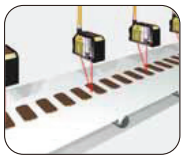
Laser Sensor

D series

- 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).

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)

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

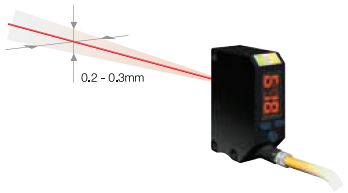
Cable / QD	Output	Transparent type (with teach-in)	
		Filled bottle	Empty bottle
Distance		1.5 meter	4.0 meter
Cable	NPN	DR-Q150TN	DR-Q400TN
	PNP	DR-Q150TP	DR-Q400TP
M8-QD	NPN	DR-Q150TCN	DR-Q400TCN
	PNP	DR-Q150TCP	DR-Q400TCP

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

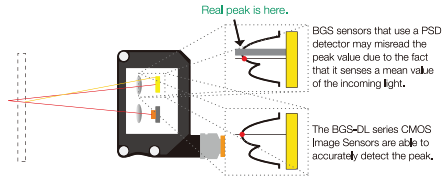
Cable / QD	Output	Retro-reflective type (with potentiometer)
Distance		5 meter
Cable	NPN	DR-500N
	PNP	DR-500P
M8-QD	NPN	DR-500CN
	PNP	DR-500CP

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.

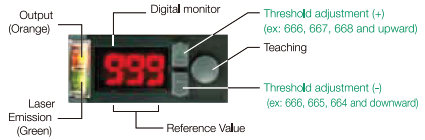


CMOS Image Sensor

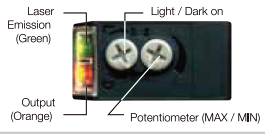


Pushbutton Teach with Fine Adjustment

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.

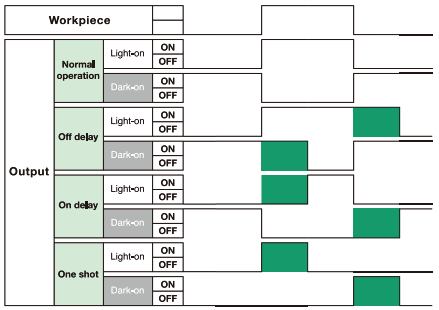


Low cost: Manual adjust type



Timer functions

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



Set time is referred as below ;

Time	ms						s			
Display	0	10	20	···	980	990	1	2	···	10
	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.

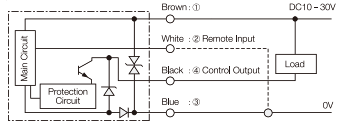
* Dispersion always happens from zero up to +5msec. For instance your setting at "10msec" means setting between "10msec and 15msec".

* Therefore please make sure to select Normal Operation if you are not in need of timer function.

Remote Input

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

DR-Q / BGS-DL series



Class 2/Class II IEC, FDA Regulation

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

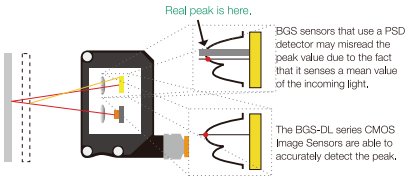
The world's first Laser / BGS with CMOS Image Sensor

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.

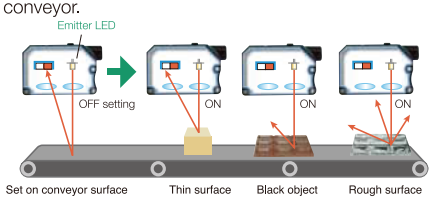
Great combination ; Laser and CMOS Image Sensor shuts out environmental influence.

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		
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^2) , 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

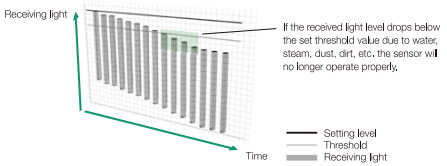
DR-Q series

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.

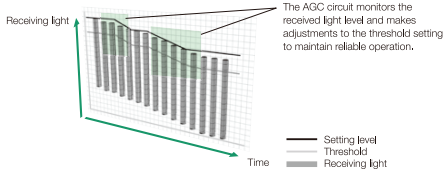
Coaxial Laser

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

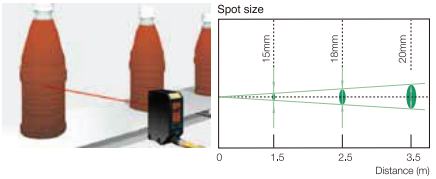
Conventional Retro Reflection sensor



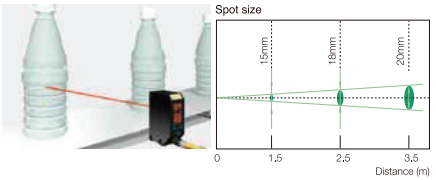
DR-Q series



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^2) , XYZ 3 directions	
Environmental illuminance	Sunlight : 10,000 lux, Incandescent lamp : 3,000 lux max	
Materials	Anti-bacterial ABS (housing), PMMA (lens)	

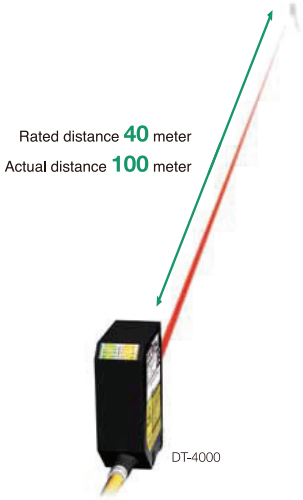
*1 Sensing distance taken with P250F reflector

The most powerful Thru-beam and Retro-reflective type sensors available with a Laser Light Source.

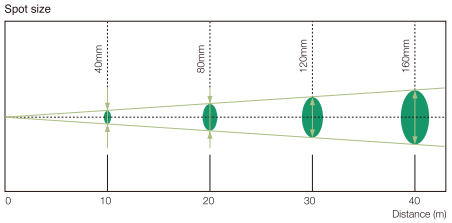
DT series (Laser thru-beam) / DR series (Laser retro-reflective)

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.

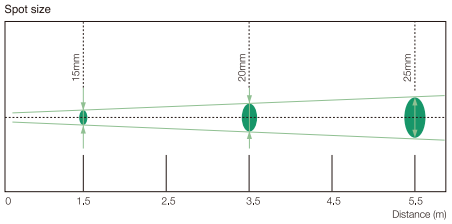
Coaxial Laser



DT-4000



DR-500



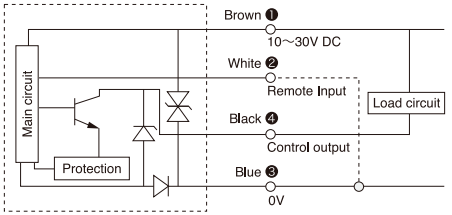
Specifications

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/S²) , 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

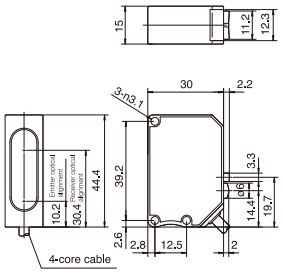
Circuit diagram

DR-Q / BGS-DL series

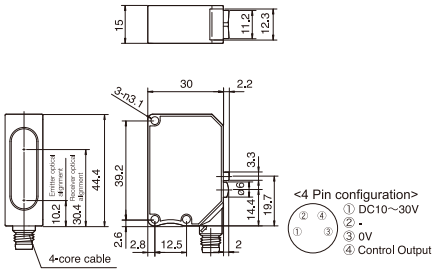


Dimensions

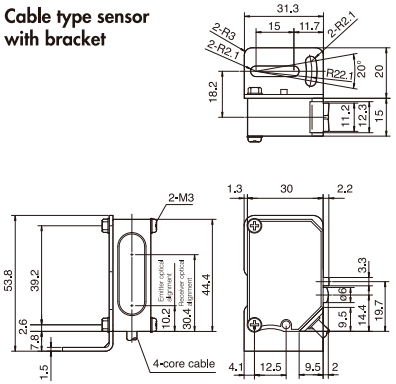
Cable type sensor



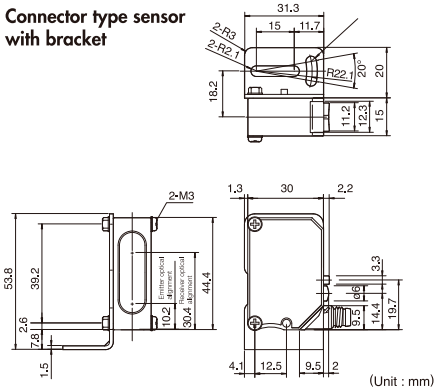
Connector type sensor



Cable type sensor with bracket

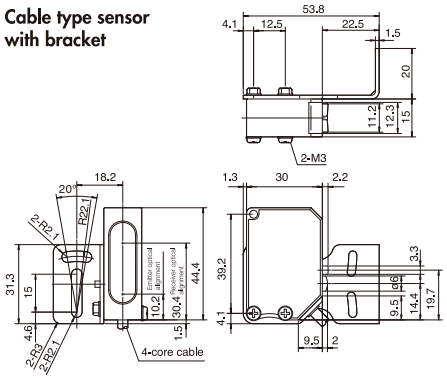


Connector type sensor with bracket

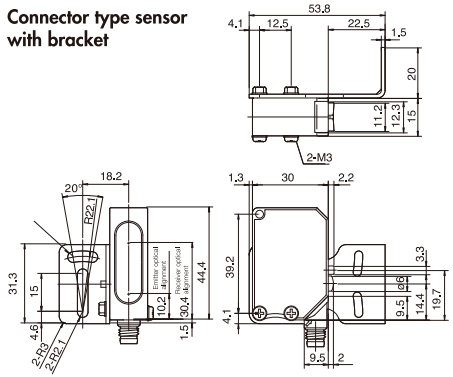


(Unit : mm)

Cable type sensor with bracket

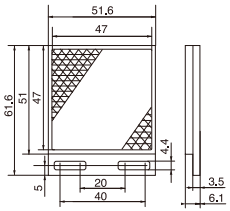


Connector type sensor with bracket

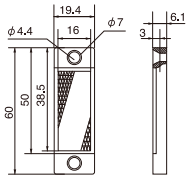


Reflectors

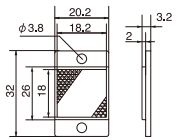
P250F



PL20F



PL10F

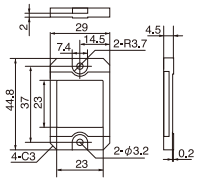


Sensing distance by reflectors

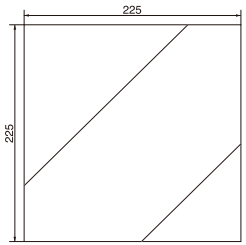
	P250F	PL20F	PL10F
DR-Q400T	4,0	2,8	1,0
DR-Q150T	1,5	1,0	0,5
DR-500	5,0	3,5	1,2

(Unit : meter)

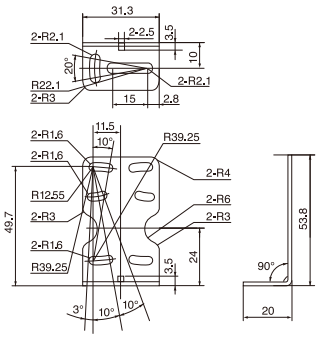
MP45



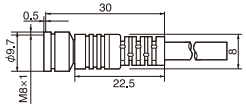
MP225



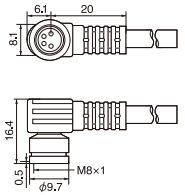
Mounting Bracket



JCN-S : M8 Straight type



JCN-L : M8 L-shape type



Options

P250F : Standard reflector

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

PL20F : Small reflector

60 × 19.4 mm
For space saving

PL10F : Miniature reflector

32 × 20.2 mm
For limited space

MP45 : Fine Positioning reflector

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

MP225 : Large reflector

225 × 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

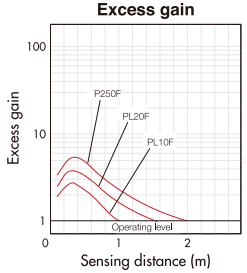
JCN-L : M8 L-shape type

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

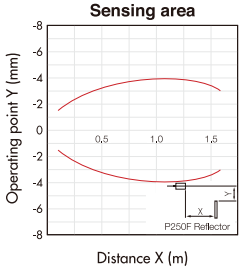
Reference (typical)

DR-Q150TN
DR-Q150TCN

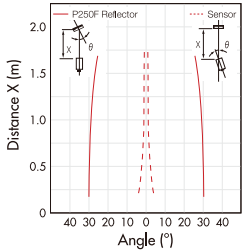
Excess gain



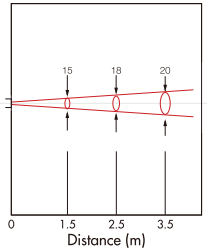
Sensing area



Angular deviation

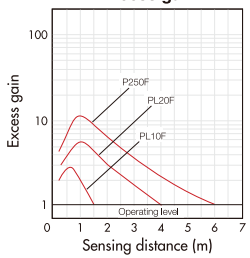


Spot size (mm)

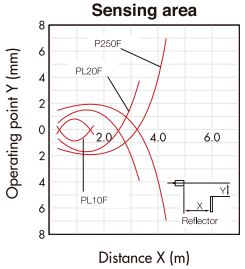


DR-Q400TN
DR-Q400TCN

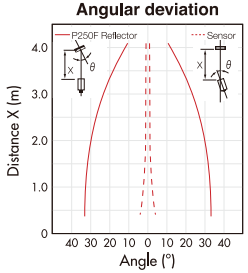
Excess gain



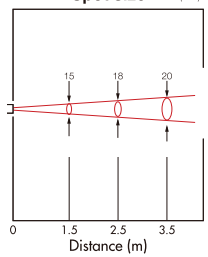
Sensing area



Angular deviation



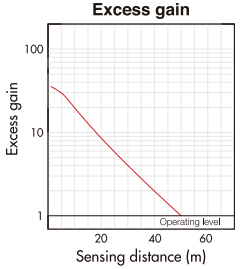
Spot size (mm)



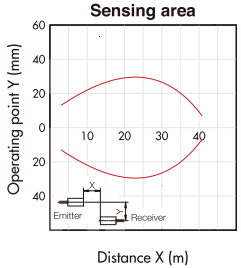
Reference (typical)

DT-4000N
DT-4000CN

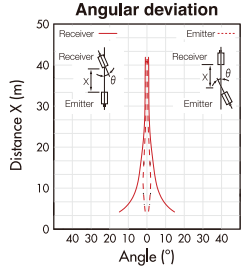
Excess gain



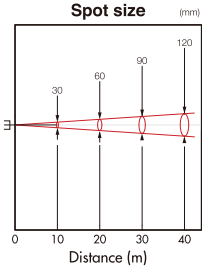
Sensing area



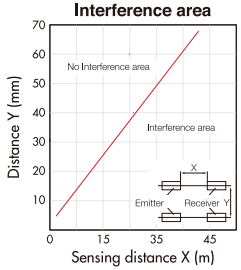
Angular deviation



Spot size (mm)

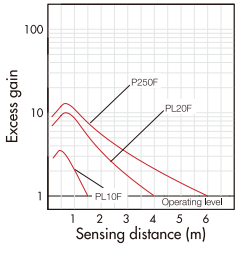


Interference area

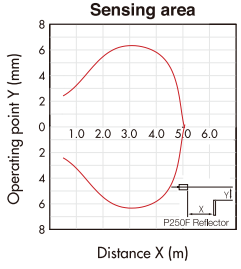


DR-500N
DR-500CN

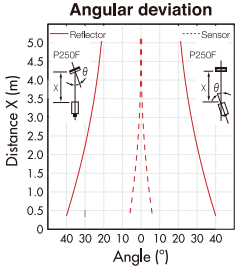
Excess gain



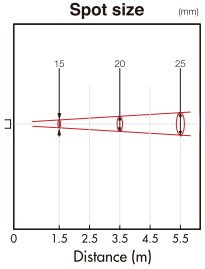
Sensing area



Angular deviation



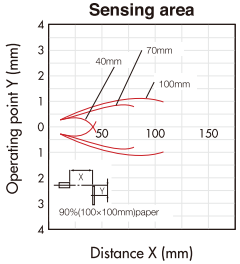
Spot size (mm)



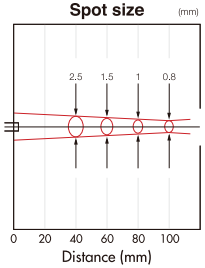
Reference (typical)

BGS-DL10TN BGS-DL10TCN

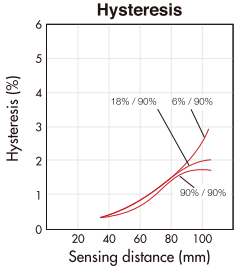
Sensing area



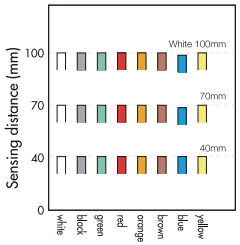
Spot size



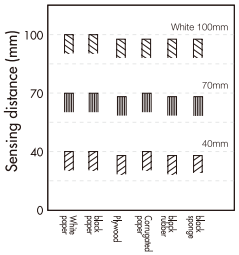
Hysteresis



Color response

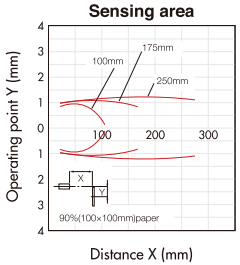


Material response

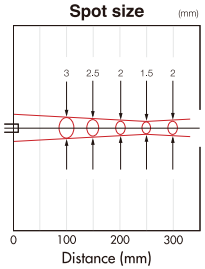


BGS-DL25TN BGS-DL25TCN

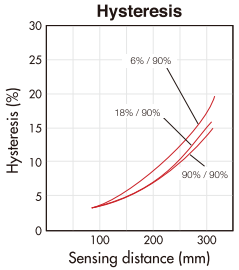
Sensing area



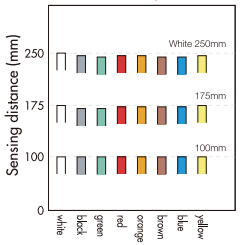
Spot size



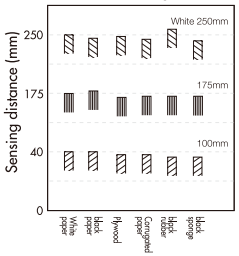
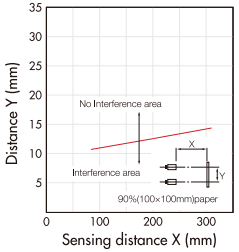
Hysteresis



Color response



Material response



Interference area