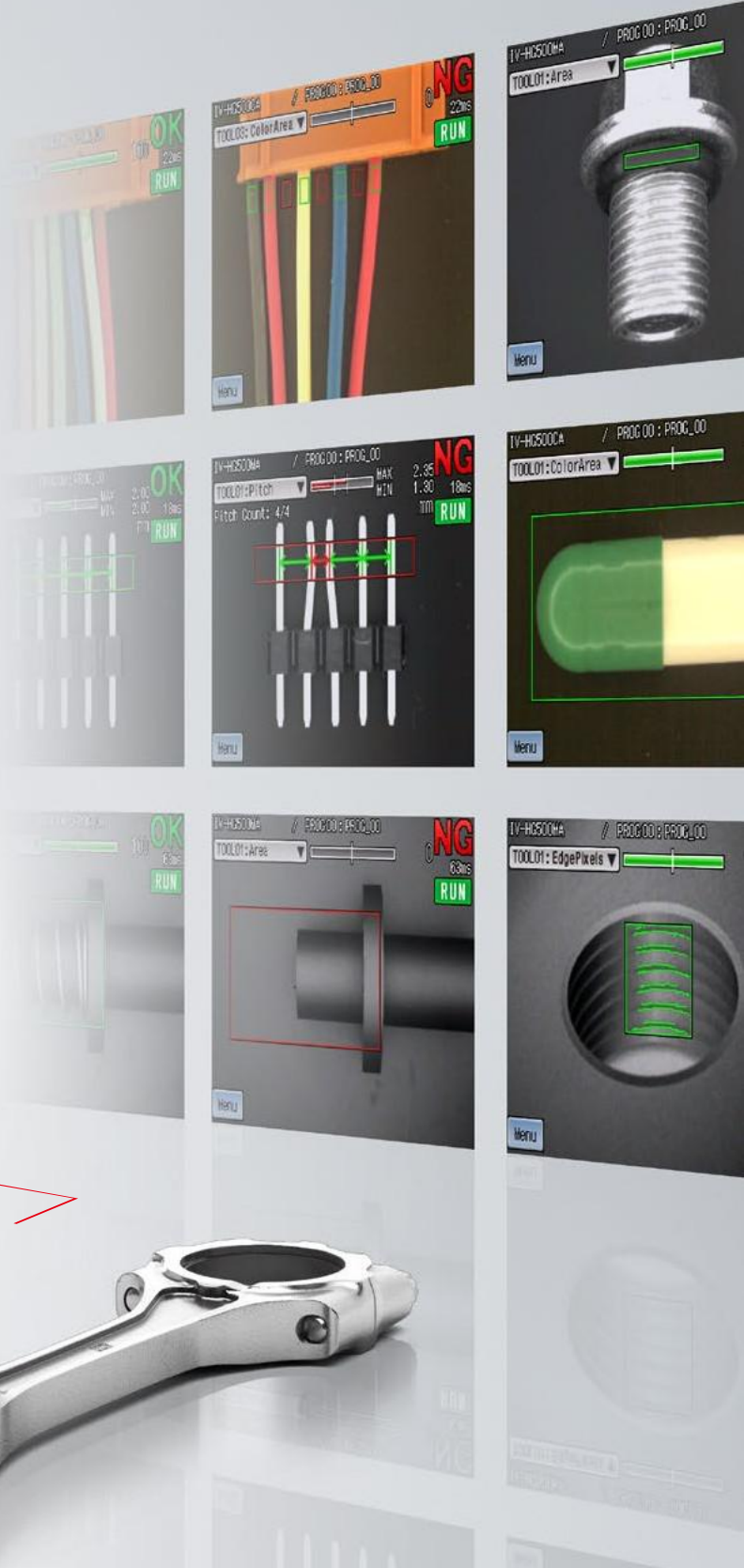


## ULTRA-COMPACT, EASY CONFIGURATION



Newly added  
OCR function

# DETECT VARIOUS PRODUCT FEATURES WITH KEYENCE VISION SENSORS



99 OK  
18ms  
RUN

IV-HG5000A / PROG00 : PROG\_00  
TOOL01:Area  
18ms  
NG  
RUN

IV-HG5000A / PROG00 : PROG\_00  
TOOL01:OCR  
Master text 15/12/2020  
Character read 15/12/2020  
Exp. Date  
15/12/2020  
1 5 / 1 2 / 2 0 2 0

100 OK  
181ms  
RUN

IV-HG5000A / PROG00 : PROG\_00  
TOOL01:OCR  
Master text 15/12/2020  
Character read 14/12/2020  
Exp. Date  
14/12/2020  
1 4 / 1 2 / 2 0 2 0

100 OK  
26ms  
RUN

IV-HG5000A / PROG00 : PROG\_00  
TOOL01:ColorArea  
Menu

IV-HG5000A / PROG02 : PROG\_02  
TOOL01:Diameter  
24ms  
100 OK  
RUN

IV-HG5000A / PROG02 : PROG\_02  
TOOL01:Diameter  
71

100 OK  
19ms  
RUN

IV-HG5000A / PROG00 : PROG\_00  
TOOL01:EdgePixels  
Menu

mm 35ms  
RUN

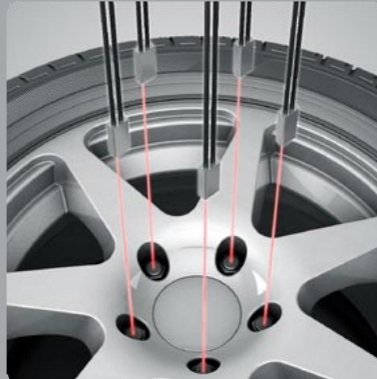
mm 3.50  
RUN

## Conventional methods experience a variety of problems.

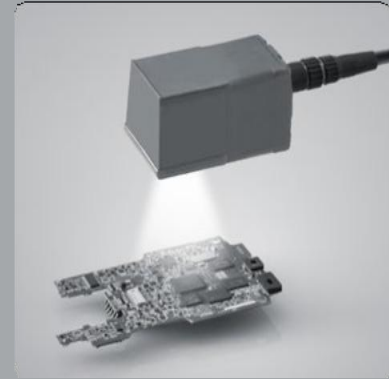
Visual



Sensor



Conventional vision sensor



## Difficult

---

- I It is difficult to perform complete inspections when checking items visually.
- I Specialized knowledge is required in order to select, install, and set sensors.
- I Conventional vision sensors require experience and take time to get used to.

## Unstable

---

- I The results in visual inspections vary from one person to another.
- I Erroneous detections occur with sensors due to misalignment.
- I Conventional vision sensors cannot capture clear images.

## KEYENCE's IV Series Vision Sensor solves all these problems.

IV Series Vision Sensor



## Easy to use

---

- | 100% inspections are possible.
- | A wide variety of detections can be supported.
- | Anyone can operate the sensor easily.

## Stable

---

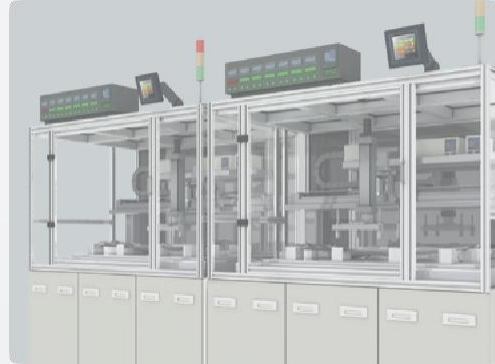
- | Accurate detections without variations are possible.
- | The entire surface is checked, providing high resistance to misaligned targets.
- | Clear images with no distortion can be captured.

**SIMPLE INSTALLATION**

# Install Anywhere Thanks to Smallest-In-Class Size



There is no space in which to install the sensor.



The device size needs to be reduced.

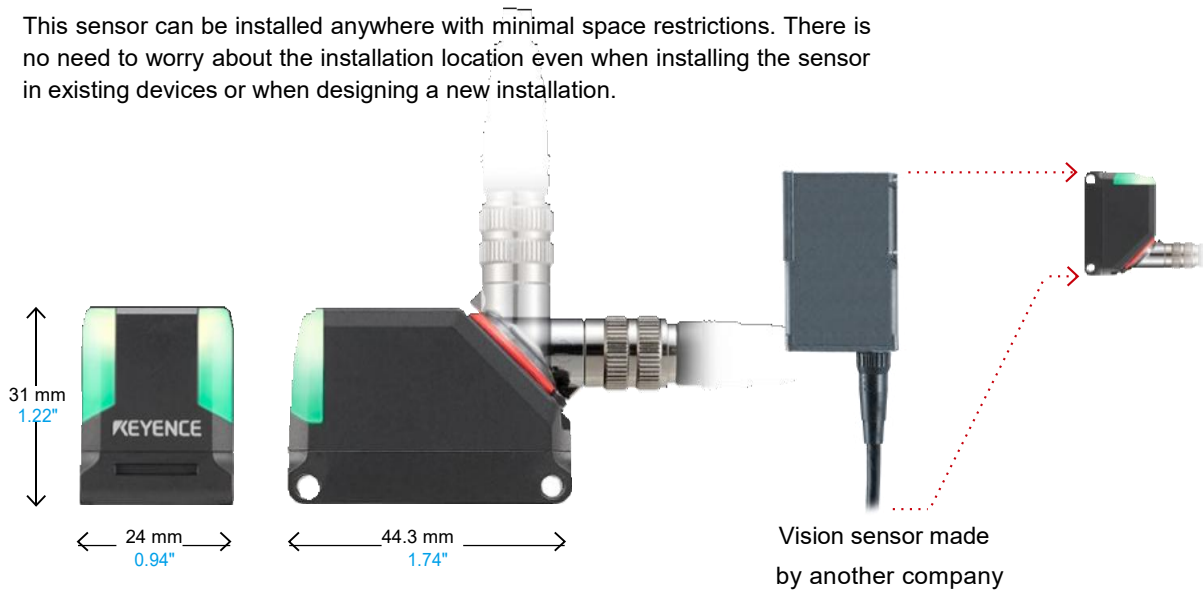


The IV Series solves these problems.



## Flexible Installation Even in Narrow Locations

This sensor can be installed anywhere with minimal space restrictions. There is no need to worry about the installation location even when installing the sensor in existing devices or when designing a new installation.



## Flexible Layout with Cable Routing That Can Be Rotated up to 330°

The cable connector can be rotated by up to 330° to match the available space and installation conditions. Together with the smallest head size in its class, this ensures a high degree of freedom when it comes to installations.



Connector can rotate 330°

## EASY SETTINGS

# 1-MINUTE SETUP



**START**

After 15 seconds

Image capture setup



After 30 seconds

Tool setup



After 45 seconds

Output setup

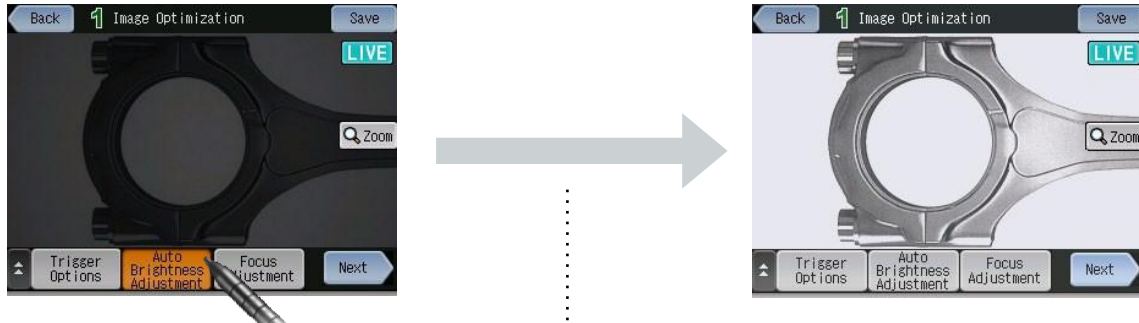
COMPLETE IN 1 MINUTE





# Automatic Brightness Adjustment

Brightness adjustment is completed with just the press of a button. Fine adjustments requiring advanced imaging skills—such as adjustments to the gain and exposure time—are also automatically optimized.

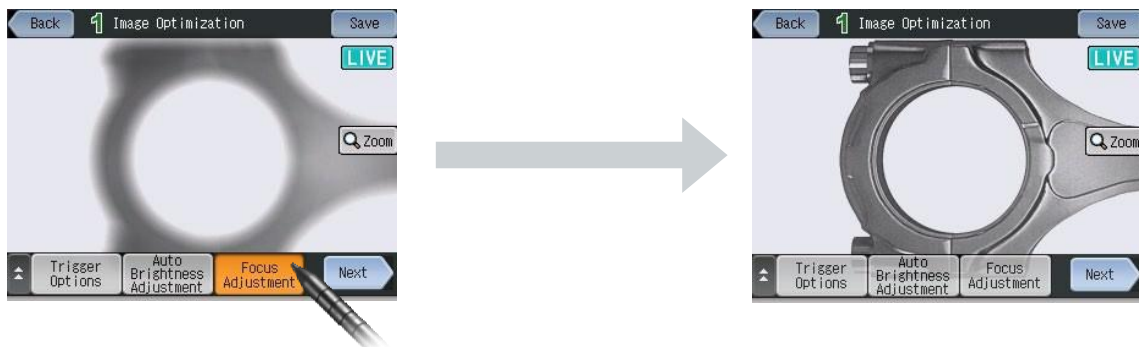


The optimal brightness is found automatically from multiple photographs taken under different image capture conditions.



# First-In-Class, High-Speed, High-Accuracy Automatic Focus

Focusing is also completed with just one button press. The specially developed automatic focus mechanism enables high-speed and high-accuracy focusing.



CLEAR IMAGE CAPTURING FOR GREATER STABILITY

# High-Quality Image Capturing Unaffected by Ambient Environment

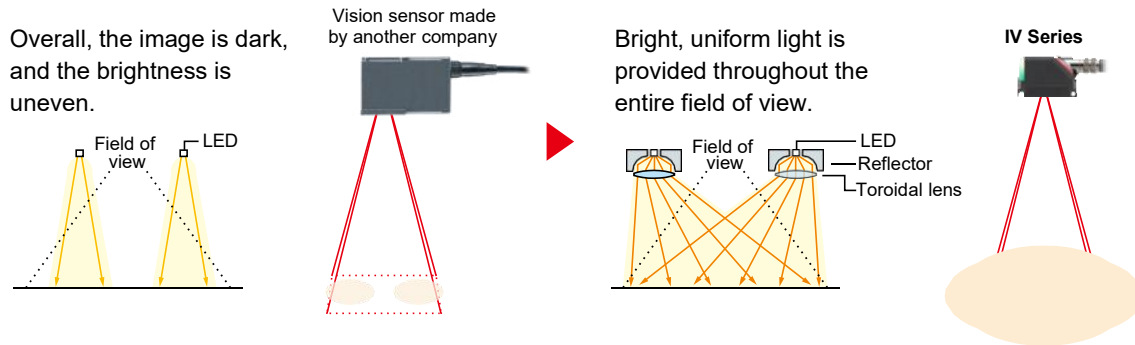
High-intensity  
Hi-R  
illumination



High-performance  
HP-Quad lens

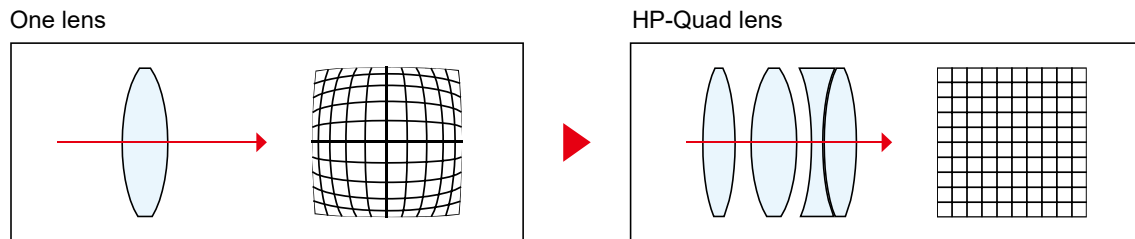
## High-Intensity Hi-R Illumination Eliminates Light Intensity Loss

KEYENCE has investigated reflector shapes in an attempt to minimize the loss of light intensity from the LEDs. The result is that we have successfully made the lighting in the entire field of view uniform and overwhelmingly bright.



## High-Performance HP-Quad Lens Minimizes Image Distortion

The newly developed lens contains 4 layers of glass. This minimizes the effect of lens distortion, making it possible to capture bright, clear images with low distortion.

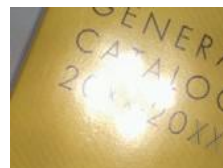


### Polarized Light Filter Attachment



This filter reduces the effects of glare from glossy targets.

Not attached



Attached



### Dome Attachment



This attachment generates indirect light from various directions to ensure the target is uniformly illuminated. This method is more effective than a polarized filter at reducing glare.

Not attached



Attached



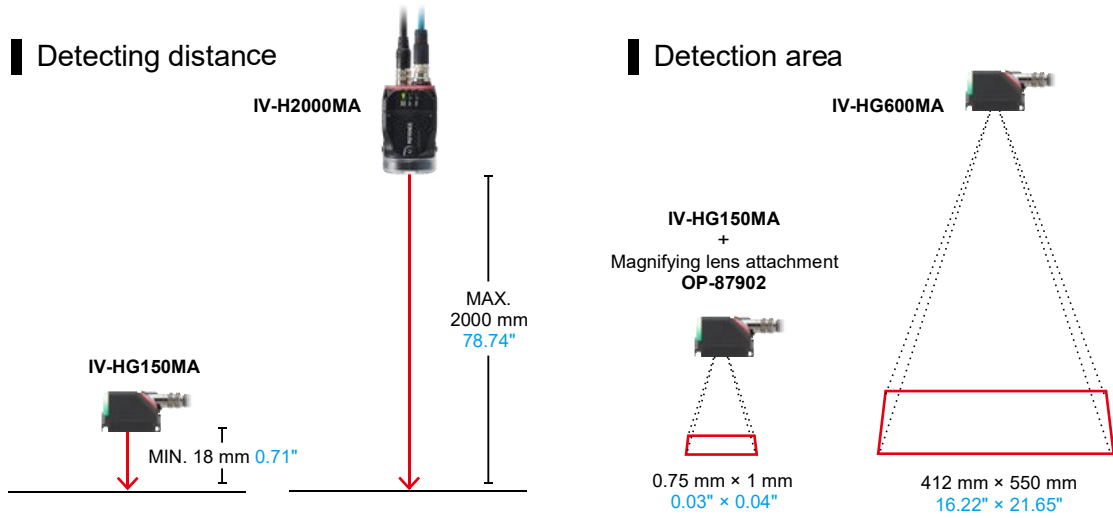
LARGER IMAGE CAPTURE FIELD FOR IMPROVED STABILITY

## Detect Small Targets, Even at Long Distances



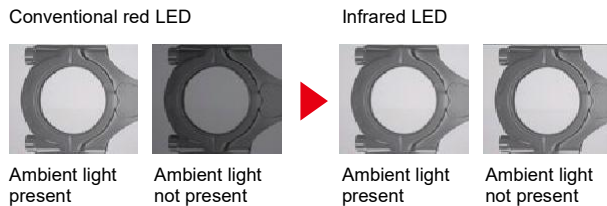
# Using a Model That Matches the Application Eliminates Erroneous Detections

In order to stabilize detection, it is absolutely necessary to capture a large image of the target. The 10 different types of sensor heads make it possible to support a wide variety of target sizes and detecting distances.



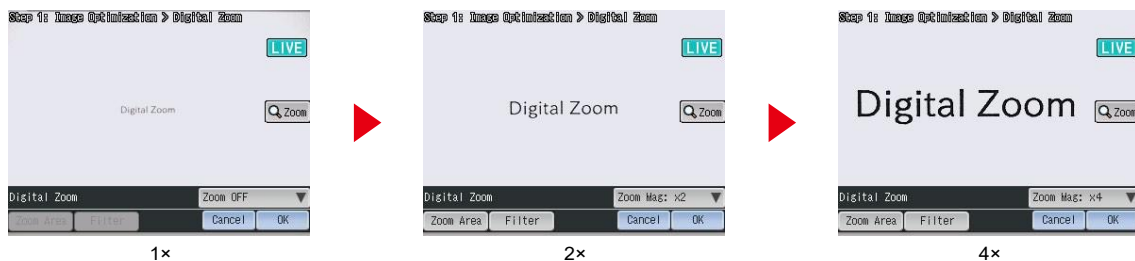
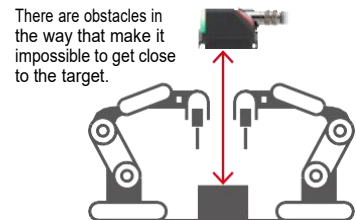
## Infrared Model Is Unaffected by Ambient Light

The long range/wide field of view model is equipped with infrared LED illumination. This makes it possible to perform stable detections that are unaffected by ambient light (such as the light in a factory from the setting sun).



## Digital Zoom Function for Stable Detection Even from Far Away

Even when it is not possible to bring the sensor close to the target due to the presence of obstacles or due to the design, this function can be used to capture a large image of the target.



# Inspection Tools That Provide Stable Operation in Various Worksites and with Various Targets

## SHAPE DETECTION

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



PASS

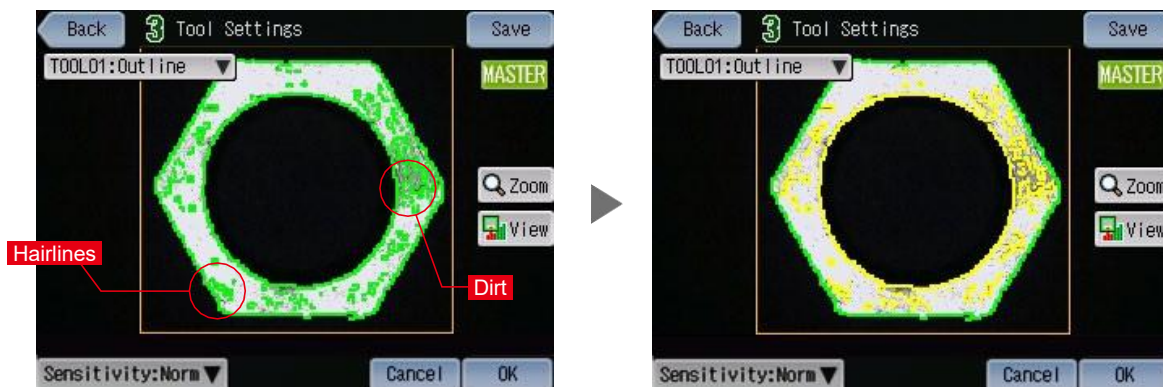


FAIL

Useful Functions That Provide Even Greater Stability

## MASK OUTLINE

Outlines that are not relevant to the detection can be disabled. This makes it possible to perform stable detection even when hairlines or dirt are present on metal targets.



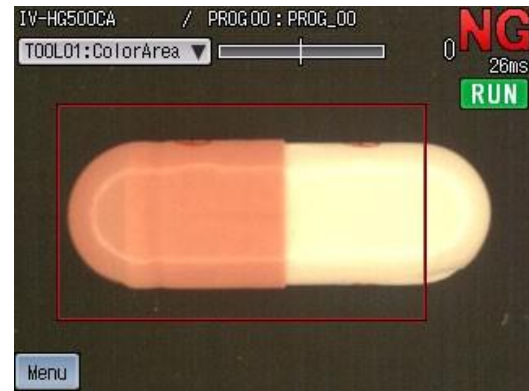
Everything other than the outline to be detected can be disabled.

## AREA

Using the registered master area (number of pixels) as reference, the difference in area from the inspection object is calculated. When using a color model, judgment is made on the basis of the area of the specified color. When using a monochrome model, brightness is judged by the area binarized in black and white.



PASS



FAIL

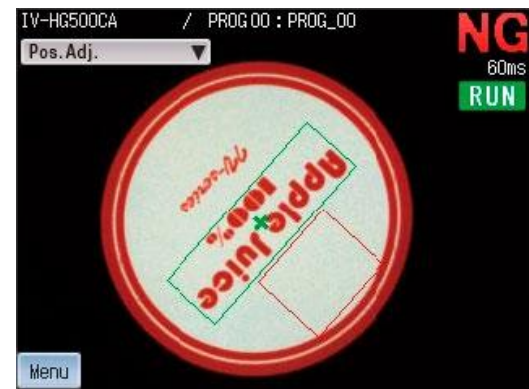
Useful Functions That Provide Even Greater Stability

## POSITION ADJUSTMENT

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, 360° rotation is supported, which means there is no need to worry about workpiece misalignment. Support for high-speed tracking is also possible.



PASS



FAIL

# Inspection Tools That Provide Stable Operation in Various Worksites and with Various Targets

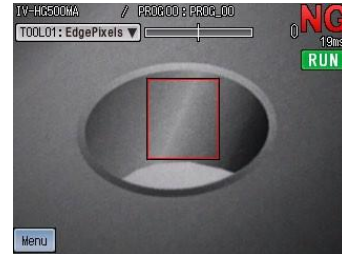
## EDGES

This tool detects the boundary between the bright and dark parts in an image. KEYENCE's proprietary edge strength optimization algorithm can be used to stably detect targets that have variations in edge contrast.

### EDGE PIXELS

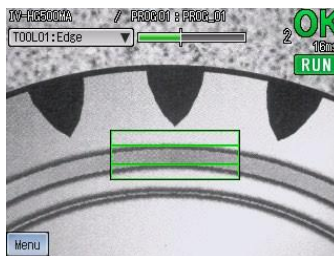


PASS

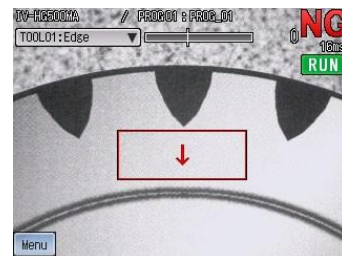


FAIL

### EDGE PRESENCE

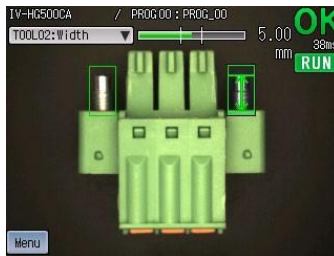


PASS

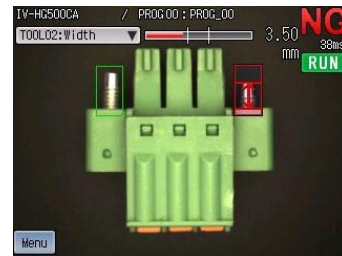


FAIL

### WIDTH/HEIGHT

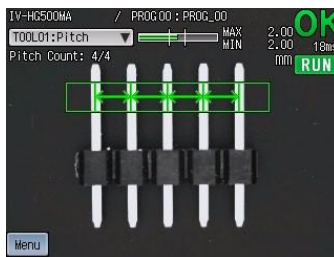


PASS

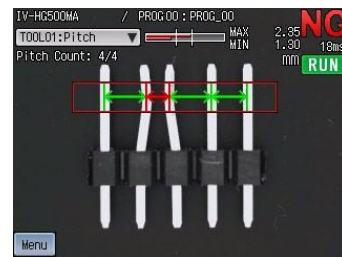


FAIL

### PITCH



PASS

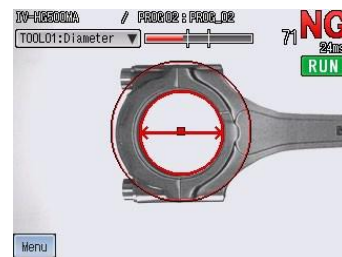


FAIL

### DIAMETER



PASS



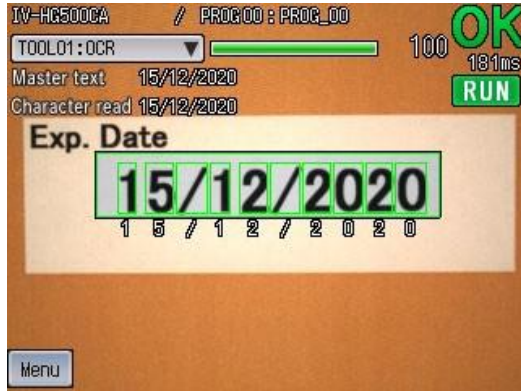
FAIL



# OCR

\*IV-HG Series

This tool detects whether the text/date on the target being inspected matches the text/date information in the registered master image. The text/date is compared against the large number of internal character fonts that have been preregistered, and targets that match are identified as being text/dates.



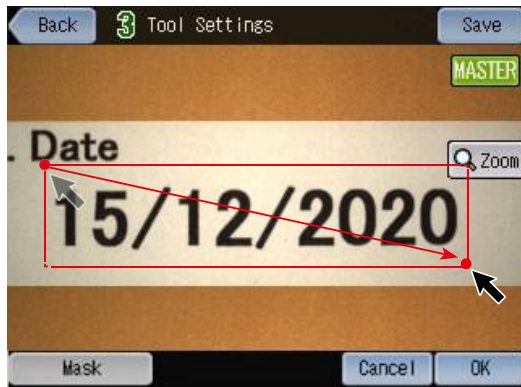
PASS



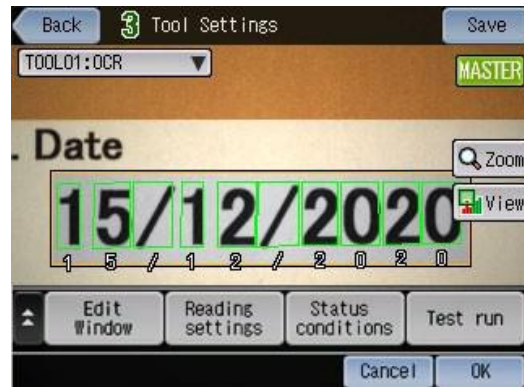
FAIL

## Just Outline to Identify Text

There is no need to perform extraction (adjusting the character width and height), register a dictionary, or any other setting configurations required with conventional vision sensors. Just outline the text to identify it. Furthermore, stable reading is possible even if the conditions of the text's shading, thickness, and size change.



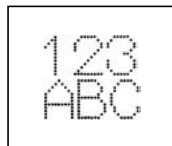
Draw the window...



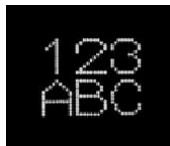
to automatically identify the text.

## Supports a Wide Variety of Marking Devices

Inkjet printer



Standard ink



White ink

Laser marker



In addition, various text formats such as those of thermal printers, hot printers, and dot characters are supported.

## IV2-Navigator software IV2-H1

IV2-Navigator allows users to configure IV2 Series settings and to check the status of operations from a PC rather than from just the control panel (IV2-CP50).

Setup flow shows the current step at a glance

Captured image




Parameter setup fields show the current value


Click and interact directly with parameter settings

## Simulation Function

This function allows you to check and modify the program configurations and perform operation simulations based on the image history without connecting the sensor. This enables easy computation of the optimal thresholds while looking at the detection result statistics and histogram, even when you are away from the actual worksite.


Run operations using the sensor.  
(The image history is recorded.)





**Sensor Setup Simulation**

Check/modify the configuration.




**IV Sensor Simulation**

Use the image history to check operations.

Rerun all tests button

OK/NG count



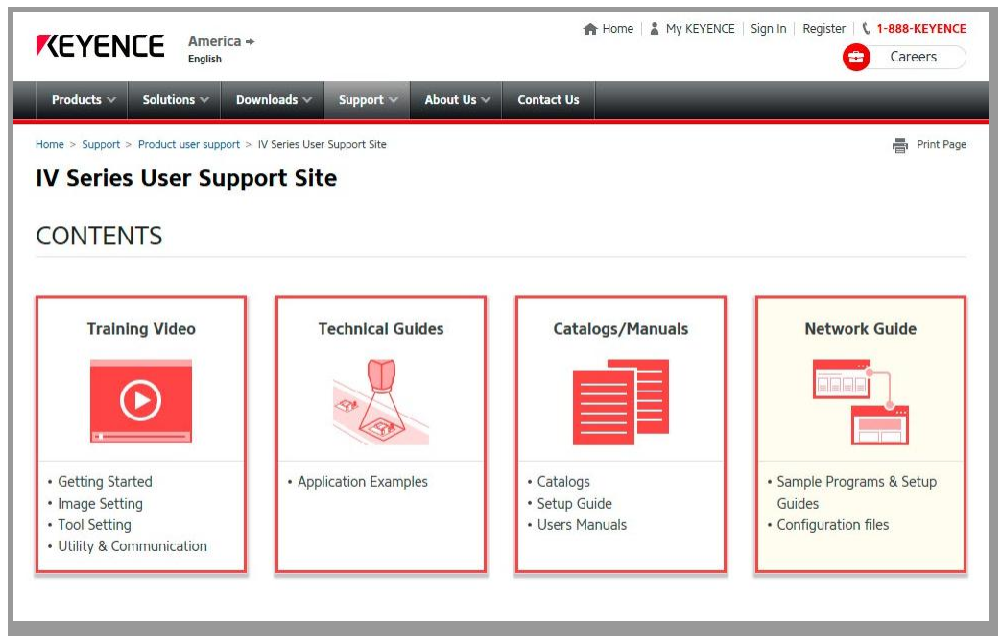
The operation screen is displayed.

The threshold can be changed.

## Dedicated User Support Site

This is a dedicated informational site that contains answers to questions such as, “How can I use the IV Series?”, “What should I do when a problem occurs?”, and “What do people in other industries do?” This site is designed not only for people who are considering purchasing the IV but also for people who have already purchased it.

[www.keyence.com/iv-support](http://www.keyence.com/iv-support)



### Training Video

This section uses videos to provide easy-to-understand introductions to topics such as the know-how required for creating images and the mastering of tools. We recommend this section both to people who are just starting to use the IV and to people who want to expand their knowledge of the IV.

### Technical Guides

A large number of examples of improvements obtained by customers using the IV in industries such as the automotive, electronics, and food industries are available. This section provides access to examples that are not readily available to the public.

### Catalogs/Manuals

All the documents such as catalogs and manuals can be accessed from this site when necessary.

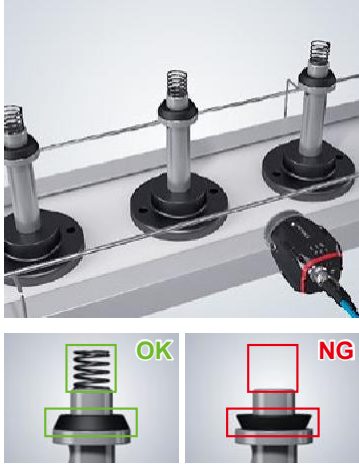
### Network Guide

Sample programs for connecting the IV to PLCs and PCs are available free of charge. These can be used to connect the IV to a wide variety of devices, thereby leading to improved inspection quality.

AUTOMOTIVE & METAL

PRESENCE DETECTION

Spring presence detection



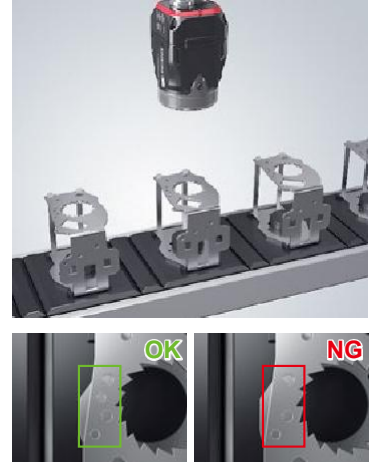
COLOR

Button assembly defect detection



SHAPE

Vehicle type detection according to stamping differences



FOOD & PHARMACEUTICAL

Expiration date text presence



Missing straw detection



Product type detection according to text differences



ELECTRIC & ELECTRONIC

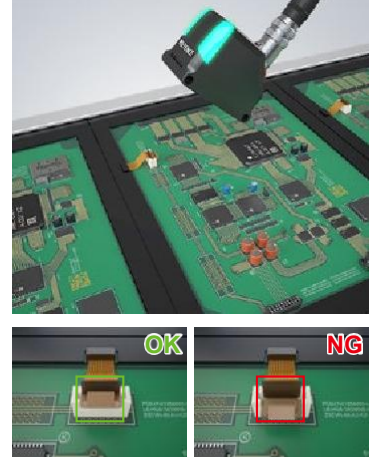
Capacitor marking presence



Remote control lighting check

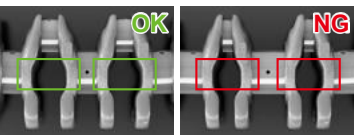
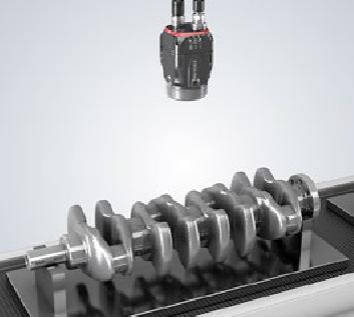


Connector locking check



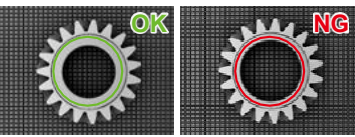
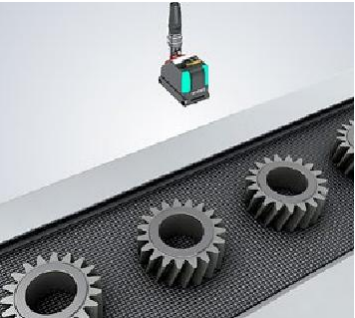
**WIDTH & HEIGHT**

Product type detection according to width differences



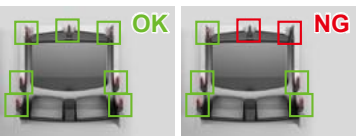
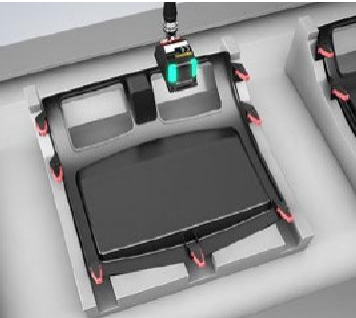
**DIAMETER, PITCH & EDGE PRESENCE**

Product type detection according to diameter differences



**WIDE FOV & SPACE-SAVING**

Instrument panel clip presence



AUTOMOTIVE & METAL

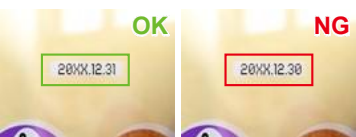
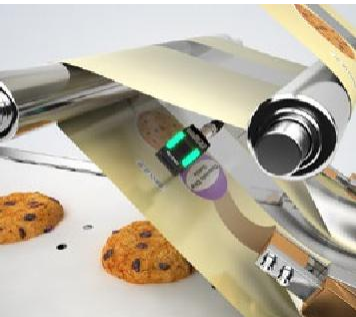
Cap tightening check



Label misalignment detection

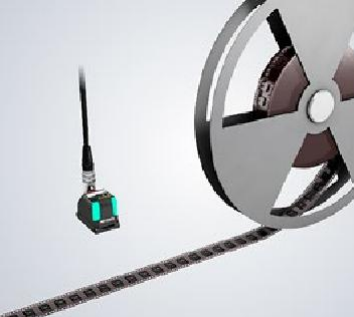


Expiration date OCR check

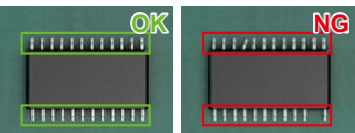


FOOD & PHARMACEUTICAL

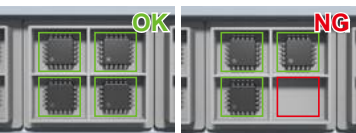
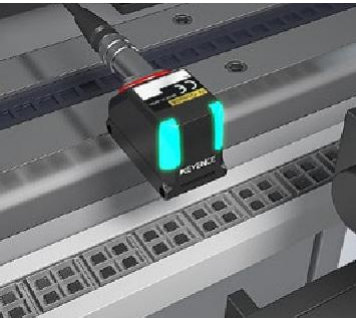
Electronic component presence/ orientation



Broken/bent lead detection








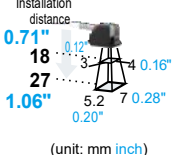
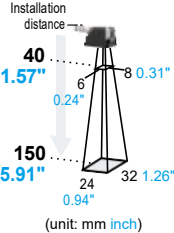
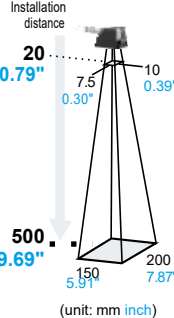
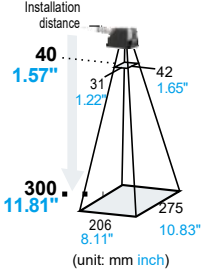
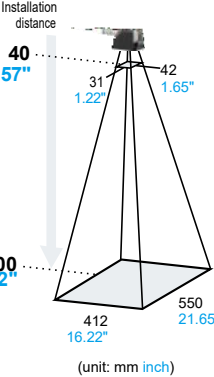
Tray component presence check



ELECTRIC & ELECTRONIC

# COMPONENT LIST

## Ultra-Compact Models

<p>ULTRA-NARROW FIELD OF VIEW SENSOR MODEL (WITH ATTACHMENT)</p> 	<p>NARROW FIELD OF VIEW SENSOR MODEL</p> 	<p>STANDARD SENSOR MODEL</p> 	<p>WIDE FIELD OF VIEW SENSOR MODEL (COLOR)</p> 	<p>WIDE FIELD OF VIEW SENSOR MODEL (MONOCHROME)</p> 
<p>Monochrome AF type <b>IV-HG150MA</b> + Magnifying lens attachment <b>OP-87902</b></p>	<p>Monochrome AF type <b>IV-HG150MA</b></p>	<p>Color AF type <b>IV-HG500CA</b></p>	<p>Color AF type <b>IV-HG300CA</b></p>	<p>Monochrome AF type <b>IV-HG600MA</b></p>
 <p>Installation distance 0.71" 18" 27" 1.06" 0.12" 3" 4" 0.16" 5.2" 7" 0.28" 0.20" (unit: mm inch)</p>	 <p>Installation distance 40" 1.57" 6" 8" 0.31" 0.24" 150" 5.91" 24" 32" 1.26" 0.94" (unit: mm inch)</p>	 <p>Installation distance 20" 0.79" 7.5" 10" 0.39" 0.30" 500" 19.69" 150" 200" 7.87" 5.31" (unit: mm inch)</p>	 <p>Installation distance 40" 1.57" 31" 42" 1.65" 1.22" 300" 11.81" 206" 275" 10.83" 8.11" (unit: mm inch)</p>	 <p>Installation distance 40" 1.57" 31" 42" 1.65" 1.22" 600" 23.62" 412" 550" 21.65" 16.22" (unit: mm inch)</p>

AF...Automatic focus model  
\*View and optical axis has individual differences.  
\*If a wider field of view or longer range is required, please contact your nearest KEYENCE sales office.

## System configuration

### Sensor/Amplifier



Ultra-compact sensor head



IV-HG sensor head to amplifier cable  
**OP-87903** (2 m 6.6')  
**OP-87904** (5 m 16.4')  
**OP-87905** (10 m 32.8')




Sensor amplifier main unit  
**IV-HG10**




Sensor amplifier expansion unit  
(\*When expanding the system)  
**IV-HG15**


### Monitor



NFA79 compliant Ethernet cable (M124pin - RJ-45)  
Straight cable  
**OP-87907** (1 m 3.3')  
**OP-87457** (2 m 6.6')  
**OP-87458** (5 m 16.4')  
**OP-87459** (10 m 32.8')



Monitor power cable (M8 4pin - strand wire)  
**OP-87443** (2 m 6.6')  
**OP-87444** (5 m 16.4')  
**OP-87445** (10 m 32.8')



Intelligent monitor  
**IV-M30**

Software for the IV2 Series  
**IV2-H1**



IV-HG I/O cable  
(3 m 9.8')  
**OP-87906**



I/O

24 V

\*When connecting to a PC, the IV-H1 software and a LAN cable are also required.



LAN cable (RJ-45 - RJ-45)  
**OP-87950** (1 m 3.3')  
**OP-87951** (3 m 9.8')  
**OP-87952** (5 m 16.4')  
**OP-87953** (10 m 32.8')

24 V

### Countermeasures against glare



IV2 dome attachment (large)  
**IV2-GD10**



IV2 dome attachment (small)  
**IV2-GD05**



Magnifying lens attachment  
**OP-87902**



Narrow field of view & standard use polarized light filter attachment  
**OP-87899**




IV-HG300CA polarized light filter attachment  
**OP-87900**




IV-HG600MA polarized light filter attachment  
**OP-87901**


### Mounting brackets



IV-HG vertical mounting bracket  
**OP-87908**



IV-HG rear mounting bracket  
**OP-87909**



IV-HG adjustable bracket  
**OP-87910**

Optional monitor accessories



Wall mounting adapter  
**OP-87464**  
(Included with IV-M30)



Panel mounting adapter  
**OP-87465**



DIN mounting adapter  
**OP-87466**

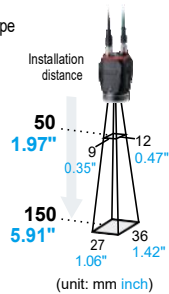


Touchpanel protectivesheet  
**OP-87463**

Stylus  
**OP-87462**  
(Included with IV-M30)

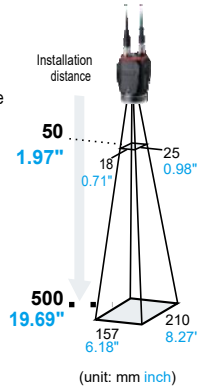
USB memory stick (1GB)  
**OP-87502**

Monochrome AF type  
**IV-H150MA**

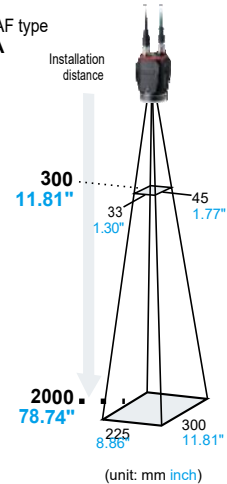


Color AF type  
**IV-H500CA**

Monochrome AF type  
**IV-H500MA**



Monochrome AF type  
**IV-H2000MA**



AF...Automatic focus model

\*View and optical axis has individual differences.

\*If a wider field of view or longer range is required, please contact your nearest KEYENCE sales office.

## System configuration

### Sensor

Sensor head  
(amplifier-integrated type)

Power I/O cable  
(M12 12pin - strand wire)  
Straight cable  
**OP-87440** (2 m 6.6')  
**OP-87441** (5 m 16.4')  
**OP-87442** (10 m 32.8')

Right angle cable  
**OP-88036** (2 m 6.6')  
**OP-88037** (5 m 16.4')  
**OP-88038** (10 m 32.8')

Software for  
the IV2 Series  
**IV2-H1**



24 V

I/O

### Monitor

NFPA79 compliant monitor cable  
for amplifier-integrated model  
(M12 4pin - M12 4pin)

Straight cable Right angle cable  
**OP-87450** (2 m 6.6') **OP-88039** (2 m 6.6')  
**OP-87451** (5 m 16.4') **OP-88040** (5 m 16.4')  
**OP-87452** (10 m 32.8') **OP-88041** (10 m 32.8')  
**OP-87453** (20 m 65.6')



Monitor power cable  
(M8 4pin - strand wire)  
**OP-87443** (2 m 6.6')  
**OP-87444** (5 m 16.4')  
**OP-87445** (10 m 32.8')



Intelligent monitor  
**IV-M30**

\*When connecting to a PC, the IV-H1 software and an Ethernet cable are also required.



NFPA79 compliant Ethernet cable (M12 4pin - RJ-45)  
Straight cable Right angle cable  
**OP-87907** (1 m 3.3') **OP-88042** (1 m 3.3')  
**OP-87457** (2 m 6.6') **OP-88043** (2 m 6.6')  
**OP-87458** (5 m 16.4') **OP-88044** (5 m 16.4')  
**OP-87459** (10 m 32.8') **OP-88045** (10 m 32.8')

24 V

### Countermeasures against glare



Dome attachment  
**IV-D10**



Polarized visible light  
filter attachment  
**OP-87436**



Infrared polarized  
filter attachment  
**OP-87437**



Mounting adapter  
**OP-87460**  
[Supplied with a sensor]



Front cover  
**OP-87461**  
[Supplied with the sensor]



Adjustable  
bracket  
**OP-87685**



Appearance of  
mounted  
**OP-87685**  
[Support pole not  
included]

# SPECIFICATIONS

## Ultra-Compact Models



### Sensor Head

Model	IV-HG500CA	IV-HG500MA	IV-HG150MA	IV-HG300CA	IV-HG600MA
Type	Standard sensor model		Narrow field of view sensor model	Wide field of view sensor model	
Installed distance	20 to 500 mm 0.79" to 19.69"		40 to 150 mm 1.57" to 5.91"	40 to 300 mm 1.57" to 11.81"	40 to 600 mm 1.57" to 23.62"
View	Installed distance 20 mm 0.79": 10 (H) × 7.5 (V) mm 0.39" (H) × 0.30" (V) to Installed distance 500 mm 19.69": 200 (H) × 150 (V) mm 7.87" (H) × 5.91" (V)		Installed distance 40 mm 1.57": 8 (H) × 6 (V) mm 0.31" (H) × 0.24" (V) to Installed distance 150 mm 5.91": 32 (H) × 24 (V) mm 1.26" (H) × 0.94" (V)*1	Installed distance 40 mm 1.57": 42 (H) × 31 (V) mm 1.65" (H) × 1.22" (V) to installed distance 300 mm 11.81": 275 (H) × 206 (V) mm 10.83" (H) × 8.11" (V)	Installed distance 40 mm 1.57": 42 (H) × 31 (V) mm 1.65" (H) × 1.22" (V) to installed distance 600 mm 23.62": 550 (H) × 412 (V) mm 21.65" (H) × 16.22" (V)
Image sensor	1/3 inch color CMOS	1/3 inch monochrome CMOS	1/3 inch monochrome CMOS	1/3 inch color CMOS	1/3 inch monochrome CMOS
Pixel	752 (H) × 480 (V)				
Focus adjustment	Auto*2				
Exposure time	1/10 to 1/50000		1/20 to 1/50000	1/25 to 1/50000	1/50 to 1/50000
Lights	Illumination Lighting method	White LED Pulse lighting/DC lighting is switchable			Infrared LED Pulse lighting
Indicators	2 (the same display details for both indicators)				
Environmental resistance	Ambient temperature	0 to +50°C 32 to 122°F (No freezing)			
	Relative humidity	35 to 85% RH (No condensation)			
	Vibration*3	10 to 55 Hz, 1.5 mm 0.06" double amplitude, 2 hours each for X, Y, and Z axes			
	Shock resistance*3	500 m/s <sup>2</sup> 6 different directions in 3 times			
Enclosure rating*4	IP67				
Material	Main unit case: Zinc die-casting, Front cover: Acrylic (hard coat), Operation indicator cover: TPU				
Weight	Approx. 75 g				

\*1 Installed distance 18 mm 0.71": 4 (H) × 3 (V) mm 0.16" (H) × 0.12" (V) to installed distance 27 mm 1.06": 7 (H) × 5.2 (V) mm 0.28" (H) × 0.20" (V) when the magnifying lens attachment (OP-87902) is used

\*2 The focusing position can be automatically adjusted at the time of installation. Deactivated during the operation. Focusing position can be registered by program

\*3 Except when IV-HG dome attachment (IV-GD05/IV-GD10) is mounted

\*4 Except when polarized filter attachment (OP-87899/OP-87900/OP-87901/OP-87902) is mounted



### Sensor Amplifier

Model	IV-HG10 (main unit)	IV-HG15 (expansion unit)
Tools	Type	Shape Detection, Color Area*1, Area*2, Edge Pixels, Width/Height, Diameter, Edge Presence, Pitch, Position Adjustment, High Speed Position Adjustment (1-Axis/2-Axis Adjustment), OCR*11
	Number*3	Detection tools: 16 tools, position adjustment tool: 1 tool
Switch settings (programs)		32 programs
Image history*4	Numbers	When using a color type head: 100 images*5, when using a monochrome type head: 300 images*6
	Condition	NG only/All is selectable
Analysis information*7		OFF/Statistics/Histograms/Matching rate list is switchable Statistics: Processing time (latest value, MAX, MIN, AVE), number of OKs, number of NGs, trigger numbers, trigger errors, judgment results list by tools Histograms: Histogram, matching degree (latest value, MAX, MIN, AVE), numbers of OKs, numbers of NGs Matching rate list: Judgment results list by tools, matching rate list by tools, judgment bar list by tools
Other functions		HDR, HighGain, Color filters*1, Digital zoom (2x, 4x), Brightness correction, Tilt correction, White balance*1, Mask outline, Mask function, Color histogram*1, Monochrome histogram*2, Test run, ToolAutoTune*10, Input monitor, Output test, Security settings, Simulator, Mutual interference prevention, Direct connection (2 units or more), Failing sensor list, Failure hold, Sensor date/time information addition, Scaling function, Calendar synchronization
Indicators		PWR/ERR, OUT, TRIG, STATUS, LINK/ACT
Input		Non-voltage input/voltage input is switchable For non-voltage input: ON voltage 2 V or lower, OFF current 0.1 mA or lower, ON current 2 mA (short circuit) For voltage input: Maximum input rating 26.4 V, ON voltage 18 V or higher, OFF current 0.2 mA or lower, ON current 2 mA (for 24 V)
	Inputs	6 inputs (IN1 to IN6)
	Function	IN1: External trigger, IN2 to IN6: Enable by assigning the optional functions Assignable functions: Program switching, Clear error, External master image registration, Main unit/expansion unit simultaneous input
Output		Open collector output NPN/PNP is switchable, N.O./N.C. is switchable For open collector NPN output: Maximum rating 26.4 V 50 mA (20 mA when linked to an expansion unit [IV-HG15]), remaining voltage 1.5 V or lower For open collector PNP output: Maximum rating 26.4 V 50 mA (20 mA when linked to an expansion unit [IV-HG15]), remaining voltage 2 V or lower
	Outputs	8 outputs (OUT1 to OUT8)
	Function	Enable by assigning the optional functions Assignable functions: Total judgment result, RUN, BUSY, Error, Position adjustment result, Judgment result of each tool, Result of the logical operation of each tool, Main unit/expansion unit logical output
Ethernet*8	Standard	100BASE-TX/10BASE-T
	Connector	RJ-45 8pin connector
Network function		FTP client, EtherNet/IP™, PROFINET
Rating	Power voltage	24 VDC ±10% (including ripple)
	Current consumption	0.8 A or less. 1.5 A or less when also using an expansion unit (IV-HG15). (The output load is excluded.)
Environmental resistance	Ambient temperature	0 to +50°C 32 to 122°F (No freezing)*9
	Relative humidity	35 to 85% RH (No condensation)
Material		Main unit case: Polycarbonate
Weight		Approx. 150 g

\*1 Color type only

\*2 Monochrome type only

\*3 Tools can be installed by programs.

\*4 Saves to the sensor amplifier's internal memory. The images saved to the sensor amplifier can be backed up to the USB memory device inserted into the intelligent monitor (IV-M30) or to the PC by the software for the IV Series (IV-H1).

\*5 When using the FTP client function: 70 pictures

\*6 When using the FTP client function: 210 pictures

\*7 This can be displayed on the intelligent monitor (IV-M30) or by software for IV (IV-H1).

\*8 This is for connection with the intelligent monitor (IV-M30) or software for IV (IV-H1).

\*9 When attaching the sensor amplifier to a DIN rail, attach the sensor amplifier to a metal plate.

\*10 ToolAutoTune can be used with the Shape Detection, Color Area, and Area tools.

\*11 Supported with Ver. R5.00.00 or later.



## Amplifier-Integrated Models



### Sensor

Model	IV-H500CA	IV-H500MA	IV-H150MA	IV-H2000MA
Type	Standard distance		Short range	
Installed distance	50 to 500 mm 1.97° to 19.69°		50 to 150 mm 1.97° to 5.91°	
View	Installed distance 50 mm 1.97°: 25 (H) × 18 (V) mm 0.98° (H) × 0.71° (V) to installed distance 500 mm 19.69°: 210 (H) × 157 (V) mm 8.27° (H) × 6.18° (V)		Installed distance 50 mm 1.97°: 12 (H) × 9 (V) mm 0.47° (H) × 0.35° (V) to installed distance 150 mm 5.91°: 36 (H) × 27 (V) mm 1.42° (H) × 1.06° (V)	
Image sensor	1/3 inch color CMOS		1/3 inch monochrome CMOS	
Pixel	752 (H) × 480 (V) 29.61° (H) × 18.90° (V)			
Focus adjustment	Auto*1			
Exposure time	1/10 to 1/50000	1/10 to 1/25000	1/20 to 1/25000	1/10 to 1/25000
Lights	White LED	Red LED		Infrared LED
Lighting method	Pulse lighting/DC lighting is switchable			
Tools	Shape Detection, Color Area*7, Area*8, Edge Pixels, Width/Height, Diameter, Edge Presence, Pitch, Position Adjustment, High Speed Position Adjustment (1-Axis/2-Axis Adjustment)			
Number*2	Detection tools: 16 tools, position adjustment tool: 1 tool			
Switch settings (programs)	32 programs			
Image history*3	100 images*4	300 images*5		
Condition	NG only/All is selectable			
Analysis information*6	OFF/Statistics/Histograms/Matching rate list is switchable Statistics: Processing time (latest value, MAX, MIN, AVE), number of OKs, number of NGs, trigger errors, judgment results list by tools Histograms: Histogram, matching degree (latest value, MAX, MIN, AVE), numbers of OKs, numbers of NGs Matching rate list: Judgment results list by tools, matching rate list by tools, judgment bar list by tools			
Other functions	HDR, HighGain, Color filters*7, Digital zoom, Brightness correction, Tilt correction, White balance*7, Mask outline, Mask function, Color histogram*7, Monochrome histogram*8, Test run, ToolAutoTune*13, Input monitor, Output test, Security settings, Simulator*9, Direct connection (2 units or more), Failing sensor list, Failure hold, Sensor date/time information addition, Scaling function			
Indicators	PWR/ERR, OUT, TRIG, STATUS, LINK/ACT			
Input	Non-voltage input/voltage input is switchable For non-voltage input: ON voltage 2 V or lower, OFF current 0.1 mA or lower, ON current 2 mA (short circuit) For voltage input: Maximum input rating 26.4 V, ON voltage 18 V or higher, OFF current 0.2 mA or lower, ON current 2 mA (for 24 V)			
Inputs	6 inputs (IN1 to IN6)			
Function	IN1: External trigger, IN2 to IN6: Enable by assigning the optional functions Assignable functions: Program switching, Clear error, External master image registration			
Output	Open collector output NPN/PNP is switchable, N.O./N.C. is switchable For open collector NPN output: Maximum rating 26.4 V 50 mA, remaining voltage 1.5 V or lower For open collector PNP output: Maximum rating 26.4 V 50 mA, remaining voltage 2 V or lower			
Outputs	4 outputs (OUT1 to OUT4)			
Function	Enable by assigning the optional functions Assignable functions: Total judge result, RUN, BUSY, Error, Position adjustment result, Judge result of each tool, Result of the logical operation of each tool			
Ethernet*10	Standard	100BASE-TX/10BASE-T		
Connector	M12 4pin connector			
Network function	FTP client, EtherNet/IP™, PROFINET			
Rating	Power voltage	24 VDC ±10% (including ripple)		
Current consumption	0.6 A or less			
Environmental resistance	Ambient temperature	0 to +50°C 32 to 122°F (No freezing)		
Relative humidity	35 to 85% RH (No condensation)			
Vibration*11	10 to 55 Hz, 1.5 mm 0.06" double amplitude, 2 hours each for X, Y, and Z axes			
Shock resistance*11	500 m/s <sup>2</sup> 6 different directions in 3 times			
Enclosure rating*12	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-H1). \*4 When using the FTP client function: 70 pictures  
\*5 When using the FTP client function: 210 pictures \*6 This can be displayed on the intelligent monitor (IV-M30) or by software for IV (IV-H1). \*7 Color type only. \*8 Monochrome type only. \*9 Simulator can be used with the IV software (IV-H1).  
\*10 This is for connection with the intelligent monitor (IV-M30) or software for IV (IV-H1). \*11 Except when IV-H dome attachment (IV-D10) is mounted \*12 Except when polarized filter attachment (OP-87436/OP-87437) is mounted.  
\*13 ToolAutoTune can be used with the Shape Detection, Color Area, and Area tools.

### Monitor



Model	IV-M30
Display	3.5" TFT color LCD 320 × 240 dot (QVGA)
Backlight	Method: White LED Duration: Approx. 50000 hours (25°C 77°F)
Touch panel	Method: Analog resistive Actuating force: 0.8 N or less
Indicators	PWR, SENSOR
Ethernet*1	Standard: 100BASE-TX/10BASE-T Connector: M12 4pin connector
Languages	Japanese/English/German/Simplified Chinese/Traditional Chinese/Italian/ French/Spanish/Portuguese/Korean
Expanded memory	USB memory*2
Rating	Power voltage: 24 VDC ±10% (including ripple) Current consumption: 0.2 A or lower
Environmental resistance	Ambient temperature: 0 to +50°C 32 to 122°F (No freezing) Ambient humidity*3: 35 to 80% RH (No condensation) Vibration: 10 to 55 Hz, 0.7 mm 0.03" double amplitude, 2 hours each for X, Y, and Z axes Drop impact resistance: 1.3 m 4.3' 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 104°F, use it in the absolute humidity of 40°C 104°F, 80% RH or lower.

### PC software

Model	IV2-H1
Compatible series	IV2 Series, IV Series
Included software	IV2 Series: IV2-Navigator, IV Series: IV-Navigator
Interface	Equipped with an Ethernet (100BASE-TX) interface
OS*1	Windows 10 Home/Pro/Enterprise Windows 7 (SP1 or higher) Home Premium/Professional/Ultimate Either of the OS above needs to be pre-installed
Languages*2	English / Japanese / German / Chinese (Simplified) / Chinese (Traditional) / Korean / Italian / French / Spanish / Portuguese / Czech / Hungarian / Polish
Processor	Compliant with OS system requirements
Memory capacity	4 GB or more
Required capacity for installation	4 GB or more
Monitor	Resolution: 1024 × 768 pixels or higher, Display color: High Color (16 bit) or higher
Operating conditions	.NET Framework 4.5.2 or later installed*3 Microsoft Visual C++ 2015 Redistribution Package Update 3 or later installed*3

\*1 32-bit and 64-bit versions supported.  
\*2 When connected to the IV2 Series. When connected to the IV Series, the supported languages are the same as the IV-H1.  
\*3 .NET Framework 4.5.2 will be automatically installed during IV2-H1 installation if .NET Framework 4.5.2 or later version is not installed.  
\*4 IV-Navigator starts when the IV Series is connected.

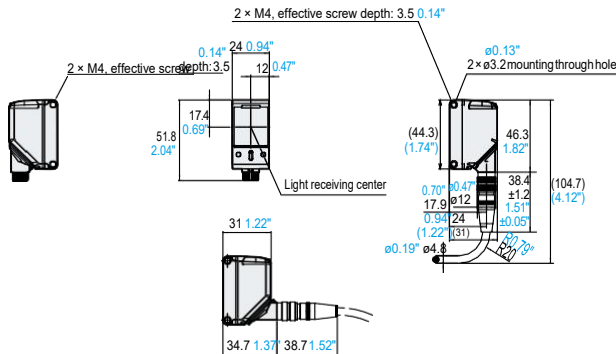
\* Windows is either registered trademark or trademark of Microsoft Corporation in the United States and/or other countries.

# DIMENSIONS

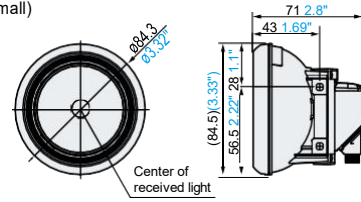
## Ultra-Compact Models

Sensor head

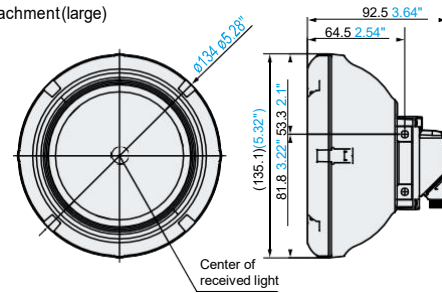
IV-HG500CA/IV-HG500MA/IV-HG150MA/IV-HG300CA/IV-HG600MA



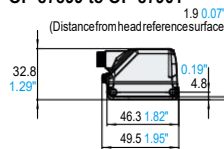
With IV2 dome attachment (small)



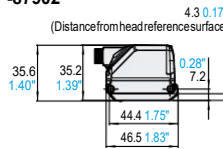
With IV2 dome attachment (large)



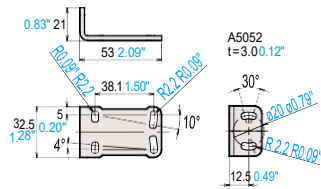
With polarized filter attachment  
OP-87899 to OP-87901



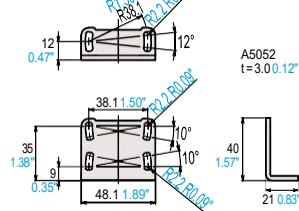
With magnifying lens attachment  
OP-87902



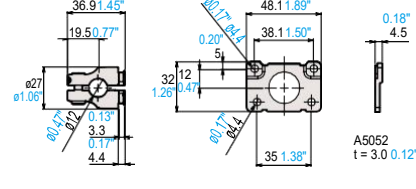
IV-HG vertical mounting bracket OP-87908



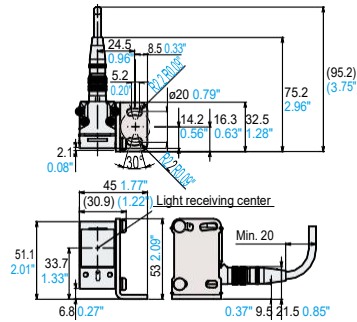
IV-HG rear mounting bracket OP-87909



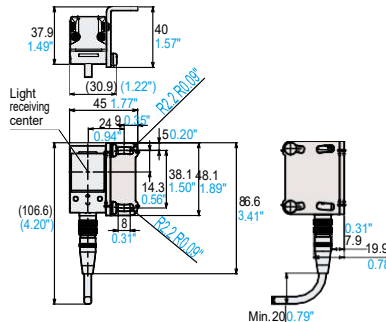
IV-HG adjustable bracket OP-87910



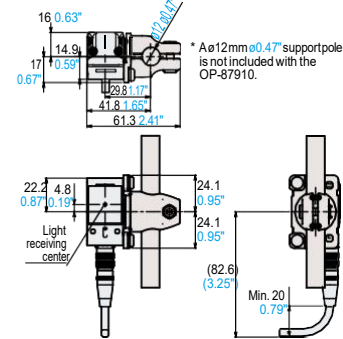
When the IV-HG vertical mounting bracket is attached



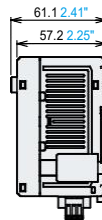
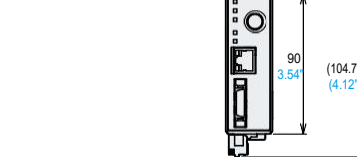
When the IV-HG rear mounting bracket is attached



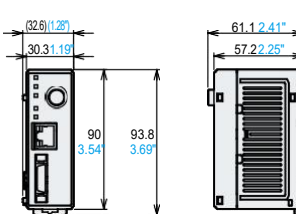
When the IV-HG adjustable bracket is attached



Sensor amplifier main unit  
IV-HG10



Sensor amplifier expansion unit  
IV-HG15



## Wiring/Circuit Diagram

Terminal number and wiring color of the I/O cable for IV-HG Series (OP-87906)

Terminal No.	Wiring color	Name	Assigning default value	Description
A1	Brown	IN1	External trigger ↑	Set external trigger. Rising timing (↑) or falling timing (↓) can be set.
A2	Red	IN2	OFF	Input assignable function • Program bit0 to bit4 • Clear Error • Ext. Master Save • OFF (not used)
A3	Orange	IN3	OFF	
A4	Yellow	IN4	OFF	
A5	Green	IN5	OFF	
A6	Blue	IN6	OFF	
A7	Purple	Unused	Unused	
A8	Gray	Unused	Unused	Unused
A9	White	Unused	Unused	
A10	Black	Unused	Unused	

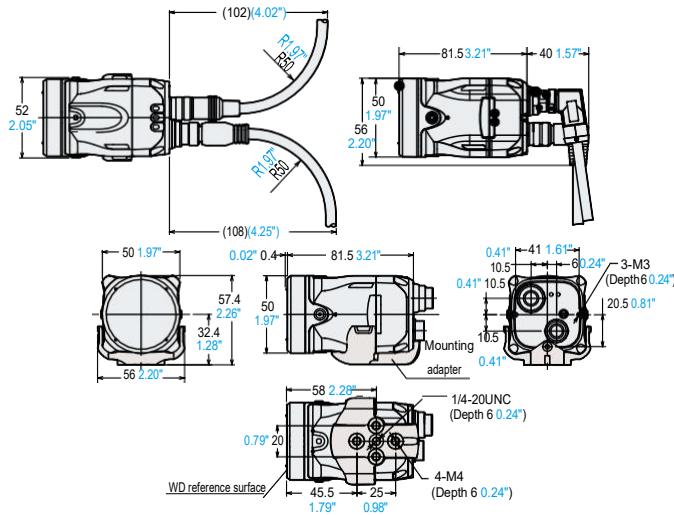
Terminal No.	Wiring color	Name	Assigning default value	Description
B1	Brown	OUT1	Total Status (N.O.)	Output assignable function • Total Status • Total Status NG • RUN • BUSY • Error • Position Adjustment • Status result of each tool (Tool 1 to 16) • Logical operation result of each tool (Logic 1 to 4) • OFF (not used)
B2	Red	OUT2	BUSY (N.O.)	
B3	Orange	OUT3	Error (N.C.)	
B4	Yellow	OUT4	OFF	
B5	Green	OUT5	OFF	
B6	Blue	OUT6	OFF	
B7	Purple	OUT7	OFF	
B8	Gray	OUT8	OFF	
B9	White	Unused	Unused	
B10	Black	Unused	Unused	

Cable specification : AWG28

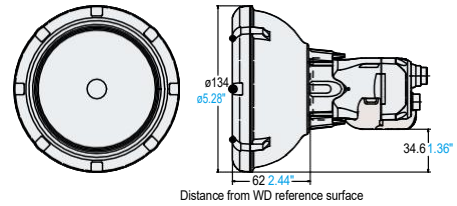
# Amplifier-Integrated Models

Unit: mm inch

Sensor **IV-H500CA/IV-H150MA/IV-H500MA/IV-H2000MA**



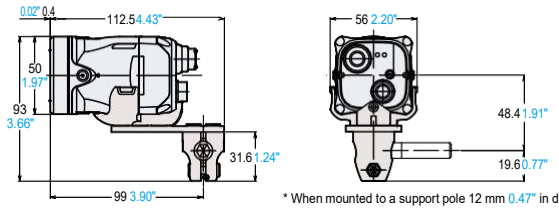
With dome attachment (IV-D10)



Distance from WD reference surface

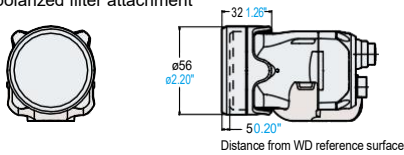
- When using dome attachment, please set the target within the range of 0 to 50 mm 0" to 1.97" from the top.
- Dome attachment can be used for standard distance and close range types.

With adjustable bracket (OP-87685)



\* When mounted to a support pole 12 mm 0.47" in diameter.

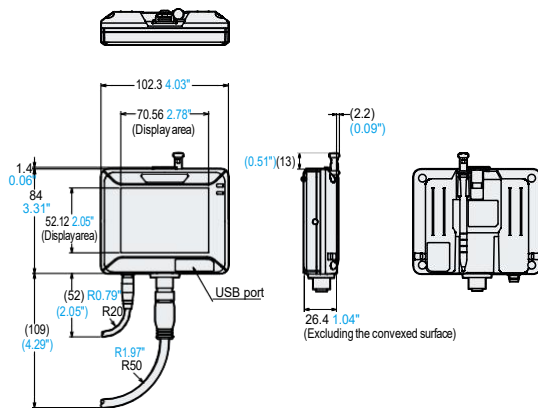
With polarized filter attachment



Distance from WD reference surface

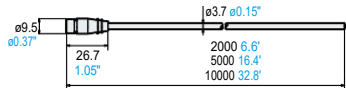
## Intelligent Monitor For Amplifier-Integrated And Ultra-Compact Models

Intelligent monitor **IV-M30**

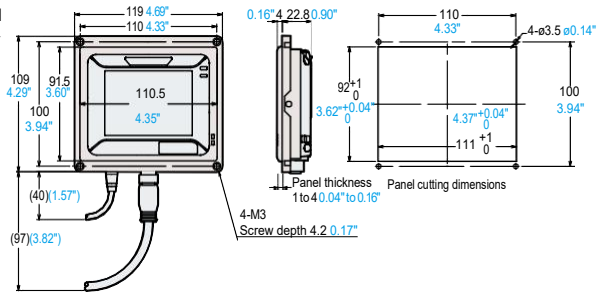


Monitor power cable

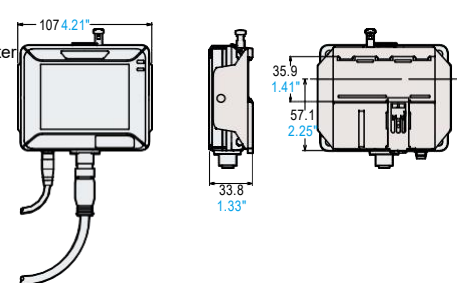
- OP-87443** (2 m 6.6')
- OP-87444** (5 m 16.4')
- OP-87445** (10 m 32.8')



Using the panel mounting adapter



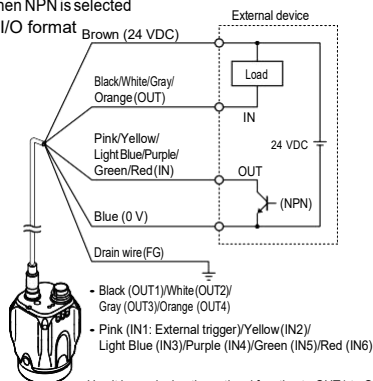
Using the DIN mounting adapter



## Wiring/Circuit Diagram

Selecting NPN output

When NPN is selected in I/O format



Use it by assigning the optional function to OUT1 to OUT4 and IN2 to IN6.

Wiring color	Name	Assigning default value	Description
Brown	24 VDC	-	+ side of power
Blue	0 V	-	- side of power GND of input-output cable
Black	OUT1	Total Status (N.O.)	Output assignable function • Total Status • Tot. StatusNG • RUN • BUSY • Error • Pos. Adj. • Judge result of each tool (Tool 1 to 16) • Logical operation result of each tool (Logic 1 to 4) • OFF (not used)
White	OUT2	BUSY (N.O.)	
Gray	OUT3	Error (N.C.)	
Orange	OUT4	OFF	
Pink	IN1	External trigger ↑	Set external trigger. Rising timing (↑) or falling timing (↓) can be set.

Wiring color	Name	Assigning default value	Description
Yellow	IN2	OFF	Input assignable function • Program bit0 to bit4 • Clear Error • Ext. Master Save • OFF (not used)
Light Blue	IN3	OFF	
Purple	IN4	OFF	
Green	IN5	OFF	
Red	IN6	OFF	
Drain	FG	-	

Cable specification

- Brown/Blue/Black/White/Gray/Orange : AWG25
- Pink/Yellow/Light Blue/Purple/Green/Red: AWG28
- With braided shield cable (with drain cable)

Full lineup of vision systems and image processing equipment to solve a variety of problems

High  
Cost/functionality  
Low

Optimal problem solving capability to meet a variety of needs

**XG-X Series**

The XG-X Series accurately meets all the needs of our customers with its rich lineup of cameras consisting of area cameras, line scan cameras, and 3D cameras; flexible inspection tools; and diverse operations.



The performance of a high-end machine, now easily accessible by anyone

**CV-X Series**

This standard model for worldwide use supports 13 languages and provides the user with both optimal problem solving capability and intuitive usability. As a next-generation image processing sensor, the CV-X Series was designed with the user in mind.



Advanced inspection capability and simple usability

**CV-5000 Series**

The rich variety of inspection tools (of which there are 19 types available) and the camera variations supporting up to 5 megapixels solve all of our customers' problems.



Affordable presence inspections

**IV Series**

Conventionally, presence inspections required multiple sensors and were difficult to set up, but the IV Series can complete these inspections in an easy and affordable manner with a single unit.



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

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- |                         |                       |                   |                        |                        |                        |                      |                        |                          |                     |
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