

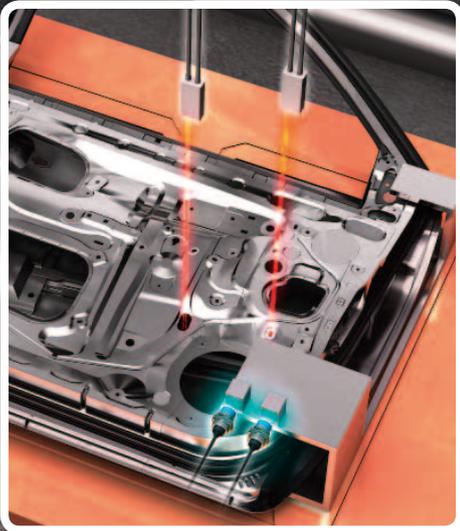


1 Minute **SETUP**

AUTO FOCUS

VISION SENSOR

Intelligent sensor
I-SERIES



Example of Conventional Presence Detection

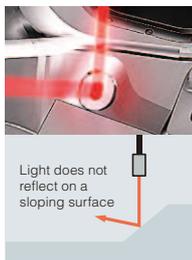
Easy, stable detection with a single vision sensor unit



BENEFITS OF USING A VISION SENSOR FOR PRESENCE DETECTION

Can be used with difficult to detect workpieces.

The vision sensor enables detection in environments such as sloping surfaces where light does not reflect well, which were previously unstable with a photoelectric sensor.



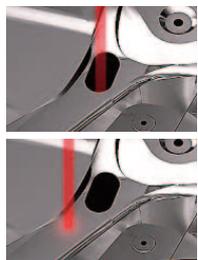
A single unit can be used for multiple parts presence inspections.

Up to 16 tools can be utilised for each captured image.



Sensor can also detect regardless of part position variations

With the position adjustment function, detection is performed simply by placing the detection object within the imaging area.



Detection is not possible when the position is misaligned.

Vision Sensor

FOR PRESENCE DETECTION

New ideas for handling difficult detection

Conventionally difficult cases that require multiple sensors can now be handled easily and at low cost with one “IV Series vision sensor”. Our unbeatable vision and presence sensor experience enables KEYENCE to introduce a new style of presence detection.

EASY-TO-USE

1 Minute **SETUP**

Startup is completed in around 1 minute thanks to “Easy Navigation”.

STABLE DETECTION

OUTSTANDING IMAGING CAPABILITY

Clear images are realised with the high-intensity illumination and high-performance lenses, equipped as standard.

AFFORDABLY PRICED

REDUCE INTRODUCTION COSTS

Choose from 8 different sensor heads to suit your needs and reduce costs.



Intelligent sensor
I-SERIES

Simply easy

1 Minute SETUP

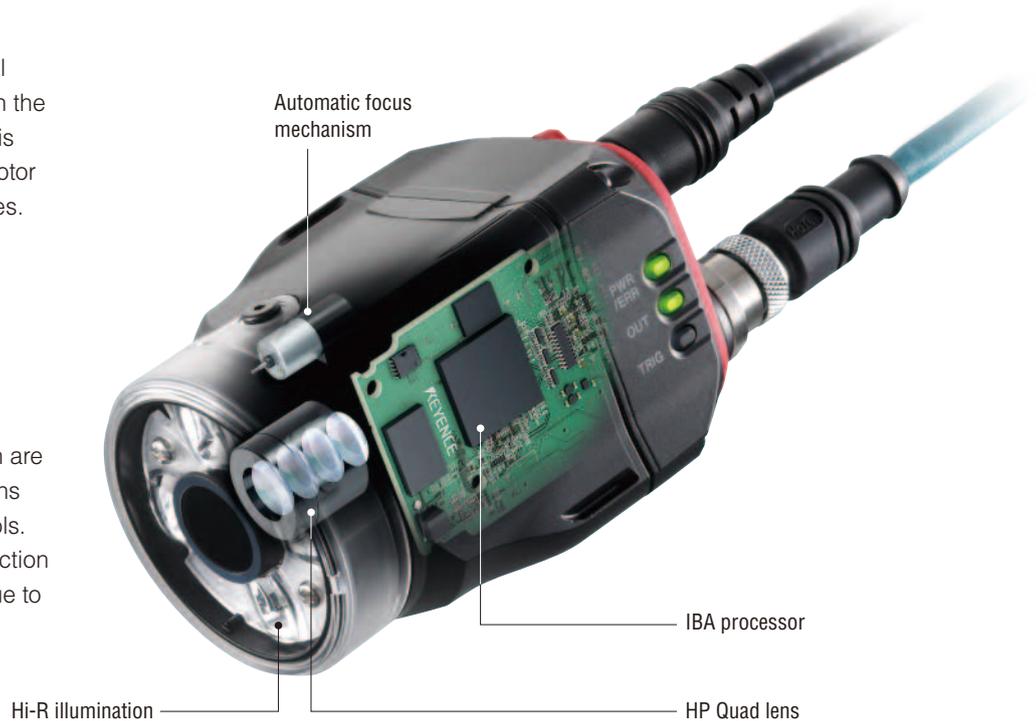
AUTO FOCUS & BRIGHTNESS

I Automatic focus

Focusing, which used to be a manual process, is now done automatically in the IV Series. One-touch quick focusing is done by a unique automatic focus motor developed exclusively for the IV Series.

Automated, one-touch brightness adjustment

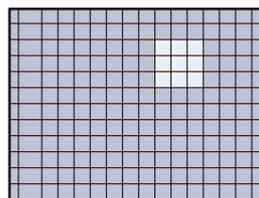
Gain, exposure time, and illumination are adjusted automatically, and operations are completed with one-touch controls. As anyone can now shoot clear detection images, there are fewer variations due to differing imaging skills.



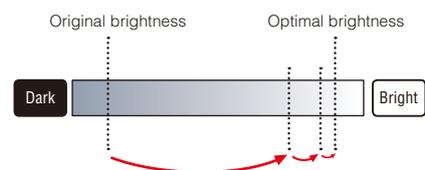
AUTOMATIC BRIGHTNESS ADJUSTMENT

IBA - INTELLIGENT BRIGHTNESS ADJUST -

With the newly developed algorithm installed in the IBA processor, the brightness is automatically adjusted to the optimum level in an instant. Additionally, our unique methods enable high-speed automatic adjustment without any adverse effects from the background.



By dividing the screen into multiple pixel blocks, presence/absence of the workpiece is recognised where the brightness has changed.

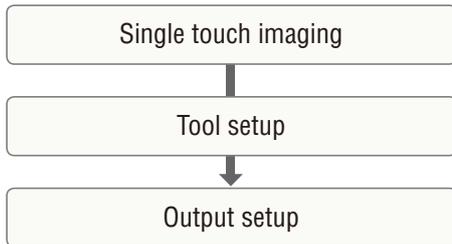


Instead of gradually moving towards the optimum brightness, adjustments can be made faster by making one large adjustment close to the optimum brightness and then performing fine adjustments.

SIMPLE ONE-TOUCH SETUP

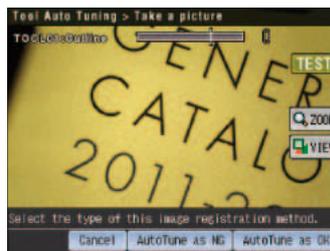
Easy navigation

Simply follow the setup flow from “single touch imaging” to output setup. The intuitive touch screen operation allows startup to be completed in about one minute, without the need for referring to manuals.



TOOL AUTO TUNE

Multiple master and defective object images can be taken with Pass/Fail judgment attached to enable automatic adjustment of thresholds and parameters to optimum values. Images can be shot immediately, read from the image history or read from USB memory.



Pass/Fail allocation screen



Selection screen of image registration source

Stable Detection

Newly developed pattern tool for stable detection

Shape Detection



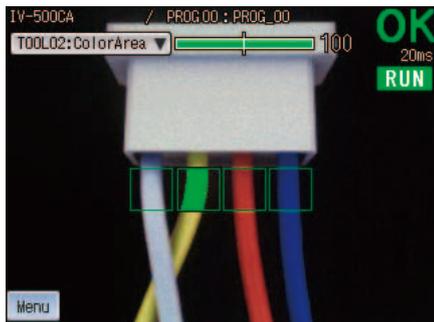
PASS
Model type detection by internal diameter difference of metal part



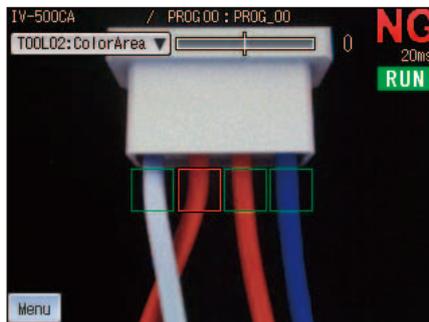
FAIL

The match percentage of the object is calculated based on the registered master shape information. Brightness differences or differences in individual surface conditions, which were previously difficult to handle with normalised correlation methods (pattern matching) can be identified.

Area



PASS
Detection by cable colour difference

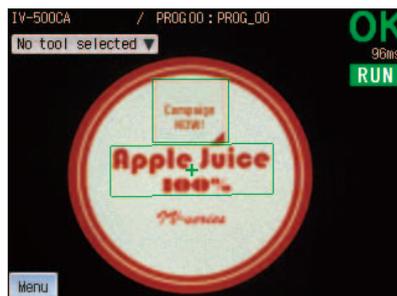


FAIL

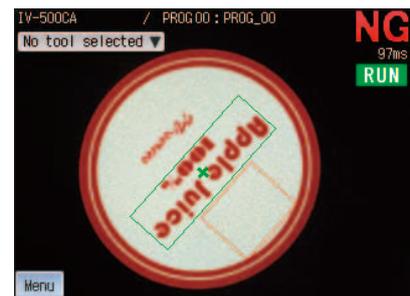
Using the registered master area (number of pixels) as reference, the difference in area from the inspection object is calculated. When the sensor is a colour type, judgment can be made based on the desired area of the specified colour. In the case of the monochrome type, brightness is judged by the area binarised in black and white.

POSITION ADJUSTMENT

If the object is misaligned, 100% inspection cannot be achieved because the object may be outside the inspection area. The position adjustment function calculates the amount of misalignment from the master image in order to correct the position, and enable correct judgment. In addition, 180° high-speed tracking is supported for rotation tracking. This means you don't need to worry about misalignment of the workpieces.



PASS
Detection of sticker presence/absence by using position adjustment



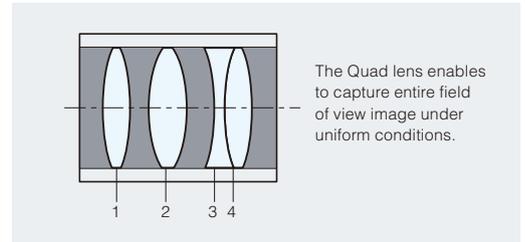
FAIL

Technology for stable detection

HP-Quad* lens

The newly developed lens contains 4 layers of glass that achieve low aberration with high light-gathering power, enabling bright, clear images with low distortion for stable detection.

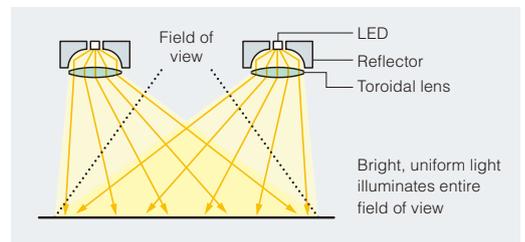
*High Precision-Quad



Hi-R* illumination

Our pursuit of an even more efficient reflector shape with less LED light intensity loss has enabled the realisation of outstanding brightness and uniformity.

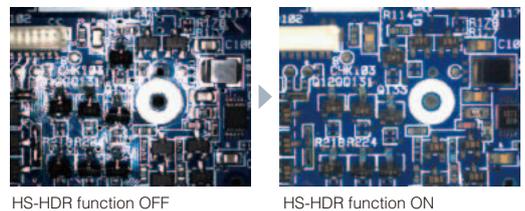
*High Reflection



HS-HDR* FUNCTION

Detection is stabilised by widening the light-receiving sensitivity range when dispersion occurs in the reflection. High speeds are realised by adjusting within a single image capturing.

*High Speed HDR



POLARISED FILTER

Glare from glossy work is reduced because only one direction of the light wave components is transmitted. The compact size enables easy installation.



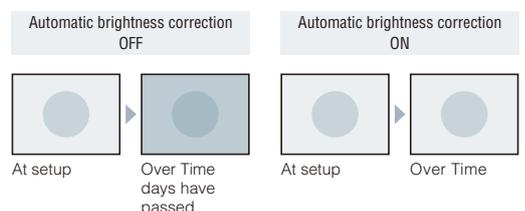
DOME LIGHT [USING IV-D10]

Effective in reducing glare. Generating indirect light from various directions ensures the object is uniformly illuminated. This method is generally more effective than a polarisation filter at reducing glare.



AUTOMATIC BRIGHTNESS CORRECTION

When the illumination has deteriorated over time, image brightness is corrected automatically so that it does not become darker. When a brightness standard is set with a master image at installation, screen brightness can be maintained.



Enhanced Utilities

Versatile use, reasonable price

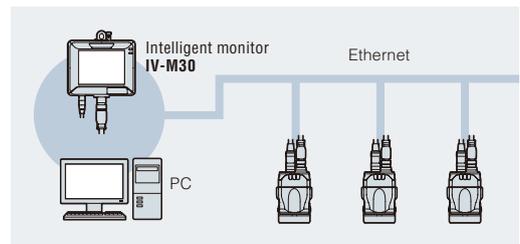
Software for IV Series, **IV-H1** **IV-Navigator**

The IV Series can be set up with an intelligent monitor (IV-M30) or a PC. As PCs can display a larger list, setup procedures are even easier to understand, and can be setup smoothly by users on the first try.



Remote Operation

The IV Series can be setup and monitored via Ethernet. Naturally, remote setup procedures are just as easy as normal operations. (Can be performed on a PC or an IV-M30 intelligent monitor.)



Statistics Function

Detection result statistics can be displayed, and results can be checked even during an operation. (Can be performed with a PC or an IV-M30 intelligent monitor.)

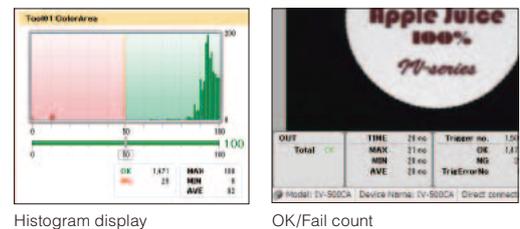
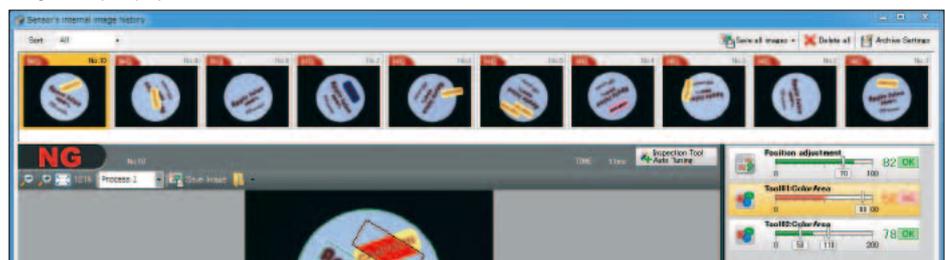


Image history display



Environmental Resistance IP67 (sensor)

Complies with the IP67 enclosure rating, which is based on IEC/JIS standards. Can be used safely in a dusty or wet environment.



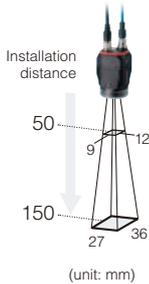
Drop impact resistance 1.3 m (intelligent monitor)

The IV-M30 has a tough construction that can resist impacts. It clears the 1.3m drop test performed under standard usage conditions (KEYENCE standard).



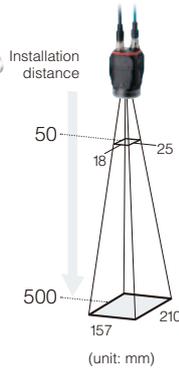
SENSOR LINEUP

Close range sensor model



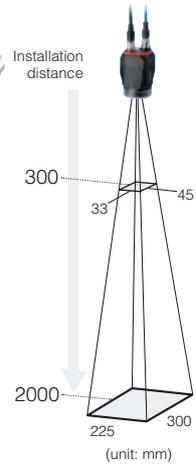
Monochrome AF type
IV-150MA
Monochrome MF type
IV-150M

Standard sensor model



Colour AF type
IV-500CA
Colour MF type
IV-500C
Monochrome AF type
IV-500MA
Monochrome MF type
IV-500M

Long range sensor model

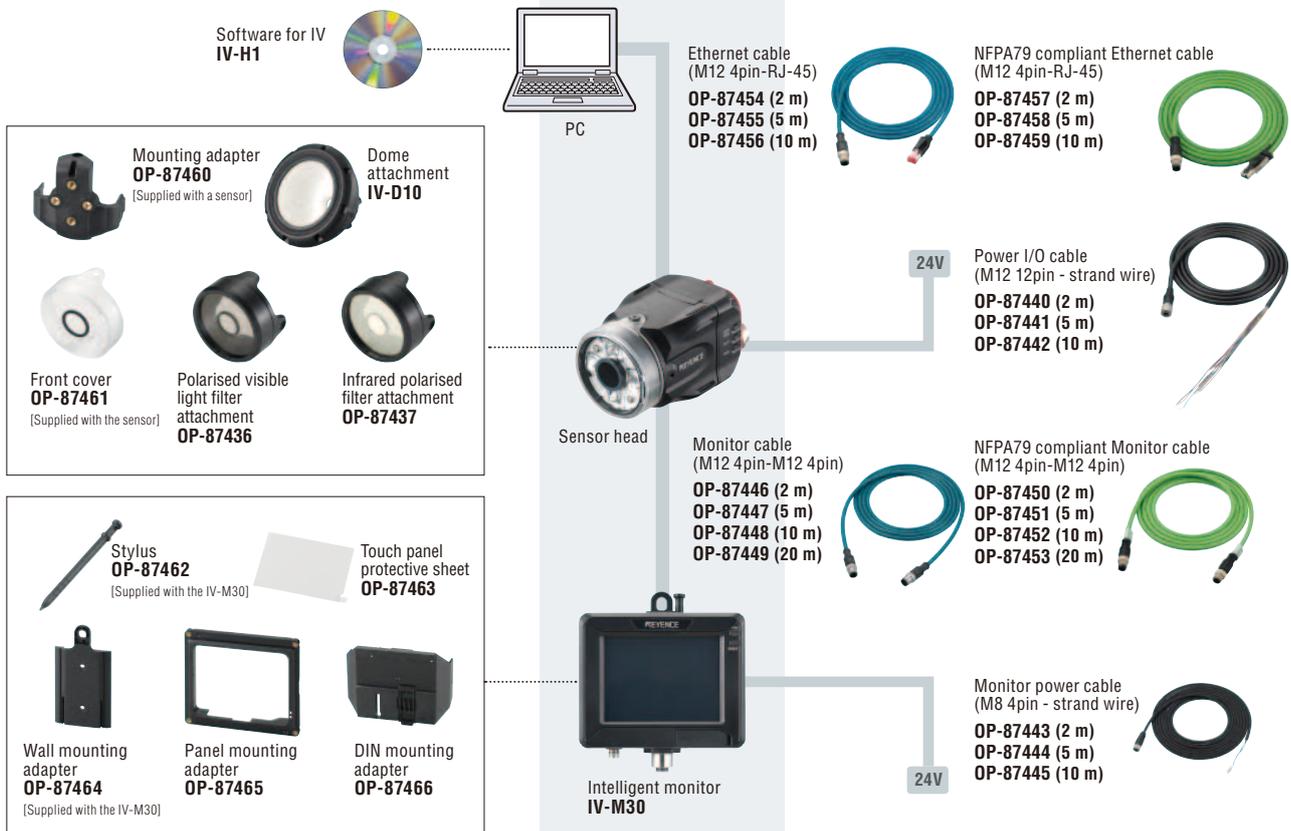


Monochrome AF type
IV-2000MA
Monochrome MF type
IV-2000M

AF...Automatic focus model
MF...Manual focus model

* View and optical axis has individual differences.
*The field of vision is halved when the digital zoom function (monochrome type only) is used.

SYSTEM CONFIGURATION



Presence detection and direction detection for electrical components

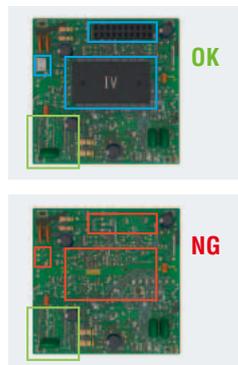


Detects the direction of the IC in carrier tape

Using the position adjustment tool, stable detection can be achieved even when work has moved in the carrier tape. High speed adjustment enables detection without slowing down the processing time of the unit.

Area	Position adjustment
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PC board mounting check

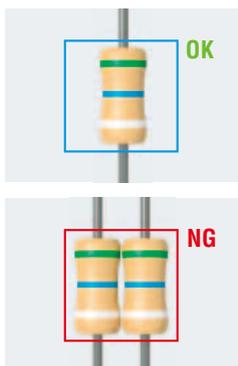


Checks the presence of mounting parts on the PCB

Many parts can be checked as up to 16 tools can be arranged. Furthermore, up to 32 programs can be set, supporting multiple product lines.

Area	Position adjustment
HS-HDR	16 tools

Overlapping electronic component detection

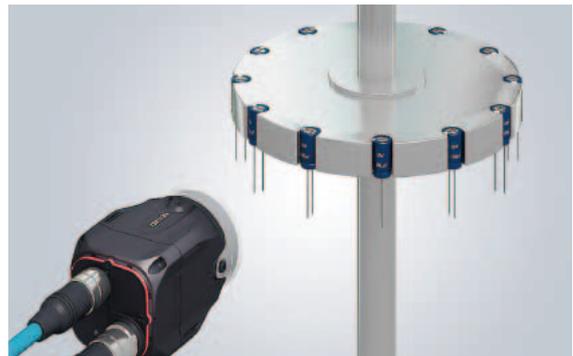


Detects overlapping (resistance) electronic components

Colour variation and unevenness can be detected with a colour camera. Both presence and overlap can be detected as area detection can be set with upper and lower thresholds.

Area

Capacitor print presence

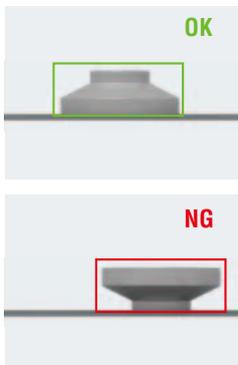


Detects print presence on a capacitor

Fine characters, which are conventionally difficult to stably detect with a dot scanning sensor can be detected stably using the scanning area.

Area

Detection of part orientation

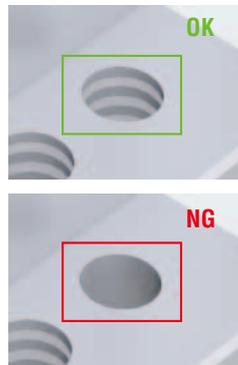
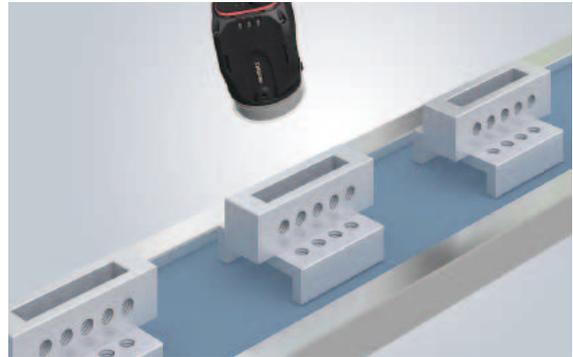


The direction of parts is detected to prevent incorrect assembly in later processes

As shape inspection is able to search for patterns within the entire screen, stable detection is possible even if a minor misalignment has occurred during conveyance.

Shape detection HS-HDR

Shaving presence detection

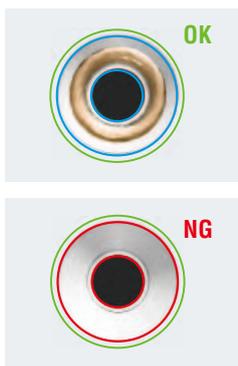


Detects whether a processed metal part contains threads

The polarisation filter and HS-HDR function enable stable detection, even for metal work with non-uniform reflection.

Thread detection HS-HDR

Grease application check

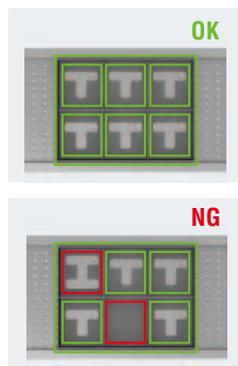


Checks the presence of grease on metallic parts

Stable detection can be achieved by reducing glare, which tends to occur frequently in grease detection, using the HS-HDR.

Area Position adjustment
HS-HDR

Proper part confirmation



Detects the presence and type of parts on a tray

As up to 16 tools can be arranged, settings can be programmed for each pocket to enable stable detection.

Shape detection Position adjustment
HS-HDR 16 tools

Label presence and misalignment detection



Detects the presence and misalignment of bottle labels

By using in combination with a position adjustment tool, misalignment can be detected using items such as the bottle cap as a reference position.



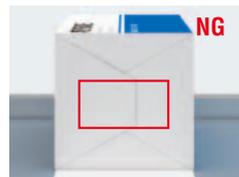
Shape detection Position adjustment

Hot-melt presence



Detects the presence of hot-melt on medicine box flaps

By using area measurement instead of point measurement, it is possible to achieve stable detection on uneven surfaces.



Area

Print presence



Detects the presence of printing

The 360° rotary position compensation function enables stable detection, regardless of cup orientation.



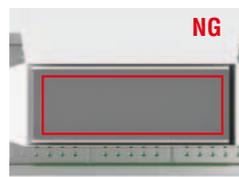
Area Position adjustment

Package insert presence



Detects the presence of an insert enclosed within packaging

Because the area can be set flexibly, stable detection is achieved even if the insert position varies due to packaging conditions.



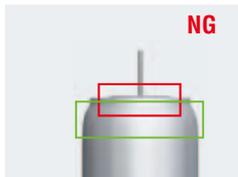
Area

O-ring presence detection



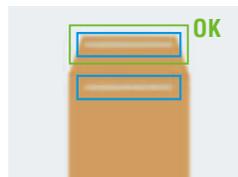
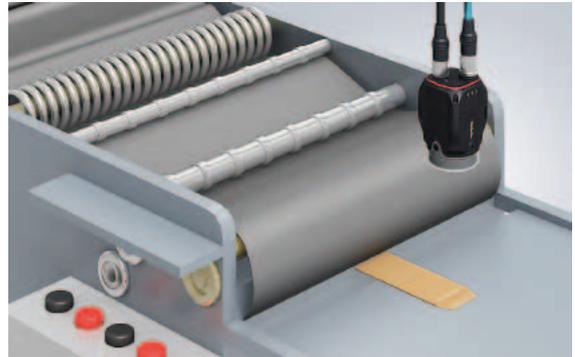
Detects the presence of an O-ring in a spray can

Used in combination with a position adjustment tool, stable detection can be achieved even with varied positions.



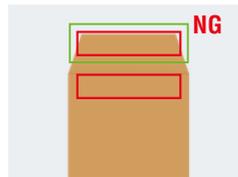
Area	Position adjustment
HS-HDR	

Adhesive strip presence



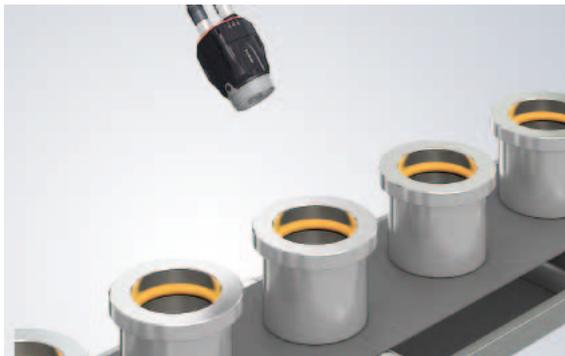
Detects the presence of an adhesive strip on an envelope

Multiple points can be simultaneously inspected for up to 16 tools. Colours can be set individually for each tool at the touch of a button.



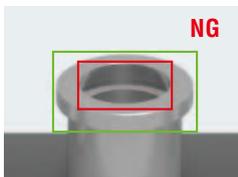
Area	Position adjustment
16 tools	

Product assembly check



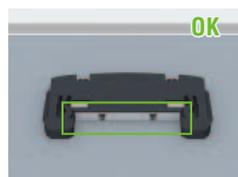
Detects the presence of packing in metallic parts

A combination of HS-HDR and a colour camera enables stable detection for metal works with uneven reflection.



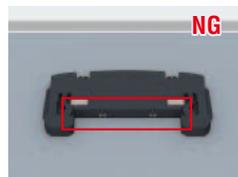
Area	Position adjustment
HS-HDR	

Metal part presence



Detects the presence of a metal part assembled on a plastic part

Even in cases involving metallic products, which are difficult to read using general sensors, fine adjustments after assembly is not required because the outline of the product is inspected.



Shape detection	HS-HDR
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SPECIFICATIONS

SENSOR

Model	IV-500CA	IV-500C	IV-500MA	IV-500M	IV-150MA	IV-150M	IV-2000MA	IV-2000M
Installed distance	Standard distance (50 to 500 mm)				Short range (50 to 150 mm)		Long range (300 to 2000 mm)	
	Installed distance 50 mm : 25 (H) x 18 (V) mm to Installed distance 500 mm : 210 (H) x 157 (V) mm				Installed distance 50 mm : 12 (H) x 9 (V) mm to Installed distance 150 mm : 36 (H) x 27 (V) mm		Installed distance 300 mm : 45 (H) x 33 (V) mm to Installed distance 2000 mm : 300 (H) x 225 (V) mm	
Image sensor	1/3 inch colour CMOS				1/3 inch monochrome CMOS			
	Pixel	752 (H) x 480 (V)						
Focus adjustment	Auto*1	Manual	Auto*1	Manual	Auto*1	Manual	Auto*1	Manual
Exposure time	1/10 to 1/50000		1/10 to 1/25000		1/20 to 1/25000		1/10 to 1/25000	
Lights	illumination	White LED			Red LED		Infrared LED	
	Lighting method	Pulse lighting/DC lighting is switchable						
Tools	Type	Outline search, Area, Position adjustment						
	Number*2	Detection tools : 16 tools, Position adjustment tool : 1 tool						
Switch settings (programs)	32 programs							
Image history*3	Numbers	100 images			300 images			
	Condition	NG only/All is selectable						
Analysis information*4	OFF/Statistics/Histograms is switchable Statistics : Processing time (latest value, MAX, MIN, AVE), number of OKs, number of NGs, trigger numbers, trigger errors, judgment results list by tool Histograms : Histogram, matching degree (latest value, MAX, MIN, AVE)							
Other functions	HDR, HighGain, Colour filters*5, Digital zoom*6, Brightness correction, Tilt correction, White balance*5, Mask outline, Mask area, Test run, ToolAutoTune, Input monitor, Output test, Security settings							
Indicators	PWR/ERR, OUT, TRIG, STATUS, LINK/ACT							
Input	Non-voltage input/voltage input is switchable For non-voltage input : ON voltage 2V or lower, OFF current 0.1mA or lower, ON current 2mA (short circuit) For voltage input : Maximum input rating 26.4V, ON voltage 15V or higher, OFF current 0.2mA or lower, ON current 2mA (for 24V)							
	Inputs	6 inputs (IN1 to IN6)						
Output	Open collector output NPN/PNP is switchable, N.O./N.C. is switchable For open collector NPN output : Maximum rating 26.4V 50mA, remaining voltage 1.5V or lower For open collector PNP output : Maximum rating 26.4V 50mA, remaining voltage 2V or lower							
	Outputs	4 outputs (OUT1 to OUT4)						
Ethernet*7	Standard	100BASE-TX/10BASE-T						
	Connector	M12 4pin connector						
Rating	Power voltage	24VDC ± 10% (including ripple)						
	Current consumption	0.6A or less						
Environmental resistance	Ambient temperature	0 to +50 °C (No freezing)						
	Relative humidity	35 to 85%RH (No condensation)						
	Vibration	10 to 55 Hz, 1.5 mm double amplitude, 2 hours each for X, Y, and Z axes						
	Shock resistance	500m/s ² 6 different directions in 3 times						
	Enclosure rating*8	IP67						
Material	Main unit case : Aluminum die-casting, Packing : NBR, Front Cover : Acrylic, Mounting adapter : POM							
Weight	Approx. 270 g							

*1 The focusing position can be automatically adjusted at the time of installation. Deactivated during the operation. Focusing position can be registered by program.

*2 Tools can be installed by programs.

*3 Saves to the memory in the sensor. The images saved in the sensor can be backed up to the USB memory installed to the intelligent monitor (IV-M30) or to the PC by the software for IV (IV-H).

*4 This can be displayed on the intelligent monitor (IV-M30) or by software for IV (IV-H1).

*5 Colour type only.

*6 Monochrome type only.

*7 This is for connection with the intelligent monitor (IV-M30) or software for IV (IV-H1).

*8 Except when polarised filter attachment (OP-87436/OP-87437) is mounted

MONITOR

Model	IV-M30	
Display	3.5" TFT colour LCD 320 x 240 dot (QVGA)	
Touch panel	Method	Analogue resistive
	Actuating force	0.8 N or less
Backlight	Method	White LED
	Duration	Approx. 50000 hours (25 °C)
Indicators	PWR, SENSOR	
Ethernet *1	Standard	100BASE-TX/10BASE-T
	Connector	M12 4pin connector
Languages	Japanese / English	
Expanded memory	USB memory *2	
Rating	Power voltage	24VDC ± 10% (including ripple)
	Current consumption	0.2 A or lower
Environmental resistance	Ambient temperature	0 to +50 °C (No freezing)
	Relative humidity *3	35 to 80 % RH (No condensation)
	Vibration	10 to 55 Hz, 0.7 mm double amplitude, 2 hours each for X, Y, and Z axes
	Drop impact resistance	1.3m over the concrete (2 times each in the arbitrary direction)
	Enclosure rating	IP40
Material	Polycarbonate	
Weight	Approx. 180 g	

*1 This is dedicated for connection with IV-series sensor.

*2 Use the KEYENCE recommended product.

*3 If the ambient temperature is over 40 °C, use it in the absolute humidity of 40 °C 80% RH or lower.

SOFTWARE

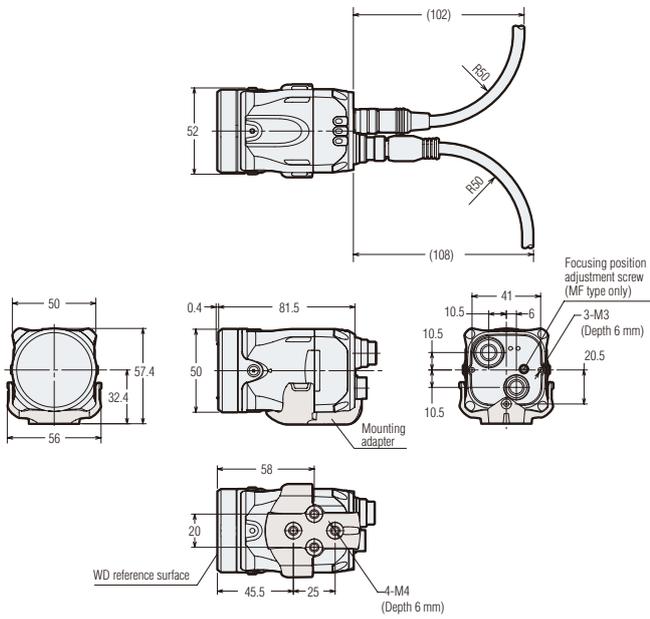
Model	IV-H1
Interface	Equip the Ethernet (100BASE-TX) interface
OS	Windows 7 Home Premium/Professional/Ultimate *1 Windows XP Professional/HomeEdition; either of OS above needs to be pre-installed
	Languages
Processor	Windows 7: needs to be compliant with system requirements for OS Windows XP: Pentium III or better, Clock speed 1 GHz or faster
Memory capacity	Windows 7: needs to be compliant with system requirements for OS Windows XP: 512 MB or more (1 GB or more is recommended)
Required capacity for installation	1 GB or more
Monitor	Resolution 1024 x 768 pixel or higher, Display colour High Colour (16bit) or higher
Operating conditions	.NET Framework 2.0 SP2 needs to be installed *2

*1 Supported for 32bit and 64bit version.

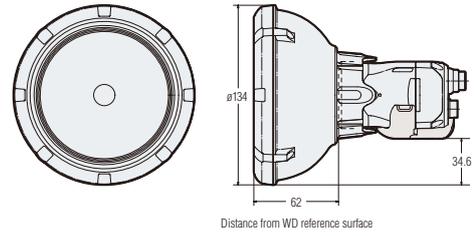
*2 If .NET Framework 2.0 is not installed, this will be automatically installed at the time of IV-H1 installation.

Sensor

**IV-500C/IV-150M/IV-500M/IV-2000M/
IV-500CA/IV-150MA/IV-500MA/IV-2000MA**

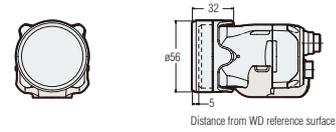


With dome attachment

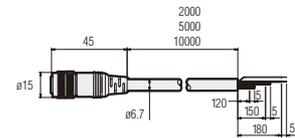


* When using dome attachment, please set the workpiece within the range of 0 to 50 mm from the top.
* Dome attachment can be used for standard distance and close range types.

With polarised filter attachment

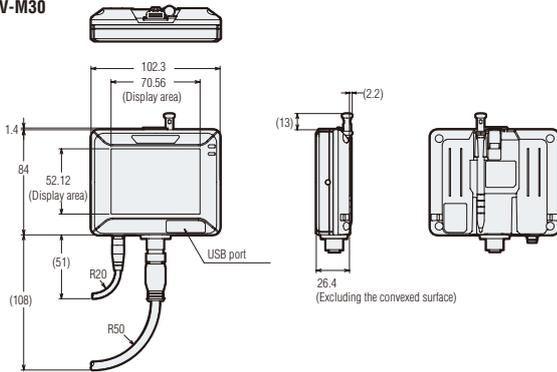


Power I/O cable
OP-87440 (2 m)/
OP-87441 (5 m)/
OP-87442 (10 m)

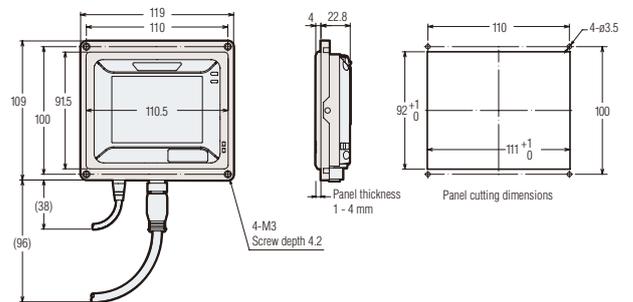


Intelligent monitor

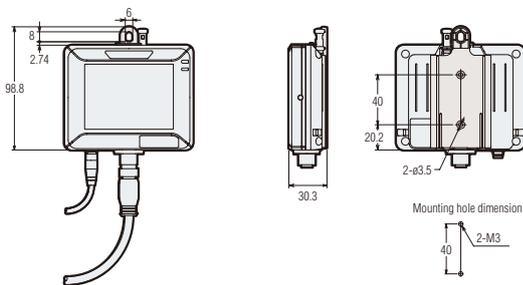
IV-M30



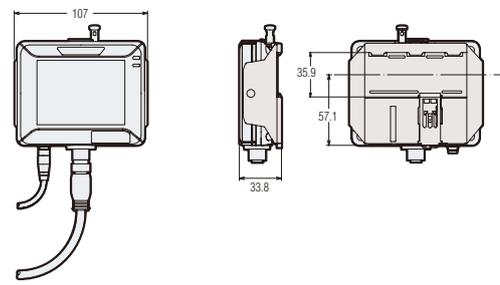
Using the panel mounting adapter



Using the wall mounting adapter

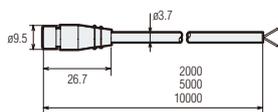


Using the DIN mounting adapter



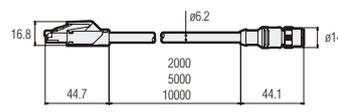
Monitor power cable

OP-87443 (2 m)/OP-87444 (5 m)/OP-87445 (10 m)



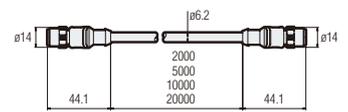
Ethernet cable

OP-87454 (2 m)/OP-87455 (5 m)/OP-87456 (10 m)

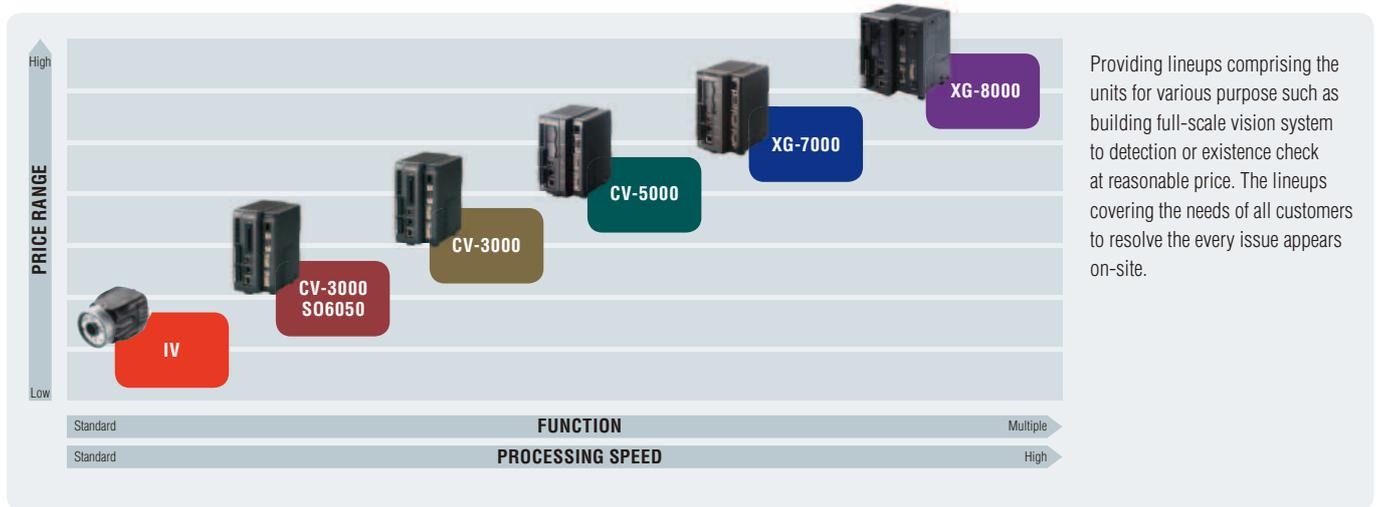


Monitor cable

OP-87446 (2 m)/OP-87447(5 m)/
OP-87448(10 m)/OP-87449(20 m)



VISION SYSTEM LINEUP



FUNCTION DETAILS

		IV	CV-3000 SO6050	CV-3000	CV-5000	XG-7000	XG-8000	
Camera	Maximum No. of cameras	1	2	4	4	4	8	
	Variation	8	4	8	16	16	19	
	No. of pixels	310,000 pixels	✓	✓	✓	✓	✓	✓
		2 megapixels	—	—	—	✓	✓	✓
		5 megapixels	—	—	—	✓	✓	✓
Colour camera support	✓	✓	✓	✓	✓	✓		
Line scan camera support	—	—	—	—	—	✓		
Controller	Image processing engine	Single core	Single core	Single core	Single core (High-speed type)	Single core (High-speed type)	Multi core	
	Processing speed	Standard	Standard	Standard	High-speed	High-speed	Ultra high -speed	
	I/O	✓	✓	✓	✓	✓	✓	
	Light extension unit support	—	—	—	✓	✓	✓	
	Touch screen support	—	—	—	—	✓	✓	
Inspection mode	Basic tool	Area	✓	✓	✓	✓	✓	
		Detection	✓	✓	✓	✓	✓	
		Edge	—	✓	✓	✓	✓	
		Flaw and stain	—	—	✓	✓	✓	
		OCR	—	—	✓	✓	✓	
	Utility	Statistical analysis	✓	✓	✓	✓	✓	
		Screen customisation	—	✓	✓	✓	✓	
		Editing during operation	—	—	—	—	✓	
		PC simulation	—	✓	✓	✓	✓	
	Other function	Position adjustment	✓	✓	✓	✓	✓	
		Calculation	—	✓	✓	✓	✓	
		Preprocessing filter	—	Powerful	Powerful	Ultra powerful	Ultra powerful	
		Numeric output	—	✓	✓	✓	✓	
		Image calculation	—	—	—	—	✓	
Image saving	✓	✓	✓	✓	✓			
Lens	Unselectable	Selectable	Selectable	Selectable	Selectable	Selectable		
Lighting	Unselectable	Selectable	Selectable	Selectable	Selectable	Selectable		
Feature	<ul style="list-style-type: none"> • Easy-to-use • Stable detection • Affordably priced 	<ul style="list-style-type: none"> • Simultaneous connection with 2 cameras • Concurrent use of monochrome and colour cameras is acceptable. • Possible to use 128 windows at detection/inspection 	<ul style="list-style-type: none"> • 20,000 parts per minute processing speed • 2 mega pixel colour and monochrome camera • 8 types of monochrome and colour cameras • Simultaneous imaging by four cameras/mixed connection 	<ul style="list-style-type: none"> • 3 + 1 Processor System • 11× high-speed CCD camera. • Sixteen different camera types 	<ul style="list-style-type: none"> • Flexible Hardware • Fully Customisable • Flow Chart Programming • Powerful Toolset • Script Based Calculation Function • C-Language Unit • ActiveX Control 	<ul style="list-style-type: none"> • Compatibility issues are eliminated since all the hardware is from the same manufacturer • Robust solid state hardware and fanless design • Easy to understand flowchart programming design which requires minimal programming knowledge 		



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SAFETY INFORMATION

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

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KU1-1061

