SS Series Photoelectric Sensors

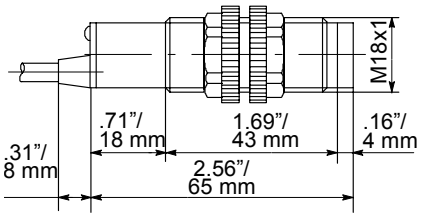
Compact M18 (18mm) Photoelectric Sensors

- Plastic housing
- Axial cable or M12 plug models
- NO/NC selectable output
- IP67 Protection degree
- Diffuse, retro-reflective, and through-beam models

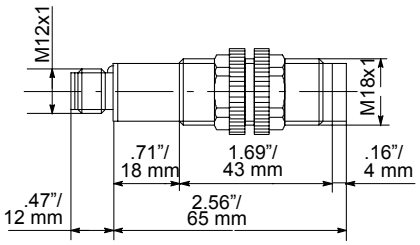
Cables and Accessories

CD12L-0B-020-A0 — Cable for quick-disconnect sensors: 12mm, straight, axial plug, two-meter length
CD12M-0B-070-A1 — Cable for quick-disconnect sensors: 12mm, straight, axial plug, seven-meter length
CD12L-0B-020-C0 — Cable for quick-disconnect sensors: 12mm, right-angle, axial plug, two-meter length
CD12M-0B-070-C1 — Cable for quick-disconnect sensors: 12mm, right-angle, axial plug, seven-meter length
ST18A — Mounting bracket for 18mm sensors, straight, metal, 10 pk
ST18C — Mounting bracket for 18mm sensors, right angle, metal, 10 pk
ST02 — Adjustable, plastic mounting bracket
ST03 — Right-angle beam adapter, for retro-reflective and through-beam models only
Reflectors For Retro-Reflective (SSP) Models:
RL102 — 26mm diameter round reflector (10pk)
RL103 — 36mm diameter round reflector (10pk)
RL104 — 47mm diameter round reflector (10pk)
RL105 — 90mm x 40mm rectangular reflector (10pk)
RL106G — 182mm x 42mm rectangular reflector (10pk)
RL109 — 83mm diameter round reflector, stud mount (10pk)
RL110 — 84mm diameter round reflector, center hole mount (10pk)
Shutters For Through-Beam (SSE, SSR) Models:
STOS1 — Shutter, 1mm diameter
STOS2 — Shutter, 2mm diameter
STOS3 — Shutter, 3mm diameter
STOS4 — Shutter, 4mm diameter
STOS6 — Shutter, 6mm diameter
STOS8 — Shutter, 8mm diameter

Dimensions



Axial Cable Model



M12 Connector Model

SS Series Part Numbers

The SS series uses a part numbering system similar to our other sensor products.
For example: Part number SS2-0P-4E would be a NO/NC, PNP, 100mm diffuse reflection M18 photoelectric switch with a plastic housing and an M12 connector fitting.

Series	
Model	
M18 compact photo switch	SS
100mm diffuse reflection	2
200mm diffuse reflection	5
400mm diffuse reflection	6
2m polarized retro-reflective	P
Emitter (through-beam)	E
8M receiver (through-beam)	R
Output State	
NO/NC selectable	0 (zero)
Logic	
NPN Output	N
PNP Output	P
Through beam emitter	0 (zero)
Housing	
Plastic housing	4
Type of Cable	
With 2m (6.6ft) axial cable	A
With M12 connector[1]	E

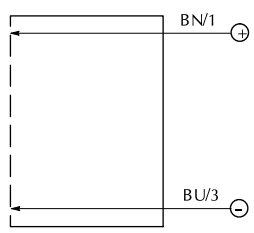
1 Order quick-disconnect cable separately.

SS2-	0N-	4A

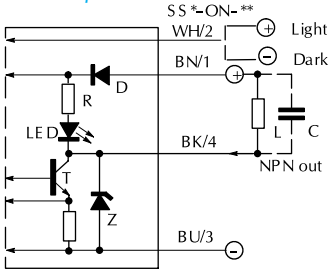
Note: Use this chart to help you understand the part numbering system. Not all combinations of letters and numbers form valid part numbers. See specifications table or price list for part numbers that we offer.

Wiring Diagrams

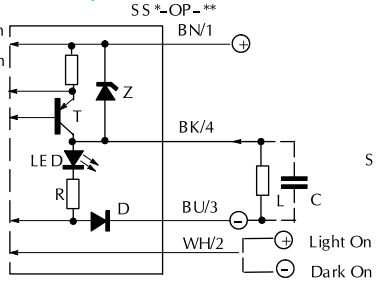
Emitter SSE-0*-**



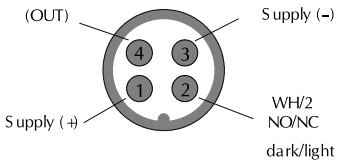
NPN Output SS*-ON-**



PNP Output SS*-OP-**



M12 Connector



SS Series Photoelectric Sensors

	Diffuse Reflective Models			Retro-Reflective Models	Through-Beam Models[5]
Model	*SS2-0N-4A* *SS2-0N-4E* *SS2-0P-4A* *SS2-0P-4E*	*SS5-0N-4A* *SS5-0N-4E* *SS5-0P-4A* *SS5-0P-4E*	*SS6-0N-4A* *SS6-0N-4E* *SS6-0P-4A* *SS6-0P-4E*	*SSP-0N-4A* *SSP-0N-4E* *SSP-0P-4A* *SSP-0P-4E*	*SSE-00-4A* *SSE-00-4E* *SSR-0P-4E* *SSR-0N-4E* *SSR-0N-4A* *SSR-0P-4A*
Type	diffuse reflection			polarized retroreflective[4]	Through-beam[5]
(Sn) Nominal Sensing Distance	100mm[1]	200mm[1]	400mm[2]	2m[3]	8M
Minimal Detectable Objects	-				Ø7.5mm
Emission	infrared (880nm)			red (660nm)	infrared (880nm)
Tolerance	+15/-5%Sn	0/+20% Sn		See SR in glossary	N/A
Sensitivity	Fixed				
Differential Travel	≤10%				
Repeat Accuracy	5%				
Operating Voltage	10-30VDC				
Ripple	≤10%				
No-load Supply Current	30mA				15mA (SSE), 20mA (SSR)
Load Current	≤100mA				
Leakage Current	≤10µA				
Voltage Drop	≤1.2volt maximum at 100mA				
Output Type	NPN or PNP / NO/NC Selectable				
Switching Frequency	250Hz				25Hz
(tv) Time Delay Before Availability	200ms				
Protection From Input Voltage Transients	Yes, as long as the transient peak does not exceed 30VDC				
Protection From Input Power Polarity Reversal	Yes				
Output Power Short-Circuit Protection	Yes (switch autoresets after overload is removed)				
Temperature Range	-25° to + 70° C (-13° to 158° F)				
Temperature Drift	≤10° Sr				
Interference to External Light	3,000 lux (incandescent lamp) 10,000 lux (sunlight)				
Protection Degree (DIN 40 050)	IEC IP67				
LED Indicators	Yellow (output energized)				Red (output energized)
Housing Material	PBT (plastic housing), Polycarbonate (cable exit)				
Lense Material	PMMA				
Weight	100g (3.53 oz)				200g (7.05oz)

[1]With 100x100mm white matt paper
[2] With 100x100mm white matt paper
[3]With standard Ø84mm RL110 reflector
[4]Each sensor includes one 84mm round reflector (RL110). Purchase additional reflectors separately.
[5]An emitter (SSE) and receiver (SSR) pair must be ordered for a complete sensor set.

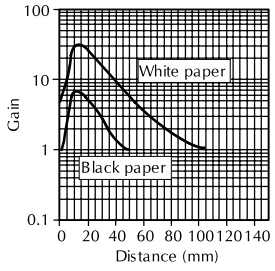
Switching Element Function		
	Retro-reflective Models	*Diffuse Reflective Models*
Light on	NC	NO
Dark on	NO	NC

SS Series Photoelectric Sensors

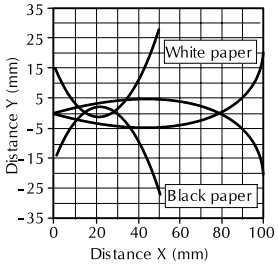
Characteristic Curves: Diffuse Reflection and Retro-Reflective Models

SS2 Models

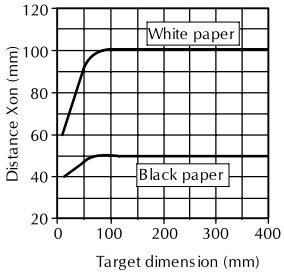
Excess gain



Parallel displacement

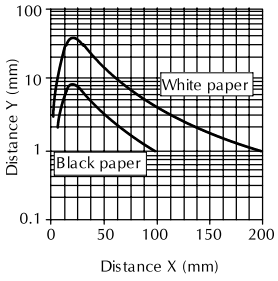


Distance/target size

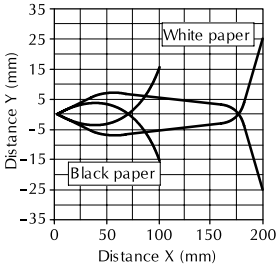


SS5 Models

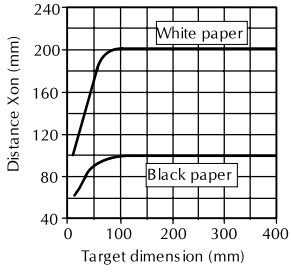
Excess gain



Parallel displacement

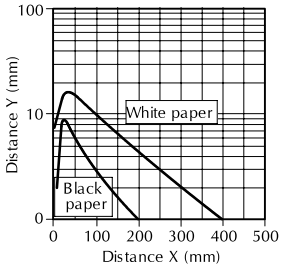


Distance/target size

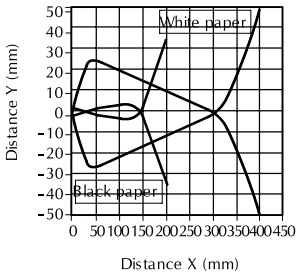


SS6 Models

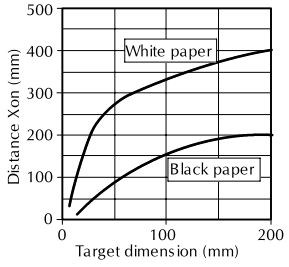
Excess gain



Parallel displacement

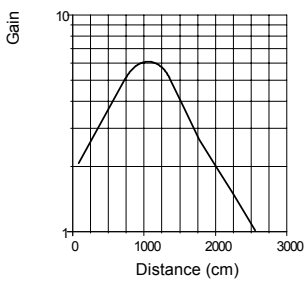


Distance/target size

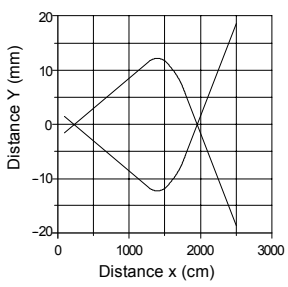


SSP Models

Excess gain

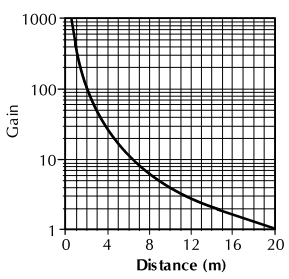


Parallel displacement

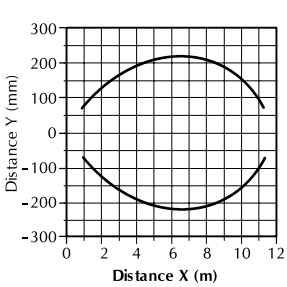


Through Beam (SSE/SSR) Models

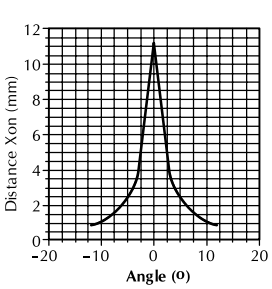
Excess gain



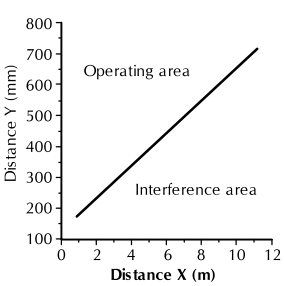
Parallel displacement



Angular displacement



Mutual Interference



Photoelectric Sensors Terminology

Diffuse-reflection proximity switch

With this type of device, the emitter and receiver form part of the same unit. The optical beams are either parallel or slightly converging. The presence of an object in the optical field causes diffused reflection of the luminous beam. The receiver detects the reflection from the object itself. The reflective properties of the object are important. It is generally possible to reliably detect the presence of any object unless it is perfectly reflective or black. Clear objects with a reflective power of 90% are detected close to the rated operating distance. Dark objects with 18% reflectivity are detected at about half the normal operating distance.

Retro-reflective photoelectric switch

The emitter and receiver form part of the same unit. The optical beams are parallel. The emitter's luminous beam hits a reflector and is redirected toward the receiver. Detection occurs when the path of the beam is interrupted by the presence of an opaque object. Operating distance mainly depends on the quality of the reflector used and on the optical-beam angle.

Through-beam photoelectric switch

Emitter and receiver are housed in two separate units and are installed one in front of the other. Detection occurs when the path of the beam is interrupted by the presence of an opaque object.

Polarized retro-reflective photoelectric switch

This is a variant of the retro-reflective photoswitch. A polarizing filter is placed in the emitter's optical path. A polarizing filter in the receiver is oriented at a right angle to the filter in the emitter. This results in the elimination of reflections from surfaces other than the reflector. The light from the reflector possesses a component that is strongly polarized in a perpendicular direction to the incident light. It becomes the only recognizable reflected-light source.

Switching element functions

Dark operate

Allows current to flow when the path of the light beam is blocked and will prevent flow when the path of the light beam is not blocked.

Light operate

Allows current to flow when the path of the light beam is not blocked and will prevent flow when the path of the light beam is blocked.

Make NO (normally open)

Causes load current to flow when a target is detected and not to flow when a target is not detected.

Break NC (normally closed)

causes load current to flow when a target is detected and not to flow when a target is not detected.

Make-break or complementary function:

A switching element combination which contains one make function and one break function.

In order to establish a relationship between the two different modes, you must distinguish between type D sensors (light diffusion) and types R and T (light reflection or transmission):

Type	Dark operate	Light operate
Diffuse Reflective	NC	NO
Retro-reflective	NO	NC
Through-beam	NO	NC

Type of output and load connection

Three-wire NPN

Two power supply wires and one output wire. The switching element is connected between output and negative terminal. When ON, the current is drawn from load through the output terminal. The other load terminal is connected to the positive terminal of the power supply.

Three-wire PNP

Two power supply wires and one output wire. The switching element is connected between output and positive terminal. When ON, the current is drawn from positive pole and supplied to the load through the output terminal. The other load terminal is connected to the negative terminal of the power supply.

Photoelectric Sensors Terminology

Programmable Four-wire NPN or PNP

Two power supply wires, one NO/NC selection input and one output. The selection wire sets NO or NC function depending on which power supply terminal it is connected to

Four-wire NPN or PNP (complementary outputs)

Two power supply wires and two complementary outputs, one NO and the other NC.

Four wire NPN or PNP:

Two power supply wires and two output wires. The type of output can be programmed. NPN output is obtained by connecting the PNP terminal to the negative terminal. PNP output is available by connecting the NPN terminal to the positive terminal.

Open collector

The output transistor is not internally connected to a pull-up or pull-down load. Therefore, it is possible to connect an external load supplied by an external voltage. If the output is not the open-collector type, it is possible for the load to be supplied by an external voltage using a blocking diode in series with the output. This solution increments the output voltage drop.

DC OUT

Two power supply wires and two optically decoupled output terminals. Because of its decoupled static relay, it is capable of offering NPN, PNP, parallel and series configurations as well as interfacing with any input desired. The changeover (make-break) function allows switching from NO to NC and vice versa by simply reversing the polarity of the power supply leads, allowing complex logical functions.

Three-Wire AC

Two power supply wires and one output. The switching element is connected between output terminal and phase line. In the ON-state, current is drawn from the phase line and supplied to the load through the output terminal. The other load terminal is connected to the neutral line.

Four-wire AC

Three power supply wires and one output. Two of the supply wires control the changeover function and NO or NC can be selected as desired by connecting to the phase, while the unused lead must not be connected.

Two-wire AC

The two leads make up the switching element itself. In the ON-state, with one terminal connected to the phase and the other to the load, current is drawn from the phase line and supplied to the load through the output terminal. The other load terminal is connected to the neutral line.

Electrical protection

Short circuit protection

All DC sensors are usually supplied with integrated short-circuit protection. AC sensors do not have this protection and using external devices such as fuses will not protect them from internal damage.

Output protection of DC sensors in the case of short circuit or overcurrent is effected by establishing a maximum current threshold (limiting current). When this threshold is exceeded (usually between 1.5 and 3 times Ie), the proximity switch opens the output circuit.

Normal operation is resumed by following certain procedures which vary according to type of protection.

a) Autoreset: reset occurs automatically after the cause of the short circuit has been removed

b) With hold: to restore normal operation it is necessary to cycle power or switch off the power supply and remove the cause of the short circuit

In both cases, during the short circuit one or a burst of current pulses (whose amplitude can reach 5A) will flow across the output.

Overvoltage protection

When the UB voltage is exceeded for a few moments, AC and DC proximity switches will not generally be damaged provided dissipated energy does not exceed 0.5J.

The AC sensors are not protected when power supply voltage permanently exceeds Ub.

For sensors with both AC and DC voltage, the Ub value in direct current can be exceeded in continuation without causing damage until the equivalent peak value in alternating current is reached. In this particular range, the sensor will not function, and the output remains disconnected.

Polarity-reversal protection

No damage will occur to switches if the supply wires are reversed.

Inductive-load protection

Unless otherwise stated, DC sensors are fitted with an inductive-load (surge) protection which consists of a diode or Zener diode.

Status Indicators

The LED indicators can be classified according to color:

CONTINUOUS GREEN:Power on

CONTINUOUS YELLOW: Output on

CONTINUOUS RED: Fault — When there is only one LED, it is usually red and indicates output state.