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**	Light ON/ Dark ON selectable (with switch)	Open collector
		LD-T20RPN		
	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**		
		LD-M10RPN		
Diffuse reflective	30-300㎜	**LD-S20R**		
		LD-S20RPN		
Convergent reflective	200-400㎜	**LD-S33R**		NPN/PNP Open collector 2 outputs

(* Available as optional part)

CAD To download CAD data including dimensions, please visit www.takex-elec.co.jp/index_e.html.

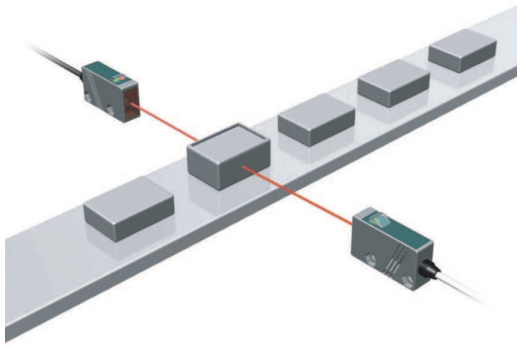
Optional parts

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

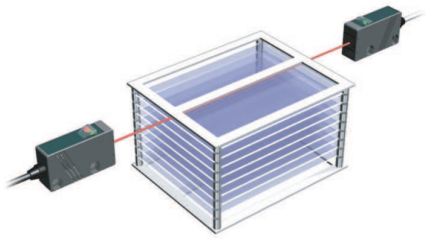
Product name	Model	Detecting distance (m)	Effective reflecting surface (mm)
		LD-M10R	
Reflector	**K-15**	0.3 - 7	36×55
	S-0503A	0.5 - 7	24×24
	K-72	1 - 5	29×8
	K-MT4	1 - 7	35×35
	K-71	3 - 5	30×18
	K-7	3 - 15	56×36

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

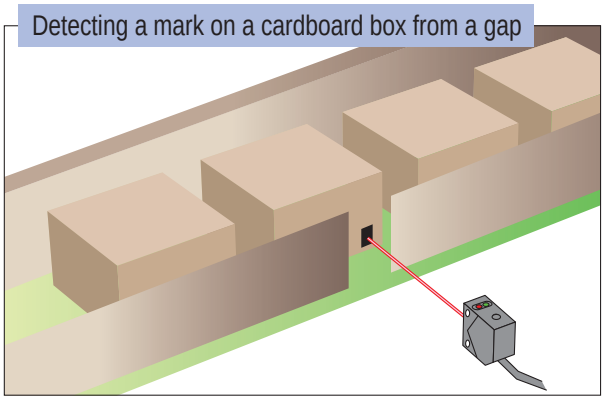
Detecting different cases



Detecting presence of a board

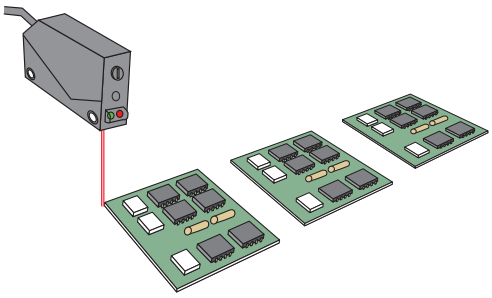


Detecting a mark on a cardboard box from a gap



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			Transmitter: Power indicator (green LED)		Operation indicator (red LED) Stability 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 mm² 2 cores 2 m (gray) Receiver: 0.2 mm² 4 cores 2 m (black)		Cable type (outer dimension: dia. 4.5 mm) 0.2 mm² 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 Excepting 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-freazing)	
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/s² / 3 times each in 3 directions	100 m/s² / 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 ±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)	φ1mm(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 mm² 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.

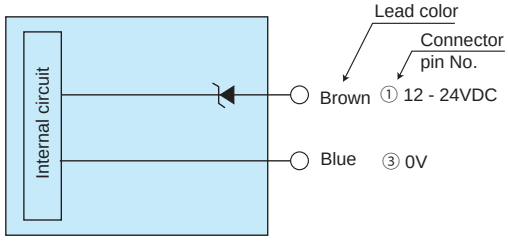
*3 The reflector is not provided with the product; it is an optional part. (About detecting distance, see “Dimensions (Optional)”.)
The detecting distance is the range which you can set for the reflector. The sensor can detect an object even in extremely short range.

Environmental Specification

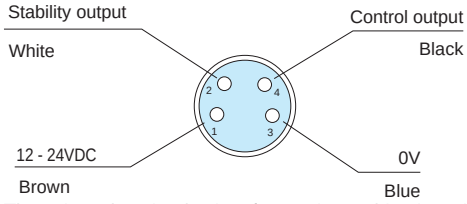
	LD-M10R	LD-S20R
Ambient light	5000 lx or less	
Ambient temperature	-10 - +55°C (no freezing)	
Ambient humidity	35~85%RH (no condensation)	
Protective structure	IP67	IP66
Vibration	10-55 Hz / 1.5 mm double amplitude / 2 hours each in 3 direction	
Shock	500 m/s² / 3 times each in 3 directions	300 m/s² / 3 times each in 3 directions
Dielectric withstanding	1000 VAC for 1 minute	
Insulation resistance	500 VDC 20 MΩ or higher	

Input/Output Circuit and Connection

• Through beam type transmitter



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

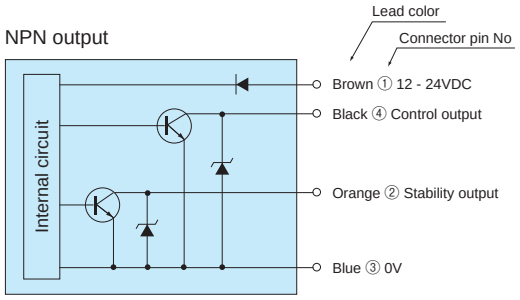


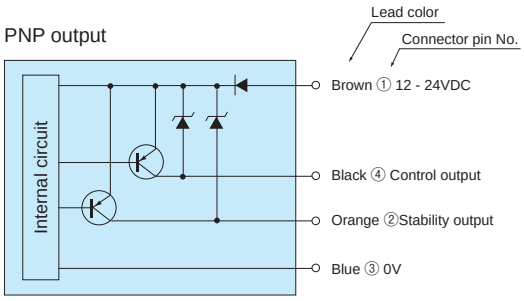
The colors show lead colors for use in combination with the optional cord with M8 connector.

(Transmitter)

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

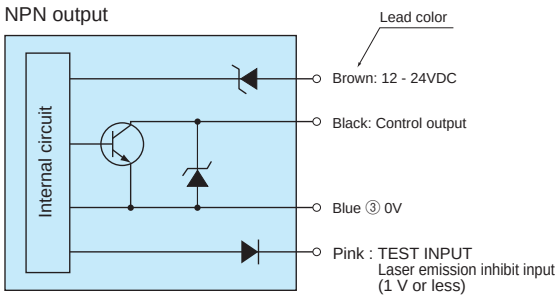
• Through beam type receiver

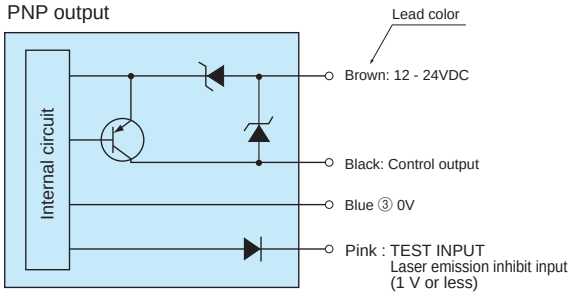




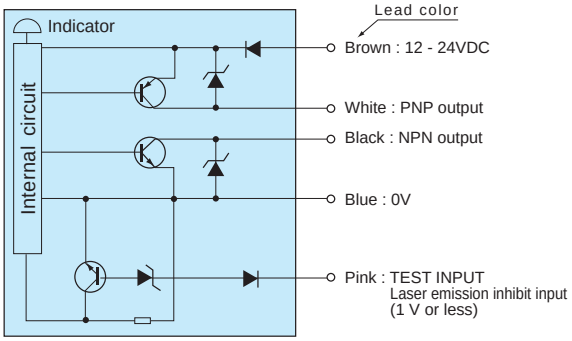
- The stability output is not provided with short circuit protection.

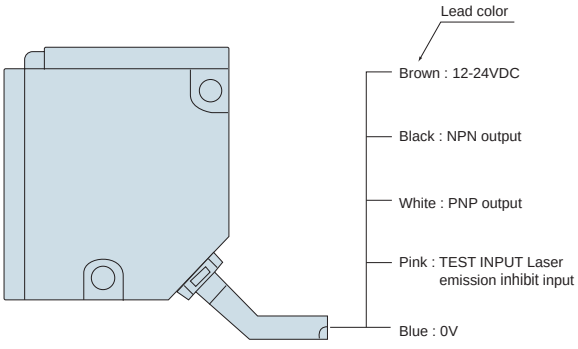
• Polarized reflective / Variable focus reflective type





• Convergent reflectionive type

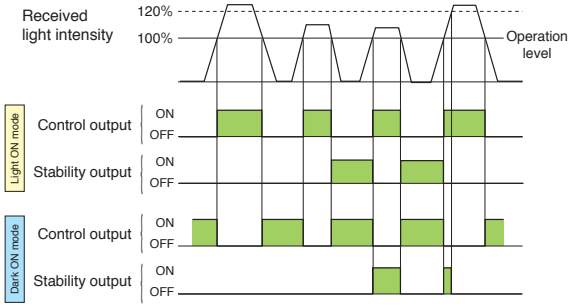




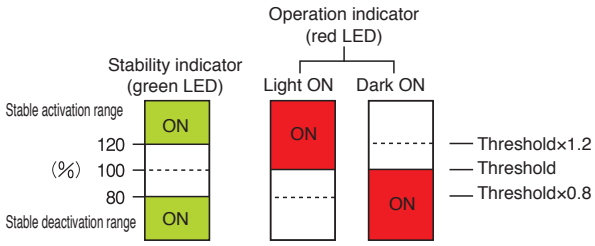
- Slow starter circuit is provided for laser emission. The laser light is illuminated about 0.5 seconds after power-up or reset of short circuit caused by emission stop input.
- The output transistor turns off when load short circuit or overload occurs. Check the load and turn the power back on.

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.

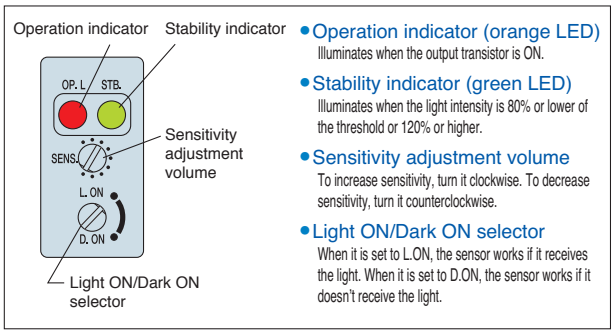


Indicators (LD-M10R)



- 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.

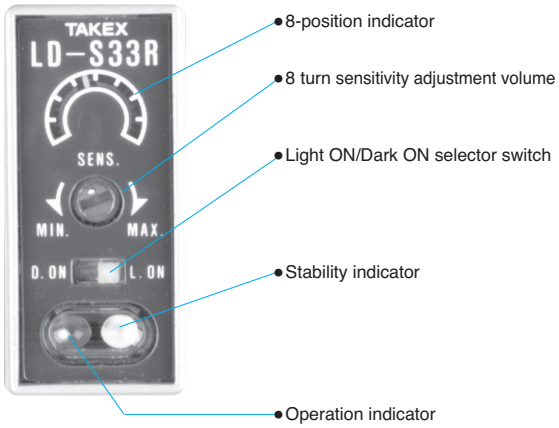
Panel and Indicators



- **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.

Panel Indication

LD-S33R

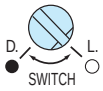


- How to select Light ON/Dark ON

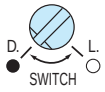
  To select the Light ON mode, set it to L. ON.

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

Light ON mode



Dark ON mode



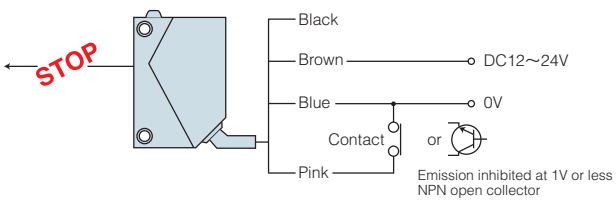
- When installing the sensor

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

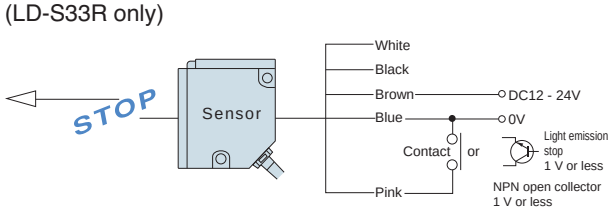
How to Use Light Emission Inhibit Function *Not equipped with LD-T20R

- 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.



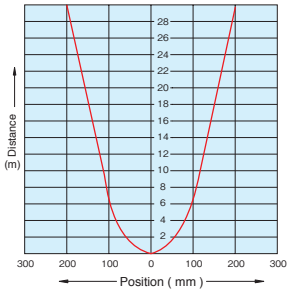
(LD-S33R only)



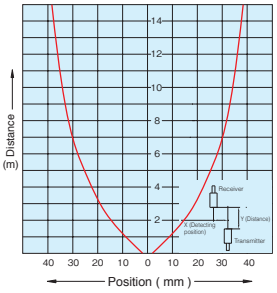
Response Curves (Typical)

• Response Curves: Beam Pattern

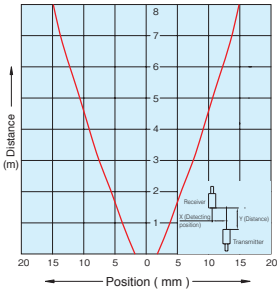
LD-T20R



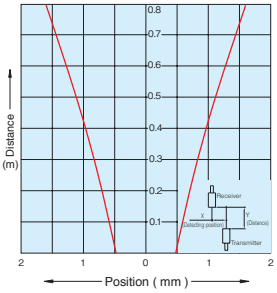
LD-T20R-P2



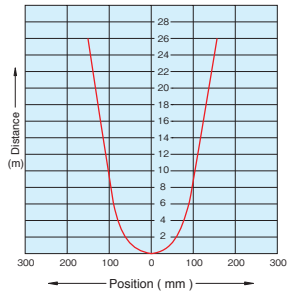
LD-T20R-P1



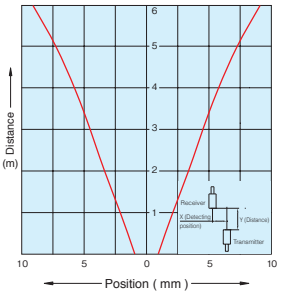
LD-T20R-P03



LD-T20R-C1

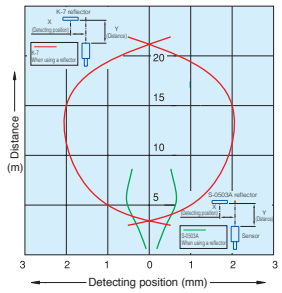


LD-T20R-C1-P1

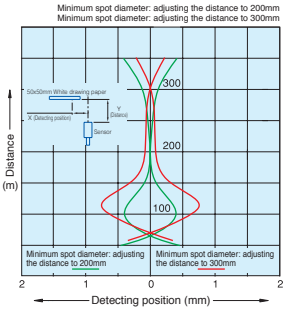


• Response Curves : Detecting Position

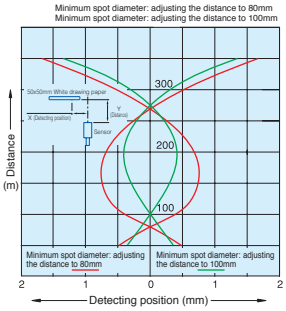
LD-M10R



LD-S20R



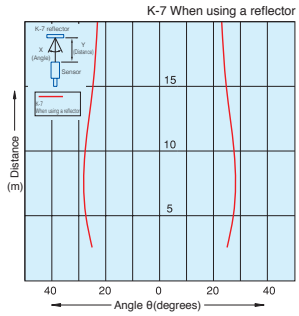
LD-S20R



• Response Curves: Tilt Angle

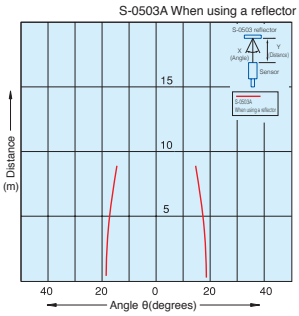
LD-M10R

K-7 When using a reflector



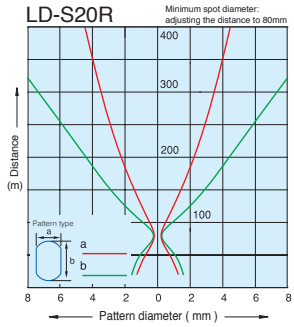
LD-M10R

S-0503A When using a reflector

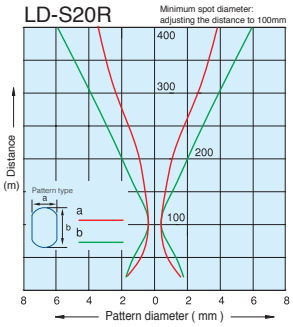


● Beam Patterns

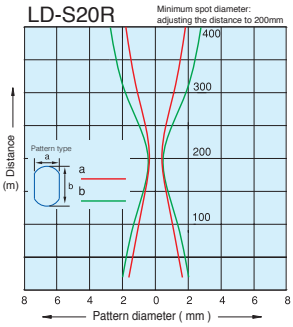
LD-S20R



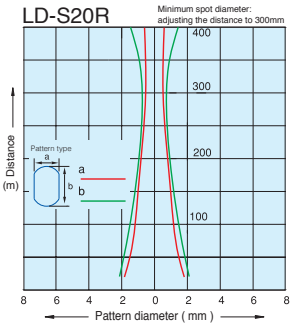
LD-S20R



LD-S20R

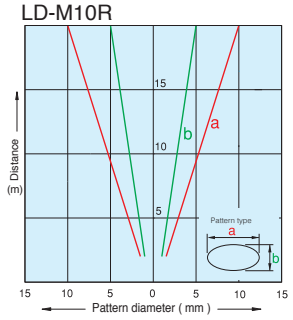


LD-S20R



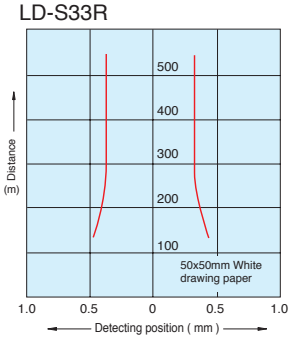
● Beam Patterns

LD-M10R



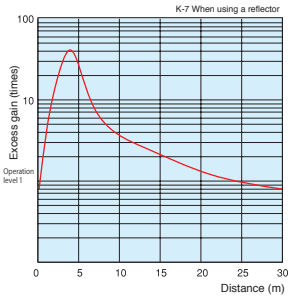
● Response Curves : Detecting Position

LD-S33R

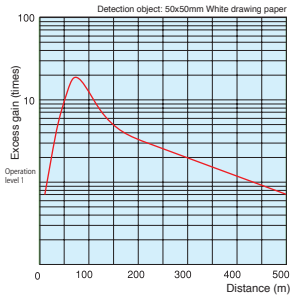


● Response Curves : Excess Gain

LD-M10R



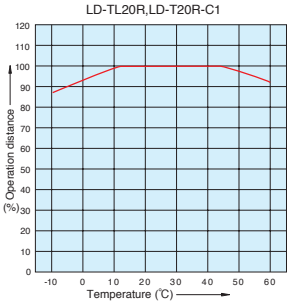
LD-S20R



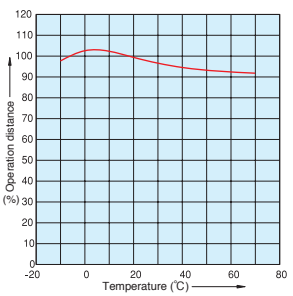
● Response Curves : Ambient Temperature

LD-T20R、LD-T20R-C1

LD-TL20R,LD-T20R-C1



LD-M10R、LD-S20R



For Correct Use

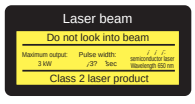
- ・Do not use the product for for the protection of human body.
- ・When using the product for safety purposes, ensure "System-Wide" safety with the control system as a whole as well as the detection.
- ・This product is not explosion proof. Please use a type approved product, "Barrier Sensor," for explosion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

Warning label

Instruction level

●Class 2



●Class 1

Class 1 laser product

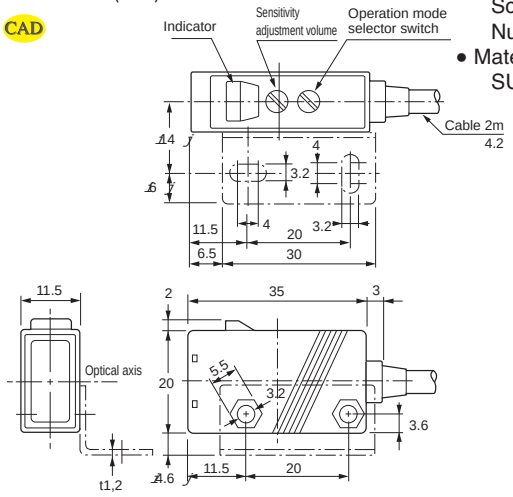
- The radiated laser beam is elliptic due to the characteristics of semiconductor laser. In addition, diffraction pattern is generated due to optical diffraction phenomenon.

- 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

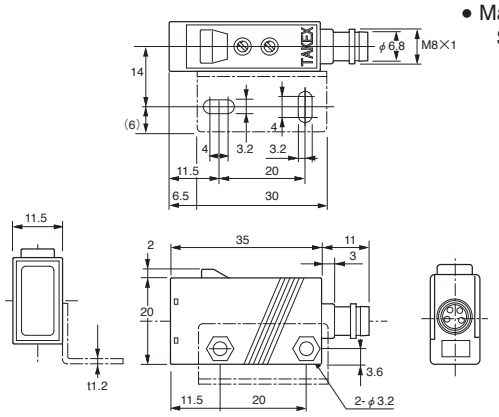
CAD



- Accessories
  Screw: 2
  Nut: 2
- Materials
  SUS

M8 connector type (-J type)

CAD

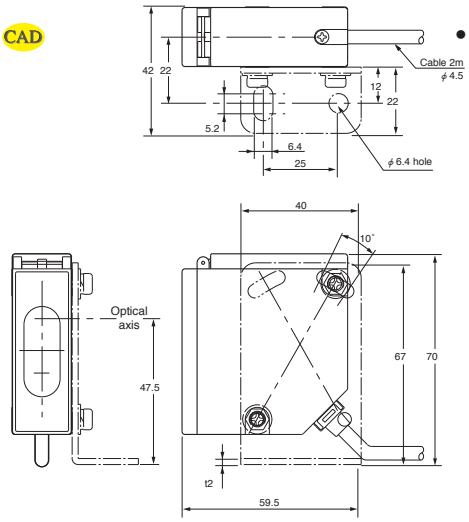


- Accessories
  Screw: 2
  Nut: 2
- Materials
  SUS

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

LD-S33R

CAD



With mounting bracket attached

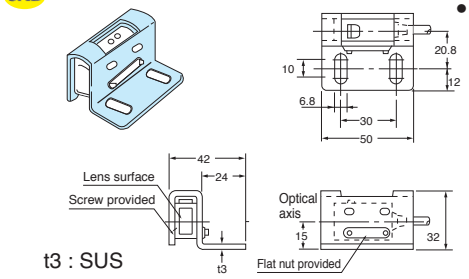
- Accessories
  Screw: 2
  Washer: 2
- Materials
  SUS

Dimensions (Optional parts) (in mm)

● Protective cover

G-MTB2

CAD



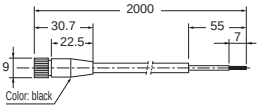
t3 : SUS

- Accessories
  Screw: 2
  Nut: 1
- Materials
  SUS

● Cable with M8 connector

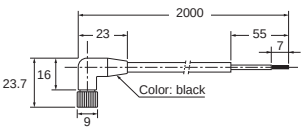
FBC-4R2S(straight)

CAD



FBC-4R2L(angled)

CAD



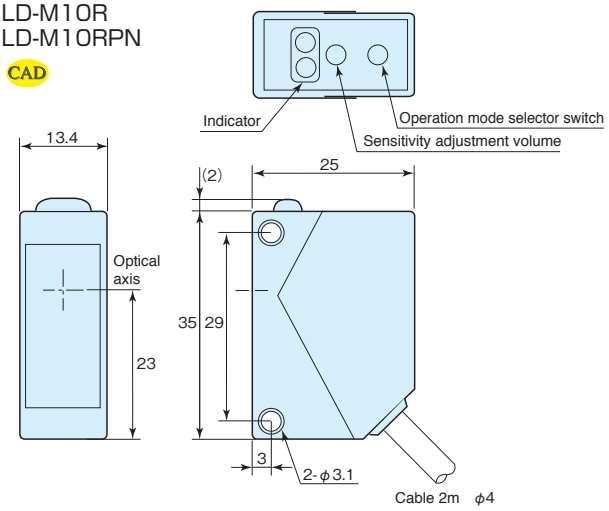
Outer diameter: 4, cable 0.2mm x 4 cores 2m
(sheath: black)

CAD To download CAD data including dimensions, please visit www.takex-elec.co.jp/index_e.html.

Dimensions (in mm)

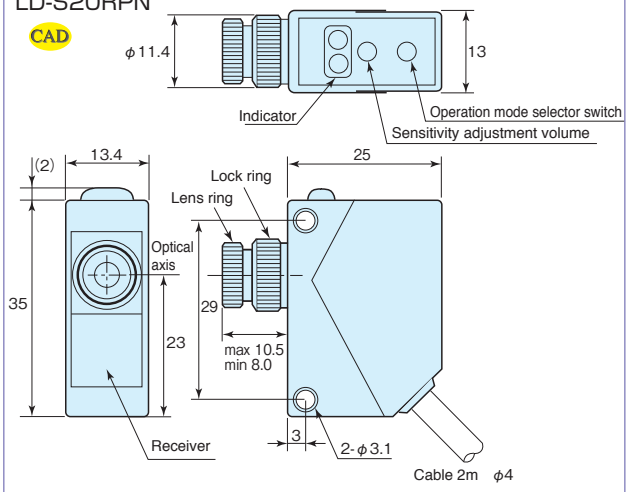
LD-M10R
LD-M10RPN

CAD

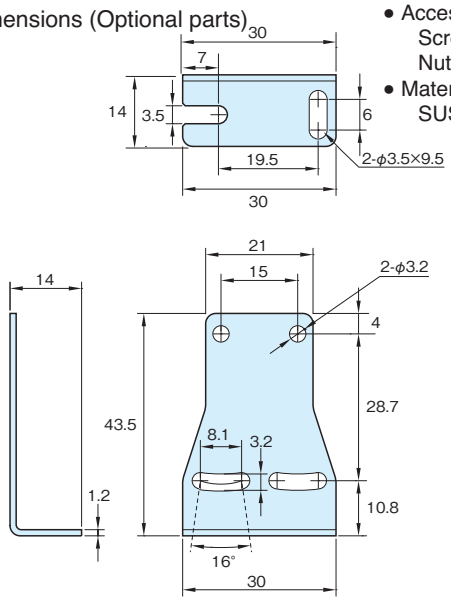


LD-S20R
LD-S20RPN

CAD

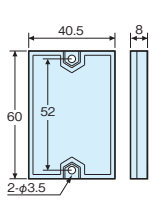
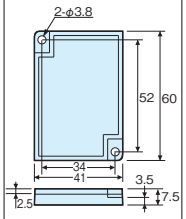
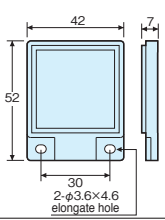
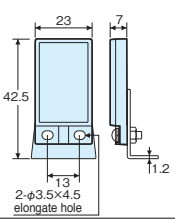
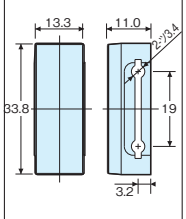
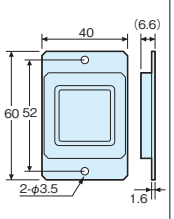


● Dimensions (Optional parts)



- 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

CAD To download CAD data including dimensions, please visit www.takex-elec.co.jp/index_e.html.