

### Vision Sensor with Built-in Al

**NEW** IV3 Series



All-in-one presence detection solution





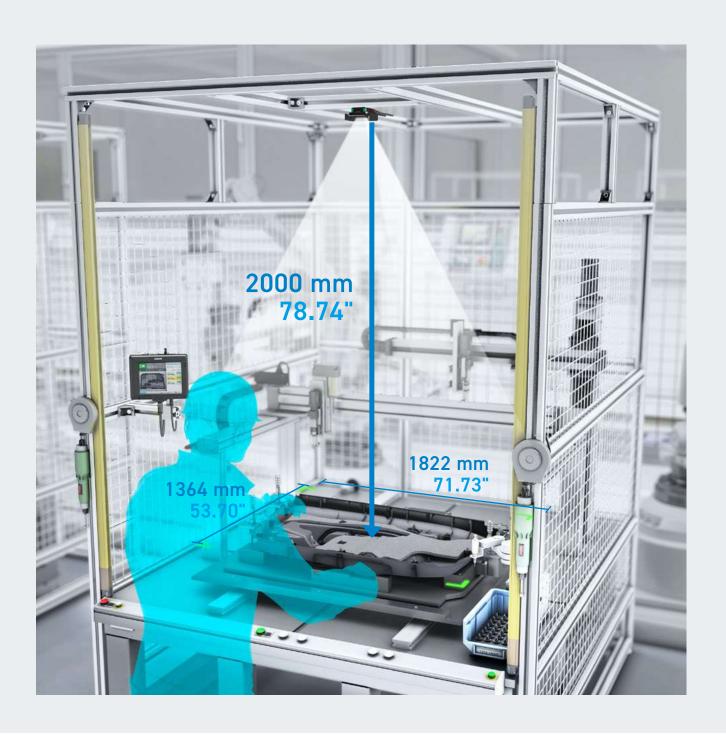
# Smart camera and compact model for use anywhere

### **IV3 Series Vision Sensor with Built-in Al**



# Smart camera and compact model for use anywhere

Semi-automatic assembly processes



#### Megapixel camera for longrange detection over a wide field of view

Perform differentiation inspections in up to 65 locations with just one device. When using infrared lighting, operators are not distracted even if the sensor head is installed 2000 mm 78.74" above the workspace.



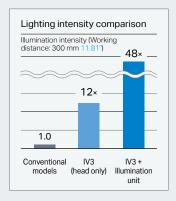




IV3 Series

## High-intensity lighting and Al tools for preventing adverse effects from ambient light

The sensor heads offer 12 times more light intensity than conventional models when used alone or 48 times more powerful when used with an illumination unit. This impressive light intensity enables stable detection with no fluctuations due to ambient light.

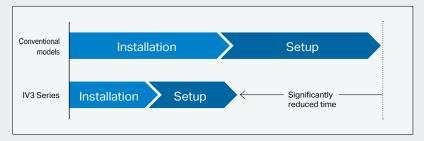




No adverse effects from ambient light or imaging environment changes

## Significantly reduced time spent from installation to setup with PoE and dual Al

With PoE support, installation is easy even in locations with no power supply or where installing a power supply is difficult. In addition, Al imaging and learning tools can significantly reduce the time spent from image capturing to settings configuration.







## Smart camera and compact model for use anywhere

#### **Automatic assembly processes**



## Compact design for easy retrofitting or equipment improvement

The small sensor size  $(24 \times 31 \times 44.3 \text{ mm} 0.94" \times 1.22" \times 1.74")$  allows for flexible, stress-free installation. This opens the door to a wide range of improvements.



## Flexible layout with a connector 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 for greater installability.



#### **Robot assembly processes**



## Robust, integrated design with IP67 enclosure

The smart camera is PoE-compatible, allowing for installation with even minimal wiring. The IP67-rated enclosure also ensures safe use even in environments with exposure to water.



## Conversion connectors with support for common cables

The conversion connectors make it possible to use any available standard cable.



Power supply cable

M12 A-coded 12-pin (included as standard) M12 A-coded 4-pin **OP-88631** M12 L-coded 5-pin **OP-88632** 

Ethernet cable

M12 X-coded 8-pin (included as standard) M12 D-coded 4-pin **OP-88633** 







(Component assembly misalignment check)

#### **i**→ ■ Edge presence





(Type-based difference check of metal components)

#### **Edge** pixels





(Tap processing presence detection)

#### Position adjustment





(Mark presence detection with rotational correction)

#### Diameter





(Diameter-based difference check of metal components)

#### Pitch

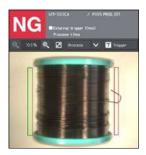




(Pin pitch check)

#### Color/brightness prohibit





(Wire protrusion detection)

#### NEW Multi-position adjustment





(Label and Expiration date detection)

#### SD card compatibility for reliable line operation even if a problem occurs

#### Settings file mirroring function

Setting data can be copied to an SD card for immediate restoration simply by transferring the settings even if the sensor fails.

### Support for up to 128 programs and multi-product production lines

Using an SD card enables up to 128 programs for use in multi-product production lines.

### SDHC UHS1 compatibility, high-speed image data storage

Applicable models	SD card	Number of programs	Image data transfer capacity (typical example)
Compact model	16 GB	128 (32 + 96)	Approx. 156,000 images*
Compact model	4 GB	128 (32 + 96)	Approx. 37,000 images*
Smart camera	8 GB	128 (32 + 96)	Approx. 75,000 images*
Compact model + Smart camera	None	32	_

<sup>\*</sup> Extended programs: Not used

File size varies depending on the image when using JPEG format.





#### Data management and cause analysis support

#### IV3-Navigator (IV3 software)



#### Simulation function

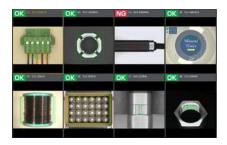




#### At-a-glance status checking of multiple sensors



# Connected sensor list NEW A list of network-connected sensors can be displayed for easy configuration of settings and display switching.



### Simultaneous multi-sensor display screen NEW

Display up to sixteen operation screens at once.

#### Automotive & metal

Lithium-ion battery presence check







Bumper bolt check







Air bag stitching check







Lithium-ion battery orientation check







Sheet right/left check







Bearing roller check







Electronics

IC presence check







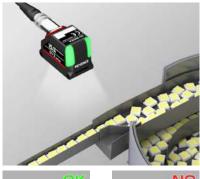
Smartphone component check



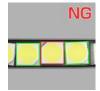




LED direction check







#### Food & pharmaceutical

Test kit product check







Diaper type check







Chocolate quantity check







#### Resin & rubber

Resin part mold check







Gear grease check







Bad mark check on tires







Logistics & robotics

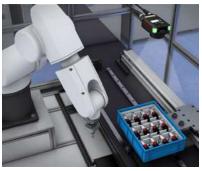
Shipping box stock check







Injector quantity check







Photocopying machine screw check







#### Specifications

#### Smart camera

Model		IV3-500CA	IV3-500MA	IV3-600CA	IV3-600MA				
Туре			ard type		iew type				
Installed distance			1.97" to 78.74"		1.97" to 78.74"				
Field of view			H) × 16 (V) mm 0.87" (H) × 0.63" (V) to 9 (H) × 592 (V) mm 31.06" (H) × 23.31" (V)		H) × 38 (V) mm 2.01" (H) × 1.50" (V) to 2 (H) × 1364 (V) mm 71.73" (H) × 53.70" (V)				
Image receiving elem	nent	1/2.9 inch color CMOS	1/2.9 inch monochrome CMOS	1/2.9 inch color CMOS	1/2.9 inch monochrome CMOS				
	Number of pixels		1280 (H)	× 960 (V)					
Focus adjustment			Au	to*1					
Exposure time				o 10 ms					
	Illumination	White LED	Infrared LED	White LED	Infrared LED				
Light	Lighting method	Pulse lighting/ continuously lighting is switchable.	Pulse lighting	Pulse lighting/ continuously lighting is switchable.	Pulse lighting				
	Available modes	Standard mode / Sorting mode  Learning, Outline, Color area*², Area*³, Edge pixels, Color average*², Brightness average*³, Width, Diameter, Edge presence, Pitch,							
Tool	Available Tool	Learning, Outline, Colo OCR, Color prohibit *1, Br	ightness prohibit, Position adjustment, Hig	gh-speed position adjustment (1-axis edge	; Edge presence, Pitch, e/2-axis edge), Blob count				
C	Number of tools *4			65 tools					
Switch settings (prog	Number of storable images			32 programs (when not using SD card) mages					
Image history*5	Condition			and OK near threshold*6, and All					
	Transfer destination			, FTP server and SFTP server					
Image data transfer	Transfer format								
mage data transiel	Transfer conditions	Selectable between bmp, jpeg, iv3p, and txt, and file names can be modified  Selectable between NG only, NG and OK near threshold*7, and All							
	RUN display			milarity, or degree of similarity bar display					
Analysis information* <sup>7</sup>	RUN information		Switchable between OFF, histogram, pro ogram: Histogram, degree of similarity (Ma Processing time: Processing count: Trigger numbers, Number of OKs, N	ocessing time, count, and output monitor ax., Min., Ave.), Number of OKs, Number of g time (latest, Max., Min., Ave.)	NGs				
	Image capture function	Digital zo	oom (2×, 4×), HDR, High gain, Color filter*2,	White balance*2, Brightness correction, A	Al capture				
Other functions	Tool functions	Additional learning, Mask outline, Masking function, Color extraction/exclusion*2, Color histogram function*2, Monochrome histogram function*3, Scaling function							
Other functions	Utilities	Failing sensor list, Failure hold, Test run, I/O monitor, Security settings (Two-factor password), Simulator*s, Additional FTP/SFTP Image Information,							
	Otilities	Multi-position adjustment, Multi-master in	nage registration, High-speed program switc		packup/restore, Threshold changing in RU				
Indicators				US, LINK/ACT, SD					
		Switchable between non-voltage input and voltage input For no-voltage input: ON voltage 2 V or lower, OF current 0.1 mA or lower, ON current 2 mA (short circuit) For voltage input: Maximum input rating 30 V, ON voltage 18 V or higher, OF current 0.15 mA or lower, ON current 2 mA (for 24 V)							
Input	Number of inputs	6 ports, 3 ports are selectable as IN/OUT							
	Function	IN1: External trigger, IN2, IN3, I/O1 to I/O3: Enable by assigning optional functions Assignable functions: Program switching. Clear error. External master image registration. SD card save cancel							
		Photo MOS relay output, NO./N.C. Switchable Maximum rating 30 V 50 mA, residual voltage 1.5 V or less *9							
Output	Number of outputs	6 ports, 3 ports are selectable as IN/OUT							
Jacpac	Function	Enable by assigning the optional functions  Assignable functions: Total judgment (OK/NG), Run, Busy, Position adjustment result, Judgment result of each tool, Result of the logical operation of each to  Error, SD card error, Variety discrimination result, Master judgment result							
	Connector	M12 12 pin A code Male connector							
Power/I/O	PoE			Class 3/4/6 *10					
	Standard			/100BASE-TX					
Ethernet	Connector			Female connector					
Network function	<u> </u>		FTP client,	SFTP client					
Interface compatibility	Built-in Ethernet		EtherNet/IP®, PROFINET*11, TCP/I	P non-procedure communication					
Expanded memory				oSD/microSDHC)*12					
	Power voltage	24 VDC +25%/-20% (including ripple)*13							
Rating	Consumption current	3.3 A or less (without the Al Lighting unit, and including the output load) 1.8 A or less (Al Lighting unit, and including the output load)*14							
	Operating ambient temperature			104°F (No freezing)					
Environmental	Operating ambient humidity								
resistance	Vibration resistance *15	10 to 55 Hz; double amplitude 1.5 mm 0.06", 2 hours in each of the X, Y, and Z directions							
	Shock resistance *15			in each of the 6 directions					
	Enclosure rating *16	IP67							
Material		Main unit case: Aluminum die-casting/P Indicator light cover: TPU Ethernet connector: Aluminum die-cast		Power connector: Aluminum die-casting Nameplate: PET Water proof cap for the Power connector	or: PC+ABS alloy				
		Front cover: Acrylic (hard coating)  Water proof cap for the Ethernet connector: PC							
Weight			Approx. 300 g 10.59 oz (w Approx. 495 g 17.47 oz	vithout the Al Lighting unit) (with the Al Lighting unit)					

Approx. 495 g17.47 02 (with the At Lighting unit)

1 The focusing position can be automatically adjusted at the time of installation. Disabled during operation. The focusing position can be registered by programs. "2 Color type only. "3 Monochrome type only. "4 Tools can be installed by programs. This is the number of detection tools and position adjustment tools. Up to 64 detection tools can be set. The number of detection tools in Sorting mode are eight tools. "5 Saves to the sensor's internal memory. The images saved to the sensor can be backed up to a USB memory stick inserted into the control panel (IV3-CP50) or to the PC where the software for the IV3 Series (IV3-H1) is being used. "6 Learning tool only. "7 Can also be displayed on the control panel (IV3-CP50) or the software for the IV3 Series (IV3-H1). "9 Make sure to keep a total of each output with 120 mA or less." "10 For a P6 power supply device, IEEE802.3at power class 4 or higher is recommended when using the Al Lighting unit, and IEEE802.3bt power class 6 or higher is recommended when the Al Lighting unit is not used. When using PoE operation may be restricted due to power limitation.
"11 Conformance Class 8, applicable protocol: LLDP, SMMP. "12 Use only products recommended by KEYENCE. "13 When using the OP-88656 (10 m 32.8), the power voltage is 24 V DC +25%-IV36 (including ripple). "14 The peak current is designed to be smaller if the Al Lighting unit is mounted. The peak current is designed to be smaller if the Al Lighting unit is mounted. The peak current is designed to be smaller if the Al Lighting unit is mounted. "15 Except when the dome attachment (IV3-D10) is mounted. "16 Except when the polarizing filter (OP-88640/OP-88640/OP-88645) is mounted."

#### PC software

Model		IV3-H1			
Supported sen	eor	IV3 Series, IV2 Series, IV Series			
Recording soft		For IV3 Series: IV3-Navigator, For IV2 Series: IV2-Navigator, For IV Series: IV-Navigator			
	Interface	Equipped with the Ethernet (1000BASE-T) interface			
System requirements	OS*1	Windows 10 Home/Pro/Enterprise Windows 7 (SP1 or higher) Home Premium/Professional/Ultimate; either OS above needs to be pre- installed			
	Languages*2	English / Japanese / German / Chinese (Simplified) / Chinese (Traditional) /Korean Italian / French / Spanish / Portuguese / Czech / Hungarian / Polish / Thai			
	Processor	Needs to be compliant with system requirements for OS.			
	Memory capacity	4 GB or more			
	Required capacity for installation	4 GB or more			
	Monitor	Resolution: 1024 × 768 pixel or higher, Display: High Color (16 bit) or higher			
	Operating conditions	.NET Framework 4.5.2 must be installed* Microsoft Visual C++ 2017 Redistributable Package must be installed.*3			

<sup>\*1</sup> Supports 32-bit and 64-bit versions. \*2 When connected to the IV3 Series. When connected to the IV/IV2 Series, the supported languages are the same as the IV2-H1. \*3 If this software is not installed, it will be automatically installed when IV3-H1 is installed.

#### Control panel

Control pan						
Model		IV3-CP50				
Supported sen	sor	IV3 Series, IV2 Series, IV Series				
Display		5.7" TFT color LCD 640 × 480 dot (VGA)				
Backlight	Method	White LED				
Dacklight	Duration	Approx. 50000 hours (25°C 77°F)				
Touch panel	Method	Analog resistive				
Touch panel	Actuating force	0.8 N or lower				
Indicators		PWR, SENSOR				
Ethernet*1	Standard	100BASE-TX				
Ethernet	Connector	M12 4 pin connector				
Languages*2		English / Japanese / German / Chinese (Simplified) / Chinese (Traditional) /Korean / Italian / French / Spanish / Portuguese / Czech / Hungarian / Polish / Thai				
Expanded memory		USB flash memory*3				
Ratings	Power voltage	24 VDC ±10% (including ripple)				
Ratings	Current consumption	0.3 A or less				
	Operating ambient temperature	0 to +50°C 32 to 122°F (No freezing)				
Environmental	Operating ambient humidity *4	35 to 85%RH (No condensation)	- ,			
resistance	Vibration resistance	10 to 55 Hz, 0.7 mm 0.03" double amplitude, 2 hours each for X, Y, and Z axes				
resistance	Drop resistance	1.3 m 4.3' over the concrete (2 times each in the arbitrary direction)				
	Enclosure rating	IP40				
Material		Main unit case: PC Power connector: brass + Ni coat Ethernet connector: Zinc + Ni coat, PA USB connector cover: EPDM Pen holder: PC	Hook for adapter: POM LED lamp cover: PC Mounting adapter: PC Stylus: POM			
Weight		Control panel: Approx. 450 g 15.89 oz A mounted with the wall mounting adapter and the stylus: Approx. 485 g 17.12 oz				

<sup>\*1</sup> Especially for connecting to the IV3 Series, IV2 Series, and IV Series. \*2 When connected to the IV3 Series. When connected to the IV3 Series, when connected to the IV3/V2 Series, the supported languages are the same as the IV2-CP50. \*3 Use a product recommended by KEYENCE. \*4 If the ambient temperature exceeds 40°C 104°F, use the sensor head in the absolute humidity of 40°C 104°F 85% RH or lower.

#### Compact model sensor amplifier

Model		IV3-G120				
Available modes		Standard mode / Sorting mode				
Tool	Tool with standard mode	Color prohibit *1, Brightness prohibit, Position adjustment, High-sp	<sup>1</sup> , Brightness average* <sup>2</sup> , Width, Diameter, Edge presence, Pitch, OCR, need position adjustment (1-axis edge/2-axis edge), Blob count			
	Number of tools *3	Total: 65 tools				
Switch settings (programs)		128 programs (when using SD card) / 32 programs (when not using SD card)				
mage history*4	Number of storable images	100 images				
mage matery	Save conditions	Selectable between NG only, NG and OK near threshold*5, and Al				
	Transfer destination	Selectable between SD card, FTP server, and SFTP server				
mage data transfer	Transfer format	Selectable between bmp, jpeg, iv3p, and txt, and file names can be modified				
	Transfer conditions	Selectable between NG only, NG and OK near threshold*s, and All				
	RUN display	Tools list (Judgment results, degree of similarity, or degree of sim				
Analysis information* <sup>6</sup>	RUN information	Switchable between OFF, histogram, processing time, count, and output monitor Histogram; Histogram, degree of similarity (Max., Min., Ave.), Number of OKs, Number of NGs Processing time: Processing time (latest, Max., Min., Ave.) Count: Trigger numbers, Number of OKs, Number of NGs, Trigger errors Output monitor: ON/OFF status by output				
	Image capture function	Digital zoom (2×, 4×), HDR, High gain, Color filter*1, White balance				
Other functions	Tool functions	Additional learning, Mask outline, Masking function, Color extract Color histogram function*1, Monochrome histogram function*2, S	cion/exclusion*1, Scaling function			
Other functions	Utilities	Failing sensor list, Failure hold, Test run, I/O monitor, Security settings (Two-factor password), Simulator**, Additional FTP/SFTP Image Information, Multi-position adjustment, Multi-master image registration, High-speed program switching, Auto program switching, Auto setting backup/restore, Threshold changing in RUN				
ndicators		PWR/ERR, OUT, TRIG, STATUS, LINK/ACT, SD				
Input Number of inpute		Switchable between non-voltage input and voltage input For no-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 0.15 mA or lower, ON current 2 mA (for 24 V)				
pac	Number of inputs	8 (IN1 to IN8)				
	Function	IN1: External trigger, IN2 to IN8: Enable by assigning optional functions Assignable functions: Program switching, Clear error, External master image registration, SD card save cancel				
		Photo MOS relay output, N.O./N.C. Switchable Maximum rating 26.4 V 50 mA, residual voltage 1.5 V or less*8				
Output	Number of outputs	8 (OUT1 to OUT8)				
ошри	Function	Enable by assigning the optional functions Assignable functions: Total judgment (OK/NG), Run, Busy, Position adjustment result, Judgment result of each tool, Result of the logical operation cleach tool, Error, SD card error, Variety discrimination result, Master judgment result				
Ethernet	Standard	1000BASE-T/100BASE-TX				
trierriet	Connector	RJ-45 8pin connector				
Network function		FTP client, SFTP client				
nterface compatibility	Built-in Ethernet	EtherNet/IP®, PROFINET*9, TCP/IP non-procedure communication				
псенасе сотпраціянту	Communication unit*10	EtherCAT®, CC-Link, DeviceNet®, RS-232C, PROFIBUS				
xpanded memory		SD card (SD/SDHC)*11				
	Power voltage	24 VDC ±10% (including ripple)				
Rating	Consumption current	2.2 A or less (including a communication unit, without the Al Ligh 3.4 A or less (including a communication unit, with the Al Lighting				
Environmental resistance	Ambient temperature	0 to +40°C 32 to 104°F (No freezing)*7				
LIVII O III I EI I LAI I ESISTATICE	Relative humidity	35 to 85%RH (No condensation)				
Material		Main unit case: PC I/O terminal block: PA Ethernet connector: Copper alloy + Ni plating Main unit rear DIN rail fixing tab: POM	Power connector: PA/POM Sensor head connector: Zinc + Ni plating/PA Main unit rear heat sink: Aluminum Nameplate: PC			
Weight		Approx. 300 g 10.59 oz				

<sup>\*1</sup> Color type only. \*2 Monochrome type only. \*3 Tools can be installed by programs. This is the number of detection tools and position adjustment tools. Up to 64 detection tools can be set. The number of detection tools in Sorting mode are eight tools. \*4 Saves to the sensor amplifier's internal memory. The images saved to the sensor amplifier can be backed up to a USB memory stick inserted into the control panel (IV3-CP50) or to the PC where the software for the IV3 Series (IV3-H1). \*1 being used. \*5 Learning tool only. \*6 Can also be desiplayed on the control panel (IV3-CP50) or the Software for the IV3 Series (IV3-H1). \*1 being used. \*5 Learning tool only. \*6 Can also be desiplayed on the control panel (IV3-CP50) or the PC where the software for the IV3 Series (IV3-H1). \*8 Make sure to keep a total of each output with 160 mA or less. \*9 Conformance Class B, Applicable protocol: LLDP, SNMP. \*10 When a communication unit (IDL Series) is connected. \*11 Use only products recommended by KEYENCE.

#### Compact model sensor head

Model		IV3-G500CA	IV3-G500MA	IV3-G600CA IV3-G600MA				
Туре		Standar	rd type	Wide view type				
Installed distan	ce	50 to 2000 mm	1.97" to 78.74"	50 to 2000 mm 1.97" to 78.74"				
Field of view (ty	pical example)	Installed distance 50 mm 1.97": 22 (H) × 16 (V) mm 0.87" (H) × 0.63" (V) Installed distance 2000 mm 78.74": 789 (H) × 592 (V) mm 31.06" (H) × 23.31" (V)		Installed distance 50 mm 1.97": 51 (H) × 38 (V) mm 2.01" (H) × 1.50" (V) Installed distance 2000 mm 78.74": 1822 (H) × 1364 (V) mm 71.73" (H) × 53.7				
Image receiving	element	1/2.9 inch color CMOS	1/2.9 inch monochrome CMOS	1/2.9 inch color CMOS	1/2.9 inch monochrome CMOS			
	Number of pixels	1280 (H) × 960 (V)						
Focus adjustme	ent		Au	ito*1				
Exposure time		12 µs to 9 ms	12 μs to 9 ms*2	12 µs to 9 ms	12 μs to 9 ms*2			
Light	Illumination	White LED	Infrared LED	White LED	Infrared LED			
	Lighting method	Pulse /continuous lighting is switchable.	Pulse lighting	Pulse /continuous lighting is switchable.	Pulse lighting			
Indicators 2 (the same display details for both indicators)								
	Operating ambient temperature	0 to +40°C 32 to 104°F (No freezing)						
Environmental	Operating ambient humidity	35 to 85% RH (No condensation)						
resistance	Vibration resistance *3	10 to 55 Hz; double amplitude 1.5 mm 0.06"; 2 hours in each of the X, Y, and Z directions						
	Shock resistance *3	500 m/s² 1640/s², 3 times in each of the 6 directions						
	Enclosure rating *4	IP67						
Material		·	Main unit case: Zinc die-casting, Front co	ver: Acrylic, Operation indicator cover: TPU	<u> </u>			
Weight		Approx. 75 g 2.65 oz (without the Al Lighting unit) Approx. 225 g 7.94 oz (with the Al Lighting unit)						

<sup>\*1</sup> The focus position can be automatically adjusted at the time of installation. This function is deactivated during operation. A different focus position can be registered for each program. \*2 When the Al Lighting unit is mounted, the maximum exposure time is 6.25 ms. \*3 Except when the dome attachment (IV2-GD05/IV2-GD10) is mounted. \*4 Except when the polarizing filter (OP-88642/OP-88643/OP-88647) is mounted.

#### Al imaging illumination unit

Model		IV3-L5C	IV3-L5M	IV3-L6C	IV3-L6M	IV3-LG5C	IV3-LG5M	IV3-LG6C	IV3-LG6M
Compatible sense	or	IV3-500CA IV3-500MA IV3-600CA IV3-600MA IV3-G500CA IV3-G500CA IV3-G500MA						IV3-G600MA	
Light	Light source	White LED	Infrared LED	White LED	Infrared LED	White LED	Infrared LED	White LED	Infrared LED
Power supply		Power is supplied by the connected sensor							
Environmental	Ambient temperature	0 to +40°C 32 to 104°F (No freezing)							
resistance	Relative humidity	35 to 85%RH (No condensation)							
	Enclosure rating	IP67*1							
Material		Case: Aluminum die-casting Front cover: Acrylic			:	Front cov	m die-casting/PBT or: Zinc + Ni plating/PA er: Acrylic i plating, TPEE		
Weight		Approx. 195 g 6.88 oz Approx. 150 g 5.30 oz							

<sup>\*1</sup> Applicable only when mounted to a compatible sensor. Except when the polarizing filter (OP-88644/OP-88645/OP-88646/OP-88647) is mounted.