KEYENCE

Digital CMOS Laser Sensor

NEW LR-X Series

ULTRA-COMPACT



LR-X Series

A reflective type with stable detection. Yet so compact.





Standard Model | M8 Connector Model | Separate Amplifier Model

NEW Digital CMOS Laser Sensor **LR-X Series**

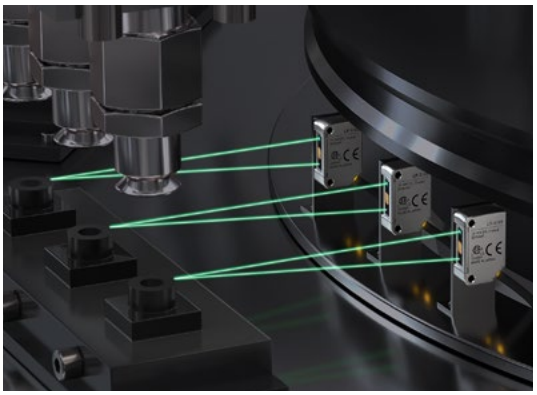
GREEN LASER

The use of a green laser and the development of a new triangulation system allows for a significant reduction in the size of the sensor.

Easy Integration in Any Situation

Ultra Compact

A digital CMOS laser sensor with an ultra-compact size of just 9.4 × 27 × 17 mm. It can be installed in spaces that are just too small. This in turn alleviates much of the effort around designing and adjusting equipment so as to accommodate the sensor. It also makes retrofitting the sensor a much easier process.

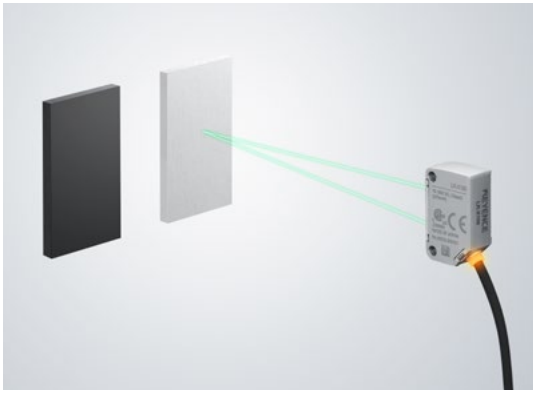


Can be used on any target

Stable Detection

Minimum standard detectable deviation: **0.5 mm**

Detects the actual distance to the target rather than the received light intensity. A high dynamic range of up to 3-million-times allows stable detection without any adverse impact from the colour or shape of the target. In addition, the minimum standard detectable deviation is 0.5 mm, allowing the detection of thin formed objects.



Easily Visible Indicators

Unmatched Ease of Use

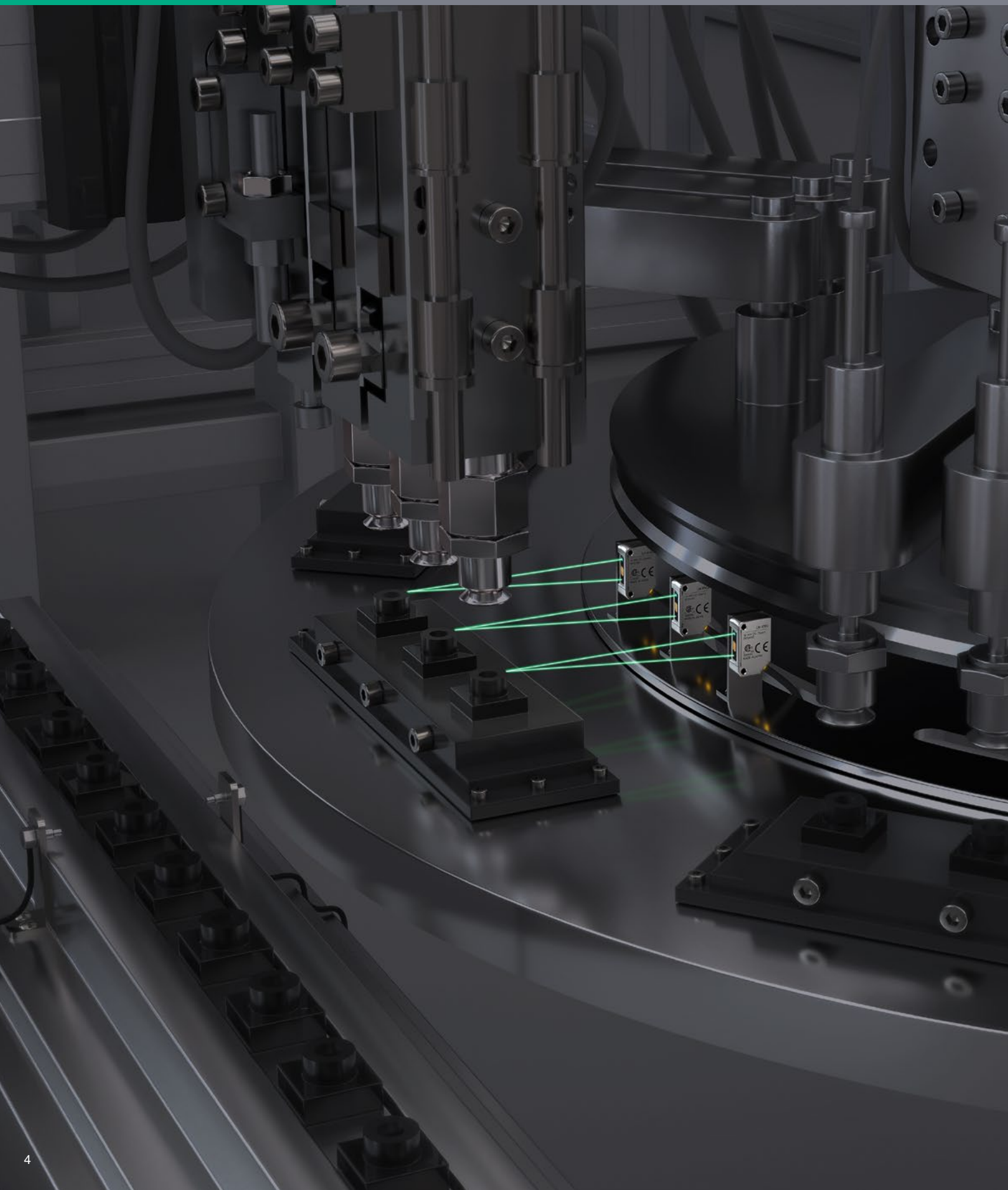
Features a high-resolution display from which text can be clearly read. From configuring settings to performing maintenance, the unit is so simple to operate that pretty much anybody can do so without having to constantly refer to the instruction manual. In addition, the display language can be switched from English to Japanese, German, or Chinese, facilitating use worldwide.



Ultra Compact

Benefits of small size

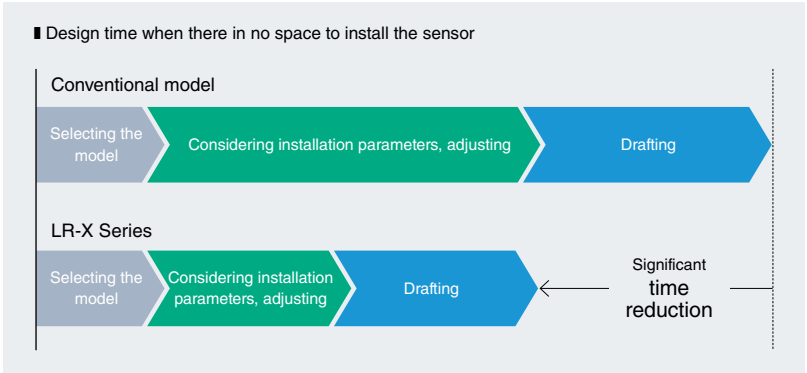
The small size is complemented by a durable design for use in any location





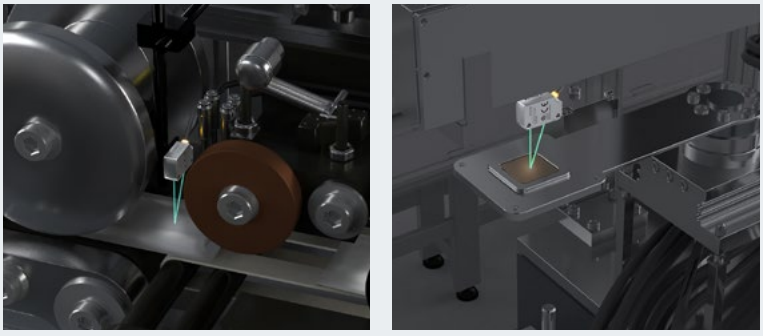
Reduce Design Time on New Machines

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

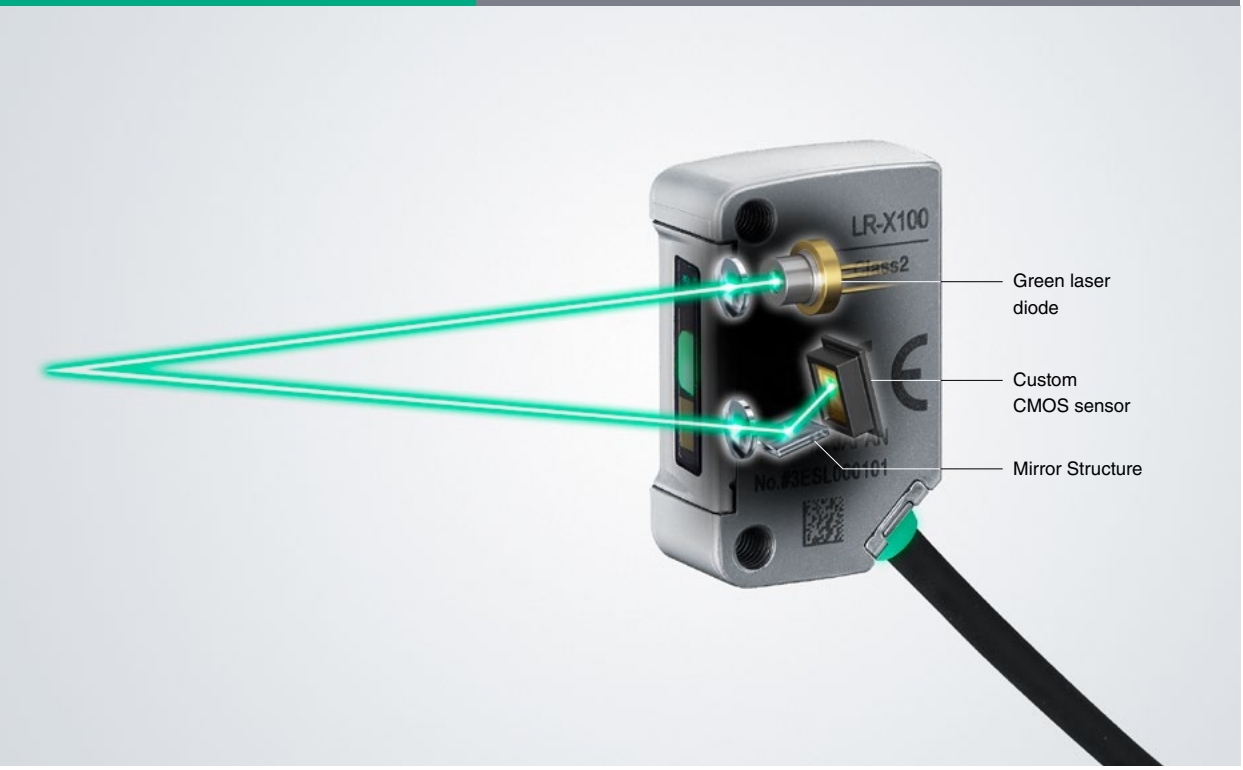
Finding locations to mount new sensors on an existing machine can be difficult, and this can be almost impossible with large or bulky sensors. The slim design of the LR-X Series greatly increases the number of places a sensor can be mounted and makes retrofitting a breeze.



Ultra Compact

Size-reducing technology

Green laser × mirror structure × new custom CMOS sensor triangulation system = significant size reduction.



WORLD'S FIRST Green Laser CMOS Sensor

The sharp beam spot allows for an ultra-compact size with high detection performance

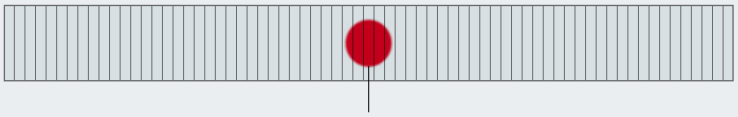
Green lasers are able to produce a smaller and sharper spot reflection on the CMOS chip, compared to that of red lasers. These characteristics reduce the potential for detection errors and allow for a higher resolution chip to be used for more precise detection.

Differences in Receiving Spots on CMOS Chips with High Resolution

GREEN LASER

Typical red laser

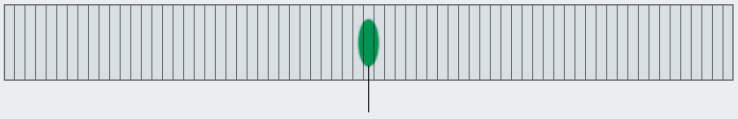
High resolution CMOS chips



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.

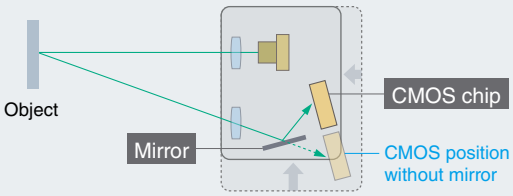
Mirror Structure

By utilising 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.

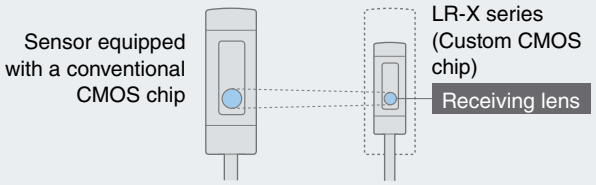
Mirror structure



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.

Slim Mounting Brackets

Lose none of the size advantages of the sensor

The size of the mounting brackets required for using the sensor has also been thoroughly reduced. We offer an extensive lineup of brackets that can be used in a variety of situations.

Adjustable Bracket A/B

Freely adjustable (vertical/horizontal) mounting brackets for fixing onto a ø6-mm shaft. Two types (A and B) are available so as to allow installation of sensors with different mounting orientations.

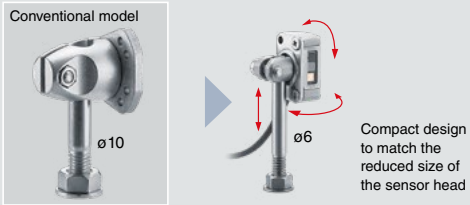
Minor adjustable angle Mounting Bracket

Fine tuning of the spot position is easy to accomplish with the sensor already secured in the bracket, helping further reduce the time and effort required for sensor installation. Fine tuning is recommended for targeting an object with pinpoint accuracy.

Pitch-Conversion Mounting Bracket

This is useful for replacing conventional photoelectric sensors. Does not require the drilling of additional mounting holes on the equipment side.

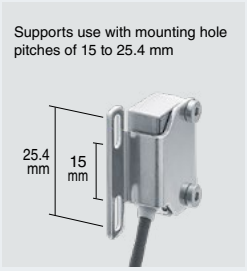
▮ Adjustable Bracket A Usage Example (OP-88501 + OP-88503)



▮ Minor adjustable angle Mounting Bracket (LR-XB1 + OP-88499 Usage Example)



▮ Pitch-Conversion Mounting Bracket (OP-88504)

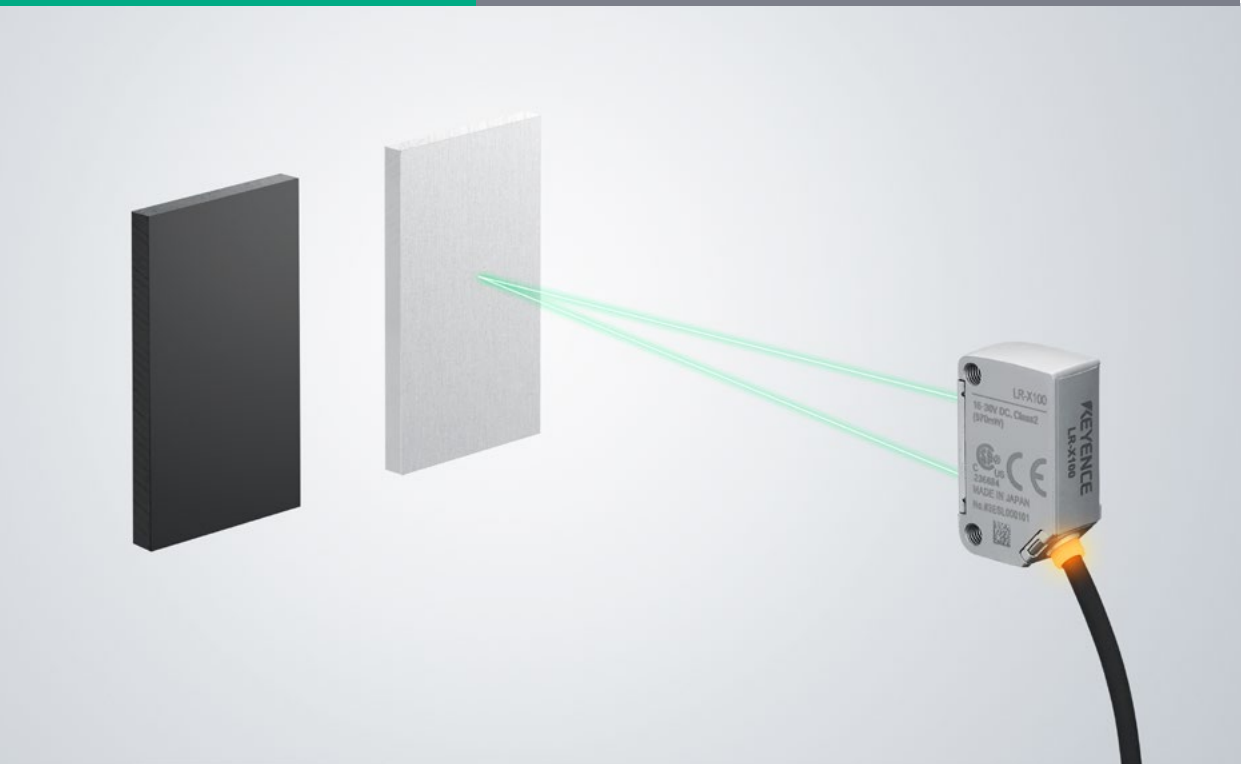


See P. 19 for more information on the available lineup of mounting brackets.

Stable Detection

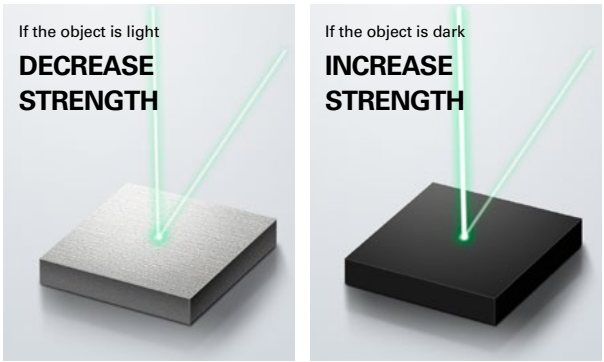
Can be used on any target

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



Detect Targets Regardless of Appearance

The LR-X Series utilises a custom CMOS chip to detect targets based on position. This ensures the stable detection of targets regardless of colour, 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.



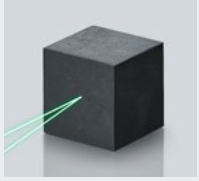
Shiny Metals



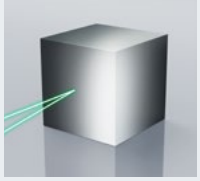
Rounded Surfaces



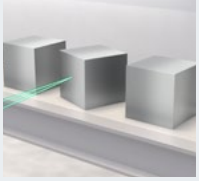
Black/Dark Targets



Varied Colours

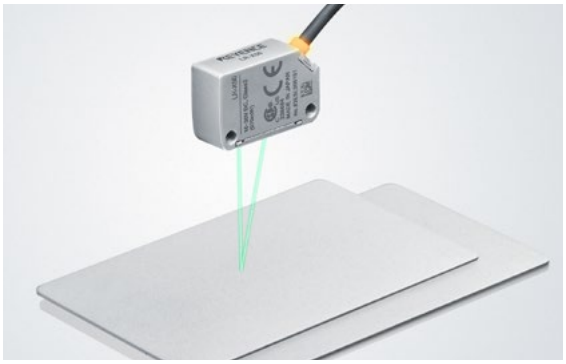


Angled Targets



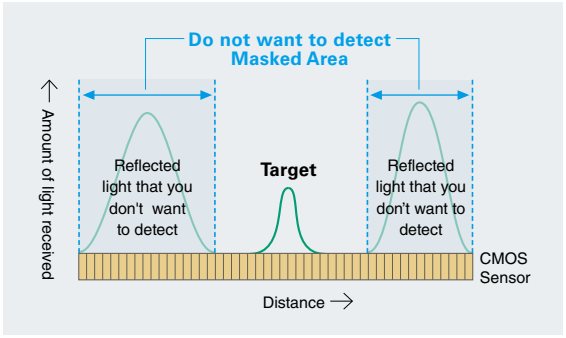
Detect Very Small Changes in Position

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



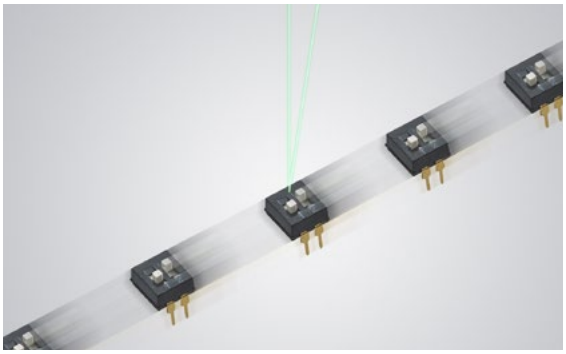
Mask Function

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.



500 µs 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.



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.



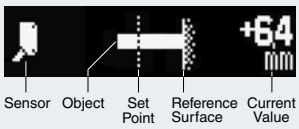
Specific actions can be selected with confidence.

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.



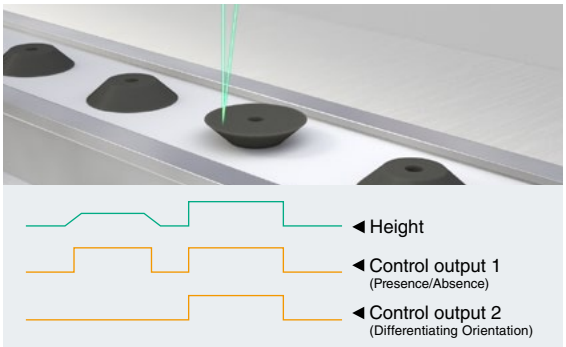
Area detection mode

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



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.



Two Types of Amplifier, Standard and Separate

Intuitive to operate and perform checks by hand

With conventional self-contained sensors, the display part may not actually be visible or operable depending on where or how it is installed. The LR-X Series features two types of amplifier to facilitate use in a variety of applications. This option optimises how the unit can be operated without compromising on usability.



NEW INNOVATION

Notification of "Misalignment" after sensor installation

Integrated Impact Alarm (Gyro Monitor)

Video explanation!

Have you ever used a sensor that has become misaligned after being bumped or hit?



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.

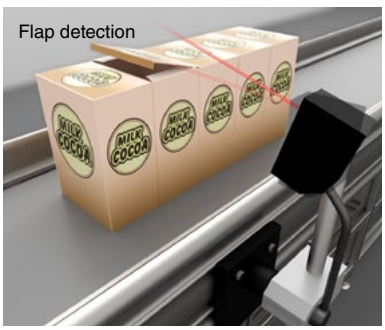
The gyro sensor instantly detects any misalignments after installation of the sensor



Recommended for applications when misalignment cause issues.

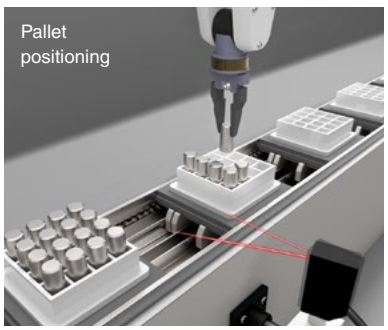
In order for a sensor to work properly, the most important thing is that the spot is detecting where it should be. If the sensor becomes misaligned after installation, the sensor may not be able to achieve the intended detection results, even if it is not actually malfunctioning. If the sensor misalignment is not noticed, there is a risk of significant productivity losses, particularly in applications such as NG detection, positioning, and timing.

NG detection



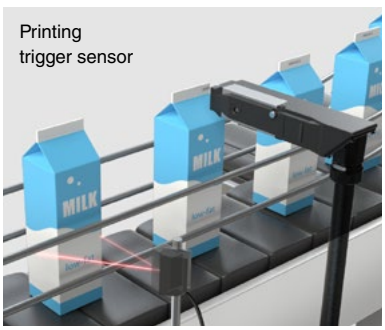
The spot isn't positioned on the NG target

Positioning



The positioning location has shifted

Timing



The printing location has shifted

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.

Superior Environmental Protection

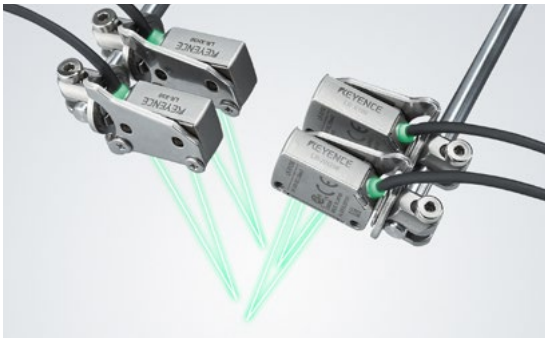




The LR-X Series features impressive enclosure ratings of IP65 and IP67. This ensures that dust, debris, and liquids will not cause damage to the unit, and allows these sensors to be used in virtually any environment.

*Excludes amplifier used with Separate Amplifier Type.

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.

Quick Head Identification

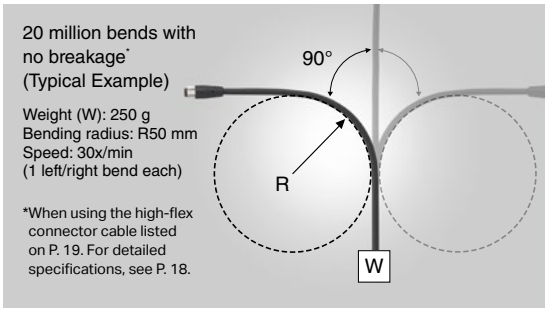




When using the Separate Amplifier Type, it is simple and easy to identify which LR-X head is attached by using the indicator blinking function. This makes setup and troubleshooting easier by ensuring focus on the right sensor head.

Uses Hi-Flex Robotic Cable

Usable even on moving machinery



Hi-Flex robotic cable allows the LR-X series to be used on robots without the risk of breakage due to repeated bending

IO-Link Compatible

Obtain data for various parameters

IO-Link

*Cable type for the separate amplifier model is not supported

Obtain data for various parameters via IO-Link communication. As it can be connected to the IO-Link master with a connector cable it reduces wiring work and helps prevent instances of mis-wiring.

Intuitive software ensures setup in mere minutes, not hours!



M8 Connector Model

Significantly reduced start-up time

- Sensor wires terminated with an M12 connector
- Reduced relay boxes by installing outside the board
- Reduction in the footprint of the control panel

Excellent troubleshooting ability

- Aggregates sensor data without any drop in productivity
- Early identification of sources of trouble reduces down time
- Uses digital transmission and so is resistant to noise

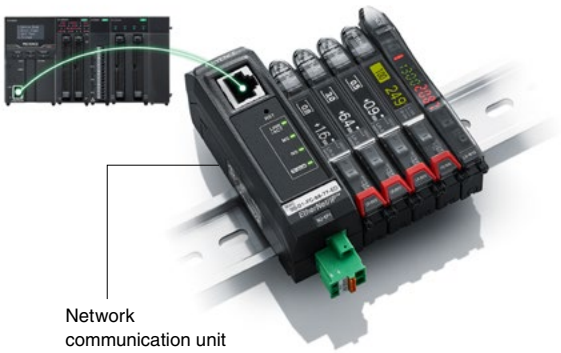
*EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

Separate Amplifier Model Options

Variations that support simplified wiring and networking

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.



Network communication unit **NU series**

CC-Link V2
PROFINET
EtherNet/IP
DeviceNet
EtherCAT

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

Devices to Support Simplified Wiring

Network Communication Unit

Type	Appearance	Model
CC-Link		**NU-CL1**[*1]
PROFINET		**NU-PN1**[*1]
EtherNet/IP®		**NU-EP1**[*1]
DeviceNet®		**NU-DN1**[*1]
EtherCAT®		**NU-EC1A**[*1]
8 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-CL1/PN1/EP1/DN1/EC1A.

Cables and Accessories

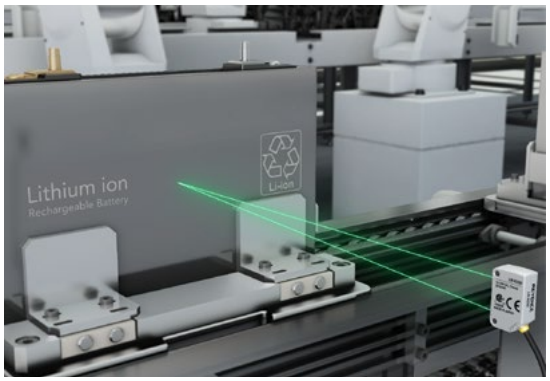
Type	Model
For Ver 1.10-compatible CC-Link Cable 20 m	**OP-79426**
For Ver 1.10-compatible CC-Link Cable 100 m	**OP-79427**
e-CON connector (pack of 2)	**OP-84338** [*1]

*1 Use a cable with a sheath outer diameter of 1.15 to 1.35 mm and a wire range of 0.1 to 0.5 mm^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.

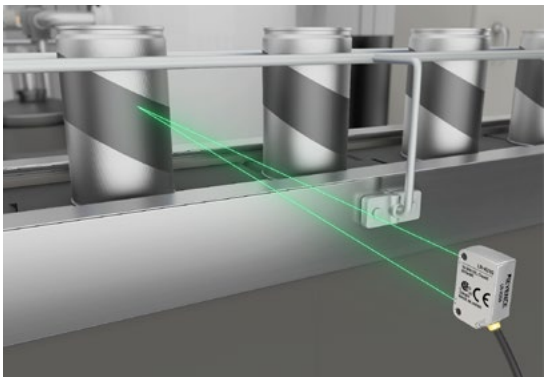
Multi-Output Units

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

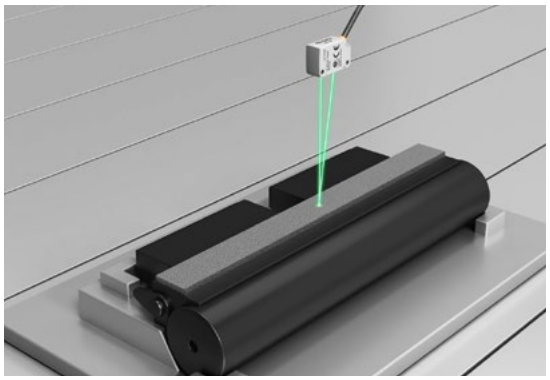
Applications



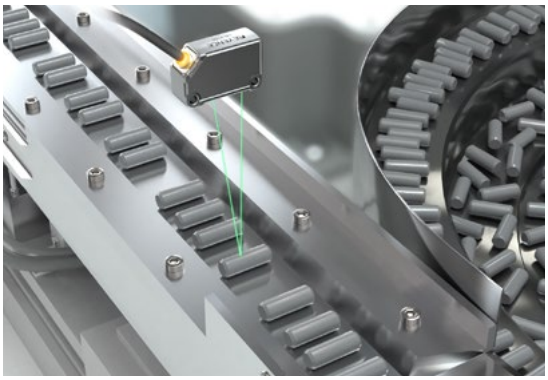
Detection of batteries on conveyor belt



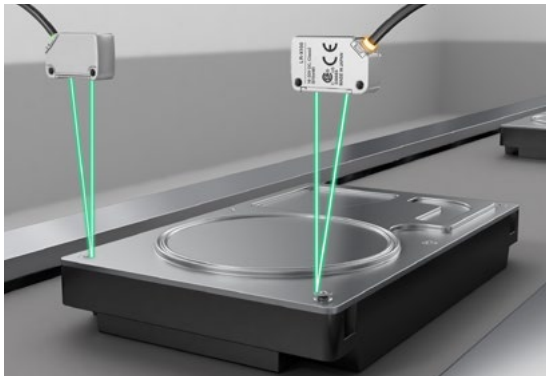
Detection of cans on conveyor belt



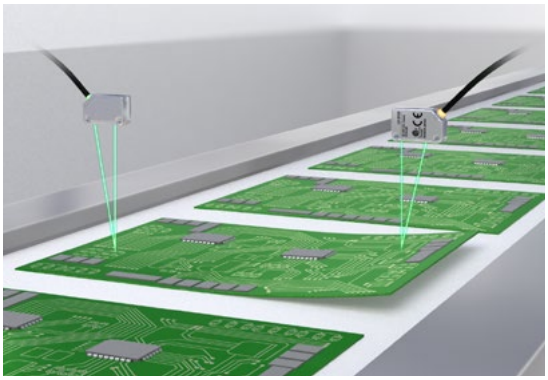
Presence or absence of black nonwoven fabric or foam



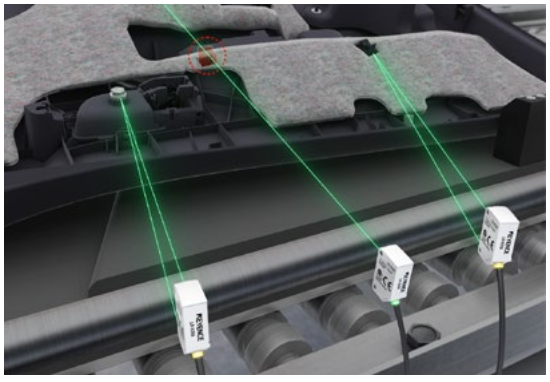
Presence or absence of shiny metal workpieces



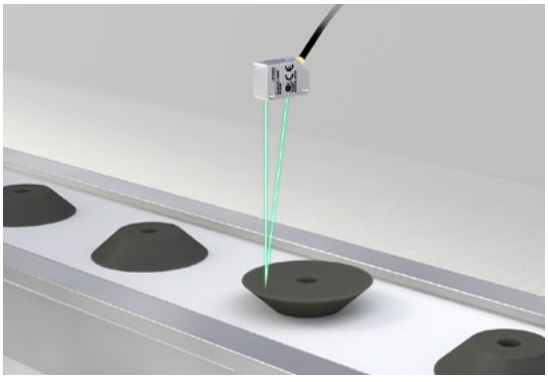
Screw height check



Detection of board warpage



Detection of assembled parts



Differentiating part orientation

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

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
OP-88714/OP-88715/OP-88716

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



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

Separate Amplifier Models



Connector Set for Sensor Head Connection
OP-88543



End Unit (when using expansion units)
OP-26751

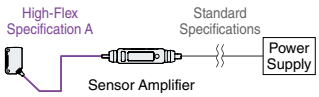
STEP 1 Select a sensor unit

Select a model according to the required functionality

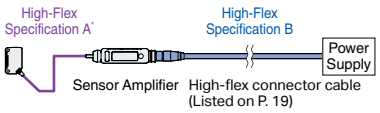
Required Functions		Standard Models		Separate Amplifier Models		
		Cable Type	M8 Connector Type	Cable Type	M8 Connector Type	Zero Line Type
I/O Specification	2 Control Outputs	✓	✓	✓	✓	-
	1 Control Output + 1 External Input	✓	✓	✓	✓	-
	2 Control Outputs + 1 External Input	-	-	✓	-	-
Enclosure Rating	Sensor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

Hi-Flex Robotic Cable Specifications

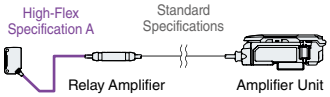
▮ Standard Models (Cable Type)



▮ Standard Models (M8 Connector Type)



▮ Separate Amplifier Models



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

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

*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	Approx. 0.2 mm × 1.5 mm (Detecting Distance: 50 mm)	0.5 mm	NPN/PNP Selectable	**LR-X50**	Approx. 90 g
		25.0 to 100.0 mm	Approx. 0.3 mm × 2 mm (Detecting Distance: 100 mm)	1.0 mm		**LR-X100**	
		30 to 250 mm	Approx. 0.8 mm × 1.2 mm (Detecting Distance: 250 mm)	30 to 180 mm: 9 mm 180 to 250 mm: 18 mm		**LR-X250**	
	M8 Connector Type Standard Cable (Power supply cable sold separately)	25.0 to 50.0 mm	Approx. 0.2 mm × 1.5 mm (Detecting Distance: 50 mm)	0.5 mm	NPN/PNP Selectable	**LR-X50C**	Approx. 35 g
		25.0 to 100.0 mm	Approx. 0.3 mm × 2 mm (Detecting Distance: 100 mm)	1.0 mm		**LR-X100C**	
		30 to 250 mm	Approx. 0.8 mm × 1.2 mm (Detecting Distance: 250 mm)	30 to 180 mm: 9 mm 180 to 250 mm: 18 mm		**LR-X250C**	
	M8 Connector Type Guarded Cable (Power supply cable sold separately)	25.0 to 50.0 mm	Approx. 0.2 mm × 1.5 mm (Detecting Distance: 50 mm)	0.5 mm	NPN/PNP Selectable	**LR-X50CG**	Approx. 45 g
		25.0 to 100.0 mm	Approx. 0.3 mm × 2 mm (Detecting Distance: 100 mm)	1.0 mm		**LR-X100CG**	
		30 to 250 mm	Approx. 0.8 mm × 1.2 mm (Detecting Distance: 250 mm)	30 to 180 mm: 9 mm 180 to 250 mm: 18 mm		**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	Approx. 0.2 mm × 1.5 mm (Detecting Distance: 50 mm)	0.5 mm	2 m	**LR-XH50**	Approx. 75 g
					10 m	**LR-XH50 (10M)**	Approx. 250 g
		25.0 to 100.0 mm	Approx. 0.3 mm × 2 mm (Detecting Distance: 100 mm)	1.0 mm	2 m	**LR-XH100**	Approx. 75 g
					10 m	**LR-XH100 (10M)**	Approx. 250 g
		30 to 250 mm	Approx. 0.8 mm × 1.2 mm (Detecting Distance: 250 mm)	30 to 180 mm: 9 mm 180 to 250 mm: 18 mm	2 m	**LR-XH250**	Approx. 75 g
					10 m	**LR-XH250 (10M)**	Approx. 250 g

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
					PNP	**LR-XN11P**	
		Expansion Unit			NPN	**LR-XN12N**	Approx. 70 g
					PNP	**LR-XN12P**	
	M8 Connector Type	Main Unit (expansion not possible)	2*1	1*1	NPN/PNP Selectable	**LR-XN11C**	Approx. 22 g
	Zero Line Type	Expansion Unit	None*2	None*2	—	**LR-XN10**	Approx. 21 g

*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
	Rear Mounting Bracket (Includes Sensor Head Fastening Screws × 2)	**OP-88500**	SUS316L Other Approx. 17 g
	Pitch Conversion Mounting Bracket (Includes Sensor Head Fastening Screws × 2)	**OP-88504**	SUS316L Other Approx. 9 g
	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

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
	Adjustable Bracket B (Includes Sensor Head Fastening Screw × 2)	**OP-88502**	SUS316L Other Approx. 20 g
	Adjustable Bracket Locking Post (65 mm)	**OP-88503**	SUS316L Other Approx. 21 g


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


OP-88542
Front Mounted


OP-88542
Incline Mounted

Amplifier Mounting Bracket for Separate Amplifier Models

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

STEP 3 Select additional accessories

M8 Connector Cables

Appearance	Type	Material	Sensor Side	Cable Connector	Length (m)	Model	Weight
	Standard	Cable: PVC, Connector: Nickel-plated brass	M8 4-Pin Straight	Strand Wire	2	**OP-88714**	Approx. 60 g
					5	**OP-88715**	Approx. 130 g
					10	**OP-88716**	Approx. 250 g
	High-Flex				2	**OP-88505**	Approx. 80 g
					5	**OP-88506**	Approx. 190 g
					10	**OP-88507**	Approx. 370 g

M12 Adapter Connector

Appearance	Target	Description	Model	Weight
	Cables with a nominal cross sectional area of 0.14 to 0.34 mm^2 and an outer diameter of ø3.5 to 6 mm	A connector that converts 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

Options for Separate Amplifier Type

Appearance	Type	Description	Model	Weight
 (Pack of 2)	Connector Set for Sensor Head Connection	Required when shortening or cutting the sensor head cable. Applicable Models: LR-XH50/XH100/XH250 LR-XH50 (10M)/XH100 (10M)/XH250 (10M) (One is included with 10-m cable length types.)	**OP-88543**	Approx. 2 g
	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 utilise when using expansion units. (Pack of 2)	**OP-26751**	Approx. 15 g

Specifications

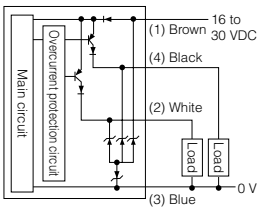
Model	Cable Type	LR-X50	LR-X100	LR-X250
	M8 Connector Type*1	LR-X50C(G)	LR-X100C(G)	LR-X250C(G)
Detecting Distance		25.0 to 50.0 mm	25.0 to 100.0 mm	30 to 250 mm
Standard Detectable Deviation		0.5 mm	1.0 mm	30 to 180 mm: 9 mm 180 to 250 mm: 18 mm
Display Resolution		0.1 mm	0.1 mm	1 to 2 mm
Spot Size		Approx. 0.2 mm × Approx. 1.5 mm (at a detecting distance of 50 mm)	Approx. 0.3 mm × Approx. 2 mm (at a detecting distance of 100 mm)	Approx. 0.8 mm × Approx. 1.2 mm (at a detecting distance of 250 mm)
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)		
Function	Timer Function	Timer OFF/Off-delay/On-delay/One-shot/On-Off delay/On-delay One-shot		
Input/Output*4	Control Output	NPN open collector/PNP open collector, N.O./N.C. 30 VDC or less, 50 mA or lower, Residual voltage 2 V or less		
	External Input	External Set/Laser OFF/Zero Shift/Hold Reset/Gyro Alert RST selectable Short circuit current - NPN: 1 mA or less, PNP: 2 mA or less 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 less at 24 V, 53 mA or less at 16 V) ECO ON/ALL: 821 mW (32 mA or less at 24 V, 44 mA or less at 16 V)		
Environmental Resistance	Enclosure Rating	IP65/IP67(IEC60529)		
	Operating Ambient Light	Incandescent lamp: 16,000 lx or less Sunlight: 16,000 lx or less		Incandescent lamp: 8,000 lx or less Sunlight: 8,000 lx or less
	Operating Ambient Temperature	-10°C to +50°C (no freezing)		
	Operating Ambient Humidity	35 to 85% RH (no condensation)		
	Shock Resistance	1,000 m/s^2 (100G) 6 times each for X, Y, and Z axes		
	Vibration Resistance	10 to 500 Hz; Power Spectral Density: 0.816 G^2/Hz for X, Y and Z axes		
Material		Head Case: SUS316L; Head Lens Cover: PSU Head Packing: FKM (lens cover), EVM (cable) Cable: PVC; Metal Jacket*5: SUS304 Amplifier Case: PBT; Amplifier Display, Indicator: PAR; Amplifier Packing: NBR; Button: POM Amplifier M8 Connector*6: SUS303		
Weight		LR-X50/X100/X250: Approx. 90 g, LR-X50C/X100C/X250C: Approx. 35 g, LR-X50CG/X100CG/X250CG: Approx. 45 g		
Accessories		Instruction manual, laser warning label		

*1 Ensure the cable length is 30 m or less for the M8 connector type. Ensure the cable length is 20 m 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 No. 56.
*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

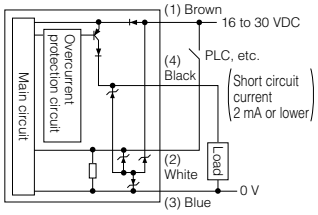
I/O Circuit Diagrams

When using in PNP mode

[OUT1 + OUT2 selected]

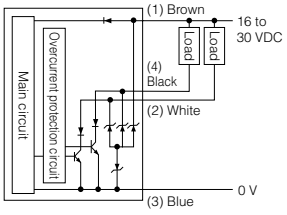


[OUT1 + INPUT selected]

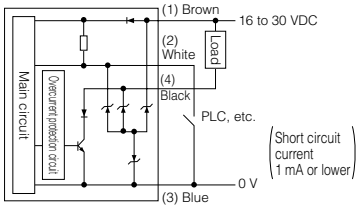


When using in NPN mode

[OUT1 + OUT2 selected]



[OUT1 + INPUT selected]



The wire colours of the M8 connector type indicate the colours 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	LR-XH50	LR-XH100	LR-XH250
	Cable Length: 10 m	LR-XH50(10M)	LR-XH100(10M)	LR-XH250(10M)
Detecting Distance		25.0 to 50.0 mm	25.0 to 100.0 mm	30 to 250 mm
Standard Detectable Deviation		0.5 mm	1.0 mm	30 to 180 mm: 9 mm, 180 to 250 mm: 18 mm
Display Resolution		0.1 mm	0.1 mm	1 to 2 mm
Spot Size		Approx. 0.2 mm × Approx. 1.5 mm (at a detecting distance of 50 mm)	Approx. 0.3 mm × Approx. 2 mm (at a detecting distance of 100 mm)	Approx. 0.8 mm × Approx. 1.2 mm (at a detecting distance of 250 mm)
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 lx or less, Sunlight: 16,000 lx or less		Incandescent lamp: 8,000 lx or less, Sunlight: 8,000 lx or less
	Operating Ambient Temperature	-10°C to +50°C (no freezing)		
	Operating Ambient Humidity	35 to 85% RH (no condensation)		
	Shock Resistance	1,000 m/s^2 (100G); 6 times each for X, Y, and Z axes		
	Vibration Resistance	10 to 500 Hz; Power Spectral Density: 0.816 G^2/Hz for X, Y and Z axes		
Material		Case: SUS316L; Lens Cover: PSU; Packing: FKM (lens cover), EVM (cable)		
Weight		2-m Cable Type: approx. 75 g, 10-m Cable Type: approx. 250 g		
Accessories		Laser warning label, sensor head connector (10-m cable type only)		

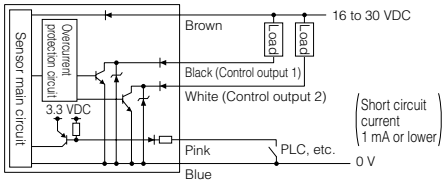
Amplifier Units

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)	—
Function	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 less, N.O./N.C. When used as a solitary unit: 100 mA or less for 1 output; 100 mA or less in total for 2 outputs; When expanding with multiple units: 50 mA or less for 1 output Residual voltage NPN: 1.4 V or less (output current: 10 mA or less)/2 V or less (output current: 10 to 100 mA), PNP: 1.6 V or less (output current: 10 mA or less)/2.2 V or less (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 less, PNP: 2 mA or less 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 less at 24 V, 61 mA or less at 16 V), ECO ON/ALL: 895 mW (37 mA or less at 24 V, 50 mA or less at 16 V) PNP output type and LR-XN11C During normal operation: 1150 mW (47 mA or less at 24 V, 64 mA or less at 16 V), ECO ON/ALL: 985 mW (40 mA or less at 24 V, 53 mA or less at 16 V)			
Environmental Resistance	Operating Ambient Temperature	–20 to +55°C (no freezing)[*8]			
	Operating Ambient Humidity	35 to 85% RH (no condensation)			
	Shock Resistance	500 m/s^2 (50G); 3 times each for X, Y, and Z axes			
	Vibration Resistance	10 to 500 Hz; Power Spectral Density: 0.816 G^2/Hz; X, Y, and Z directions			
Case Material		Main Unit and Cover: Polycarbonate			
Weight		Approx. 80 g	Approx. 70 g	Approx. 22 g	Approx. 21 g
Accessories		Instruction manual			

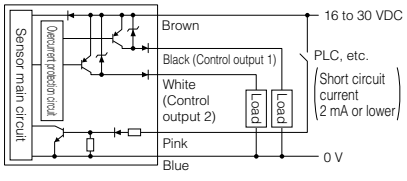
*1 Classification performed based on IEC60825-1 standards in accordance with FDA (CDRH) Laser Notice No. 56. *2 Ensure the cable length is 30 m or less for the M8 connector type. Ensure the cable length is 20 m or less when connecting via IO-Link. *3 Output 2 and the external input are selectable. *4 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; Expansion by 3 to 10 units: -20 to +50°C, Expansion by 11 to 16 units: -20 to +45°C

I/O Circuit Diagrams

LR-XN11N/ XN12N



LR-XN11P/ XN12P



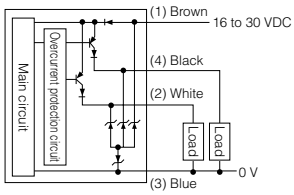
LR-XN11C Select PNP or NPN and the function of I/O pin (2) during the initial settings.

Sensor pin layout

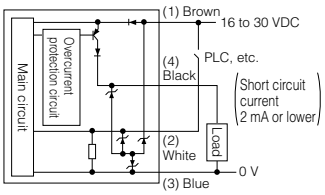


LR-XN11C: When using in PNP mode

[OUT1 + OUT2 selected]

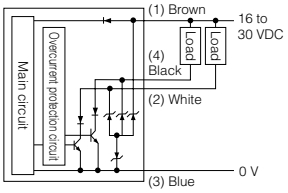


[OUT1 + INPUT selected]

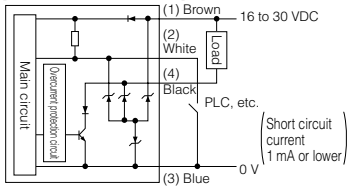


LR-XN11C: When using in NPN mode

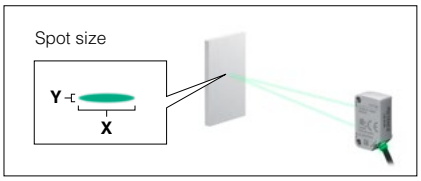
[OUT1 + OUT2 selected]



[OUT1 + INPUT selected]

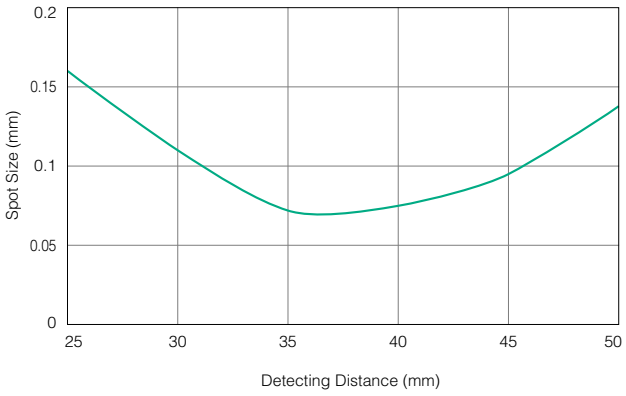


The wire colours indicate the colours when using an OP-88505/88506/88507 M8 connector cable (sold separately).

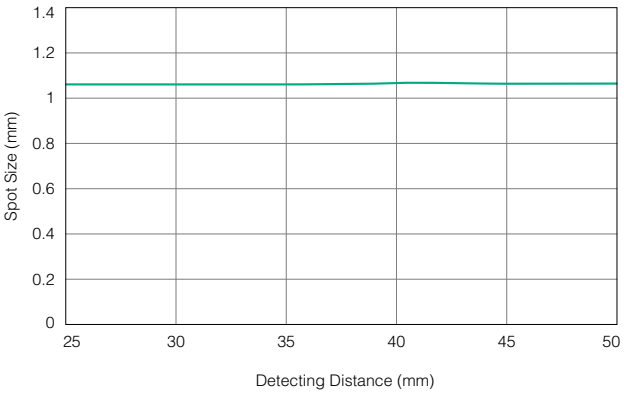


▮ LR-X50/X50C/X50CG/XH50/XH50(10M)

Y

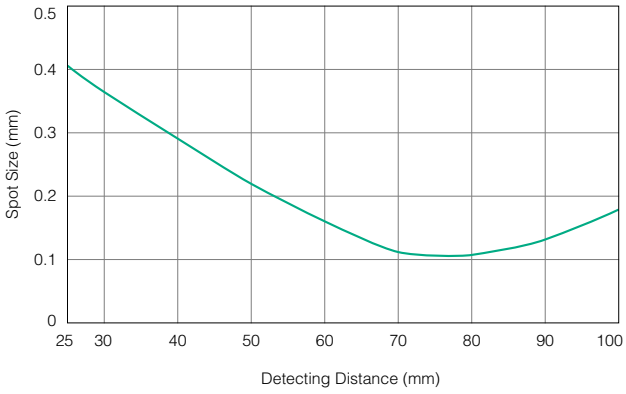


X

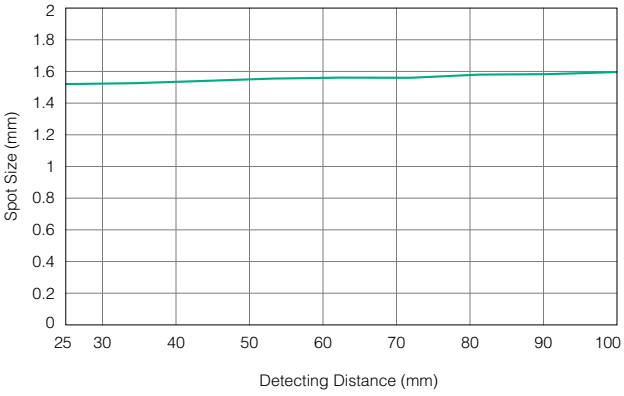


▮ LR-X100/X100C/X100CG/XH100/XH100(10M)

Y

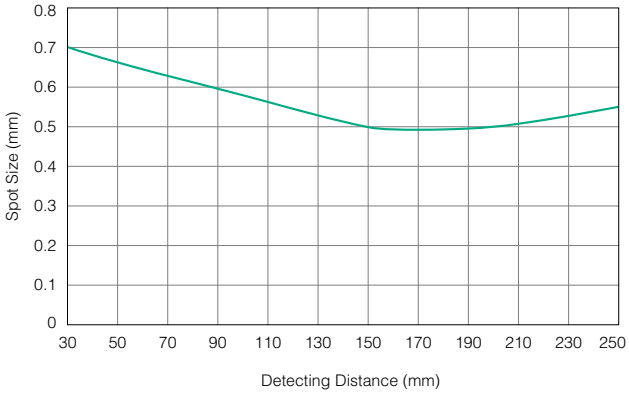


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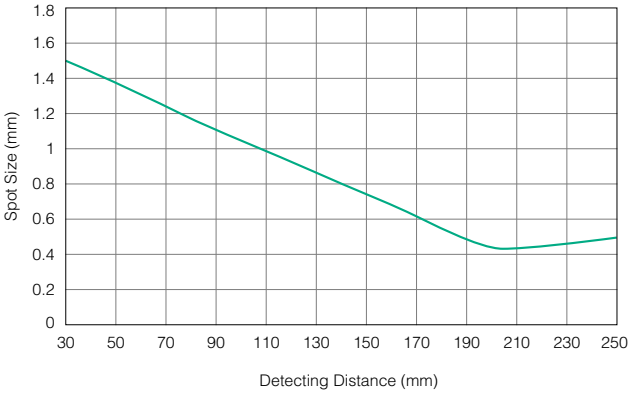


▮ LR-X250/X250C/X250CG/XH250/XH250(10M)

Y



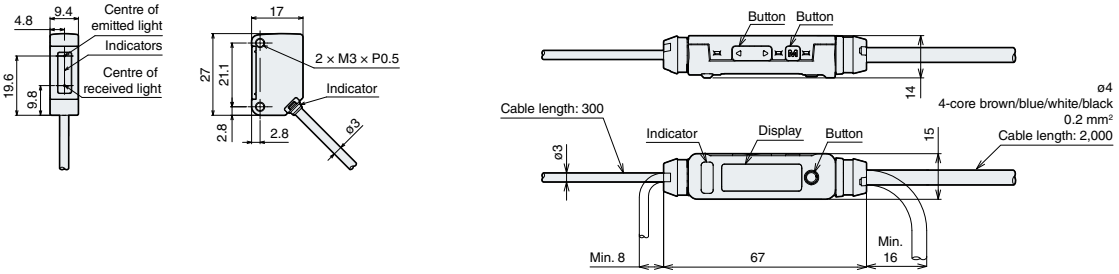
X



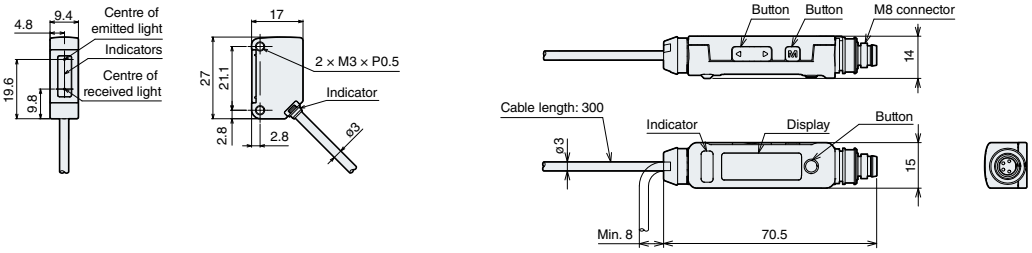
▮ Standard Models

Sensors

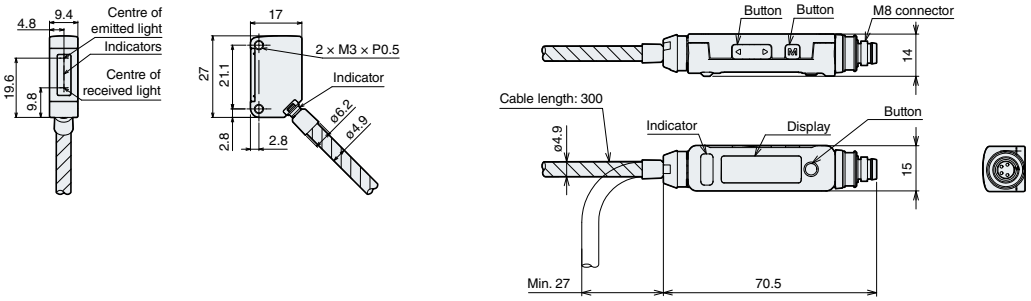
LR-X50/ X100/ X250



LR-X50C/ X100C/ X250C



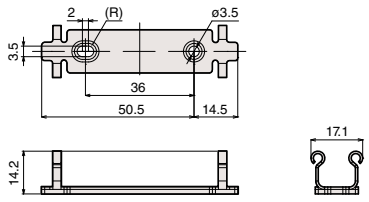
LR-X50CG/ X100CG/ X250CG



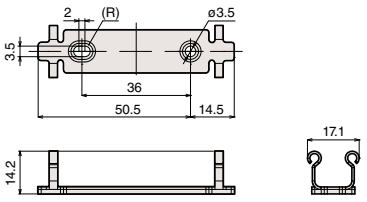
Amplifier Holder for Standard Models

OP-88542

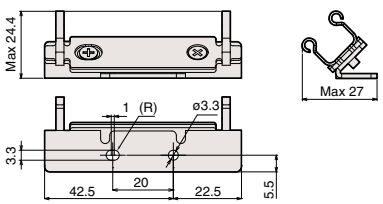
Front mount Holder alone



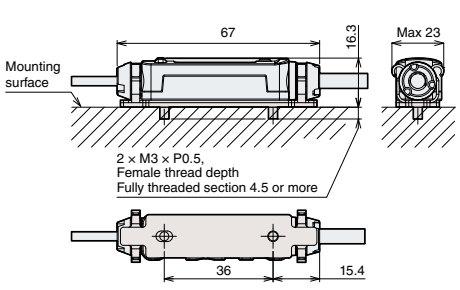
Sideways mount Holder alone



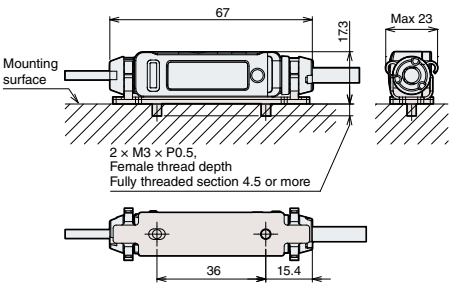
Angled mount Holder alone



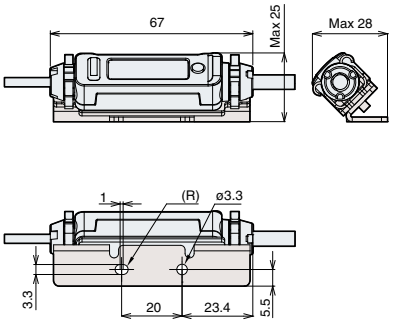
Front mount With amplifier mounted



Sideways mount With amplifier mounted



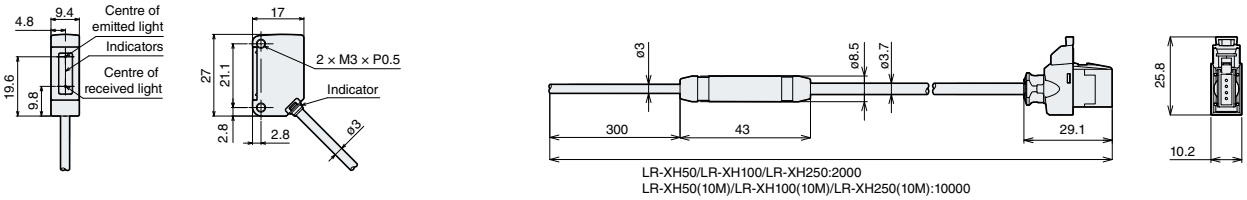
Angled mount With amplifier mounted



▮ Separate Amplifier Models (Sensor Heads)

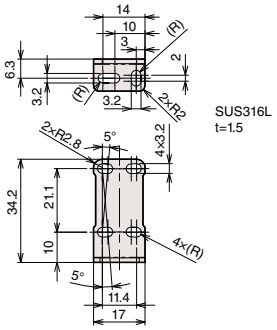
Sensor Heads

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

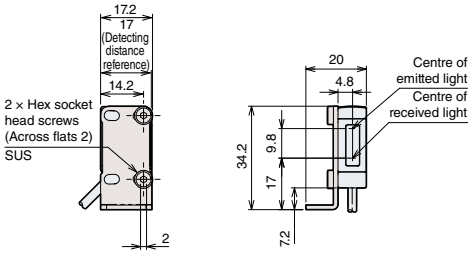


Standard Mounting Brackets for Sensor Heads

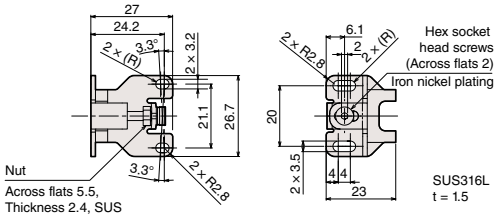
OP-88499



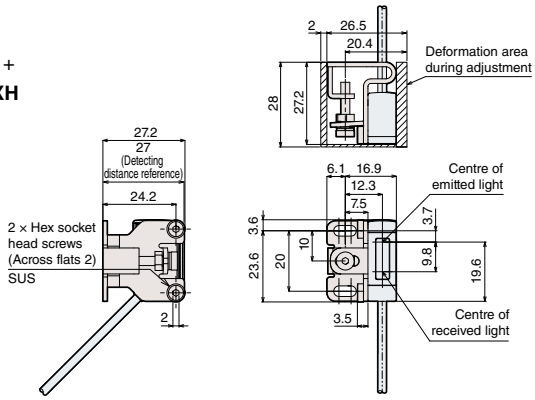
OP-88499 + LR-X/LR-XH



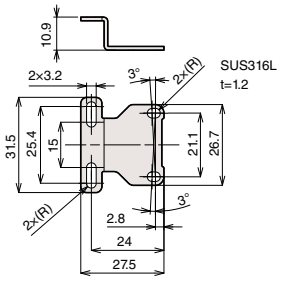
OP-88500



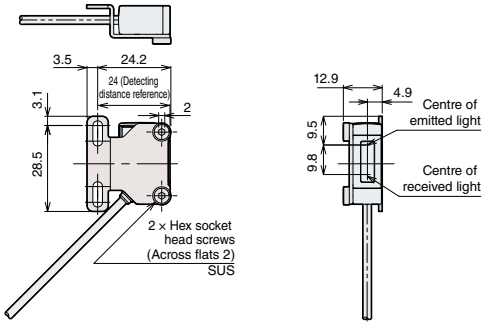
OP-88500 + LR-X/LR-XH



OP-88504



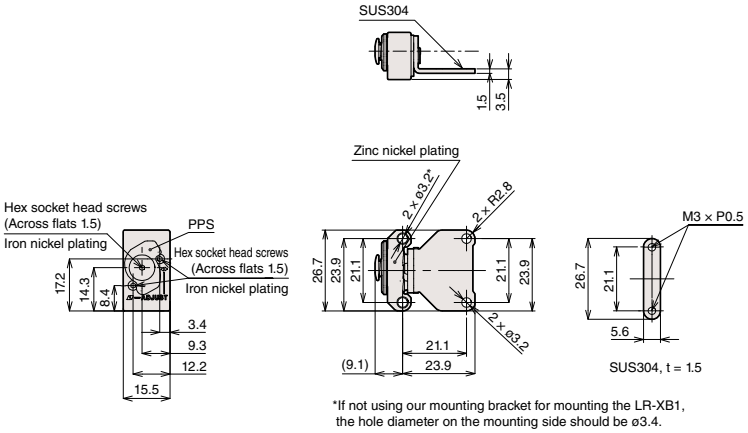
OP-88504 + LR-X/LR-XH



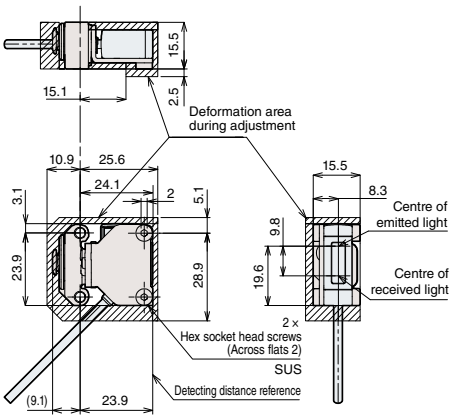
▮ Separate Amplifier Models (Sensor Heads)

Standard Mounting Brackets for Sensor Heads

LR-XB1

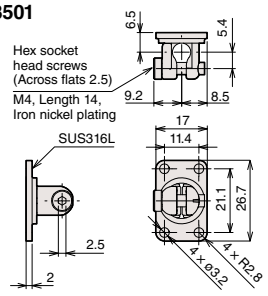


LR-XB1 + LR-X/LR-XH

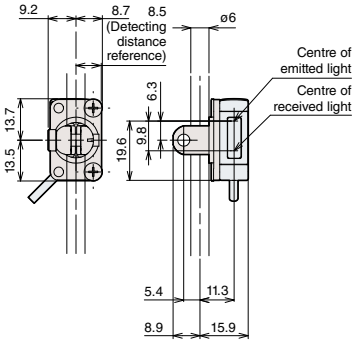


Adjustable Brackets for Sensor Heads

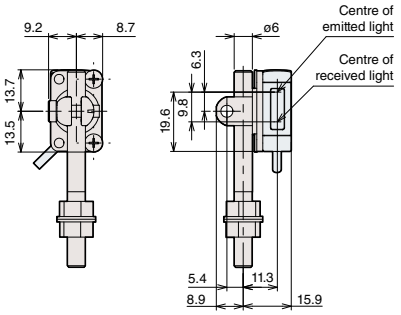
OP-88501



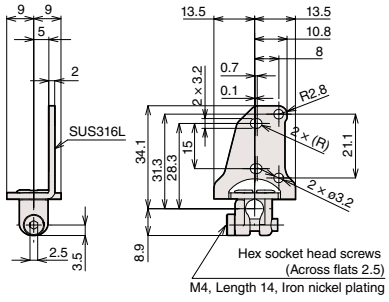
OP-88501 + LR-X/LR-XH



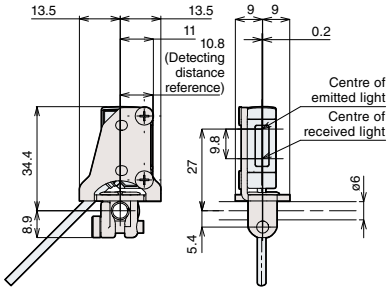
OP-88501 + OP-88503 + LR-X/LR-XH



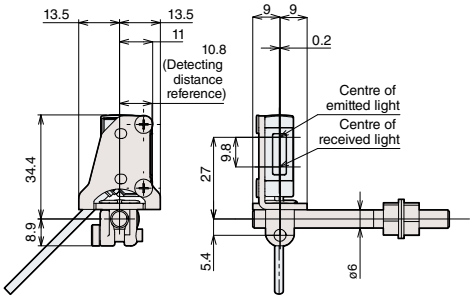
OP-88502



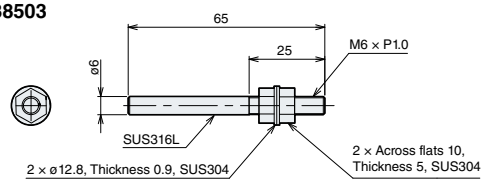
OP-88502 + LR-X/LR-XH



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



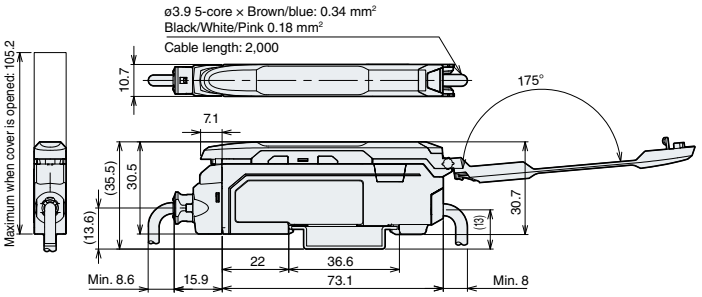
OP-88503



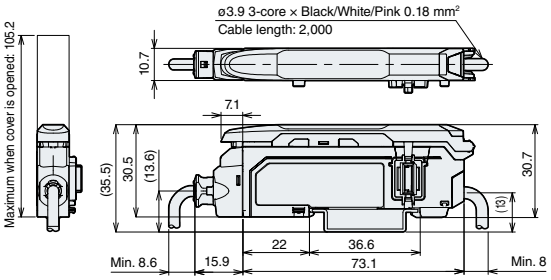
▮ Separate Amplifier Models (Amplifier Units)

Amplifier Units

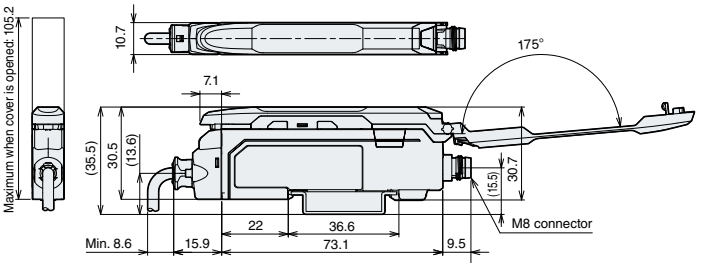
LR-XN11N/XN11P Main Unit (Cable Type)



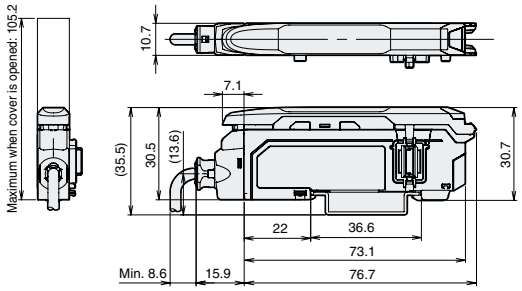
LR-XN12N/XN12P Expansion Unit (Cable Type)



LR-XN11C Main Unit (M8 Connector Type)

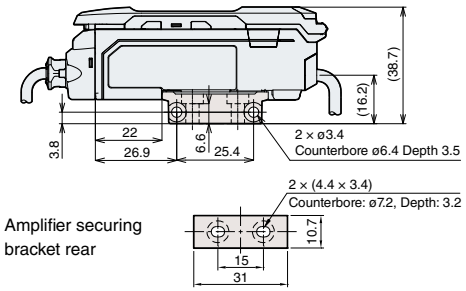


LR-XN10 Expansion Unit (Zero Line Type)

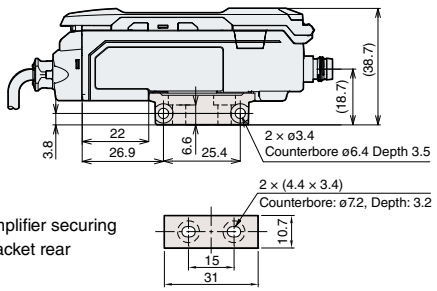


When Separate Amplifier Securing Bracket is Used (separately sold accessory **OP-88245**)

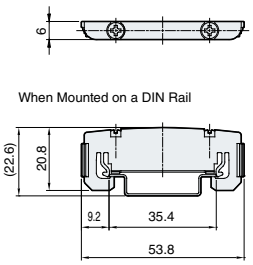
Cable Type



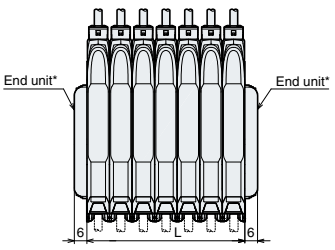
M8 Connector Type



End Unit (Separately sold accessory **OP-26751**)



When using expansion units

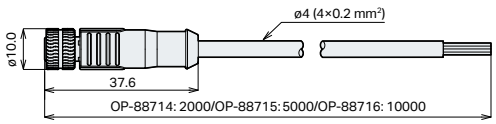


Total Number	L (mm)
1	10.7
2	21.4
3	32.1
4	42.8
5	53.5
6	64.2
7	74.9
8	85.6
9	96.3

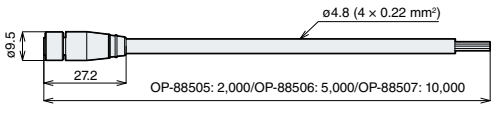
*When using expansion units, be sure to use an end unit. (Accessory)

▮ M8 Connector Cable

OP-88714/88715/88716



OP-88505/88506/88507



Connector pin layout



No.	Colour
①	Brown
②	White
③	Blue
④	Black

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LR Family of Sensors

Detection by distance

Do-It-All Laser Sensor

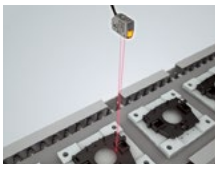
LR-Z Series

Detecting Distances

LR-ZB100N/P	35 to 100 mm
LR-ZB250AN/P	35 to 250 mm
LR-ZH500N/P	35 to 500 mm



Metal workpiece presence check



Black workpiece presence check

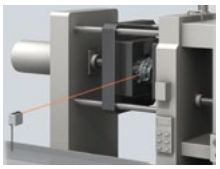


Long Range Laser Sensor

LR-T Series

Detecting Distances

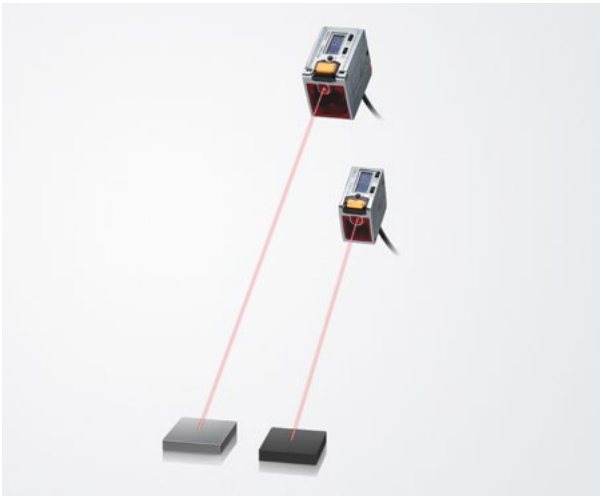
LR-TB2000(C)	60 to 2000 mm
LR-TB5000(C)	60 to 5000 mm



Mould empty confirmation



Vehicle positioning



Detection by appearance

(colour)

All-Purpose Appearance Sensor

LR-W Series

Detecting Distances

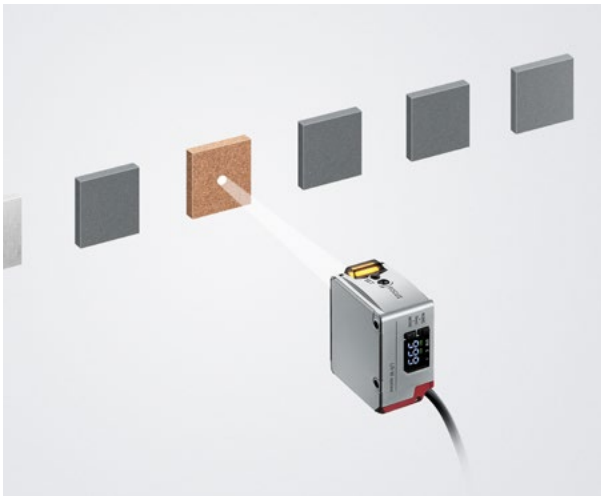
LR-W500(C)	30 to 500 mm
LR-W70(C)	30 to 70 mm
LR-WF10(C)	Varies based on fibre unit



Connector colour differentiation



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





LR-X SERIES

The new standard for reflective-type general-purpose sensors

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