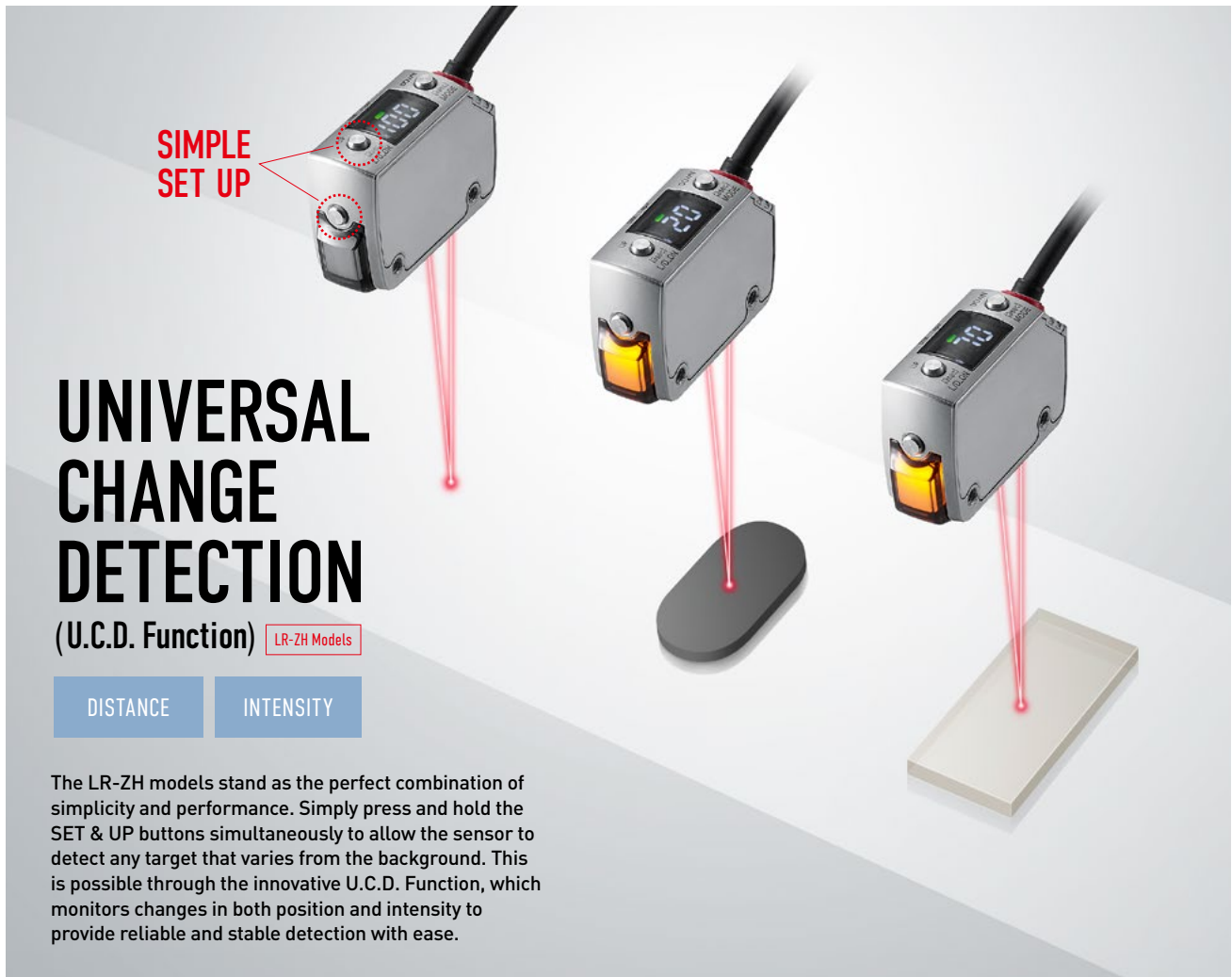




## ALL-PURPOSE LASER SENSOR

Position, Contrast,  
& Transparency Detection

# TRUE DO-IT-ALL SENSOR



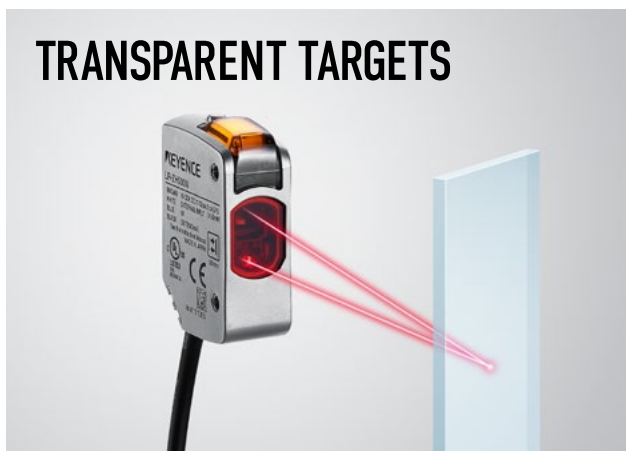
**SIMPLE SET UP**

## UNIVERSAL CHANGE DETECTION

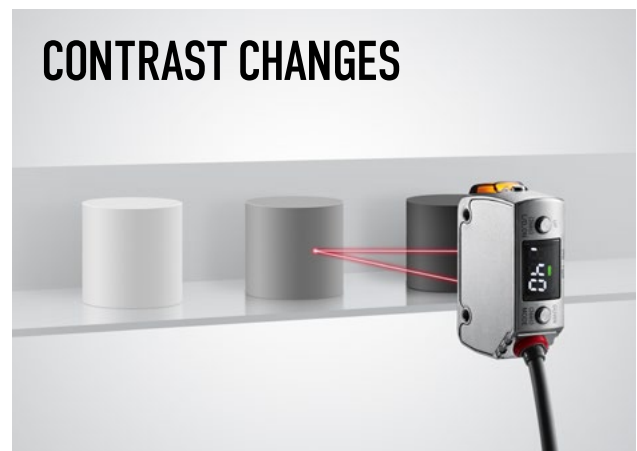
(U.C.D. Function) LR-ZH Models

**DISTANCE**   **INTENSITY**

The LR-ZH models stand as the perfect combination of simplicity and performance. Simply press and hold the SET & UP buttons simultaneously to allow the sensor to detect any target that varies from the background. This is possible through the innovative U.C.D. Function, which monitors changes in both position and intensity to provide reliable and stable detection with ease.



From clear bottles to plastic films, the LR-ZH models are able to easily detect transparent objects.



The ability to detect contrast changes ensures detection of targets close to the background



# POSITION BASED DETECTION

DISTANCE

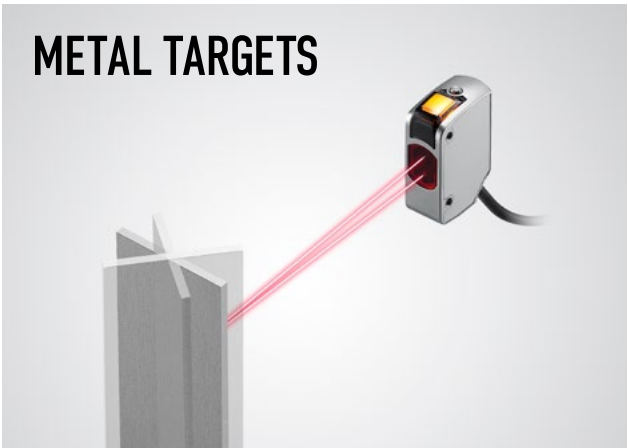
Position-based sensing, along with the diffuse sensor design, allow the LR-Z Series to reliably detect targets regardless of shape, colour, or surface finish. All without the use of a cumbersome reflector.

Max.  
**500  
mm**  
RANGE



## DARK TARGETS

The Light Power Control Function adjusts light intensity to guarantee proper detection of dark and distant targets.



## METAL TARGETS

Even at extreme angles, shiny metal targets are stably detected with the versatile DATUM Calibration.

# ADDITIONAL FEATURES



## Rugged Metal Housing

The durable stainless steel housing provides increased longevity in rough factory environments.



## Water and Dust Resistance

The impressive IP68 & IP69K enclosure ratings ensure detection in both washdown and heavy buildup areas.



## 7-Segment LED Display

Installation, calibration, and monitoring are made easy with the intuitive LED display. (LR-ZH: white LED, LR-ZB: red LED)



## Highly Visible Indicator

The sensor output status is easily recognised from a distance making troubleshooting a breeze.



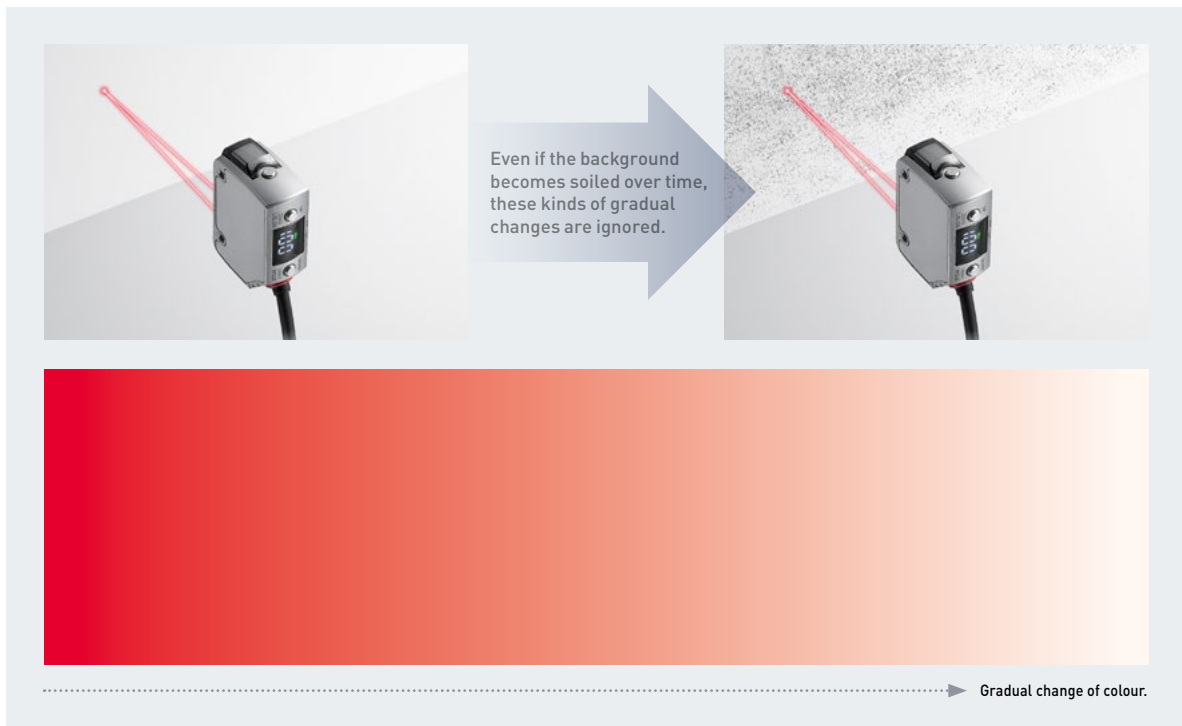
## Simplified Operation

Three buttons is all it takes to fully utilise the innovative features of the LR-Z Series.



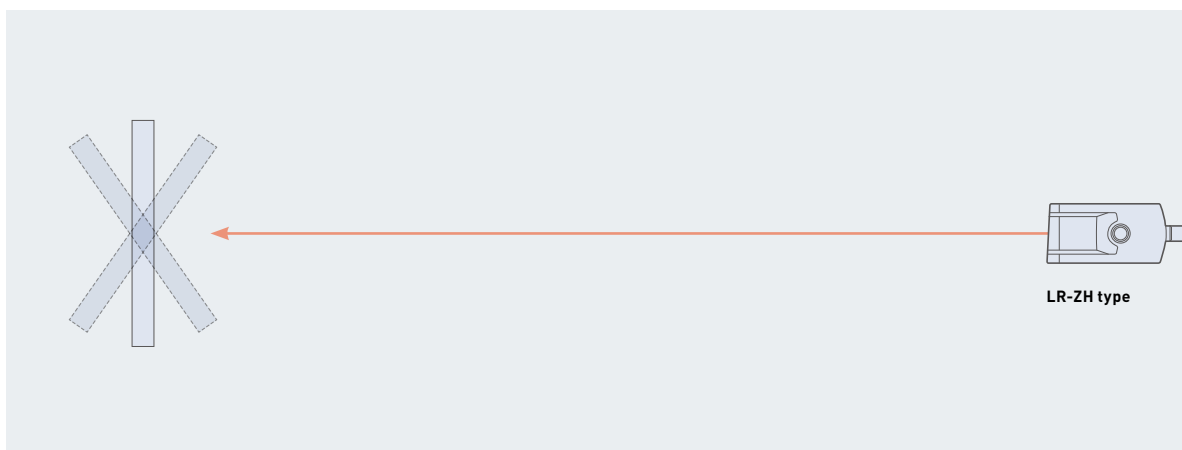
## Improved Ambient Light Resistance (LR-ZH only)

Resistance to ambient light has been greatly improved. This type can withstand up to 10000 lux of incandescent light and up to 20000 lux of sunlight.



## Dynamic Stability Control

The D.S.C. function ensures stable detection by accounting for changes in the background due to dust or vibration.

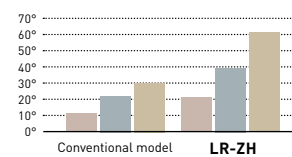


## High Angular Characteristic

When used with high-gloss metallic workpieces, this sensor provides angle characteristics about twice that of conventional models. This contributes to more accurate detection from a variety of angles.

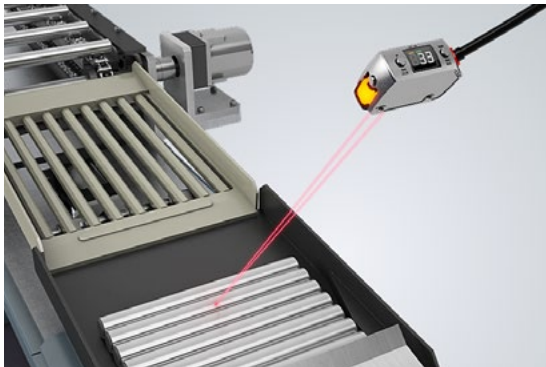
Horizontal direction angle characteristics at a detecting distance of 200 mm

- Response time: 1.5 ms
- Response time: 10 ms
- Response time: 50 ms



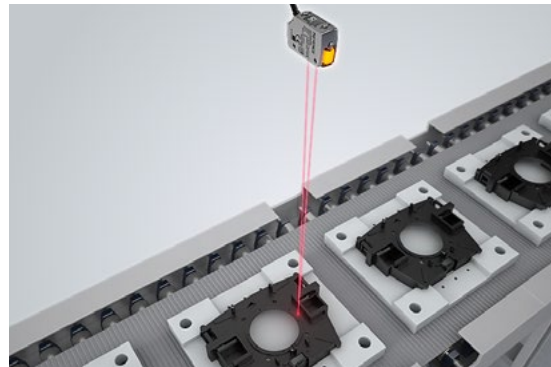


# APPLICATIONS



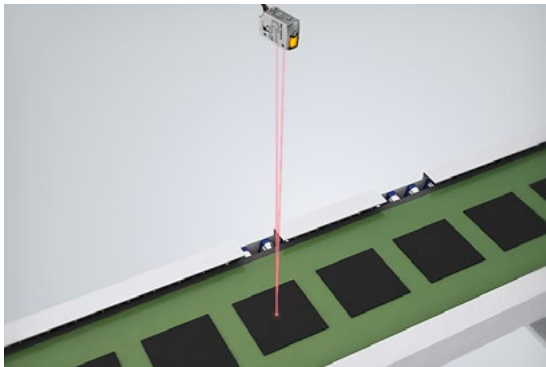
## Detection of Metallic Workpieces

Accurately detects metallic workpieces, even from angled installation.



## Detection of Black Workpieces

Provides problem-free detection of difficult workpieces with low reflectivity and complex shapes.



## Detection of Black Nonwoven Fabric

Universal Change Detection, a new feature of LR-ZH, makes it possible to stably detect even thin workpieces with low reflectivity, such as anti-reflective materials.



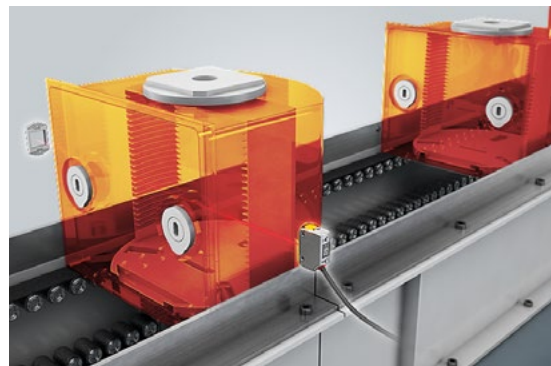
## Durable Enough to Remain Problem-Free After Cleaning

Thanks to the IP69K enclosure rating, this sensor is robust enough to function without a cover even in processes that expose the sensor to water during cleaning.



## Detection of Transparent Workpieces






















Thanks to the Universal Change Detection (LR-ZH Models) feature, even transparent objects can be detected with the use of guides and jigs.







## Detection of FOUUs

Even FOUUs (front opening unified pods) can be detected with the use of a reflector and Universal Change Detection (LR-ZH Models).

**Lineup**





Type	Detecting distance	Spot diameter	Standard detectable deviation	Connection method	Output	Model	Weight
 M18 threaded mount w/ M12 connector	 25 to 490 mm	Approx. $\phi$ 3 mm 	9 mm (25 to 170 mm) 25 mm (170 to 290 mm) 40 mm (290 to 390 mm) 50 mm (390 to 490 mm)	M12 4-pin	NPN/PNP selectable	<b>LR-ZH490CB</b> <small>U.C.D. Function</small>	75 g
 M18 threaded mount w/ M12 connector	 25 to 240 mm	Approx. 2.4 mm  Approx. $\pm$ 1.2 mm At detecting distance of 240 mm	9 mm (25 to 170 mm) 25 mm (170 to 240 mm)	M12 4-pin	Bipolar (NPN+ PNP)	<b>LR-ZB240CB</b>	
 M18 threaded mount w/ M12 connector	 25 to 90 mm	Approx. 2 mm  Approx. $\pm$ 1 mm At detecting distance of 90 mm	1.5 mm (25 to 40 mm) 3 mm (40 to 90 mm)	M12 4-pin		<b>LR-ZB90CB</b>	
 Rectangular w/ cable	 35 to 500 mm	Approx. $\phi$ 3 mm 	9 mm (35 to 180 mm) 25 mm (180 to 300 mm) 40 mm (300 to 400 mm) 50 mm (400 to 500 mm)	2 m cable	NPN	<b>LR-ZH500N</b> <small>U.C.D. Function</small>	110 g
 Rectangular w/ M8 connector					PNP	<b>LR-ZH500P</b> <small>U.C.D. Function</small>	
				M8 4-pin	NPN	<b>LR-ZH500CN</b> <small>U.C.D. Function</small>	55 g
M8 3-pin					PNP	<b>LR-ZH500CP</b> <small>U.C.D. Function</small>	
 Rectangular w/ cable	 35 to 250 mm	Approx. 2.4 mm  Approx. $\pm$ 1.2 mm At detecting distance of 250 mm	9 mm (35 to 180 mm) 25 mm (180 to 250 mm)	2 m cable	NPN	<b>LR-ZB250AN</b>	110 g
 Rectangular w/ M8 connector					PNP	<b>LR-ZB250AP</b>	
				M8 4-pin	NPN	<b>LR-ZB250CN</b>	55 g
M8 3-pin	PNP	<b>LR-ZB250CP</b>					
 Rectangular w/ cable	 35 to 100 mm	Approx. 2 mm  Approx. $\pm$ 1 mm At detecting distance of 100 mm	1.5 mm (35 to 50 mm) 3 mm (50 to 100 mm)	2 m cable	NPN	<b>LR-ZB100N</b>	110 g
 Rectangular w/ M8 connector					PNP	<b>LR-ZB100P</b>	
				M8 4-pin	NPN	<b>LR-ZB100CN</b>	55 g
M8 3-pin					PNP	<b>LR-ZB100CP</b>	

**Mounting brackets**



Type	Model	Compatible models	Material/Weight
 Standard mounting bracket (M3 screw $\times$ 2 supplied)	<b>OP-87408</b> <sup>*1</sup>	Rectangular	SUS316L 30 g
 Rear mounting bracket (M3 screw $\times$ 2 supplied)	<b>OP-87409</b>	Rectangular	SUS316L 30 g
 Robust mounting bracket (t = 3) (M3 screw $\times$ 2 supplied)	<b>OP-87410</b> <sup>*2</sup>	Rectangular	SUS316L 170 g
 M18 nut & Lock washer set	<b>OP-87413</b>	M18 Threaded Mount	M18 nut SUS316L 10 g Lock washer SUS304 5 g

\*1 This bracket is dedicated to the cable type. Use OP-87409 or OP-87410, when installing the connector type.  
\*2 This can be used only in combination with an L-shaped connector cable, when installing the connector type.

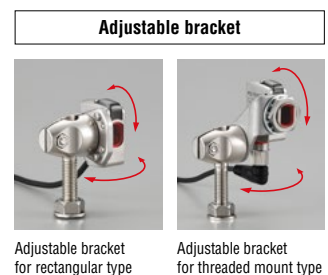
**Mounting brackets [adjustable brackets]**

Type	Model	Compatible models	Material/Weight
 Adjustable bracket (M3 screw $\times$ 2 supplied)	<b>OP-87404</b>	Rectangular	Zinc nickel plating 95 g
 Adjustable bracket	<b>OP-87405</b>	M18 Threaded Mount	Zinc nickel plating 100 g
 Screw length	Screw length: 45 mm	<b>OP-87406</b>	Iron nickel plating 70 g
	Screw length: 65 mm	<b>OP-87407</b>	Iron nickel plating 80 g
 Locking screw for adjustable bracket			

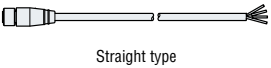
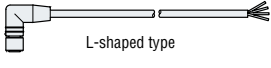
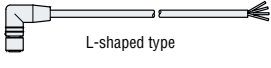
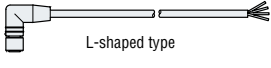
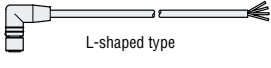
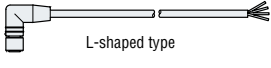
**Reflectors (For U.C.D. function only)**

Type	Model	Compatible models	Maximum detecting distance	Appearance
Reflector	<b>R-6L</b>	<b>LR-ZH models</b>	700 mm	
Reflective tape	<b>OP-87123</b>		700 mm	 25 $\times$ 25 mm

\* When using the reflector or reflective tape, ensure that the spot from the sensor is stationary on the reflector.



**Cables**

Specifications	Material	Appearance	Connection method	Length	Model	
Standard	Cable: PVC Connector: Brass Nickel Plating	 <p>Straight type</p>	M12 4-pin	2 m	OP-75721	
				10 m	OP-85502	
	Cable: PVC Connector: Zinc Nickel Plating		M8 4-pin	2 m	OP-73864	
				10 m	OP-73865	
Oil resistant	Cable: PUR Connector: Zinc Nickel Plating		 <p>L-shaped type</p>	M12 4-pin	2 m	OP-87636
					10 m	OP-87637
	Cable: PVC Connector: SUS316L			M8 4-pin	2 m	OP-87628
					10 m	OP-87629
Chemical resistant	Cable: PVC Connector: SUS316L	 <p>L-shaped type</p>		M12 4-pin	2 m	OP-87402
					2 m	OP-87621
	Cable: PVC Connector: Brass Nickel Plating			M8 4-pin	2 m	OP-87622
					2 m	OP-75722
Standard	Cable: PVC Connector: Brass Nickel Plating		 <p>L-shaped type</p>	M12 4-pin	2 m	OP-75722
					10 m	OP-87274
	Cable: PVC Connector: Zinc Nickel Plating			M8 4-pin	2 m	OP-85497
					2 m	OP-87631
Oil resistant	Cable: PUR Connector: Zinc Nickel Plating	 <p>L-shaped type</p>		M12 4-pin	2 m	OP-87640
					10 m	OP-87641
	Cable: PVC Connector: SUS316L			M8 4-pin	2 m	OP-87632
					10 m	OP-87633
Chemical resistant	Cable: PVC Connector: SUS316L		 <p>L-shaped type</p>	M12 4-pin	2 m	OP-87403
					2 m	OP-87619
	Cable: PVC Connector: Brass Nickel Plating			M8 4-pin	2 m	OP-87620
					2 m	OP-87620

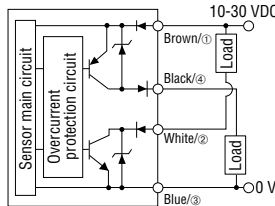
**Enclosure ratings for each cable type**

Enclosure rating	Standard cable	Oil resistant cable	Chemical resistant cable
IP67 IEC60529	✓	✓	✓
IP68 IEC60529	-	✓	✓
IP69K DIN40050-9	-	-	✓
ECOLAB, Diversey	-	-	✓*

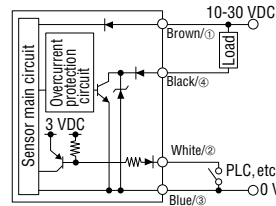
\* Have passed resistance tests with cleaning agents from multiple manufacturers.

**I/O circuit diagram**

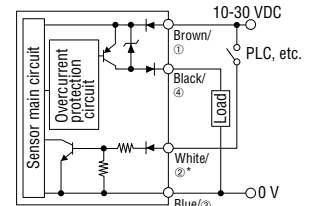
**Bipolar type (LR-ZBxB)**



**NPN type (LR-ZxN)**

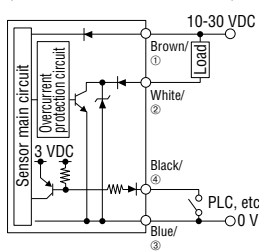


**PNP type (LR-ZxP)**

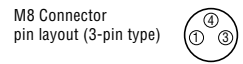
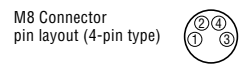
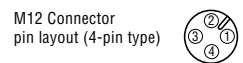
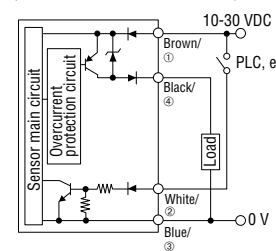


\* Cable type and M8 connector: 4 pin type only

**LR-ZH490CB (When NPN output is selected)**



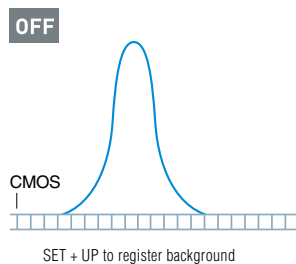
**LR-ZH490CB (When PNP output is selected)**



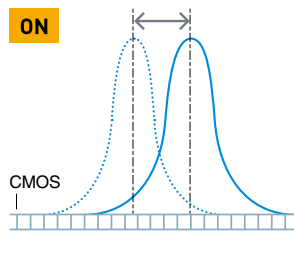
**Universal Change Detection:**

Universal Change Detection works by storing the light receiving pattern (distance and returned light intensity) associated with a set background or reference surface. From here, the sensor is able to detect any variations from the calibrated light receiving pattern (position changes and/or intensity changes).

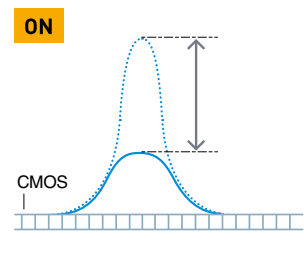
**Background**



**Position Change**



**Intensity Change**





# SPECIFICATIONS

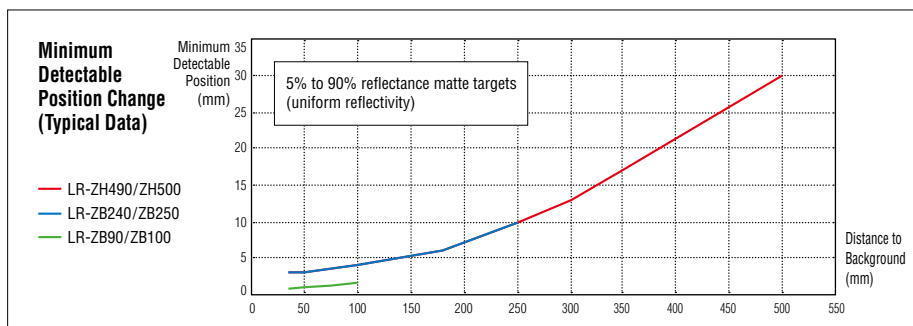


## Specifications

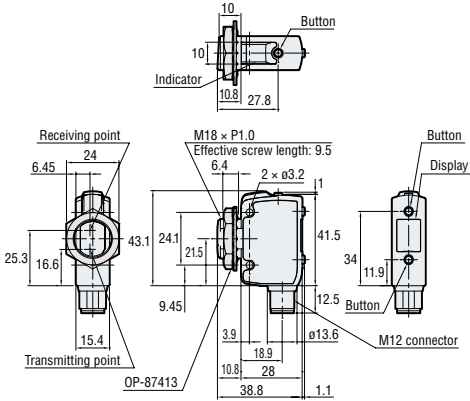
Type		Distance based laser sensor											
Appearance		M18 Threaded mount			Rectangular								
Model	Bipolar	M12 connector 4-pin	LR-ZH490CB*1 U.C.D. Function	LR-ZB240CB	LR-ZB90CB	—	—	—					
	NPN	2 m cable	—	—	—	LR-ZH500N U.C.D. Function	LR-ZB250AN	LR-ZB100N					
		M8 connector 4-pin	—	—	—	LR-ZH500CN U.C.D. Function	LR-ZB250CN	LR-ZB100CN					
	PNP	2 m cable	—	—	—	LR-ZH500P*1 U.C.D. Function	LR-ZB250AP	LR-ZB100P					
		M8 connector 4-pin	—	—	—	LR-ZH500CP*1 U.C.D. Function	LR-ZB250CP	LR-ZB100CP					
		M8 connector 3-pin	—	—	—	LR-ZH500C3P*1 U.C.D. Function	LR-ZB250C3P	LR-ZB100C3P					
Detectable distance		25 to 490 mm (465 to 0) <sup>2</sup>		25 to 240 mm (215 to 0) <sup>2</sup>	25 to 90 mm (650 to 0) <sup>2</sup>	35 to 500 mm (465 to 0) <sup>2</sup>		35 to 250 mm (215 to 0) <sup>2</sup>	35 to 100 mm (650 to 0) <sup>2</sup>				
Standard detectable deviation		25 to 170 mm : 9 mm 170 to 290 mm : 25 mm 290 to 390 mm : 40 mm 390 to 490 mm : 50 mm		25 to 170 mm : 9 mm 170 to 240 mm : 25 mm	25 to 40 mm : 1.5 mm 40 to 90 mm : 3 mm	35 to 180 mm : 9 mm 180 to 300 mm : 25 mm 300 to 400 mm : 40 mm 400 to 500 mm : 50 mm		35 to 180 mm : 9 mm 180 to 250 mm : 25 mm	35 to 50 mm : 1.5 mm 50 to 100 mm : 3 mm				
Display resolution		1 to 5 (1 to 5 mm)		1 to 3 (1 to 3 mm)	2 (0.2 mm)	1 to 5 (1 to 5 mm)		1 to 3 (1 to 3 mm)	2 (0.2 mm)				
Spot size		Approx. ø3 mm		Approx. 2.4 × 1.2 mm at 240 mm	Approx. 2 × 1 mm at 90 mm	Approx. ø3 mm		Approx. 2.4 × 1.2 mm at 250 mm	Approx. 2 × 1 mm at 100 mm				
Response time		1.5 ms / 10 ms / 50 ms selectable											
Light source	Type	Red laser (660 nm)											
	Laser class	Class 2 laser product (IEC60825-1) Class II Laser product (FDA(CDRH)Part1040.10)		Class 1 laser product (IEC60825-1, FDA (CDRH) Part1040.10 <sup>3</sup> )		Class 2 laser product (IEC60825-1) Class II Laser product (FDA(CDRH)Part1040.10)		Class 1 laser product (IEC60825-1, FDA (CDRH) Part1040.10 <sup>3</sup> )					
Function	Indicator	3-digit 7-segment display (white), output indicator (yellow), DATUM indicator (orange), 1 spot indicator (green)		3-digit 7-segment display (red), output indicator (yellow), DATUM indicator (orange), 1 spot indicator (green)		3-digit 7-segment display (white), output indicator (yellow), DATUM indicator (orange), 1 spot indicator (green)		3-digit 7-segment display (red), output indicator (yellow), DATUM indicator (orange), 1 spot indicator (green)					
	Timer	OFF/ON delay/Off delay/One-shot											
Specifications	Power voltage	10 to 30 VDC, including 10% ripple (P-P), Class 2 or LPS											
	Power consumption	450 mW or less (18 mA or less at 24 V, 34 mA or less at 12 V)											
	Control output	LR-ZHxB: NPN Open collector/PNP Open collector, selectable, LR-ZBxB: NPN+PNP Open collector, LR-ZxN: NPN Open collector, LR-ZxP: PNP Open collector, Applied voltage 30 VDC or less, Control current 100 mA or less, Residual voltage 1.2 V or less at 10 mA or less, 2 V or less at 10 to 100 mA											
	Protection circuit	Protection against reverse power connection, output overcurrent, output surge, reverse output connection											
	Output operation	Light-ON / Dark-ON selectable											
	External input *4	Input time calibration: 35 ms or more ON, 35 ms or more OFF Laser emission stop: 2 ms or more ON, 20 ms or more OFF Short-circuit current NPN: 1 mA or less/PNP: 2 mA or less		None		Input time calibration: 35 ms or more ON, 35 ms or more OFF Laser emission stop: 2 ms or more ON, 20 ms or more OFF Short-circuit current NPN: 1 mA or less/PNP: 2 mA or less							
Environmental resistance	Enclosure rating	IP68(IEC60529), IP69K(DIN40050-9), NEMA 4X, 6P, 13(NEMA250), ECOLAB <sup>5</sup> , Diversey <sup>5</sup>											
	Ambient light *6	Incandescent lamp: 10000 lux or less Sunlight: 20000 lux or less at 240 mm		Incandescent lamp: 2000 lux or less Sunlight: 4000 lux or less		Incandescent lamp: 4000 lux or less Sunlight: 8000 lux or less		Incandescent lamp: 10000 lux or less Sunlight: 20000 lux or less at 250 mm		Incandescent lamp: 2000 lux or less Sunlight: 4000 lux or less		Incandescent lamp: 4000 lux or less Sunlight: 8000 lux or less	
	Ambient temperature	-10 to +50°C (No freezing)											
	Storage temperature	-25 to +75°C (No freezing)											
	Ambient humidity	35 to 85%RH (No condensation)											
	Shock resistance	1000 m/s <sup>2</sup> in X, Y, Z axis directions respectively 6 times											
	Vibration resistance	10 to 55 Hz Double amplitude 1.5 mm in the X, Y, Z axis directions respectively, 2 hours											
	Insulating resistance	20 MΩ or more (500 VDC)											
Withstand voltage	1000 VAC 50/60 Hz 1 min												
Material	Case: SUS316L, Display: PES, Lens cover: PMMA with scratch-resistant coating, Packing/ Connector ring: FKM, Nut: SUS316L, Lock washer: SUS304				Case: SUS316L, Display: PES, Lens cover: PMMA with scratch-resistant coating, Packing/ Connector ring: FKM								
Accompanying items	Instruction Manual, FDA warning/ certification/ identification label, Laser warning/explanation labels		Instruction Manual, Certification/Identification label (FDA)		Instruction Manual, FDA warning/ certification/ identification label, Laser warning/explanation labels		Instruction Manual, Certification/Identification label (FDA)						

\*1 IO-Link specification v.1.1/COM2 (38.4 kbps) is supported. (LR-ZH490CB: Only when PNP output is selected.) You can download a setup file from the KEYENCE website (<http://www.keyence.com>). If using the product in an environment in which downloading files over the internet is not possible, contact your nearest KEYENCE office. \*2 Display readings can be used as a guide for the detecting distance. When the setting value is tuned, the readout shifts. When the value exceeds "-99", "-FF" is displayed. \*3 The laser classification for FDA (CDRH) is implemented based on IEC60825-1 in accordance with the requirements of Laser Notice. \*4 M8 connector (3-pin) type does not include the external input function. \*5 Have passed resistance tests with cleaning agents from multiple manufactures. \*6 When the response time is 10 ms

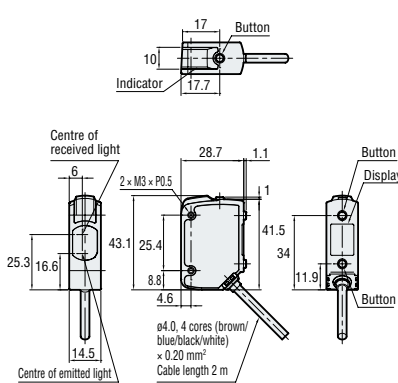
## Reference data



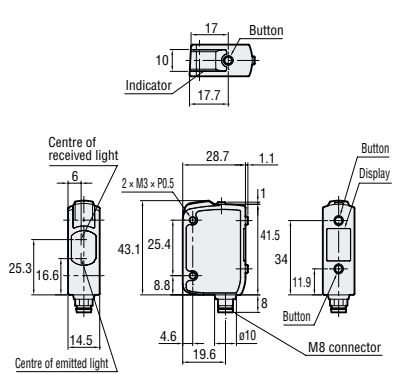
LR-ZH490CB/  
ZB240CB/  
ZB90CB



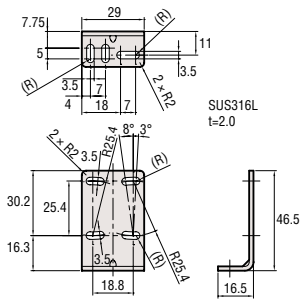
LR-ZH500N/ZH500P/  
ZB250AN/ZB250AP/  
ZB100N/ZB100P



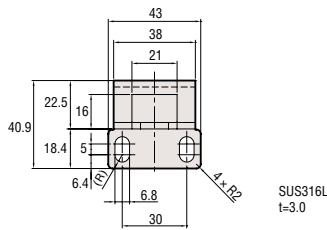
LR-ZH500CN/ZH500CP/ZH500C3P/  
ZB250CN/ZB250CP/ZB250C3P/  
ZB100CN/ZB100CP/ZB100C3P



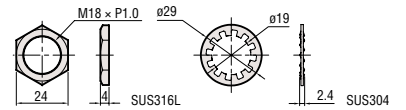
OP-87408



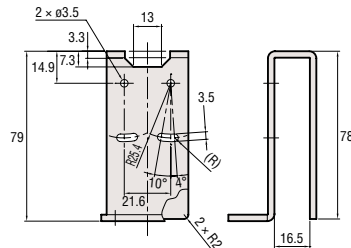
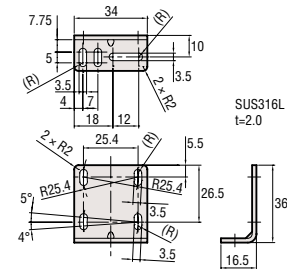
OP-87410



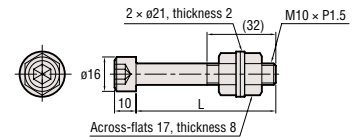
OP-87413



OP-87409

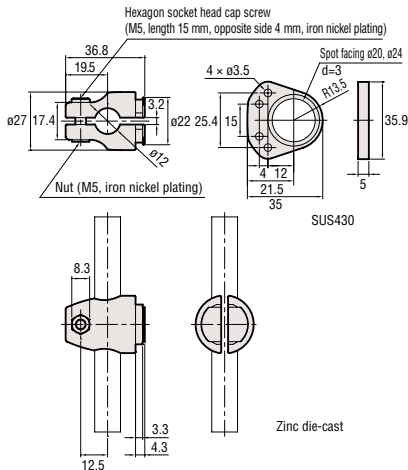


OP-87406/87407

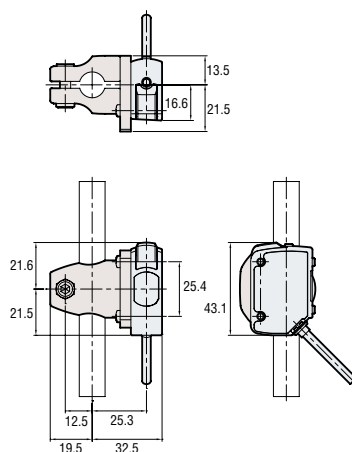


Iron nickel plating  
L=45 mm : OP-87406  
L=65 mm : OP-87407

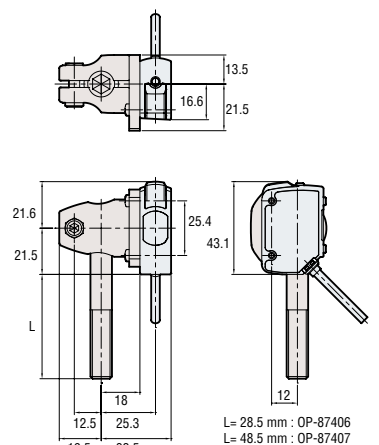
OP-87404



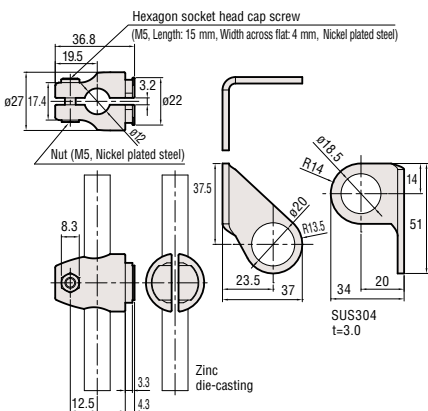
OP-87404 + LR-ZH500N



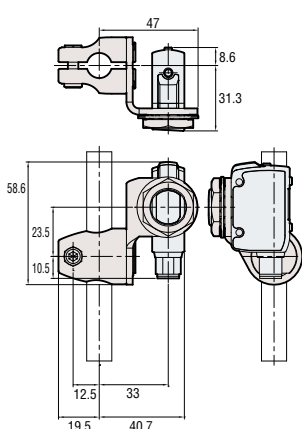
OP-87406/87407 + OP-87404 + LR-ZH500N



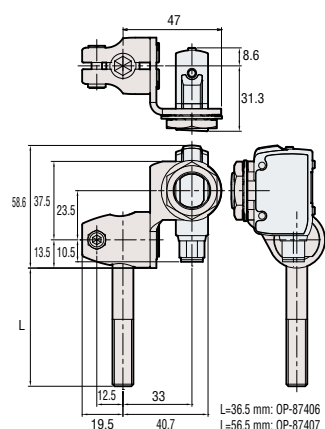
**OP-87405**



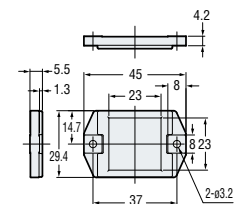
**OP-87405 + LR-ZH490CB**



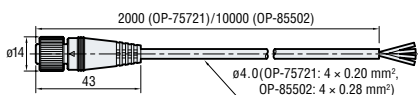
**OP-87406/87407 + OP-87405 + LR-ZH490CB**



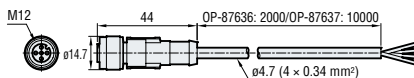
**Reflector R-6L**



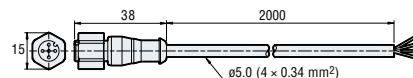
**OP-75721 / 85502**



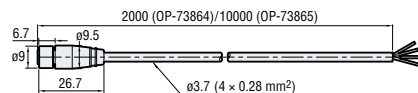
**OP-87636 / 87637**



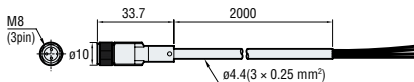
**OP-87402**



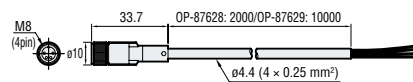
**OP-73864 / 73865**



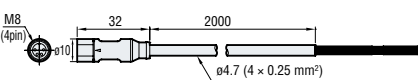
**OP-87627**



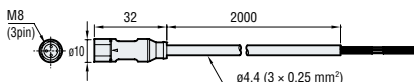
**OP-87628/87629**



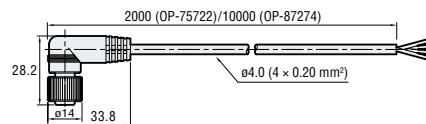
**OP-87621**



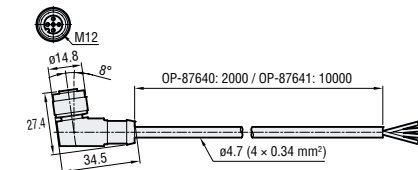
**OP-87622**



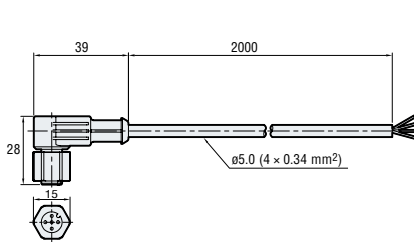
**OP-75722 / 87274**



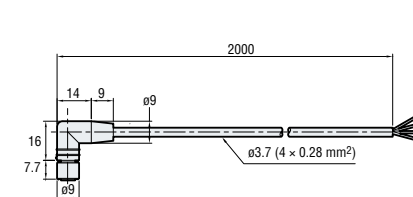
**OP-87640/87641**



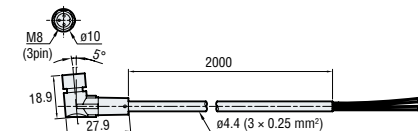
**OP-87403**



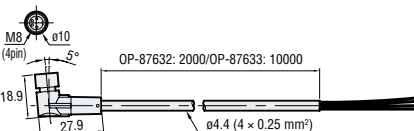
**OP-85497**



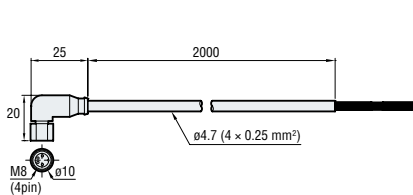
**OP-87631**



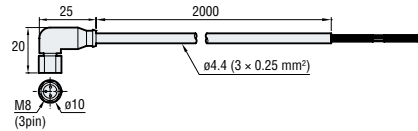
**OP-87632/87633**



**OP-87619**



**OP-87620**



**M12 Connector pin layout (4-pin type)**



**M8 Connector pin layout (4-pin type)**



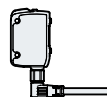
**M8 Connector pin layout (3-pin type)**



No.	Colour
①	Brown
②	White
③	Blue
④	Black

**Note:**

When the L-shaped connector is in use, the cable is fixed in the direction shown on the right. The connector is not rotatable.



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