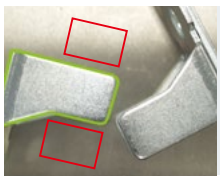
Using rotation direction-added search

Once the position of the workpiece is detected, an additional search for features present in the direction of rotation is performed, allowing for stable, high-speed angle determination even for only slight features.



Detection target selection conditions

When performing robot picking and the like, analysis of the profile feature for slight differences is performed at the same time as space determination for gripping the workpiece. This eliminates the need for complex branch condition settings and calculations, anyone is able to use the device to its fullest potential easily.



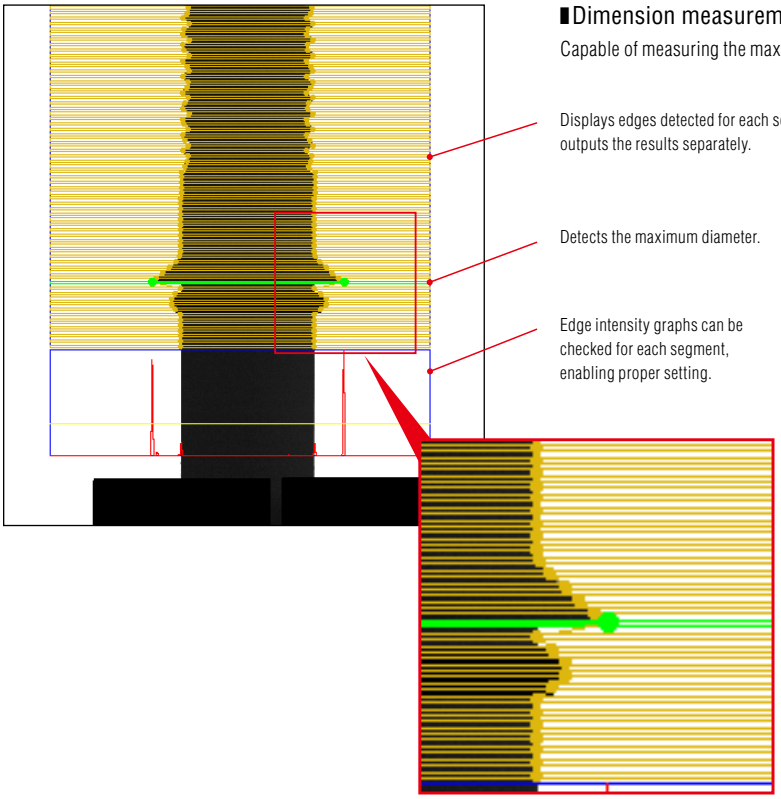
Simply by adding regions at both ends of the workpiece to the target selection conditions, determining whether there is enough space for the gripper to enter can be performed at the same time as the search.

Measure Up to 5000 Points within One Region

Trend edge

Instant profile measurement for an entire area

This tool detects up to 5000 edges within the inspection region and outputs their positions and widths. In addition to all edge data, maximum/minimum/average widths, tip position, and peak-to peak width can be measured without complicated calculations. It is also possible to find a virtual circle or approximate line from the information of the detected multiple points.

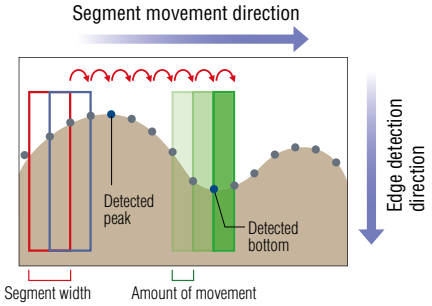


Dimension measurement for a bolt

Capable of measuring the maximum diameter of a bolt or the core diameter of a screw thread.

[PRINCIPLE OF DETECTION]

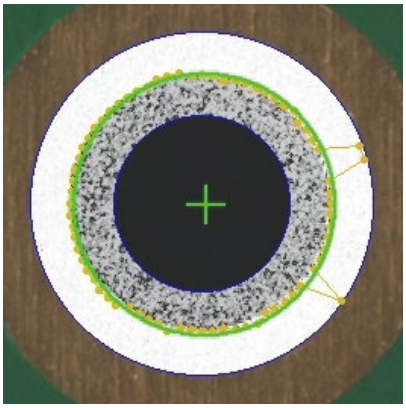
A segment of a specified width moves within the inspection region at a specified pitch in an overlapping pattern to detect edges at each position. Since the segment shift can be specified in 1/100 pixel units, all edges can be detected completely within the region.



Circular/Arc processing

Detecting PCB hole centres

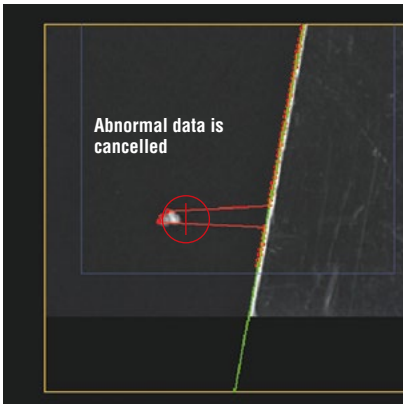
Trend edge can calculate the centre position and diameter of a circle by detecting multiple edge points around a curve, using this data to project a best fit circle. Abnormal edge positions can be filtered and ignored before drawing the virtual circle to allow for reliable measurements.



Linear processing (Abnormal point removal)

Detecting the position of glass substrate edges

The trend edge tool can map a virtual straight line from all of the edge positions along a substrates edge. With the ability to filter and ignore abnormal points the virtual straight line can be used for accurate position, angle, reference and geometric data.



Capable of Handling All Inspection Needs

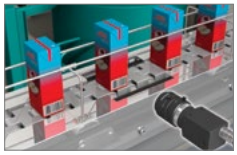
1D/2D code reading

Executes reading and image processing inspection simultaneously

Various inspections, such as inspections of the external appearance and dimensions, can be performed simultaneously with the reading of 1D and 2D codes printed on the target or with the inspection of the quality of the printed 1D and 2D codes. By removing the need for both conventional 1D & 2D code readers and a camera for image processing, space and money can be saved with the use of this tool.

▮ Capable of handling various types of codes

1D CODE



Simultaneous reading of barcodes and characters

2D CODES

DataMatrix

QR code

Composite Code

▮ Print quality verification function

This newly added function to verify 1D/2D code printing quality enables in-line checking of relative changes in printing quality while performing reading at the same time.

Supported standards

1D: ISO/IEC 15416
2D: ISO/IEC 15415, AIM DPM-1-2006, SAE AS9132

Detects defects in 1D code printing to judge the code as NG.

Notice:
This function is designed to capture relative changes in print quality and thus cannot be used as a print quality verification system for absolute value evaluation.

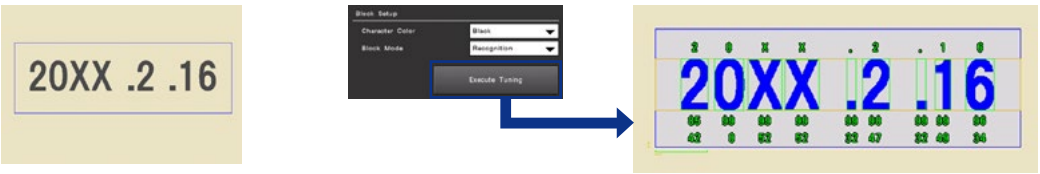
OCR2

NEW

Simple and Reliable Character Recognition Tool

A tool that checks printed and engraved characters on products.
Simply select the area for inspection and with a press of a button, the image processing settings will automatically be tuned for the best results.
Any user can set the tool up.

STEP1 Set the area ▶▶▶ **STEP2** Carry out tuning and identify characters at the click of a button!



▮ Customisable user dictionary

Built-in library can be used in combination with user-defined characters.
Achieves stable ID and OCR/OCV through sub-pattern registration, even with variable print quality.
The number of readable characters has also increased to 40, including the "+" symbol.

▮ Highly robust

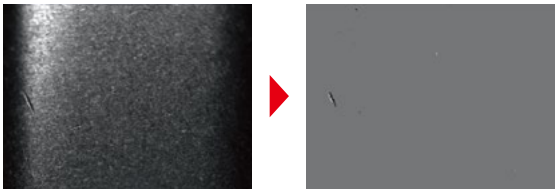
Achieves robust performance thanks to a newly developed algorithm, even with background noise or low contrast.
Makes stable inspections possible.

Highlight and Improve Features That Previously Could Not Be Seen. Remove Features and Aspects of an Image for Stable Inspection.

Shading correction (real time)

Shading correction is a real time filter that evens out any large random shadows or glare on a target surface, leaving behind smaller defined points which are often associated to being flaws or defects. As this is a grey scale processing filter, it dynamically changes the processed image based on the input image rather than being based on a fixed binary setting level. This ensures consistency with target variation and changes in the raw image.

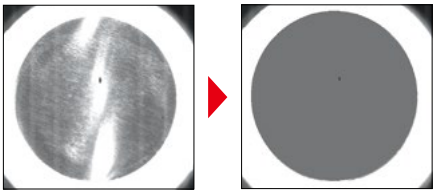
▮ Surface quality on a metal roller



Original image | After preprocessing

Shading correction can be used to extract just bright, dark or both bright and dark defects depending on the nature of the surface.

▮ Defect detection on the bottom of a can



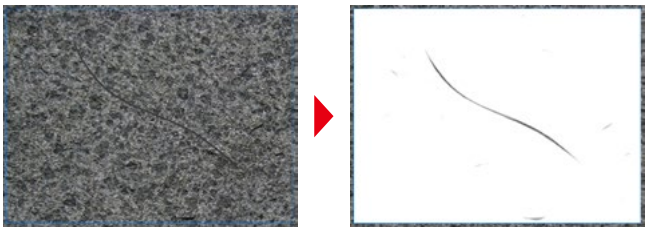
Original image | After preprocessing

Cancelling out the hot-spots caused by changes in the target surface creates a uniform background that makes it possible to detect defects.

Scratch defect extraction

Eliminates noise information within the inspection region and only highlights linear information. This filter is particularly effective for linear defect inspection for workpieces having rough surface conditions.

▮ Linear defect on a metal component



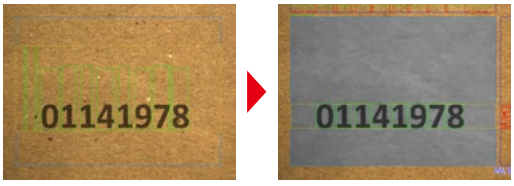
Original image | After preprocessing

Only linear defects are extracted by ignoring background noise.

Noise isolation

Eliminates or, in contrast, extracts noise having a specified area or smaller. This filter is effective when a rough background hinders image processing or to detect subtle defects.

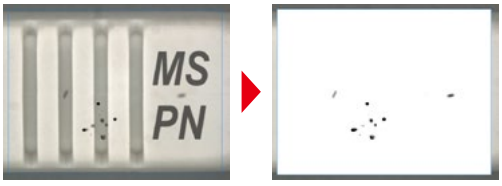
▮ Recognition of characters printed on cardboard



Original image | After preprocessing

Only bright and dark noise are removed and the printing condition remains unaffected.

▮ Defect inspection for a plastic mould



Original image | After preprocessing

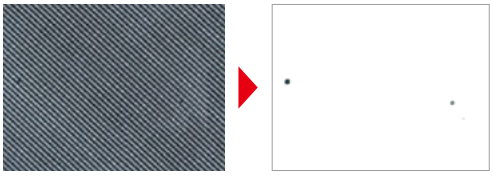
Only black defects smaller than the specified area are extracted.

KEYENCE's Proprietary Algorithms for an Optimal and Stable Inspection

Bidirectional smoothing

Has an effect that removes a significant amount of fine background patterns or noise.
This filter can be set to have an effect that performs smoothing in individual directions (X/Y), thus making it applicable for a wide range of applications, including counting individual items.

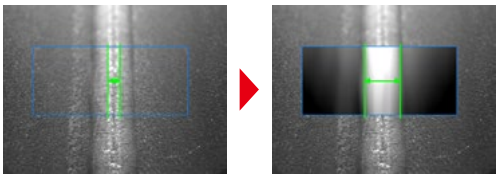
Foreign particle detection on a striped pattern



Original image　　After preprocessing

By eliminating the striped texture to the target, foreign particles can be detected.

Width inspection for a welded pipe section



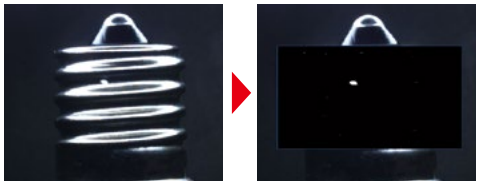
Original image　　After preprocessing

The blur filter allows a stable width measurement by eliminating unnecessary featured points other than the welded section.

Individual filter processing direction

As for the blur filter, all directions can now be applied for "shading correction", "image extraction", "expand, and "shrink" filters. Being able to choose the processing direction helps to enhance the image according to how the feature appears.

Individual filter processing direction

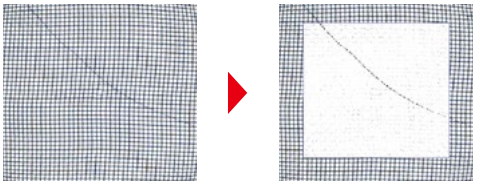


Original image　　After preprocessing

[Filter used: Shading correction] Processing direction: X

The defective area is isolated by removing the directional shading on the thread.

Foreign material detection on a lattice pattern

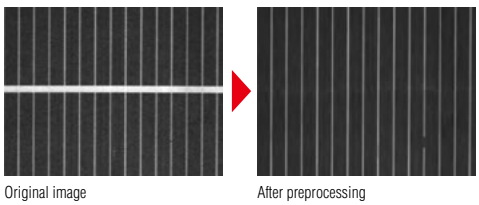


Original image　　After preprocessing

[Filter used: Image extraction] Processing direction: X -> Processing direction: Y

The background lattice pattern is removed by applying the filter multiple times while changing the processing direction.

Inspection of grid lines on a solar cell

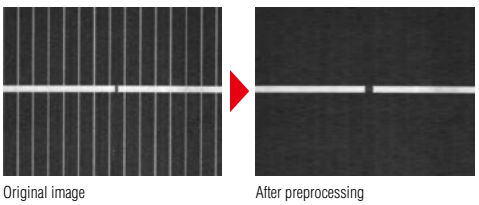


Original image　　After preprocessing

[Filter used: Shrink] Processing direction: Y

The break is enhanced while the width of the grid lines remain and the bus bar is removed for stable inspection.

Inspection of bus bars on a solar cell



Original image　　After preprocessing

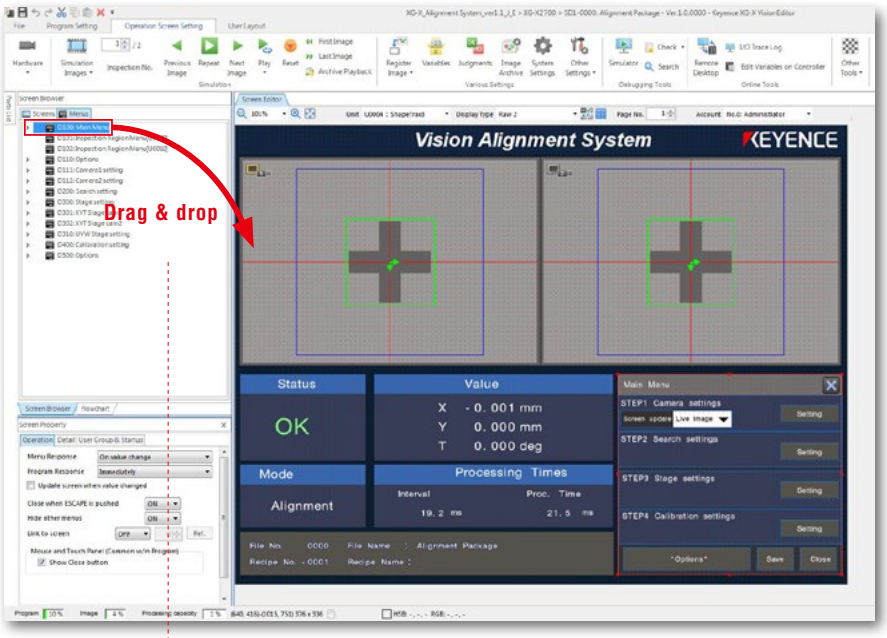
[Filter used: Shrink] Processing direction: X

The grid lines on the background are removed by shrinking the image in the X direction broadening the break in the bus bar.

Fully Customisable Operator Screens & Menus

Screen Editor

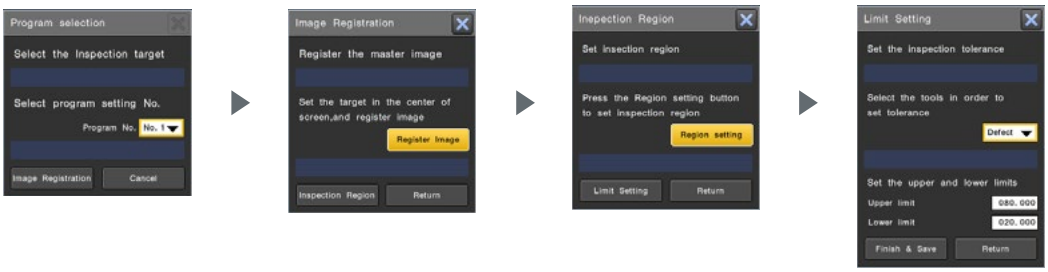
Controller display screens and operating interfaces can be created easily using the Screen Editor.



Drag & drop items from the list to the screen for simple GUI building.

Custom menu creation

Step by step procedures for changes such as product change over or shift adjustments can be simplified with customised operator menus.



By creating menus for a step by step process (such as calibration) there are no reasons why adjustments shouldn't be made or settings being incomplete and steps missed.

Conventional Systems

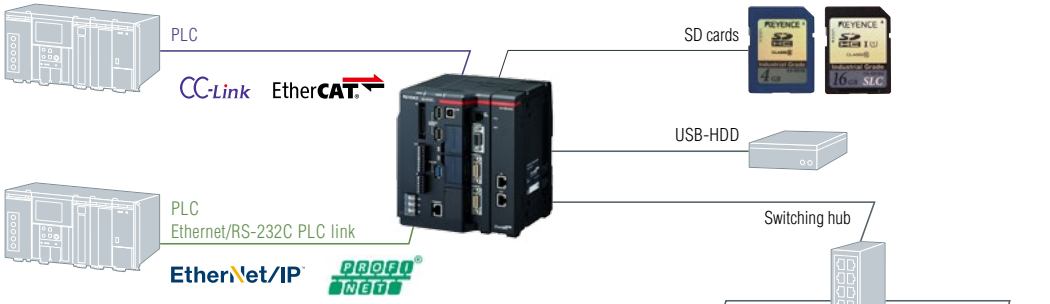
Due to different adjustment methods and different personnel making changes, cases often emerge where the setting is incorrect or varies between operators. With conventional systems complex parameter driven menus may need to be understood. It takes time and resources for operators to be trained and sometimes due to the complex menu interface the ability to operate the machine is limited to a few people.

Custom dialogue

Necessary steps and required settings can be put together to match up with the process. Menus can also be attributed to the relevant aspects of the image processing flowchart. This helps make sure that any operator of any level can easily be guided through the process required on the machine.

Save image and data for analysis and simulation

Supports a variety of connections between PLCs from various manufacturers and exchanges results and commands via the data memory just by selecting the connection destination manufacturer/device. As standard, the main unit is equipped with I/O, RS-232C, Ethernet, USB, and SD card slots. Furthermore, it is also possible to check communication with the communication monitor. This achieves significant reductions in cost, time, and effort.



XG-H1XE
- **VisionEditor**
  Upload/download/add or edit settings files
- **VisionTerminal**
  Measurements/image file logging/remote desktop function

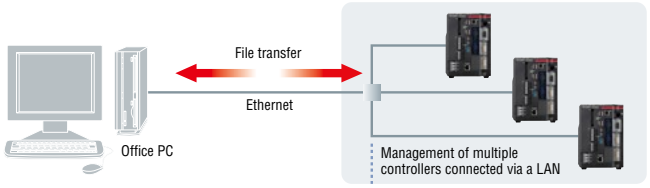
VNC

ActiveX

EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

Remote data logging & monitoring software XG-X VisionTerminal

The XG-X VisionTerminal software enables the remote monitoring, logging and support of any XG-X Series controller connected to a PC via a standard network. Maintenance man-hours, down-time and business trips can be significantly reduced as problems can be resolved remotely with the transfer of setting files and image data.



Main functions

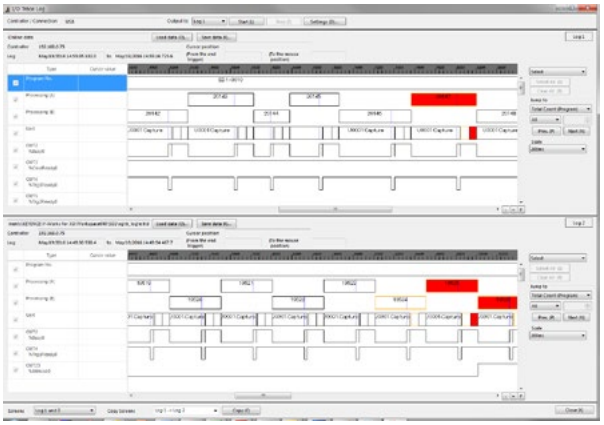
Remote desktop function …Enables the verification and remote operation of a connected controller, without extra data being sent and interfering with controller processing.

Logging function ……Enables the display, logging of measurement results and storage of image data to a PC folder from an inspection with any connected controller. This function also supports the accumulation output buffer of the controller to ensure complete data collection.

File acquisition function …Enables the transferring of setting data files and image data files between the XG-X Series controller and a PC.

Trace log function

The trace log function is a great tool to help with processing and I/O troubleshooting. Giving integrators and developers the capability for checking and monitoring the sequencing of units being processed, I/O signals and commands. The results display can be split and the processing time for each unit along with other information can be easily displayed. The trace log can also be saved and be used at a later date as a reference guide.



Camera lineup

		Model	Specification	Function	Capture range (pixels)	Image transfer time
21 megapixel camera series		**CA-H2100M** **CA-H2100C**	16× high-speed monochrome 16× high-speed colour	High speed, high resolution	5104 × 4092	109.9 ms
5 megapixel camera series		**CA-H500MX** **CA-H500CX**	16× high-speed monochrome 16× high-speed colour	High speed, high performance*1	2432 × 2040	27.7 ms 29.2 ms
		**CA-H500M** **CA-H500C**	16× high-speed monochrome 16× high-speed colour	High speed, environment resistant*2	2432 × 2050	28.4 ms
2 megapixel camera series		**CA-H200MX** **CA-H200CX**	16× high-speed monochrome 16× high-speed colour	High speed, high performance*1	1600 × 1200	11.7 ms
		**CA-H200M** **CA-H200C**	16× high-speed monochrome 16× high-speed colour	High speed, environment resistant*2	1600 × 1200	11.8 ms
		**CA-200M** **CA-200C**	Monochrome Colour	Environment resistant*2	1600 × 1200	56.5 ms
		**CA-HS200M** **CA-HS200C**	16× high-speed compact monochrome 16× high-speed compact colour	High speed, compact	1600 × 1200	14.2 ms
0.47 megapixel camera series		**CA-H048MX** **CA-H048CX**	16× high-speed monochrome 16× high-speed colour	High speed, high performance*1	784 × 596	2.9 ms
					512 × 480	1.7 ms
0.31 megapixel camera series		**CA-H035M** **CA-H035C**	16× high-speed monochrome 16× high-speed colour	High speed, environment resistant*2	640 × 480	2.9 ms
		**CA-035M** **CA-035C**	Monochrome Colour	Environment resistant*2	640 × 480	16.5 ms
		**CA-HS035M** **CA-HS035C**	7× high-speed compact monochrome 7× high-speed compact colour	High speed, compact	640 × 480	4.5 ms

*1 Colour cameras support LumiTrax™ image capture, and monochrome cameras support LumiTrax™ and Multi-Spectrum.
*2 To use this camera as an IP64-rated, environment-resistant camera, use it with a KEYENCE-specified IP64-rated lens and an environment-resistant cable.

		Model	Applicable lens	Number of pixels	Max. expanded image size	Scan speed	Pixel clock
Line scan options		**CA-HL02MX**	1 in. C-mount	2048	2048 × 16384	6.1 µs/line	188 MHz (15× transfer)
		CA-HL04MX	1 in. C-mount	4096	4096 × 16384	10.2 µs/line	400 MHz (32× transfer)
		CA-HL08MX	2 in. (M40 P0.75) lens*1	8192	8192 × 8192	10.2 µs/line	800 MHz (64× transfer)
		XG-HL02M	1 in. C-mount	2048	2048 × 16384	24 µs/line	100 MHz (8× transfer)
		XG-HL04M	1 in. C-mount	4096	4096 × 16384	24 µs/line	200 MHz (16× transfer)
		XG-HL08M	2 in. (M40 P0.75) lens*1	8192	8192 × 8192	45 µs/line	200 MHz (16× transfer)

* 1 F-mount lenses supported with an F-mount conversion adapter.

3D inspection model

		Model	Specification	Capture range	Image transfer time
Laser profile measurement system		**LJ-V Series**	Head: 7 types	Z-axis: ±2.3 to ±145 mm / X-axis: 7 to 180 mm	64000 profiles/sec (max.)

▮Controller lineup

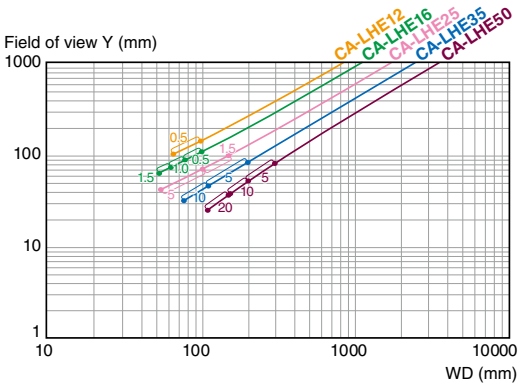
The XG-X Series offers the same ease of use for all applications without having to select between a stand-alone type for simple applications and a PC-based type for more difficult applications.
With a wide selection of devices that allows for selection of the best controller to fit the situation—including the application, required processing speed and capacity, and connected cameras—the lineup's offerings will become the industry standard for tomorrow's image processing selection.

			Area camera-only models							Models compatible with all cameras	
											
Model			**XG-X1000**	**XG-X1200**	**XG-X1500**	**XG-X2000**	**XG-X2200**	**XG-X2500**	**XG-X2700**	**XG-X2800**	**XG-X2900**
DSP + CPU, total number of cores (number of calculation DSP cores)			7 (2)			8 (high-speed DSP: 3)			14 (high-speed DSP: 7)		
Supported cameras	0.31 to 0.47 megapixels	CA-(H)035x CA-HS035x CA-H048xX	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2 megapixels	CA-(H)200x CA-HS200x CA-H200xX	—	✓	✓	—	✓	✓	✓	✓	✓
	5 megapixels	CA-H500x CA-H500xX	—	—	✓	—	—	✓	✓	✓	✓
	21 megapixels	CA-H2100x	—	—	—	—	—	—	✓	✓	✓
	Line scan Camera	XG-HL02M XG-HL04M XG-HL08M	—	—	—	—	—	—	—	✓	✓
		CA-HL02MX CA-HL04MX CA-HL08MX	—	—	—	—	—	—	—	✓	✓
Laser profile measurement system	LJ-V Series		—	—	—	—	—	—	—	✓	✓
Built-in camera interface			2	2	2	2	2	2	2	—*	—*
Dedicated touch panel (RS-232C)			✓	✓	✓	✓	✓	✓	✓	✓	✓

* Use in combination with a separate camera expansion unit.

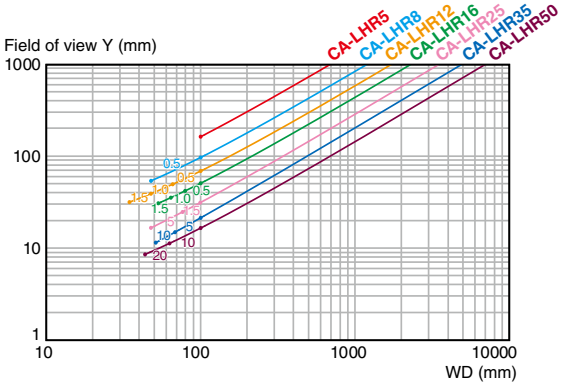
▮CA-H2100C/CA-H2100M

(When the **CA-LHE** Series is attached)



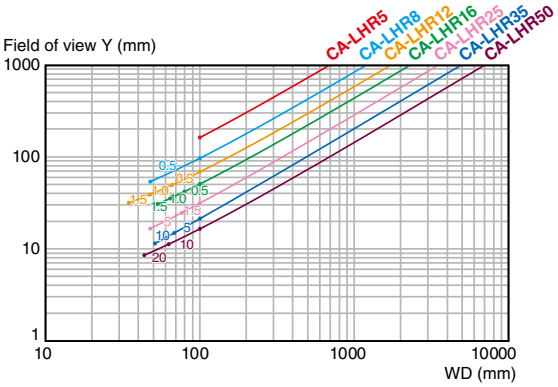
▮CA-H500CX/CA-H500MX

(When the **CA-LHR** Series is attached)



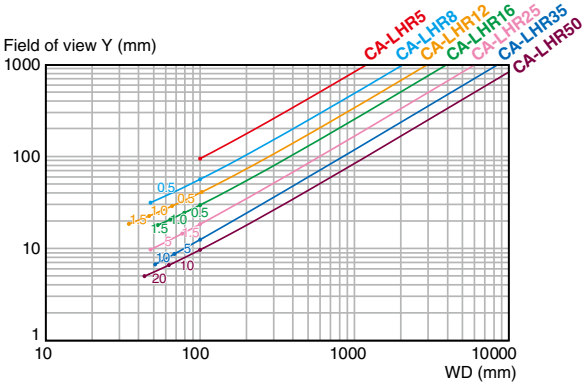
▮CA-H500C/CA-H500M

(When the **CA-LHR** Series is attached)



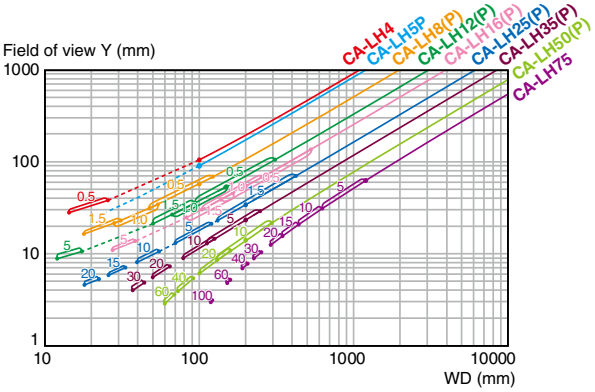
▮CA-H200CX/CA-H200MX

(When the **CA-LHR** Series is attached)



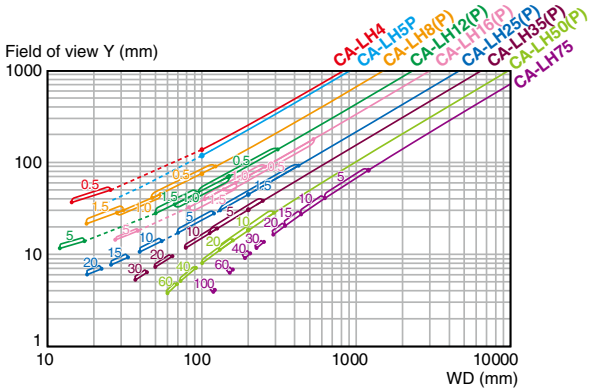
▮CA-H200CX/CA-H200MX

(When the **CA-LH/LHxP** Series is attached)



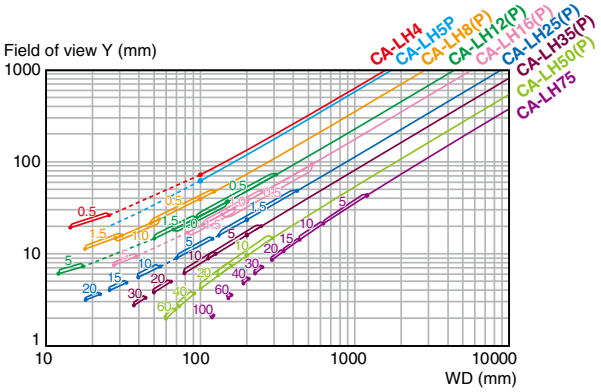
▮CA-200C/CA-200M/CA-H200C/CA-H200M

(When the **CA-LH/LHxP** Series is attached)



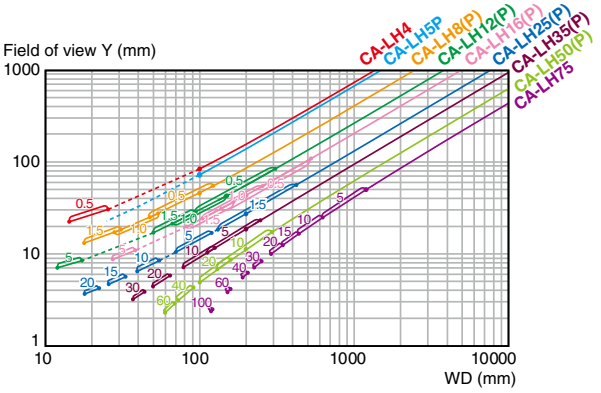
▮CA-H048CX/CA-H048MX

(When the **CA-LH/LHxP** Series is attached)



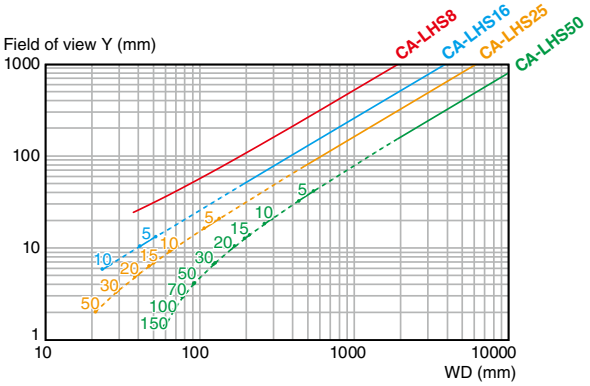
▮CA-035C/CA-035M/CA-H035C/CA-H035M

(When the **CA-LH/LHxP** Series is attached)



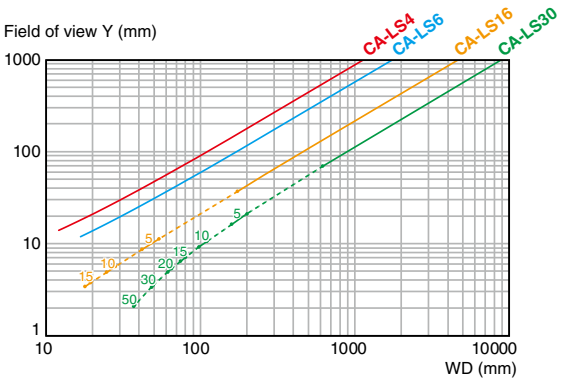
▮CA-HS200C/CA-HS200M

(When the **CA-LHS** Series is attached)



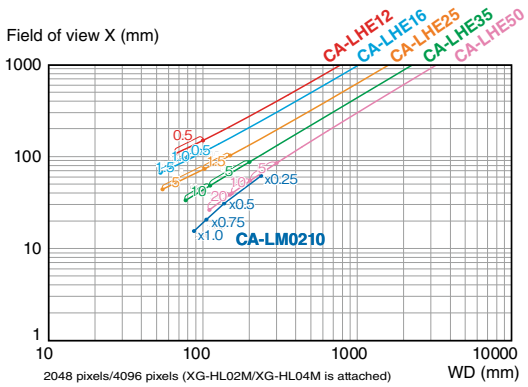
▮CA-HS035C/CA-HS035M

(When the **CA-LS** Series is attached)



▮CA-HL02MX/CA-HL04MX

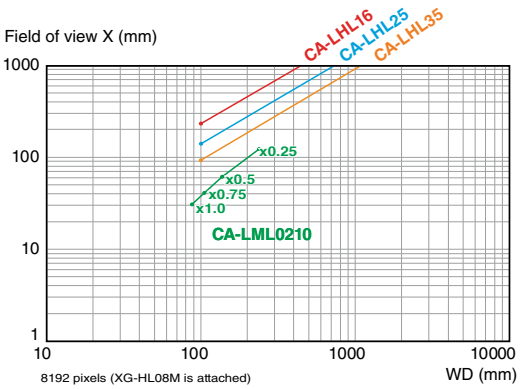
(When the **CA-LHE** Series is attached)



2048 pixels/4096 pixels (XG-HL02M/XG-HL04M is attached)

▮CA-HL08MX

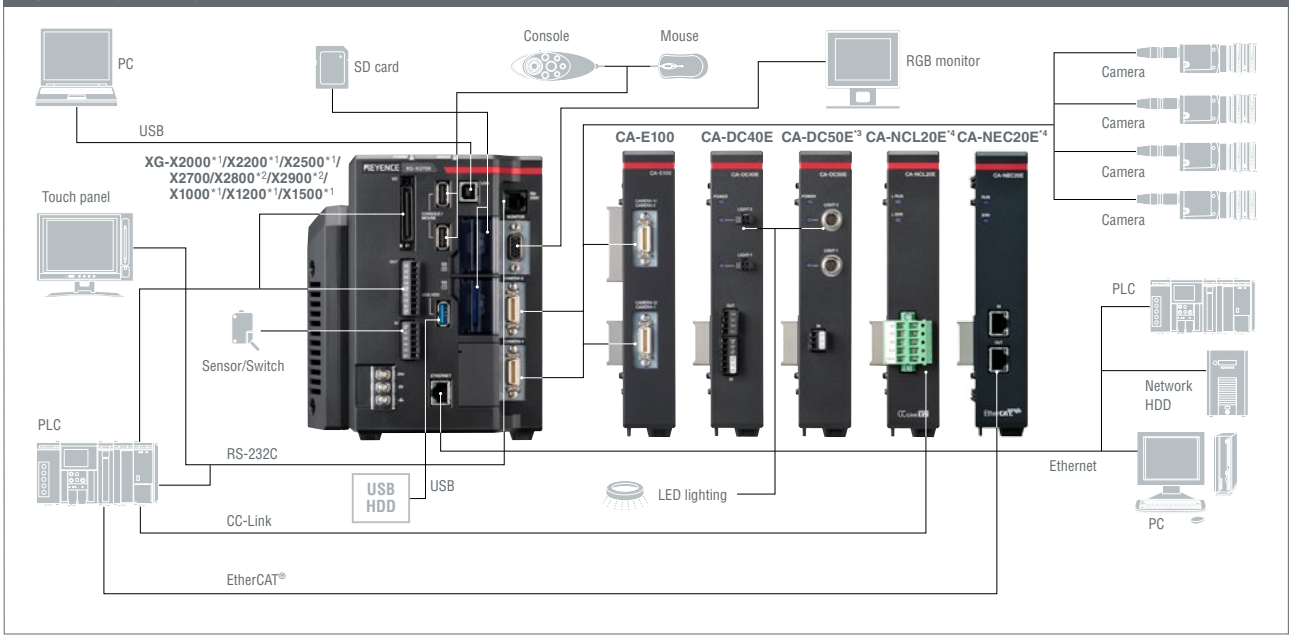
(When the **CA-LHL** Series is attached)



8192 pixels (XG-HL08M is attached)

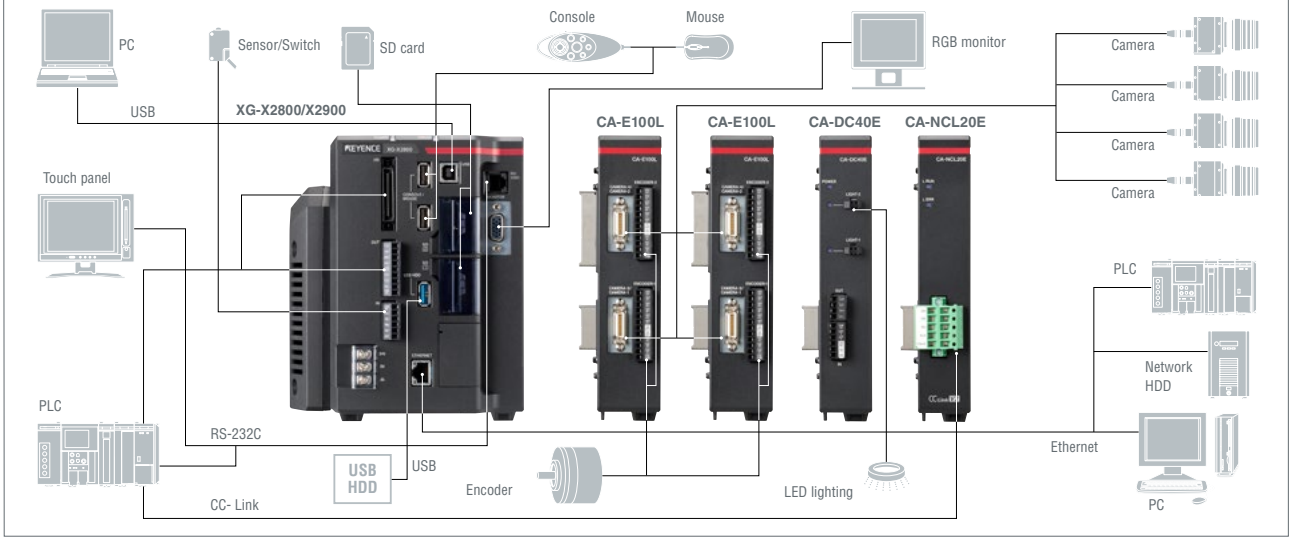
* Using close up rings may result in distortion and lower resolution around the edges of the image area / image sensor. For other field of view graphs, refer to the user's manual.

System configuration diagram XG-X2000/X2200/X2500/X2700/X2800/X2900/X1000/X1200/X1500



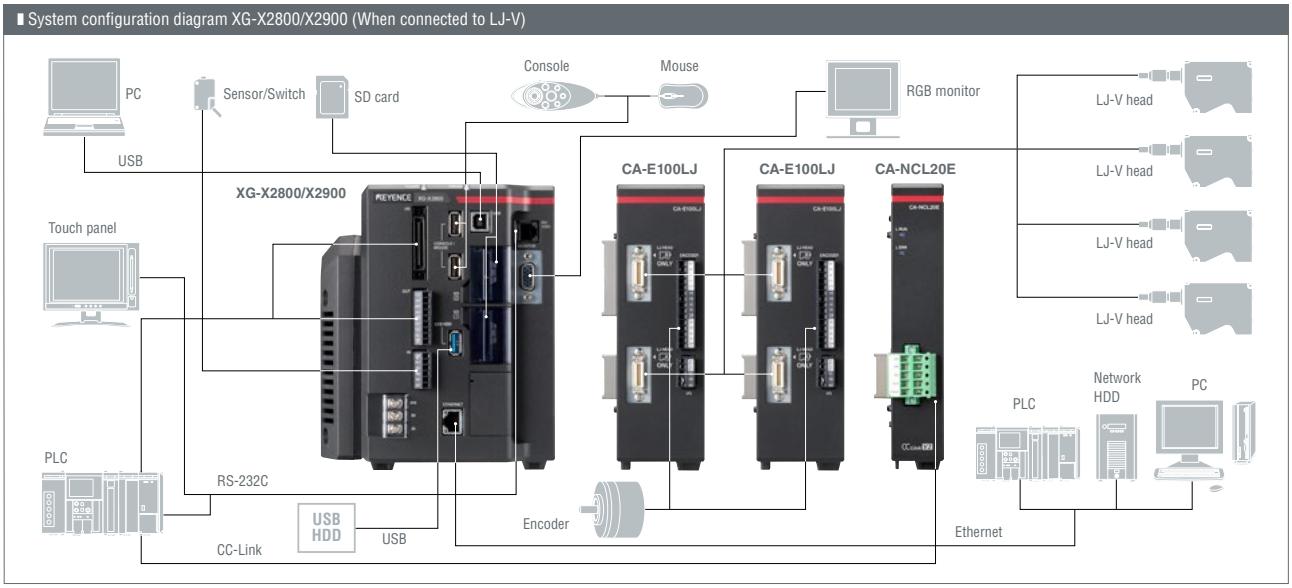
*1 Fan units cannot be connected to XG-X2000/X2200/X2500/X1000/X1200/X1500.
*2 XG-X2800/X2900 has no camera connection port. Use in combination with a camera input unit or similar device.
*3 LumiTrax™ mode is unavailable when used with the XG-X1000 Series. CA-DRWxX lights can be used as standard high-intensity lighting
*4 The CA-NCL20E and the CA-NEC20E cannot be connected at the same time.

System configuration diagram XG-X2800/X2900 (When connected to a line scan camera)

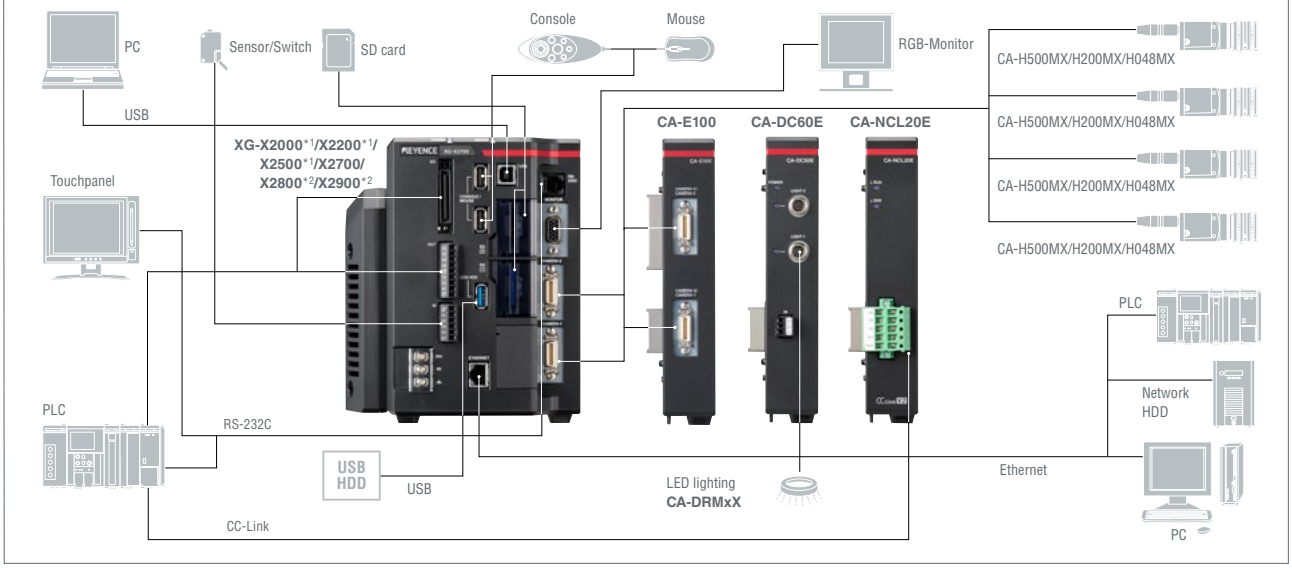


CONTACT YOUR NEAREST OFFICE FOR RELEASE STATUS

System configuration diagram XG-X2800/X2900 (When connected to LJ-V)



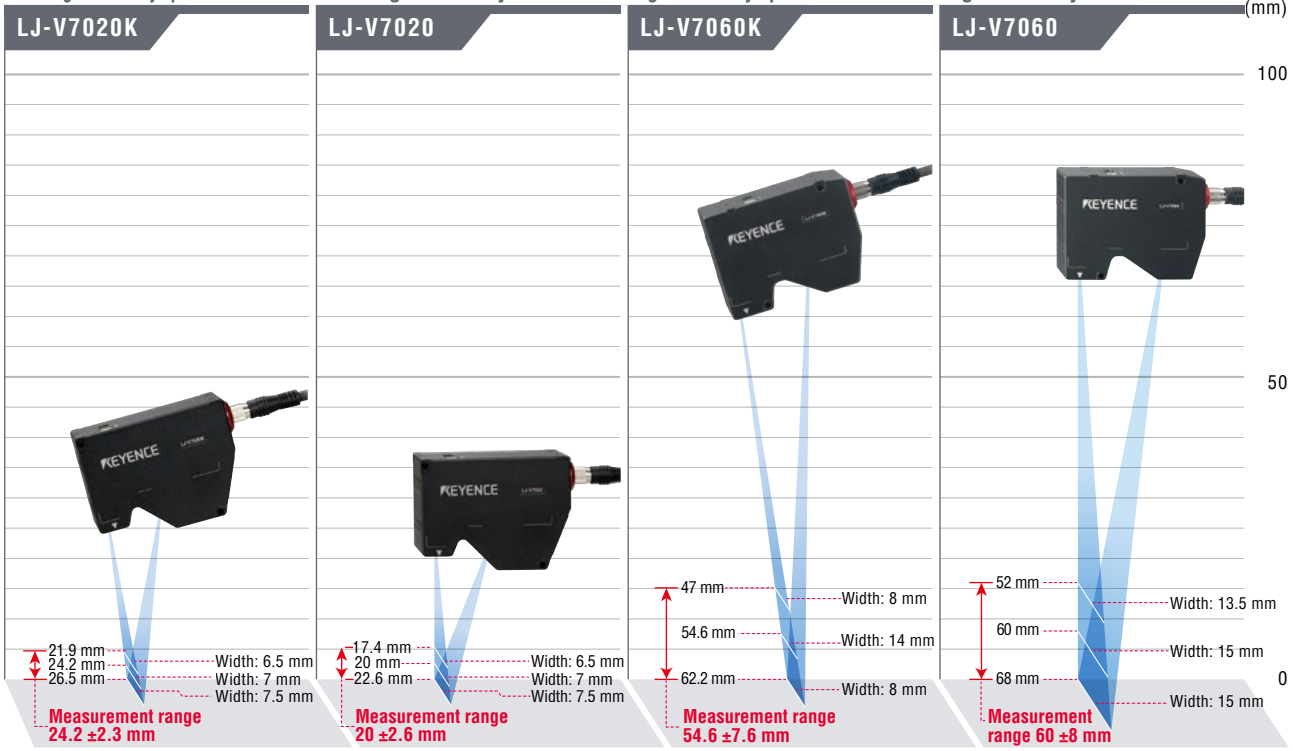
System configuration diagram XG-X2000/X2200/X2500/X2700/X2800/X2900 (When using Multi-Spectrum image capture)



*1 Fan units cannot be connected to XG-X2000/X2200/X2500.
*2 XG-X2800/X2900 has no camera connection port. Use in combination with a camera input unit or similar device.

Ultra high-accuracy specular reflection

LJ-V7020K



Measurement range	Z-axis	24.2 ±2.3 mm
	X-axis	7 mm
Repeatability	Z-axis	0.2 µm
	X-axis	2.5 µm

Ultra high-accuracy

LJ-V7020

Measurement range	Z-axis	20 ±2.6 mm
	X-axis	7 mm
Repeatability	Z-axis	0.2 µm
	X-axis	2.5 µm

High-accuracy specular reflection

LJ-V7060K

Measurement range	Z-axis	54.6 ±7.6 mm
	X-axis	14 mm
Repeatability	Z-axis	0.4 µm
	X-axis	5 µm

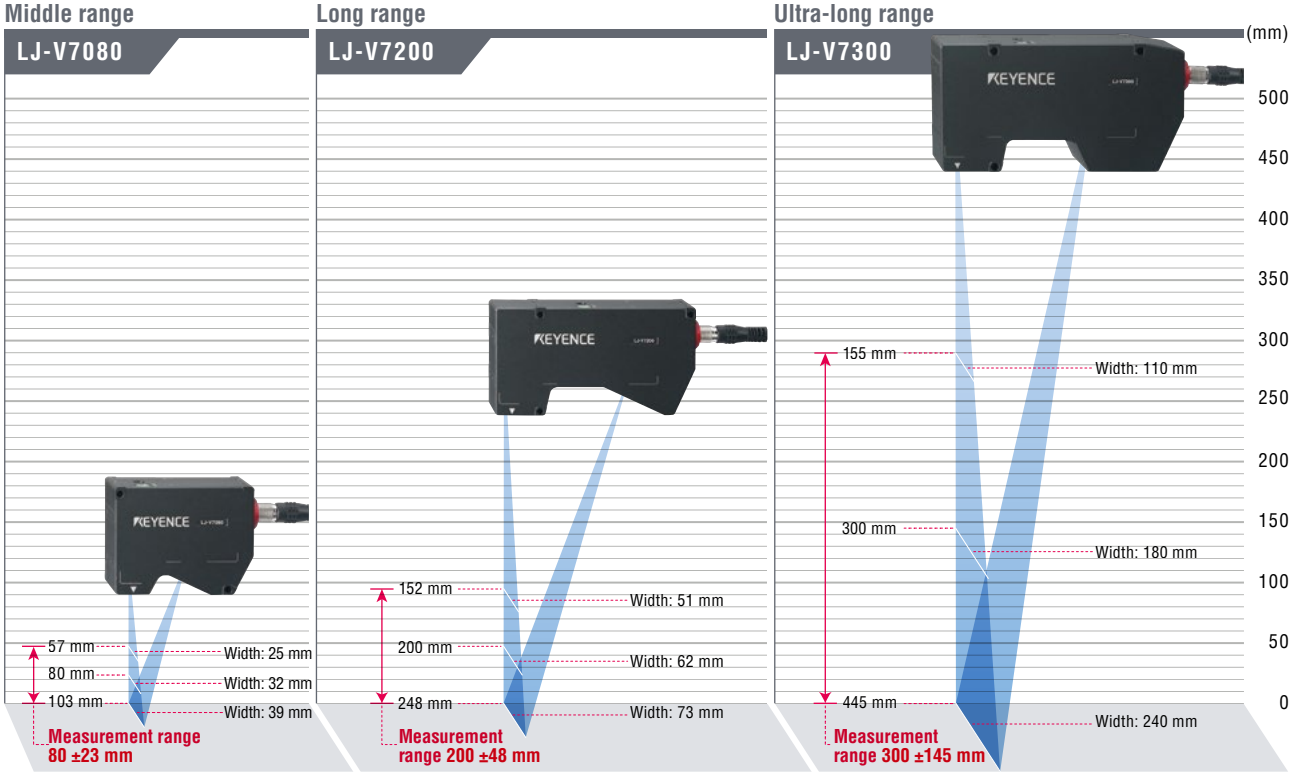
High-accuracy

LJ-V7060

Measurement range	Z-axis	60 ±8 mm
	X-axis	15 mm
Repeatability	Z-axis	0.4 µm
	X-axis	5 µm

Middle range

LJ-V7080



Measurement range	Z-axis	80 ±23 mm
	X-axis	32 mm
Repeatability	Z-axis	0.5 µm
	X-axis	10 µm

Long range

LJ-V7200

Measurement range	Z-axis	200 ±48 mm
	X-axis	62 mm
Repeatability	Z-axis	1 µm
	X-axis	20 µm

Ultra-long range

LJ-V7300

Measurement range	Z-axis	300 ±145 mm
	X-axis	180 mm
Repeatability	Z-axis	5 µm
	X-axis	60 µm

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Controller

5 megapixel camera-compatible
XG-X2500/XG-X1500

2 megapixel camera-compatible
XG-X2200/XG-X1200

0.47 megapixel camera-compatible
XG-X2000/XG-X1000

21 megapixel camera-compatible
XG-X2700

Line scan camera/ LJ-V/21 megapixel camera-compatible
XG-X2800/XG-X2900

Expansion unit

Area camera input unit
CA-E100

Line scan camera input unit
CA-E100L

Dedicated to the XG-X2000 Series

LJ-V input unit
CA-E100LJ/ E110LJ

Dedicated to the XG-X2000 Series

High-speed transmission line scan camera input unit
CA-E200L

Dedicated to the XG-X2000 Series

LED light control expansion unit
CA-DC40E

LumiTrax™-compatible light control expansion unit
CA-DC50E[*1]

Multi-Spectrum-compatible light control expansion unit
CA-DC60E

Dedicated to the XG-X2000 Series

CC-Link unit
CA-NCL20E

EtherCAT® unit
CA-NEC20E

*1 LumiTrax™ mode is unavailable when used with the XG-X1000 Series.
CA-DRWxX lights can be used as standard high-intensity lighting.

Area camera

16× speed, 21 megapixel camera
CA-H2100C (Colour)
CA-H2100M (Monochrome)

16× speed, high-performance 5 megapixel camera
CA-H500CX (Colour)
CA-H500MX (Monochrome)

16× speed, high-performance 2 megapixel camera
CA-H200CX (Colour)
CA-H200MX (Monochrome)

16× speed, high-performance 0.47 megapixel camera
CA-H048CX (Colour)
CA-H048MX (Monochrome)

16× speed, environment-resistant 5 megapixel camera
CA-H500C (Colour)
CA-H500M (Monochrome)

16× speed, environment-resistant 2 megapixel camera
CA-H200C (Colour)
CA-H200M (Monochrome)

Environment-resistant 2 megapixel camera
CA-200C (Colour)
CA-200M (Monochrome)

16× speed, environment-resistant 0.31 megapixel camera
CA-H035C (Colour)
CA-H035M (Monochrome)

Environment-resistant 0.31 megapixel camera
CA-035C (Colour)
CA-035M (Monochrome)

Ultra-compact (16×) 2 megapixel camera
CA-HS200C (Colour)
CA-HS200M (Monochrome)

Ultra-compact (7×) 0.31 megapixel camera
CA-HS035C (Colour)
CA-HS035M (Monochrome)

Programmable Encoder

Encoder head unit
CA-EN100H

Encoder relay unit
CA-EN100U

Encoder head cable
CA-EN5 (5 m)
CA-EN10 (10 m)

Line scan cameras

8192 pixels
High-speed Line scan camera
CA-HL08MX (Monochrome)

4096 pixels
High-speed Line scan camera
CA-HL04MX (Monochrome)

2048 pixels
High-speed Line scan camera
CA-HL02MX (Monochrome)

16×, 8192 pixels
Line scan camera
XG-HL08M (Monochrome)

16×, 4096 pixels
Line scan camera
XG-HL04M (Monochrome)

8×, 2048 pixels
Line scan camera
XG-HL02M (Monochrome)

Option

Camera cable

L-type connector

Camera cables

Cable type	Connector shape	3 m	5 m	10 m	17 m	Extension cable	
Standard	Straight	**CA-CH3**	**CA-CH5**	**CA-CH10**	—	—	—
	L-type	**CA-CH3L**	**CA-CH5L**	**CA-CH10L**	—	—	—
High-flex	Straight	**CA-CH3R**	**CA-CH5R**	**CA-CH10R**	**CA-CH17R**	**CA-CH3BE** (3 m)	—
Environment-resistant	Straight	**CA-CH3P**	—	**CA-CH10P**	—	—	—
For High-speed transmission line scan camera	Straight	**CA-CF3**	**CA-CF5**	**CA-CF10**	—	**CA-CF5E** (5 m)	**CA-CF10E** (10 m)
	L-type	**CA-CF3L**	**CA-CF5L**	**CA-CF10L**	—	—	—

The max. cable length varies depending on the use of extension cables/amplifiers.
Contact KEYENCE for details.

List of supported connection of camera cables	Area camera										
	CA-H2100x	**CA-H500xX**	**CA-H500x**	**CA-H200xX**	**CA-H200x**	**CA-200x**	**CA-HS200x**	**CA-H048xX**	**CA-H035x**	**CA-035x**	**CA-HS035x**
CA-CH3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CA-CH5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CA-CH10	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CA-CH17R	—	—	—	—	—	—	—	—	—	✓	—

	Line scan camera					
	XG-HL08M	**XG-HL04M**	**XG-HL02M**	**CA-HL02MX**	**CA-HL04MX**	**CA-HL08MX**
CA-CH3	✓	✓	✓	—	—	—
CA-CH5	✓	✓	✓	—	—	—
CA-CH10	✓	✓	✓	—	—	—
CA-CF3	—	—	—	✓	✓	✓
CA-CF5	—	—	—	✓	✓	✓
CA-CF10	—	—	—	✓	✓	✓

Amplifier for extension cables

CA-CHX10U

Camera cables can be extended up to 37 m*.

* The maximum length varies depending on the camera model. Contact us for details.

The dedicated extension cable is necessary in order to connect an amplifier to a camera or between two amplifiers. Contact KEYENCE for details.

LJ-V head connection cable

CB-B3 (3 m)
CB-B10 (10 m)

LJ-V head connection extension cable

CB-B5E (5 m)
CB-B10E (10 m)
CB-B20E (20 m)

Monitor/Touch panel

Multi-touch enabled 12" touch panel
CA-MP120T
12" colour LCD monitor
CA-MP120

CA-MP120T/MP120 monitor stand
OP-87262

CA-MP120T protective film
OP-87263

Options for CA-MP120T
For XG-X Series:
OP-87264
(Touch panel modular RS-232C cable, 3 m)
OP-87265
(Touch panel modular RS-232C cable, 10 m)

CA-MP120T/MP120 pole-mounting bracket
OP-42279

Monitor cable
OP-66842 (3 m)
OP-87055 (10 m)

*A RGB monitor cable and touch panel RS-232C cable are required when using the CA-MP120T.

Communication cable

Parallel I/O cable
OP-51657 (3 m)

Communication cable conversion connector
OP-26486: 9 pins
For 9-pin SYSMAC: **OP-84384**
For 9-pin MELSEC: **OP-86930**
* When connecting the MELSEC-FX, which requires a 9-pin connection, use the OP-26486.

RS-232C communication cable
OP-26487 (2.5 m)

1 Gbps Ethernet cable
OP-66843 (3 m)

USB cable
OP-66844 (2 m)

Others

Image processing system integration software
XG-H1XE
See the chart below for information on supported operating systems.

Handheld controller (USB)
OP-87983

Dedicated mouse
OP-87506
Mouse stand
OP-87601

Industrial SD card
CA-SD16G: 16 GB
CA-SD4G: 4 GB
CA-SD1G: 1 GB
OP-87133: 512 MB

Dedicated 24 VDC power supply
CA-U4
CA-U5

The XG-X Series manual set OP-M**** is not included with the controller.
A PDF version is included with the integrated development environment software XG-H1XE.

Supported OS and recommended running environment for XG-H1XE

Supported OS	Microsoft Windows 10 (Home/Pro/Enterprise) / Microsoft Windows 7 (Home Premium/Professional/Ultimate/Enterprise) • Compatibility with both 32-bit and 64-bit versions (64-bit version recommended) • Use with any OS other than the above is not possible.
Running environment	• CPU: Intel® Core™ i3 processor or better • RAM: 2 GB or more (When use of images exceeding 5 megapixels is expected, Windows 7 / Windows 10 (64-bit version) with 8 GB or more RAM is recommended.) • HDD: 500 MB or more (with additional space for storing images required) Besides these, if installation of Microsoft .NET Framework is necessary, 4.5 GB or more of free space is required in addition to the above. • Monitor: 1024 × 768 pixels or better (1280 × 1024 pixels recommended) An internet connection for accessing the webpage for submitting the activation code request and a means of receiving activation code via e-mail is required.

* Microsoft is either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.
Intel and Intel Core are registered trademarks of Intel Corporation in the United States and other countries.

Controller (XG-X2700/XG-X2500/XG-X2200/XG-X2000)

Model		XG-X2700	XG-X2500	XG-X2200	XG-X2000
Camera input		Two colour/monochrome cameras, up to 4 inputs can be connected by connecting 1 optional area camera input unit CA-E100.			
	Trigger input	Simultaneous/individual capture with up to 4 cameras can be selected (up to 2 cameras for simultaneous capture when the CA-E100 is not connected)			
Supported cameras/ Number of pixels		• CA-035C/HS035C/H035C/035M/HS035M/H035M 0.31 megapixel mode: 640 (H) × 480 (V), approx. 0.31 megapixels 0.24 megapixel mode: 512 (H) × 480 (V), approx. 0.24 megapixels • CA-H048CX/H048MX 0.47 megapixel mode: 784 (H) × 596 (V), approx. 0.47 megapixels 0.31 megapixel mode: 640 (H) × 480 (V), approx. 0.31 megapixels 0.24 megapixel mode: 512 (H) × 480 (V), approx. 0.24 megapixels • CA-200C/HS200C/H200C/200M/HS200M/H200M 2 megapixel mode: 1600 (H) × 1200 (V), approx. 1.92 megapixels 1 megapixel mode: 1024 (H) × 960 (V), approx. 0.98 megapixels • CA-H200CX/H200MX 2 megapixel mode: 1600 (H) × 1200 (V), approx. 1.92 megapixels • CA-H500C/H500M 5 megapixel mode: 2432 (H) × 2050 (V), approx. 4.99 megapixels • CA-H500CX/H500MX 5 megapixel mode: 2432 (H) × 2040 (V), approx. 4.96 megapixels 2 megapixel mode: 1600 (H) × 1200 (V), approx. 1.92 megapixels • CA-H2100C/H2100M 21 megapixel mode: 5104 (H) × 4092 (V), approx. 20.89 megapixels 5 megapixel mode: 2432 (H) × 2050 (V), approx. 4.99 megapixels	• CA-035C/HS035C/H035C/035M/HS035M/H035M 0.31 megapixel mode: 640 (H) × 480 (V), approx. 0.31 megapixels 0.24 megapixel mode: 512 (H) × 480 (V), approx. 0.24 megapixels • CA-H048CX/H048MX 0.47 megapixel mode: 784 (H) × 596 (V), approx. 0.47 megapixels 0.31 megapixel mode: 640 (H) × 480 (V), approx. 0.31 megapixels 0.24 megapixel mode: 512 (H) × 480 (V), approx. 0.24 megapixels • CA-200C/HS200C/H200C/200M/HS200M/H200M 2 megapixel mode: 1600 (H) × 1200 (V), approx. 1.92 megapixels 1 megapixel mode: 1024 (H) × 960 (V), approx. 0.98 megapixels • CA-H200CX/H200MX 2 megapixel mode: 1600 (H) × 1200 (V), approx. 1.92 megapixels • CA-H500C/H500M 5 megapixel mode: 2432 (H) × 2050 (V), approx. 4.99 megapixels • CA-H500CX/H500MX 5 megapixel mode: 2432 (H) × 2040 (V), approx. 4.96 megapixels 2 megapixel mode: 1600 (H) × 1200 (V), approx. 1.92 megapixels	• CA-035C/HS035C/H035C/035M/HS035M/H035M 0.31 megapixel mode: 640 (H) × 480 (V), approx. 0.31 megapixels 0.24 megapixel mode: 512 (H) × 480 (V), approx. 0.24 megapixels • CA-H048CX/H048MX 0.47 megapixel mode: 784 (H) × 596 (V), approx. 0.47 megapixels 0.31 megapixel mode: 640 (H) × 480 (V), approx. 0.31 megapixels 0.24 megapixel mode: 512 (H) × 480 (V), approx. 0.24 megapixels • CA-200C/HS200C/H200C/200M/HS200M/H200M 2 megapixel mode: 1600 (H) × 1200 (V), approx. 1.92 megapixels 1 megapixel mode: 1024 (H) × 960 (V), approx. 0.98 megapixels • CA-H200CX/H200MX 2 megapixel mode: 1600 (H) × 1200 (V), approx. 1.92 megapixels	• CA-035C/HS035C/H035C/035M/HS035M/H035M 0.31 megapixel mode: 640 (H) × 480 (V), approx. 0.31 megapixels 0.24 megapixel mode: 512 (H) × 480 (V), approx. 0.24 megapixels • CA-H048CX/H048MX 0.47 megapixel mode: 784 (H) × 596 (V), approx. 0.47 megapixels 0.31 megapixel mode: 640 (H) × 480 (V), approx. 0.31 megapixels 0.24 megapixel mode: 512 (H) × 480 (V), approx. 0.24 megapixels
Main image processor		DSP (Fast type)	DSP		
Program memory		Up to 1000 settings (depending on SD card capacity and setting contents) for SD card 1 and SD card 2 individually and external switching is possible			
Screen capacity		Maximum 1000 screens for each program (depending on SD card size), Image compression, Support for image registration and partial image registration from a position-corrected image, Externally switchable according to variables.			
Memory card		• SD card slot × 2 Supports OP-87133 (512 MB), CA-SD1G (1 GB: standard equipment on the SD1 slot), CA-SD4G (4 GB), and CA-SD16G (16 GB)		• SD card slot × 2 Supports OP-87133 (512 MB: standard equipment on the SD1 slot), CA-SD1G (1 GB), CA-SD4G (4 GB), and CA-SD16G (16 GB)	
Image archive		With area camera connected: • Max. 12757 images (monochrome camera, 0.24 megapixels) • Max. 10221 images (monochrome camera, 0.31 megapixels) • Max. 6730 images (monochrome camera, 0.47 megapixels) • Max. 1638 images(monochrome camera, 2 megapixels) • Max. 613 images (monochrome camera, 5 megapixels) • Max. 122 images(monochrome camera, 21 megapixels) • Max. 12441 images (colour camera, 0.24 megapixels) • Max. 9998 images(colour camera, 0.31 megapixels) • Max. 6609 images (colour camera, 0.47 megapixels) • Max. 1598 images (colour camera, 2 megapixels) • Max. 583 images (colour camera, 5 megapixels) • Max. 110 images (colour camera, 21 megapixels)	With area camera connected: • Max. 12757 images (monochrome camera, 0.24 megapixels) • Max. 10221 images (monochrome camera, 0.31 megapixels) • Max. 6730 images (monochrome camera, 0.47 megapixels) • Max. 1638 images (monochrome camera, 2 megapixels) • Max. 613 images (monochrome camera, 5 megapixels) • Max. 12441 images (colour camera, 0.24 megapixels) • Max. 9998 images (colour camera, 0.31 megapixels) • Max. 6609 images (colour camera, 0.47 megapixels) • Max. 1598 images (colour camera, 2 megapixels) • Max. 583 images (colour camera, 5 megapixels)	With area camera connected: • Max. 4091 images (monochrome camera, 0.24 megapixels) • Max. 3277 images (monochrome camera, 0.31 megapixels) • Max. 2156 images (monochrome camera, 0.47 megapixels) • Max. 520 images (monochrome camera, 2 megapixels) • Max. 3985 images (colour camera, 0.24 megapixels) • Max. 3200 images (colour camera, 0.31 megapixels) • Max. 2111 images (colour camera, 0.47 megapixels) • Max. 490 images (colour camera, 2 megapixels)	With area camera connected: • Max. 2181 images (monochrome camera, 0.24 megapixels) • Max. 1747 images (monochrome camera, 0.31 megapixels) • Max. 1148 images (monochrome camera, 0.47 megapixels) • Max. 2122 images (colour camera, 0.24 megapixels) • Max. 1702 images (colour camera, 0.31 megapixels) • Max. 1120 images (colour camera, 0.47 megapixels)
Interface	Assignable input	• 20 connection points (including four high-speed terminals that can be assigned to trigger input) • Input rating: 26.4 V or lower, or 2 mA or greater (3 mA or greater for high-speed input terminals)			
	Assignable output	• 28 connection points (including four high-speed terminals that can be assigned to external trigger-linked FLASH output) • Photo MOSFET*1: Max. 50 mA (30 V or less)			
	Monitor output	Analogue RGB output, XGA (1024 × 768, 24-bit colour)			
	Unit indicators	Power, ERROR LED display			
	RS-232C	• Functionality switchable between numerical data output, control I/O, and CA Series touch panel interface (Cannot be used in conjunction with PLC links using RS-232C) • Supports a maximum baud rate of 230400 bps			
	PLC link	• Can output numerical values and perform control input/output using the Ethernet or RS-232C port (Cannot be used in conjunction with CC-Link, EtherNet/IP™, PROFINET, EtherCAT®) • The following PLCs are supported via link unit*2: KEYENCE: KV-7000 Series, KV-5000/3000 Series, KV-1000/700 Series, KV Nano Series Mitsubishi Electric: MELSEC iQ-R/L/Q Series, MELSEC A Series, (RS-232C only), MELSEC iQ-F Series, MELSEC FX Series (RS-232C only) OMRON: SYSMAC CJ2/CJ1/CS1 Series, SYSMAC C Series (RS-232C only), SYSMAC CP1 Series YASKAWA Electric Corporation: MP2000 Series/MP900 Series (RS-232C only)			
	Ethernet	• Can output numerical values and perform control input/output • Connecting to KEYENCE PC application software enables not only the above functions but also makes it possible to upload and download inspection settings, perform a variety of simulations, send and receive a variety of data including image data, and use the remote desktop function. Supports FTP client and server functions, a VNC server function (for non-PC clients, only displaying the monitor screen is supported), and a BOOTP function • 1000BASE-T/100BASE-TX/10BASE-T			
	USB	• Connecting to KEYENCE PC application software makes it possible to output numerical values, perform control I/O, upload and download inspection settings, perform a variety of simulations, send and receive a variety of data including image data, and use the remote desktop function. • Dedicated to USB 2.0			
	CC-Link	• By connecting the optional CC-Link unit CA-NCL20E, numerical value output and control input/output are enabled (Cannot be used in conjunction with PLC-Link, EtherNet/IP™, PROFINET or EtherCAT®) • Supports ver. 1.10 and ver. 2.00 remote device stations			
	EtherCAT®	• Connecting the optional EtherCAT® unit CA-NEC20E enables numerical value output and control I/O (Cannot be used in conjunction with PLC-Link, EtherNet/IP™, or PROFINET.) • Process data object communication (cyclic communication) (Input: max. 536 bytes, output: max. 532 bytes) • Message communication (non-cyclic communication) • Supports CoE • Explicit Device Identification • Conforms to conformance test V2.1.0.2.			
	EtherNet/IP™	• Numerical data input/output and control input/output enabled via the Ethernet port (Cannot be used in conjunction with PLC-link, CC-Link, PROFINET or EtherCAT®) • Cyclic communication (max. 1436 bytes) and message communication supported • Maximum connections: 32 • Conforms to conformance test Version.CT15.			
	PROFINET	• Numerical value input and control input/output enabled via the Ethernet port(Cannot be used in conjunction with PLC-Link, CC-Link, EtherNet/IP™ or EtherCAT®) • Supports cyclic communication (max. 1408 bytes) • Non-cyclic (record data) communication is possible. • In conformity with Conformance Class A.			
	SNTP	Unit's date and time auto-corrects when unit is connected to SNTP server			
	USB console	• Possible to control various menus via an optional USB console (OP-87983) • Supports the assignment of operations to console buttons			
	Mouse	Possible to control various menus via an optional dedicated mouse (OP-87506)			
	Touch panel	• Settings can be operated from a CA Series touch panel using the RS-232C port (Cannot be used in conjunction with RS-232C no-protocol communication, PLC links using RS-232C, or EtherCAT®) • Supports dedicated touch menus and operation buttons			
	USB HDD	• By connecting the HDD (max. 2 TB) to the dedicated USB port (supports USB 3.0, bus-powered, rated output 900 mA), image and other data can be output			
Language		Japanese/English/Simplified Chinese/Traditional Chinese/German (initial language set at first startup)			
Illumination control		By connecting the optional light expansion unit CA-DC40E/DC50E/DC60E, lighting and intensity control for the LED illumination is possible.*3			
Cooling fan		CA-F100 fan unit is included (attached) to the controller.	None		
Rating	Voltage	24 VDC ±10%			
	Current consumption	3.8 A			3.1 A
Environmental resistance	Operating ambient temperature	0 to 45°C (when installed on a DIN rail)/0 to 40°C (when installed on a surface)			
	Operating ambient humidity	35 to 85% RH (no condensation)			
Weight		Approx. 1800 g	Approx. 1600 g		

*1 Positive common connections supporting NPN input devices and negative common connections supporting PNP input devices are both possible. *2 Models equipped with the Ethernet port in the CPU unit support Ethernet port direct connection.
*3 Up to 8 light control expansion units can be connected (max. two CA-DC50E/DC60E units out of 8).

Controller (XG-X2800)

Model		XG-X2800	
Camera input*1		• With area camera input unit CA-E100 connected: 2 colour/monochrome cameras per CA-E100, up to 4 cameras via a maximum of 2 units can be connected. • With line scan camera input unit CA-E100L connected: 2 line scan cameras or two monochrome/colour cameras per CA-E100L, 4 cameras max. with 2 camera input units • With high-speed line scan camera unit CA-E200L connected: 2 high-speed line scan cameras per CA-E200L, 4 cameras max. with 2 camera input units	• With LJ-V input unit CA-E100LJ/110LJ connected: Two LJ-V Series heads of the same model per CA-E100LJ/CA-E110LJ, up to 4 cameras using a maximum of 2 units can be connected.
	Trigger input	Simultaneous/individual capture with up to 4 cameras can be selected. (Up to 2 cameras for simultaneous capture when one camera input unit is connected)	
Supported cameras/ Number of pixels	Area camera	• CA-035C/HS035C/H035C/035M/HS035M/H035M 0.31 megapixel mode: 640 (H) × 480 (V), approx. 0.31 megapixels 0.24 megapixel mode: 512 (H) × 480 (V), approx. 0.24 megapixels • CA-H048CX/H048MX 0.47 megapixel mode: 784 (H) × 596 (V), approx. 0.47 megapixels 0.31 megapixel mode: 640 (H) × 480 (V), approx. 0.31 megapixels 0.24 megapixel mode: 512 (H) × 480 (V), approx. 0.24 megapixels • CA-200C/HS200C/H200C/200M/HS200M/H200M 2 megapixel mode: 1600 (H) × 1200 (V), approx. 1.92 megapixels 1 megapixel mode: 1024 (H) × 960 (V), approx. 0.98 megapixels	• CA-H200CX/H200MX 2 megapixel mode: 1600 (H) × 1200 (V), approx. 1.92 megapixels • CA-H500C/H500M 5 megapixel mode: 2432 (H) × 2050 (V), approx. 4.99 megapixels • CA-H500CX/H500MX 5 megapixel mode: 2432 (H) × 2040 (V), approx. 4.96 megapixels 2 megapixel mode: 1600 (H) × 1200 (V), approx. 1.92 megapixels • CA-H2100C/H2100M 21 megapixel mode: 5104 (H) × 4092 (V), approx. 20.89 megapixels 5 megapixel mode: 2432 (H) × 2050 (V), approx. 4.99 megapixels
	Line Scan Camera	• XG-HL08M 8192 (H) × 8192 (L), approx. 67.11 megapixels • XG-HL04M 4096 (H) × 16384 (L), approx. 67.11 megapixels	• XG-HL02M 2048 (H) × 16384 (L), approx. 33.55 megapixels
	High-speed line scan camera	• CA-HL08MX 8192 (H) × 8192 (L), approx. 67.11 megapixels • CA-HL04MX 4096 (H) × 16384 (L), approx. 67.11 megapixels	• CA-HL02MX 2048 (H) × 16384 (L), approx. 33.55 megapixels
	LJ-V sensor head	• LJ-V7020/7020K/7060/7060K/7080/7200/7300 512 (H) × 16384 (L), approx. 8.39 megapixels 1024 (H) × 8192 (L), approx. 8.39 megapixels 2048 (H) × 4096 (L), approx. 8.39 megapixels	
Main image processor		DSP (Fast type)	
Program memory		Up to 1000 settings (depending on SD card capacity and setting contents) for SD card 1 and SD card 2 individually and external switching is possible	
Screen capacity		Maximum 1000 screens for each program (depending on SD card size), Image compression, Support for image registration and partial image registration from a position-corrected image, Externally switchable according to variables.	
Memory card		• SD card slot × 2 • Supports OP-87133 (512 MB), CA-SD1G (1 GB: standard equipment on the SD1 slot), CA-SD4G (4 GB), and CA-SD16G (16 GB)	
Image archive		• Can store the image amounts listed below as an archive to the image memory of the main unit	
	Area camera	• Max. 12757 images (monochrome camera, 0.24 megapixels) • Max. 10221 images (monochrome camera, 0.31 megapixels) • Max. 6730 images (monochrome camera, 0.47 megapixels) • Max. 1638 images (monochrome camera, 2 megapixels) • Max. 613 images (monochrome camera, 5 megapixels) • Max. 122 images (monochrome camera, 21 megapixels)	• Max. 12441 images (colour camera, 0.24 megapixels) • Max. 9998 images (colour camera, 0.31 megapixels) • Max. 6609 images (colour camera, 0.47 megapixels) • Max. 1598 images (colour camera, 2 megapixels) • Max. 583 images (colour camera, 5 megapixels) • Max. 110 images (colour camera, 21 megapixels)
	Line Scan Camera	• Max. 71 images (CA-HL02MX continuous capture, 2048 × 16384 pixels) • Max. 151 images (CA-HL02MX/XG-HL02M continuous capture, 2048 × 8192 pixels) • Max. 71 images (CA-HL02MX/XG-HL02M individual capture, 2048 × 16384 pixels) • Max. 31 images (CA-HL04MX continuous capture, 4096 × 16384 pixels)	• Max. 68 images (CA-HL04MX/XG-HL04M continuous capture, 4096 × 8192 pixels) • Max. 31 images (CA-HL04MX/XG-HL04M individual capture, 4096 × 16384 pixels) • Max. 28 images (CA-HL08MX/XG-HL08M continuous capture, 8192 × 8192 pixels) • Max. 31 images (CA-HL08MX/XG-HL08M individual capture, 8192 × 8192 pixels)
	LJ-V Series head	• Max. 150 images (2048 × 4096, continuous and sheet-fed capture) • Max. 150 images (1024 × 8192, continuous and sheet-fed capture)	• Max. 150 images (512 × 16384, continuous and sheet-fed capture)
Interface	Assignable input	• 20 connection points (including four high-speed terminals that can be assigned to trigger input) • Input rating: 26.4 V or lower, or 2 mA or greater (3 mA or greater for high-speed input terminals)	
	Assignable output	• 28 connection points (including four high-speed terminals that can be assigned to external trigger-linked FLASH output) • Photo MOSFET*2: Max.50 mA (30 V or less)	
	Encoder input	• When the CA-E100L/E200L is connected: 2 inputs per unit, 4 inputs total for 2 units max. • When the CA-E100LJ/E110LJ is connected: 1 input per unit, 2 inputs total for 2 units max. (1 input for 1 unit max. with the XG-X2800LJ) • RS-422 line-driver output (Multi-drop support*3, Supports 5 V output included: max. 150 mA) and open collector output (24 V devices only with CA-E100L/E200L) included	
	Monitor output	Analogue RGB output, XGA (1024 × 768, 24-bit colour)	
	Unit indicators	Power, ERROR LED display	
	RS-232C	• Functionality switchable between numerical data output, control input/output, and CA Series touch panel interface (Cannot be used in conjunction with PLC links using RS-232C) • Supports a maximum baud rate of 230400 bps	
	PLC link	• Can output numerical values and perform control input/output using the Ethernet or RS-232C port (Cannot be used in conjunction with CC-Link, EtherNet/IP™, PROFINET, EtherCAT®) • The following PLCs are supported via link unit*4: KEYENCE: KV-7000 Series, KV-5000/3000 Series, KV-1000/700 Series, KV Nano Series Mitsubishi Electric: MELSEC iQ-R/L/Q Series, MELSEC A Series, (RS-232C only), MELSEC iQ-F Series, MELSEC FX Series (RS-232C only) OMRON: SYSMAC CJ2/CJ1/CS1 Series, SYSMAC C Series (RS-232C only), SYSMAC CP1 Series YASKAWA Electric Corporation: MP2000 Series/MP900 Series (RS-232C only)	
	Ethernet	• Can output numerical values and perform control input/output • Connecting to KEYENCE PC application software enables not only the above functions but also makes it possible to upload and download inspection settings, perform a variety of simulations, send and receive a variety of data including image data, and use the remote desktop function. • Supports FTP client and server functions, a VNC server function (for non-PC clients, only displaying the monitor screen is supported), and a BOOTP function • 1000BASE-T/100BASE-TX/10BASE-T	
	USB	• Connecting to KEYENCE PC application software makes it possible to output numerical values, perform control I/O, upload and download inspection settings, perform a variety of simulations, send and receive a variety of data including image data, and use the remote desktop function. • Dedicated to USB 2.0	
	CC-Link	• By connecting the optional CC-Link unit CA-NCL20E, numerical value output and control input/output are enabled (Cannot be used in conjunction with PLC-Link, EtherNet/IP™, PROFINET or EtherCAT®) • Supports ver. 1.10 and ver. 2.00 remote device stations	
	EtherCAT®	• Connecting the optional EtherCAT® unit CA-NEC20E enables numerical value output and control input/output (Cannot be used in conjunction with PLC-Link, CC-Link, EtherNet/IP™, or PROFINET.) • Process data object communication (cyclic communication) (Input: max. 536 bytes, output: max. 532 bytes) • Message communication (non-cyclic communication) • Supports CoE • Explicit Device Identification • Conforms to conformance test V2.1.0.2.	
	EtherNet/IP™	• Numerical data input/output and control input/output enabled via the Ethernet port (Cannot be used in conjunction with PLC-link, CC-Link, PROFINET or EtherCAT®) • Cyclic (implicit) communication (max. 1436 bytes) possible. Message communication possible. • Maximum connections: 32 • Conforms to conformance test Version.CT15.	
	PROFINET	• Numerical value and control input/output enabled via the Ethernet port (Cannot be used in conjunction with PLC-link, CC-Link, EtherNet/IP™ or EtherCAT®) • Supports cyclic communication (max. 1408 bytes) • Non-cyclic (record data) communication is possible. • In conformity with Conformance Class A.	
	SNTP	Unit's date and time auto-corrects when unit is connected to SNTP server	
	USB console	• Possible to control various menus via an optional USB console (OP-87983) • Supports the assignment of operations to console buttons	
	Mouse	Possible to control various menus via an optional dedicated mouse (OP-87506)	
	Touch panel	• Settings can be operated from a CA Series touch panel using the RS-232C port (Cannot be used in conjunction with RS-232C no-protocol communication or PLC links using RS-232C) • Supports dedicated touch menus and operation buttons	
	USB HDD	• By connecting the HDD (max. 2 TB) to the dedicated USB port (supports USB 3.0, bus-powered, rated output 900 mA), image and other data can be output	
Language		Japanese/English/Simplified Chinese/Traditional Chinese/German (initial language set at first startup)	
Illumination control		By connecting the optional light expansion unit CA-DC40E/DC50E/DC60E, lighting and intensity control for the LED illumination is possible.*5	
Cooling fan		CA-F100 fan unit is included (attached) to the controller.	
Rating	Voltage	24 VDC ±10%	
	Current consumption	5.3 A	
Environmental resistance	Operating ambient temperature	0 to 45°C (when installed on a DIN rail)/0 to 40°C (when installed on a surface)	
	Operating ambient humidity	35 to 85% RH (no condensation)	
Weight		Approx. 1750 g	

*1 Because the controller does not include camera connectivity, at least 1 camera input unit (option) is required. *2 The output common can be configured for NPN or PNP input devices.
*3 Supported on the CA-E100L/E200L. *4 Models equipped with the Ethernet port in the CPU unit support Ethernet port direct connection. *5 Up to 8 light control expansion units can be connected (max. two CA-DC50E/DC60E units out of 8).

Controller (XG-X2900)

Model		XG-X2900	
Camera input*1		• With area camera input unit CA-E100 connected: 2 colour/monochrome cameras per CA-E100, up to 4 cameras via a maximum of 2 units can be connected. • With line scan camera input unit CA-E100L connected: 2 line scan cameras or two monochrome/colour cameras per CA-E100L, 4 cameras max. with 2 camera input units • With high-speed line scan camera unit CA-E200L connected: 2 high-speed line scan cameras per CA-E200L, 4 cameras max. with 2 camera input units	• With LJ-V input unit CA-E100LJ/110LJ connected: Two LJ-V Series heads of the same model per CA-E100LJ/CA-E110LJ, up to 4 cameras using a maximum of 2 units can be connected.
	Trigger input	Simultaneous/individual capture with up to 4 cameras can be selected (up to 2 cameras for simultaneous capture when one camera input unit is connected)	
Supported cameras/ Number of pixels	Area camera	• CA-035C/HS035C/H035C/035M/HS035M/H035M 0.31 megapixel mode: 640 (H) × 480 (V), approx. 0.31 megapixels 0.24 megapixel mode: 512 (H) × 480 (V), approx. 0.24 megapixels • CA-H048CX/H048MX 0.47 megapixel mode: 784 (H) × 596 (V), approx. 0.47 megapixels 0.31 megapixel mode: 640 (H) × 480 (V), approx. 0.31 megapixels 0.24 megapixel mode: 512 (H) × 480 (V), approx. 0.24 megapixels • CA-200C/HS200C/H200C/200M/HS200M/H200M 2 megapixel mode: 1600 (H) × 1200 (V), approx. 1.92 megapixels 1 megapixel mode: 1024 (H) × 960 (V), approx. 0.98 megapixels	• CA-H200CX/H200MX 2 megapixel mode: 1600 (H) × 1200 (V), approx. 1.92 megapixels • CA-H500C/H500M 5 megapixel mode: 2432 (H) × 2050 (V), approx. 4.99 megapixels • CA-H500CX/H500MX 5 megapixel mode: 2432 (H) × 2040 (V), approx. 4.96 megapixels 2 megapixel mode: 1600 (H) × 1200 (V), approx. 1.92 megapixels • CA-H2100C/H2100M 21 megapixel mode: 5104 (H) × 4092 (V), approx. 20.89 megapixels 5 megapixel mode: 2432 (H) × 2050 (V), approx. 4.99 megapixels
	Line Scan Camera	• XG-HL08M 8192 (H) × 8192 (L), approx. 67.11 megapixels • XG-HL04M 4096 (H) × 16384 (L), approx. 67.11 megapixels	• XG-HL02M 2048 (H) × 16384 (L), approx. 33.55 megapixels
	High-speed line scan camera	• CA-HL08MX 8192 (H) × 8192 (L), approx. 67.11 megapixels • CA-HL04MX 4096 (H) × 16384 (L), approx. 67.11 megapixels	• CA-HL02MX 2048 (H) × 16384 (L), approx. 33.55 megapixels
	LJ-V sensor head	• LJ-V7020/7020K/7060/7060K/7080/7200/7300 512 (H) × 16384 (L), approx. 8.39 megapixels 1024 (H) × 8192 (L), approx. 8.39 megapixels 2048 (H) × 4096 (L), approx. 8.39 megapixels	
Main image processor		DSP (Fast type)	
Program memory		Up to 1000 settings (depending on SD card capacity and setting contents) for SD card 1 and SD card 2 individually and external switching is possible	
Screen capacity		Maximum 1000 screens for each program (depending on SD card size), Image compression, Support for image registration and partial image registration from a position-corrected image, Externally switchable according to variables.	
Memory card		• SD card slot × 2 • Supports OP-87133 (512 MB), CA-SD1G (1 GB), CA-SD4G (4 GB: standard equipment on the SD1 slot), and CA-SD16G (16 GB)	
Image archive		Can store the image amounts listed below as an archive to the image memory of the main unit	
	Area camera	• Max. 29005 images (monochrome camera, 0.24 megapixels) • Max. 23241 images (monochrome camera, 0.31 megapixels) • Max. 15306 images (monochrome camera, 0.47 megapixels) • Max. 3732 images (monochrome camera, 2 megapixels) • Max. 1421 images (monochrome camera, 5 megapixels) • Max. 307 images (monochrome camera, 21 megapixels)	• Max. 28297 images (colour camera, 0.24 megapixels) • Max. 22744 images (colour camera, 0.31 megapixels) • Max. 15043 images (colour camera, 0.47 megapixels) • Max. 3675 images (colour camera, 2 megapixels) • Max. 1386 images (colour camera, 5 megapixels) • Max. 292 images (colour camera, 21 megapixels)
	Line Scan Camera	• Max. 185 images (CA-HL02MX continuous capture, 2048 × 16384 pixels) • Max. 387 images (CA-HL02MX/XG-HL02M continuous capture, 2048 × 8192 pixels) • Max. 185 images (CA-HL02MX/XG-HL02M individual capture, 2048 × 16384 pixels) • Max. 88 images (CA-HL04MX, continuous capture, 4096 × 16384 pixels)	• Max. 182 images (CA-HL04MX/XG-HL04M continuous capture, 4096 × 8192 pixels) • Max. 88 images (CA-HL04MX/XG-HL04M individual capture, 4096 × 16384 pixels) • Max. 85 images (CA-HL08MX/XG-HL08M continuous capture, 8192 × 8192 pixels) • Max. 88 images (CA-HL08MX/XG-HL08M individual capture, 8192 × 8192 pixels)
	LJ-V Series head	• Max. 390 images (2048 × 4096, continuous and sheet-fed capture) • Max. 390 images (1024 × 8192, continuous and sheet-fed capture)	• Max. 390 images (512 × 16384, continuous and sheet-fed capture)
Interface	Assignable input	• 20 connection points (including four high-speed terminals that can be assigned to trigger input) • Input rating: 26.4 V or lower, or 2 mA or greater (3 mA or greater for high-speed input terminals)	
	Assignable output	• 28 connection points (including four high-speed terminals that can be assigned to external trigger-linked FLASH output) • Photo MOSFET*2: Max.50 mA (30 V or less)	
	Encoder input	• When the CA-E100L/E200L is connected: 2 inputs per unit, 4 inputs total for 2 units max. • When the CA-E100LJ/E110LJ is connected: 1 input per unit, 2 inputs total for 2 units max. (1 input for 1 unit max. with the XG-X2800LJ) • RS-422 line-driver output (Multi-drop support*3, Supports 5 V output included: max. 150 mA) and open collector output (24 V devices only with CA-E100L/E200L) included	
	Monitor output	Analogue RGB output, XGA (1024 × 768, 24-bit colour)	
	Unit indicators	Power, ERROR LED display	
	RS-232C	• Functionality switchable between numerical data output, control input/output, and CA Series touch panel interface (Cannot be used in conjunction with PLC links using RS-232C) • Supports a maximum baud rate of 230400 bps	
	PLC link	• Numerical data output and control input/output enabled via the RS-232C port or Ethernet port (Cannot be used in conjunction with CC-Link, EtherNet/IP™ PROFINET or EtherCAT®) • The following PLCs are supported via link unit*4: KEYENCE: KV-7000 Series, KV-5000/3000 Series, KV-1000/700 Series, KV Nano Series Mitsubishi Electric: MELSEC iQ-R/L/Q Series, MELSEC A Series, (RS-232C only), MELSEC iQ-F Series, MELSEC FX Series (RS-232C only) OMRON: SYSMAC CJ2/CJ1/CS1 Series, SYSMAC C Series (RS-232C only), SYSMAC CP1 Series YASKAWA Electric Corporation: MP2000 Series/MP900 Series (RS-232C only)	
	Ethernet	• Can output numerical values and perform control input/output • Connecting to KEYENCE PC application software enables not only the above functions but also makes it possible to upload and download inspection settings, perform a variety of simulations, send and receive a variety of data including image data, and use the remote desktop function. • Supports FTP client and server functions, a VNC server function (for non-PC clients, only displaying the monitor screen is supported), and a BOOTP function • 1000BASE-T/100BASE-TX/10BASE-T	
	USB	• Connecting to KEYENCE PC application software makes it possible to output numerical values, perform control I/O, upload and download inspection settings, perform a variety of simulations, send and receive a variety of data including image data, and use the remote desktop function. • Dedicated to USB 2.0	
	CC-Link	• By connecting the optional CC-Link unit CA-NCL20E, numerical value output and control input/output are enabled (Cannot be used in conjunction with PLC-Link, EtherNet/IP™, PROFINET or EtherCAT®) • Supports ver. 1.10 and ver. 2.00 remote device stations	
	EtherCAT®	• Connecting the optional EtherCAT® unit CA-NEC20E enables numerical value output and control input/output (Cannot be used in conjunction with PLC-Link, CC-Link, EtherNet/IP™, or PROFINET.) • Process data object communication (cyclic communication) (Input: max. 536 bytes, output: max. 532 bytes) • Message communication (non-cyclic communication) • Supports CoE • Explicit Device Identification • Conforms to conformance test V2.1.0.2.	
	EtherNet/IP™	• Numerical data input/output and control input/output enabled via the Ethernet port (Cannot be used in conjunction with PLC-link, CC-Link, PROFINET or EtherCAT®) • Cyclic (implicit) communication (max. 1436 bytes) possible. Message communication possible. • Maximum connections: 32 • Conforms to conformance test Version.CT15.	
	PROFINET	• Numerical value and control input/output enabled via the Ethernet port (Cannot be used in conjunction with PLC-link, CC-Link, EtherNet/IP™ or EtherCAT®) • Supports cyclic communication (max. 1408 bytes) • Non-cyclic (record data) communication is possible. • In conformity with Conformance Class A.	
	SNTP	Unit's date and time auto-corrects when unit is connected to SNTP server	
	USB console	• Possible to control various menus via an optional USB console (OP-87983) • Supports the assignment of operations to console buttons	
	Mouse	Possible to control various menus via an optional dedicated mouse (OP-87506)	
	Touch panel	• Settings can be operated from a CA Series touch panel using the RS-232C port (Cannot be used in conjunction with RS-232C no-protocol communication or PLC links using RS-232C) • Supports dedicated touch menus and operation buttons	
	USB HDD	• By connecting the HDD (max. 2 TB) to the dedicated USB port (supports USB 3.0, bus-powered, rated output 900 mA), image and other data can be output	
Language		Japanese/English/Simplified Chinese/Traditional Chinese/German (initial language set at first startup)	
Illumination control		By connecting the optional light expansion unit CA-DC40E/DC50E/DC60E, lighting and intensity control for the LED illumination is possible.*5	
Cooling fan		CA-F100 fan unit is included (attached) to the controller.	
Rating	Voltage	24 VDC ±10%	
	Current consumption	5.3 A	
Environmental resistance	Operating ambient temperature	0 to 45°C (when installed on a DIN rail)/0 to 40°C (when installed on a surface)	
	Operating ambient humidity	35 to 85% RH (no condensation)	
Weight		Approx. 1750 g	

*1 Because the controller does not include camera connectivity, at least 1 camera input unit (option) is required. *2 The output common can be configured for NPN or PNP input devices.
*3 Supported on the CA-E100L/E200L. *4 Models equipped with the Ethernet port in the CPU unit support Ethernet port direct connection. *5 Up to 8 light control expansion units can be connected (max. two CA-DC50E/DC60E units out of 8).

Controller (XG-X1500/XG-X1200/XG-X1000)

Model		XG-X1500	XG-X1200	XG-X1000
Camera input		Two colour/monochrome cameras Up to 4 inputs can be connected by connecting 1 optional area camera input unit CA-E100.		
	Trigger input	Simultaneous/individual capture with up to 4 cameras can be selected (up to 2 cameras for simultaneous capture when the CA-E100 is not connected)		
Supported cameras/ Number of pixels		• CA-035C/HS035C/H035C/035M/HS035M/H035M 0.31 megapixel mode: 640 (H) × 480 (V), approx. 0.31 megapixels 0.24 megapixel mode: 512 (H) × 480 (V), approx. 0.24 megapixels • CA-H048CX/H048MX 0.47 megapixel mode: 784 (H) × 596 (V), approx. 0.47 megapixels 0.31 megapixel mode: 640 (H) × 480 (V), approx. 0.31 megapixels 0.24 megapixel mode: 512 (H) × 480 (V), approx. 0.24 megapixels • CA-200C/HS200C/H200C/200M/HS200M/H200M 2 megapixel mode: 1600 (H) × 1200 (V), approx. 1.92 megapixels 1 megapixel mode: 1024 (H) × 960 (V), approx. 0.98 megapixels • CA-H200CX/H200MX 2 megapixel mode: 1600 (H) × 1200 (V), approx. 1.92 megapixels • CA-H500C/H500M 5 megapixel mode: 2432 (H) × 2050 (V), approx. 4.99 megapixels • CA-H500CX/H500MX 5 megapixel mode: 2432 (H) × 2040 (V), approx. 4.96 megapixels 2 megapixel mode: 1600 (H) × 1200 (V), approx. 1.92 megapixels	• CA-035C/HS035C/H035C/035M/HS035M/H035M 0.31 megapixel mode: 640 (H) × 480 (V), approx. 0.31 megapixels 0.24 megapixel mode: 512 (H) × 480 (V), approx. 0.24 megapixels • CA-H048CX/H048MX 0.47 megapixel mode: 784 (H) × 596 (V), approx. 0.47 megapixels 0.31 megapixel mode: 640 (H) × 480 (V), approx. 0.31 megapixels 0.24 megapixel mode: 512 (H) × 480 (V), approx. 0.24 megapixels • CA-200C/HS200C/H200C/200M/HS200M/H200M 2 megapixel mode: 1600 (H) × 1200 (V), approx. 1.92 megapixels 1 megapixel mode: 1024 (H) × 960 (V), approx. 0.98 megapixels • CA-H200CX/H200MX 2 megapixel mode: 1600 (H) × 1200 (V), approx. 1.92 megapixels	• CA-035C/HS035C/H035C/035M/HS035M/H035M 0.31 megapixel mode: 640 (H) × 480 (V), approx. 0.31 megapixels 0.24 megapixel mode: 512 (H) × 480 (V), approx. 0.24 megapixels • CA-H048CX/H048MX 0.47 megapixel mode: 784 (H) × 596 (V), approx. 0.47 megapixels 0.31 megapixel mode: 640 (H) × 480 (V), approx. 0.31 megapixels 0.24 megapixel mode: 512 (H) × 480 (V), approx. 0.24 megapixels
Main image processor		DSP		
Program memory		Up to 1000 settings (depending on SD card capacity and setting contents) for SD card 1 and SD card 2 individually and external switching is possible		
Screen capacity		Maximum 1000 screens for each program (depending on SD card size), Image compression, Support for image registration and partial image registration from a position-corrected image, Externally switchable according to variables.		
Memory card		• SD card slot × 2 Supports OP-87133 (512 MB), CA-SD1G (1 GB: standard equipment on the SD1 slot), CA-SD4G (4 GB), and CA-SD16G (16 GB)	• SD card slot × 2 Supports OP-87133 (512 MB: standard equipment on the SD1 slot), CA-SD1G (1 GB), CA-SD4G (4 GB), and CA-SD16G (16 GB)	
Image archive		Can store the image amounts listed below as an archive to the image memory of the main unit		
		With area camera connected: • Max. 7341 images (monochrome camera, 0.24 megapixels) • Max. 5881 images (monochrome camera, 0.31 megapixels) • Max. 3871 images (monochrome camera, 0.47 megapixels) • Max. 939 images (monochrome camera, 2 megapixels) • Max. 344 images (monochrome camera, 5 megapixels) • Max. 7156 images (colour camera, 0.24 megapixels) • Max. 5749 images (colour camera, 0.31 megapixels) • Max. 3798 images (colour camera, 0.47 megapixels) • Max. 905 images (colour camera, 2 megapixels) • Max. 315 images (colour camera, 5 megapixels)	With area camera connected: • Max. 1924 images (monochrome camera, 0.24 megapixels) • Max. 1541 images (monochrome camera, 0.31 megapixels) • Max. 1012 images (monochrome camera, 0.47 megapixels) • Max. 241 images (monochrome camera, 2 megapixels) • Max. 1871 images (colour camera, 0.24 megapixels) • Max. 1501 images (colour camera, 0.31 megapixels) • Max. 987 images (colour camera, 0.47 megapixels) • Max. 213 images (colour camera, 2 megapixels)	With area camera connected: • Max. 1098 images (monochrome camera, 0.24 megapixels) • Max. 878 images (monochrome camera, 0.31 megapixels) • Max. 576 images (monochrome camera, 0.47 megapixels) • Max. 1065 images (colour camera, 0.24 megapixels) • Max. 852 images (colour camera, 0.31 megapixels) • Max. 558 images (colour camera, 0.47 megapixels)
Interface	Assignable input	• 20 connection points (including four high-speed terminals that can be assigned to trigger input) • Input rating: 26.4 V or lower, or 2 mA or greater (3 mA or greater for high-speed input terminals)		
	Assignable output	• 28 connection points (including four high-speed terminals that can be assigned to external trigger-linked FLASH output) • Photo MOSFET*1: Max. 50 mA (30 V or less)		
	Monitor output	Analogue RGB output, XGA (1024 × 768, 24-bit colour)		
	Unit indicators	Power, ERROR LED display		
	RS-232C	• Functionality switchable between numerical data output, control input/output, and CA Series touch panel interface (Cannot be used in conjunction with PLC links using RS-232C) • Supports a maximum baud rate of 230400 bps		
	PLC link	• Can output numerical values and perform control input/output using the Ethernet or RS-232C port (Cannot be used in conjunction with PLC-Link, EtherNet/IP™, or PROFINET.) • The following PLCs are supported via link unit*2: KEYENCE: KV-7000 Series, KV-5000/3000 Series, KV-1000/700 Series, KV Nano Series Mitsubishi Electric: MELSEC iQ-R/L/Q Series, MELSEC A Series, (RS-232C only), MELSEC iQ-F Series, MELSEC FX Series (RS-232C only) OMRON: SYSMAC CJ2/CJ1/CS1/CP1 Series, SYSMAC C Series (RS-232C only) YASKAWA Electric Corporation: MP2000 Series, MP900 Series (RS-232C only)		
	Ethernet	• Can output numerical values and perform control input/output • Connecting to KEYENCE PC application software enables not only the above functions but also makes it possible to upload and download inspection settings, perform a variety of simulations, send and receive a variety of data including image data, and use the remote desktop function. • Supports FTP client and server functions, a VNC server function (for non-PC clients, only displaying the monitor screen is supported), and a BOOTP function • 1000BASE-T/100BASE-TX/10BASE-T		
	USB	• Connecting to KEYENCE PC application software makes it possible to output numerical values, perform control I/O, upload and download inspection settings, perform a variety of simulations, send and receive a variety of data including image data, and use the remote desktop function. • Dedicated to USB 2.0		
	CC-Link	• By connecting the optional CC-Link unit CA-NCL20E, numerical value output and control input/output are enabled (Cannot be used in conjunction with EtherNet/IP™, PROFINET or EtherCAT®) • Supports ver. 1.10 and ver. 2.00 remote device stations		
	EtherNet/IP™	• Numerical data input/output and control input/output enabled via the Ethernet port (Cannot be used in conjunction with PLC-link, CC-Link, PROFINET or EtherCAT®) • Cyclic (implicit) communication (max. 1436 bytes) possible. Message communication possible. • Maximum connections: 32 • Conforms to conformance test Version.CT15.		
	PROFINET	• Numerical value input and control input/output enabled via the Ethernet port (Cannot be used in conjunction with PLC-link, CC-Link, EtherNet/IP™ or EtherCAT®) • Supports cyclic communication (max. 1408 bytes) • Non-cyclic (record data) communication is possible. • In conformity with Conformance Class A.		
	EtherCAT®	• Connecting the optional EtherCAT® unit CA-NEC20E enables numerical value output and control input/output (Cannot be used in conjunction with PLC-Link, CC-Link, EtherNet/IP™, or PROFINET.) • Process data object communication (cyclic communication) (Input: max. 536 bytes, output: max. 532 bytes) • Message communication (non-cyclic communication) • Supports CoE • Explicit Device Identification • Conforms to conformance test V2.1.0.2.		
	SNTP	Unit's date and time auto-corrects when unit is connected to SNTP server		
	USB console	• Possible to control various menus via an optional USB console (OP-87983) • Supports the assignment of operations to console buttons		
	Mouse	Possible to control various menus via an optional dedicated mouse (OP-87506)		
	Touch panel	• Settings can be operated from a CA Series touch panel using the RS-232C port (Cannot be used in conjunction with RS-232C no-protocol communication or PLC links using RS-232C) • Supports dedicated touch menus and operation buttons		
	USB HDD	By connecting the HDD (max. 2 TB) to the dedicated USB port (supports USB 3.0, bus-powered, rated output 900 mA), image and other data can be output		
Language		Japanese/English/Simplified Chinese/Traditional Chinese/German (initial language set at first startup)		
Illumination control		By connecting the optional light expansion unit CA-DC40E/DC50E, lighting and intensity control for the LED illumination is possible.*3		
Cooling fan		None		
Rating	Voltage	24 VDC ±10%		
	Current consumption	3.8 A		3.1 A
Environmental resistance	Operating ambient temperature	0 to 45°C (when installed on a DIN rail)/0 to 40°C (when installed on a surface)		
	Operating ambient humidity	35 to 85% RH (no condensation)		
Weight		Approx. 1600 g		

*1 Positive common connections supporting NPN input devices and negative common connections supporting PNP input devices are both possible.

*2 Models equipped with the Ethernet port in the CPU unit support Ethernet port direct connection.

*3 Up to 8 light control expansion units can be connected (max. two CA-DC50E units out of 8).

Specifications (Camera)

Camera (CA-H2100C/H2100M)

Model		CA-H2100C	CA-H2100M
Image receiving element		Colour CMOS, 16× high-speed reading using square-pixel	Monochrome CMOS, 16× high-speed reading using square-pixel
Unit cell size		3.5 µm × 3.5 µm	
Image size		Equivalent to 4/3"	
Valid pixel count		21 megapixel mode: 5104 (H) × 4092 (V), 5 megapixel mode: 2432 (H) × 2040 (V),	
Scanning system		Progressive 21 megapixel mode: 110 ms, 5 megapixel mode: 40.2 ms	
Pixel transfer frequency		195 MHz	
Transfer system		Digital serial transfer	
Electronic shutter		Can be set to 0.05 to 9000 msec by specifying the following numerical inputs: 1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000	
Lens mount		C-mount	
Environmental resistance	Operating ambient temperature	0 to 40°C	
	Operating ambient humidity	35 to 85%RH	
Weight		Approx. 300 g (not including lens)	

Camera (CA-H500CX/H500MX)

LumiTrax™/Multi-Spectrum

Model		CA-H500CX	CA-H500MX
Image receiving element		Colour CMOS, 16× high-speed reading using square-pixel	Monochrome CMOS, 16× high-speed reading using square-pixel
Unit cell size		3.45 µm × 3.45 µm	
Image size		Equivalent to 2/3"	
Valid pixel count		5 megapixel mode: 2432 (H) × 2040 (V), 2 megapixel mode: 1600 (H) × 1200 (V),	
Scanning system		Progressive	
		5 megapixel mode: 29.2 ms	5 megapixel mode: 27.7 ms
		2 megapixel mode: 11.7 ms	
Pixel transfer frequency		195 MHz	
Transfer system		Digital serial transfer	
Electronic shutter		Can be set to 0.017 to 100 msec by specifying the following numerical inputs: 1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000, 1/50000	
Lens mount		C-mount	
Environmental resistance	Operating ambient temperature	0 to 40°C	
	Operating ambient humidity	35 to 85%RH	
Weight		Approx. 280 g (not including lens)	

Camera (CA-H200CX/H200MX)

LumiTrax™/Multi-Spectrum

Model		CA-H200CX	CA-H200MX
Image receiving element		Colour CMOS, 16× high-speed reading using square-pixel	Monochrome CMOS, 16× high-speed reading using square-pixel
Unit cell size		3.45 µm × 3.45 µm	
Image size		Equivalent to 1/2"	
Valid pixel count		1600 (H) × 1200 (V)	
Scanning system		Progressive 11.7 ms	
Pixel transfer frequency		195 MHz	
Transfer system		Digital serial transfer	
Electronic shutter		Can be set to 0.017 to 100 msec by specifying the following numerical inputs: 1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000, 1/50000	
Lens mount		C-mount	
Environmental resistance	Operating ambient temperature	0 to 40°C	
	Operating ambient humidity	35 to 85%RH	
Weight		Approx. 280 g (not including lens)	

Camera (CA-H048CX/H048MX)

LumiTrax™/Multi-Spectrum

Model		CA-H048CX	CA-H048MX
Image receiving element		Colour CMOS, 16× high-speed reading using square-pixel	Monochrome CMOS, 16× high-speed reading using square-pixel
Unit cell size		4.8 µm × 4.8 µm	
Image size		Equivalent to 1/3"	
Valid pixel count		0.47 megapixel mode: 784 (H) × 596 (V) 0.31 megapixel mode: 640 (H) × 480 (V) 0.24 megapixel mode: 512 (H) × 480 (V)	
Scanning system		Progressive 0.47 megapixel mode: 2.9 ms 0.31 megapixel mode: 2.0 ms 0.24 megapixel mode: 1.7 ms	
Pixel transfer frequency		195 MHz	
Transfer system		Digital serial transfer	
Electronic shutter		Can be set to 0.022 to 1000 msec by specifying the following numerical inputs: 1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000	
Lens mount		C-mount	
Environmental resistance	Operating ambient temperature	0 to 40°C	
	Operating ambient humidity	35 to 85%RH	
Weight		Approx. 190 g (not including lens)	

▮ Camera (CA-H500C/CA-H500M)

Model		CA-H500C	CA-H500M
Image receiving element		Colour CMOS, 11×/16× high-speed reading using square-pixel	Monochrome CMOS, 11×/16× high-speed reading using square-pixel
Unit cell size		3.45 µm × 3.45 µm	
Image size		Equivalent to 2/3"	
Valid pixel count		4.99 megapixels, 2432 (H) × 2050 (V)	
Scanning system		Progressive At 11× transfer speed: 61.2 ms *1, At 16× transfer speed: 28.4 ms *2	
Pixel transfer frequency		At 11× transfer speed: 132 MHz (66 MHz × 2) *1, At 16× transfer speed: 198 MHz *2	
Transfer system		Digital serial transfer	
Electronic shutter		Can be set to 0.05 to 9000 msec by specifying the following numerical inputs: 1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000	
Lens mount		C-mount	
Enclosure rating		IP64*3	
Environmental resistance	Operating ambient temperature	0 to 50°C	
	Operating ambient humidity	35 to 85%RH	
Weight		Approx. 75 g (not including lens)	

*1 Transfer speed setting: Standard
*2 Transfer speed setting: Fast
*3 A KEYENCE-specified IP64-rated lens and environment-resistant cable must be used on the product.

▮ Camera (CA-H200C/CA-H200M)

Model		CA-H200C	CA-H200M
Image receiving element		Colour CMOS, 7×/11×/16× high-speed reading using square-pixel	Monochrome CMOS, 7×/11×/16× high-speed reading using square-pixel
Unit cell size		4.5 µm × 4.5 µm	
Image size		Equivalent to 1/1.8"	
Valid pixel count		2 megapixel mode: 1600 (H) × 1200 (V), 1 megapixel mode: 1024 (H) × 960 (V),	
Scanning system		Progressive At 7× transfer speed: 28.9 ms *1, At 16× transfer speed: 11.8 ms *2	
Pixel transfer frequency		At 7× transfer speed: 86 MHz (43 MHz × 2) *1, At 16× transfer speed: 198 MHz *2	
Transfer system		Digital serial transfer	
Electronic shutter		Can be set to 0.05 to 9000 msec by specifying the following numerical inputs: 1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000	
Lens mount		C-mount	
Enclosure rating		IP64*3	
Environmental resistance	Operating ambient temperature	0 to 45°C	
	Operating ambient humidity	35 to 85%RH	
Weight		Approx. 75 g (not including lens)	

*1 Transfer speed setting: Standard
*2 Transfer speed setting: Fast
*3 A KEYENCE-specified IP64-rated lens and environment-resistant cable must be used on the product.

▮ Camera (CA-200C/CA-200M)

Model		CA-200C	CA-200M
Image receiving element		Colour CMOS, High-speed reading using square-pixel	Monochrome CMOS, High-speed reading using square-pixel
Unit cell size		4.5 µm × 4.5 µm	
Image size		Equivalent to 1/1.8"	
Valid pixel count		2 megapixel mode: 1600 (H) × 1200 (V), 1 megapixel mode: 1024 (H) × 960 (V)	
Scanning system		Progressive 56.5 ms	
Pixel transfer frequency		43 MHz	
Transfer system		Digital serial transfer	
Electronic shutter		Can be set to 0.05 to 9000 msec by specifying the following numerical inputs: 1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000	
Lens mount		C-mount	
Enclosure rating		IP64*1	
Environmental resistance	Operating ambient temperature	0 to 45°C	
	Operating ambient humidity	35 to 85%RH	
Weight		Approx. 75 g (not including lens)	

*1 A KEYENCE-specified IP64-rated lens and environment-resistant cable must be used on the product.

▮ Camera (CA-HS200C/CA-HS200M)

Model		CA-HS200C	CA-HS200M
Image receiving element		Colour CMOS, 7×/16× high-speed reading using square-pixel	Monochrome CMOS, 7×/16× high-speed reading using square-pixel
Unit cell size		3.45 µm × 3.45 µm	
Image size		Equivalent to 1/2"	
Valid pixel count		2 megapixel mode: 1600 (H) × 1200 (V), 1 megapixel mode: 1024 (H) × 960 (V)	
Scanning system		Progressive At 7× transfer speed: 28.4 ms *1, At 16× transfer speed: 14.2 ms *2	
Pixel transfer frequency		At 7× transfer speed: 86 MHz (43 MHz × 2) *1, At 16× transfer speed: 198 MHz *2	
Transfer system		Digital serial transfer	
Electronic shutter		Can be set to 0.05 to 9000 msec by specifying the following numerical inputs: 1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000	
Lens mount		Special mount (M15.5 P0.5 male)	
Environmental resistance	Operating ambient temperature	0 to 45°C	
	Operating ambient humidity	35 to 85%RH	
Weight		Approx. 45 g (not including lens)	

*1 Transfer speed setting: Standard
*2 Transfer speed setting: Fast

▮ Camera (CA-H035C/CA-H035M)

Model		CA-H035C	CA-H035M
Image receiving element		Colour CMOS, 7×/16× high-speed reading using square-pixel	Monochrome CMOS, 7×/16× high-speed reading using square-pixel
Unit cell size		6.9 µm × 6.9 µm	
Image size		Equivalent to 1/3"	
Valid pixel count		0.31 megapixel mode: 640 (H) × 480 (V), 0.24 megapixel mode: 512 (H) × 480 (V)	
Scanning system		Progressive At 7× transfer speed: 4.8 ms *1, At 16× transfer speed: 2.9 ms *2	
Pixel transfer frequency		At 7× transfer speed: 86 MHz (43 MHz × 2) *1, At 16× transfer speed: 198 MHz *2	
Transfer system		Digital serial transfer	
Electronic shutter		Can be set to 0.05 to 9000 msec by specifying the following numerical inputs: 1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000	
Lens mount		C-mount	
Enclosure rating		IP64*3	
Environmental resistance	Operating ambient temperature	0 to 50°C	
	Operating ambient humidity	35 to 85%RH	
Weight		Approx. 75 g (not including lens)	

*1 Transfer speed setting: Standard
*2 Transfer speed setting: Fast
*3 A KEYENCE-specified IP64-rated lens and environment-resistant cable must be used on the product.

▮ Camera (CA-035C/CA-035M)

Model		CA-035C	CA-035M
Image receiving element		Colour CMOS, High-speed reading using square-pixel	Monochrome CMOS, High-speed reading using square-pixel
Unit cell size		6.9 µm × 6.9 µm	
Image size		Equivalent to 1/3"	
Valid pixel count		0.31 megapixel mode: 640 (H) × 480 (V), 0.24 megapixel mode: 512 (H) × 480 (V)	
Scanning system		Progressive 16.5 ms	
Pixel transfer frequency		25 MHz	
Transfer system		Digital serial transfer	
Electronic shutter		Can be set to 0.05 to 9000 msec by specifying the following numerical inputs: 1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000	
Lens mount		C-mount	
Enclosure rating		IP64*1	
Environmental resistance	Operating ambient temperature	0 to 50°C	
	Operating ambient humidity	35 to 85%RH	
Weight		Approx. 75 g (not including lens)	

*1 A KEYENCE-specified IP64-rated lens and environment-resistant cable must be used on the product.

▮ Camera (CA-HS035C/CA-HS035M)

Model	Camera unit	CA-HS035CH	CA-HS035MH
	Relay unit	CA-HS035CU	CA-HS035MU
Image receiving element		Colour CMOS, 7× high-speed reading using square-pixel	Monochrome CMOS, 7× high-speed reading using square-pixel
Unit cell size		7.4 µm × 7.4 µm	
Image size		Equivalent to 1/3"	
Valid pixel count		0.31 megapixel mode: 640 (H) × 480 (V), 0.24 megapixel mode: 512 (H) × 480 (V)	
Scanning system		Progressive 4.5 ms	
Pixel transfer frequency		86 MHz (43 MHz × 2)	
Transfer system		Digital serial transfer	
Electronic shutter		Can be set to 0.05 to 100 msec by specifying the following numerical inputs: 1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000	
Lens mount		Special mount (M10.5 P0.5 male)	
Environmental resistance	Operating ambient temperature	0 to 40°C	
	Operating ambient humidity	35 to 85%RH	
Weight	Camera unit	Approx. 135 g (cable included, lens not included)	
	Relay unit	Approx. 75 g (not including lens)	

▮ Line scan camera (XG-HL02M/HL04M/HL08M)

Model		XG-HL02M	XG-HL04M	XG-HL08M
Image receiving element		14.3 mm monochrome CMOS image receiving element, 8× high-speed reading using square-pixel (output × 2), 2048 pixels Unit cell size 7 µm × 7 µm	14.3 mm monochrome CMOS image receiving element, 16× high-speed reading using square-pixel (output × 4), 4096 pixels Unit cell size 3.5 µm × 3.5 µm	28.7 mm monochrome CMOS image receiving element, 16× high-speed reading using square-pixel (output × 8), 8192 pixels Unit cell size 3.5 µm × 3.5 µm
Valid pixel count	Processing area (individual) Processing area (continuous)	2048 pixels 2048 (H) × 16384 (L) 2048 (H) × 8192 (V)	4096 pixels 4096 (H) × 16384 (L) 4096 (H) × 8192 (V)	8192 pixels 8192 (H) × 8192 (L) 8192 (H) × 8192 (L)
Minimum scan time		24 µs (41.7 kHz)	24 µs (41.7 kHz)	45 µs (22.2 kHz)
Pixel transfer frequency		100 MHz (50 MHz × 2 ch), 8×	200 MHz (50 MHz × 4 ch), 16×	200 MHz (25 MHz × 8 ch), 16×
Transfer system		Digital serial transfer		
Electronic shutter		User-defined setting (2 µs to 20000 µs)*1		
Function		Shading correction function to correct for uneven lighting (setting saved in the camera)		
Lens mount		C-mount	C-mount	Special mount (M40 P0.75)
Environmental resistance	Ambient temperature	0 to +40°C		
	Ambient humidity	35 to 85% RH (No condensation)		
Weight		Approx. 340 g (not including lens)	Approx. 350 g (not including lens)	Approx. 310 g (not including lens)

*1 The maximum shutter time is limited to 3 µs less than the line trigger cycle setting.

▮ High-speed transmission line scan camera (CA-HL02MX/HL04MX/HL08MX)

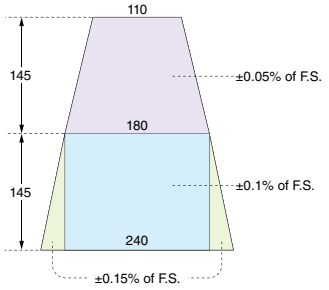
Model		CA-HL02MX		CA-HL04MX			CA-HL08MX	
Image receiving element		15.4 mm monochrome CMOS image receiving element, 30× high-speed reading using square-pixel		15.4 mm monochrome CMOS image receiving element, 32× high-speed reading using square-pixel			30.8 mm monochrome CMOS image receiving element, 64× high-speed reading using square-pixel	
Unit cell size		15 µm × 7.5 µm*1	7.5 µm × 7.5 µm	15 µm × 7.5 µm*1	7.5 µm × 7.5 µm	3.75 µm × 3.75 µm	7.5 µm × 7.5 µm	3.75 µm × 3.75 µm
Valid pixel count	Processing area (individual) Processing area (continuous)	1024 pixels 1024 (H) × 16384 (L) 1024 (H) × 8192 (V)	2048 pixels 2048 (H) × 16384 (L) 2048 (H) × 8192 (V)	1024 pixels 1024 (H) × 16384 (L) 1024 (H) × 8192 (V)	2048 pixels 2048 (H) × 16384 (L) 2048 (H) × 8192 (V)	4096 pixels 4096 (H) × 16384 (L) 4096 (H) × 8192 (V)	4096 pixels 4096 (H) × 16384 (L) 4096 (H) × 8192 (V)	8192 pixels 8192 (H) × 8192 (L) 8192 (H) × 8192 (V)
Minimum scan time		6.1 µs (165 kHz)*2		6.1 µs (165 kHz)*2		10.2 µs (97.7 kHz)*2	6.1 µs (165 kHz)*2	10.2 µs (97.7 kHz)*2
Pixel transfer frequency		188 MHz, 15×	375 MHz, 30×	188 MHz, 15×	375 MHz, 30×	400 MHz, 32×	750 MHz, 60×	800 MHz, 64×
Transfer system		Digital serial transfer						
Electronic shutter		User-defined settings (2 µs to 20000 µs, max. shutter speed limited to 4 µsec less than line scan interval during operation)						
Function		Shading correction (setting saved in camera)						
		Installation auxiliary function (LED pointer / Mounting angle monitor)						
		Binning function						
Lens mount		C-mount		C-mount			Special mount (M40 P0.75)	
Environmental resistance	Ambient temperature	0 to 40°C						
	Ambient humidity	35 to 85% RH (No condensation)						
Weight		Approx. 350 g (not including lens)		Approx. 350 g (not including lens)			Approx. 310 g (not including lens)	

*1 When using the binning function to use information from multiple image receiving elements for individual pixel data.
*2 When the line scan interval is configured for use with an encoder. When time-specified, the scan time may be lengthened by up to 1 µsec.

LJ-V sensor head unit

Model			LJ-V7020K*1	LJ-V7020*1	LJ-V7060K	LJ-V7060	LJ-V7080	LJ-V7200	LJ-V7300
Mounting conditions			Specular reflection	Diffuse reflection	Specular reflection	Diffuse reflection			
Reference distance			24.2 mm	20 mm	54.6 mm	60 mm	80 mm	200 mm	300 mm
Measurement range	Z-axis (height)		±2.3 mm (F.S.=4.6 mm)	±2.6 mm (F.S.=5.2 mm)	±7.6 mm (F.S.=15.2 mm)	±8 mm (F.S.=16 mm)	±23 mm (F.S.=46 mm)	±48 mm (F.S.=96 mm)	±145 mm (F.S.=290 mm)
	X-axis (width)	NEAR side	6.5 mm	6.5 mm	8 mm	13.5 mm	25 mm	51 mm	110 mm
		Reference distance	7 mm	7 mm	14 mm	15 mm	32 mm	62 mm	180 mm
		Far side	7.5 mm	7.5 mm	8 mm	15 mm	39 mm	73 mm	240 mm
Light source			Blue semiconductor laser						
	Wavelength		405 nm (visible beam)						
	Laser class (IEC60825-1 FDA(CDRH) Part 1040.10*2)		Class 2M Laser Product*3		Class 2 Laser Product	Class 2M Laser Product*3	Class 2 Laser Product		
	Output		10 mW		4.8 mW	10 mW	4.8 mW		
Spot size (reference distance)			Approx. 14 mm × 35 µm		Approx. 21 mm × 45 µm		Approx. 48 mm × 48 µm	Approx. 90 mm × 85 µm	Approx. 240 mm × 610 µm
Repeatability*4	Z-axis (height)*5		0.2 µm		0.4 µm		0.5 µm	1 µm	5 µm
	X-axis (width)*6		2.5 µm		5 µm		10 µm	20 µm	60 µm
Linearity	Z-axis (height)*7		±0.1% of F.S.						±0.05 to ±0.15% of F.S.*8
Profile Data interval	X-axis (width)		10 µm		20 µm		50 µm	100 µm	300 µm
Sampling cycle (trigger interval)*9			Top speed: 16 µs						
Temperature characteristics			0.01% of F.S./°C						
Environmental resistance	Enclosure rating*10		IP67 (IEC60529)						
	Ambient operating illuminance*11		Incandescent lamp: 10000 lux max.						
	Ambient temperature*12		0 to +45°C						
	Ambient humidity		20 to 85% RH (No condensation)						
	Vibration resistance		10 to 57 Hz, 1.5 mm double amplitude in X, Y, and Z directions, 3 hours respectively						
	Impact resistance		15 G/6 msec						
Material			Aluminium						
Weight			Approx. 410 g		Approx. 450 g		Approx. 400 g	Approx. 550 g	Approx. 1000 g

*1 The double polarisation function cannot be used.
*2 The laser classification for FDA(CDRH) is implemented based on IEC60825-1 in accordance with the requirements of Laser Notice No. 50.
*3 Do not look into the beam directly using any optical instruments (such as eye loupes, magnifiers, microscopes, telescopes, or binoculars). Viewing the laser output with an optical instrument may pose an eye hazard.
*4 This value is from a case in which measurement has been performed with a reference distance with 4096 times of averaging.
*5 The measurement targets are KEYENCE standard targets. This value is from a case in which the average height of the default setting area has been measured in height mode. All other settings are default.
*6 The measurement target is a pin gauge. This value is from a case in which the position of the intersection between the rounded surface of the pin gauge and the edge level has been measured in position mode. All other settings are default.
*7 The measurement targets are KEYENCE standard targets. The profile data is from a case in which measurement has been performed with 64 times of smoothing and 8 times of averaging. All other settings are default.
*8 The linearity will differ depending on the measurement area. (See the diagram on the right.)
*9 For high-speed mode, when the measurement area is at its minimum, binning is ON, image capture mode is set to standard, and parallel image capture is ON. All other settings are default. For advanced function mode, when the measurement area is at its minimum, binning is ON and image capture mode is set to standard. All other settings are default.
10 This value is from a case in which the sensor head cable (CB-B) or extension cable (CB-B*E) has been connected.
*11 This is the illuminance for the light-receiving surface of the sensor head during white paper measurement when light has been shined onto the white paper.
*12 The sensor head must be mounted on a metal plate for use.



LJ-V input unit (CA-E100LJ/E110LJ)

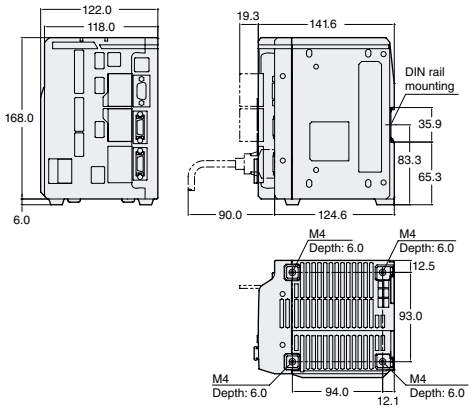
Model		CA-E100LJ/E110LJ*1
LJ-V Series head input		2 points*2
Supported heads		LJ-V7020 / LJ-V7020K / LJ-V7060 / LJ-V7060K / LJ-V7080 / LJ-V7200 / LJ-V7300
Encoder input		Single line: RS-422 line-driver output (multi-drop support, 5 V output included: max. 150 mA) and open collector output (5 V / 12 V / 24 V support) included
Response frequency (RS-422)		Single phase/Z-phase: 1.6 MHz, 2-phase/1-multiplication: 1.6 MHz, 2-phase/2-multiplication: 3.2 MHz, 2-phase/4-multiplication: 6.4 MHz
Open collector (OC)		Single phase/Z-phase: 100 kHz, 2-phase/1-multiplication: 100 kHz, 2-phase/2-multiplication: 200 kHz, 2-phase/4-multiplication: 400 kHz
Laser remote interlock input		Non-voltage input (short-circuit by factory-set short pin)
Power supply		Supplied from controller
Environmental resistance	Ambient temperature	0 to 45°C (DIN-rail mounting) / 0 to 40°C (bottom-mounting)
	Ambient humidity	35 to 85% RH (No condensation)
Weight		Approx. 760 g

*1 CA-E110LJ is an input unit compatible with heads capable of outputting brightness. Contact your sales representative for details.
*2 Only identical-model heads are supported when connecting two devices.

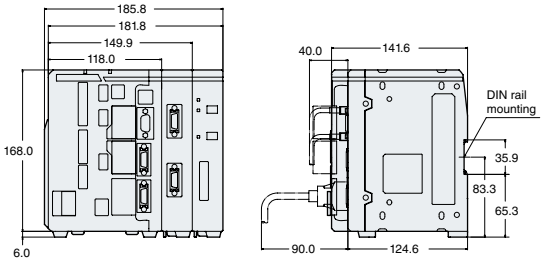
Controller

Unit: mm

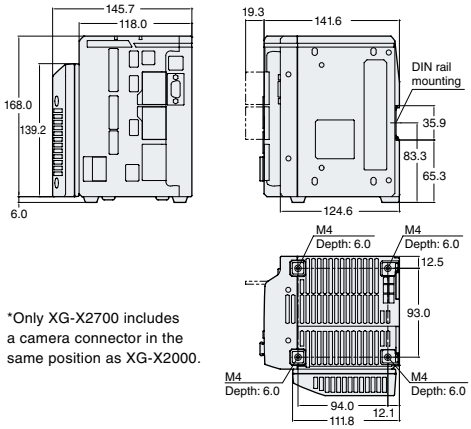
▮Controller **XG-X2000/X2200/X2500/X1000/X1200/X1500**



▮When mounting area camera input unit **CA-E100**/ Light control expansion module **CA-DC40E**

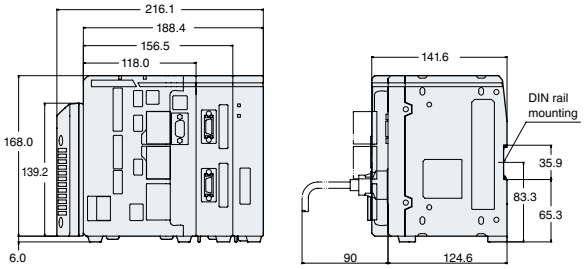


▮Controller **XG-X2700*/X2800/X2800LJ/X2900**



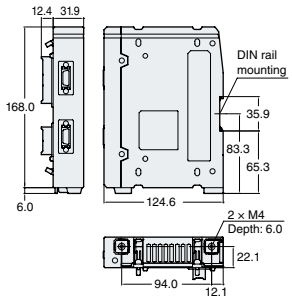
*Only XG-X2700 includes a camera connector in the same position as XG-X2000.

▮When mounting line scan camera input unit **CA-E100L***/CC-Link unit **CA-NCL20E/CA-NEC20E**

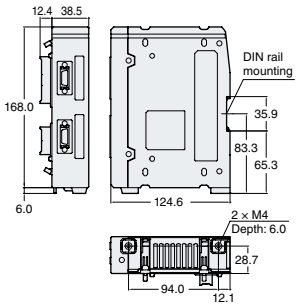


*CA-E100L can only be connected to XG-X2800.

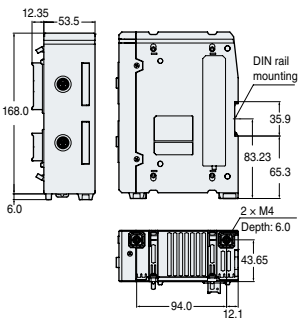
▮Area camera input unit **CA-E100**



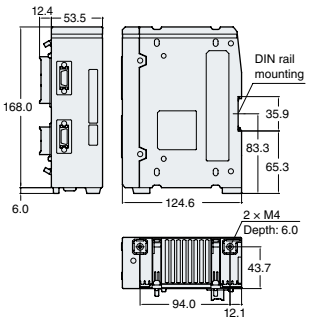
▮Line scan camera input unit **CA-E100L**



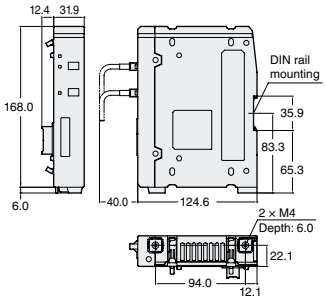
▮Line scan camera input unit **CA-E200L**



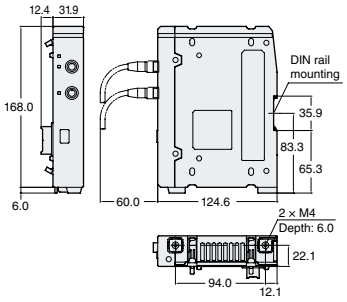
▮LJ-V input unit **CA-E100LJ/CA-E110LJ**



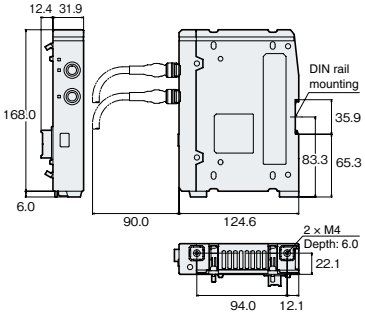
▮Light control expansion module **CA-DC40E**



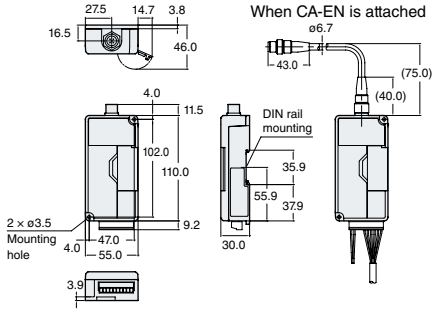
▮Light control expansion module **CA-DC50E**



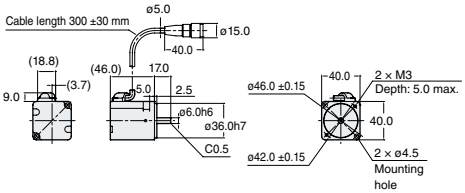
▮Light control expansion module **CA-DC60E**



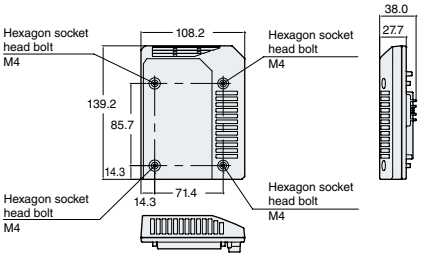
▮Encoder relay unit **CA-EN100U**



▮Dedicated encoder **CA-EN100H**

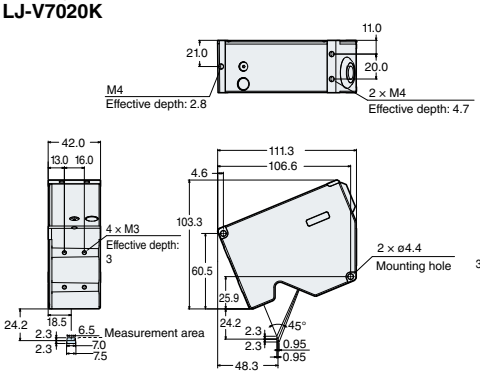


▮Fan unit **CA-F100**

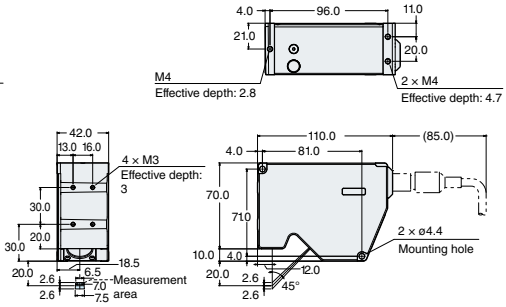


LJ-V head

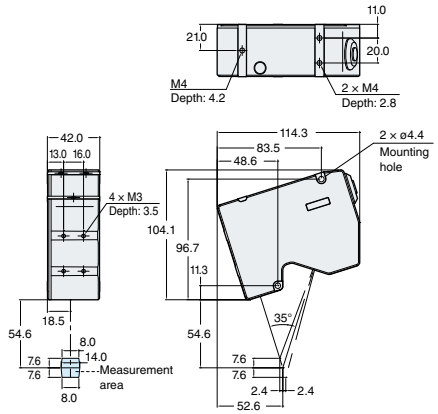
▮Ultra high-accuracy specular reflection model **LJ-V7020K**



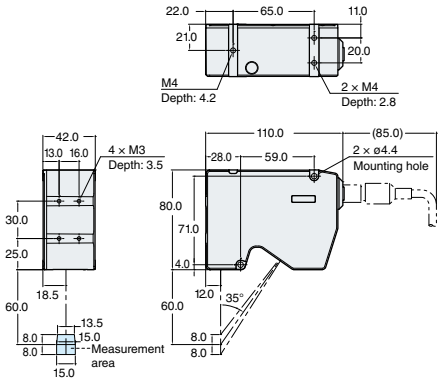
▮Ultra high-accuracy model **LJ-V7020**



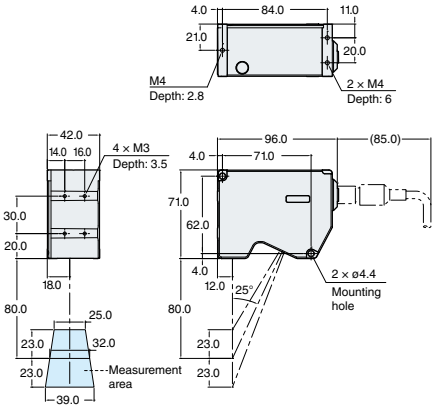
▮High-accuracy specular reflection model **LJ-V7060K**



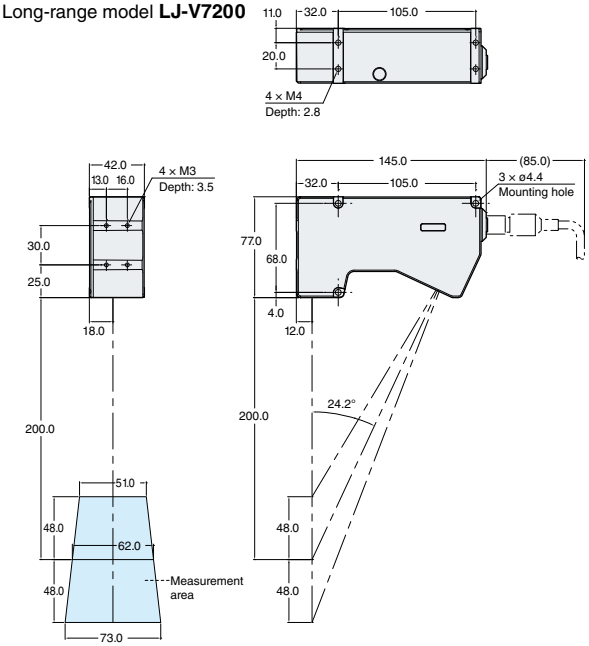
▮High-accuracy model **LJ-V7060**



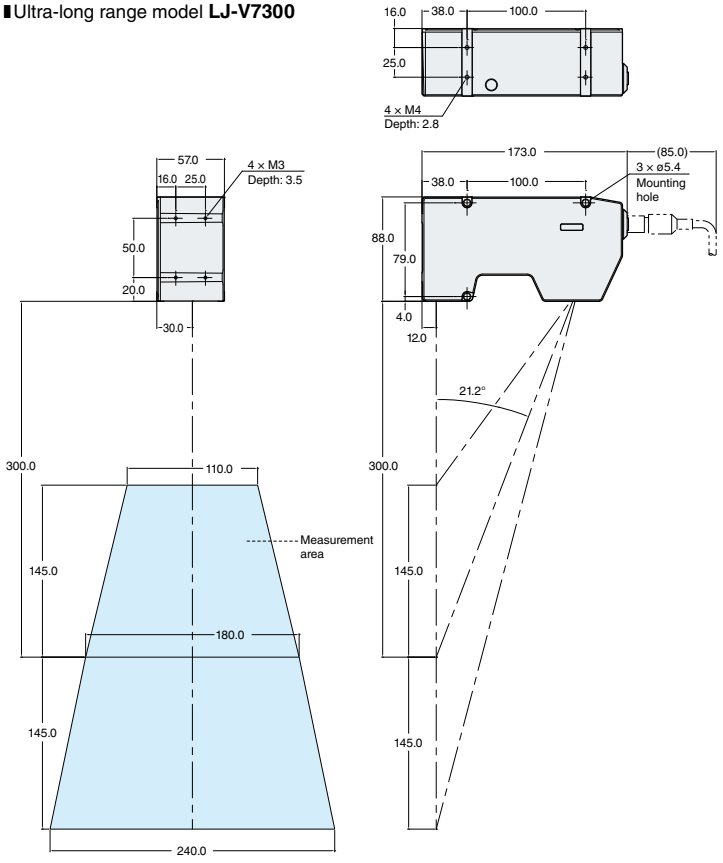
▮Middle-range model **LJ-V7080**



▮Long-range model **LJ-V7200**



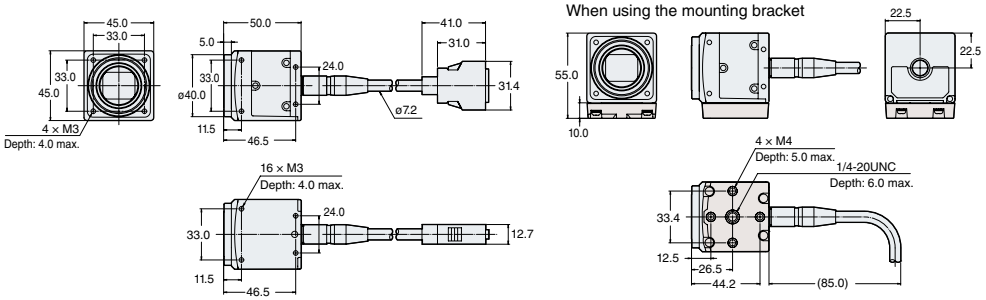
▮Ultra-long range model **LJ-V7300**



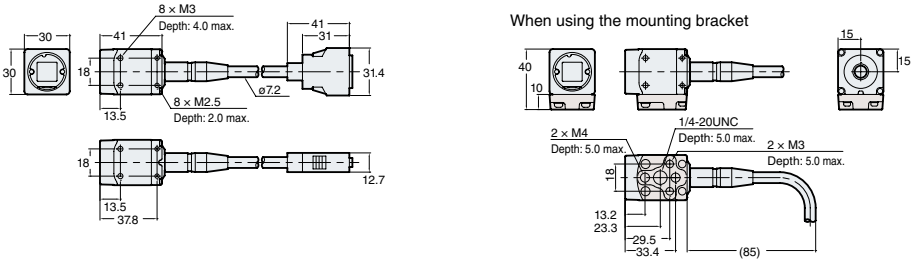
CONTACT YOUR NEAREST OFFICE FOR RELEASE STATUS

Unit: mm

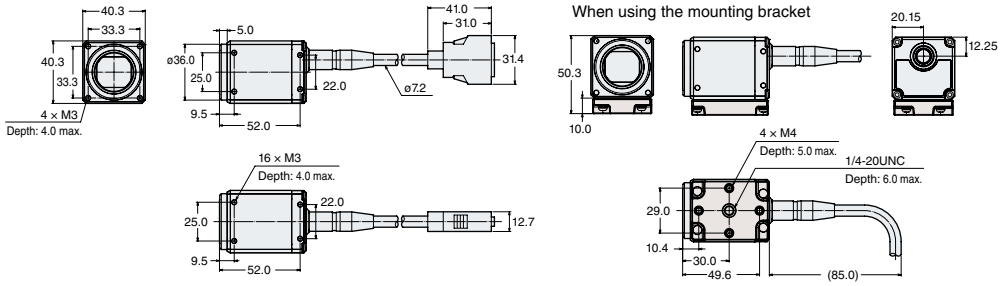
Camera **CA-H2100C/CA-H2100M**



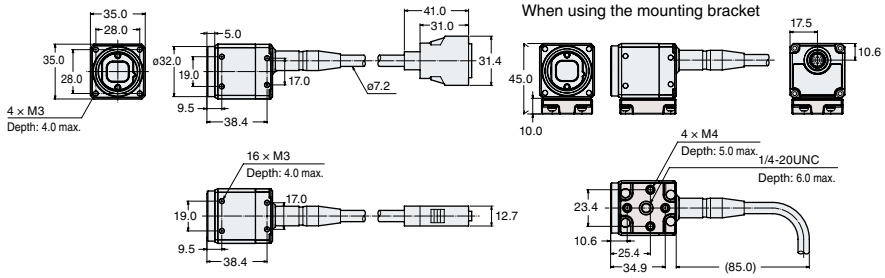
Camera **CA-H500C/CA-H500M/CA-H200C/CA-H200M/CA-200C/CA-200M/CA-H035C/CA-H035M/CA-035C/CA-035M**



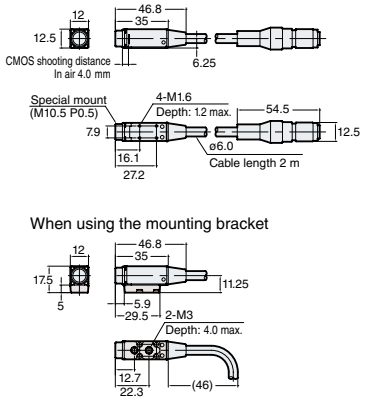
Camera **CA-H500CX/CA-H500MX/CA-H200CX/CA-H200MX**



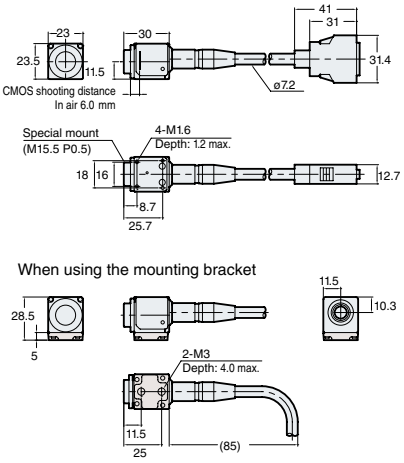
Camera **CA-H048CX/CA-H048MX**



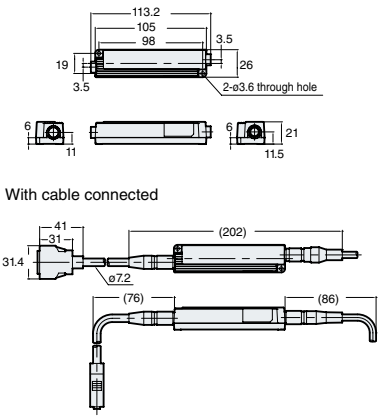
Camera **CA-HS035C/CA-HS035M**



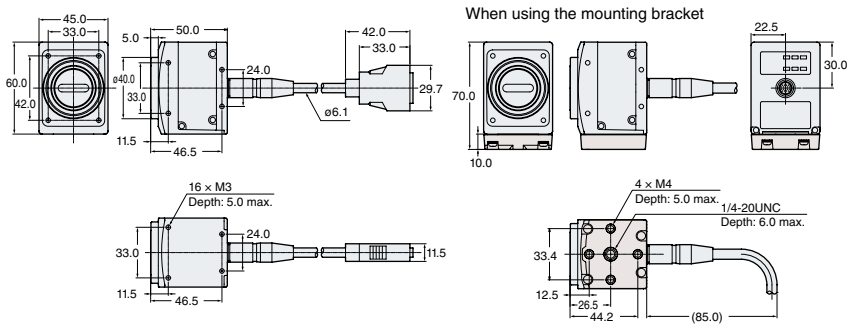
Camera **CA-HS200CH/CA-HS200MH**



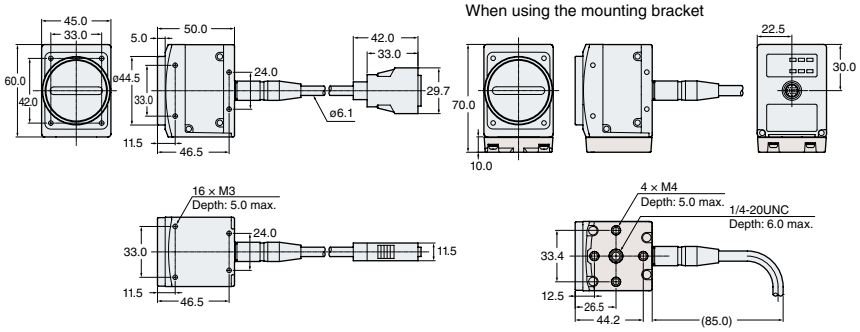
Camera control unit **CA-HS035CU/CA-HS035MU**



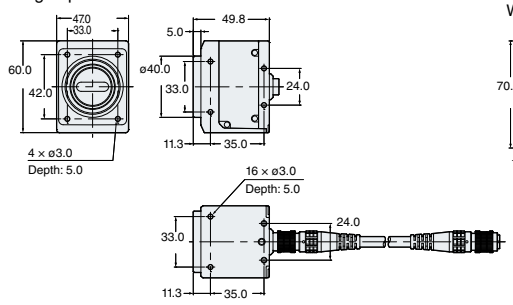
▮Camera **XG-HL02M/XG-HL04M**



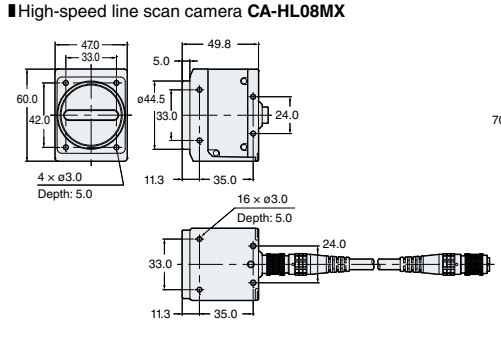
▮Camera **XG-HL08M**



▮High-speed line scan camera **CA-HL02MX/HL04MX**



▮High-speed line scan camera **CA-HL08MX**

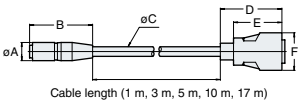


▮Camera cable

CA-CH3 (3 m)/**CA-CH5** (5 m)/**CA-CH10** (10 m)

▮High-flex camera cable

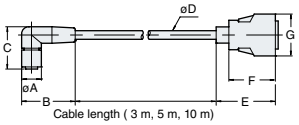
CA-CH3R (3 m)/
CA-CH5R (5 m)/
CA-CH10R (10 m)/
CA-CH17R (17 m)



	A	B	C	D	E	F
CA-CHx	12.5	43.0	7.2	41.0	31.0	31.4
CA-CHxR	14.0	54.0	7.6	41.0	31.0	31.4

▮L-shaped connector camera cable

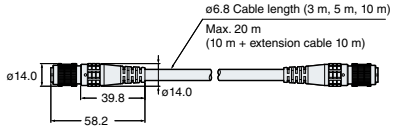
CA-CH3L (3 m)/**CA-CH5L** (5 m)/**CA-CH10L** (10 m)



	A	B	C	D	E	F	G
CA-CHxL	14.0	38.0	30.0	7.2	41.0	31.0	31.4

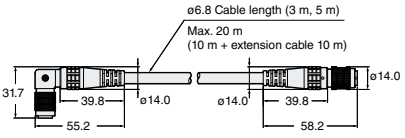
▮High-speed line scan camera cable

CA-CF3(3 m)/**CA-CF5**(5 m)/**CA-CF10**(10 m)



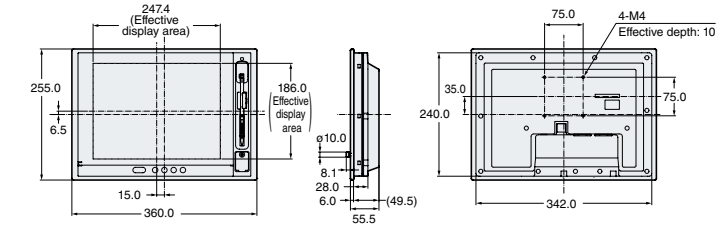
▮L-shaped connector cable for high-speed line scan cameras

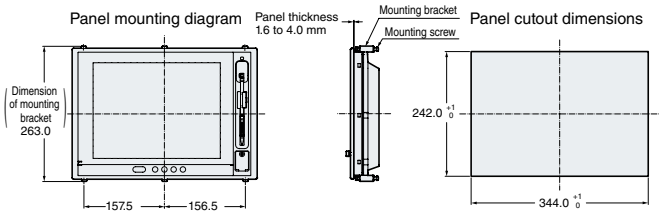
CA-CF3L(3 m)/**CA-CF5L**(5 m)/**CA-CF10L**(10 m)



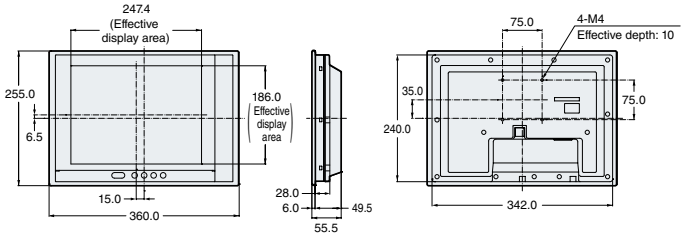
Unit: mm

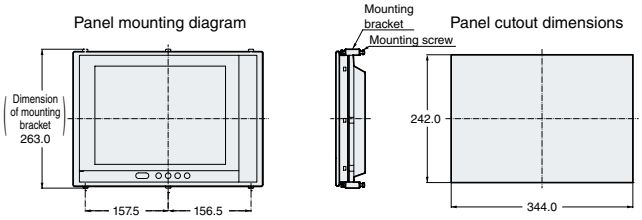
▮Touch panel HMI **CA-MP120T**



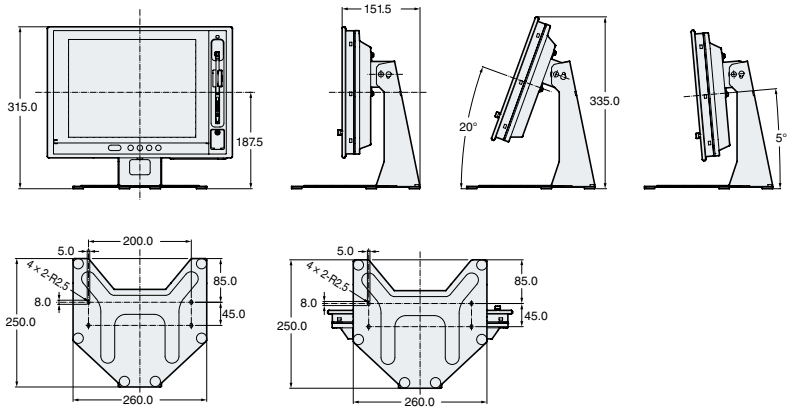


▮LCD monitor **CA-MP120**

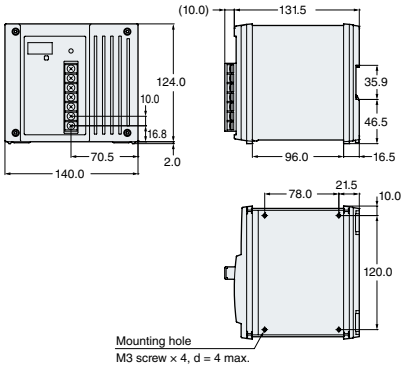




▮Monitor stand **OP-87262**



▮Dedicated 24 VDC power supply **CA-U5**



Refer to the Vision System Peripheral Equipment catalogue for dimension diagrams for lenses and close-up rings.

www.keyence.com/machinevision

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

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