DL-S series

Background suppression photo sensors

Short-range

Medium-range

- **Self-diagnosis feature**
  - Sensor signaling an error due to degradation of receiver light intensity level
  - Feature applicable to countering soiling of lens or light axis misalignment over time, allowing easy maintenance
- **IP 67 water resistance allows washing**

  Sensor when line is washed
- **Visible beam spot for ease of checking (red LED type)**

Type

Type	Detecting distance	Model	Light source	Operation mode	Output mode
Short-range	10～30mm	**DL-S3R**	Red	Light-ON/ Dark-ON selectable (with switch)	NPN open collector
		DL-S3	Infrared		
	10～40mm	**DL-S4R**	Red		
		DL-S4	Infrared		
	10～50mm	**DL-S5R**	Red		
		DL-S5	Infrared		
Medium-range	10～100mm	**DL-S10R**	Red		
		DL-S10	Infrared		
	10～150mm	**DL-S15**			
	10～200mm	**DL-S20**			

- Red LED medium-range type

  Model DL-S20R

  Red LED employed as light emitting element for clear identification of detecting position

  Detecting distance: 200 mm

Rating/Performance/Specification

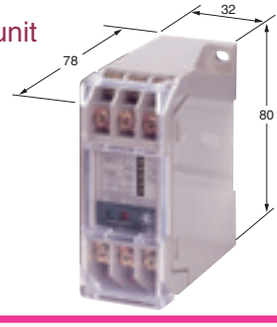
Rating/performance	Type		Short-range						Medium-range			
			Red LED			Infrared LED			Red LED	Infrared LED		
	Model		**DL-S3R**	**DL-S4R**	**DL-S5R**	**DL-S3**	**DL-S4**	**DL-S5**	**DL-S10R**	**DL-S10**	**DL-S15**	**DL-S20**
	Detection method		Distance limited reflection									
	Detecting range *1		10-30mm	10-40mm	10-50mm	10-30mm	10-40mm	10-50mm	10-100mm	10-100mm	10-150mm	10-200mm
	Range of distance adjustment with volume		10% less than maximum detecting distance			20% less than maximum detecting distance			10% less than maximum detecting distance			
	Power supply		12-24V DC ±10% / Ripple 10% max.									
	Current consumption		27mA max.						30mA max.			
	Output mode	Control output	NPN open collector *2 Rating: sink current 100 mA (30 VDC) max.									
		Stability output	NPN open collector *2 Rating: sink current 50 mA (30 VDC) max.									
	Operation mode		Light-ON/Dark-ON selectable (with switch)									
	Response time		0.35ms max.									
	Hysteresis		5% max.									
Specification	Light source (light wavelength)		Red LED (700 nm)			Infrared LED (880 nm)			Red LED (700 nm)	Infrared LED (880 nm)		
	Light-sensitive element		2-division photodiode									
	Indicator		Operation indicator: red LED/Stability indicator: green LED									
	Volume (VR)		Distance adjustment volume									
	Switch (SW)		Light-ON/Dark-ON selector switch L.ON: Light-ON D.ON: Dark-ON									
	Short circuit protection		Provided (for control output only)									
	Material		Case and lens: polyarylate						Case: heat-resistant ABS / Lens: polyethersulfone			
	Connection		Permanently attached cord (Outer dimension: dia.3) 0.15sq. 4 core, 2 m length, black						Permanently attached cord (Outer dimension: dia.4) 0.15sq. 4 core, 2 m, black			
	Mass		50g max.						80g max.			
	Notes		*1 With volume at MAX: white drawing paper of 50×50mm for short-range type, 100×100mm for medium-range type *2 PNP output types available for all models ("PN" added at the end of model No.: Ex. DL-S3RPN) / No stability output provided for PNP output type									

Environmental Specification

Environment	Ambient light	5,000lx max.
	Ambient temperature	–25 - +55°C (non-freezing)
	Ambient humidity	35-85%RH (non-condensing)
	Protective structure	IP67
	Vibration	10-55 Hz / 1.5 mm amplitude / 2 hours each in 3 directions
	Shock	500 m/s² / 10 times each in 3 directions

- Applicable power supply unit

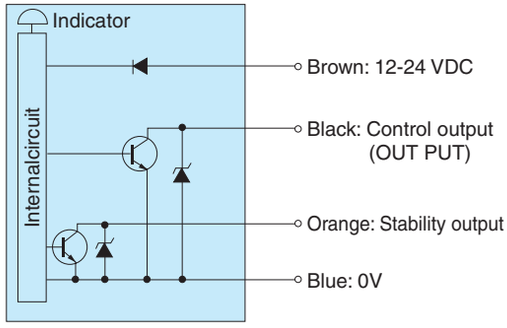
PS Series
High capacity of 200 mA at 12 VDC



(General-purpose type)
PS3N
PS3N-SR
(Multifunctional type)
PS3F
PS3F-SR

DL-S

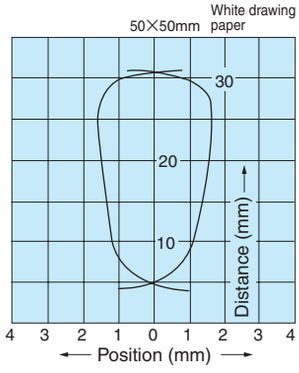
Input/Output Circuit and Connection



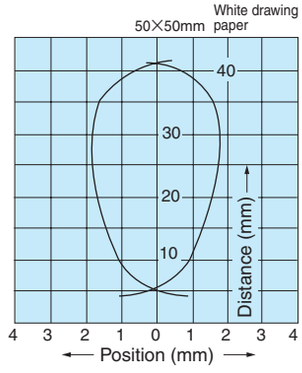
- The output transistor turns off when load short circuit or overload occurs. Check the load and turn the power back on.
- Note that the stability output is not provided with the short circuit protection circuit.

Activation area characteristics (Typical example)

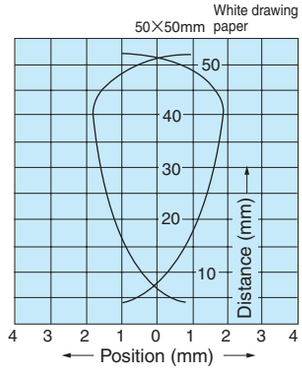
DL-S3R



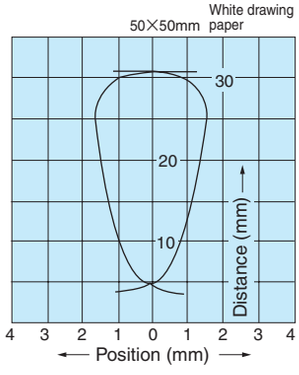
DL-S4R



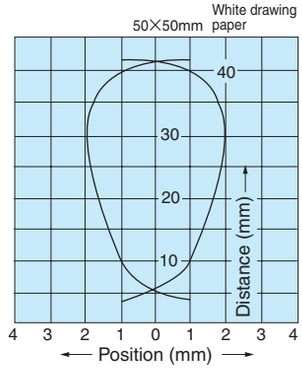
DL-S5R



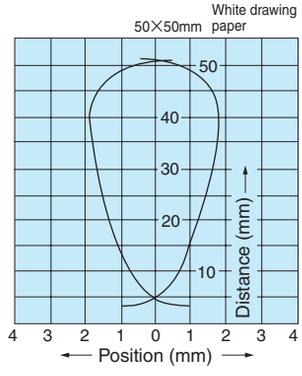
DL-S3



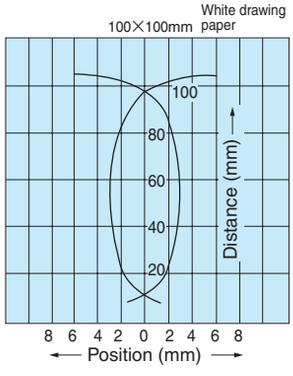
DL-S4



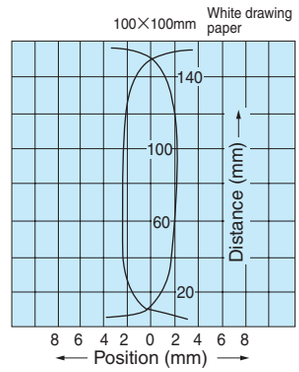
DL-S5



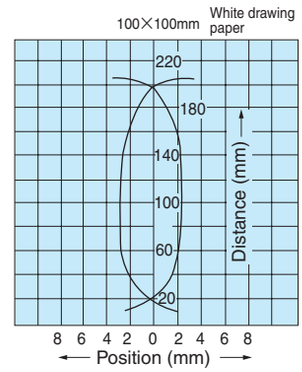
DL-S10R・S10



DL-S15

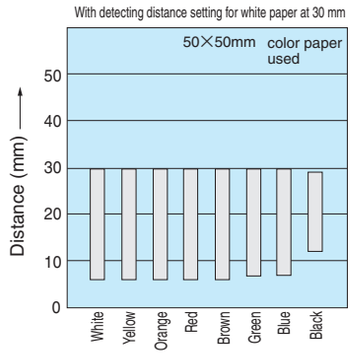


DL-S20

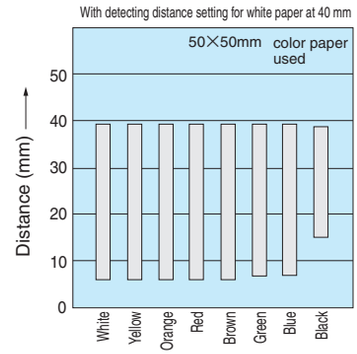


Color Paper Detection Characteristics (Typical Example)

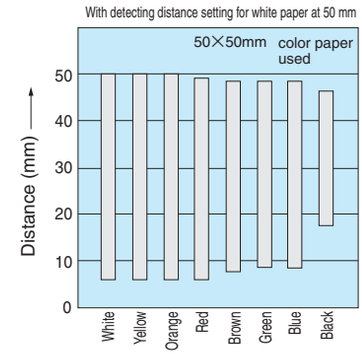
DL-S3R



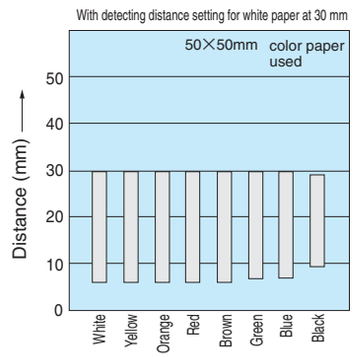
DL-S4R



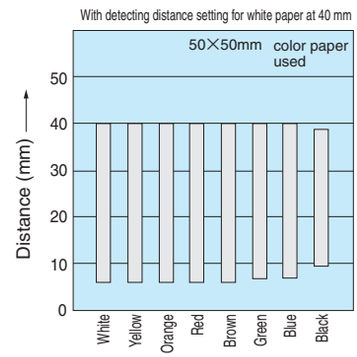
DL-S5R



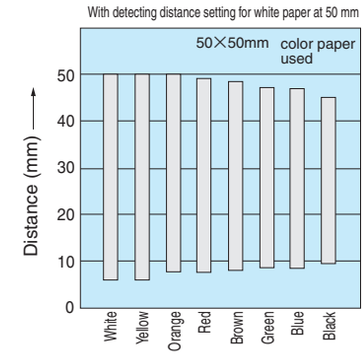
DL-S3



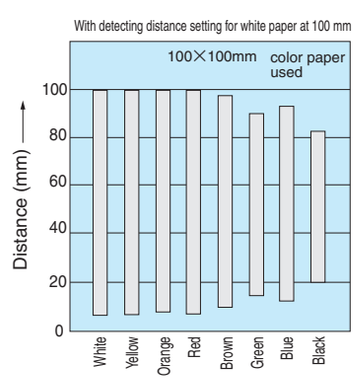
DL-S4



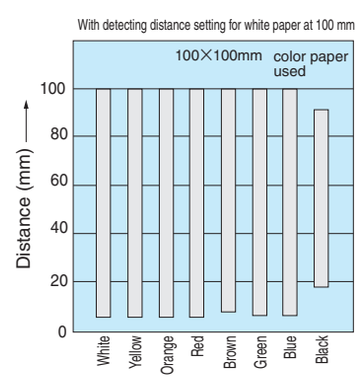
DL-S5



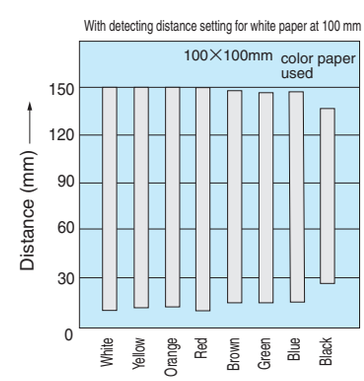
DL-S10R



DL-S10

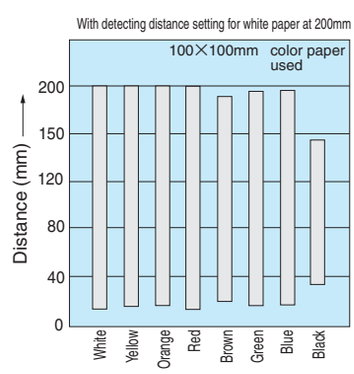


DL-S15

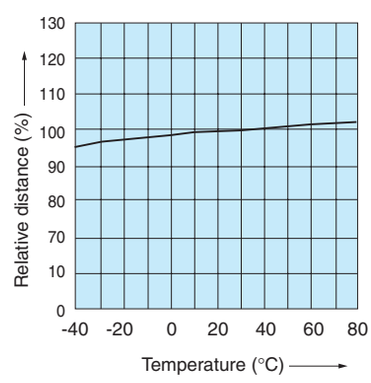


Temperature Characteristics (Typical Example)

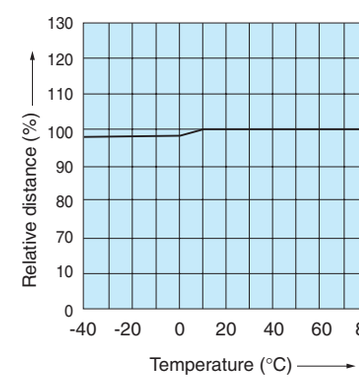
DL-S20



DL-S10R



DL-S10・S15・S20



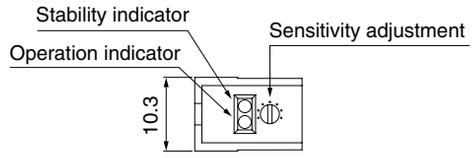
DL-S

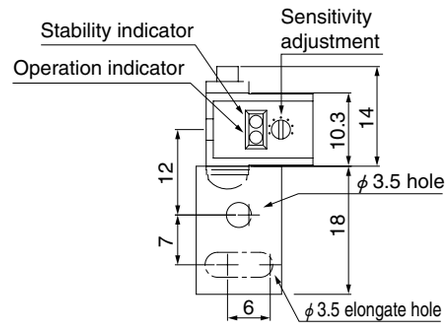
Dimensions (in mm)

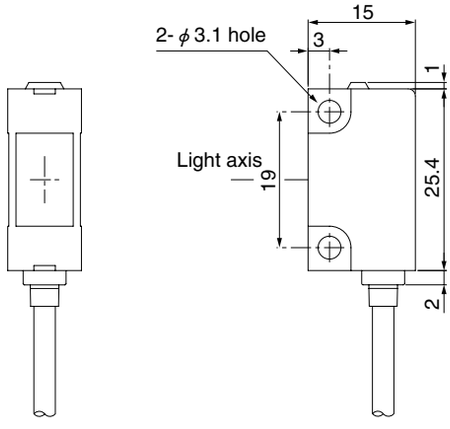
Short-range

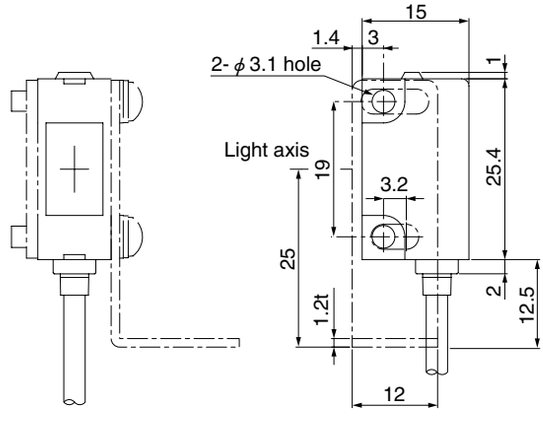
CAD

With mounting bracket (accessory) attached





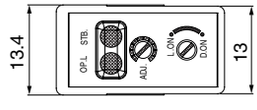


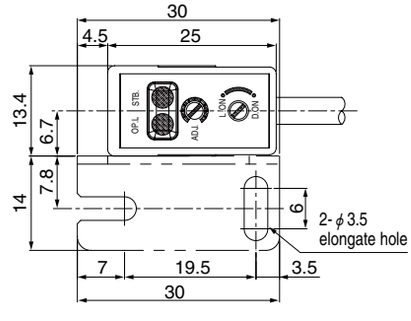


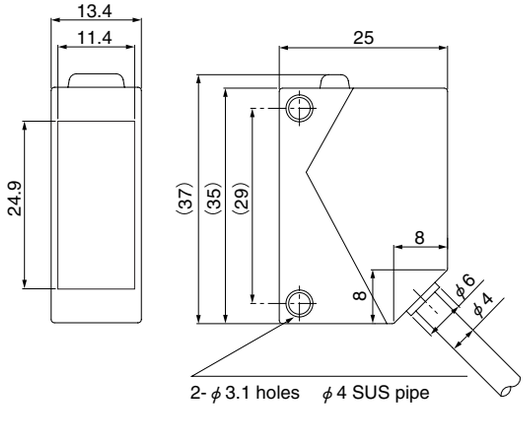
Medium-range

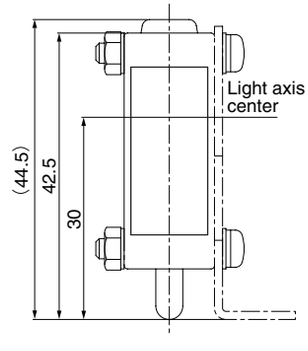
CAD

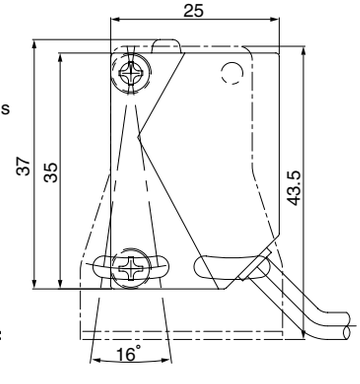
With mounting bracket (accessory) attached









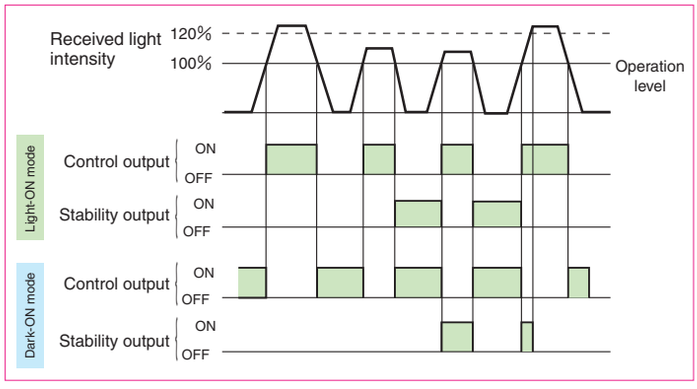


For Correct Use

Be sure to follow the instructions in the operation manual provided for correct use of the product.

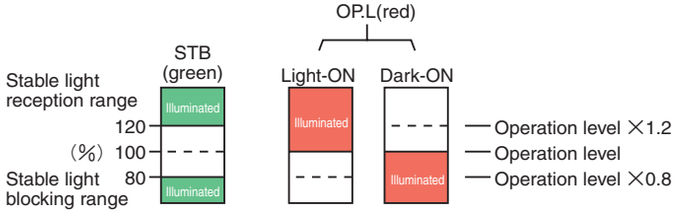
Stability output

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 detection has occurred with the level of received light 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

- The operation indicator (red LED) and stability indicator (green LED) show the levels of light intensity as described in the figure on the right.
- After aligning the optical axis, use a detection object to block and unblock the light beam several times to make sure that the sensitivity level is in a range that allows stable activation and deactivation.
- Setting the sensitivity in a range allowing stable operation achieves higher reliability against changes in the operating environment generated after the sensitivity is set.



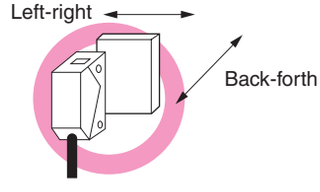
- The red LED (OP.L) is the operation indicator.
  In the L.ON (Light-ON) mode, the indicator is illuminated when a certain amount of light is detected.
  In the D.ON (Dark-ON) mode, the indicator is illuminated when a certain amount of light is not detected.

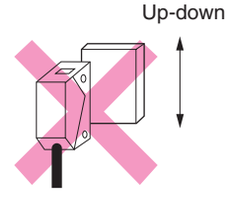
Light-ON/Dark-ON switching

For Light-ON mode: Set the switch to L (Light).
For Dark-ON mode: Set the switch to D (Dark).

Detecting direction

The 2-division photodiode has directionality and the sensor may not be used in a certain direction. The direction of movement of the object must be as shown in the figure.





Prohibited direction

*Up-down movement shown in the figure may be allowed within the detecting distance set with the distance adjustment.

Background

Any glossy or mirror-like object present in the background of the detection object may cause faulty operation depending on the angle of the background. In such cases, mount the sensor at an angle.