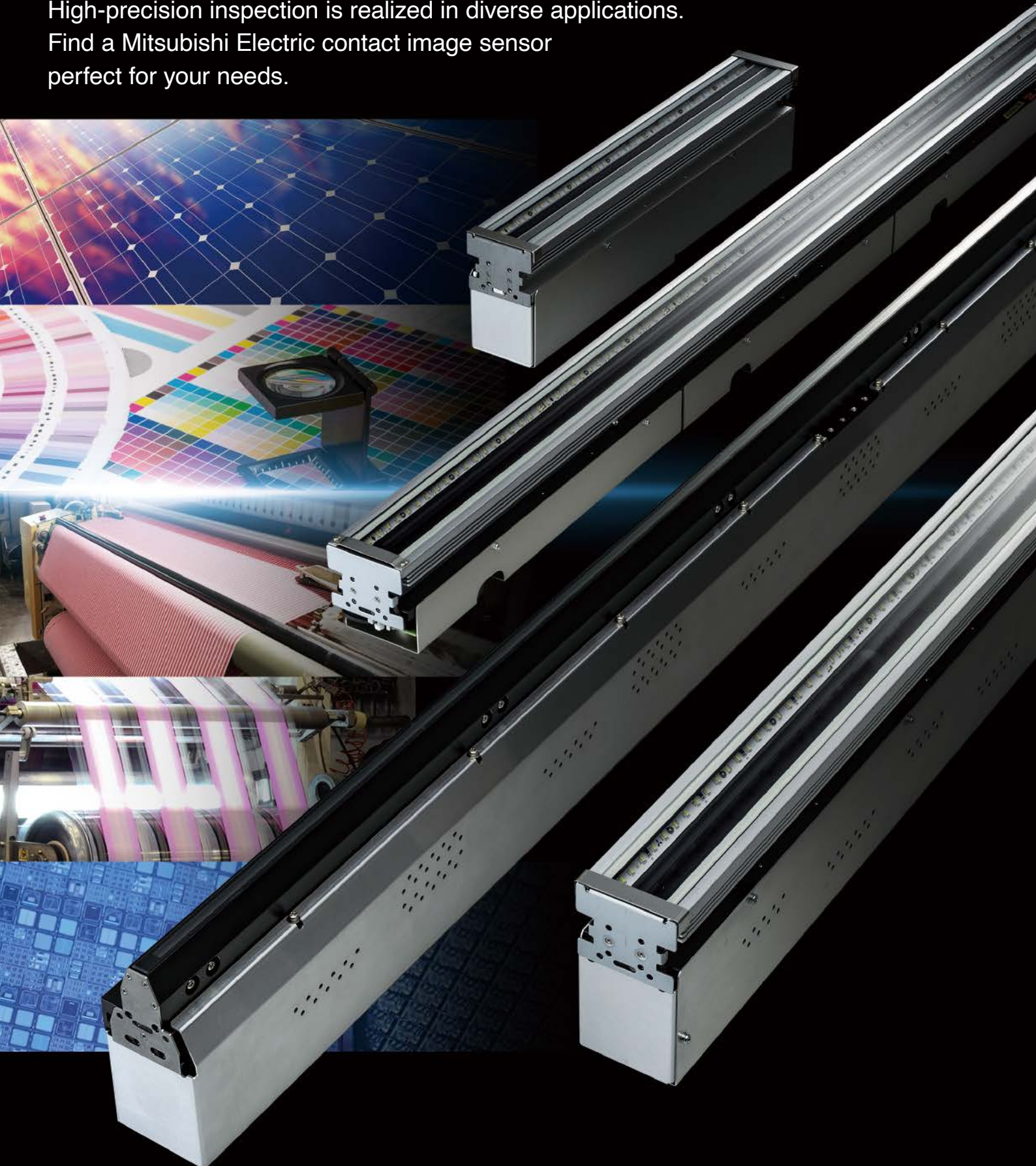


## KD Series Contact Image Sensors for Surface Inspection

High-precision inspection is realized in diverse applications.  
Find a Mitsubishi Electric contact image sensor  
perfect for your needs.



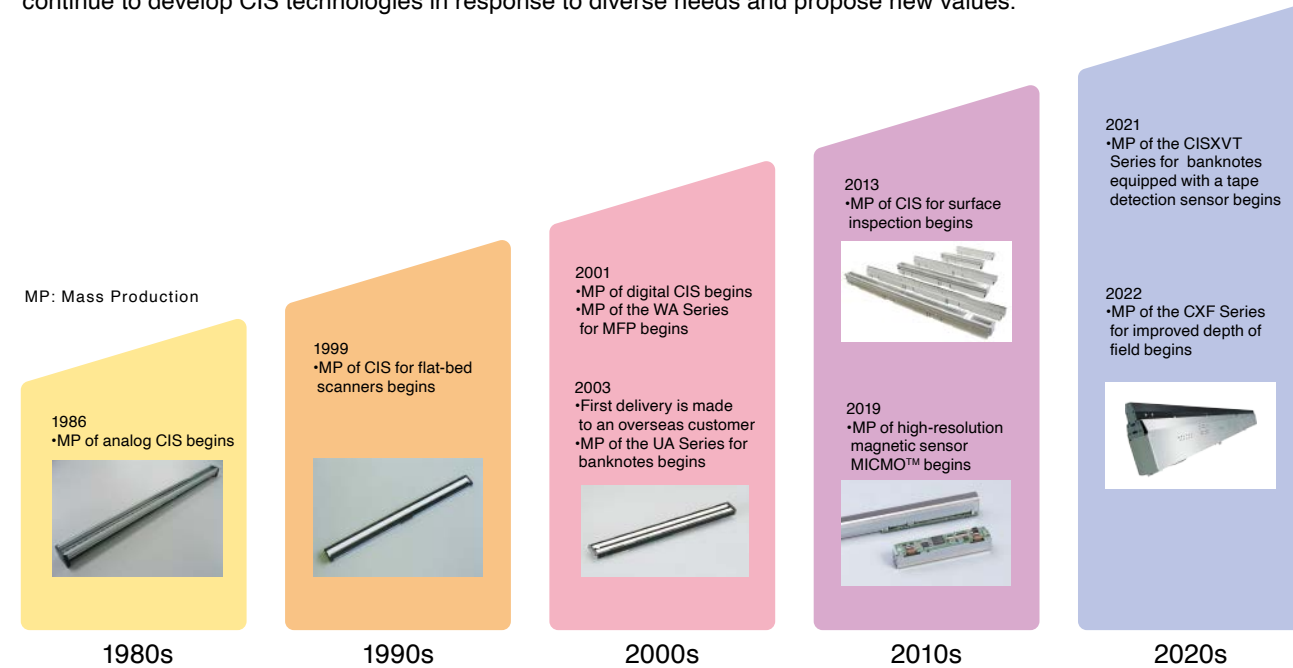


Mitsubishi Electric, as a leading company with years of experience in the CIS field,

has and will continue to provide high-quality products that satisfy customer needs.

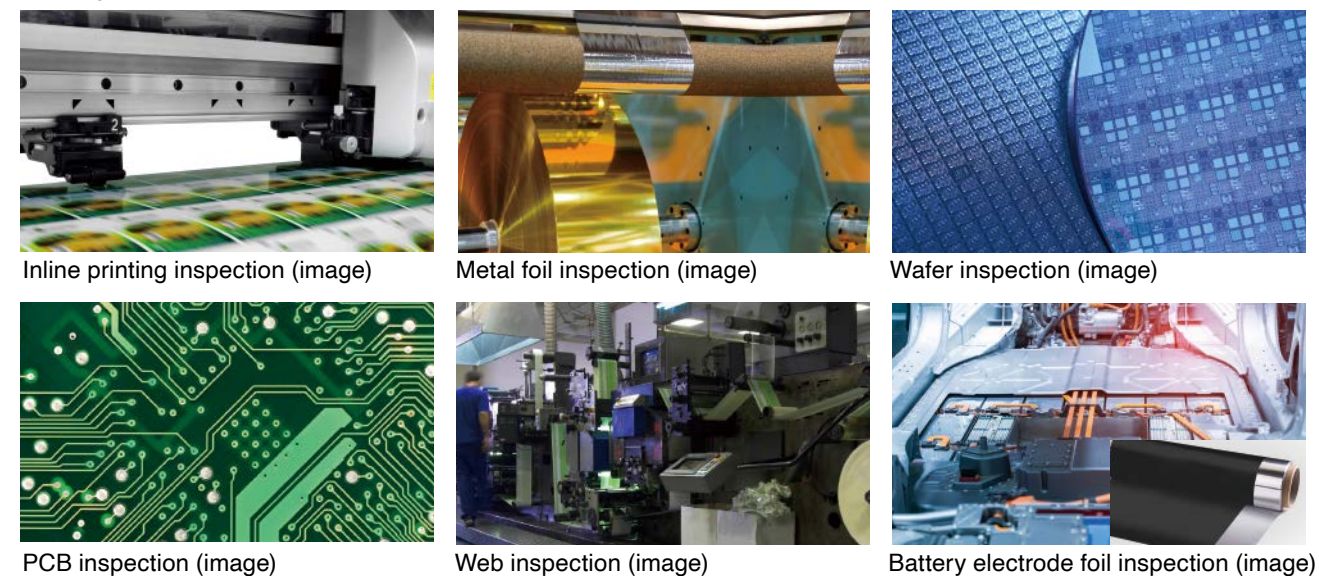
These contact image sensors embody the technologies and trust that Mitsubishi Electric has cultivated over more than 30 years

Mitsubishi Electric's CIS (Contact Image Sensor) business was launched in 1986. Since then, our contact image sensors have been delivered to diverse applications worldwide as high-quality image scanning devices. Based on the company's outstanding mounting technology and cutting-edge optical design technology, they combine an independently developed high-sensitivity CMOS image sensor and a signal processing feature catered to customer needs, and are used by customers throughout the world such as to achieve high-resolution, high-speed scanning by multifunction office machines and accurate reading of paper currency by banking terminals. The KD Series Contact Image Sensors for Surface Inspection are imaging devices that utilize Mitsubishi Electric's long-standing CIS technology to realize high-performance surface inspection in a smarter and more simple manner. It can be applied to the surface inspection of printing, film, substrates, and other such objects along the production line, and can be used to detect and trace defects and flaws in manufacturing processes, thereby contributing to enhancing productivity and managing manufacturing quality and safety. As a leading company in the field, Mitsubishi Electric will continue to develop CIS technologies in response to diverse needs and propose new values.



Some examples of application to surface inspection

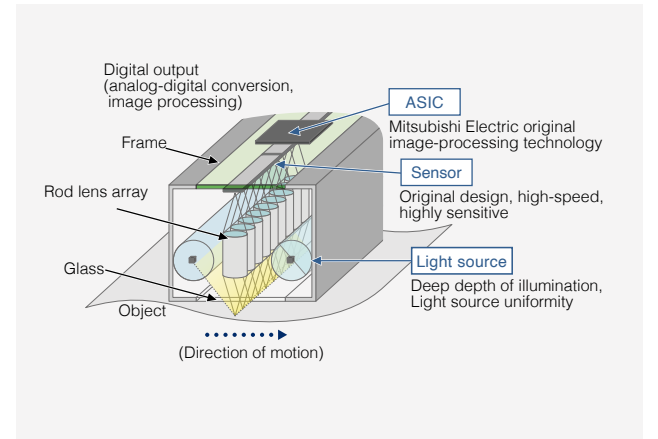
The KD Series Contact Image Sensor for Surface Inspection are suited for use in diverse applications, from the inspection to dimensional measurement of printing, labels, and packages, to detect scratches, stains, damage, coloring, position, etc.



KD Series Contact Image Sensors realize high-precision inspection with a compact, easy-to-install design

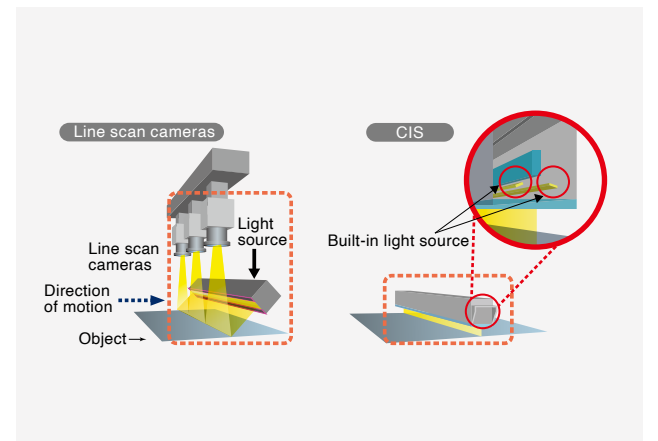
An all-in-one module ensures easy and smooth installation

The sensor (Imaging element), light source (LED), and rod lens array (erect 1:1 image) are all built into the same frame. Therefore, the lens and light source do not need to be designed and procured separately, and installation is easy.



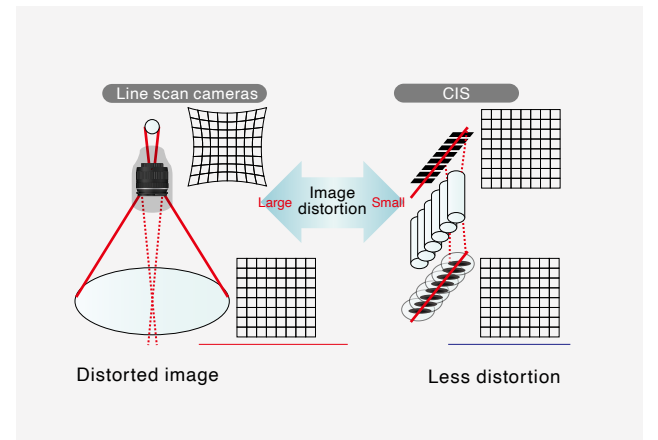
A compact system that can scan large widths in one pass in response to diverse application needs

By selecting scanning widths that suit each application needs, entire scanning areas can be scanned in one pass without having to make adjustments. Furthermore, the sensor scans objects at close range, so it does not require a large space as does a line camera.



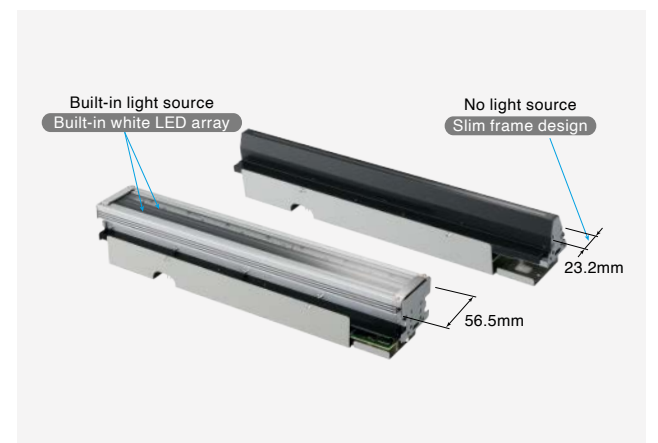
Low-distortion scanning delivers greater accuracy in detecting flaws

The rod lens array (erect 1:1 image) is the same length as the scanning line. Therefore, even images from the edges of the sensor can be acquired without distortion on the edges, for accurate detection of flaws.



Available with and without a built-in light source to match various needs

Models with a built-in light source incorporate a white LED array. Models without a built-in light source are suited for inspections that require various angles of light and special light sources.



## AX/MX/CX/CXS Series A diverse lineup responds to diverse needs

### KD-AX Series

Major applications



High-speed color scanning

Camera Link™

22kHz at 600dpi

Focal point 12mm/14.5mm

309mm

335mm

617mm

926mm

- Dark and white correction •Gamma correction
- Pixel interpolation •PGA(Programmable Gain Amp)
- LED lighting control •Switching Resolution
- Overlap output •Indicator lamp •Basex2 output



### KD-MX Series

Major applications



High-speed monochrome scanning

Camera Link™

44kHz at 600dpi

Focal point 12mm/14.5mm

309mm

617mm

926mm

- Dark and white correction •Gamma correction
- Pixel interpolation •PGA(Programmable Gain Amp)
- LED lighting control •Switching Resolution
- Overlap output •User settings Save •External lighting control



### KD-CX/CXS Series

Major applications



High-speed color/monochrome scanning

CoaXpress™

55kHz at 600dpi

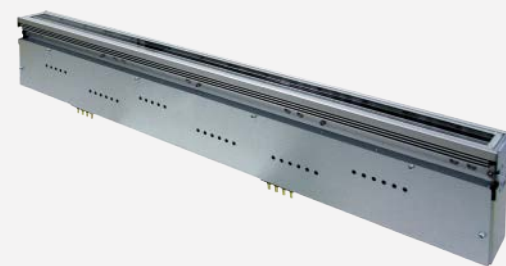
Focal point 12mm/14.5mm

367mm

587mm

807mm

- Dark and white correction •Gamma correction
- Pixel interpolation •PGA(Programmable Gain Amp)
- LED lighting control •Switching Resolution
- Overlap output •User settings Save •External lighting control



## SX Series Smallest KD-CIS model that takes up minimum space

### KD-SX Series

Major applications



High-speed monochrome scanning

GigE Vision™

6kHz at 600dpi

Focal point 1.3mm

106mm

- Dark and white correction •LED lighting control
- Pixel interpolation •PGA(Programmable Gain Amp)



## CXL/CXF/DXL Series Scans widths up to 1688mm in one pass

### KD-CXL Series

Major applications



High-speed color/monochrome scanning

CoaXpress™

55kHz at 600dpi

Focal point 27mm

1064mm

1247mm

1688mm

- Dark and white correction •Gamma correction •Pixel interpolation
- PGA(Programmable Gain Amp) •Switching Resolution
- Overlap output •User settings Save •External lighting control
- Electronic shutter



### KD-CXF Series

Major applications



High-speed color/monochrome scanning

CoaXpress™

55kHz at 600dpi

Focal point 27mm

1064mm

- Dark and white correction •Gamma correction •Pixel interpolation
- PGA(Programmable Gain Amp) •Switching Resolution
- Overlap output •User settings Save •External lighting control
- Electronic shutter
- Four times greater depth of field compared with KD-CXL**



### KD-DXL Series

Major applications



High-speed color/monochrome scanning

Camera Link™

55kHz at 600dpi

Focal point 27mm

1064mm

1247mm

1688mm

- Dark and white correction •Gamma correction •Pixel interpolation
- PGA(Programmable Gain Amp) •Switching Resolution
- Overlap output •User settings Save •External lighting control
- Electronic shutter



Icons of major applications >>



Printing



Films



Substrates



Wafers



Fabrics



Battery sheets

For information on other specifications and features, please refer the last page of this catalog or the documents for each model.



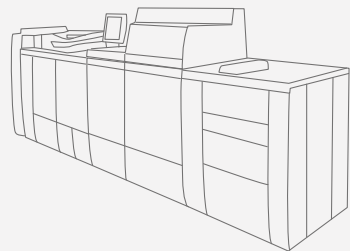
## Application examples

### Printing inspections

### Mitsubishi Electric CIS for diverse printing inspection needs

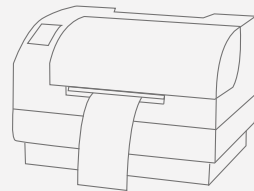
High printing quality inspection can be achieved in diverse applications, from inline to offline inspection

#### Inline inspection system of the sheetfed inkjet press



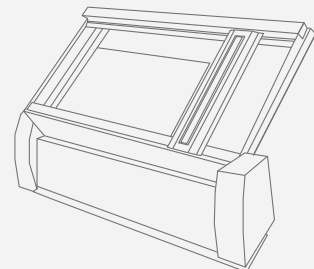
May be mounted on the inspection unit of the inkjet press where space is limited

#### Label printers



May be used for the inspection of labels for foods items, pharmaceuticals, physical distribution, etc.

#### Offline inspection system



May be used as a key component for inspection that requires high precision

Recommended models: KD-AX, KD-CX, KD-CXL, KD-CXF, KD-SX

### Lithium ion battery plant

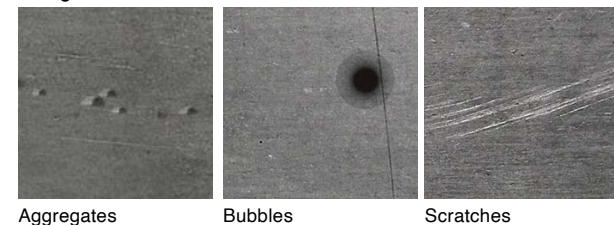
### Mitsubishi Electric CIS for high-precision inspection in a variety of processes

Contact image sensors are ideal for the external inspection of secondary battery electrode foils and separators, as they deliver high-speed, high-precision, low-distortion images

The module is compact enough not to take up space even for front and back inspection needs



Surface scratches and foreign matter are scanned at high resolution



Aggregates Bubbles Scratches

Can be installed in multiple numbers and in narrow, inconspicuous spaces

Contact image sensors are ideal for measuring the lengths of coated electrodes and for the detection of edges, as they deliver images with minimum distortion



No fine adjustment is needed as with a camera

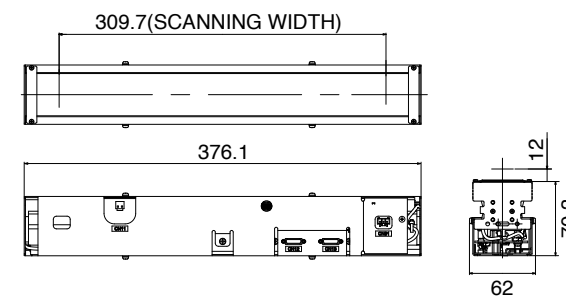
A selection of scanning widths are offered to match each items

Conceptual drawing of an electrode foil production line

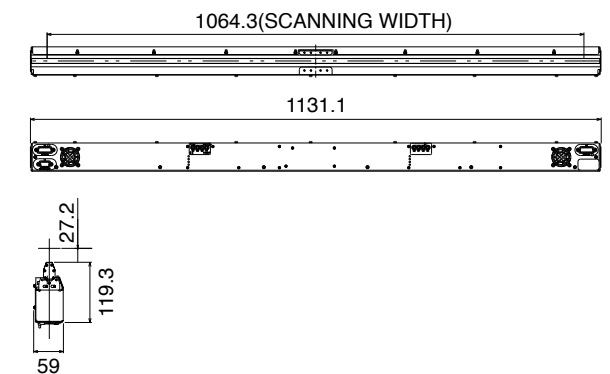
Recommended models: KD-MX, KD-DXL

## Outline drawings

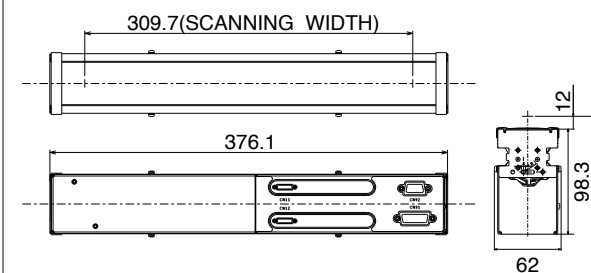
### AX Series KD6R309AX4



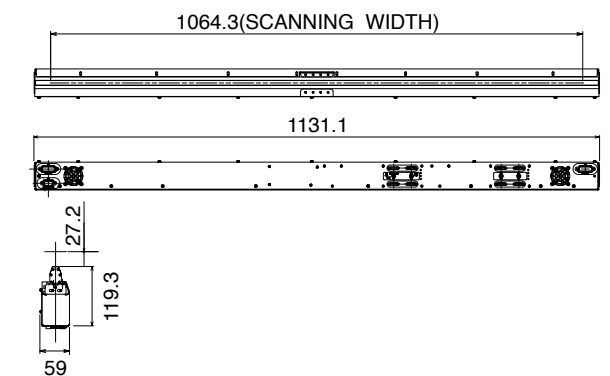
### CXL Series KD6R1064CXL-NL



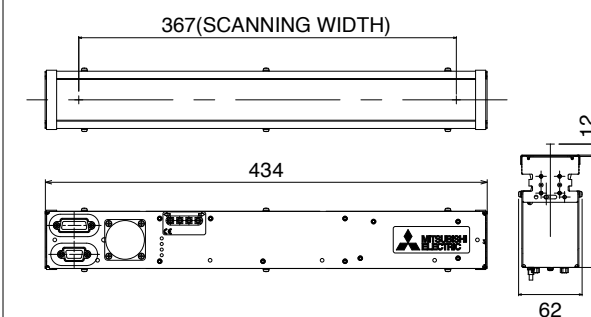
### MX Series KD6R309MX



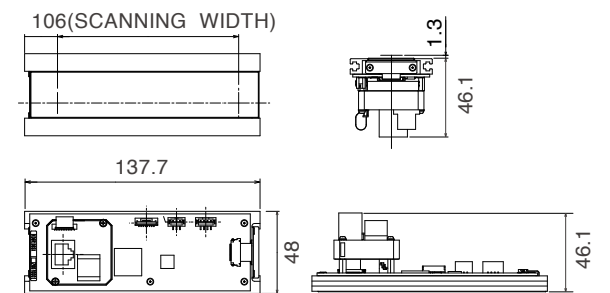
### DXL Series KD6R1064DXL-NL



### CX Series KD6R367CX



### SX Series KD6R106SX



## What to prepare when using a contact image sensor

- DC5V power supply •DC5V power supply cable •DC24V power supply
- DC24V power supply cable •Interface cable (Camera Link™ cable, etc.)
- PC equipped with a frame grabber board •Camera file

For details, please refer the user's manuals for each model.

A demo unit of each series is available, for use to scan images in your evaluation environment, to jointly evaluate work samples in our demonstration environment, or to evaluate images of work samples you place in our care.



# Specifications

		AX Series				MX Series			CX/CXS Series			
Imaging element		CMOS line sensor										
Optical system		Rod lens array										
Light source		LED array (both sides, white LED)										
Data output format		Camera Link™				Camera Link™			CoaXpress™ Rev1.1			
Resolution (dpi)		600/300/200/150				600/300/150			600/300/200/150			
Scan width (mm)		309	619	929	335	309	619	929	367	587	807	
Valid pixels (pixel)		7,319	14,639	21,959	7,929	7,319	14,639	21,959	8,669	13,871	19,073	
Line rate (kHz)	600dpi	22			20	44			55			
	300dpi	31			27	-			96			
	200dpi											
	150dpi	44			130							
Scan speed (m/s)	600dpi	0.9			0.9	1.9			2.3			
	300dpi	2.6			2.3	3.7			8.1			
	200dpi	3.9			3.4	-			16.5			
	150dpi	5.3			4.6	7.5			26.9			
Focal point (mm)	Built-in light source	12				12			12			
	No light source	14.5				14.5			14.5			
CE certification		○				○			○			
RoHs		RoHS2 compliance										
Environmental temperature(°C)		5 - 50										
Ext. dimensions (mm)	Built-in light source	L	376.1	687.1	996.1	376.1	376.1	687.1	996.1	434	654	874
		D	62				62			62		
		H	70.3				98.3			109.4		
	No light source	L	376.1	687.1	996.1	-	376.1	687.1	996.1	434	654	874
		D	62				62			62		
		H	67.1				94.8			105.9		
Weight (kg)	Built-in light source	1.7	3.1	4.5	1.7	1.9	3.3	4.8	2.6	3.9	5.1	
	No light source	1.2	2.3	3.3	-	1.2	2.3	3.3	1.9	2.9	3.8	

		CXL Series				DXL Series			SX Series			
Imaging element		CMOS line sensor										
Optical system		Rod lens array										
Light source		-										
Data output format		CoaXpress™ Rev1.1				Camera Link™			LED (both sides, red LED)			
Resolution (dpi)		600/300/200/150				600/300/200/150			GigE Vision™ Rev2.0			
Scan width (mm)		1064	1247	1688		1064	1247	1688	600	106		
Valid pixels (pixel)		25,142	29,477	39,881		25,142	29,477	39,881	2,504			
Line rate (kHz)	600dpi	55	47			35	29		6			
	300dpi	96	94			72	60		-			
	200dpi	130				104						
	150dpi	159				134			114			
Scan speed (m/s)	600dpi	2.3	2.0			1.5	1.2		0.3			
	300dpi	8.1	8.0			6.1	5.1		-			
	200dpi	16.5	16.5	16.5		13.2	11.2					
	150dpi	29.9	29.9	29.9		22.7	19.3					
Focal point (mm)	Built-in light source	-				-			1.3			
	No light source	27				27			-			
CE certification		○				○			-			
RoHs		RoHS2 compliance										
Environmental temperature(°C)		5 - 50										
Ext. dimensions (mm)	Built-in light source	L								137.7		
		D	-				-			48		
		H								46.1		
	No light source	L	1131.1	1314.1	1755.1		1131.1	1314.1	1755.1	-		
		D	59				59					
		H	119.3				119.3					
Weight (kg)	Built-in light source	-				-			1.7			
	No light source	5.3	6.2	8.4		5.8	6.7	9.1	-			

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Integrated Sensing Systems Division  
 Electric Devices Marketing and Business Development Department  
 Electric Devices and Meteorological Systems Section

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