

# Laser Sensors

A laser light source is ideally suited for BGS sensing, it is also very good for transparent object detection. This type of sensor offers excellent repeat accuracy and performance.

D series	89
D2SA series	100
Z-L / BGS-ZL series	110



# Laser Sensor D series

## BGS-DL series

### Pushbutton teach type

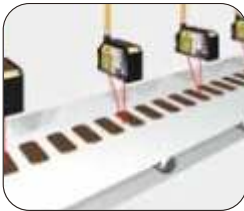
(Sensing distance : 40 - 100mm)  
· BGS-DL10TN / TP / TCN / TCP  
(Sensing distance : 100 - 250mm)  
· BGS-DL25TN / TP / TCN / TCP

### Manual adjust type

(Sensing distance : 40 - 100mm) (Sensing distance : 100 - 700mm)  
· BGS-DL10N / P / CN / CP · BGS-DL70N / P / CN / CP  
(Sensing distance : 100 - 300mm)  
· BGS-DL30N / P / CN / CP

Laser Sensor

## Applications



For thin workpieces on a fluttering conveyor. (BGS-DL10T)



Any transparent object, PET / Glass / Plastic. (DR-Q150)



Positioning for ink printer (DR-500)



Stable sensing of aluminum pouch (DR-500)

- **CMOS Image Sensor + Digital Monitor for easy setting.**
- **DR-Q series, transparent detection with AGC (Automatic Gain Control) function.**
- **BGS-DL series, the leading edge of BGS type sensors, the ultimate in Diffuse Reflective sensing.**
- **DT series, long distance Thru-beam sensor (max. 100 meters).**

## Product Types

Cable / QD	Output	BGS / Accurate type	
		Laser CMOS Teach-in	Potentiometer
Distance		40 - 100mm	
Cable	NPN	BGS-DL10TN	BGS-DL10N
	PNP	BGS-DL10TP	BGS-DL10P
M8-QD	NPN	BGS-DL10TCN	BGS-DL10CN
	PNP	BGS-DL10TCP	BGS-DL10CP

Cable / QD	Output	BGS / Longer distance		
		Laser CMOS Teach-in	Potentiometer	
Distance		100 - 250mm	100 - 300mm	100 - 700mm
Cable	NPN	BGS-DL25TN	BGS-DL30N	BGS-DL70N
	PNP	BGS-DL25TP	BGS-DL30P	BGS-DL70P
M8-QD	NPN	BGS-DL25TCN	BGS-DL30CN	BGS-DL70CN
	PNP	BGS-DL25TCP	BGS-DL30CP	BGS-DL70CP

Cable / QD	Output	Transparent type (with teach-in)	
		Filled bottle	Empty bottle
Distance		1.5 meter	4.0 meter
Cable	NPN	DR-Q150TN	DR-Q400TN
	PNP	DR-Q150TP	DR-Q400TP
M8-QD	NPN	DR-Q150TCN	DR-Q400TCN
	PNP	DR-Q150TCP	DR-Q400TCP

Cable / QD	Output	Thri-Beam type (with potentiometer)	
		40 meter	
Cable	NPN	DT-4000N	
	PNP	DT-4000P	
M8-QD	NPN	DT-4000CN	
	PNP	DT-4000CP	

Cable / QD	Output	Retro-reflective type (with potentiometer)	
		5 meter	
Cable	NPN	DR-500N	
	PNP	DR-500P	
M8-QD	NPN	DR-500CN	
	PNP	DR-500CP	

**DR-Q series**

**Transparent detection type**

(Sensing distance : 1.5m)  
 • DR-Q150TN / TP / TCN / TCP  
 (Sensing distance : 4m)  
 • DR-Q400TN / TP / TCN / TCP

**DT series**

**Thru-beam type**

(Sensing distance : 40m)  
 • DT-4000N / P / CN / CP

**DR series**

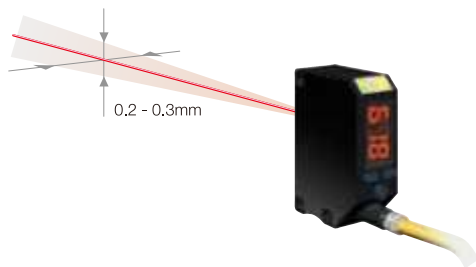
**Retro-reflective type**

(Sensing distance : 5m)  
 • DR-500N / P / CN / CP

**Features**

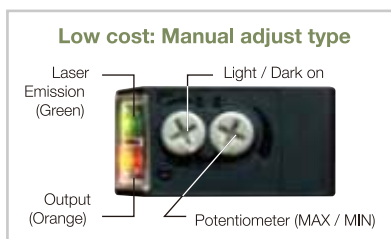
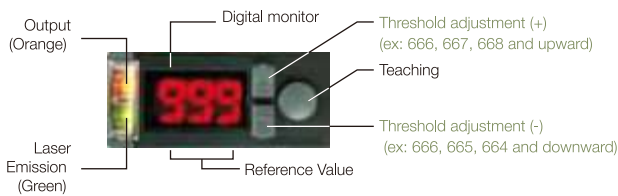
**Repeat Accuracy**

Very tight Repeat Accuracy, 0.2 - 0.3 mm for BGS type.  
 Even Thru-beam and Retro types have 0.3mm Repeat Accuracy (\*).  
 \* = Tested at the middle point of sensing range.



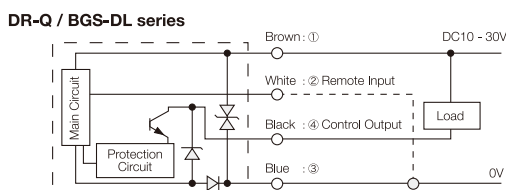
**Pushbutton Teach with Fine Adjustment**

In addition to a Teach button there are also two threshold adjustment buttons. Fine adjustments can be made to the threshold value after Teaching by using the adjustment buttons.

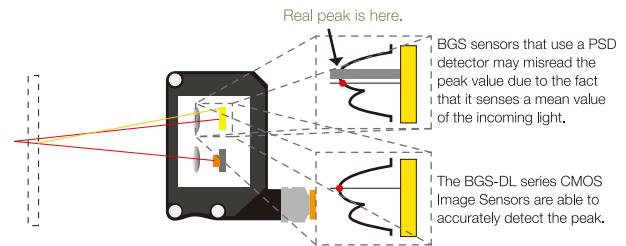


**Remote Input**

The DR-Q and BGS-DL sensors have a Remote Teach input that can be used to remotely set the sensor sensitivity.

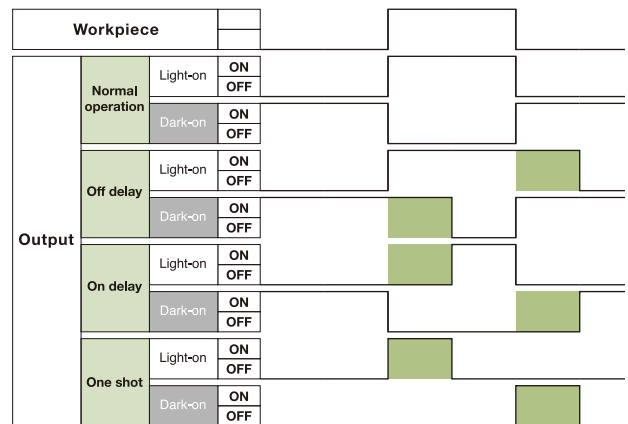


**CMOS Image Sensor**



**Timer functions**

The pushbutton teach models of the D series have built-in Timer functions for added flexibility.



Depends on set time of delay

Set time is referred as below ;

Time	ms					s				
	0	10	20	...	980	990	1	2	...	10
Display	0	1	2	...	98	99	01	02	...	10

- \* 1msec increment for 0-999 msec.
- \* Timer is not available for Manual adjust type sensors
- \* 1sec increment from 1sec to 10 sec.
- \* Dispersion always happens from zero up to +5msec.  
For instance your setting at "10msec" means setting between "10msec and 15msec".
- \* Therefore please make sure to select Normal Operation if you are not in need of timer function.

**Class 2/Class II IEC, FDA Regulation**

The D series conforms to Class 2 (IEC) and Class II (FDA) regulations.

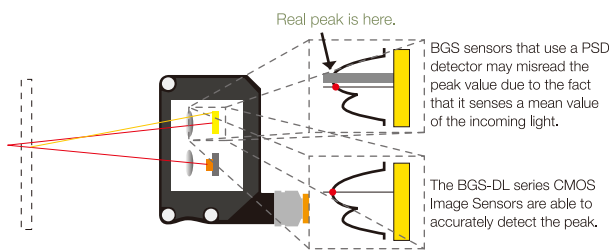


## The world's first Laser / BGS with CMOS Image Sensor BGS-DL series

BGS (Background Suppression) type sensors are the most accurate method of diffuse sensing, BGS sensors are able to detect objects without being influenced by either the background or the color of the workpiece. A conventional LED - BGS sensor is accurate, but a Laser CMOS - Laser BGS sensor is able to detect black and/or highly reflective surfaces reliably.

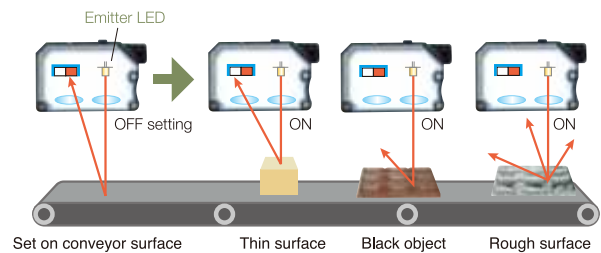
### Great combination ; Laser and CMOS Image Sensor shuts out environmental influence.

CMOS Image Sensor system can detect light quantity at each CMOS pixel under well controlled shutter speed, therefore it sharply detects the peak value in the viewfield of sensor while PSD detects mean value of peaks as shown below. Actually it means CMOS Image Sensor System is the ideal way for such objects having reflecting and/or rough surface.



### FGS Function, the best solution for fluttering conveyor.

The BGS-DL series BGS sensors also have a FGS function built-in. The FGS function monitors the surface of the conveyor, if the reflected light from the conveyor is interrupted by the workpiece the output is activated. The FGS sensor is similar to a retro-reflective sensor but it operates in a diffuse mode. Therefore the FGS sensor is best for detecting black, reflective, thin, or rough surfaces moving on a conveyor.



## Specifications

Model	Laser CMOS BGS (Teach-in type)		Manual adjust Potentiometer type		
	Accurate type	Long distance type	Accurate type	Long distance type	
Type	Accurate type	Long distance type	Accurate type	Long distance type	
Cable type	BGS-DL10TN (or DL10TP)	BGS-DL25TN (or DL25TP)	BGS-DL10N (or DL10P)	BGS-DL30N (or DL30P)	BGS-DL70N (or DL70P)
M8 connector type	BGS-DL10TCN (or DL10TCP)	BGS-DL25TCN (or DL25TCP)	BGS-DL10CN (or DL10CP)	BGS-DL30CN (or DL30CP)	BGS-DL70CN (or DL70CP)
Sensing distance	40-100mm	100-250mm	40-100mm	100-300mm	100-700mm
Spot size	φ1mm / 80mm	φ2mm / 200mm	φ3mm / 80mm	φ6mm / 200mm	
Sensitivity adjustment	Push button Teach with fine adjust buttons		4-turn potentiometer		
Hysteresis	3% / 80mm	10% / 200mm	5% / 80mm	5% / 200mm	5% / 300mm
Supply voltage	DC10-30V including 10% ripple (P-P)				
Power consumption	50mA max (12V), 35mA max (24V)		35mA		
Response time	1.5msec Max(fixed sensitivity)		0.7msec		
Timer	Off delay/On delay/One shot delay (1msec increment : 0-999msec, 1sec increment for 1-10 sec)		N/A		
External input	Remote Teach / Laser OFF selectable		N/A		
Light source	Red Laser Diode 650nm, Max 1mW 300s, Class 2		Red Laser Diode 650nm, Max 2mW 6s, Class 2 (Max 3mW for BGS-DL70)		
LED Indicator	Output indicator (orange), Laser emission (green)				
Digital indicator	7 segment, 3 digit Red LED		N/A		
Control output	NPN or PNP open collector DC30V 100mA max				
Operating mode	Light/Dark On selectable				
Operating temp / humidity	-10 to 50 °C / 35-85% RH				
Insulation resistance	20M Ohm or more (at 500V DC)				
Protection category	IP67				
Conformity	IEC, CE				
Shock resistance	50G (500m/S <sup>2</sup> ), XYZ 3 directions				
Environmental illuminance	Sunlight : 10,000 lux, Incandescent lamp : 3,000 lux max				
Materials	Anti-bacterial ABS (housing), PMMA (lens)				

\*1 Sensing distance with 100mm X 100mm gray 18% paper.

\*2 Details of hysteresis by color/distance shall be referred in technical chart provided in this catalogue.

## Transparent Detection with Laser Light Source is the best solution for Glass/PET DR-Q series

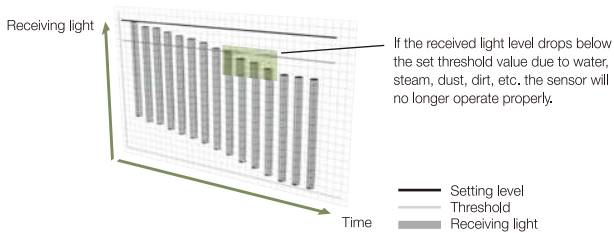
The DR-Q Series offers superior performance in Transparent Object detection. With a 0.7 msec. response time it is ideal for use in high speed bottling applications. Accurate detection is assured by the use of a Coaxial light source. The AGC (Automatic Gain Control) circuit will automatically compensate for changes in the incoming light level (due to dust/dirt etc.) by adjusting the threshold setting.



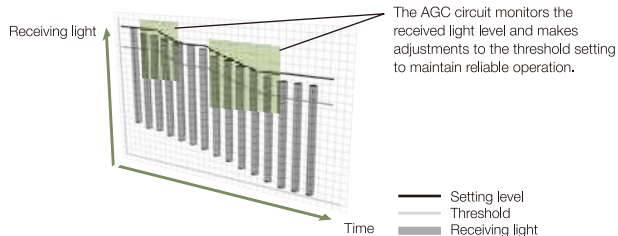
Coaxial Laser

AGC (Automatic Gain Control) circuit monitors the incoming light level to maintain reliable operation even in dusty / dirty conditions.

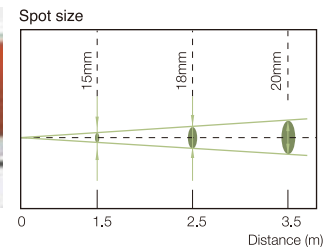
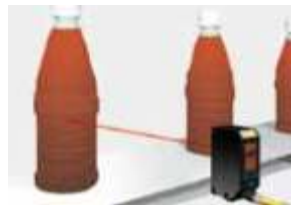
### Conventional Retro Reflection sensor



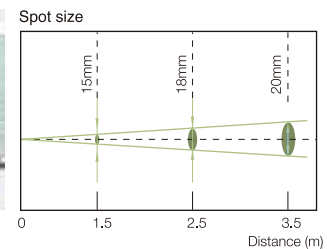
### DR-Q series



### DR-Q150T



### DR-Q400T



## Specifications

Model	Transparent type	
Type	Accurate type : For filled bottle	Long distance type
Cable type	DR-Q150TN (or Q150TP)	DR-Q400TN (or Q400TP)
M8 connector type	DR-Q150TCN (or Q150TCP)	DR-Q400TCN (or Q400TCP)
Sensing distance	1.5 meter	4 meter
Spot size	15mm / 1.5 meter	20mm / 3.5 meter
Sensitivity adjustment	Pushbutton teach with fine adjustment button	
Supply voltage	DC10-30V including 10% ripple (P-P)	
Power consumption	35mA	
Response time	0.7 msec	
Timer	Off delay/On delay/One shot delay (1msec increment : 0-999msec, 1sec increment for 1-10 sec)	
Light source	Red Laser Diode 650nm, Max 2mW 4μs, Class 2	
LED Indicator	Output indicator (orange), Laser emission (green)	
Digital indicator	7 segment, 3 digit Red LED	
Control output	NPN or PNP open collector DC30V 100mA max	
Operating mode	Light/Dark On selectable	
Operating temp / humidity	-10 to 50 °C / 35-95% RH	
Insulation resistance	20M Ohm or more (at 500V DC)	
Protection category	IP67	
Conformity	IEC, CE	
Shock resistance	50G (500m/S <sup>2</sup> ) , XYZ 3 directions	
Environmental illuminance	Sunlight : 10,000 lux, Incandescent lamp : 3,000 lux max	
Materials	Anti-bacterial ABS (housing), PMMA (lens)	

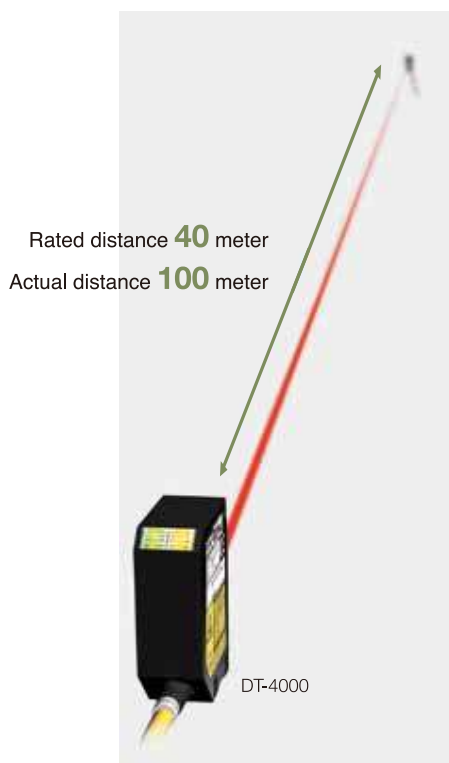
\*1 Sensing distance taken with P250F reflector

**The most powerful Thru-beam and Retro-reflective type sensors available with a Laser Light Source.  
DT series (Laser thru-beam) / DR series (Laser retro-reflective)**

The D Series Laser Sensors offer a long sensing distance in conventional Thru-beam and Retro-reflective sensors. The Co-axial Laser light source gives extremely tight alignment to the target. Alignment of the sensor is easy thanks to the bright projected laser spot. The DT Series Thru-beam detects at 100 meters distance while the actual Margin Spec is set at 40 meters.

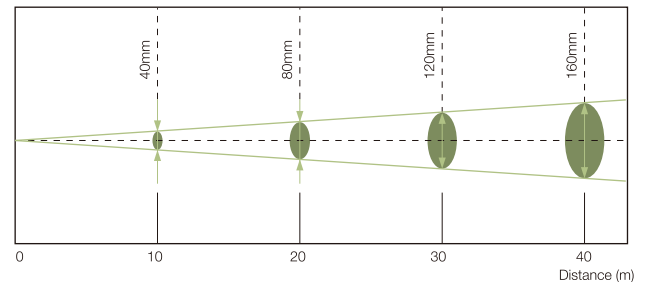


Coaxial Laser



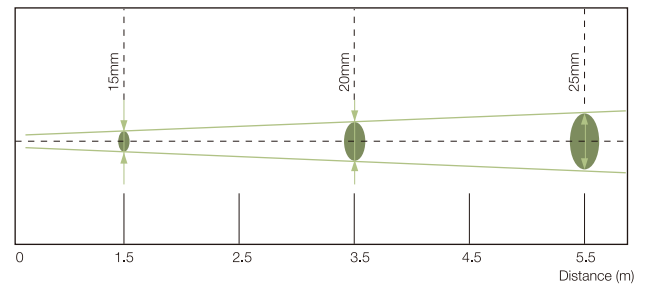
**DT-4000**

Spot size



**DR-500**

Spot size



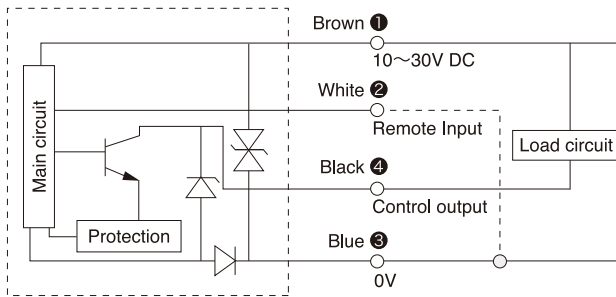
**Specifications**

Model	Potentiometer adjustment type	
Type	Thru-Beam	Retro reflective
Cable type	DT-4000N (or 4000P)	DR-500N (or 500P)
M8 connector type	DT-4000CN (or 4000CP)	DR-500CN (or 500CP)
Sensing distance	40 meter	5 meter
Spot size	15mm/5 meter	20mm/3.5 meter
Sensitivity adjustment	1-turn potentiometer	
Supply voltage	DC10-30V including 10% ripple (P-P)	
Power consumption	40mA	30 mA
Response time	0.5msec	
Light source	Red Laser Diode 650nm, Max 2mW 4s, Class 2	
LED Indicator	Output indicator (orange), Laser emission (green)	
Digital indicator	N/A	
Control output	NPN or PNP open collector DC30V 100mA max	
Operating mode	Light/Dark On switchable	
Operating temp / humidity	-10 to 50 °C / 35-95% RH	
Insulation resistance	20M Ohm or more (at 500V DC)	
Protection category	IP67	
Conformity	IEC, CE	
Shock resistance	50G (500m/S <sup>2</sup> ) , XYZ 3 directions	
Environmental illuminance	Sunlight : 10,000 lux, Incandescent lamp : 3,000 lux max	
Materials	Anti-bacterial ABS (housing), PMMA (lens)	

\*1 Sensing distance taken with P250F reflector

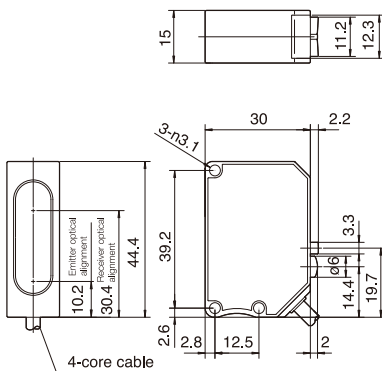
## Circuit diagram

### DR-Q / BGS-DL series

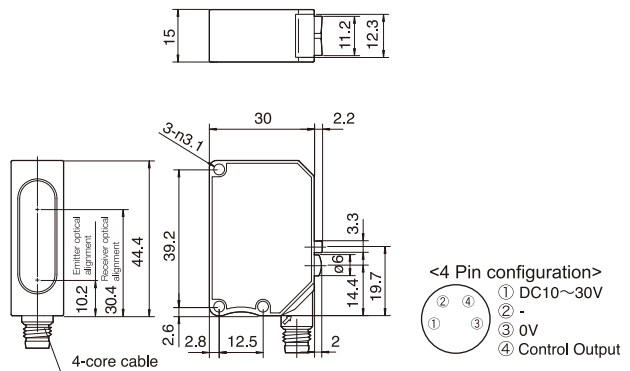


## Dimensions

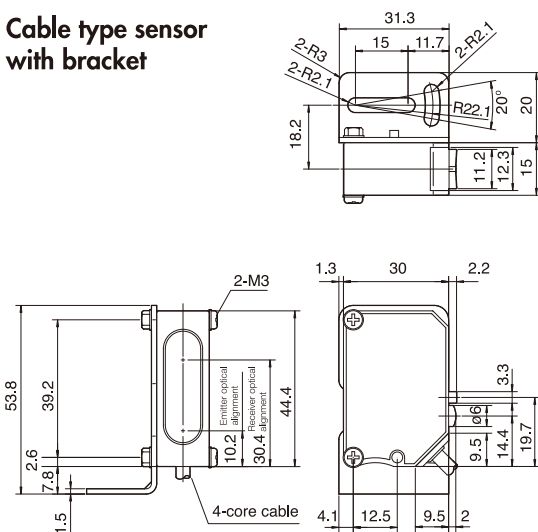
### Cable type sensor



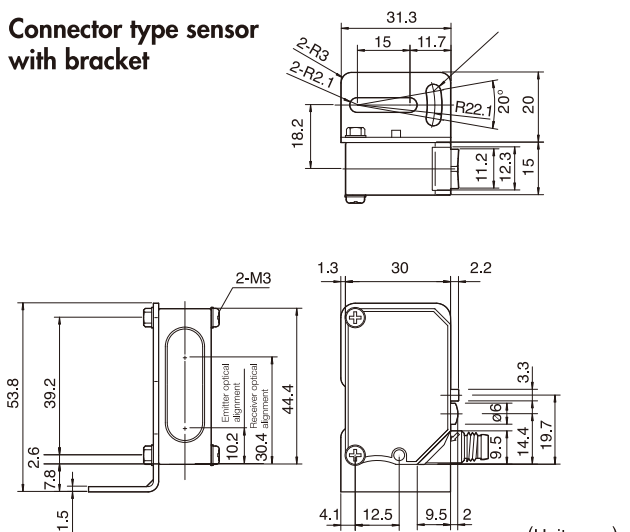
### Connector type sensor



### Cable type sensor with bracket



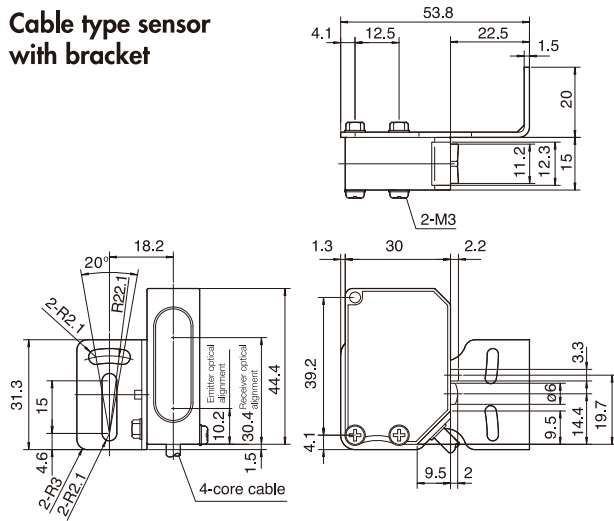
### Connector type sensor with bracket



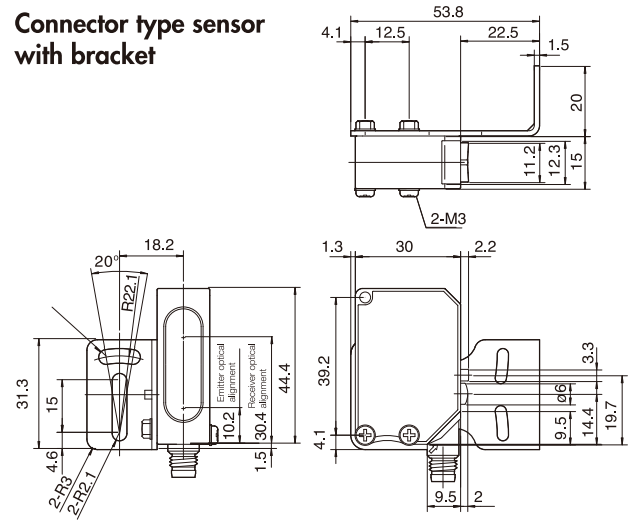
(Unit : mm)



**Cable type sensor with bracket**

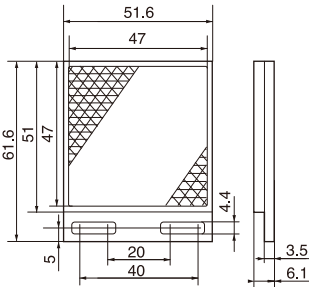


**Connector type sensor with bracket**

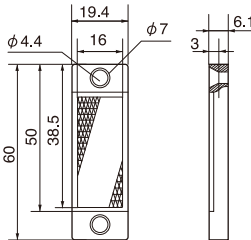


**Reflectors**

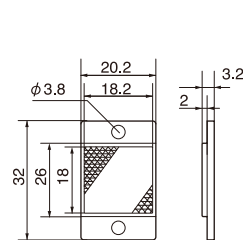
**P250F**



**PL20F**



**PL10F**

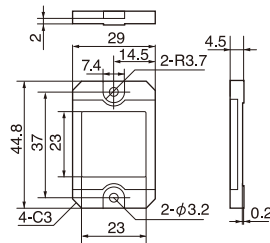


**Sensing distance by reflectors**

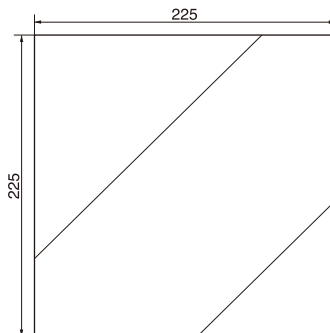
	P250F	PL20F	PL10F
DR-Q400T	4.0	2.8	1.0
DR-Q150T	1.5	1.0	0.5
DR-500	5.0	3.5	1.2

(Unit : meter)

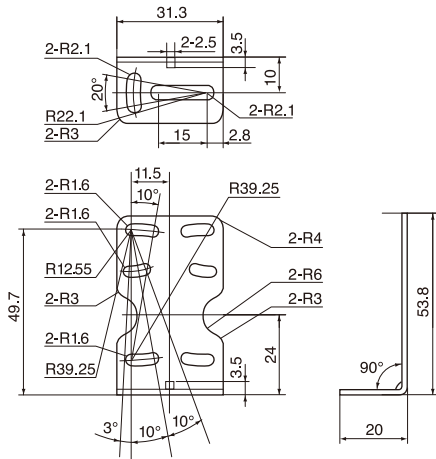
**MP45**



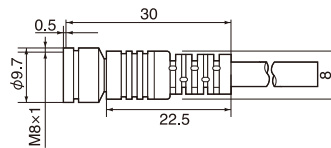
**MP225**



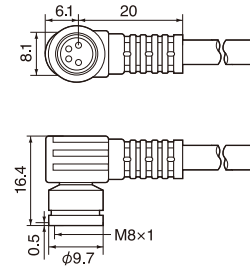
**Mounting Bracket**



**JCN-S : M8 Straight type**



**JCN-L : M8 L-shape type**



**Options**

**P250F : Standard reflector**



61.6 x 51.6 mm  
Standard accessory for any D series Retro type

**PL20F : Small reflector**



60 x 19.4 mm  
For space saving

**PL10F : Miniature reflector**



32 x 20.2 mm  
For limited space

**MP45 : Fine Positioning reflector**



44.8 x 29mm  
Fine pixels of surface.  
Ideal for use of fine positioning.

**MP225 : Large reflector**



225 x 225mm  
Free-cut reflector sheet of MP45 material.

**JCN-S : M8 Straight type**



JCN-S : 2 meter  
JCN-5S : 5 meter  
JCN-10S : 10 meter

**JCN-L : M8 L-shape type**

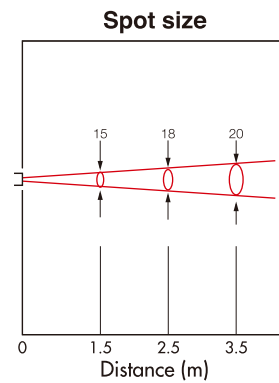
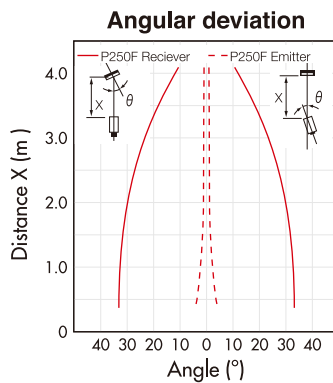
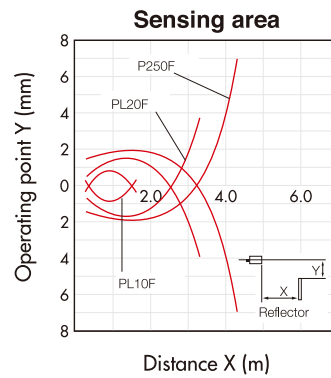
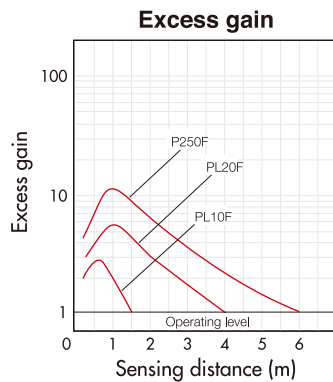
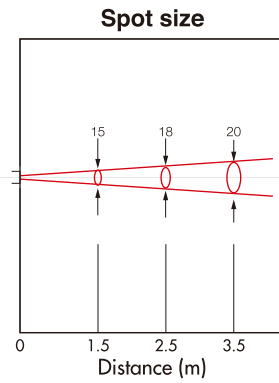
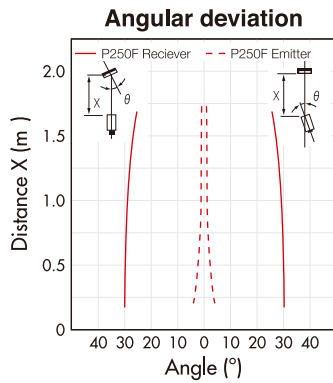
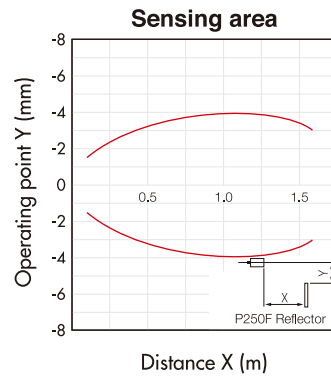
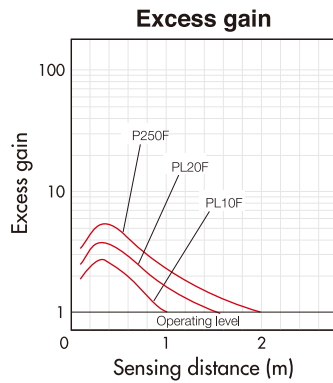


JCN-L : 2 meter  
JCN-5L : 5 meter  
JCN-10L : 10 meter

Reference (typical)

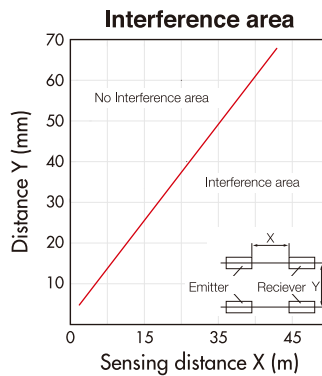
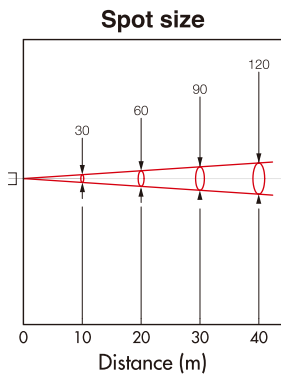
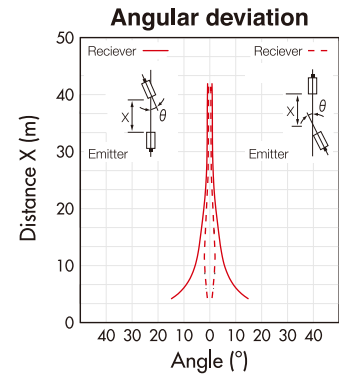
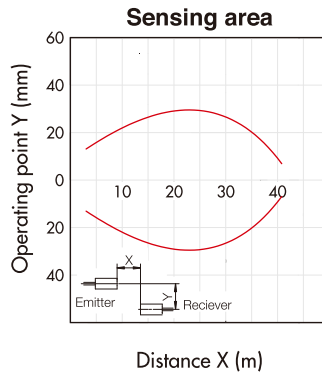
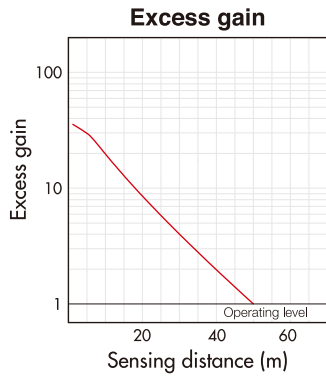
DR-Q150TN  
DR-Q150TCN

DR-Q400TN  
DR-Q400TCN

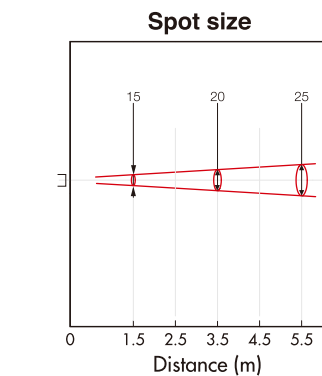
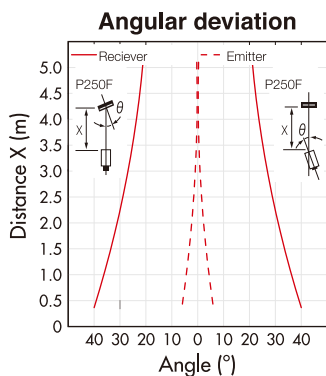
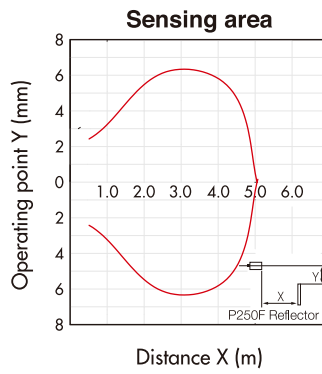
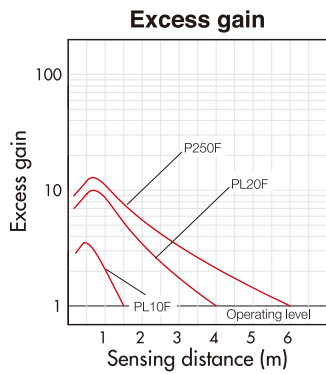


**Reference (typical)**

DT-4000N  
DT-4000CN

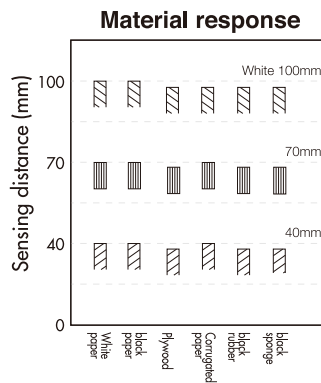
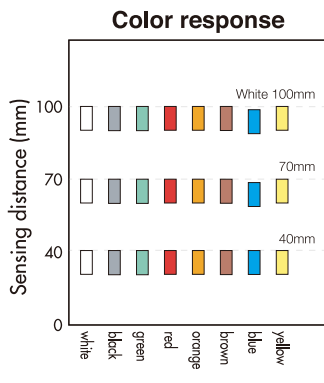
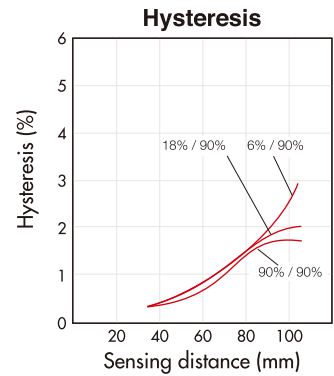
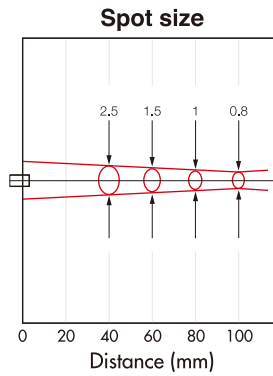
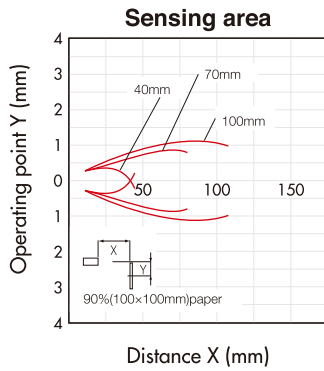


DR-500N  
DR-500CN

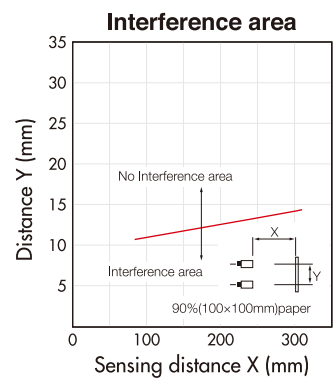
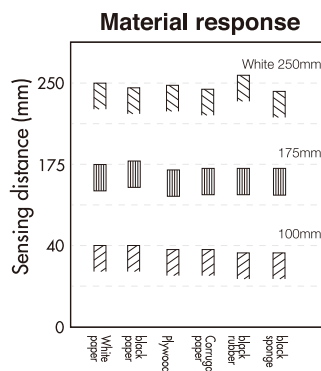
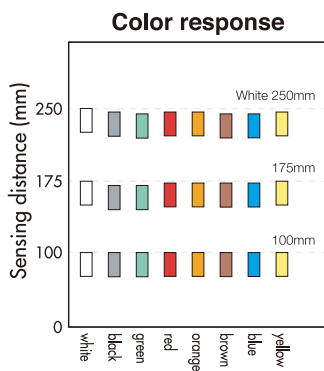
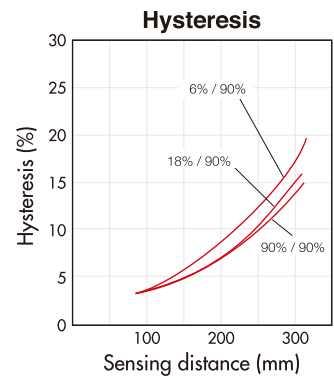
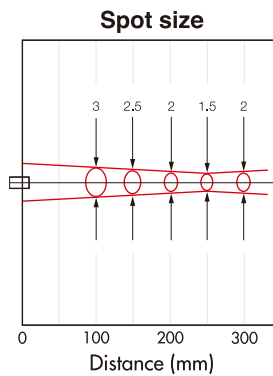
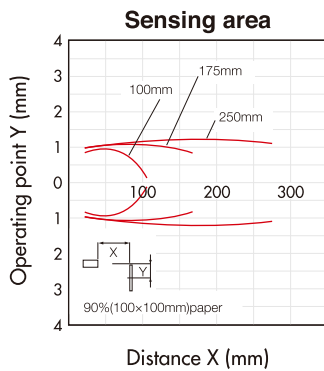


**Reference (typical)**

BGS-DL10TN  
BGS-DL10TCN



BGS-DL25TN  
BGS-DL25TCN



# Laser Sensor D2SA series



## Sensor head Retro reflective type

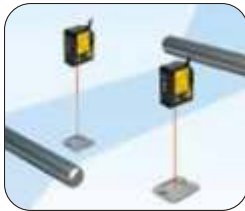
(Sensing distance : 2-8m) (Sensing distance : 0.1-50m)  
 · DSR-800 · DSR-5000

## Diffuse reflective type

(Sensing distance : 0.25-1m)  
 · DSD-100

→  
Next page

## Applications



Edge guiding of Transparent film



Sensing transparent bags



Checking for the presence of threads



Locating a small IC chip held by a vacuum pickup

- **Digital Amplifier with Modular Laser Optics. Two independent outputs, high speed response up to 60μsec.**
- **Max. 70 meter sensing distance with coaxial beam light source. (Retro-reflective Type)**

## Sensor head

Type	Model	Mode	Sensing Distance
Retro Reflective	DSR-800 (Reflector MP45)	Long	8 meter (*1)
		Standard	5 meter
		Fast	2 meter
	DSR-5000 (Reflector P250F) (*2)	Long	0.5 - 50 meter
		Standard	0.3 - 35 meter
		Fast	0.1 - 20 meter
Diffuse Reflective	DSD-100	Long	1.0 meter
		Standard	0.7 meter
		Fast	0.25 meter
Thru-beam Cable type	DSTC-200	Standard	2 meter
	DSTA-200	Standard	2 meter
		Measurement	0.5 meter
Thru-beam M8 QD type	DSTA-200-M8	Standard	2 meter
		Standard	2 meter
		Measurement	0.5 meter

## Amplifier

Type	Mode	Specifications
Stand Alone Type	D2SA-MNS	2CH with Analogue, NPN
	D2SA-MPS	2CH with Analogue, PNP
	D2SA-MN3S	1CH, NPN
	D2SA-MP3S	1CH, PNP
	D2SA-MNS-M8	1CH, NPN, M8-QD
	D2SA-MPS-M8	1CH, PNP, M8-QD
Interconnect Type Master Units	D2SA-MN	2CH with Analogue, NPN
	D2SA-MP	2CH with Analogue, PNP
	D2SA-MN3	1CH, NPN
	D2SA-MP3	1CH, PNP
	D2SA-MN-M8	1CH, NPN, M8-QD
	D2SA-MP-M8	1CH, PNP, M8-QD
Interconnect Type Slave Units	D2SA-SN	2CH with Analogue, NPN
	D2SA-SP	2CH with Analogue, PNP
	D2SA-SN1	1CH, NPN
	D2SA-SP1	1CH, PNP
	D2SA-SN-M8	1CH, NPN, M8-QD
	D2SA-SP-M8	1CH, PNP, M8-QD

\*1 Lens attachment BL-W130L-1 will change the sensing distance of DSR-800 head as follows ;  
 Line Beam : Long mode / 2m, Standard/1.5m, Fast / 1m  
 Area Beam : Long mode / 1.5m, Standard / 1m, Fast / 0.6m

\*2 The MP-45 reflector is used when the sensing distance will be less than 10 meters.  
 MP45 : Long mode / 0.5 - 20m, Standard / 0.3 - 10m, Fast / 0.1 - 5m

\*3 The sensing distance of the DSD-100 is defined with a 200 x 200 mm white paper target.

\*4 Fast Mode is not available when using the "DSTA" sensing heads in Measurement Mode.  
 Measurement Mode is only possible when using the 2CH type amplifiers.

**Thru-beam type**

(Sensing distance : 2m) (Sensing distance : 0.5 - 2m)  
 · DSTC-200 / - M8    · DSTA-200 / - M8

**Amplifier**

**Stand alone type**

· DSA-MNS / MN3S / MNS-M8  
 · DSA-MPS / MP3S / MPS-M8

**Interconnect type Master units**

· D2SA-MN / MN3 / MN-M8  
 · D2SA -MP / MP3 / MP-M8

## Amplifier

**The Interconnect Type Amplifiers (Master: D2SA-M, Slave: D2SA-S) can be connected in parallel to provide Cross-talk prevention as well as to transfer settings.**

**It is possible to connect a maximum of 30 amplifiers together. (12VDC @ 40°C ambient or less)**

### 2 Amplifier Types (Standalone & Interconnect)

The Interconnect Type amplifiers are convenient when using multiple D2SA amplifiers in parallel. 8 amplifiers can be connected together if the ambient temperature does not exceed 50°C. A maximum of 30 amplifiers can be connected together, the surrounding temperature must be 40°C or less.



Stand Alone type

Interconnect type

Cross-talk prevention for up to 4 amplifiers.

The Interconnect Type amplifiers automatically provide Cross-talk prevention for up to 4 amplifiers. The D2SA series amplifiers can be connected to Optex-FA's D2RF series fiber optic amplifiers.

### Programmable external input

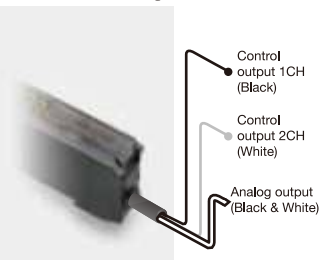
The External input can be programmed to operate in one of the following modes.

- Remote teach
- Synchronizing signal input
- Laser OFF
- Counter reset



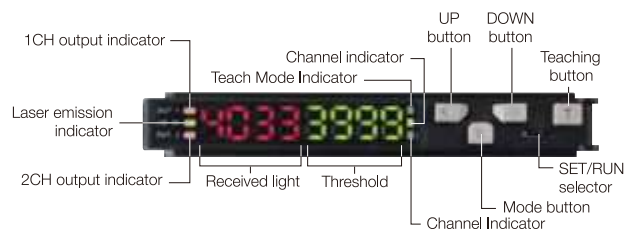
### 2 Independent outputs & Analog

2CH models have two digital outputs for control and/or alarm, there is also a 4~20 mA analog output. The external input can be configured to operate as needed.



### Dual Digital Display

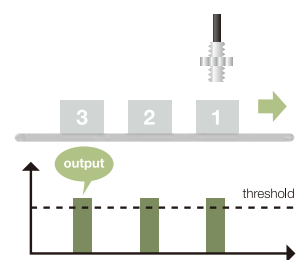
The Threshold value and the Reflected Light level are both indicated at the same time, setting the sensitivity is easy.



### Counter Mode

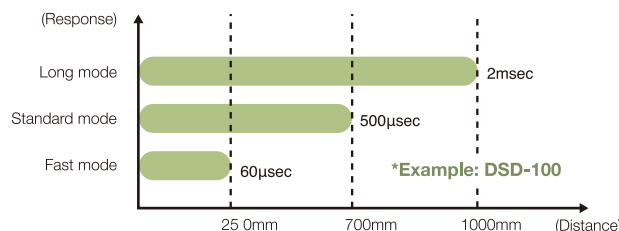
The output turns ON when the count value reaches the preset number.

The preset number can be reset by remote teach.



### Response Time

Select the sensing distance and response time based upon your application.



### e-con, the easy connection

Just snap-in the e-con to connect to amplifiers. All the sensor heads are connectable to any amplifier with the preset e-con mechanics.



### IP67 water tightness

All the DS Series sensor heads secures IP67 Water tightness with its rugged housing.



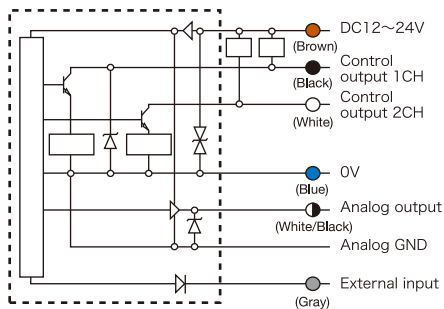
**Interconnect type Slave units**

- D2SA-SN / SN1 / SN-M8
- D2SA-SP / SP1 / SP-M8

**Wiring Diagram : (N = NPN, P=PNP)**

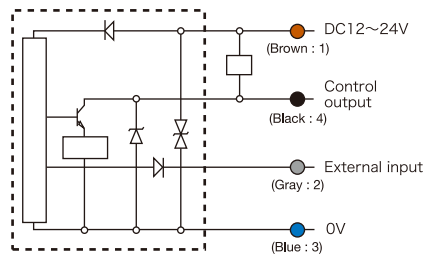
**2CH output types**

D2SA-MN(P)S / D2SA-MN(P) / D2SA-SN(P)



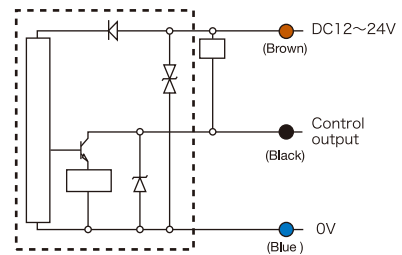
**1CH, M8-QD types**

D2SA-MN(P)S-M8, D2SA-MN(P)-M8



**1CH types**

D2SA-MN(P)3S / D2SA-MN(P)3 / D2SA-SN(P)1



\*1 Slave Unit "D2SA-S???" is powered by Master unit, so power lines are not available.

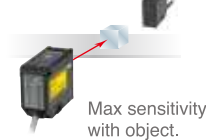
**A choice of 6 convenient Teach functions to solve any application.**

**Single Point Teach**

**Diffuse Reflective**



**Retro/Thru-beam**



Use this teaching mode when no target is present. Set the threshold so the sensor does not detect the background.

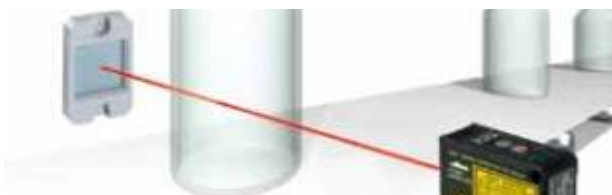
**Two Point Teach**

**Diffuse Reflective**



This is the basic setting method for the DSD-100 Diffuse Reflective type sensor. First teach with the target present and then teach the background. The threshold is then set between the target value and the background.

**Transparent Object Teach**



This mode is only for the DSR-800 Retro-Reflective sensor. Teach without the target present so that the sensor is set to the maximum sensitivity, the DSR-800 is able to easily detect transparent film, bottles, glass, etc.

**Automatic Teach**



In this mode there is no reason to stop the conveyor. It is possible to teach the sensor while the product is running.

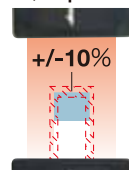
**Zone Teach**



Select the detection area. Use the Up / Down buttons to set the area within +/- 10%. After teaching this area can be increased or decreased by adjusting the settings.

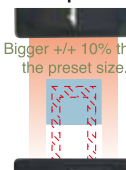
**Judgement Teach**

**OK (Output OFF)**



**Output 1**

Bigger +/- 10% than the preset size.



**Output 2**

Smaller +/- 10% than the preset size.



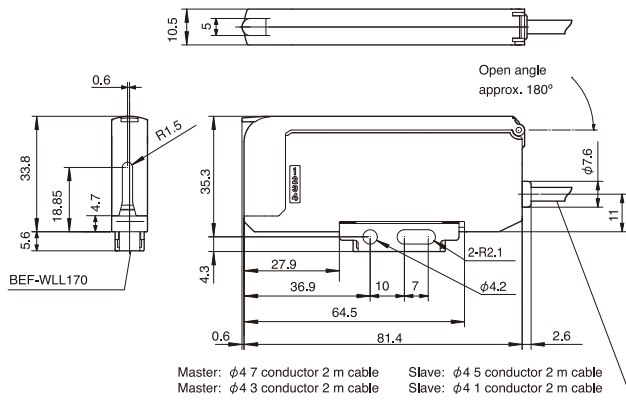
This function is exclusive to the DSTA-200 wide beam measurement sensing heads. Used to judge the size and width of a target within +/- 10% of the specified size. Even if the object position changes the sensor will detect it, so this is actually Area Teach.



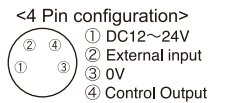
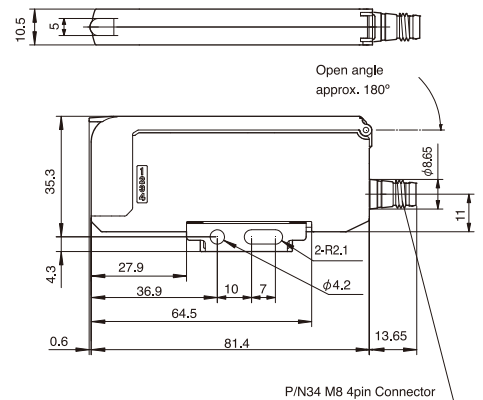
## Amplifier Dimensions

### Stand-alone type

#### Cable type

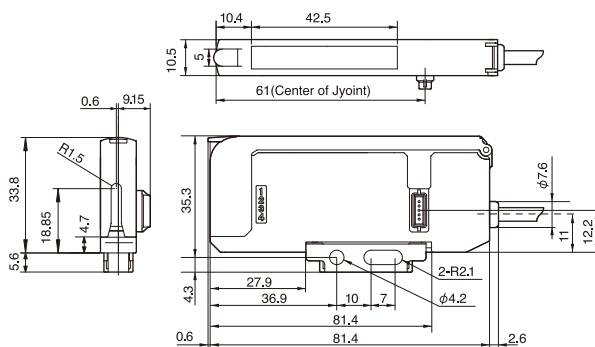


#### M8-QD type



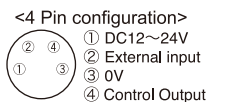
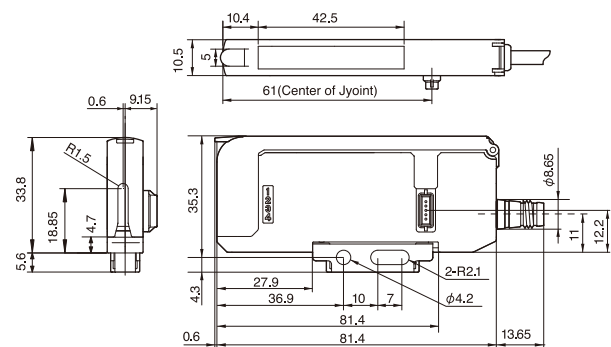
### Interconnection type

#### Cable type



### Slave unit

#### M8-QD type



(Unit : mm)

## Specifications

### 1CH Output Type Specifications

Model		Stand-alone type	Interconnect type	
			Master Unit	Slave Unit
Cable type	NPN	D2SA-MN3S	D2SA-MN3	D2SA-SN1
	PNP	D2SA-MP3S	D2SA-MP3	D2SA-SP1
M8 Connector type	NPN	D2SA-MNS-M8	D2SA-MN-M8	D2SA-SN-M8
	PNP	D2SA-MPS-M8	D2SA-MP-M8	D2SA-SP-M8
Response time	60μ /500μ /2msec (Fast/Standard/Long) selectable			
External input	External Input (*1) : Select one among (1) teach (2) Synchronizing (3) Laser OFF, or (4) Reset Counter (This function is available only with M8-QD type except Slave unit of M8-DQ Type)			
Control output	NPN or PNP Open collector, 100mA Max, residual voltage 1.8V Max			
Analogue output	N/A			
Timer	On delay / Off delay / One Shot / No delay, 1msec to 9s (1ms increment)			
Operating mode	Light ON / Dark ON selectable			
Crosstalk prevention	4pcs Max.			
Sensitivity adjustment	Teach-in (manual adjustment is possible)			
LED Indicator	Green (laser power), Orange (output), Red (teaching), Green (active CH)			
Digital display	8 digits (7 segments)			
Power consumption	45mA Max, 24V DC			
Supply voltage	12 - 24V DC +/- 10%, ripple 10%			
Operating temp / humidity (*3)	-25 to 55 °C (-13 to 131 °F) / 35 to 85% RH (no freezing)			
Storage temp / humidity	-40 to 70 °C (-40 to 158 °F) / 35 to 85% RH (no condensation)			
Shock resistance	50G (500m/s <sup>2</sup> ) , XYZ 3-ways			
Protection category	IEC IP50			
Materials	PC			

### 2CH Output Type Specifications

Model		Stand-alone type	Interconnect type	
			Master Unit	Slave Unit
Cable type	NPN	D2SA-MNS	D2SA-MN	D2SA-SN
	PNP	D2SA-MPS	D2SA-MP	D2SA-SP
M8 Connector type	NPN	-	-	-
	PNP	-	-	-
Response time	60μ /500μ /2msec (Fast/Standard/Long) selectable			
External input	External Input (*1) : Select one among (1) teach (2) Synchronizing (3) Laser OFF, or (4) Reset Counter Control Output : 2CH, used as Control Output or Alarm output			
Control output	NPN or PNP Open collector, 100mA Max, residual voltage 1.8V Max			
Analogue output	4-20mA (*2)			
Timer	On delay / Off delay / One Shot / No delay, 1msec to 9s (1ms increment)			
Operating mode	Light ON / Dark ON selectable			
Crosstalk prevention	4pcs Max.			
Sensitivity adjustment	Teach-in (manual adjustment is possible)			
LED Indicator	Green (laser power), Orange (output), Red (teaching), Green (active CH)			
Digital display	8 digits (7 segments)			
Power consumption	45mA Max, 24V DC			
Supply voltage	12 - 24V DC +/- 10%, ripple 10%			
Operating temp / humidity (*3)	-25 to 55 °C (-13 to 131 °F) / 35 to 85% RH (no freezing)			
Storage temp / humidity	-40 to 70 °C (-40 to 158 °F) / 35 to 85% RH (no condensation)			
Shock resistance	50G (500m/s <sup>2</sup> ) , XYZ 3-ways			
Protection category	IEC IP50			
Materials	PC			

\* 1 The teach mode preset at amplifier will be done with External Teach

\* 2 Load impedance 300Ω Max

\* 3 Up to 3pcs of interconnection. Up to 30 pcs with 40 °C (104 °F) surroundings operated in 12V DC.

## Options

JCN-S : M8 Straight type



JCN-S : 2 meter  
JCN-5S : 5 meter  
JCN-10S : 10 meter

JCN-L : M8 L-shape type



JCN-L : 2 meter  
JCN-5L : 5 meter  
JCN-10L : 10 meter

BEF-EB01-W190 : Fixture terminal



## Laser Head Lineup (IP67 protection. Visible red laser for easy alignment)

### Retro Reflective Type

The DSR-800 projects a very small Spot beam that is only 2 mm in diameter. There is an optional lens attachment (BL-W130L-1) that can be used to change the projected beam into a 40 mm wide line or a large circular beam.

The DSR-5000 has a maximum sensing distance of 70 meters in the Long Distance mode. The sensing distance is determined by the Response time that has been selected. The DSR-800 is able to detect Glass and/or PET bottles up to a maximum distance of 8 meters. Both types will project a 2 mm diameter Spot beam at 2 meters.



### DSR-800 : Three types of projected beams are possible.

The DSR-800 will reliably detect clear glass and/or PET bottles. The 2 mm diameter projected beam combined with the "Glass Teach" function insure that the detection of clear materials is easy to setup.



The projected beam of the DSR-800 can be changed to a Wide Line beam (40 x 1 mm), or Circular Area beam (35 x 35 mm) by using the optional lens attachment BL-W130L-1.



### DSR-5000 : Max 70 meter of sensing distance (Long Mode with Sensitivity Compensation ON)

When used with the P250F reflector a 70 meter distance is possible.



## Diffuse Reflective Type

The DSD-100 has a maximum sensing distance of 1.5 meters in the Long mode. The co-axial beam provides accurate sensing regardless of the orientation of the workpiece.

With a 1 mm projected beam at 1 meter distance, it is possible to detect the target through a small opening.



### DSD-100 : Diffuse Reflective sensor with 1.5 meter sensing distance.

In the Long mode with Sensitivity Compensation ON, a 1.5 meter sensing distance is possible. Ideal for positioning applications due to the coaxial optics and 1 mm projected beam.



Coaxial beam



## Thru-beam type

There are two models, the DSTC-200 (2 mm spot) or the DSTA-200 (30 x 2.5 mm line array). The DSTA-200 is a Measurement type sensor with a 30 mm wide beam. The 4 to 20 mA analog output can be used for measuring the size of objects. M8 QD connector models are available for easy maintenance.

The DSL-8L04-2-130 connecting cable is required for use with the M8 types.



DSL-8L04-2-130, M8 QD cable for sensor head DSTA(C)-200-M8

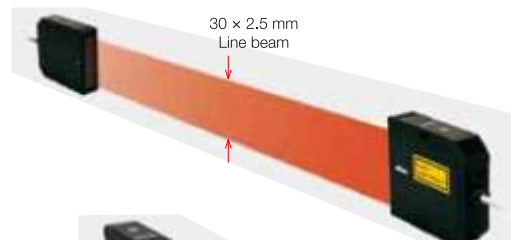


DSTA-200, Line beam, 30 x 2.5 mm width at 50 cm distance.

DSTC-200, Standard Thru-beam, 2 mm spot size at 2 meter distance.

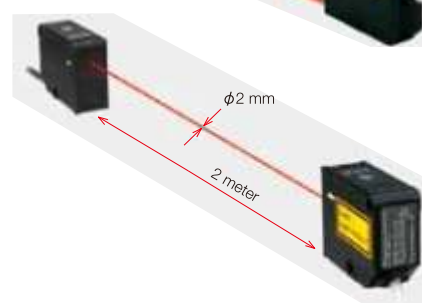
### DSTA-200 : 30mm width Line Beam for sorting application with 4-20mA output.

Ideal for sorting by width and size of objects. Measurement Mode will give analogue signal for use in the range of 0.5 meter.



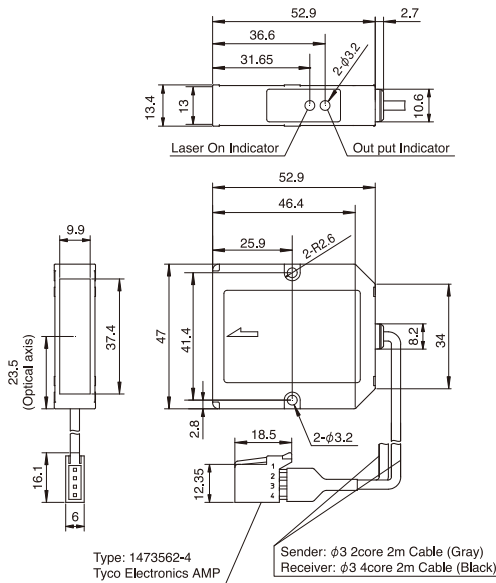
### DSTC-200 : 2mm sharp and small spot

At the rated distance of 2 meters the projected beam is only 2 mm in diameter.

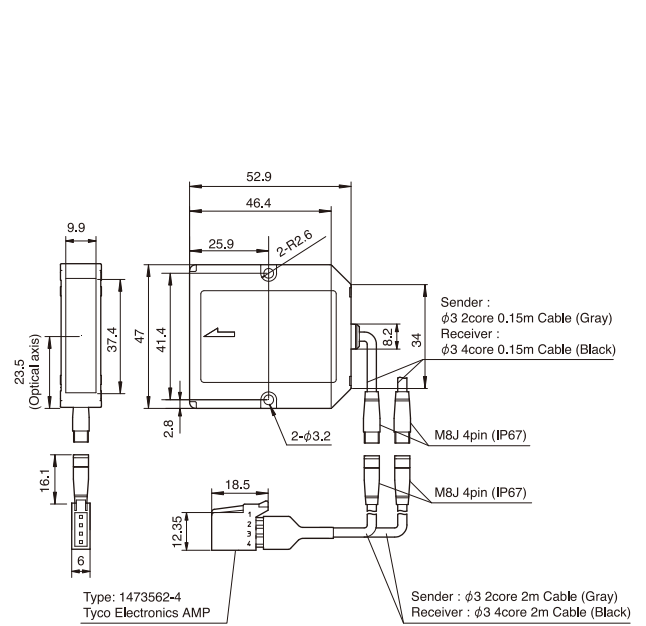


## Laser Head Dimensions

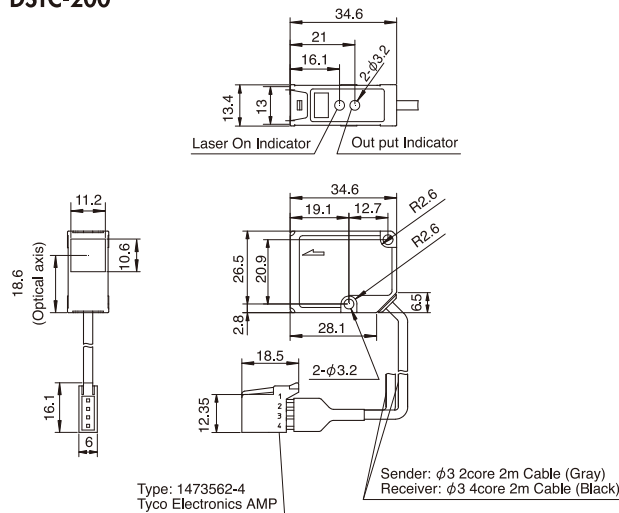
### DSTA-200



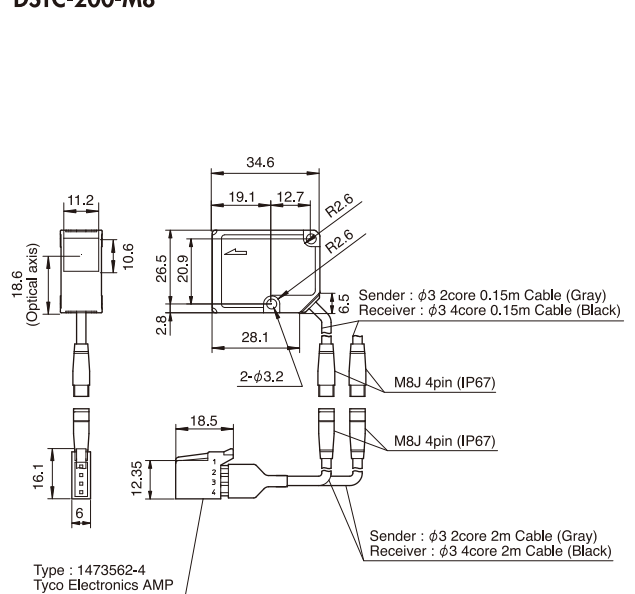
### DSTA-200-M8



### DSTC-200



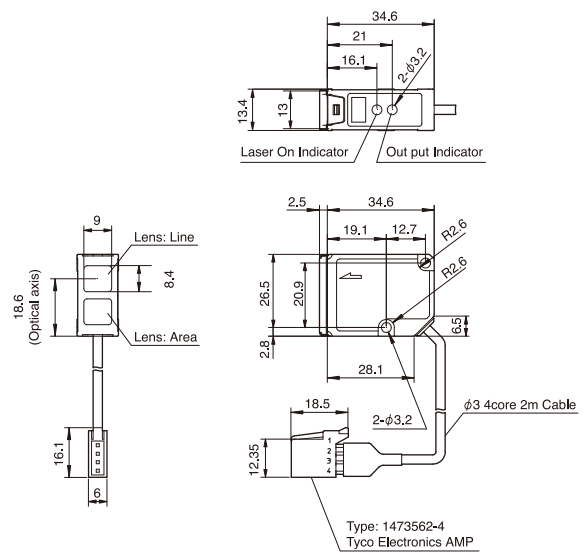
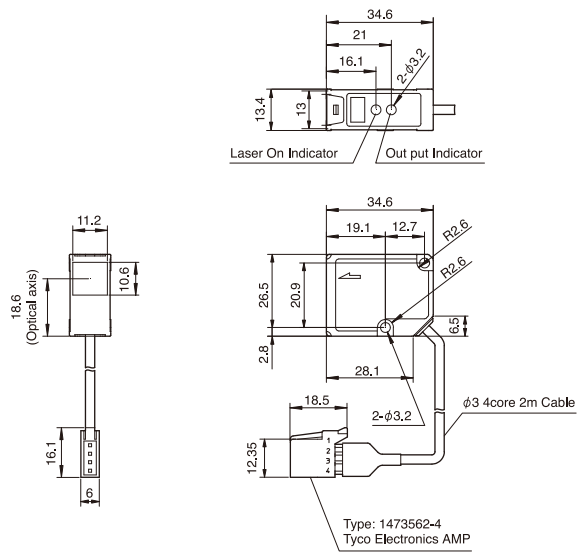
### DSTC-200-M8



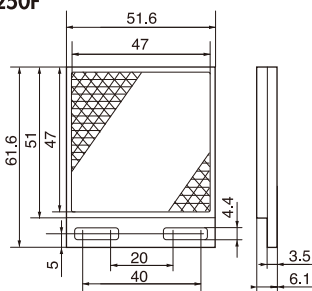
The sensing head dimensions for the DSR-5000, DSR-800 and DSD-100 are the same as the DSTC-200 with the exception of the cable.

**DSR-800 / DSR-5000 / DSD-100**

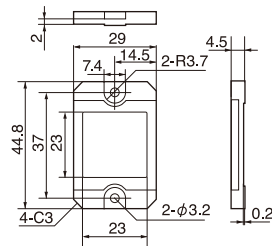
**DSR-800 + Lens Attachment**



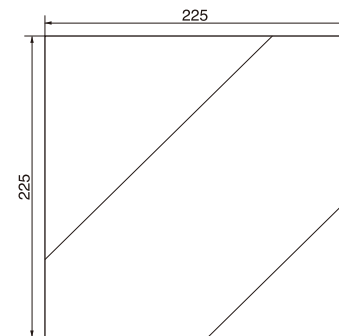
**P250F**



**MP45**



**MP-225**



(Unit : mm)

## Specifications

Model	Cable	Retro-reflective type		Diffuse reflective type	Thru-beam type	Thru-beam / Measurement type
		DSR-5000	DSR-800	DSD-100	DSTC-200 Emitter: DSTC-D Receiver: DSTC-200	DSTA-200 Emitter: DSTA-D Receiver: DSTA-200
	M8 QD-type	-	-	-	DSTC-200-M8	DSTA-200-M8
	Emitter M8	-	-	-	DSTC-S	DSTA-S
	Detector M8	-	-	-	DSTC-R	DSTA-R
<b>Amplifier unit</b>	D2SA-M□□ /D2SA-M□ -M8 / D2SA-S□□					
<b>Light source</b>	Visible light semiconductor laser 650nm					
<b>Output</b>	max. 3mW				max. 390W	
<b>IEC / JIS CLASS</b>	CLASS 2				CLASS 1	
<b>FDA CLASS</b>	Class II					
<b>Sensing distance (*1)</b>	<b>Long</b>	0.5 - 50 m	8 m	1 m	2 m	2 m Length measurement mode: 0.5 m (Only Long and Standard)
	<b>Standard</b>	0.3 - 35 m	5 m	0.7 m		
	<b>Fast</b>	0.1 - 20 m	2 m	0.25 m		
<b>Spot size (*2)</b>	Selectable			Approx. 1 mmφ (Distance: 1 m)	Approx. 2 mmφ (Distance: 2 m)	Approx. 30 x 2.5 mm (Distance: 2 m)
<b>Repeat accuracy (*3)</b>	0.2 mm			0.2 mm	0.2 mm	0.3 mm
<b>LED Indicator</b>	Laser radiation indicator light: Green Output indicator light: Orange					
<b>Operating temp / humidity</b>	-10 to +55°C/35 to 85 %RH (No condensation or freezing)					
<b>Storage temp / humidity</b>	-25 to +70°C/35 to 85 %RH (No condensation or freezing)					
<b>Environmental illuminance</b>	3,000 lx (Incandescent light) 10,000 lx (Sunlight)					
<b>Shock resistance</b>	10 to 55 Hz Double-amplitude 1.5 mm 2 hours at each direction of X, Y and Z					
<b>Protection category</b>	IP67					
<b>Material</b>	PC (Case, Cover) PMMA / Glass (Front glass)					
<b>Weight (including the codes) (*4)</b>	45g				90g	115g

\* 1 DSD-100 : With white paper (90 %) of 200 x 200 mm  
DSR-800 : With the reflector MP-45 (accessory)

\* 2 Defined with center strength  $1/e^2$  (13.5%).  
There may be leak light other than the specified spot size. The sensor may be influenced when there is a highly reflective object around the target.

\* 3 Right angle to sensing axis.

\* 4 The weights of DSTC-200 and DSTA-200 include the emitter and the receiver.

\* For the model M8-QD type, replacement is available only for the emitter and the detector.

## Class II , FDA Regulation

The D2SA series conforms to FDA Class II .



## Options

**MP-45 : Standard reflector for DSR-800**



**P250F : Long distance reflector for DSR-5000**



**MP225 : Large reflector**

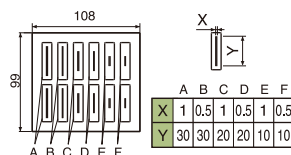


225 x 225mm  
Free-cut reflector  
sheet of MP45 material.

**BL-W130L-1 : Beam Selector**



**BL-W130-2 : Slit Mask for DSTA-200 sensor head**



**DSL-8L04-2-130 : M8-QD cable**





Laser Sensor

# Z-L / BGS-ZL series

**Thru-beam type**

(Sensing distance : 30m)  
· ZT-L3000N / P / CN / CP

**Polarized Retro-reflective**

(Sensing distance : 10m)  
· ZR-L1000N / P / CN / CP

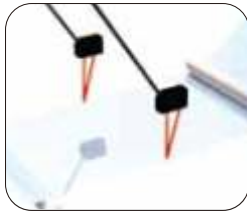
**Diffuse-reflective**

(Sensing distance : 400mm)  
· ZD-L40N / P / CN / CP

→  
Next page

- **The Laser light source projects a 2 mm spot at 400 mm distance (Diffuse mode).**
- **BGS (Background Suppression) sensing is also available in the BGS-ZL series.**

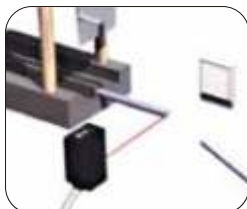
**Applications**



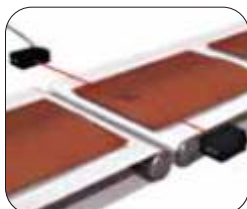
**Edge control (BGS-ZL30)**



**Height control of multi-colored object (BGS-ZL30)**



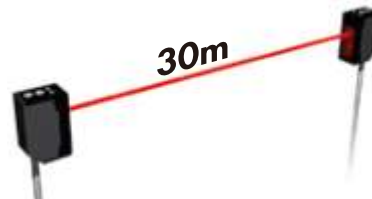
**Counting metal parts (ZR-L1000)**



**Thin plates counting (ZT-L3000)**

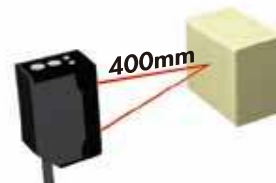
**Features**

**Thru-Beam type**



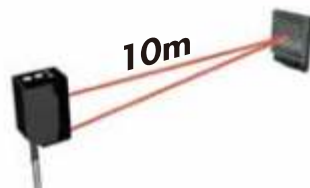
ZT-L3000

**Diffuse type**



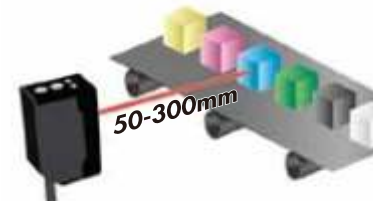
ZD-L40

**Retro Reflective type**



ZR-L1000

**BGS type**



BGS-ZL30  
BGS-ZL10

**Class 2/Class II IEC, FDA Regulation**

Conforms to Class 2 (IEC) and Class II (FDA) regulations.  
(Class 1 for Thru-beam type)





**Long distance**

(Sensing distance : 50-300mm)  
 · BGS-ZL30N / P / CN / CP

**Short distance**

(Sensing distance : 20-100mm)  
 · BGS-Z10N / P / CN / CP

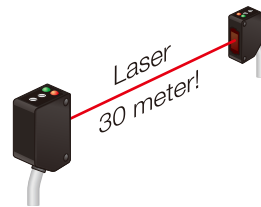
## Laser Thru-beam / RetroType

- **30 meter sensing distance (Thru-beam type), fast 250μsec. response time.**
- **Compact size with Laser source, small 2 mm diameter projected beam.**
- **IP67 rating**
- **M8 QD types are available**

### Features

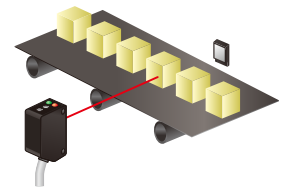
**Thru-beam type, ZT-L series**

30mm spot size at 30 meter sensing distance



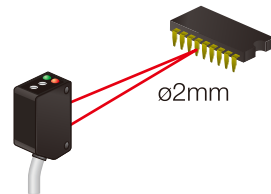
**250μsec response**

Good for fast moving objects.



**Diffuse Reflective, ZD-L type**

Fine 2mm spot at 400mm sensing distance



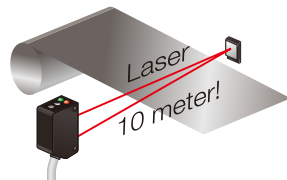
**Cross-talk prevention**

2 sensors can be mounted side-by-side.



**Retro Reflective, ZR-L type**

10mm spot size at 10 meter sensing distance



**IP67 rating**

Hose it down!  
 Water-tightness is tested to IP67.



## Specifications

Model	Thru-beam	Polarized Retro-reflective	Diffuse-reflective	
Cable type	NPN	ZT-L3000N	ZR-L1000N	ZD-L40N
	PNP	ZT-L3000P	ZR-L1000P	ZD-L40P
M8 connector type	NPN	ZT-L3000CN	ZR-L1000CN	ZD-L40CN
	PNP	ZT-L3000CP	ZR-L1000CP	ZD-L40CP
Supply voltage	DC10~30V Inc. 10% ripple			
Power consumption	30mA max.	20mA max.		
Sensing distance	30meter	10meter (Reflector : P250F)	400mm	
Spot size	30mm/30m	10mm/8m	2mm/400mm	
Response time	250μsec			
Hysteresis	-			
Operating temp	-10 to +50°C			
Operating humidity	35 to 85%			
Storage temp / humidity	-25 to +70°C/35 to 95%			
Vibration resistance	10 to 55Hz width 1.5mm			
Shock resistance	50 G (500 m/s <sup>2</sup> )			
Protection category	IP67			
Light source	Laser (650nm)			
Laser class (IEC)	class 1	class 2		
Laser class (FDA)	class I	class II		
Output indicator	Orange(Yellow) LED			
Laser power indicator	Green LED			
Sensitivity adjustment	Single turn potentiometer			
Operating mode	Light On / Dark On selectable (switch)			
Connection	2m cable / M8 connector			

## BGS - Laser Type

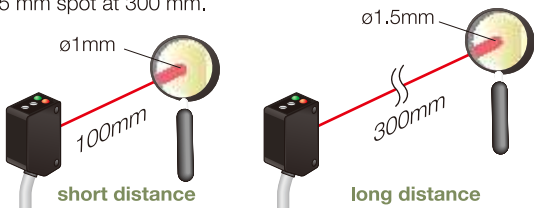
Fine spot / high speed applications

- **BGS (Background Suppression Type) Sensors are not influenced by the background, available with conventional Laser light source.**
- **250  $\mu$ sec fast response (Laser light source models)**
- **1 mm projected spot size with BGS optical system (BGS-ZL Laser types)**

### Features

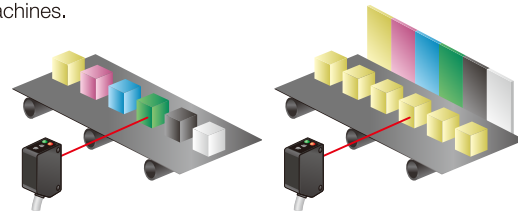
#### 1 mm projected spot size

The Short distance BGS Laser sensor projects a very small  $\phi 1$  mm spot at 100 mm distance. Ideal for the detection of small targets at long distance without being influenced by the background. The Long distance type projects a  $\phi 1.5$  mm spot at 300 mm.



#### BGS optical system designed with Laser light source

Extremely small BGS type sensors are only 17 x 10 x 20mm. Ideal for use in OEM equipment such as Printed Circuit Board processing machines.



#### External control of Laser Beam

External control of laser OFF is possible by connecting gray wire to GND (NPN type) or DC10-30V (PNP type). (This function is not available in 3 pin types)



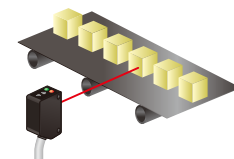
#### 4 Turn adjustment pot.

A four turn adjustment pot. is built-in for precise adjustment of the sensing distance. The potentiometer has a slip clutch that protects it from damage when it is turned past the end.



#### 250 $\mu$ sec response

Good for fast moving objects.



## Specifications

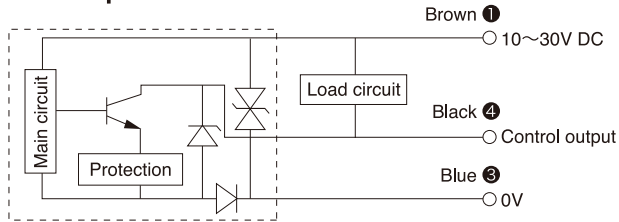
Model		long distance		short distance	
		2m Cable	M8QD 4pin	2m Cable	M8QD 4pin
Type	NPN	BGS-ZL30N	BGS-ZL30CN	BGS-ZL10N	BGS-ZL10CN
	PNP	BGS-ZL30P	BGS-ZL30CP	BGS-ZL10P	BGS-ZL10CP
Adjustable distance		50 - 300 mm (*1)		20 -100 mm (*1)	
Sensing distance		10 - 300 mm (*1)		5 -100 mm (*1)	
Response time		250 $\mu$ s			
Spot size		$\phi$ 1.5mm/300mm		$\phi$ 1mm/100mm	
Hysteresis (white to white)		5%			
Operating mode		Light On / Dark On selectable			
Output indicator		Output : orange, Laser Power : green			
Sensitivity adjustment		4-turn, endless pot.			
Control output		NPN or PNP open collector, 100mA max / DC30V			
Supply voltage		DC 10 - 30V, including 10% ripple			
Power consumption		30mA max			
Protection category		IP 67			
Shock resistance		50G			
Operating temp / humidity		-10 to 55°C / 35 to 85% RH			
Materials		Housing : ABS with glass, Lens : PMMA			

\*1 white paper 100 X 100mm

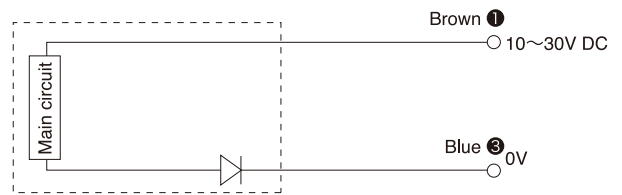
"M8-QD in 3 pins for European machines " are available with extension code of -CN(P)3, for instance, "BGS-ZL30CN3".

## Circuit diagram

### NPN output

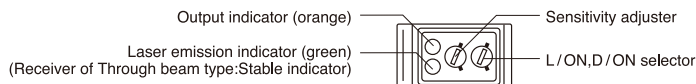


### Emitter of Thru-beam type

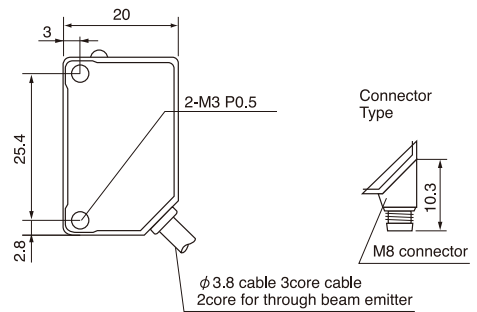
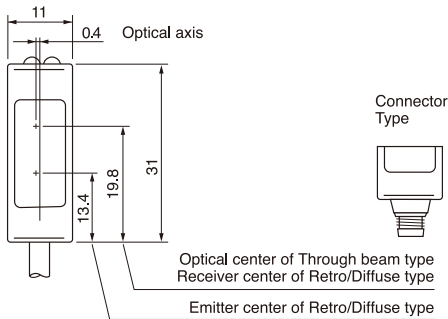


## Dimensions

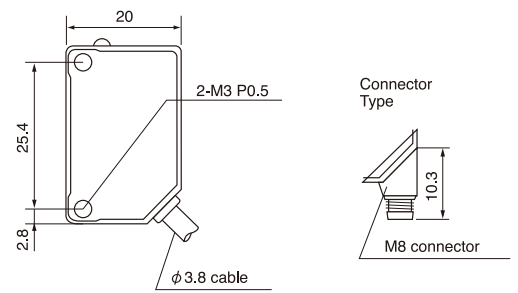
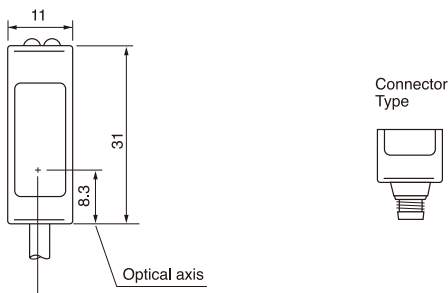
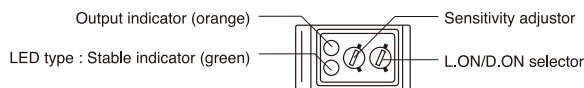
### General Use Type except BGS



Remark : ZR-QX type (coaxial beam for transparent detection) has single LED (orange for output indicator).



### BGS Type



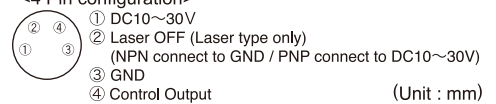
#### <Cable>

Brown : DC10~30V  
 Blue : GND  
 Black : Control Output  
 Gray : Laser OFF (Laser type only)  
 (NPN connect to GND / PNP connect to DC10~30V)

#### <3 Pin configuration>

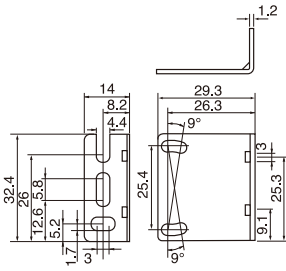


#### <4 Pin configuration>

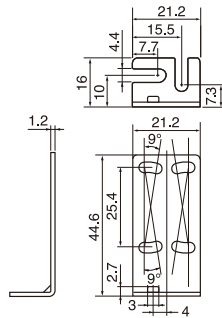


(Unit : mm)

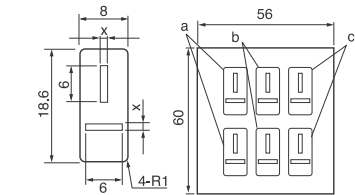
**Standard bracket BEF-W-100-A**  
For M8 QD type sensors



**Standard bracket BEF-W-100-B**  
For cabled type sensors

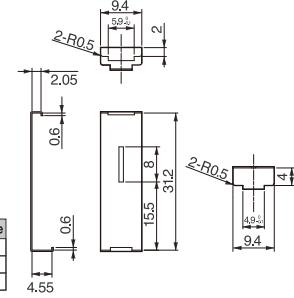


**Slit mask BL-160-SK**  
(for Thru-beam type)



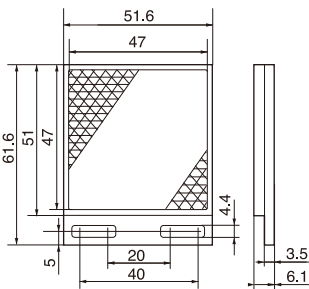
Type	Size	Attached to	Object size (Min)	Scanning range
Slit a	0.5mm	Receiver,Emitter	0.4mm	0.8mm
Slit B	1mm	Receiver,Emitter	0.6mm	2.5mm
Slit C	2mm	Receiver,Emitter	1.5mm	5mm

**Slit mask BL-100-M1**

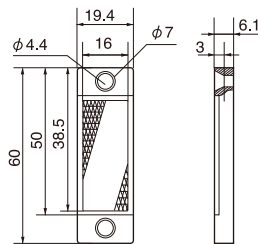


**Reflectors for Laser Type**

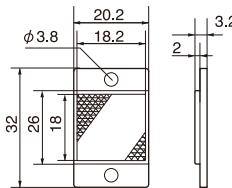
**P250F**  
(Standard, 0.2-10m)



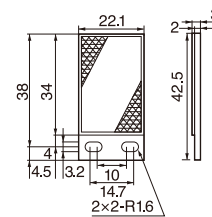
**PL20F**  
(Optional, 0.2-8m)



**PL10F**  
(Optional, 0.2-7m)



**V-42F**  
(Optional, 0.1-5m)



JCN-S : M8 Straight type



JCN-S : 2 meter  
JCN-5S : 5 meter  
JCN-10S : 10 meter

**PL20F**



JCN-L : L-shape M8 type



JCN-L : 2 meter  
JCN-5L : 5 meter  
JCN-10L : 10 meter

**PL10F**



Protective mounting brackets  
LK-S01



**V-42F**



LK-S02



**Sensor stand  
PLN-1**

**Fixture of Reflector  
PLN-1M**

