KEYENCE

Compact Laser Sensor

LR-X Series

SMALL SIZE
STABLE DETECTION



Unmatched Stability
In A Remarkably Small Footprint





Compact Laser Sensor **LR-X Series**

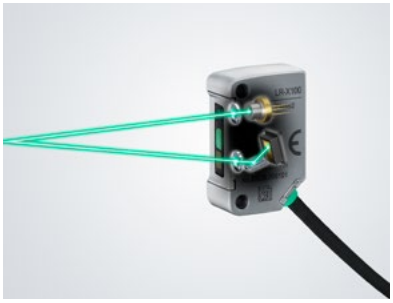
Compact & Robust Design

- Small Size
- Easy Integration
- Rugged Construction



Impressive Detection Capabilities

- Detect Any Target
- Detect Small Changes
- Detect Sensor Misalignment



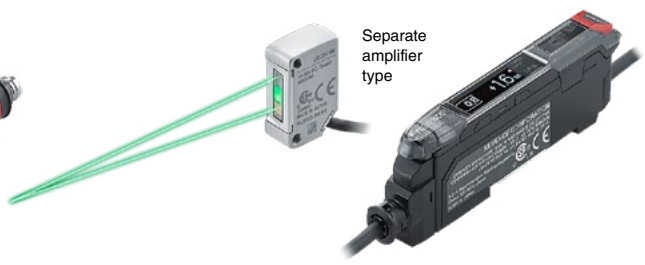
Unmatched Ease of Use

- OLED Display
- Easily Visible Indicators
- Quick Head Identification



Compact Laser Sensor **LR-X Series**





Compact & Robust Design

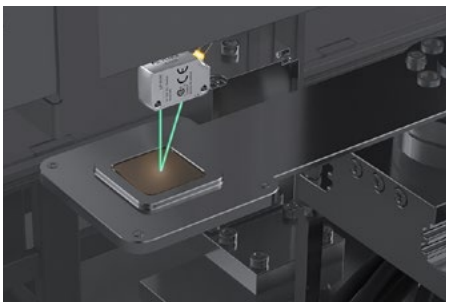
The small size is complimented by a durable design for use in any location



Easy Integration in Any Situation

Reduce Design Time on New Machines

As machines become more compact and space remains at a premium, it is not always easy to design in sensors. The compact size of the LR-X Series eliminates this concern as it takes up little room and will not impact other elements of the design.



Retrofitting Has Never Been Easier

Finding locations to mount new sensors on an existing machine can be difficult, but this can be almost impossible with large or bulky sensors. The slim design of the LR-X Series greatly increases the number of places a sensor can be mounted and makes retrofitting a breeze.



Durable Metal Housing

Damage due to impact is never a concern with the LR-X Series. The food-grade stainless steel housing (SUS316L) provides extraordinary resistance to impact damage from parts or operators.



Superior Environmental Protection

The LR-X Series features impressive enclosure ratings of IP65 and IP67. This ensures that dust, debris, and liquids will not cause damage to the unit, and allows these sensors to be used in virtually any environment.

* Excludes amplifier used with Separate Amplifier Type.





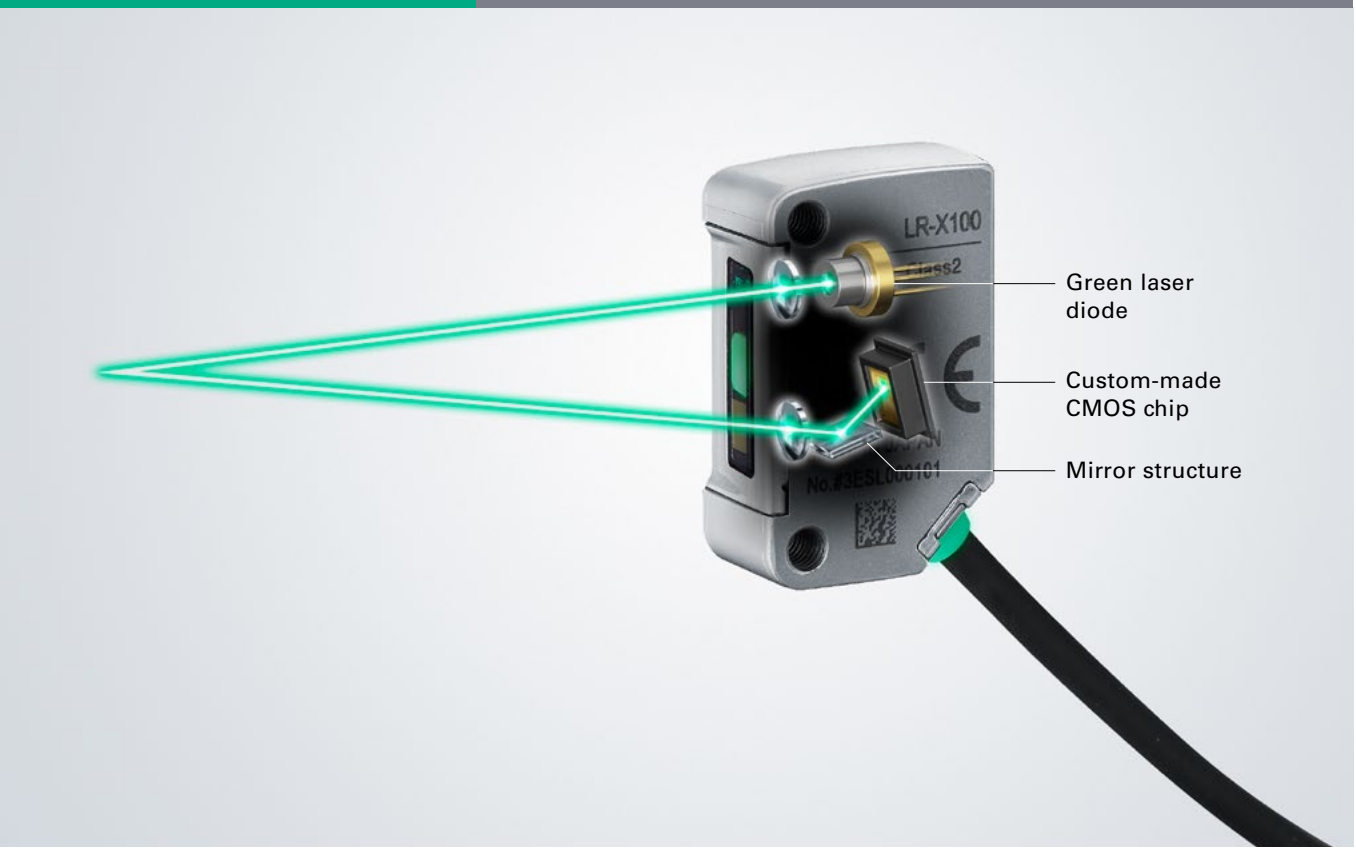
Additional Guarding Prevents Cable Damage

Even cable damage can be guarded against when using the Standard Type models. The LR-X Series offers units that feature a metal guarded cable between the head and amplifier, preventing damage due to cutting, crushing, or pinching the cable.



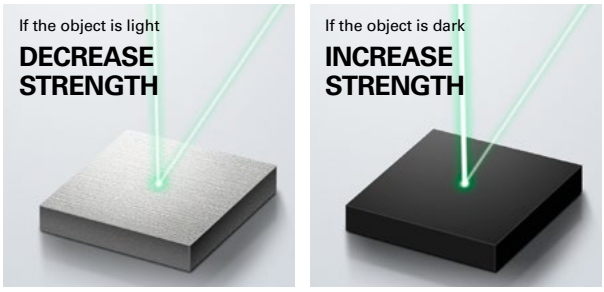
Impressive Detection Capabilities

Position-based sensing and advanced circuitry ensure detection of any target



Detect Targets Regardless of Appearance

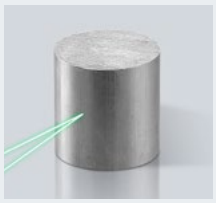
The LR-X Series utilizes a custom CMOS chip to detect targets based on position. This ensures the stable detection of targets regardless of color, surface finish, or shape. Along with this, the built-in dynamic range adjusts the intensity of the laser to prevent saturation from light targets and ensure detection of dark targets.



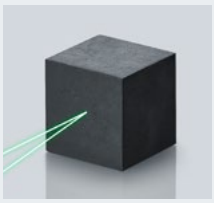
Shiny Metals



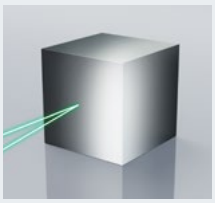
Rounded Surfaces



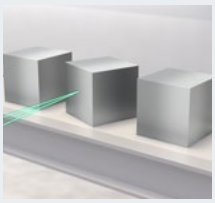
Black/Dark Targets



Varied Colors

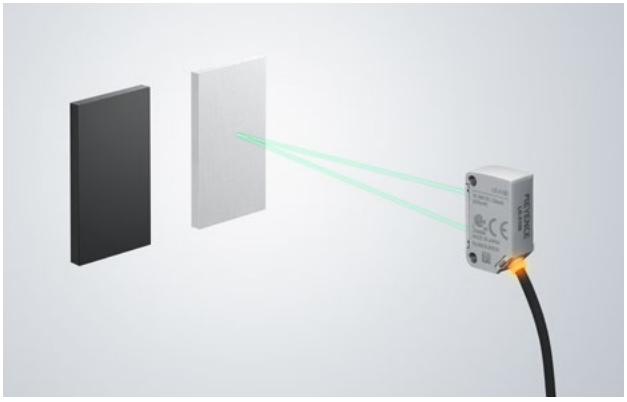


Angled Targets



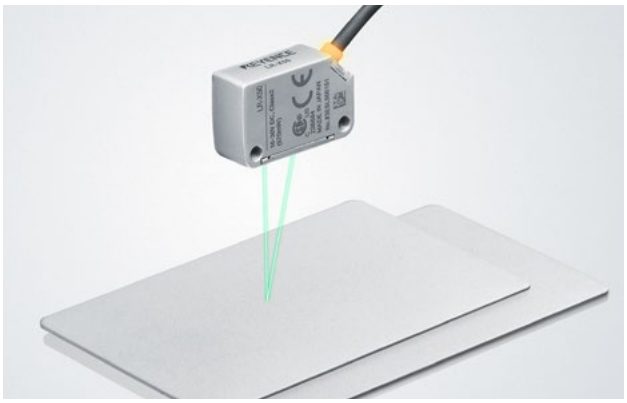
WORLD'S FIRST
Green Laser CMOS Sensor

When using a green laser, the returned light from an object creates a smaller and sharper spot on the CMOS chip compared to light returned from a red laser. This tighter spot leads to a higher degree of reliability and stability in the detection of any target.



Detect Very Small Changes in Position

The unique construction of the LR-X Series allows the unit to detect minute changes as small as 0.5 mm 0.02". This expansion in detection capabilities enables usage in applications typically requiring much larger sensors.



NEW INNOVATION

Integrated Impact Alarm (Gyro Monitor)

Stable detection can quickly be compromised if a sensor is bumped or hit out of alignment. Luckily, the LR-X Series features the innovative gyro monitor, which can immediately alert users to impacts that could cause misalignment due to sensor rotation.



Ease of Use

Set up and troubleshooting have never been easier or quicker



Detailed OLED Display, Set Up in Minutes

Never guess at what a menu or setting is trying to say again! The LR-X Series features an intuitive OLED display, which spells things out with perfect clarity. From set points to menu settings, understanding a sensor has never been easier.

Conventional display | **LR-X Series Display**



The current value and set point can be understood at a glance.



No manual needed to find the proper menu options.



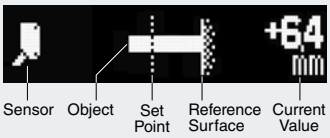
Specific actions can be selected with confidence.

Intuitive Display Options

The benefits of the OLED display extend beyond just the settings. When paired with specific detection modes, these displays can provide a level of detail that is unmatched in other sensors and makes understanding the situation effortless.

Bar display

See all the elements pertinent to detection and understand quickly where the object being detected is located.



Area detection mode

No need to switch between screens, see the near and far thresholds that make up the detection area.



Clearly Visible Indicators (Front & Back)

Easily understand the output status of the unit from any location. The LR-X Series features two status indicators, one on the face of the unit and one on the back of the unit where the cable is connected.





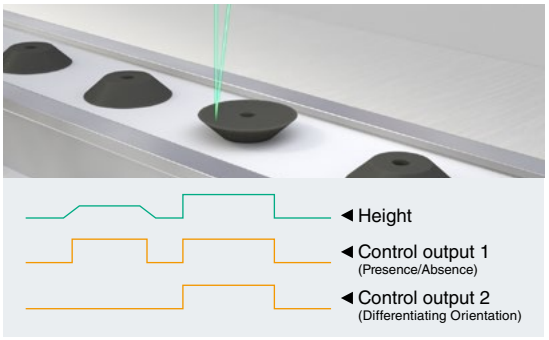
Quick Head Identification

When using the Separate Amplifier Type, it is simple and easy to identify which LR-X head is attached by using the indicator blinking function. This makes setup and troubleshooting easier by ensuring focus on the right sensor head.



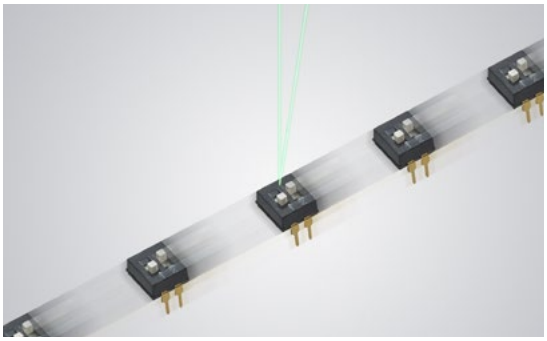


Additional Features



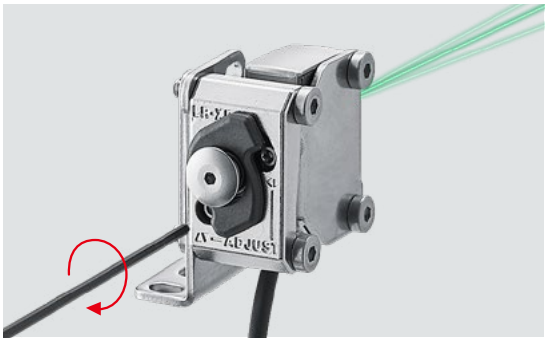
2 Independent Outputs

Do more with one sensor. The LR-X Series features two independent outputs, allowing for the differentiation of up to three different conditions.



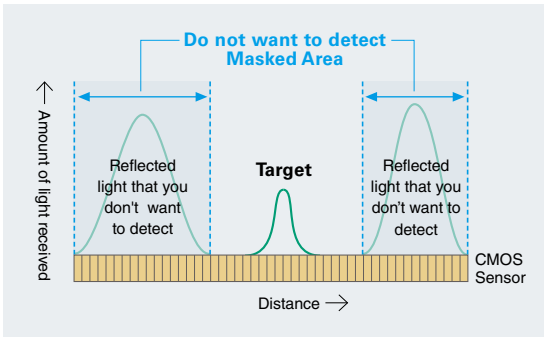
500µs Response Time

Target speed and size are no longer a concern with this blazing fast response time. Small targets and fast moving targets can now be stably detected.



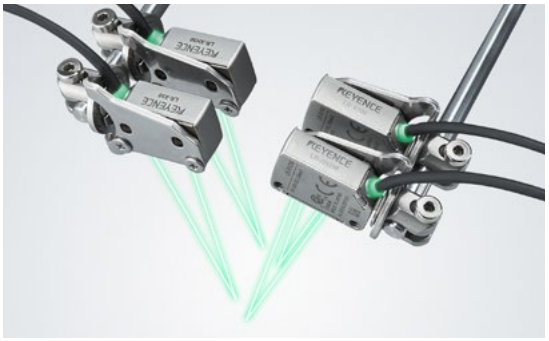
Fine Adjustment Bracket

When detecting small targets proper alignment is key. The fine adjustment bracket will ensure just that with the ability to easily make precise XY adjustments.



Mask Function

If reflected light from near or far objects is causing detection issues, simply mask those areas and ensure only the target to be detected is seen.



Interference Prevention Function

Prevent interference on up to 8 units when using the expandable separate amplifier models. This ensures stable detection with heads mounted in close proximity.

Display example: Response time setting screen



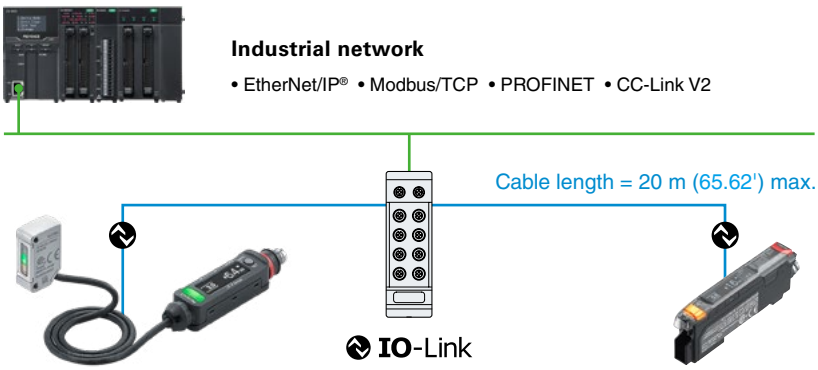
Multi-Language Display Options

English, Japanese, Chinese, and German language options exist on all units, ensuring these sensors can be understood almost anywhere they are used.

Communication Options

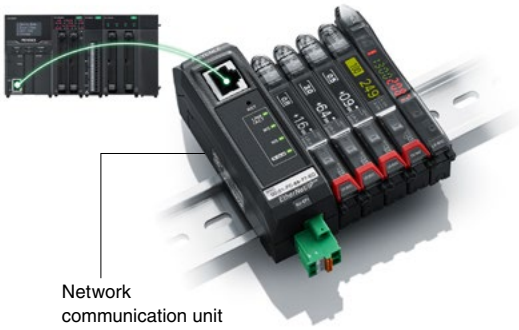
Connecting to a Network	**IO-Link Communication**

Those using IO-Link can immediately integrate the LR-X Series into their existing setup. Both the Standard Type and Separate Amplifier (M8) Type support IO-Link communication.



Connecting to a Network	**Network Communication Unit**	Separate amplifier type only

By pairing the LR-X Series with a KEYENCE Network Unit, it is possible to communicate sensor settings and detection status via one of several network protocol options. Up to 16 outputs can be connected.



EtherNet/IP
PROFINET
DeviceNet
EtherCAT
CC-Link V2

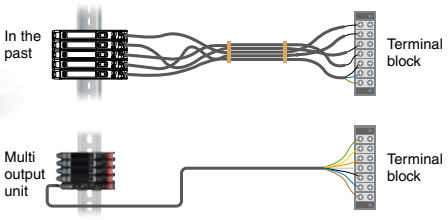
* The LR-X Series live value cannot be acquired through the network communication unit.

Simplified Connection to a Panel	**Multi-Output Unit**	Separate amplifier type only

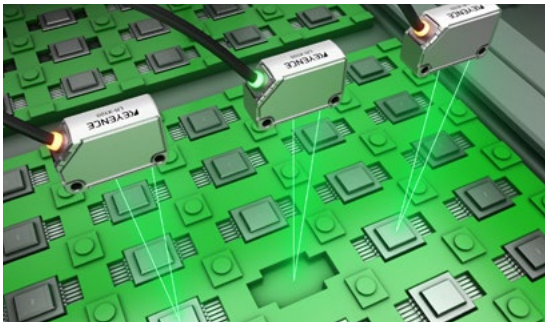
Reduce the total number of wires and simplify integration by using the KEYENCE Multi-Output Unit. Connect up to eight amplifiers to one unit and consolidate all the wires into a single cable.



Drastically reduce the number of cables and wires



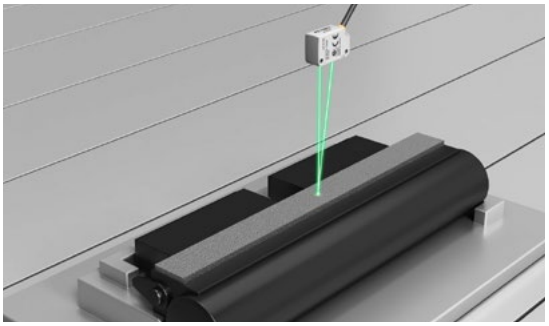
Applications



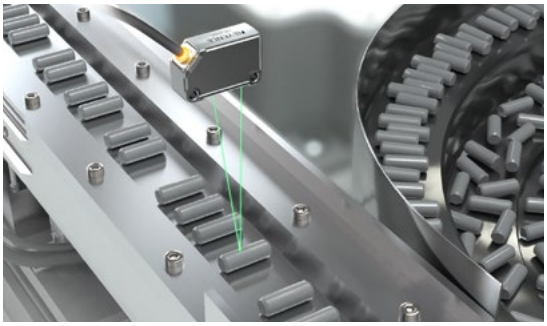
Presence or absence of chips in a tray



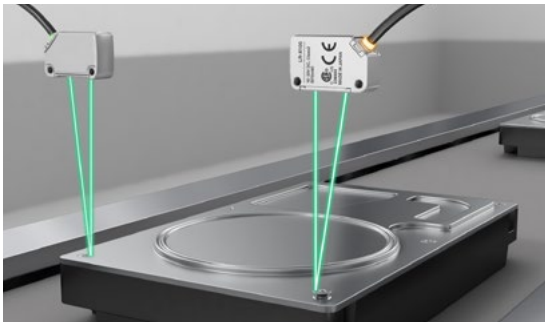
Confirmation that the straw has been attached



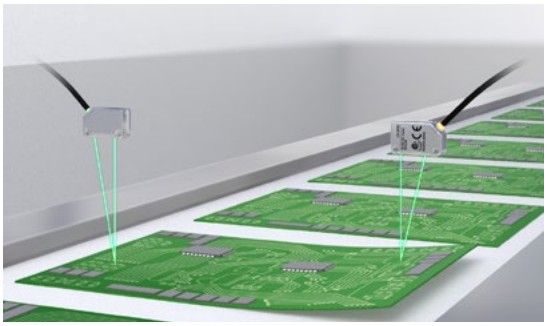
Presence or absence of black nonwoven fabric or foam



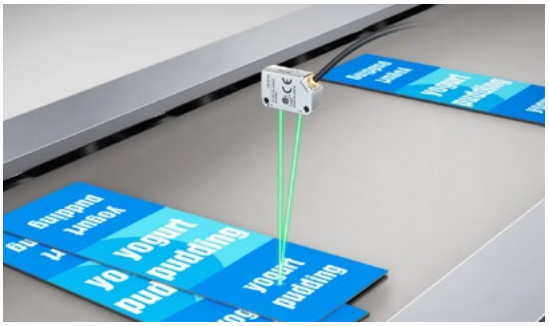
Presence or absence of shiny metal workpieces



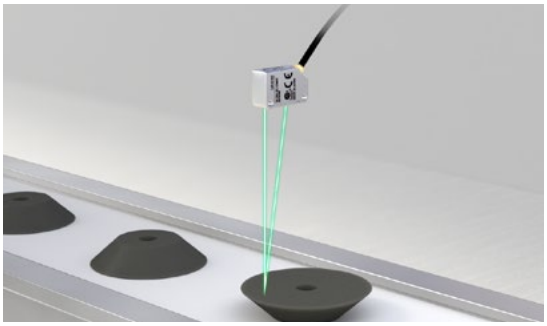
Screw height check



Detection of board warpage



Overlap detection of papers or labels



Differentiating part orientation

Benefits of Green Laser + CMOS Chip

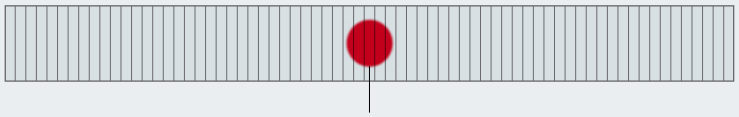
Green lasers are able to produce a smaller and sharper spot reflection on the CMOS chip, compared to that of red lasers. These characteristics reduce the potential for detection errors and allow for a higher resolution chip to be used for more precise detection.

Differences in Receiving Spots on CMOS Chips with High Resolution

GREEN LASER

Typical red laser

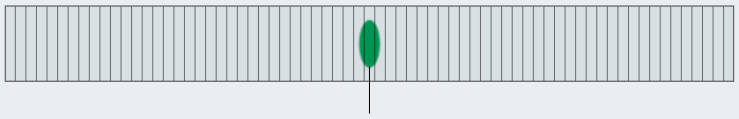
High resolution CMOS chips



The spot from a red laser is typically larger in size and more prone to blurring which can lead to detection errors or less precise detection.

Green laser

High resolution CMOS chip



The compact size and sharpness of the green laser reduces the potential for detection errors and increases precision.

New Optical System

To achieve the compact size and precision of the LR-X Series, it was necessary to introduce a brand new optical system setup.

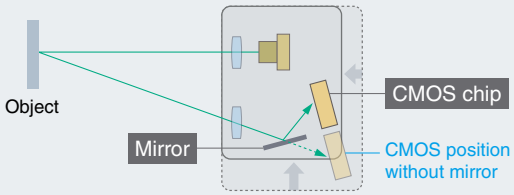
Mirror Structure

By utilizing a mirror to redirect the reflected light, the CMOS chip can be placed in a location that helps reduce the overall body size.

Custom CMOS Chip

This chip provides a resolution that is 100 times greater than conventional CMOS chips, allowing for more stable detection with less returned light. This allows for a smaller light receiving lens to be implemented.

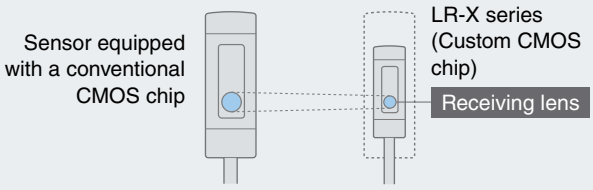
Mirror structure



By implementing the mirror, the CMOS chip can be placed in an ideal location to reduce size.

Custom CMOS Chip

Comparison of the size of the light receiving lens required for stable detection



The lens for the receiving element can be drastically reduced in size, since the high resolution CMOS chip requires less light for stable detection.

Selecting an LR-X Series Model

STEP 1 → **STEP 2** → **STEP 3**

Select a sensor unit → Select mounting bracket(s) → Select additional accessories

STEP 1 Select a Sensor Unit

Standard Models



Cable Type
LR-X50/ X100/ X250





M8 Connector Type (Standard Cable/ Guarded Cable)
LR-X50C(G)/X100C(G)/ X250C(G)

Separate Amplifier Models



Sensor Head
LR-XH50/XH100/XH250
*2 cable lengths available
2 m and 10 m 6.6' and 32.8'

Amplifier Units



Cable Type (Main Unit/Expansion Unit)
LR-XN11N/XN11P/ XN12N/XN12P



M8 Connector Type
LR-XN11C



Zero Line Type
LR-XN10

STEP 2 Select Mounting Bracket(s)

For Sensor Heads

Standard Mounting Brackets for Sensor Head



L-Type Mounting Bracket
OP-88499



Rear Mounting Bracket
OP-88500



Pitch-Conversion Mounting Bracket
OP-88504



Fine-Tuning Mounting Bracket
LR-XB1

Adjustable Brackets for Sensor Head



Adjustable Bracket A
OP-88501



Adjustable Bracket B
OP-88502



Adjustable Bracket Locking Post
OP-88503

For Amplifiers

For Standard Models



Amplifier Holder for Standard Models
OP-88542

For Separate Amplifier Models



Separate Amplifier Securing Bracket (for Main Unit)
OP-88245

STEP 3 Select Additional Accessories

Wiring



Connector Cable for M8 Connector Type
2 m/5 m/10 m
6.6'/16.4'/32.8'
OP-88714/ OP-88715/ OP-88716

High-Flex Cable for M8 Connector Type
2 m/5 m/10 m
6.6'/16.4'/32.8'
OP-88505/ OP-88506/ OP-88507



Loose Wires - M12 Adapter Connector (Male)
OP-88296

Separate Amplifier Models



Connector Set for Sensor Head Connection
OP-88543



End Unit (when using expansion units)
OP-26751

STEP 1 Select a Sensor Unit Select a model according to the required functionality

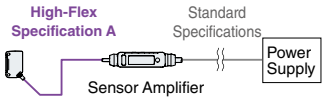
Required Functions		Standard Models		Separate Amplifier Models		
		Cable Type	M8 Connector Type	Cable Type	M8 Connector Type	Zero Line Type
I/O Specifications	2 Control Outputs	✓	✓	✓	✓	—
	1 Control Output + 1 External Input	✓	✓	✓	✓	—
	2 Control Outputs + 1 External Input	—	—	✓	—	—
Enclosure Rating	Sensor Unit	IP65/IP67	IP65/IP67	IP65/IP67	IP65/IP67	IP65/IP67
	Amplifier	IP65/IP67	IP65/IP67	—	—	—
Functions	IO-Link	✓	✓	—	✓	—
	Network Unit Compatibility	—	—	✓ (expansion unit)	—	✓
	Expansion	—	—	✓	—	✓
	Interference Prevention	—	—	✓	—	✓

Hi-Flex Robotic Cable Specifications

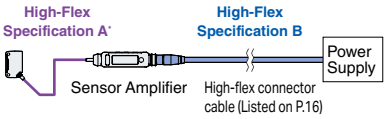
High-Flex Specification A (typical example) 5 million bends with no breakage

High-Flex Specification B (typical example) 20 million bends with no breakage

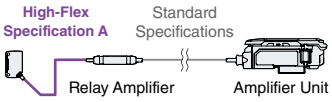
Standard Models (Cable Type)



Standard Models (M8 Connector Type)



Separate Amplifier Models



*Guarded cables with a model number ending in "G" are standard specifications

Standard Model Lineup

Type	Detecting Distance	Spot Size	Standard Detectable Deviation	NPN/PNP Output	Model	Weight
 Cable Type	25.0 to 50.0 mm 0.98" to 1.97"	Approx. 0.2 mm × 1.5 mm 0.008" × 0.06" (Detecting Distance: 50 mm 1.97")	0.5 mm 0.02"	NPN/PNP Selectable	**LR-X50**	Approx. 90 g 3.17 oz
	25.0 to 100.0 mm 0.98" to 3.94"	Approx. 0.3 mm × 2 mm 0.012" × 0.08" (Detecting Distance: 100 mm 3.94")	1.0 mm 0.04"		**LR-X100**	
	30 to 250 mm 1.18" to 9.84"	Approx. 0.8 mm × 1.2 mm 0.03" × 0.05" (Detecting Distance: 250 mm 9.84")	30 to 180 mm: 9 mm 1.18" to 7.09": 0.35" 180 to 250 mm: 18 mm 7.09" to 9.84": 0.71"		**LR-X250**	
 M8 Connector Type Standard Cable (Power supply cable sold separately)	25.0 to 50.0 mm 0.98" to 1.97"	Approx. 0.2 mm × 1.5 mm 0.008" × 0.06" (Detecting Distance: 50 mm 1.97")	0.5 mm 0.02"	NPN/PNP Selectable	**LR-X50C**	Approx. 35 g 1.23 oz
	25.0 to 100.0 mm 0.98" to 3.94"	Approx. 0.3 mm × 2 mm 0.012" × 0.08" (Detecting Distance: 100 mm 3.94")	1.0 mm 0.04"		**LR-X100C**	
	30 to 250 mm 1.18" to 9.84"	Approx. 0.8 mm × 1.2 mm 0.03" × 0.05" (Detecting Distance: 250 mm 9.84")	30 to 180 mm: 9 mm 1.18" to 7.09": 0.35" 180 to 250 mm: 18 mm 7.09" to 9.84": 0.71"		**LR-X250C**	
 M8 Connector Type Guarded Cable (Power supply cable sold separately)	25.0 to 50.0 mm 0.98" to 1.97"	Approx. 0.2 mm × 1.5 mm 0.008" × 0.06" (Detecting Distance: 50 mm 1.97")	0.5 mm 0.02"	NPN/PNP Selectable	**LR-X50CG**	Approx. 45 g 1.58 oz
	25.0 to 100.0 mm 0.98" to 3.94"	Approx. 0.3 mm × 2 mm 0.012" × 0.08" (Detecting Distance: 100 mm 3.94")	1.0 mm 0.04"		**LR-X100CG**	
	30 to 250 mm 1.18" to 9.84"	Approx. 0.8 mm × 1.2 mm 0.03" × 0.05" (Detecting Distance: 250 mm 9.84")	30 to 180 mm: 9 mm 1.18" to 7.09": 0.35" 180 to 250 mm: 18 mm 7.09" to 9.84": 0.71"		**LR-X250CG**	

Separate Amplifier Model Lineup

Sensor Head

Type	Detecting Distance	Spot Size	Standard Detectable Deviation	Head Cable Length	Model	Weight
	25.0 to 50.0 mm 0.98" to 1.97"	Approx. 0.2 mm × 1.5 mm 0.008" × 0.06" (Detecting Distance: 50 mm 1.97")	0.5 mm 0.02"	2 m 6.6'	**LR-XH50**	Approx. 75 g 2.64 oz
				10 m 32.8'	**LR-XH50 (10M)**	Approx. 250 g 8.81 oz
	25.0 to 100.0 mm 0.98" to 3.94"	Approx. 0.3 mm × 2 mm 0.012" × 0.08" (Detecting Distance: 100 mm 3.94")	1.0 mm 0.04"	2 m 6.6'	**LR-XH100**	Approx. 75 g 2.64 oz
				10 m 32.8'	**LR-XH100 (10M)**	Approx. 250 g 8.81 oz
	30 to 250 mm 1.18" to 9.84"	Approx. 0.8 mm × 1.2 mm 0.03" × 0.05" (Detecting Distance: 250 mm 9.84")	30 to 180 mm: 9 mm 1.18" to 7.09": 0.35" 180 to 250 mm: 18 mm 7.09" to 9.84": 0.71"	2 m 6.6'	**LR-XH250**	Approx. 75 g 2.64 oz
				10 m 32.8'	**LR-XH250 (10M)**	Approx. 250 g 8.81 oz

Amplifier Units

Appearance	Type	Main Unit/Expansion Unit	Control Output	External Input	NPN/PNP Output	Model	Weight
Main Unit  Expansion Unit 	Cable Type	Main Unit	2	1	NPN	**LR-XN11N**	Approx. 80 g 2.82 oz
					PNP	**LR-XN11P**	
		Expansion Unit			NPN	**LR-XN12N**	Approx. 70 g 2.46 oz
					PNP	**LR-XN12P**	
	M8 Connector Type	Main Unit (expansion not possible)	2*1	1*1	NPN/PNP Selectable	**LR-XN11C**	Approx. 22 g 0.77 oz
	Zero Line Type	Expansion Unit	None*2	None*2	—	**LR-XN10**	Approx. 21 g 0.74 oz

*1 Switchable between 2 control outputs + 0 external inputs, or 1 control output + 1 external input. *2 Counted as 1 output if expanded with Multi-Output Unit FS-MC8N/MC8P or the NU Series Network Communication Unit.

STEP 2 Select Mounting Bracket(s)

Standard Mounting Brackets for Sensor Head

Appearance		Model	Material/Weight
	L-Type Mounting Bracket (Includes Sensor Head Fastening Screws × 2)	**OP-88499**	SUS316L Other Approx. 9 g 0.31 oz
	Rear Mounting Bracket (Includes Sensor Head Fastening Screws × 2)	**OP-88500**	SUS316L Other Approx. 17 g 0.59 oz
	Pitch-Conversion Mounting Bracket (Includes Sensor Head Fastening Screws × 2)	**OP-88504**	SUS316L Other Approx. 9 g 0.31 oz
	Fine-Tuning Mounting Bracket (Includes Sensor Head Fastening Screws × 2 Mounting Bracket Locking Screws × 2/Plate Nut × 1)	**LR-XB1**	Zinc Nickel Plating SUS304 PPS Other Approx. 30 g 1.05 oz

Adjustable Brackets for Sensor Head

Appearance		Model	Material/Weight
	Adjustable Bracket A (Includes Sensor Head Fastening Screw × 2)	**OP-88501**	SUS316L Other Approx. 15 g 0.52 oz
	Adjustable Bracket B (Includes Sensor Head Fastening Screw × 2)	**OP-88502**	SUS316L Other Approx. 20 g 0.70 oz
	Adjustable Bracket Locking Post (65 mm 2.56")	**OP-88503**	SUS316L Other Approx. 21 g 0.74 oz


OP-88501 + OP-88503


OP-88502 + OP-88503

Amplifier Mounting Bracket for Standard Models

Appearance		Model	Material/Weight
	Amplifier Holder for Standard Models (Includes M3 Screws × 2)	**OP-88542**	SUS304 Other Approx. 32 g 1.12 oz


OP-88542
Front Mounted


OP-88542
Angled Mount

Amplifier Mounting Bracket for Separate Amplifier Models

Appearance		Model	Material/Weight
	Separate Amplifier Securing Bracket (for Main Unit)	**OP-88245**	PC Approx. 2 g 0.07 oz

STEP 3 Select Additional Accessories

M8 Connector Cables

Appearance	Type	Material	Sensor Side	Cable Connector	Length (m feet)	Model	Weight
	Standard	Cable: PVC, Connector: Nickel-plated brass	M8 4-Pin Straight	Loose wires	2 6.6'	**OP-88714**	Approx. 60 g 2.11 oz
					5 16.4'	**OP-88715**	Approx. 130 g 4.58 oz
					10 32.8'	**OP-88716**	Approx. 250 g 8.81 oz
	High-flex				2 6.6'	**OP-88505**	Approx. 80 g 2.82 oz
					5 16.4'	**OP-88506**	Approx. 190 g 6.70 oz
					10 32.8'	**OP-88507**	Approx. 370 g 13.05 oz

M12 Adapter Connector

Appearance	Applicable To	Description	Model	Weight
	Cables with a nominal cross sectional area of 0.14 to 0.34 mm² 0.00022 to 0.00053 in² and an outer diameter of ø3.5 to 6 mm ø0.14" to 0.24"	A connector that adapts loose wires to a M12 4-pin connector (male). Useful for when connecting IO-Link compatible models to master units.	**OP-88296**	Approx. 12 g 0.42 oz

Options for Separate Amplifier Type

Appearance	Type	Description	Model	Weight
 (Pack of 2)	Connector Set for Sensor Head Connection	Required when cutting cables for connecting to amplifiers. LR-XH50/XH100/XH250 LR-XH50 (10M)/XH100(10M)/XH250(10M) (One is included with 10 m 32.8' cable length types.)	**OP-88543**	Approx. 2 g 0.07 oz
	End Unit for Separate Amplifier (for Expansion)	Mount the amplifiers on DIN rail and then place the end units on the sides to secure them in place. Always utilize when using expansion units. (Pack of 2)	**OP-26751**	Approx. 15 g 0.52 oz

Specifications

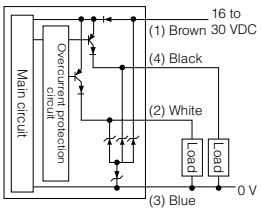
Model	Cable Type	LR-X50	LR-X100	LR-X250
	M8 Connector Type*1	LR-X50C(G)	LR-X100C(G)	LR-X250C(G)
Detecting Distance		25.0 to 50.0 mm 0.98" to 1.97"	25.0 to 100.0 mm 0.98" to 3.94"	30 to 250 mm 1.18" to 9.84"
Standard Detectable Deviation		0.5 mm 0.02"	1.0 mm 0.04"	30 to 180 mm: 9 mm 1.18" to 7.09": 0.35" 180 to 250 mm: 18 mm 7.09" to 9.84": 0.71"
Display Resolution		0.1 mm 0.004"	0.1 mm 0.004"	1 to 2 mm 0.04" to 0.08"
Spot Size		Approx. 0.2 mm × 1.5 mm 0.008" × 0.06" (at a detecting distance of 50 mm 1.97")	Approx. 0.3 mm × 2 mm 0.012" × 0.08" (at a detecting distance of 100 mm 3.94")	Approx. 0.8 mm × 1.2 mm 0.03" × 0.05" (at a detecting distance of 250 mm 9.84")
Response Time*2		500 µs/1 ms/3 ms/10 ms/200 ms Selectable		
Light Source	Type	Green laser (505 nm)		
	Laser Class	Class 1 Laser Product (IEC60825-1, FDA (CDRH), Part1040.10*3)		
IO-Link		Specification v1.1/COM2 (38.4 kbps)		
Functions	Timer Function	Timer OFF/Off-delay/On-delay/One-shot/On-Off delay/On-delay One-shot		
I/O*4	Control Output	NPN open collector/PNP open collector, N.O./N.C selectable. 30 VDC or lower, 50 mA or lower, Residual voltage 2 V or lower		
	External Input	External Set/Laser OFF/Zero Shift/Hold Reset/Gyro Alert RST selectable Short circuit current - NPN: 1 mA or lower, PNP: 2 mA or lower Input time 3 ms or more ON, 20 ms or more OFF (25 ms or more ON, 25 ms or more OFF when External Set is selected only)		
Protection Circuit		Protection against reverse power connection, protection against output overcurrent, protection against output surge, protection against reverse output connection		
Power Supply	Power Voltage	16 to 30 VDC (including 10% ripple (P-P) or less), class 2		
	Power Consumption (Excluding Load Current)	During normal operation: 970 mW (38 mA or lower at 24 V, 53 mA or lower at 16 V) ECO ON/ALL: 821 mW (32 mA or lower at 24 V, 44 mA or lower at 16 V)		
Environmental Resistance	Enclosure Rating	IP65/IP67 (IEC60529)		
	Operating Ambient Light	Incandescent lamp: 16000 lux or less Sunlight: 16000 lux or less		Incandescent lamp: 8000 lux or less Sunlight: 8000 lux or less
	Operating Ambient Temperature	-10°C to +50°C 14°F to + 122°F (no freezing)		
	Operating Ambient Humidity	35 to 85% RH (no condensation)		
	Shock Resistance	1000 m/s² (100G) 6 times each for X, Y, and Z axes		
	Vibration Resistance	10 to 500 Hz; Power Spectral Density: 0.816 G²/Hz for X, Y and Z axes		
Material		Head Case: SUS316L; Head Lens Cover: PSU Head Gasket: FKM (lens cover), EVM (cable) Cable: PVC; Metal Jacket*5: SUS304 Amplifier Case: PBT; Amplifier Display, Indicator: PAR; Amplifier Gasket: NBR; Button: POM Amplifier M8 Connector*6: SUS303		
Weight		LR-X50/X100/X250: Approx. 90 g 3.17 oz, LR-X50C/X100C/X250C: Approx. 35 g 1.23 oz, LR-X50CG/X100CG/X250CG: Approx. 45 g 1.58 oz		
Accessories		Instruction manual, laser warning label		

*1 Ensure the cable length is 30 m 98.4' or less for the M8 connector type. Ensure the cable length is 20 m 65.6' or less when connecting via IO-Link.
*2 If 500 µs is selected, the following limitations apply.
· Only 2-point calibration can be performed.
· The detection range masking is set during calibration. (Manual setting of the masking range is not supported.)
· Output 2 is limited to an alarm output for errors and gyro issues, and standard/area cannot be used.
*3 Classification performed based on IEC60825-1 standards in accordance with FDA (CDRH) Laser Notice.
*4 The I/O can be selected from the following combinations. Control output × 2, Control output + External input
*5 LR-X50CG/X100CG/X250CG only
*6 LR-X50C(G)/X100C(G)/X250C(G) only

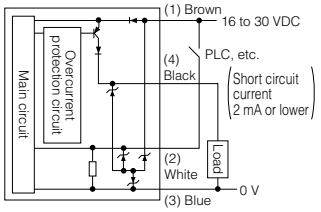
I/O Circuit Diagrams

When using in PNP mode

[OUT1 + OUT2 selected]

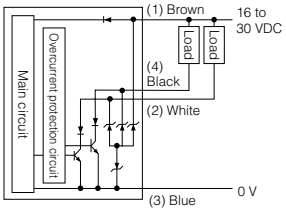


[OUT1 + INPUT selected]

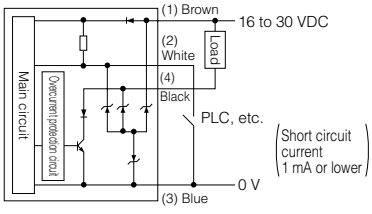


When using in NPN mode

[OUT1 + OUT2 selected]



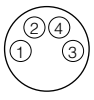
[OUT1 + INPUT selected]



The wire colors of the M8 connector type indicate the colors when using an OP-88505/88506/88507 M8 connector cable (sold separately).

Select PNP or NPN and the function of I/O pin (2) during the initial settings.

Sensor pin layout



Sensor Head

Model	Cable Length: 2 m 6.6'	LR-XH50	LR-XH100	LR-XH250
	Cable Length: 10 m 32.8'	LR-XH50 (10M)	LR-XH100 (10M)	LR-XH250 (10M)
Detecting Distance		25.0 to 50.0 mm 0.98" to 1.97"	25.0 to 100.0 mm 0.98" to 3.94"	30 to 250 mm 1.18" to 9.84"
Standard Detectable Deviation		0.5 mm 0.02"	1.0 mm 0.04"	30 to 180 mm: 9 mm, 180 to 250 mm: 18 mm 1.18" to 7.09": 0.35", 7.09" to 9.84": 0.71
Display Resolution		0.1 mm 0.004"	0.1 mm 0.004"	1 to 2 mm 0.04" to 0.08"
Spot Size		Approx. 0.2 mm × 1.5 mm 0.008" × 0.06" (at a detecting distance of 50 mm 1.97")	Approx. 0.3 mm × 2 mm 0.012" × 0.08" (at a detecting distance of 100 mm 3.94")	Approx. 0.8 mm × 1.2 mm 0.03" × 0.05" (at a detecting distance of 250 mm 9.84")
Light Source	Type	Green laser (505 nm)		
	Laser Class	Class 1 laser product (IEC60825-1, FDA (CDRH), Part1040.10*1)		
Environmental Resistance	Enclosure Rating	IP65/IP67 (IEC60529)		
	Operating Ambient Light	Incandescent lamp: 16,000 lux or less, Sunlight: 16000 lux or less		Incandescent lamp: 8000 lux or less, Sunlight: 8000 lux or less
	Operating Ambient Temperature	-10°C to +50°C 14°F to 122°F (no freezing)		
	Operating Ambient Humidity	35 to 85% RH (no condensation)		
	Shock Resistance	1000 m/s² (100G); 6 times each for X, Y, and Z axes		
	Vibration Resistance	10 to 500 Hz; Power Spectral Density: 0.816 G²/Hz for X, Y and Z axes		
Material		Case: SUS316L; Lens Cover: PSU; Gasket: FKM (lens cover), EVM (cable)		
Weight		2 m 6.6' Cable Type: approx. 75 g 2.64 oz, 10 m 32.8' Cable Type: approx. 250 g 8.81 oz		
Accessories		Laser warning label, sensor head connector (10 m 32.8' cable type only)		

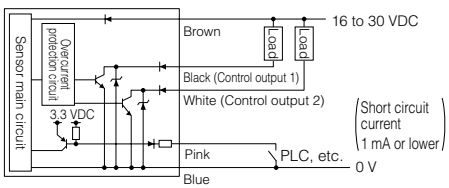
Amplifier Unit

Model	NPN Output	LR-XN11N	LR-XN12N	LR-XN11C (Selectable output)	LR-XN10
	PNP Output	LR-XN11P	LR-XN12P		
Cable/Connector		Cable		M8 connector*2	—
Main Unit/Expansion Unit		Main Unit	Expansion Unit	Main Unit (expansion not possible)	Expansion Unit
No. of Control Outputs		2	2	2*3	None*4
No. of External Inputs		1	1	1*3	—
Response Time*5		500 µs/1 ms/3 ms/10 ms/200 ms Selectable			
IO-Link		—	—	Specification v1.1/COM2 (38.4 kbps)	—
Functions	Timer Function	Timer OFF/Off-delay/On-delay/One-shot/On-Off delay/On-delay One-shot			
I/O	Control Output	Open collector, 30 VDC or lower, N.O./N.C. When used as a solitary unit: 100 mA or lower for 1 output; 100 mA or lower in total for 2 outputs; When expanding with multiple units: 50 mA or lower for 1 output Residual voltage NPN: 1.4 V or lower (output current: 10 mA or lower)/2 V or lower (output current: 10 to 100 mA), PNP: 1.6 V or lower (output current: 10 mA or lower)/2.2 V or lower (output current: 10 to 100 mA)			
	External Input	External Set/Laser OFF/Zero Shift/Hold Reset/Gyro Alert RST selectable Short circuit current - NPN: 1 mA or lower, PNP: 2 mA or lower Input time: 3 ms or more ON, 20 ms or more OFF (25 ms or more ON, 25 ms or more OFF only when External Set is selected)			
Unit Expansion (excluding LR-XN11C)		Up to 8 expansion units possible (including main unit, a total of 9 units connected) However, up to 16-unit expansion is possible when the LR-XN10 is used for expansion with the NU Series.			
Protection Circuit		Protection against reverse power connection, protection against output overcurrent, protection against output surge, protection against reverse output connection			
Number of Interference Prevention Devices (excluding LR-XN11C)		OFF/4 units/8 units selectable*6			
Power Supply	Power Voltage	16 to 30 VDC*7 (including 10% ripple (P-P) or less), class 2			
	Power Consumption (excluding Load Current)	NPN output type and LR-XN10 During normal operation: 1060 mW (44 mA or lower at 24 V, 61 mA or lower at 16 V), ECO ON/ALL: 895 mW (37 mA or lower at 24 V, 50 mA or lower at 16 V) PNP output type and LR-XN11C During normal operation: 1150 mW (47 mA or lower at 24 V, 64 mA or lower at 16 V), ECO ON/ALL: 985 mW (40 mA or lower at 24 V, 53 mA or lower at 16 V)			
Environmental Resistance	Operating Ambient Temperature	–20 to +55°C -4°F to 131°F (no freezing)*8			
	Operating Ambient Humidity	35 to 85% RH (no condensation)			
	Shock Resistance	500 m/s² (50G); 3 times each for X, Y, and Z axes			
	Vibration Resistance	10 to 500 Hz; Power Spectral Density: 0.816 G²/Hz; X, Y, and Z directions			
Case Material		Main Unit and Cover: Polycarbonate			
Weight		Approx. 80 g 2.82 oz	Approx. 70 g 2.46 oz	Approx. 22 g 0.77 oz	Approx. 21 g 0.74 oz
Accessories		Instruction manual			

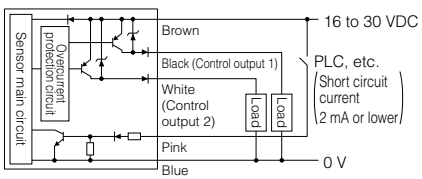
*1 Classification performed based on IEC60825-1 standards in accordance with FDA (CDRH) Laser Notice. *2 Ensure the cable length is 30 m 98.4' or less for the M8 connector type. Ensure the cable length is 20 m 65.6' or less when connecting via IO-Link. *3 Output 2 and the external input are selectable. *4 This counts as 1 output when expanding with multiple units to the FS-MC8N/MC8P and NU Series.
*5 If 500 µs is selected, the following limitations apply.
· Only 2-point calibration can be performed. · The detection range masking is set during calibration. (Manual setting of the masking range is not supported.)
· Output 2 is limited to an alarm output for errors and gyro issues, and standard/area cannot be used. · The interference prevention function is not supported
*6 Selecting four or eight interference prevention units causes the response time to change as follows: 4 Units selected: 6 ms/18 ms/60 ms/1.2 s selectable; 8 Units selected: 12 ms/36 ms/120 ms/2.4 s selectable.
*7 When expanding the system with 4 or more expansion units, use a power voltage of 20 V or higher. *8 Expansion by 1 or 2 units: –20 to +55°C -4°F to 131°F; Expansion by 3 to 10 units: -20 to +50°C -4°F to 122°F, Expansion by 11 to 16 units: -20 to +45°C -4°F to 113°F

I/O Circuit Diagrams

LR-XN11N/ XN12N



LR-XN11P/ XN12P



LR-XN11C

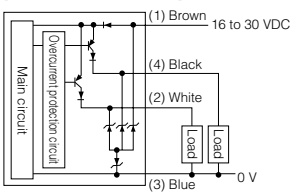
Select PNP or NPN and the function of I/O pin (2) during the initial settings.

Sensor pin layout

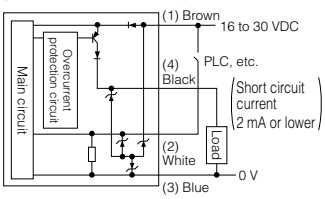


LR-XN11C: When using in PNP mode

[OUT1 + OUT2 selected]

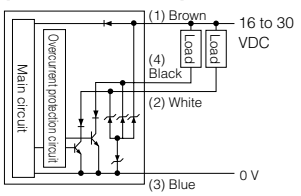


[OUT1 + INPUT selected]

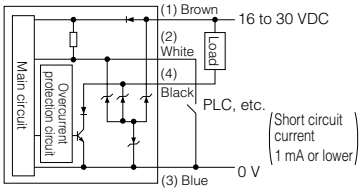


LR-XN11C: When using in NPN mode

[OUT1 + OUT2 selected]



[OUT1 + INPUT selected]

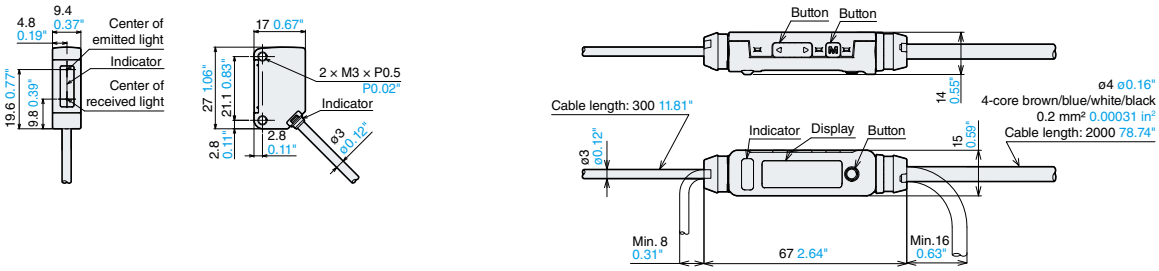


The wire colors indicate the colors when using an OP-88505/88506/88507 M8 connector cable (sold separately).

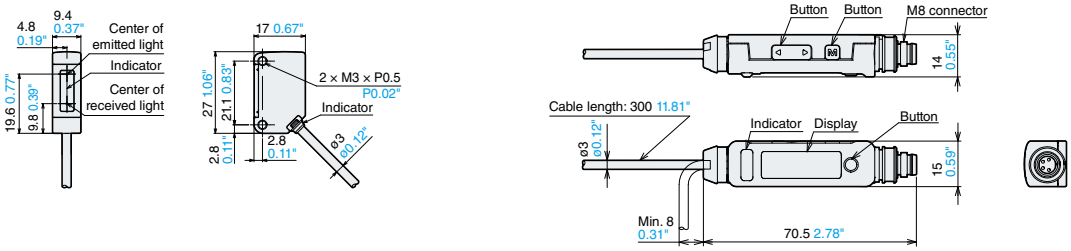
Standard Models

Sensors

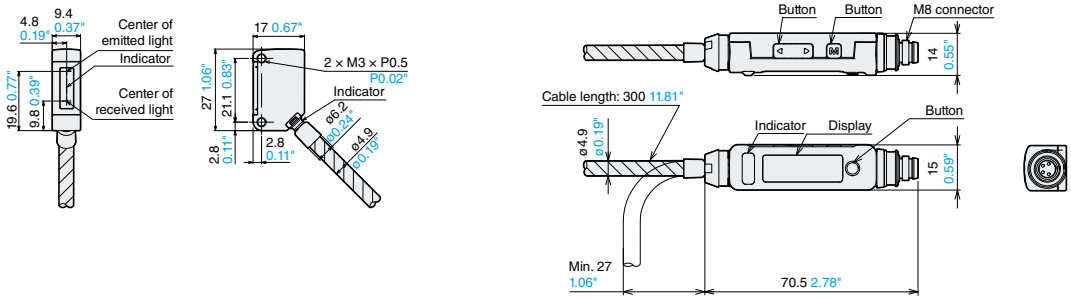
LR-X50/ X100/ X250



LR-X50C/ X100C/ X250C



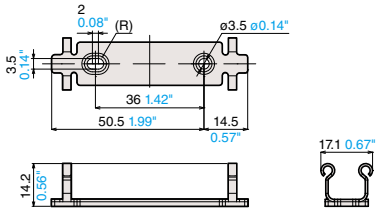
LR-X50CG/ X100CG/ X250CG



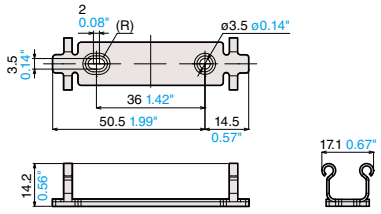
Amplifier Holder for Standard Models

OP-88542

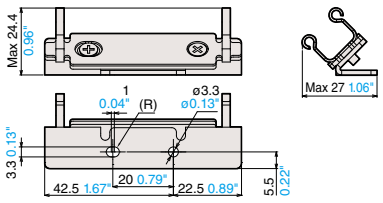
Front mount
Holder alone



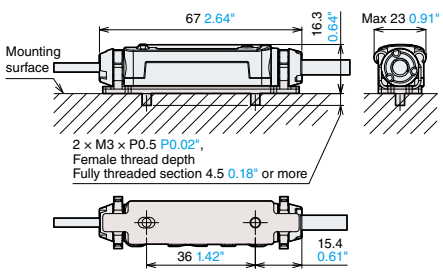
Sideways mount
Holder alone



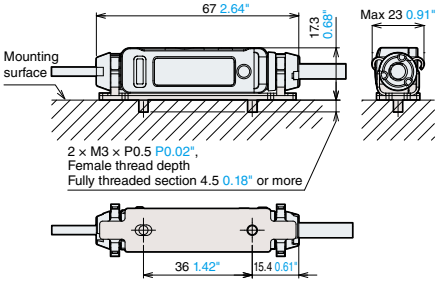
Angled mount
Holder alone



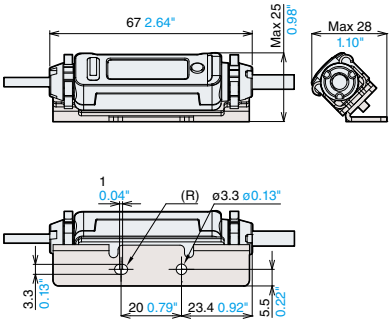
Front mount
With amplifier mounted



Sideways mount
With amplifier mounted



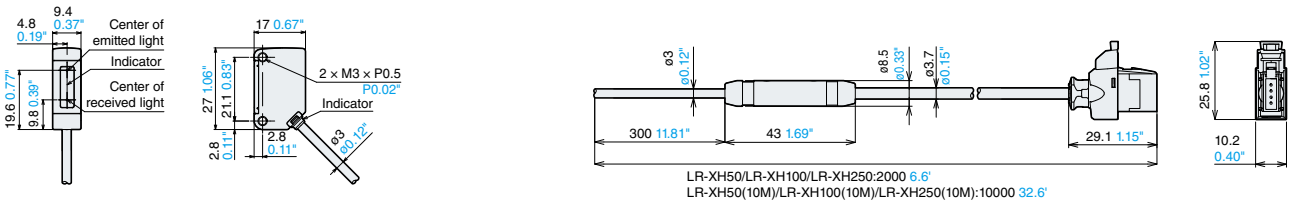
Angled mount
With amplifier mounted



Separate Amplifier Models (Sensor Heads)

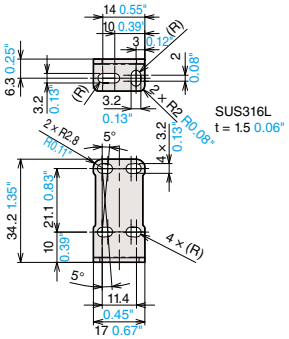
Sensor Heads

LR-XH50/XH100/XH250
XH50 (10M)/XH100 (10M)/XH250 (10M)

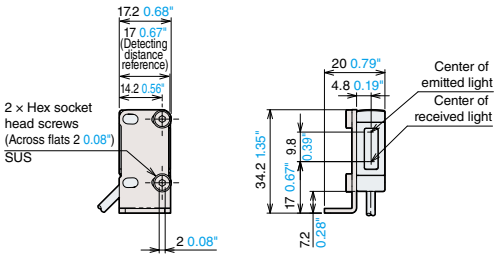


Standard Mounting Brackets for Sensor Heads

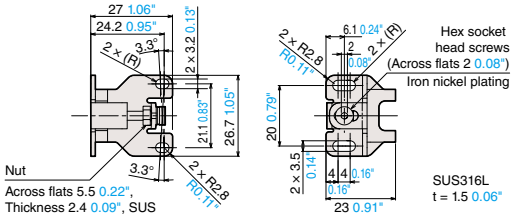
OP-88499



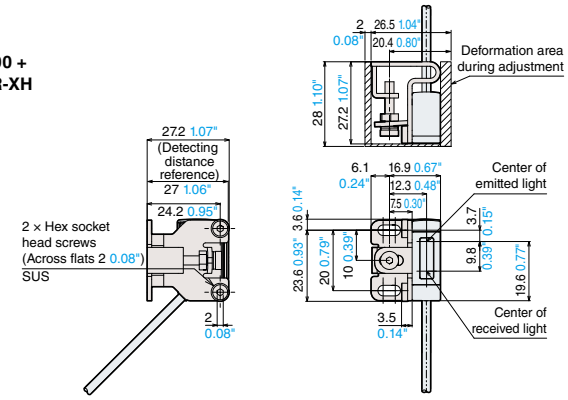
OP-88499 + LR-X/LR-XH



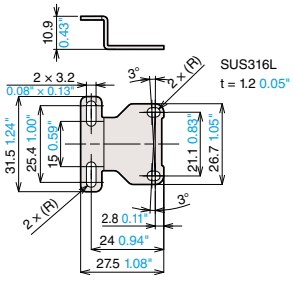
OP-88500



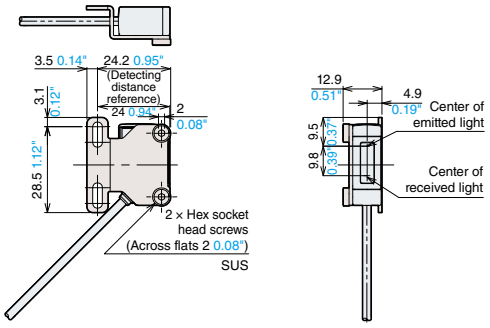
OP-88500 + LR-X/LR-XH



OP-88504



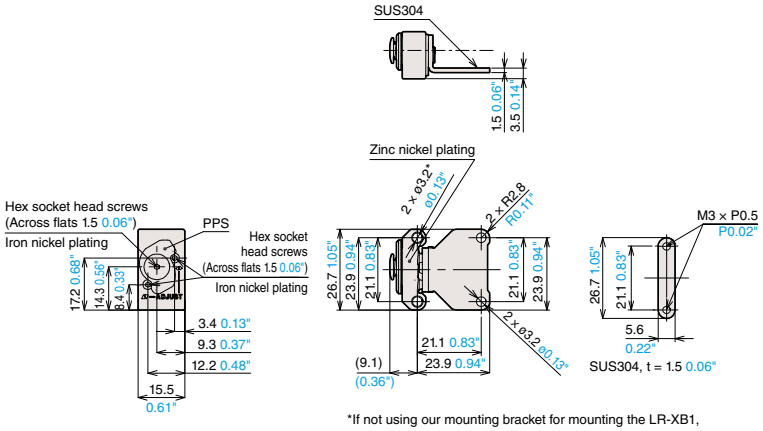
OP-88504 + LR-X/LR-XH



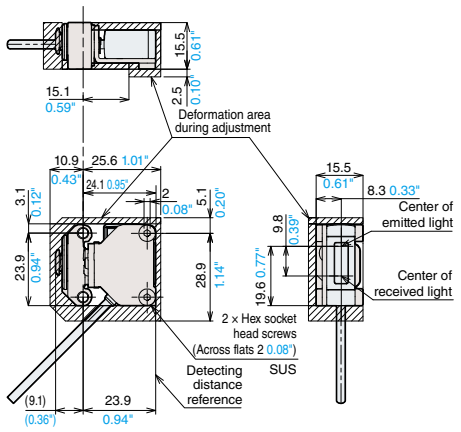
Separate Amplifier Models (Sensor Heads)

Standard Mounting Brackets for Sensor Heads

LR-XB1

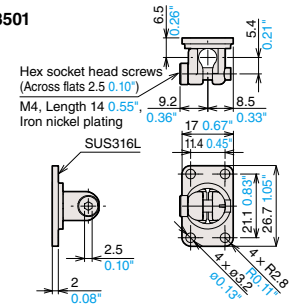


LR-XB1 + LR-X/LR-XH

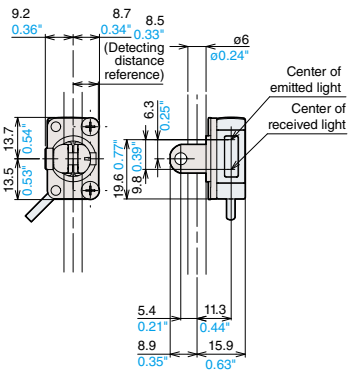


Adjustable Brackets for Sensor Heads

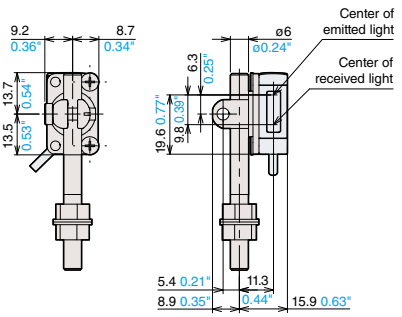
OP-88501



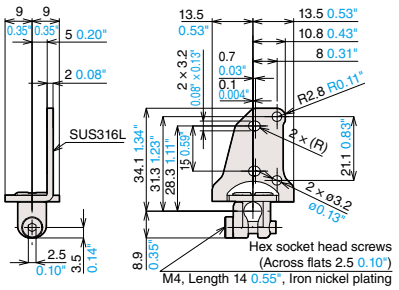
OP-88501 + LR-X/LR-XH



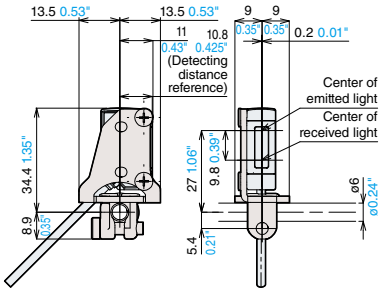
OP-88501 + OP-88503 + LR-X/LR-XH



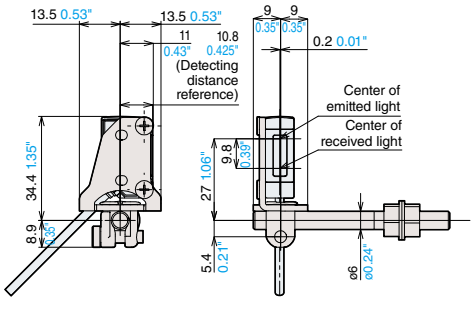
OP-88502



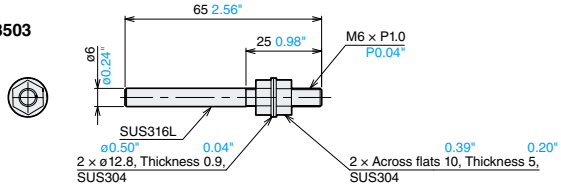
OP-88502 + LR-X/LR-XH



OP-88502 + OP-88503 + LR-X/LR-XH



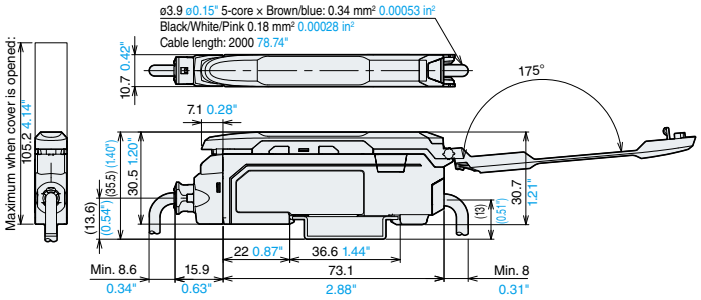
OP-88503



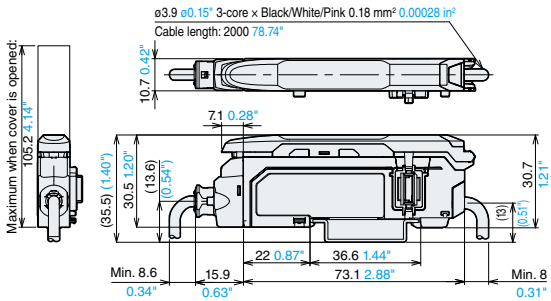
Separate Amplifier Models (Amplifier Units)

Amplifier Units

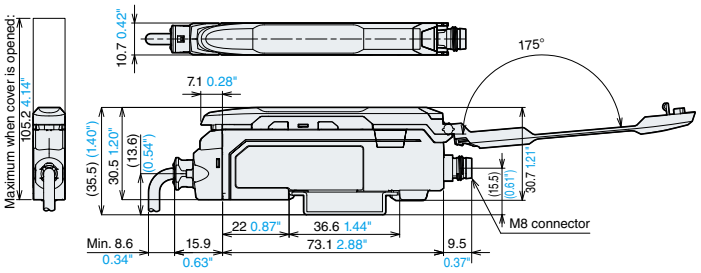
LR-XN11N/XN11P Main Unit (Cable Type)



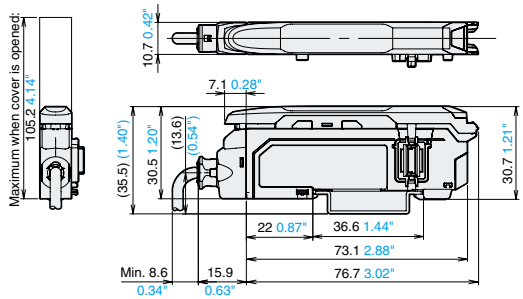
LR-XN12N/XN12P Expansion Unit (Cable Type)



LR-XN11C Main Unit (M8 Connector Type)

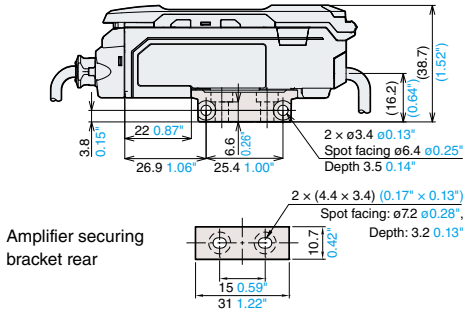


LR-XN10 Expansion Unit (Zero Line Type)

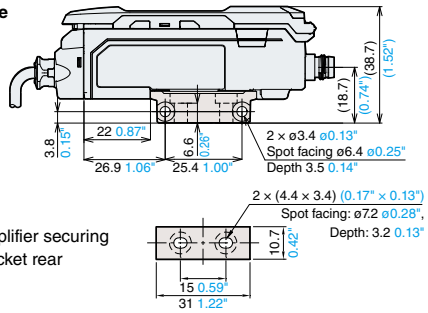


When Separate Amplifier Securing Bracket is Used (separately sold accessory **OP-88245**)

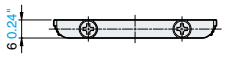
Cable Type



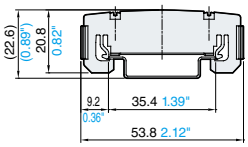
M8 Connector Type



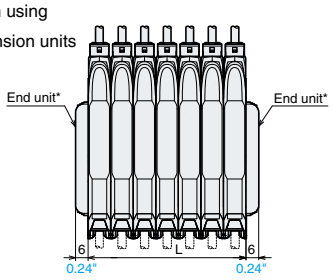
End Unit (Separately sold accessory OP-26751)



When Mounted on a DIN Rail



When using expansion units

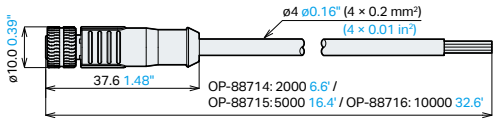


Total Number of Devices	L (mm inch)
1	10.7 0.42"
2	21.4 0.84"
3	32.1 1.26"
4	42.8 1.69"
5	53.5 2.11"
6	64.2 2.53"
7	74.9 2.95"
8	85.6 3.37"
9	96.3 3.79"

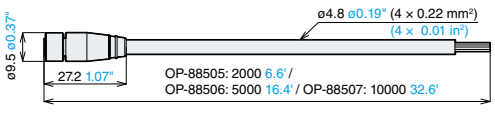
*When using expansion units, be sure to use end units. (Accessory)

M8 Connector Cable

OP-88714/88715/88716



OP-88505/88506/88507



Connector pin layout



No.	Color
(1)	Brown
(2)	White
(3)	Blue
(4)	Black

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Network Communication Units

Type	Appearance	Model
EtherNet/IP®		**NU-EP1** *1
PROFINET		**NU-PN1** *1
CC-Link		**NU-CL1** *1
DeviceNet®		**NU-DN1** *1
EtherCAT®		**NU-EC1A** *1
8-input eCON Input Unit		**NU-EN8N** *2

*1 The LR-X Series cannot provide the current value via a network communication unit.
*2 NU-EN8N is used in combination with NU-EP1/CL1/DN1/EC1A.

Cables and Accessories

Type	Model
For Ver 1.10-compatible CC-Link Cable 20 m 65.6'	**OP-79426**
For Ver 1.10-compatible CC-Link Cable 100 m 328.1'	**OP-79427**
e-CON connector (pack of 2)	**OP-84338** *1

*1 Use a cable with a sheath outer diameter of 1.15 to 1.35 mm 0.45" to 0.05" and a wire range of 0.1 to 0.5 mm^2 0.004 to 0.02 in^2.
If connecting a device that uses a cable with a diameter other than that detailed above, separately prepare an e-CON compatible with the wire diameter.

Multi-Output Units

Type	External Appearance	Separate Control Outputs	Common Output	Common Input	Model	
					NPN Output	PNP Output
Main Unit		8	1	1	**FS-MC8N**	**FS-MC8P**

LR Family of Sensors

Detection by distance

Do-It-All
Laser Sensor
LR-Z Series

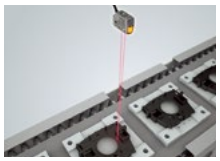


Detecting Distances

LR-ZB90CB	25 to 90 mm 0.98" to 3.54"
LR-ZB240CB	25 to 240 mm 0.98" to 9.45"
LR-ZH490CB	25 to 490 mm 0.98" to 19.29"

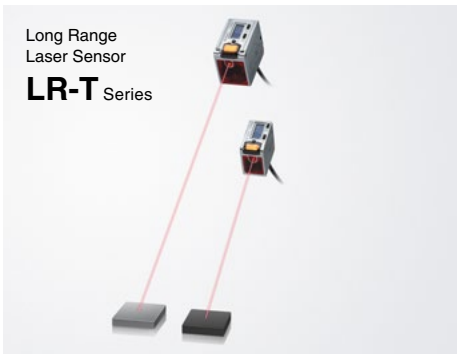


Metal workpiece presence check



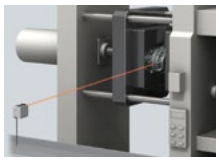
Black workpiece presence check

Long Range
Laser Sensor
LR-T Series



Detecting Distances

LR-TB2000(C)	60 to 2000 mm 2.36" to 78.74"
LR-TB5000(C)	60 to 5000 mm 2.36" to 196.85"



Mold empty confirmation

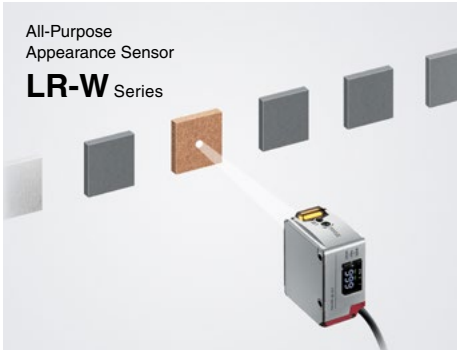


Vehicle positioning

Detection by appearance

(color)

All-Purpose
Appearance Sensor
LR-W Series

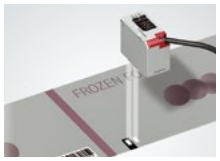


Detecting Distances

LR-W500(C)	30 to 500 mm 1.18" to 19.69"
LR-W70(C)	30 to 70 mm 1.18" to 2.76"
LR-WF10(C)	Varies based on the fiber unit



Connector color differentiation



Registration mark detection
(LR-W70: 2 spot function)

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