

DL-S series

Background suppression photo sensors



- Self check feature
 - The sensor will provide notification when a fault occurs because the level of light intensity is low.
 - Maintenance is easy to protect against long term dirty lenses and light axis misalignment.
- IP 67 rated housing
- You can wash the sensor together with he lines.
- Visible beam spot for easy checking (red LED type)

Type

Type	Detecting distance	Model		Light source	Operation mode	Output mode
		NPN output	PNP output			
Short range	 10-30mm	DL-S3R	DL-S3RPN	Red	Light ON/ Dark ON selectable (with switch)	open collector
		DL-S3	DL-S3PN	Infrared		
	 10-40mm	DL-S4R	DL-S4RPN	Red		
		DL-S4	DL-S4PN	Infrared		
	 10-50mm	DL-S5R	DL-S5RPN	Red		
		DL-S5	DL-S5PN	Infrared		
Medium range	 10-100mm	DL-S10R	DL-S10RPN	Red		
		DL-S10	DL-S10PN	Infrared		
	 10-150mm	DL-S15	DL-S15PN			
	 10-200mm	DL-S20	DL-S20PN			

- Red LED medium-range type
 - Model DL-S20R (NPN output) is available
 - Red LED employed as light emitting element for clear identification of detecting position.
 - Detecting distance: 200 mm

Rating/Performance/Specification

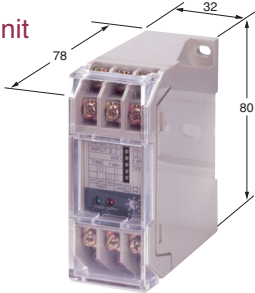
Type		Short range						Medium range			
Model	NPN type	DL-S3R	DL-S4R	DL-S5R	DL-S3	DL-S4	DL-S5	DL-S10R	DL-S10	DL-S15	DL-S20
	PNP type	DL-S3RPN	DL-S4RPN	DL-S5RPN	DL-S3PN	DL-S4PN	DL-S5PN	DL-S10RPN	DL-S10PN	DL-S15PN	DL-S20PN
Detection method		Limited range reflective									
Detecting range *1		10-30mm	10-40mm	10-50mm	10-30mm	10-40mm	10-50mm	10-100mm	10-100mm	10-150mm	10-200mm
Range of distance adjustment with volume		20% 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% or less									
Current consumption		NPN type : 27mA or less / PNP type : 35mA or less			NPN type : 27mA or less / PNP type : 30mA or less			NPN type : 30mA or less / PNP type : 33mA or less			
Output mode	control output	NPN type	NPN open collector Rating: sink current 100 mA (30 VDC) or less.								
		PNP type	PNP open collector Rating: source current 100 mA (30 VDC) or less.								
	stability output	NPN type	NPN open collector Rating: sink current 30 mA (30 VDC) or less.								
		PNP type	Not available								
Operation mode		Light ON/Dark ON selectable (with switch)									
Response time		0.35ms or less									
Hysteresis		5% or less									
Light source (light wavelength)		Red LED (700 nm)			Infrared LED (880 nm)			Red LED (700 nm)	Infrared LED (880 nm)		
Light receiving element		2 segment 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	NPN type	Cable type (outer dimension: dia. 3.0mm) 0.15 mm ² 4cores 2 m (black)						Cable type (outer dimension: dia. 4.0mm) 0.2 mm ² 4cores 2 m (black)			
	PNP type	Cable type (outer dimension: dia. 3.0mm) 0.15 mm ² 3cores 2 m (black)						Cable type (outer dimension: dia. 3.0mm) 0.2 mm ² 3cores 2 m (black)			
Weight		Approx.50 g						Approx.80 g			
Accessory		Mounting bracket , screwdriver for volume adjustment, operation manual									
Notes		*1 With volume at MAX: white drawing paper of 50×50mm for short range type, 100×100mm for medium range type									

Environmental Specification

Ambient light	5,000lx or less
Ambient temperature	−25 - +55°C (non-freezing)
Ambient humidity	35-85%RH (non-condensing)
Protective structure	IP67
Vibration	10-55 Hz / 1.5 mm double amplitude / 2 hours each in 3 directions
Shock	500 m/s ² / 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

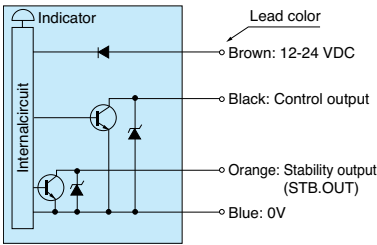
(Multifunctional type)
PS3F
PS3F-SR

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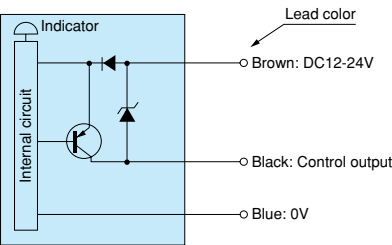
DL-S

Input/Output Circuit and Connection

NPN output



PNP output

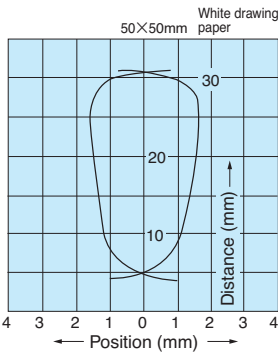


The PNP output does not provide stability output.

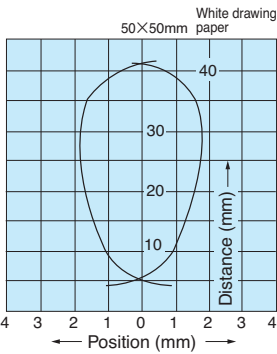
- The output transistor turns off when load short circuit or overload occurs. Check the load and turn the power back on.
- Note that the stability output is not provided with the short circuit protection circuit.

Response Curves : Detecting Position (Typical)

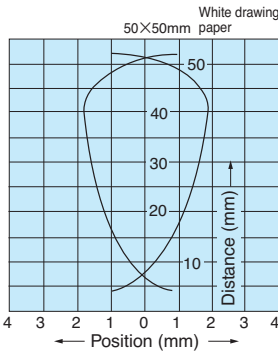
DL-S3R



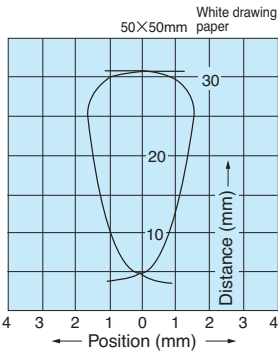
DL-S4R



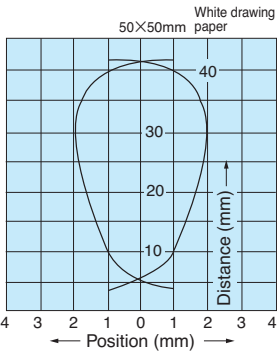
DL-S5R



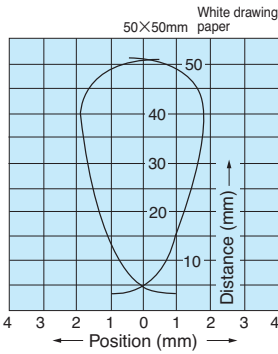
DL-S3



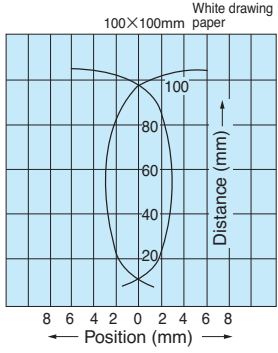
DL-S4



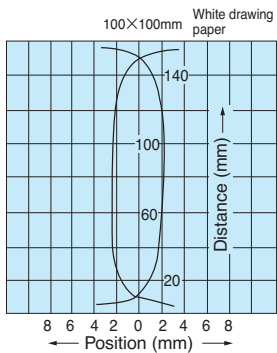
DL-S5



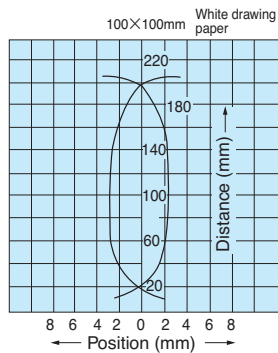
DL-S10R・S10



DL-S15



DL-S20



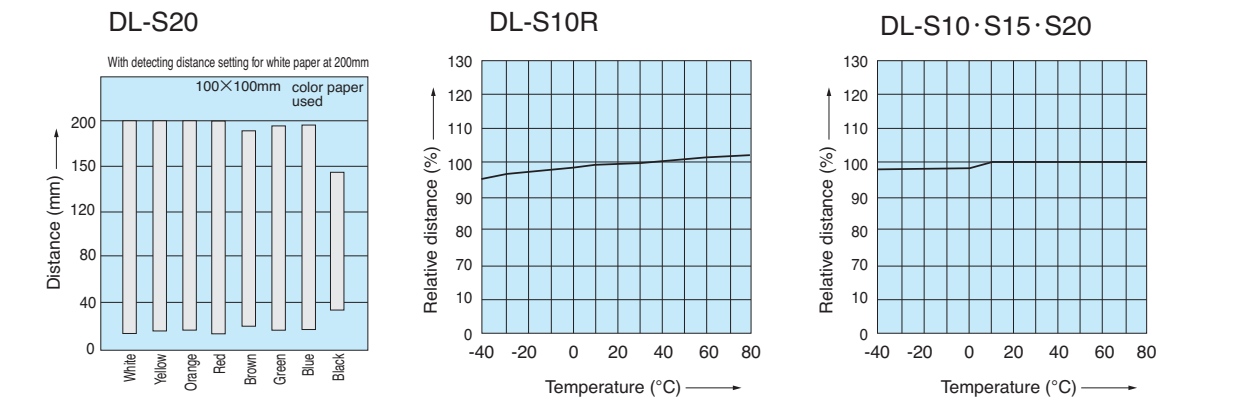
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Response Curves: Color Cards (Typical)



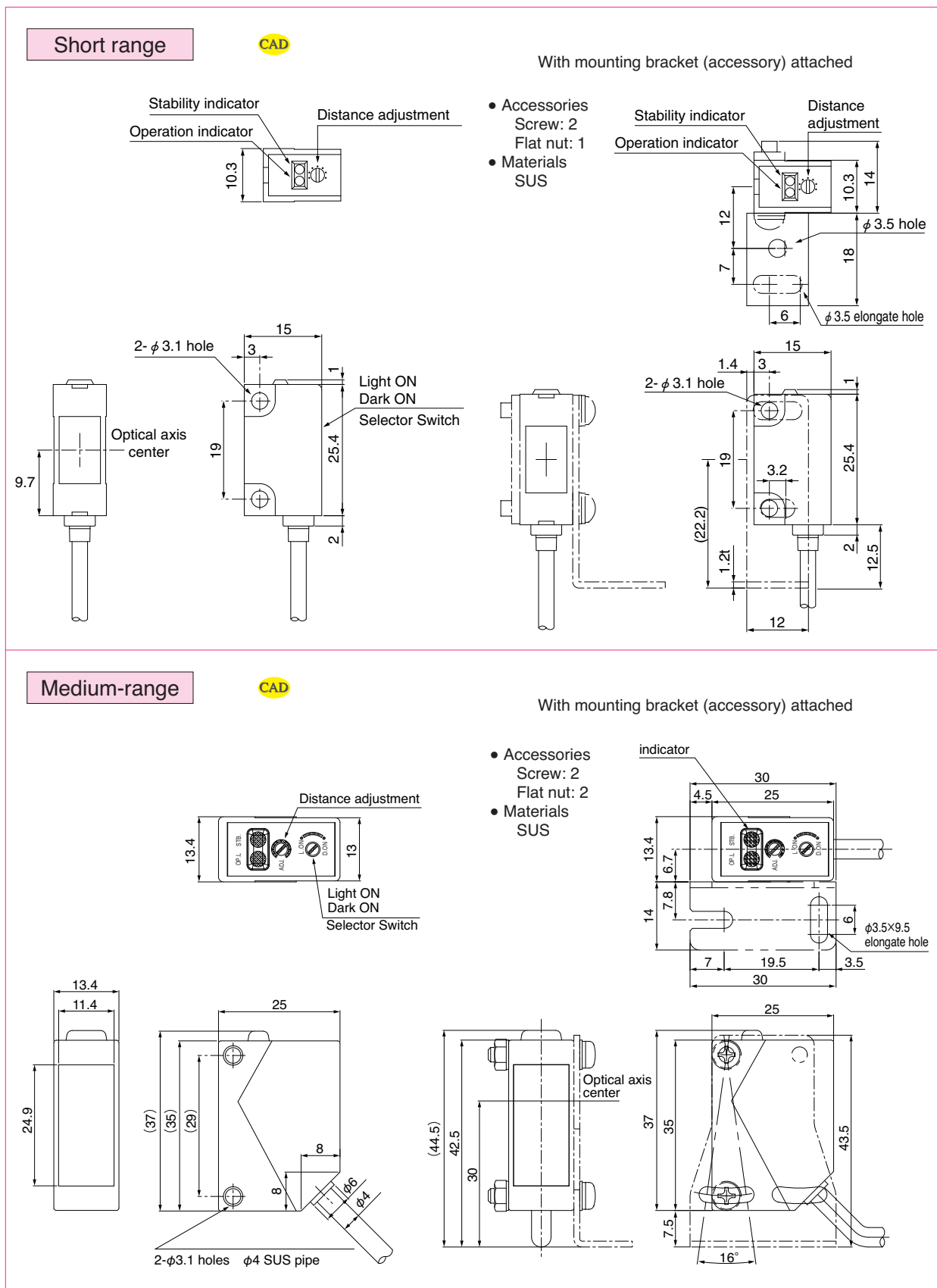
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Response Curves : Ambient Temperature (Typical)



DL-S

Dimensions (in mm)

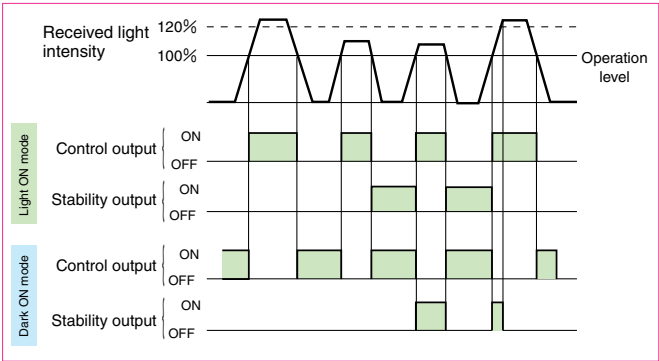


For Correct Use

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

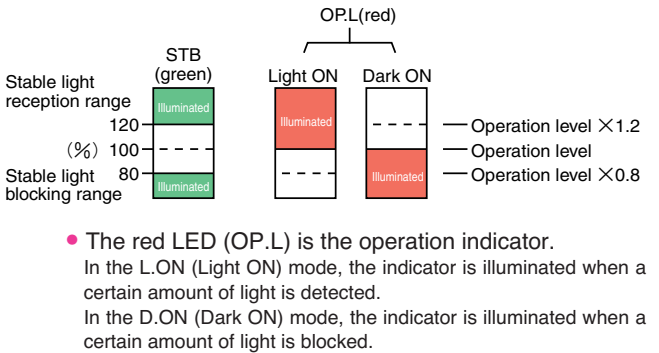
Stability output

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 (stable operation over the level), 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.
- This setting achieves higher reliability against changes in the operating environment generated over time.



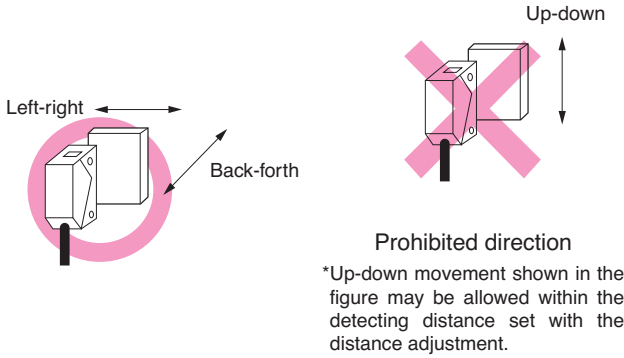
Light ON/Dark ON switching



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

Detecting direction

The 2 segment 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.



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 object. In such cases, change the mounting angle of the sensor so that it operates correctly.

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