

# Vision System with Built-in Al

**NEW** VS Series



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# Two AI technologies

# for automation of previously impossible vision inspections

[Technology 1] Increased detection performance: Proprietary KEYENCE algorithm for smart camera-based 25-megapixel high-accuracy Al inspection

[Technology 2] Increased operational efficiency: Quick and easy startup using a general-purpose PC and only a few dozen images for learning





# Optimal tools × Optimal image creation to meet a wide variety of inspection needs



## Lineup



Standard zoom smart camera **VS-L** 



Short-range zoom smart camera **VS-S** 



C-mount smart camera **VS-C** 

## Optimal inspection tools [Two Al tools + Rule-based tools]

The combination of both supervised and unsupervised Al tools alongside rule-based inspection tools provide flexible solutions to a wide variety of vision applications.



## Optimal image creation [ZoomTrax × Specialized imaging]

Award-winning imaging and illumination tools such as LumiTrax, Multi-Spectrum, and ZoomTrax make it possible to create the ideal image for stable inspection.







Multi-spectrum lighting

High-intensity smart ring illumination

## **Optimal inspection tools** Two AI tools × Rule-based tools

Improving yield rates by reducing excessive detection of good products and minimizing accidental shipment of defective products is incredibly difficult.



# Improve flexibility through supervised and unsupervised AI learning + rule-based inspection tools



AI Classification



## Application-specific AI tools × Rule-based tools



## The right tool for the right application

Take advantage of two AI tools along with rule-based tools to supercharge any inspection.





# Two AI tools × Rule-based tools



3

Al lea

Rule-base system

Supervise Al learnin

# **Rule-Based Inspection**

# Detection based on size and count:

# Cast holes



#### Challenge with conventional appearance inspection

# Al results do not provide size or count results

Setting judgment conditions for size or count are not possible with Al.

#### Solution with the VS Series

#### Detect size and count of defects that AI Tools flag using rule-based tools

Defective areas detected by Al tools can be reinspected with rule-based inspection tools to set judgment conditions for defect size and count.



## Three tools for optimizing inspection performance

### Prevention of accidental shipment of defective products



### Yield rate improvement



Two AI tools × Rule-based system



prevent accidental shipment of defective products.



# Al learning

Al that can handle variations in good products without sacrificing operating speed makes it possible to improve yield rates.

Simultaneous elimination of accidental shipment of defective products and improved yield rate

## KEYENCE proprietary AI: Immediate usability with only a few sample products

Conventional AI learning requires a large number of images (hundreds to thousands) to achieve the desired detection performance. With the VS Series, however, the AI tools offer impressive detection performance with only a small number of images (from just a few to several dozen), significantly reducing startup time.

#### Number of images required for learning before operation



Maximum detection capability by learning just a small number of images

Significantly reduced startup time

## Automatic selection of images for learning Al Auto Image Selector

With conventional AI systems, users have to select the images to use for learning manually, requiring a certain level of experience and a lot of time. With AI Auto Image Selector, the software automatically selects the images for learning, eliminating the need for specialized skills and significantly reducing the time needed for learning.



The Auto Image Selector automatically repeats learning until clear separation of results is possible.

No need for trial and error or special skills

# Significantly reduced time and effort spent on learning

Ideal inspection image creation ZoomTrax × Specialized imaging

Image optimization used to require a great amount of time and skill.



# Adjust focus and field of view with one click



![](_page_12_Picture_0.jpeg)

## Optical zoom with no loss in resolution: ZoomTrax

A series of mechanical zoom lenses allows a single camera to be used across a wide range of mounting distances and fields of view without changing lenses.

Customized CMOS sensors are available from 1.6 to 15 MP. By integrating a series of 19 lenses and a CMOS sensor, the VS Series realizes high-grade optical performance with minimal distortion.

![](_page_12_Picture_4.jpeg)

## Simply specify the area to get the best field of view and resolution

Using optical zoom, the VS can easily change the field of view without sacrificing resolution. All adjustments can be completed from the software. No mechanical changes necessary!

![](_page_12_Picture_7.jpeg)

## Optimized images for robust inspections

The VS Series utilizes a unique auto-focus algorithm to create the best image. This optimizes images for code reading, measurement, and flaw detection applications that require high resolution.

![](_page_12_Picture_10.jpeg)

# Our commitment to easy installation

We considered every possible issue that you may encounter with camera installation. No control panel is required, so it can be installed immediately, anytime, before or during projects. Laser pointer for easy installation

![](_page_13_Picture_4.jpeg)

## OLED Display

View connection status, IP address, and other settings directly on the camera.

## **IP67** Rated

A double-packed structure ensures a high level of waterproofing.

![](_page_13_Picture_9.jpeg)

### PoE

Supply power to both the camera and light with one cable using Power over Ethernet.

![](_page_13_Figure_12.jpeg)

## Lighting techniques and algorithms for reliable inspections

KEYENCE's high-intensity smart ring light features snap-on installation and the ability to cut ambient light as well as advanced algorithms that adapt to changes in the environment.

# High-intensity lighting 20 times brighter than conventional models

Overdrive lighting delivers high-intensity light using a burst-release of accumulated charge.

![](_page_14_Picture_4.jpeg)

A newly designed custom aspheric lens is installed on each of the LEDs. This creates clear, uniform images even over larger fields of view.

Conventional ring light illumination High-intensity smart ring illumination

![](_page_14_Picture_8.jpeg)

### **Fine HDR**

Uniform images can be captured by correcting the contrast with one image capture. Multiple image captures are not required, so the VS Series can be used on high-speed lines.

![](_page_14_Picture_11.jpeg)

![](_page_14_Picture_12.jpeg)

## LumiTrax Glare Reduction

LumiTrax mode combines smart ring lighting techniques with proprietary algorithms to minimize glare.

![](_page_14_Picture_15.jpeg)

# Optimal image creation with vision-guided robotics

## Fixed and on-hand camera support

# Improved stability of vision-guided robotics

The VS series improves vision-guided robotics applications by utilizing ZoomTrax, smart cameras, and high intensity smart ring illumination functions for greater imaging and environmental stability.

![](_page_15_Picture_4.jpeg)

## Bright, uniform illumination even over a wide field of view Fine HDR

With a wider field of view, brightness can be uneven with a noticeable difference in intensity between the center and the edges of the screen. Advanced imaging technologies such as overdrive lighting with high-intensity smart rings and HDR capturing help to minimize such differences even with a wide field of view.

![](_page_16_Picture_2.jpeg)

## Support for multiple pallets and tooling changeover ZoomTrax

![](_page_16_Figure_4.jpeg)

## Optimal hardware for on-hand picking Internal wiring

A wider range of on-hand applications is possible thanks to on-robot PoE connectivity, IP67 environmental resistance, and a lightweight C-mount design.

![](_page_16_Picture_7.jpeg)

Connects to internal wiring, which prevents cable breakage

Robust IP67 enclosure rating

Lightweight C-mount design option

![](_page_16_Picture_11.jpeg)

# VS Creator for quick programming of any inspection

# Create both simple and sophisticated inspections Quick inspection creation with one software package

VS Creator is designed to be both easy to use and intuitive, allowing for flexible creation of inspection applications to suit a wide variety of needs.

![](_page_17_Figure_3.jpeg)

![](_page_18_Picture_0.jpeg)

## Capable, flexible, and easy to understand

The number of inspection tools needed tends to increase with application complexity. The VS Series keeps it simple and organized.

#### Step layout made in four steps

#### Free layout for easy organization

![](_page_18_Figure_5.jpeg)

Check inspection items at a glance

### Link tool results with ease

Create complex inspections by linking tools using conditional formatting.

![](_page_18_Figure_9.jpeg)

# Vision dashboard — Immediate data utilization

# Instantaneous data utilization and screen customization

The Vision Dashboard significantly reduces the time required for data utilization compared to conventional systems. The various tools and dashboard components also make operation screen customization incredibly easy.

![](_page_19_Picture_3.jpeg)

## Quickly access necessary data

Create lists and graphs in an instant by utilizing standard spreadsheet functions.

			1	tem Name	• Measure	ed Value				
Drag & drop to link data				udgment		True		Creat	te various cha	rts with
			I	Edge Width		136.365		just a	few clicks	
	A		C	D	E	F	G	Н	I	J
1										
2	Judgment	TRUE	TRUE	TRUE	TRUE	TRUE				
3	Edge Width	137.0	137.2	137.4	137.1	136.9		138	٠	
4	Upper Limit	140.0 🗘	137.0 🗘	137.0 🗘	137.0 🗘	137.0 🗢		137.5-		
5	Lower Limit	136.0 🗘	136.0 🗘	136.0 🗘	136.0 🗘	136.0 🗢				
6						in fait		137-		
7										
8								136.5-		
9	<b>Execution Count</b>	1000	1000	1000	1000	1000		150.5		
10	Pass Count	950	970	960	975	990		126		
11	Fail Count	50	30	40	25	• 10		150	Edge Width	
12	Yield	95.0%	97.0%	96.0%	97.5%	99.0%				
12										

Use auto-fill to generate detailed tables

## Quick calculations using selected data

Formulas can be easily applied using the same rules as common spreadsheet software. You can also calculate multiple cells in a batch.

Example Calculating maximum va	lue				
Tool[0001]		А	В		
Intensity	1	Intensity Average 1	130.5		
Tool[0002]	2	Intensity Average 2	189.3		
Intensity	3	Intensity Average 3	160.1		
Tool[0003]	4	Maximum Value	=MAX(B1:B3)		
Intensity	5				

Easy calculation using familiar formulas —

# Intuitive operation screens for onsite use

# Easy operation screen customization

# Custom Screen

Dedicated screens that are easy to use for onsite personnel can improve overall efficiency, but making the screens can take a long time. Custom Screen makes it easy to create intuitive, user-friendly operation screens quickly.

![](_page_21_Picture_4.jpeg)

Multiple image processing screens displayed side by side

Customizable graphical component locations

History and NG image displays

## Easy-to-view screens for onsite use

When it comes to factory automation, screens that are clear and easy to read are important. Custom Screen makes it easy to create highly visible components such as buttons, text, and graphs.

![](_page_22_Figure_2.jpeg)

Page switching to suit onsite needs

## Intuitive screen editing

Values and input boxes can be easily arranged by dragging & dropping or by right-clicking and choosing the desired component. Intuitive PC operations make it easy to bring ideas to life on the screen.

	Position X	1085.829	Drag & drop function components	onality for arranging
	Position Y	786.508	Position X	1085.829
• <b>F</b> <sup>96.1</sup> •	Match %	-0.008 96.063	Position Y	786.508
	Minimum Match %	60.000 💭	Angle	-0.008
			Match %	96.063

## Web-based HMI

Custom operation screens can be used on a wide variety of network-connected display devices. Multiple camera screens can also be displayed on the same device, allowing for a wider choice of usable displays to fit a wider variety of equipment.

![](_page_22_Figure_9.jpeg)

# Utilities to facilitate troubleshooting and repeat deployments

# Quick startup, scaling, and troubleshooting Capture Replication function

![](_page_23_Picture_2.jpeg)

Suppose you want to reproduce lab conditions or need to fix a deployed camera that has been bumped or moved... ZoomTrax's Capture Replication function can instantly replicate the lens setup from a previous test or deployment based on a registered image. This can further reduce the time required to complete installation on-site.

![](_page_23_Picture_4.jpeg)

Al reproduces the imaging used in testing by automatically adjusting the field of view, focus, and exposure time.

#### When setup reproduction is necessary

Reproducing a setup for repeated expansion of lines

![](_page_23_Picture_8.jpeg)

Correcting device position when it shifts due to collision

![](_page_23_Picture_10.jpeg)

Replicating setup for repair or replacement

![](_page_23_Picture_12.jpeg)

![](_page_24_Picture_1.jpeg)

# Visualizing communication Communication debugging function

![](_page_24_Picture_3.jpeg)

Connecting and coordinating communication is a tedious task when setting up a system. The VS Series offers two visualization utilities that solve common communication issues.

#### Communication monitor

Camera R	eceive Da	ita	Camera S	end Data		
Address	Value	Description	Address	Value	Description	
2.3		Result Ack	2.0		Pass e	Signal address and status are listed
2.4		Go to Run	2.1		Fail	
2.5		Go to Setting	2.2		Reserved	
2.6		Error0 Clear	2.3		Result Ready	
2.7		Error1 Clear	2.4		Run Status	Simple list format to establish connection with
3.0		Command Request	2.5		Reserved	Ethernet/IP™, PROFINE I, and PLC Link

#### Timing chart monitor

![](_page_24_Figure_8.jpeg)

Changes in signals over time can be visualized Timing errors and missing signals can be analyzed

## Restore data after accidental overwrite Automatic backup of setup

![](_page_24_Picture_11.jpeg)

The most recent editing history is automatically backed up on the computer. Settings can be restored immediately if a problem arises.

This helps prevent the added work of recreating the settings.

![](_page_24_Figure_14.jpeg)

The last 20 automatic backups are stored on the computer.

Settings can be quickly restored from the history.

# Three types of smart cameras to support any application

![](_page_25_Picture_1.jpeg)

![](_page_26_Picture_0.jpeg)

![](_page_26_Picture_1.jpeg)

# Easy four-step process for selecting your optimal hardware

![](_page_27_Picture_2.jpeg)

## step.2 Select the camera resolution

## Selecting a zoom camera

Select the resolution according to your application.

![](_page_27_Figure_6.jpeg)

Supported target sizes and resolutions are listed on the field of view chart on page 30.

![](_page_28_Picture_0.jpeg)

![](_page_28_Picture_1.jpeg)

STEP.3 Select the lighting

# Smart ring lighting, High intensity

The lineup of camera-integrated lighting covers a wide range of applications.

![](_page_28_Picture_5.jpeg)

Smart ring lighting, High intensity CA-DEW10X (white)

![](_page_28_Picture_7.jpeg)

Smart ring lighting, High intensity CA-DER10X (red)

![](_page_28_Picture_9.jpeg)

Smart ring lighting, High intensity CA-DEB10X (blue)

![](_page_28_Picture_11.jpeg)

Smart ring lighting, High intensity CA-DEIR10X (near-infrared)

# Additional Lighting Options

The lineup includes lighting of various shapes and sizes, which can be matched to your application and detection requirements.

![](_page_28_Picture_15.jpeg)

Multi-spectrum lighting CA-DRMxX

![](_page_28_Picture_18.jpeg)

Bar lights CA-DB **CA-DBxW** 

![](_page_28_Picture_20.jpeg)

Back lights

CA-DS

Coaxial lights (on-axis) CA-DX

Dome lights CA-DD

![](_page_28_Picture_24.jpeg)

## STEP.4

## Select optional mounting

CA-DQxM

## Different mounting jigs to meet your specific installation needs

\* Other mounting jigs are listed on page 31.

![](_page_28_Picture_29.jpeg)

![](_page_28_Picture_30.jpeg)

#### Field of view information for standard zoom smart cameras

![](_page_29_Figure_2.jpeg)

	Working distance	Field of view	Pixel resolution				
	150 mm	18 to 138 mm	12 to 95 μm				
	5.91"	0.71" to 5.43"	0.47 to 3.74 Mil				
VS-L160	1000 mm	<mark>94 to</mark> 818 mm	<mark>65</mark> to 568 μm				
	39.37"	3.70" to 32.20"	2.56 to 22.36 Mi				
	3000 mm	274 to 2418 mm	<mark>190</mark> to 1679 μm				
	118.11"	10.79" to 95.20"	7.48 to 66.10 Mil				
	150 mm	25 to 138 mm	12 to 67 μm				
	5.91"	0.98" to 5.43"	0.47 to 2.64 Mil				
VS-L320	1000 mm	134 to 818 mm	65 to 399 μm				
	39.37"	5.28" to 32.20"	2.56 to 15.71 Mil				
	3000 mm	390 to 2418 mm	<mark>190</mark> to 1180 μm				
	118.11"	15.35" to 95.20"	7.48 to 46.46 Mil				
	150 mm	31 to 138 mm	12 to 56 μm				
	5.91"	1.22" to 5.43"	0.47 to 2.20 Mil				
VS-L500	1000 mm	162 to 818 mm	65 to 331 μm				
	39.37"	6.38" to 32.20"	2.56 to 13.03 Mil				
	3000 mm	470 to 2418 mm	190 to 981 µm				
	118.11"	18.50" to 95.20"	7.48 to 38.62 Mil				
	150 mm	55 to 138 mm	13 to 31 µm				
	5.91"	2.17" to 5.43"	0.51 to 1.22 Mil				
VS-L1500	1000 mm	289 to 818 mm	65 to 185 μm				
	39.37"	11.38" to 32.20"	2.56 to 7.28 Mil				
	3000 mm	839 to 2418 mm	190 to 549 μm				
	118.11"	33.03" to 95.20"	7.48 to 21.61 Mil				

Field of view information for short-range zoom smart cameras

![](_page_29_Figure_5.jpeg)

	Working distance	Field of view	Pixel resolution	
	50 mm	16 to 57 mm	11 to 39 μm	
	1.97"	0.63" to 2.24"	0.43 to 1.54 Mil	
VS-S160	150 mm	37 to 137 mm	<mark>25</mark> to 95 μm	
	5.91"	1.46" to 5.39"	0.98 to 3.74 Mil	
	500 mm	116 to 417 mm	<mark>80</mark> to 289 μm	
	19.69"	4.57" to 16.42"	3.15 to 11.38 Mil	
	50 mm	22 to 57 mm	11 to 28 μm	
	1.97"	0.87" to 2.24"	0.43 to 1.10 Mil	
VS-S320	150 mm	54 to 137 mm	<mark>26</mark> to 67 μm	
	5.91"	2.13" to 5.39"	1.02 to 2.64 Mil	
	500 mm	166 to 417 mm	<mark>81</mark> to 203 μm	
	19.69"	6.54" to 16.42"	3.19 to 7.99 Mil	
	50 mm	27 to 57 mm	11 to 23 μm	
	1.97"	1.06" to 2.24"	0.43 to 0.91 Mil	
VS-S500	150 mm	66 to 137 mm	<mark>26</mark> to 55 μm	
	5.91"	2.60" to 5.39"	1.02 to 2.17 Mil	
	500 mm	200 to 417 mm	<mark>81</mark> to 169 μm	
	19.69"	7.87" to 16.42"	3.19 to 6.65 Mil	
	50 mm	49 to 57 mm	11 to 13 μm	
	1.97"	1.93" to 2.24"	0.43 to 0.51 Mil	
VS-S1500	150 mm	118 to 137 mm	<mark>26</mark> to 31 μm	
	5.91"	4.65" to 5.39"	1.02 to 1.22 Mil	
	500 mm	358 to 417 mm	<mark>81 to 94 μm</mark>	
	19.69"	14.09" to 16.42"	3.19 to 3.70 Mil	

Supported communication protocol(s) Communication networks (standard equipment) PLC LINK Ether Net/IP

![](_page_29_Picture_9.jpeg)

![](_page_30_Figure_1.jpeg)

OP-88828

(32 GB) CA-MSD64G (64 GB)

illumination controller)

#### Standard zoom smart camera/Short-range zoom smart camera

			VS-L	XMX			VS-LxxxCX			VS-SxxxMX				VS-SxxxCX			
Model		160	320	500	1500	160	320	500	1500	160	320	500	1500	160	320	500	1500
	Internal storage	3 GB	7 GB	7 GB	7 GB	3 GB	7 GB	7 GB	7 GB	3 GB	7 GB	7 GB	7 GB	3 GB	7 GB	7 GB	7 GB
Storage	microSD card (external)*1								Max. 6	64 GB							
Image sensor	Frame rate	85 fps	83 fps	81 fps	48 fps	85 fps	83 fps	81 fps	48 fps	85 fps	83 fps	81 fps	48 fps	85 fps	83 fps	81 fps	48 fps
	Mount		Lens-integrated type														
Lens	Max. optical magnification	× 8.75	× 6.0	× 5.0	× 2.75	× 8.75	× 6.0	× 5.0	× 2.75	× 3.5	× 2.4	× 2.0	× 1.1	× 3.5	× 2.4	× 2.0	× 1.1
	Installation distance*2		150 mm to 5000 mm 5.91" to 196.85" 50 mm to 500 mm 1.97" to 19.69"														
1/0	Number of inputs								1 (insu	ilated)							
connection	Number of outputs								3 (insu	ilated)							
	Number of inputs/outputs							2 (insulated)	(input and ou	tput switche	d via settings	)					
	Ethernet							PoE	IEEE 802.3at	, M12 X cabl	e×1						
I/F	1/0							1 ln/	3 Out/2 In, Ou	ut M12 A cab	le×1						
	Lighting interface							Dedicate	ed lighting coi	nnection inte	erface × 1						
	External media		1	[	1.6.14		1	m	ICTOSD Card s	10t × 1 (UHS-	· I)		1.6.M				1.6.14
	Imaging mode	1.6 M	1.6 M 3.2 M	1.6 M 3.2 M 5 M	3.2 M 5 M 15 M	1.6 M	1.6 M 3.2 M	1.6 M 3.2 M 5 M	3.2 M 5 M 15 M	1.6 M	1.6 M 3.2 M	1.6 M 3.2 M 5 M	3.2 M 5 M 15 M	1.6 M	1.6 M 3.2 M	1.6 M 3.2 M 5 M	3.2 M 5 M 15 M
Functions	Output image pixels	(1.6 M mode) 1440×1072 1072×1440 1248×1248 1664×928 928×1664 2160×720 720×2160	(3.2 M mode) 2048×1536 1536×2048 1776×1776 2368×1328 1328×2368 3072×1024 1024×3072	(5 M mode) 2544×1904 1904×2544 2224×2224 2976×1664 1664×2976 3824×1280 1280×3824	(15 M mode) 4400×3296	(1.6 M mode) 1440×1072 1072×1440 1248×1248 1664×928 928×1664 2160×720 720×2160	(3.2 M mode) 2048×1536 1536×2048 1776×1776 2368×1328 1328×2368 3072×1024 1024×3072	(5 M mode) 2544×1904 1904×2544 2224×2224 2976×1664 1664×2976 3824×1280 1280×3824	(15 M mode) 4400×3296	(1.6 M mode) 1440×1072 1072×1440 1248×1248 1664×928 928×1664 2160×720 720×2160	(3.2 M mode) 2048×1536 1536×2048 1776×1776 2368×1328 1328×2368 3072×1024 1024×3072	(5 M mode) 2544×1904 1904×2544 2224×2224 2976×1664 1664×2976 3824×1280 1280×3824	(15 M mode) 4400×3296	(1.6 M mode) 1440×1072 1072×1440 1248×1248 1664×928 928×1664 2160×720 720×2160	(3.2 M mode) 2048×1536 1536×2048 1776×1776 2368×1328 1328×2368 3072×1024 1024×3072	(5 M mode) 2544×1904 1904×2544 2224×2224 2976×1664 1664×2976 3824×1280 1280×3824	(15 M mode) 4400×3296
	Exposure time								0.037 to m se	c 1000 mse	2						
	Image correction functions		Gain, Offset, Gamma correction, White balance, Fine HDR														
	Indicators						OLED displa	y, Status LED	, Ethernet LEI	) (LINK/ACT)	, SD card acc	ess indicator					
	Buttons								Operation I	outtons × 3							
	Installation support functions	Pointer (Class 1 laser product*3), Angle monitor															
	Voltage		24 V +25%/-20% or PoE (IEEE802.3at Power Class 4)														
Dowor	Current consumption (camera only)							0.97 A, 18.7	W (for 19.2 V	)/0.78 A, 18.	7 W (for 24 V)						
supply	Current consumption (including lighting)							4.7 A, 89.7	W (for 19.2 V	)/3.8 A, 89.7	W (for 24 V)						
	Current consumption (With CA-DEx10X connected)*4							11.3 A, 216.7	7 W (for 19.2 \	/)/9.1 A, 216	.7 W (for 24 V	)					
	Weight				Approx. 700	) g 24.71 oz							Approx. 57	0 g 20.12 oz			
	Size (H×W×D)		1	22.3 mm × 5	52.6 mm × 99	.1 mm <mark>4.81</mark> "	× 2.07" × 3.90	)"		122.3 mm × 52.6 mm × 69.2 mm 4.81" × 2.07" × 2.72"							
	Enclosure rating								IP67 (IEC	260529)							
	Materials*5							Case: Alun	ninum die-cas	sting, Front c	over: Glass						
Other	Case temperature*6								0℃ to 65℃	32 to 149°F							
Other	Operating ambient humidity							85%	RH or below	(no condens	ation)						
	Standard certifications								CE, FCC, NR	TL, KC, UKCA							
	Vibration resistance					10 to 500	Hz; Power spe	ectral density	: 0.05 G2/Hz;	X, Y, and Z d	irections, 0.5	hours (IEC60	068-2-64)				
	Shock resistance						50	G, 3 times in	each of the 6	i directions (l	EC60068-2-	27)					

so G, s unles in each of the 6 directions (IEU60068-2-27) \*1 Using the configuration software, format the media before use. \*2 VS-LxxXMX/CX's field-of-view measuring range is 150 mm to 3000 mm 5.91° to 118.11°. VS-SxxXMX/CX's field-of-view measuring range is 50 mm to 500 mm 1.97° to 19.69°. \*3 FDA (CDRH) Part 1040.10 (The laser classification is implemented based on IEC 60825-1 in a coordance with the requirements of Laser Notice), IEC60825-1. \*4 Maximum instantaneous current. Average current is below current consumption (including lighting). \*5 ESD-Safe, IEC6 1340-5-1 compliant. \*6 Reference - Case temperature 65°C 149°F with 200 mm × 200 mm × 10 mm 7.87° × 7.87° × 0.39° aluminum board and at ambient temperature of 40°C 104°F. • The \*MX' model name suffix indicates a monochrome camera model, and the \*CX' suffix indicates a color camera model. • 1.6-megapixel cameras do not support AI Segmentation or AI Detection Fine Mode.

#### C-mount smart camera

Model		VS-C160M / CX	VS-C320M / CX	VS-C500M / CX	VS-C1500M / CX	VS-C2500M / CX					
Charage	Internal storage	3 GB	7 GB	7 GB	7 GB	7 GB					
Storage	microSD card (external)*1		Max. 64 GB								
	Image size	1/2.9"	1/1.8"	2/3"	1.1"	4/3"					
Image sensor	Pixel size	3.45 µm 0.14 Mil	3.45 µm 0.14 Mil	3.45 µm 0.14 Mil	2.5 μm 0.10 Mil	2.5 µm 0.10 Mil					
	Frame rate	83 fps	62 fps	55 fps	40 fps	28 fps					
Lens	Mount			C-mount							
1/0	Number of inputs		1 (insulated)								
1/U	Number of outputs	3 (insulated)									
connection	Number of inputs/outputs		2 (insula	ted) (input and output switched via	settings)						
	Ethernet			PoE IEEE 802.3at, M12 X cable × 1							
I/E	1/0		1 ln/3 Out/2 ln, Out M12 A cable × 1								
N.	Lighting interface	Dedicated lighting connection interface × 1									
	External media	microSD card slot × 1									
	Output image pixels	1440 × 1072	2048 × 1536	2448×2048	4400 × 3296	5120×5120					
	Exposure time	0.015 msec to 1000 msec	0.015 msec to 1000 msec	0.015 msec to 1000 msec	0.008 msec to 1000 msec	0.008 msec to 1000 msec					
Functions	Image correction functions	Gain, Offset, Gamma correction, White balance, Fine HDR									
T unctions	Indicators	OLED display, Status LED, Ethernet LED (LINK/ACT), SD card access indicator									
	Buttons	Operation buttons × 3									
	Installation support functions	Angle monitor									
	Voltage	24 V +25%/-20% or PoE (IEEE802.3at Power Class 4)									
	Current consumption (camera only)	0.97 A, 18.7 W (for 19.2 V)/0.78 A, 18.7 W (for 24 V)									
Power supply	Current consumption (including lighting)	4.7 A, 89.7 W (for 19.2 V)/3.8 A, 89.7 W (for 24 V)									
	Current consumption (With CA-DEx10X connected)*2	11.3 A, 216.7 W (for 19.2 V)/9.1 A, 216.7 W (for 24 V)									
	Weight	Approx. 420 g 14.83 oz									
	Size (H×W×D)		93.2 mr	n × 52.6 mm × 66 mm <mark>3.67" × 2.07</mark> '	× 2.60"						
	Enclosure rating			IP67 (IEC60529)							
	Materials*3		Case:	Aluminum die-casting, Front cover:	Glass						
Other	Case temperature*4			0°C to 65°C 32 to 149°F							
	Operating ambient humidity			85% RH or below (no condensation)							
	Standard certifications			CE, FCC, NRTL, KC, UKCA							
	Vibration resistance		10 to 500 Hz; Power spectral de	nsity: 0.05 G2/Hz; X, Y, and Z directi	ons, 0.5 hours (IEC60068-2-64)						
	Shock resistance		50 G, 3 tim	es in each of the 6 directions (IEC60	068-2-27)						

\*1 Using the configuration software, format the media before use. \*2 Maximum instantaneous current. Average current is below current consumption (including lighting). \*3 ESD-Safe, IEC61340-5-1 compliant. \*4 Reference - Case temperature 65°C 149°F with 200 mm × 200 mm × 10 mm 7.87°× 0.39° aluminum board and at ambient temperature of 40°C 104°F. The \*MX" model name suffix indicates a monochrome image sensor model, and the "CX" suffix indicates a color image sensor model. •1.6-megapixel cameras do not support AI Segmentation or AI Detection Fine Mode.

#### Standard zoom smart camera

#### Camera

VS-L1500MX/L1500CX/L500MX/L500CX/L320MX/L320CX/L160MX/L160CX

- 52.6 99 1 20 0.79" 6.6 0.26" 5.3 0.21 7 0.28 38 15.2 <mark>0.6</mark>" 26.3 33.3 54.5 . 62 2.44" 79.3 122.3 5 × M3 Depth: 6 0.24" 4 × M4 47.5 Depth: 6 0.24" 30 4 × M4 Depth: 6 0.24" -65.2 (102 4.02") (103 <mark>4.06"</mark>) Min. 50 1.97 Min. 50 1.97 40.7 1.6 oq 16.7 18.7 17.8 0.7' 26.3 1.04 36.8 -

![](_page_32_Figure_7.jpeg)

Short-range zoom smart camera

#### Camera

VS-S1500MX/S1500CX/S500MX/S500CX/S320MX/S320CX/S160MX/S160CX

![](_page_32_Figure_11.jpeg)

![](_page_32_Figure_12.jpeg)

Smart ring lighting, High intensity

When used with CA-DEW10X/DER10X/DEB10X/DEIR10X

![](_page_32_Picture_13.jpeg)

VS-C2500MX/C2500CX/C1500MX/C1500CX/C500MX/C500CX/C320MX/C320CX/C160MX/C160CX

![](_page_32_Figure_15.jpeg)

### Application examples

#### Automobiles/Metals

#### Presence check

Inspection for desiccant on ECU

![](_page_33_Picture_4.jpeg)

![](_page_33_Picture_5.jpeg)

![](_page_33_Picture_6.jpeg)

#### Appearance inspection

Laser welding appearance inspection

![](_page_33_Picture_9.jpeg)

![](_page_33_Picture_10.jpeg)

Die-cast product appearance inspection

![](_page_33_Picture_12.jpeg)

#### Appearance inspection

Sealant application inspection

![](_page_33_Picture_15.jpeg)

# Dimension inspection Connector terminal bend inspection

![](_page_33_Picture_17.jpeg)

#### Vision-guided robotics

Two-step image-based picking of small parts on pallets

![](_page_33_Picture_20.jpeg)

![](_page_33_Picture_21.jpeg)

Injector part number OCR and 2D code reading

![](_page_33_Picture_23.jpeg)

#### Electronic components

#### Presence check

Lead frame plating inspection

![](_page_34_Picture_3.jpeg)

Vision-guided robotics

![](_page_34_Picture_5.jpeg)

#### Food / Pharmaceuticals / Commodities

#### Presence check

Commodity alignment inspection (missing/incorrectly positioned targets)

![](_page_34_Picture_9.jpeg)

#### Appearance inspection

Packing seal width inspection

![](_page_34_Picture_12.jpeg)

- Appearance inspection
  - IC mold defect/blister inspection

![](_page_34_Picture_15.jpeg)

#### Appearance inspection

Bus bar appearance inspection

![](_page_34_Picture_18.jpeg)

#### Appearance inspection

Food tray appearance inspection

![](_page_34_Picture_21.jpeg)

#### Character recognition

#### Medicine text and barcode inspection

![](_page_34_Picture_24.jpeg)

## A Game-Changing

Vision System

![](_page_35_Picture_2.jpeg)

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