

# KEYENCE

Value  
Priced



**New Standard!** All-Purpose Laser Photoeye



**NEW** Self-contained  
CMOS Laser Sensor

# LR-Z SERIES

Self-contained  
CMOS Laser Sensor

# LR-Z SERIES



KEYENCE  
LR-ZB150N  
RANGE: 100mm (3.94") - 1500mm (59.1")  
2.5MM Ø EXTERNAL DIAMETER  
3.8MM Ø MOUNTING HOLES  
3.8MM Ø MOUNTING HOLES  
MADE IN JAPAN

UL  
CE  
RoHS

18.7

## **Introducing a more versatile Laser Sensor**

Detection is often difficult with reflective sensors for a variety of reasons, including target color, material, surface finish, and environment. In order to solve these issues, the stability of a CMOS laser has been combined with the versatility of a self-contained sensor in a heavy duty metal body to create a more stable and user friendly general purpose sensor.

### **BEST DETECTION ABILITY in its class**

CMOS laser and DATUM detection

### **DURABLE & LONG LIFE**

High enclosure rating and Stainless steel body (SUS316L)

### **SIMPLIFIED OPERATION**

One-touch setup and Digital display

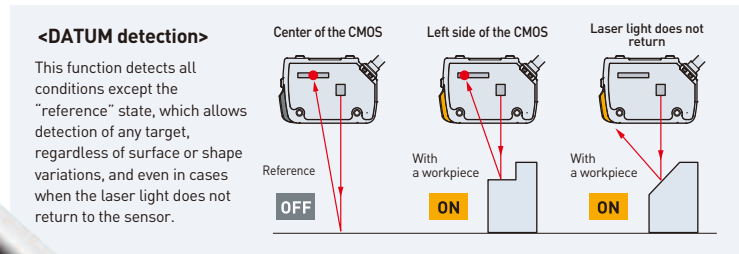
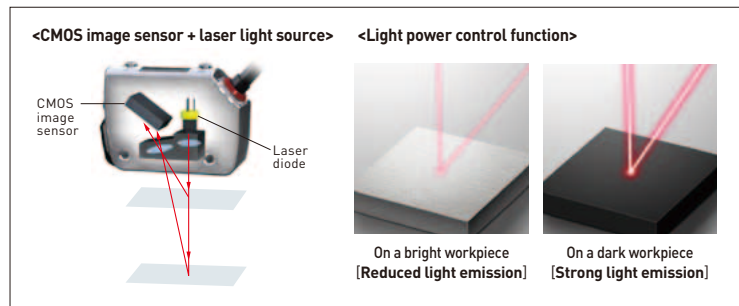
# BEST DETECTION ABILITY in its class

CMOS laser and DATUM detection



## Best detection ability by a self-contained sensor in its class

The LR-Z Series provides uncompromised detection ability while maintaining the easy operation of a self-contained design. This sensor monitors and automatically adjusts its sensitivity using a light power control function made possible by combining the benefits of a CMOS receiving element with a laser light source. This allows for stable detection to be achieved, regardless of color or angle. The built-in background and foreground suppression functions allow the LR-Z to achieve the best detection ability of any self-contained sensor in its class.



**Case: SUS316L (stainless steel)**  
Extremely high chemical resistance among corrosion resistant stainless steels

**Cover: PES (Polyethersulfone)**  
Food grade hygiene in addition to high chemical resistance

**Packing: FKM (Fluoro-rubber)**  
High chemical / oil resistance

# DURABLE & LONG LIFE

## High enclosure rating and Stainless steel body (SUS316L)

The SUS316L stainless steel body of the LR-Z resists damage, even when overtightened or experiencing impact from tools or other equipment, meaning there is no additional protective cover needed. In addition, the heavy duty body is highly resistant to oil, acid, and alkaline detergents and can be used in harsh environments due to its NEMA and IP rated enclosure.

**Optical plate: PMMA (Acrylic resin)**  
High transparency and chemical resistance with scratch resistant coating

**Sealant: Silicone**  
Resistant against high pressure / high temperature water flow



Resists damage, even when over-tightened



Resistant to impact  
(Approx. 3 times more resistant compared to our conventional model)



Meets NEMA Type 4x, 6P, 13 and IP68/69K requirements

# SIMPLIFIED OPERATION

## One-touch setup and Digital display

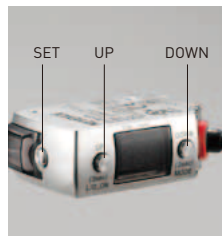
The LR-Z is designed to provide reliable, yet simple operation for any user. Its large indicator ensures outstanding visibility, even from long distance. Operation is simplified through the addition of a digital 7-segment display and one-touch teaching method. Sensitivity settings are easily performed while monitoring the digital display for proper operation. The LR-Z is also equipped with a key lock function to prevent unexpected or accidental changes.



Large indicator  
(Approx. 6 times larger compared to our conventional model)



Digital 7-segment display



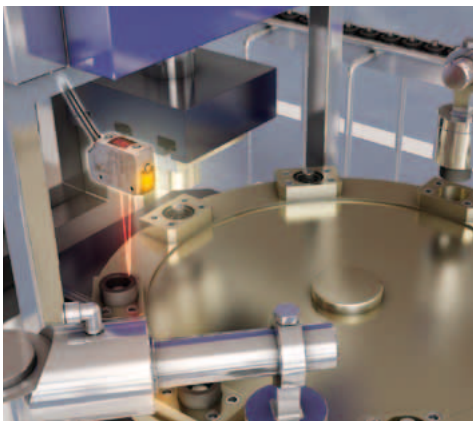
Easy setup with one touch teaching



## Versatile for use in a large variety of applications and industries

**Black targets**

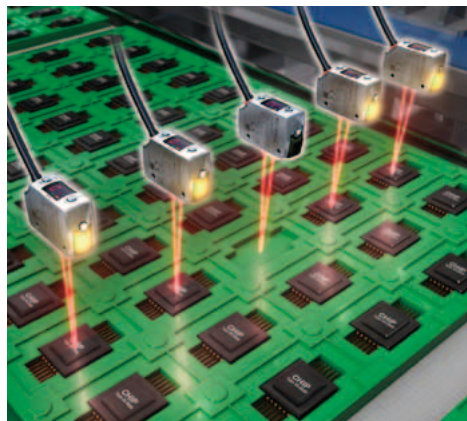
**Inspecting press fit anti vibration rubber bushings on an index table**



Automatic light power control enables reliable detection even on a black workpiece with low reflectivity.

**Presence confirmation**

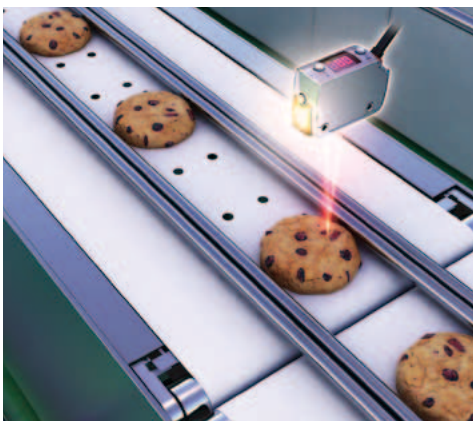
**Detecting presence / absence of IC components**



The light power control function enables stable detection even when the intensity changes due to color and surface variations.

**Irregular surfaces**

**Detecting presence / absence in food processing and packaging**



Reliable detection is possible regardless of irregular surfaces or background color.

**Printed targets**

**Confirming package presence**



The LR-Z Series performs reliable detection even on printed packaging with a glossy finish.



Improvement application

### Confirming workpiece ejection in oil-contaminated environments



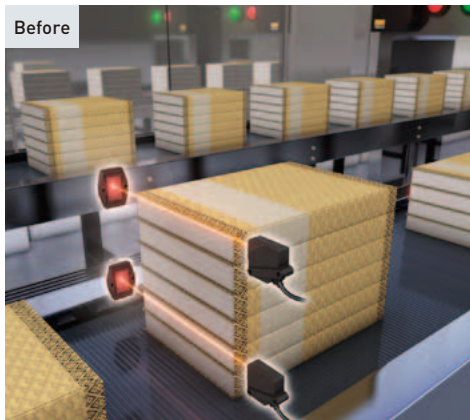
A thru-beam photoelectric sensor was used. Production was temporarily stopped due to a large amount of oil buildup.



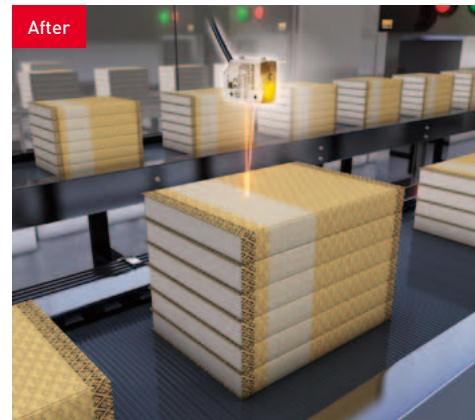
Downtime can be reduced by installing a sensor away from oil splash in order to eliminate malfunctions.

Improvement application

### Confirming product quantity



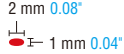











Previously, confirming product quantity required manual adjustment of the sensors at product changeover to account for different product heights.






By installing the LR-Z sensor above the target and using the external calibration input, product changeover time is reduced and precise operation is ensured.



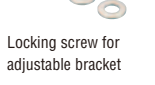
## Lineup

Type	Detecting distance	Spot diameter	Standard detectable deviation	Connection method	Output	Model	Weight
 Rectangular w/ cable	 35 to 100 mm 1.38" to 3.94"	 2 mm 0.08" 1 mm 0.04" At detecting distance of 100 mm 3.94"	1.5 mm 0.06" (35 to 50 mm 1.38" to 1.97") 3 mm 0.12" (50 to 100 mm 1.97" to 3.94")	2 m 6.56' cable	NPN	LR-ZB100N	110 g
					PNP	LR-ZB100P	
 Rectangular w/ M8 connector	 35 to 250 mm 1.38" to 9.84"	 2.4 mm 0.09" 1.2 mm 0.05" At detecting distance of 250 mm 9.84"	9 mm 0.35" (35 to 180 mm 1.38" to 7.09") 25 mm 0.98" (180 to 250 mm 7.09" to 9.84")	M8 4-pin	NPN	LR-ZB100CN	55 g
				M8 3-pin	PNP	LR-ZB100CP	
					PNP	LR-ZB100C3P	
 Rectangular w/ cable	 35 to 250 mm 1.38" to 9.84"	 2.4 mm 0.09" 1.2 mm 0.05" At detecting distance of 250 mm 9.84"	9 mm 0.35" (35 to 180 mm 1.38" to 7.09") 25 mm 0.98" (180 to 250 mm 7.09" to 9.84")	2 m 6.56' cable	NPN	LR-ZB250N	110 g
					PNP	LR-ZB250P	
 Rectangular w/ M8 connector	 35 to 250 mm 1.38" to 9.84"	 2.4 mm 0.09" 1.2 mm 0.05" At detecting distance of 250 mm 9.84"	9 mm 0.35" (35 to 180 mm 1.38" to 7.09") 25 mm 0.98" (180 to 250 mm 7.09" to 9.84")	M8 4-pin	NPN	LR-ZB250CN	55 g
				M8 3-pin	PNP	LR-ZB250CP	
					PNP	LR-ZB250C3P	

## Mounting bracket

Type	Model	Material/Weight
 Standard mounting bracket (M3 screw x 2 supplied)	OP-87408 <sup>*1</sup>	SUS316L 30 g
 Rear mounting bracket (M3 screw x 2 supplied)	OP-87409	SUS316L 30 g
 Robust mounting bracket (t = 3) (M3 screw x 2 supplied)	OP-87410 <sup>*2</sup>	SUS316L 170 g

## Mounting bracket (adjustable bracket)

Type	Model	Material/Weight
 Adjustable bracket for rectangular type (M3 screw x 2 supplied)	OP-87404	Zinc nickel plating 95 g
 Screw length	OP-87406	Iron nickel plating 70 g
 Locking screw for adjustable bracket	OP-87407	Iron nickel plating 80 g

## New adjustable bracket

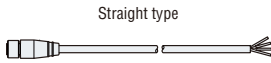
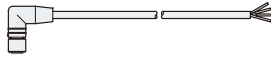


Adjustable bracket for rectangular type

\*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.

## ■ Cable

Specifications	Material	Appearance	Connection method	Length	Model	Weight
Standard	Cable: PVC Connector: Brass nickel plating	 <p style="text-align: center;">Straight type</p>	M8 4-pin	2 m <a href="#">6.56'</a>	<b>OP-73864</b>	55 g
				10 m <a href="#">32.8'</a>	<b>OP-73865</b>	220 g
Oil resistant	Cable: PUR Connector: Brass nickel plating		M8 4-pin	2 m <a href="#">6.56'</a>	<b>OP-87396</b>	80 g
				10 m <a href="#">32.8'</a>	<b>OP-85499</b>	65 g
Chemical resistant	Cable: PVC Connector: SUS316L		M8 4-pin	2 m <a href="#">6.56'</a>	<b>OP-85500</b>	310 g
				10 m <a href="#">32.8'</a>	<b>OP-87397</b>	75 g
Standard	Cable: PVC Connector: Brass nickel plating	 <p style="text-align: center;">L-shaped type</p>	M8 3-pin	2 m <a href="#">6.56'</a>	<b>OP-87398</b>	60 g
				2 m <a href="#">6.56'</a>	<b>OP-87399</b>	80 g
Oil resistant	Cable: PUR Connector: Brass nickel plating		M8 4-pin	2 m <a href="#">6.56'</a>	<b>OP-85497</b>	55 g
				10 m <a href="#">32.8'</a>	<b>OP-85584</b>	65 g
Chemical resistant	Cable: PVC Connector: SUS316L		M8 4-pin	2 m <a href="#">6.56'</a>	<b>OP-85585</b>	310 g
				10 m <a href="#">32.8'</a>	<b>OP-87400</b>	70 g
Standard	Cable: PVC Connector: Brass nickel plating	M8 3-pin	2 m <a href="#">6.56'</a>	<b>OP-87401</b>	60 g	

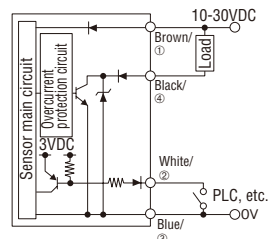
## ■ Enclosure ratings for each cable type

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 manufactures.

## ■ I/O circuit diagram

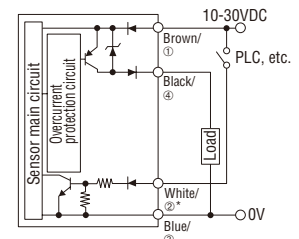
**NPN type (LR-ZB \* N)**



M8 Connector  
pin layout (4-pin type)



**PNP type (LR-ZB \* P)**



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

M8 Connector  
pin layout (3-pin type)



## Specifications

Type		Distance based laser sensor		
Appearance		Rectangular		
Model	NPN	2 m 6.56' cable	LR-ZB100N	LR-ZB250N
		M8 connector 4-pin	LR-ZB100CN	LR-ZB250CN
	PNP	2 m 6.56' cable	LR-ZB100P	LR-ZB250P
		M8 connector 4-pin	LR-ZB100CP	LR-ZB250CP
		M8 connector 3-pin	LR-ZB100C3P	LR-ZB250C3P
Detectable distance		35 to 100 mm 1.38" to 3.94" (650 to 0) <sup>1</sup>	35 to 250 mm 1.38" to 9.84" (215 to 0) <sup>1</sup>	
Standard detectable deviation		35 to 50 mm 1.38" to 1.97"; 1.5 mm 0.06" 50 to 100 mm 1.97" to 3.94"; 3 mm 0.12"	35 to 180 mm 1.38" to 7.09"; 9 mm 0.35" 180 to 250 mm 7.09" to 9.84"; 25 mm 0.98"	
Display resolution		2 (0.2 mm 0.008")	1 to 3 (1 to 3 mm 0.04" to 0.12")	
Spot diameter		2 × 1 mm 0.08" × 0.04" at 100 mm 3.94"	2.4 × 1.2 mm 0.09" × 0.05" at 250 mm 9.84"	
Response time		1.5 ms / 10 ms / 50 ms selectable		
Light source	Type	Red laser (660 nm)		
	Laser class	Class 1 laser product (IEC60825-1, FDA (CDRH) Part1040.10 <sup>2</sup> )		
Function	Indicator	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 12V)		
	Control output	LR-ZB*N: NPN Open collector LR-ZB*P: 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 <sup>3</sup>	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>4</sup> , Diversey <sup>4</sup>		
	Ambient light <sup>5</sup>	Incandescent lamp: 4000 lux or less Sunlight: 8000 lux or less	Incandescent lamp: 2000 lux or less Sunlight: 4000 lux or less	
	Ambient temperature	-10 to +50°C 14 to 122°F (No freezing)		
	Storage temperature	-25 to +75°C -13 to 167°F (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 0.06" 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			
Accompanying items	Instruction Manual, Certification/Identification label (FDA)			

<sup>1</sup> Display reading 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.

<sup>2</sup> The laser classification for FDA (CDRH) is implemented based on IEC60825-1 in accordance with the requirements of Laser Notice No.50.

<sup>3</sup> M8 connector (3-pin) type does not include the external input function.

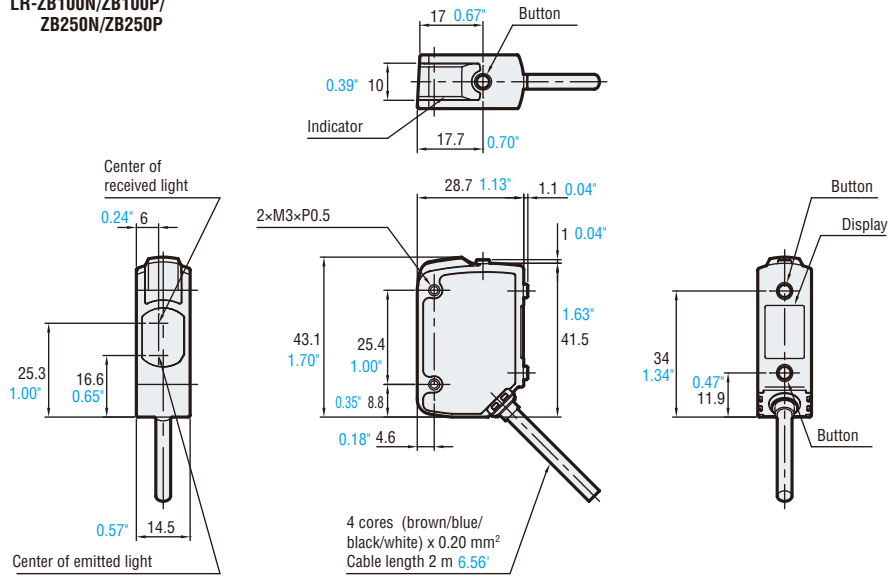
<sup>4</sup> Have passed resistance tests with cleaning agents from multiple manufacturers.

<sup>5</sup> When the response time is 10 ms

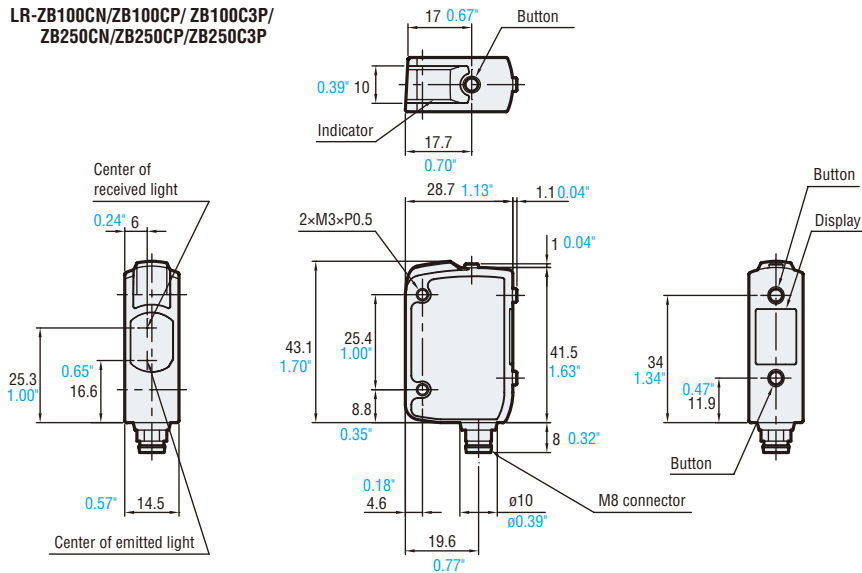
■ Dimensions

Unit: mm inch

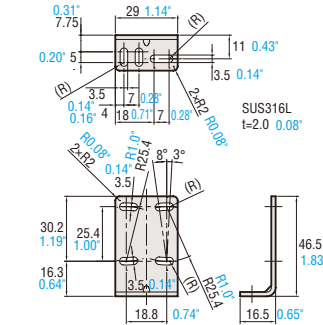
LR-ZB100N/ZB100P/  
ZB250N/ZB250P



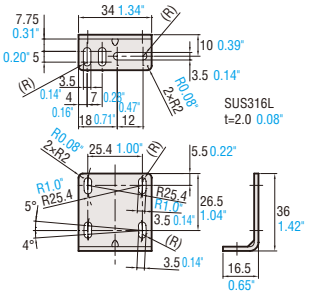
LR-ZB100CN/ZB100CP/ ZB100C3P/  
ZB250CN/ZB250CP/ZB250C3P



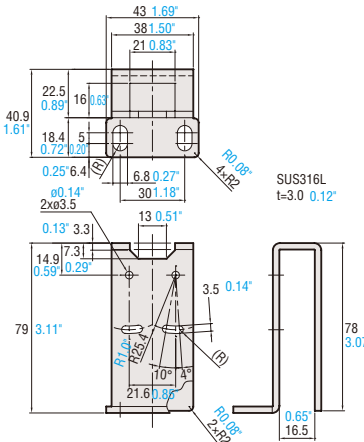
OP-87408



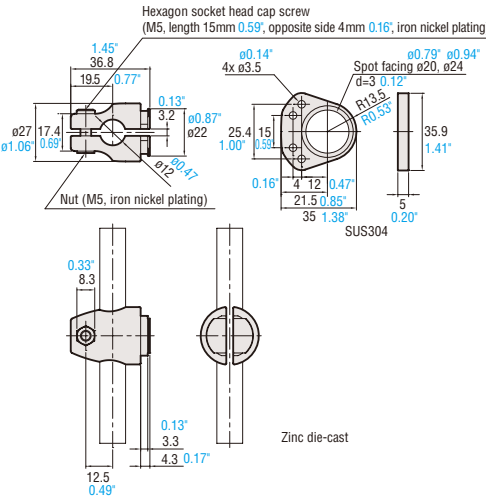
OP-87409



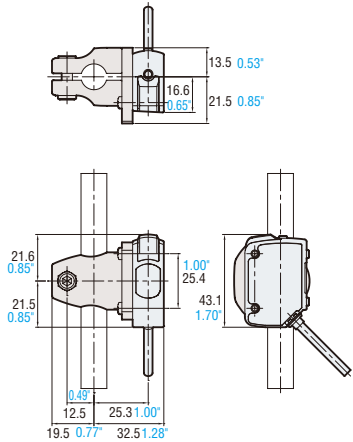
OP-87410



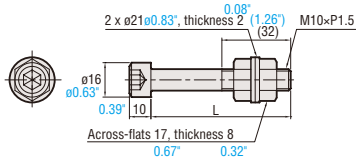
OP-87404



OP-87404+ LR-ZB100N

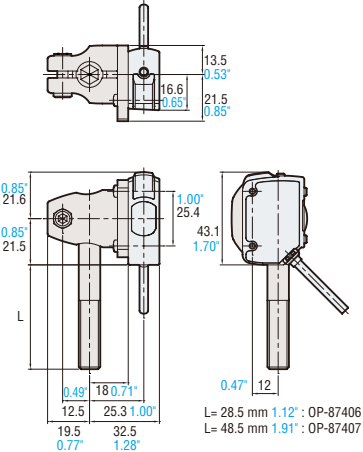


OP-87406/87407

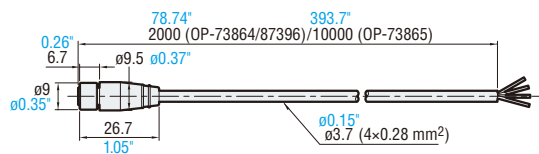


Iron nickel plating  
L=45 mm 1.77": OP-87406  
L=65 mm 2.56": OP-87407

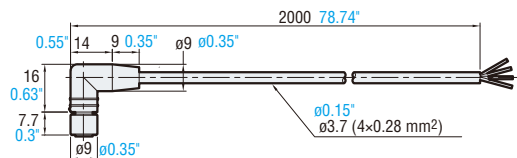
OP-87406 / 87407 + OP-87404 + LR-ZB100N



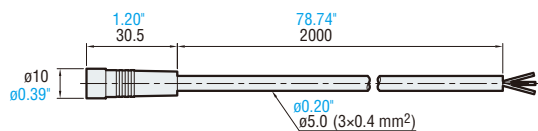
## OP-73864 / 73865



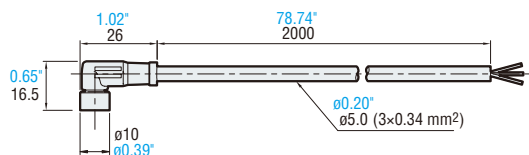
## OP-85497



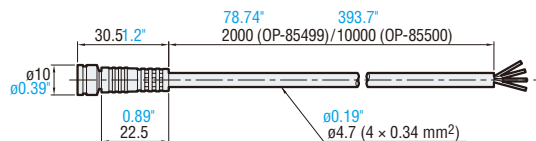
## OP-87396



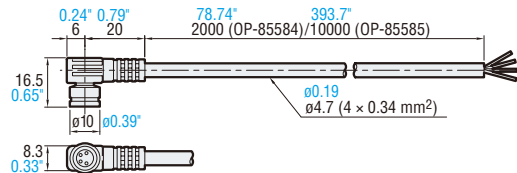
## OP-87399



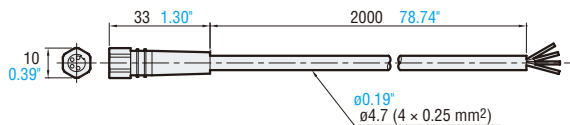
## OP-85499 / 85500



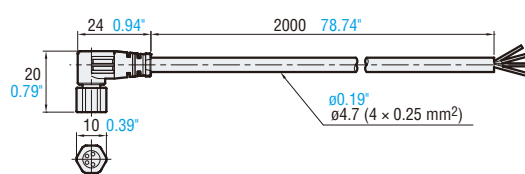
## OP-85584 / 85585



## OP-87397 / 87398



## OP-87400 / 87401

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

No.	Color
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.



CAD DATA DOWNLOAD

www.keyence.com/CADG