



High power with ultra thin beam.  
Long range and nighly accurate detection by red laser.

- Wide variety of models for different detecting distances and detection objects.
- Easy adjustment with red laser spot.
- Fine spot beam detects a minute object through a narrow gap or a hole.



This is a laser product. To use the product safely, do not look at the beam directly and do not direct toward the human body.

### Type

Detection method	Detecting distance	Model	Operation mode	Output mode	
↑ Through beam	20m	LD-T20R LD-T20RPN	Light ON/ Dark ON selectable (with switch)	Open collector	
	15m	LD-T20R-P2			
	7m	LD-T20R-P1			
		LD-T20RPN-P1			
	3m	LD-T20R-P05			
		LD-T20RPN-P05			
	0.7m	LD-T20R-P03			
		LD-T20RPN-P03			
	20m	LD-T20R-C1			
		LD-T20RPN-C1			
10m		LD-T20R-C1-P2			
5m	LD-T20R-C1-P1				
⊕ Polarized retroreflective	The detecting distance varies, depending on the reflector you are using.(*)	LD-M10R	Light ON/ Dark ON selectable (with switch)	Open collector	
		LD-M10RPN			
⊕↕ Diffuse reflective	30-300mm	LD-S20R			Open collector
		LD-S20RPN			
⊕ Convergent reflective	200-400mm	LD-S33R			NPN/PNP Open collector 2 outputs

(\* Available as optional part)

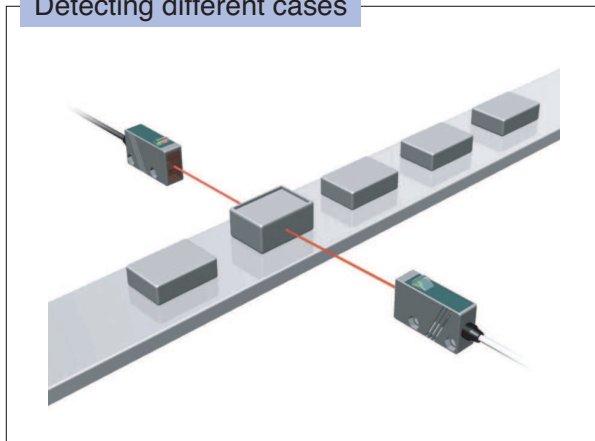
## Optional parts

Type	Model	Applicable model	Shape, etc.
Cord with M8 connector	<b>FBC-4R2S</b>	For M8 connector type	Straight with 4 cores cable, 2 m (transmitter/receiver)
	<b>FBC-4R2L</b>		Angled with 4 cores cable, 2 m (transmitter/receiver)
Protective cover	<b>G-MTB2</b>	For through beam LD-T20R	Rigid protective cover doubling as mounting bracket. See "Dimensions (optional parts)."

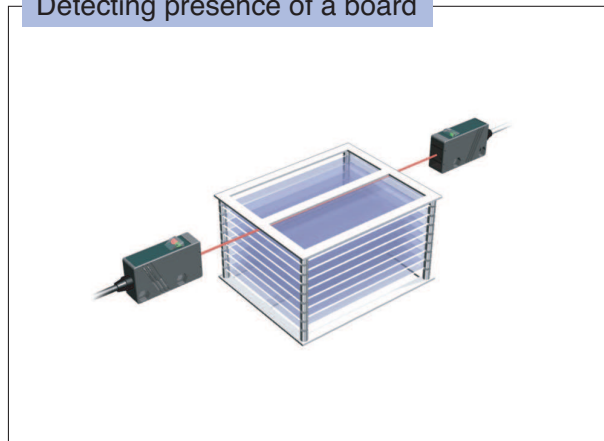
Product name	Model	Detecting distance (m)	Effective reflecting surface (mm)
		<b>LD-M10R</b>	
Reflector	<b>K-15</b>	0.3 - 7	36×55
	<b>S-0503A</b>	0.5 - 7	24×24
	<b>K-72</b>	1 - 5	29×8
	<b>K-MT4</b>	1 - 7	35×35
	<b>K-71</b>	3 - 5	30×18
	<b>K-7</b>	3 - 15	56×36

- Choose an appropriate model along your purpose. (Separately available)
- Reflectors other than above may not function appropriately.

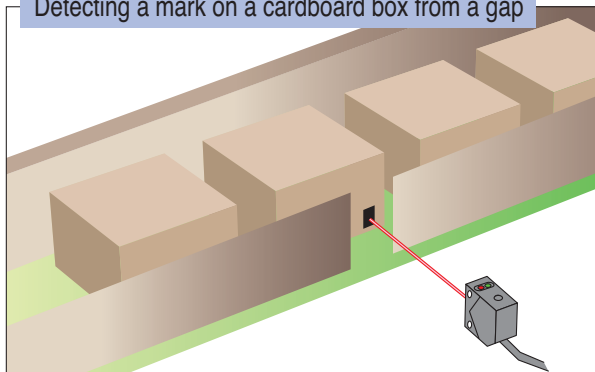
Detecting different cases



Detecting presence of a board

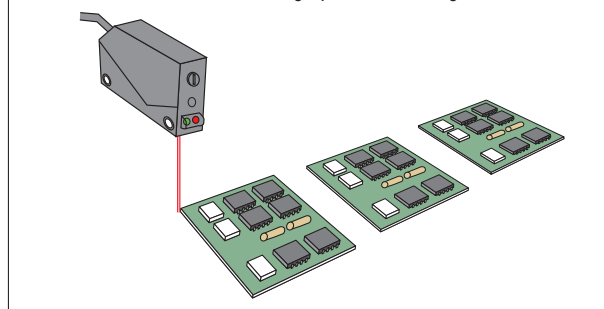


Detecting a mark on a cardboard box from a gap



Deciding the location of hybrid board

To decide the location with high precision, using a fine beam.



## Rating/Performance/Specification

Model	NPN type	LD-T20R	LD-T20R-C1	LD-S33R
	PNP type	LD-T20RPN	LD-T20RPN-C1	
Detection method	Through beam			Convergent reflectionive
Detecting distance	20m			200-400mm
Detection object	Φ20mm or more Opaque			0.5 mm (black mark on white background) or more at 300 mm
Power supply	12 - 24VDC ±10% / Ripple 10% or less.			
Current consumption	NPN type	Transmitter: 20 mA or less. Receiver: 20 mA or less.		38mA or less
	PNP type	Transmitter: 20 mA or less. Receiver: 25 mA or less.		
Output mode	Control output	NPN type	NPN open collector output Rating: sink current 100 mA (30 VDC) or less.	NPN /PNP open collector 2 outputs Rating: sink current 100 mA (30 VDC) or less
		PNP type	PNP open collector output Rating: source current 100 mA (30 VDC) or less.	
	Stability output	NPN type	NPN open collector output Rating: sink current 50 mA (30 VDC) or less.	—————
		PNP type	PNP open collector output Rating: source current 50 mA (30 VDC) or less.	—————
Operation mode	Light ON/Dark ON selectable			
Response time	0.5ms or less.			
Operating angle	30° (at receiver)			—————
Spot diameter	—————			Approx. φ2 mm at 300 mm
Smallest detectable mark width	—————			0.5 mm (black mark on white background) at 300 mm
Light source (light wavelength)	Red semiconductor laser (650 nm) Class 2		Red semiconductor laser (650 nm) Class 1	Red semiconductor laser (650 nm) Class 2
	Indicator			Operation indicator (red LED) Stability indicator (green LED)
Indicator		Transmitter: Power indicator (green LED) Receiver: Operation indicator (red LED) Stability indicator (green LED)		
Volume	SENS: sensitivity adjustment (at receiver)			8 turn sensitivity adjustment
Switch	Light ON/Dark ON selector switch provided			
Short circuit protection	Provided (for control output only)			Provided
Material	Case	Polyarylate		Body: zinc die cast / Aluminum head: heat-resistant ABS / Display: polycarbonate
	Lens	Acrylic		Glass
Connection	Cable type (outer dimension: dia. 4.2) Transmitter: 0.3 mm <sup>2</sup> 2 cores 2 m (gray) Receiver: 0.2 mm <sup>2</sup> 4 cores 2 m (black)			Cable type (outer dimension: dia. 4.5 mm) 0.2 mm <sup>2</sup> 5 cores 2 m
	-J type: M8 connector connection			—————
Weight	Attached cable type: approx. 80 g (transmitter/receiver) / -J type: approx. 25 g (transmitter/receiver)			Approx. 300g
Notes	Mounting bracket, operation manual, warning label *1, instruction label			

\*1 Excluding LD-T20R-C1 and LD-T20RPN-C1.

## Environmental Specification

	LD-T20R	LD-S33R
Ambient light	5,000 lx or less	Sunlight: Light receiving surface illumination 10,000 lx or less Incandescent lamp: receiving surface illumination 3,000 lx or less
Ambient temperature	-10 - +55°C (non-freezing)	
Ambient humidity	35 - 85%RH (non-condensing)	
Protective structure	IP67	IP66
Vibration	10 - 55 Hz / 1.5 mm double amplitude / 2 hours each in 3 direction	
Shock	500 m/s <sup>2</sup> / 3 times each in 3 directions	100 m/s <sup>2</sup> / 3 times each in 3 directions
Dielectric withstanding	1,000 VAC for 1 minute	
Insulation resistance	500 VDC, 20 MΩ or higher	

## Related Products

Model	Detecting distance	Detection object
LD-T20R-P2	15m	Φ2mm or more Opaque
LD-T20R-P1	7m	Φ1mm or more Opaque
LD-T20R-P05	3m	Φ0.5mm or more Opaque
LD-T20R-P03	0.7m	Φ0.3mm or more Opaque
LD-T20R-C1-P2	10m	Φ2mm or more Opaque
LD-T20R-C1-P1	5m	Φ1mm or more Opaque

Rating, performance, specification, etc. are the same with LD-T20R.

## Rating/Performance/Specification

Model	NPN type	LD-M10R	LD-S20R
	PNP type	LD-M10RPN	LD-S20RPN
Detection method		Polarized reflective	Variable focus reflective
Detecting distance		Depending on reflectors(Reflectors are optional *3)	30 - 300 mm (10 x 10 mm white drawing paper) *2
Spot variable range		—————	80 mm - 300mm *2
Power supply		12-24VDC $\pm$ 10% / Ripple 10% or less	
Current consumption	NPN type	35 mA or less *1	
	PNP type	40 mA or less *1	
Output mode	NPN type	NPN open collector Rating: Sink current 100 mA (30 VDC) or less Residual voltage: 1 V or less	
	PNP type	PNP open collector Rating: Source current 100 mA (30 VDC) or less Residual voltage: 2 V or less	
Operation mode		Light ON/Dark ON selectable (with switch)	
Cross talk prevention		Built-in(Up to 2 sensors)	
Test input		No voltage input(Contact or Non contact)	
Response time		0.5ms or less	
Spot diameter		15 x 7 mm ellipse (at 15 m)	$\phi$ 1mm(adjustable range: 80 - 300 mm from light receiving surface)
Smallest detectable mark width		—————	1 mm (black mark on white background) at 300 mm
Light source (wavelength)		Red semiconductor laser (650 nm) Class 2	
Indicator		Operation indicator (orange LED) / Stability indicator (green LED)	
Volume (VR)		SENS: sensitivity adjustment (at receiver)	
Switch (SW)		Dark ON / Light ON selector switch	
Short circuit protection		Provided	
Connection		Cable type (outer dimension: dia. 4 mm) 0.2 mm <sup>2</sup> 4 cores 2 m (black)	
Material		Case: Heat resistant ABS Lens: Acrylic	Case:Heat resistant ABS Transmitter lens:Glass Transmitter hood:Aluminum Receiver lens:Acrylic
Weight		Approx. 80g	
Accessory		Operation manual, Mounting bracket, Screwdriver for adjustment, warning label, instruction label	

● The detecting distance and detection object of the reflector type varies, depending on the reflector you are using. The detecting distance is the range which you can set for the reflector. The sensor can detect an object even in extremely short range.

\*1 The laser diode is equipped with a circuit that maintains the same light intensity level by increasing the current if it becomes dark. For this reason, allow sufficient margin in the capacity of the power supply.

\*2 The distance from the receiving lens of the sensor.

\*3 The reflector is not provided with the product; it is an optional part. (About detecting distance, see "Dimensions (Optional)".)

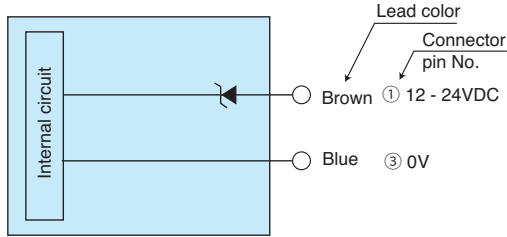
The detecting distance is the range which you can set for the reflector. The sensor can detect an object even in extremely short range.

## Environmental Specification

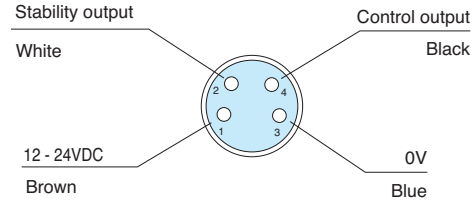
	LD-M10R	LD-S20R
Ambient light	5000 lx or less	
Ambient temperature	-10 - +55°C (no freezing)	
Ambient humidity	35~85%RH (no condensation)	
Protective structure	IP67	IP66
Vibration	10-55 Hz / 1.5 mm double amplitude / 2 hours each in 3 direction	
Shock	500 m/s <sup>2</sup> / 3 times each in 3 directions	300 m/s <sup>2</sup> / 3 times each in 3 directions
Dielectric withstanding	1000 VAC for 1 minute	
Insulation resistance	500 VDC 20 M $\Omega$ or higher	

## Input/Output Circuit and Connection

### Through beam type transmitter



### Pin assignment and connection of M8 connector type (-J)

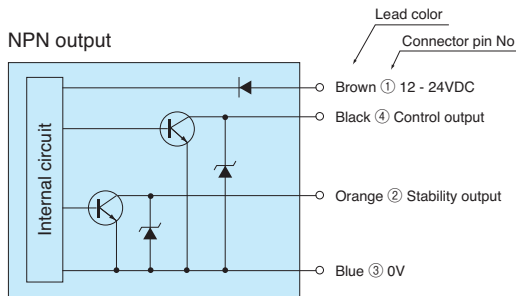


The colors show lead colors for use in combination with the optional cord with M8 connector.

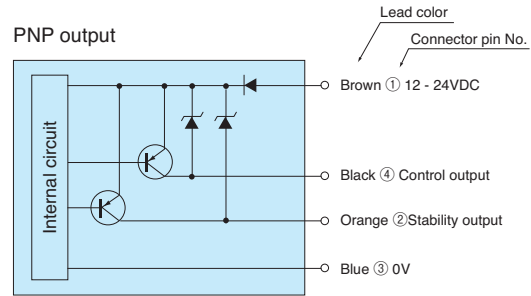
#### (Transmitter)

Lines other than Lines 1 (brown) and 3 (blue) are unused.

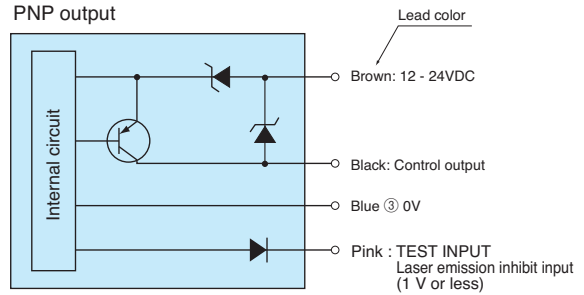
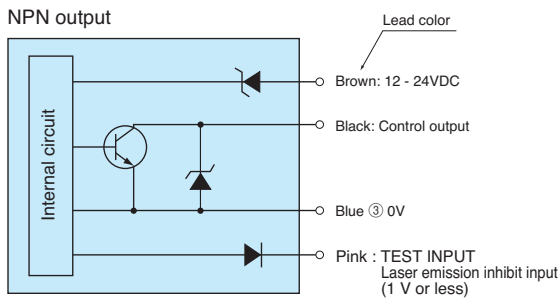
### Through beam type receiver



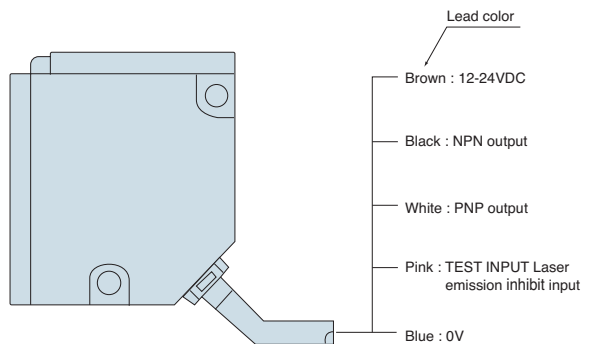
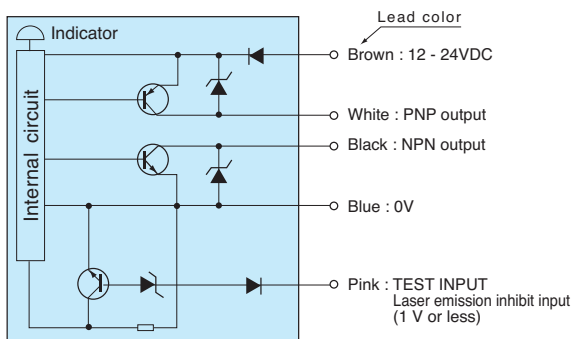
The stability output is not provided with short circuit protection.



### Polarized reflective / Variable focus reflective type



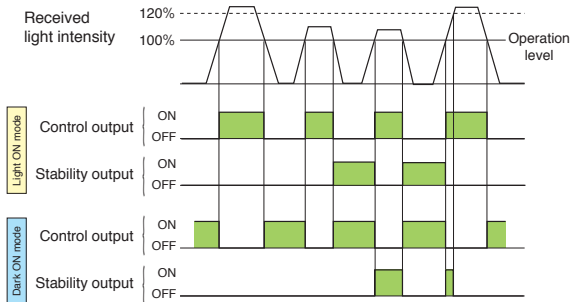
### Convergent reflectionive type



- Slow starter circuit is provided for laser emission. The laser light is illuminated about 0.5 seconds after power-up or reset of short circuit caused by emission stop input.
- The output transistor turns off when load short circuit or overload occurs. Check the load and turn the power back on.

## Stability output(provided with LD-T20R)

The stability output can be used to check for reduction of the light intensity level along with any change in the operating environment or operation over time or to perform initial check of the operation. When two consecutive detections have occurred with the intensity of light detected exceeding the operation level but not reaching 120 % of the level (range allowing stable operation), the stability signal is output when the control output is deactivated.



## Panel and Indicators

Operation indicator  
Stability indicator  
Sensitivity adjustment volume  
Light ON/Dark ON selector

- **Operation indicator (orange LED)**  
Illuminates when the output transistor is ON.
- **Stability indicator (green LED)**  
Illuminates when the light intensity is 80% or lower of the threshold or 120% or higher.
- **Sensitivity adjustment volume**  
To increase sensitivity, turn it clockwise. To decrease sensitivity, turn it counterclockwise.
- **Light ON/Dark ON selector**  
When it is set to L.ON, the sensor works if it receives the light. When it is set to D.ON, the sensor works if it doesn't receive the light.

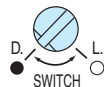
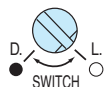
### How to select Light ON/Dark ON

To select the Light ON mode, set it to L. ON.

To select the Dark ON mode, set it to D. ON.

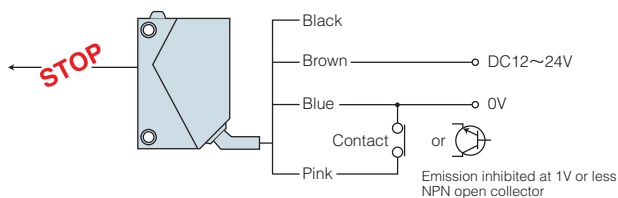
Light ON mode

Dark ON mode

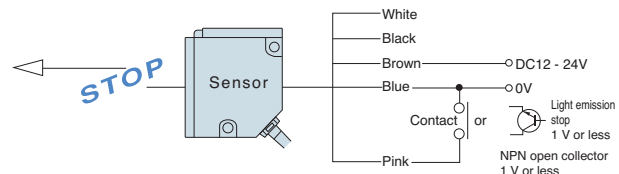


## How to Use Light Emission Inhibit Function \*Not equipped with LD-T20R

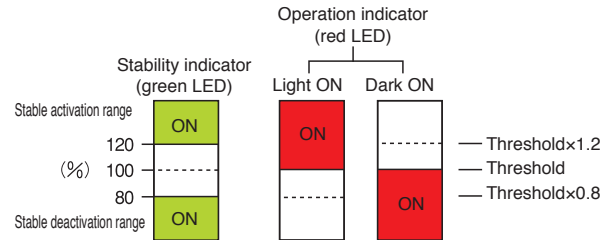
- Short circuiting the blue and pink leads of the transmitter stops the laser light emission at arbitrary timing
- When not using the light emission inhibit function, connect the pink lead to the brown.



(LD-S33R only)



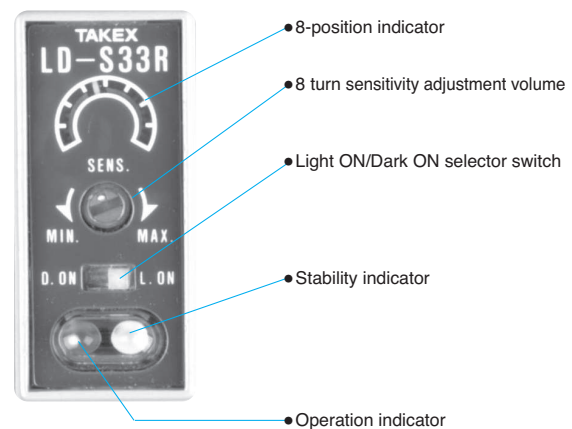
## Indicators (LD-M10R)



- Operation indicator (red LED) and Stability indicator (green LED) turn on as the figure above shows. After optical axis alignment and sensitivity adjustment, make sure that light reception and light blocking are occurred within the stable activation or deactivation ranges by blocking and unblocking the light with the detection object.
- Setting within the stable range increases the reliability against variation of environment after setting.

## Panel Indication

LD-S33R



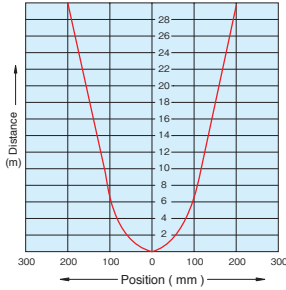
- When installing the sensor

Please keep the tightening torque 1.2N · m or less.

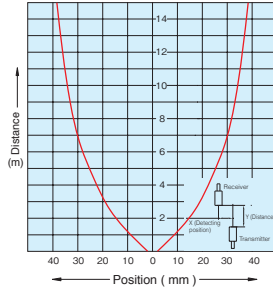
## Response Curves (Typical)

### Response Curves: Beam Pattern

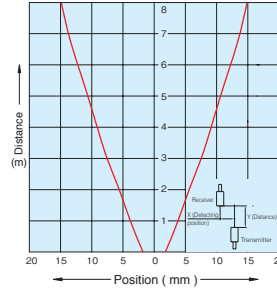
LD-T20R



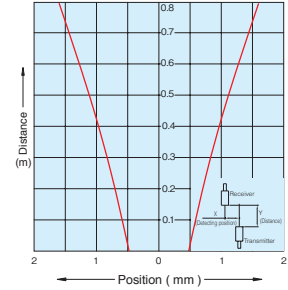
LD-T20R-P2



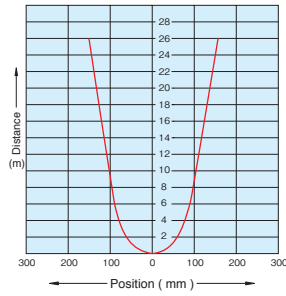
LD-T20R-P1



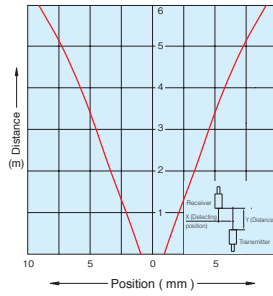
LD-T20R-P03



LD-T20R-C1

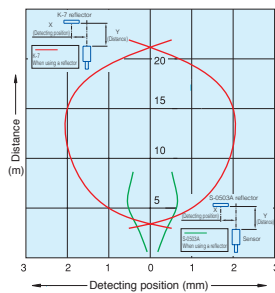


LD-T20R-C1-P1

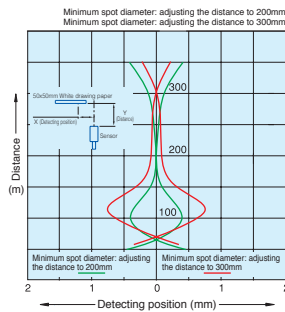


### Response Curves : Detecting Position

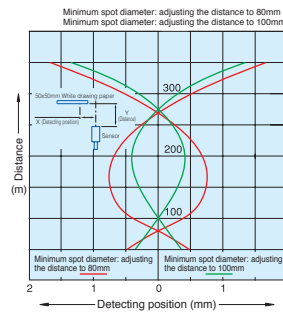
LD-M10R



LD-S20R

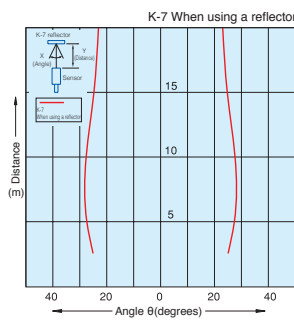


LD-S20R

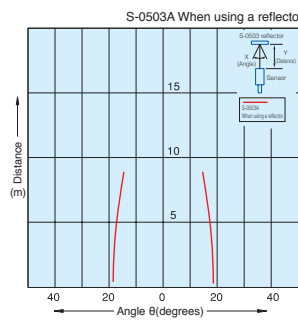


### Response Curves: Tilt Angle

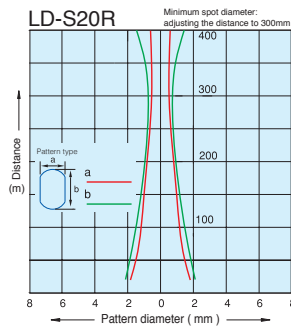
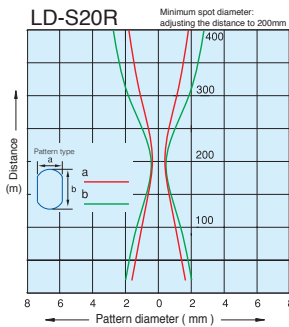
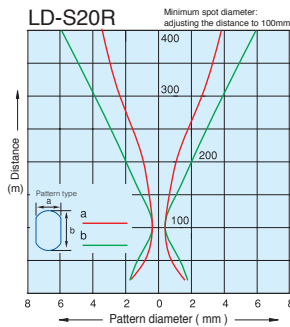
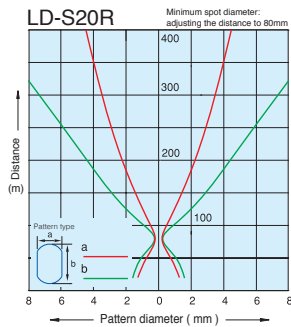
LD-M10R



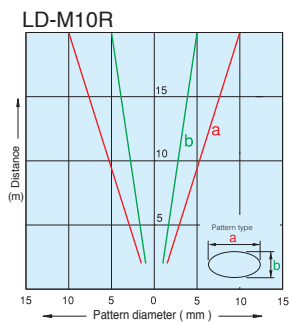
LD-M10R



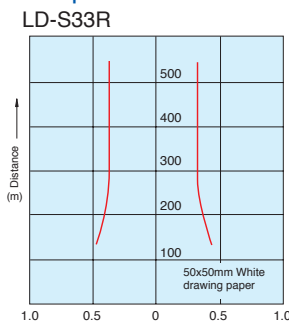
## • Beam Patterns



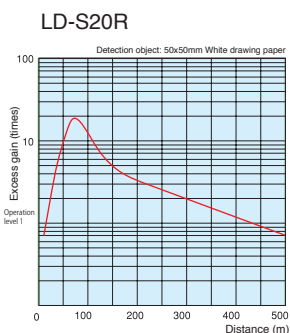
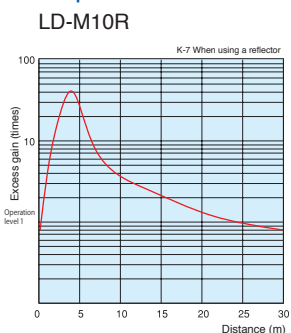
## • Beam Patterns



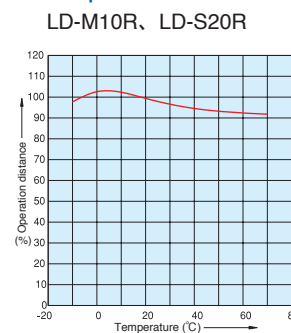
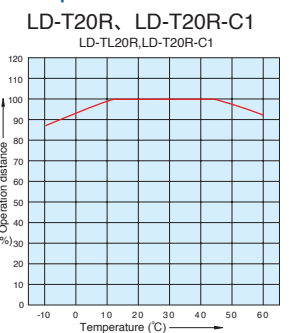
## • Response Curves : Detecting Position



## • Response Curves : Excess Gain



## • Response Curves : Ambient Temperature



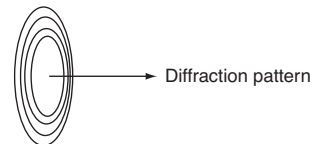
## For Correct Use



- Do not use the product for for the protection of human body.
- When using the product for safety purposes, ensure "System-Wide" safety with the control system as a whole as well as the detection.
- This product is not explosion proof. Please use a type approved product, "Barrier Sensor," for explosion proof equipment.

- The semiconductor laser used in this product falls under the following class as defined in JIS C 6802 "Safety of Laser Products."
  - Class 1 (Intrinsically safe under the rationally predictable operation conditions)
  - Class 2 (Emits visible radiation from which the eyes are generally protected by the aversion reactions)
- This product employs a parallel beam of laser and care should be taken not to allow the laser light to enter human eye. Never look into the laser radiation outlet of the transmitter connected to power supply. Looking straight into the laser light may damage the eye.
- This product is provided with warning and instruction labels as shown below for notifying and alerting the operator of the sensor of the degree of danger. After the product has been installed, attach the labels in prominent locations on the sensor.

- The radiated laser beam is elliptic due to the characteristics of semiconductor laser. In addition, diffraction pattern is generated due to optical diffraction phenomenon.

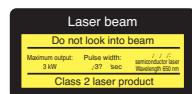


### Warning label

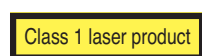


### Instruction level

- Class 2



- Class 1



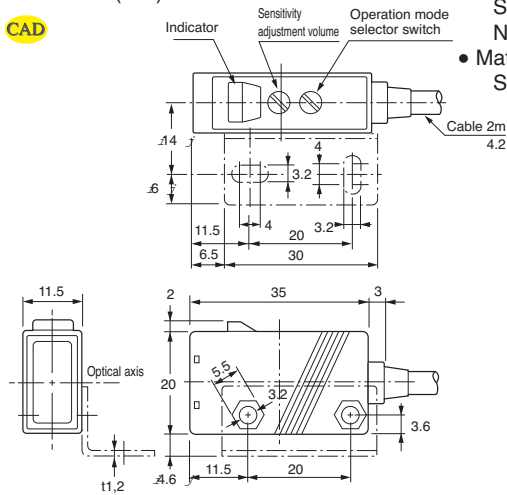
- Be notified that this product uses semiconductor laser and is prone to deterioration due to surge current or static electricity.
- The laser diode is equipped with a circuit that maintains the same light intensity level by increasing the current if it becomes dark. For this reason, allow sufficient margin in the capacity of the power supply.
- Always avoid use in which the power is turned on and off consecutively.
- Be sure to turn off the power before moving including mounting and removing or repairing.



## Dimensions (in mm)

### LD-T20R (-C1) Series

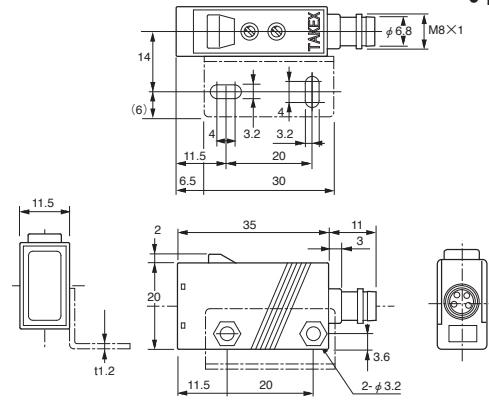
CAD



- Accessories  
Screw: 2  
Nut: 2
- Materials  
SUS

### M8 connector type (-J type)

CAD

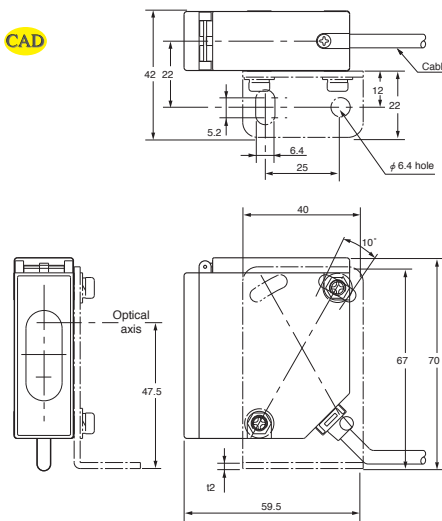


- Accessories  
Screw: 2  
Nut: 2
- Materials  
SUS

The figures above show the receiver. The transmitter has a different panel side.

### LD-S33R

CAD



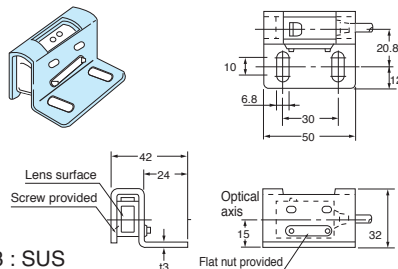
- Accessories  
Screw: 2  
Washer: 2
- Materials  
SUS

With mounting bracket attached

## Dimensions (Optional parts) (in mm)

- Protective cover  
G-MTB2

CAD



t3 : SUS

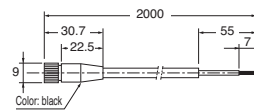
Flat nut provided

- Accessories  
Screw: 2  
Nut: 1
- Materials  
SUS

- Cable with M8 connector

FBC-4R2S(straight)

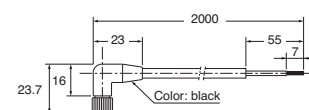
CAD



Color: black

FBC-4R2L(angled)

CAD



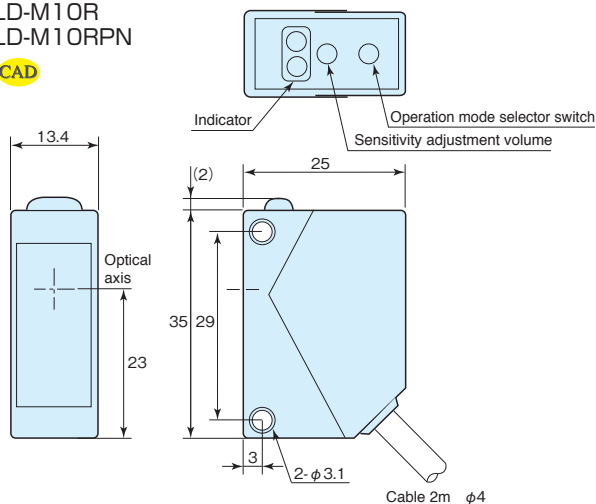
Color: black

Outer diameter: 4, cable 0.2mm x 4 cores 2m (sheath: black)

## Dimensions (in mm)

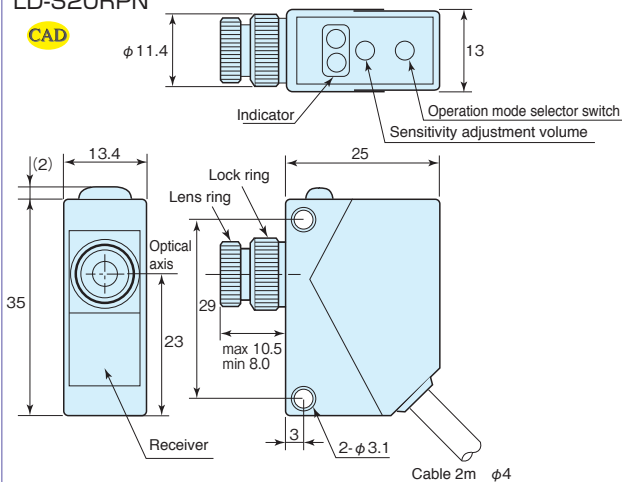
LD-M10R  
LD-M10RPN

CAD

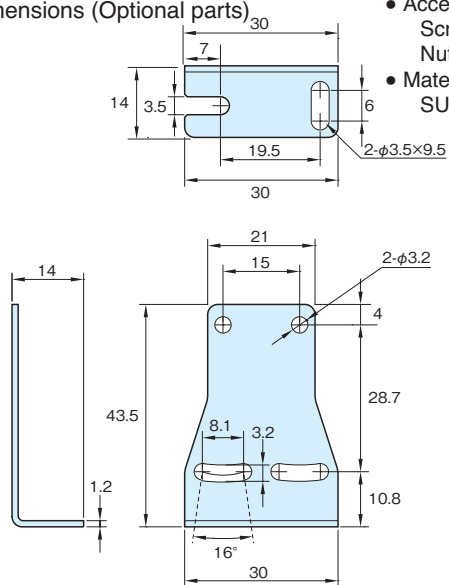


LD-S20R  
LD-S20RPN

CAD



### Dimensions (Optional parts)



- Accessories  
Screw: 2  
Nut: 2
- Materials  
SUS

## Option

Reflector model	K-7	K-15	K-MT4	K-71	K-72	S-0503A
Effective reflecting surface	56×36 mm	36×55 mm	35×35 mm	30×18 mm	29×8 mm	24×24 mm
Dimensions in mm						
Detecting distance (m) LD-M10R	3 - 15	0.3 - 7	1 - 7	3 - 5	1 - 5	0.5 - 7