

# Photoelectric Sensors Selection Guide



Photoelectric Sensors Selection Guide				
Specification	FA Series LED DC	FA Series Laser DC	FB Series DC	SS Series DC
<b>Description</b>	18mm plastic, DC	18mm plastic or metal, DC	18mm plastic, DC	18mm plastic, DC
<b>Sensing Distances</b>	Diffuse models: 1m Reflective models: 3m Through-beam: 20m	Diffuse models: 300mm Reflective models: 20m Through-beam: 50m	Diffuse models: 400mm Reflective models: 2.5m Through-beam models: 8m	Diffuse models: 100mm, 200mm, 400mm Reflective models: 2m Through-beam models: 8m
<b>Output State</b>	Complementary N.O. / N.C.	Complementary N.O. / N.C.	Light-on, Dark-on	N.O. / N.C. selectable
<b>Logic Output</b>	NPN/PNP	NPN/PNP	NPN/PNP	NPN/PNP
<b>Connection Type</b>	Axial cable / M12 connector	Axial cable / M12 connector	M12 connector	Axial cable / M12 connector
<b>Supply Voltage</b>	10 to 30 VDC	10 to 30 VDC	10 to 30 VDC	10 to 30 VDC
<b>Switching Frequency</b>	250Hz	Diffuse and reflective models: 800Hz Through-beam models: 1kHz	1kHz	Diffuse and reflective models: 250Hz Through-beam models: 25Hz
<b>Rating</b>	IEC IP67	IEC IP67	Diffuse: IEC IP65 Retro-reflective and Through-beam: IEC IP67	IEC IP67



Photoelectric Sensors Selection Guide (continued)				
Specification	MS Series DC	FARS Series DC	FF Series	FFRS Series
<b>Description</b>	18mm plastic with background suppression, DC	18mm diffuse with background suppression	IP69K sensors, 18 mm stainless steel, DC	IP69K sensors, 18mm stainless steel diffuse with background suppression, DC
<b>Sensing Distances</b>	Diffuse Reflection Standard distance models: 50mm Extended distance models: 100mm	30 to 130 mm	Diffuse: 100m, 400m, 800mm Polarized reflective: 4m Through-beam: 20m Retro-reflective: 1m	Standard: 30 to 130mm Shiny object: 60 to 100mm
<b>Output State</b>	N.O. / N.C. selectable	N.O. / N.C. background suppression Light-on/Dark-on selectable Q/Qnot	N.O. / N.C. Complementary; Light-on/Dark-on selectable	N.O. / N.C. Complementary; Light-on/Dark-on selectable
<b>Logic Output</b>	NPN/PNP selectable	NPN/PNP	NPN/PNP	NPN/PNP
<b>Connection Type</b>	Axial cable M12 connector	Axial cable M12 connector	M12 connector	M12 connector
<b>Supply Voltage</b>	10 to 30 VDC	10 to 30 VDC	10 to 30 VDC	10 to 30 VDC
<b>Switching Frequency</b>	80Hz	1kHz	Diffuse, Polarized reflective and Retro-reflective: 500Hz, Through-beam: 250Hz	Standard: 1kHz Shiny: 400Hz
<b>Rating</b>	IEC IP67	IEC IP67	IEC IP68, IP69K	IEC IP68, IP69K

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## Photoelectric Sensors Selection Guide (continued)

Specification	MQ Series AC	MV Series AC	C5 Series DC	HE/HER Series DC	DM Series DC
<b>Description</b>	18mm diffuse with background suppression, 90° radial optic	18mm plastic, AC	5mm stainless steel, DC	8mm Through-Beam	12mm nickel-plated brass with Teach operating distance function, DC
<b>Sensing Distances</b>	Standard distance models: 50mm Extended distance models: 100mm	Diffuse: 100mm, 200mm, 400mm Retroreflective: 3m Through-beam: 16m	Diffuse models: 50mm Through-beam models: 250mm	1000 mm / Ex. gain = 2	Diffuse models: 100mm, 300mm Retroreflective models: 2m Through-beam: 4m
<b>Output State</b>	N.O./ N.C. background suppression	N.O./ receiver dependent	N.O. / receiver dependent	N.O./ N.C.	Diffuse: N.O./ N.C. selectable Polarized retroreflective: N.O./ N.C. selectable Through-beam: N.O. / N.C./ receiver dependent
<b>Logic Output</b>	Triac	Triac	NPN / PNP/ N.O. only	NPN / PNP	NPN / PNP
<b>Connection Type</b>	M12 quick-disconnect	Axial cable M12 connector	Axial cable M8 connector	Axial cable M8 quick-disconnect	Axial cable / M12 connector
<b>Operating Voltage</b>	20 – 253 VAC	20 – 253 VAC	10 – 30 VDC	10 – 30 VDC	10 – 30 VDC
<b>Switching Frequency</b>	25Hz	25Hz	250Hz	10kHz	Diffuse and retroreflective models: 400Hz Through-beam models: 250Hz
<b>Rating</b>	IEC IP67	IEC IP67	IEC IP67	IEC IP67	IEC IP67



## Photoelectric Sensors Selection Guide (continued)

Specification	C18 Series DC	GX Series DC	QM Series DC	FM Series DC
<b>Description</b>	18mm nickel-plated brass, DC	18mm rectangular plastic, DC	Mini-rectangular plastic, DC	Harsh Duty, rectangular metal, DC
<b>Sensing Distances</b>	Diffuse models: up to 600mm Diffuse models w/ background suppression: 10–120 mm Retroreflective models: Up to 2m Through-beam models: Up to 6m	Diffuse models w/ background suppression: Up to 150mm Retroreflective models: Up to 4m Through-beam models: Up to 20m	Diffuse models: 100mm, 400mm, 1m, 1.5 m Diffuse w/ background suppression: 200mm, 400mm Retroreflective models: 7m Polarized retroreflective: 5m Retroreflective transparent objects: 1m, 1.5m, 4m Through-beam : 20m, 30m	Diffuse models: 0.5 m Diffuse w/ background suppression: 0.2 m Polarized retroreflective: Up to 5m Through-beam: Up to 10m
<b>Output State</b>	Diffuse: Light-on / Dark-on selectable Diffuse models with background suppression: Light-on Polarized retroreflective: Dark-on Through-beam: Light-on / Dark-on / receiver dependent	Diffuse models w/ background suppression: Light-on Polarized retroreflective: Light-on / Dark-on Through-beam: Light-on / Dark-on / receiver dependent	Light-on / Dark-on selectable	Light-on / Dark-on selectable
<b>Logic Output</b>	NPN / PNP/ receiver dependent	NPN / PNP/ receiver dependent	NPN / PNP	NPN / PNP
<b>Connection Type</b>	Axial cable / M12 connector	M12 connector	Axial cable / M8 connector	Axial cable / M8 connector / 0.3 m cable with M12 QD connector
<b>Operating Voltage</b>	10–36 VDC	10–30 VDC	10–30 VDC	10–30 VDC
<b>Switching Frequency</b>	Diffuse models: 1kHz Diffuse models w/ background suppression: 500Hz Retroreflective models: 1kHz Through-beam models: 1kHz	1kHz	1kHz, 2kHz	1kHz
<b>Rating</b>	IEC IP67	IEC IP67	IEC IP67	IEC IP 65, 67, 68, 69K

# Photoelectric Sensors Selection Guide



Photoelectric Sensors Selection Guide (continued)				
Specification	FE Series DC	CX Series DC	OPT Short Range (CMOS) Series	OPT (Transit Time) Series
<b>Description</b>	Mini-rectangular plastic, DC	Mini-rectangular plastic, DC	Photoelectric reflex laser distance measuring sensors. 50 x 50mm rectangular housing.	Photoelectric transit time laser distance measuring sensors. 32 x 22mm, 50 x 50mm, and 81 x 55mm rectangular housing.
<b>Sensing Distances</b>	Diffuse models: 800mm Retroreflective models: 4m Through-beam: 12m	Diffuse models: up to 600mm Diffuse models w/ background suppression: 15–150 mm Retroreflective models: Up to 2m Through-beam models: Up to 6m	Diffuse models: 80mm, 160mm, 350mm, 660mm	Diffuse models: 1m, 3m, 3.05 m, 6.2 m, 10.1 m Retroreflective models: 100.2 m
<b>Output State</b>	Light-on/Dark-on selectable	N.O.	Diffuse models: Analog N.O. / N.C. selectable (OPT2001–OPT2006) N.O. / N.C. selectable	Diffuse models: Analog N.O. / N.C. selectable N.O. / N.C. selectable Two selectable N.O. / N.C. Antivalent N.O./N.C. selectable  Retroreflective models: 2 N.O. / N.C. selectable
<b>Logic Output</b>	NPN/PNP	NPN/PNP	PNP, NPN or Push-Pull	PNP or PNP/NPN
<b>Connection Type</b>	Axial cable / M8 connector	Axial cable / M8 connector	5-pin M12 connector 8-pin M12 connector	4-pin M8, 4-pin M12, 5-pin M12, 8-pin M12, and pigtail connectors
<b>Operating Voltage</b>	10–30 VDC	10–36 VDC	18–30 VDC, 10–30 VDC	18–30 VDC, 10–30 VDC
<b>Switching Frequency</b>	1kHz	Diffuse models: 1kHz Diffuse models w/ background suppression: 500Hz Retroreflective models: 1kHz Through-beam models: 1kHz	100Hz	50Hz, 250Hz, 1kHz
<b>Rating</b>	IEC IP67	IEC IP65	IEC IP67	IEC IP68



Photoelectric Sensors Selection Guide (continued)		
Specification	OPT Color Series	OPT Contrast Series
<b>Description</b>	Color Sensors	Contrast Sensors
<b>Sensing Distances</b>	30–40 mm	12–40 mm
<b>Output State</b>	Light-on / Dark-on selectable	OPT2024 / OPT2025: N.O. All other models: N.O. and N.C. Complementary
<b>Logic Output</b>	NPN or PNP	NPN or PNP
<b>Connection Type</b>	8-pin M12	OPT2024 / OPT2025: 4-pin M12 quick-disconnect All other models: 8-pin M12 quick-disconnect
<b>Operating Voltage</b>	10–30 VDC	10–30 VDC
<b>Switching Frequency</b>	1.8 kHz	OPT2024 / OPT2025: 5kHz All other models: 25kHz
<b>Rating</b>	IP68	IP67

# Photoelectric Sensors Selection Guide



Photoelectric Sensors Selection Guide (continued)		
Specification	FW Series DC	CH Enhanced 50 Series
Description	30mm mount, metal, DC	Fiberglass-reinforced plastic
Sensing Distances	Diffuse w/background suppression models: Adjustable 50 to 800 mm; Fixed to 600mm Polarized retroreflective models: 0.1–15 m	Through-beam: 500 ft (152m) Diffuse models: 10 ft (3m) Polarized retroreflective: 16 ft (4.9 m) Clear /object detector: 45 in (1.2 m)
Output State	Diffuse w/background suppression models: Light-on Polarized retroreflective models: Light-on or Dark-on	Light-on / Dark-on selectable
Logic Output	PNP/NPN	Through-beam: NPN/PNP 250mA, Solid-state relay 300mA @ 240 VAC/ VDC, SPDT EM relay 3A @ 120VAC Diffuse: NPN/PNP 250mA, Solid-state relay 300mA @ 240 VAC/VDC, SPDT EM relay 3A @ 120VAC Polarized retroreflective: NPN/PNP 250mA, Solid-state relay 300mA @ 240 VAC/VDC, SPDT EM relay 3A @ 120VAC Clear object detector: NPN/PNP 250mA, Solid-state relay 300mA @ 240 VAC/VDC, SPDT EM relay 3A @ 120VAC
Connection Type	M12 [12mm] connector	Cable or mini/micro connection
Operating Voltage	10 to 30 VDC	10 to 40 VDC, 12 to 240 VDC, 24 to 240 VAC
Switching Frequency	Diffuse w/background suppression models: 300Hz Polarized retroreflective models: 1000Hz	Various
Rating	IEC IP67	IEC IP67



Photoelectric Sensors Selection Guide (continued)			
Specification	DFT Series Fiber Amp	DFP Series Fiber Amp	OPT Series Fiber Amp
Description	Compact rectangular plastic fiber optic amplifier with Teach operating distance function, DC	Compact rectangular plastic fiber optic amplifier, DC	Fiber optic amplifiers. Single and multi-fiber units.
Sensing Distances	See Optical Fiber Tables following the amplifier's specifications	See Optical Fiber Tables following the amplifier's specifications	See Fiber Optic Cable tables following the amplifier's specifications
Output State	Light-on / Dark-on selectable	Light-on / Dark-on selectable	Light-on / Dark-on selectable
Logic Output	NPN/PNP	NPN/PNP	NPN/PNP / Push Pull
Connection Type	Axial cable / M8 connector	Axial cable / M8 connector	OPT2040/OPT2041: M8 4 pole OPT2042: M12 4 pole, M12 8 pole
Supply Voltage	10 to 30 VDC	10 to 30 VDC	OPT2040: 10-30 VDC OPT2041: 18-30 VDC OPT2042: 18-30 VDC
Switching Frequency	1.5 kHz	1.5 kHz	OPT2040: 2kHz OPT2041: 4kHz OPT2042: 2kHz
Rating	IEC IP64	IEC IP64	OPT2040: IEC IP65 OPT2041: IEC IP65 OPT2042: IEC IP50 OPT2043: IEC IP50

# Photoelectric Sensors Selection Guide



Photoelectric Sensors Selection Guide (continued)			
Specification	SSF Series Fiber Amp	OPT Series Plastic Fibers	OPT Series Glass Fibers
Description	18mm plastic fiber optic amplifier, DC	Cutttable diffuse reflection and through-beam fiber optic cables (2.2 mm diameter)	Glass fiber optic cables diffuse reflection and through-beam (1.6 mm Diameter)
Sensing Distances	See Optical Fiber Tables following the amplifier's specifications	Amplifier dependent. Refer to fiber optic tables for sensing distances.	Amplifier dependent. Refer to fiber Optic tables for sensing distances.
Output State	Light-on / Dark-on selectable	Amplifier dependent	Amplifier dependent
Logic Output	NPN/PNP	Amplifier dependent	Amplifier dependent
Connection Type	Axial cable / M12 connector	Amplifier dependent	Amplifier dependent
Supply Voltage	10 to 30 VDC	Amplifier dependent	Amplifier dependent
Switching Frequency	800Hz	Amplifier dependent	Amplifier dependent
Rating	IEC IP67	IEC IP67	IEC IP67



Photoelectric Sensors Selection Guide (continued)			
Specification	CF Series Optical Fibers	PS Series Forks	S8 Series Contrast Print Mark Sensors
Description	Cutttable diffuse reflection and through-beam fiber optic cables (2.2 mm diameter)	Visible Red, Infrared and Laser Fork Sensors	Metal or plastic contrast print mark sensors
Sensing Distances	Amplifier dependent. Refer to fiber optic tables for sensing distances.	5mm (0.2 in) to 220mm (8.66 in)	6–12 mm [0.2–0.5 in]
Output State	N/A	Selectable Light-on / Dark-on	Selectable Light-on / Dark-on
Logic Output	N/A	NPN/PNP	NPN/PNP
Connection Type	N/A	M8 Connector or M12 Connector	M8 Connector or 150mm M12 Connector
Supply Voltage	N/A	10 – 30 VDC	10–30 VDC
Switching Frequency	N/A	See specifications for specific switching frequencies.	2 kHz
Rating	IEC IP67	IEC IP67/IP69K	IEC IP67 (S8-PR) / IEC IP69K (S8-MR)

# Photoelectric Sensors Selection Guide



## Photoelectric Sensors Selection Guide (continued)

Specification	<i>TL Series Contrast Print Mark Sensors</i>	<i>CX0 Series Area Sensors</i>	<i>CX2 Series Area Sensors</i>	<i>BX Series Light Screen</i>
<b>Description</b>	Basic, standard, or low jitter contrast sensor	Area sensor, sender/receiver pair, object detection, 5mm or 10mm pitch	Area sensor, sender/receiver pair, object detection, 5mm or 10mm pitch	Rectangular plastic high resolution area sensor, DC
<b>Sensing Distances</b>	6–12 mm [0.2–0.5 in]	3m – 6m [9.8 –19.7 in] with up to 320mm height	3m – 6m [9.8 –19.7 in] with up to 960mm height	Through-beam: 2m with 70mm height area
<b>Output State</b>	Selectable Light-on / Dark-on Analog output on select models.	N.O./N.C. configurable	N.O./N.C. configurable, 0-10V, 4-20mA analog out	Selectable N.O./N.C.
<b>Logic Output</b>	NPN / PNP	PNP	PNP	NPN / PNP
<b>Connection Type</b>	M12 Connector	(1) 4-pin and (1) 5-pin M12 quick-disconnect	(1) 4-pin and (1) 8-pin M12 quick-disconnect	M12 connector
<b>Supply Voltage</b>	10–30 VDC	16.8–30 VDC	16.8–30 VDC	12 to 24 VDC
<b>Switching Frequency</b>	TL46-W - 15 kHz TL46-WL - 20 kHz TL46-WJ - 50 kHz	12.3 Hz – 280 Hz, depending on model.	12.3 Hz – 280 Hz, depending on model.	N/A
<b>Rating</b>	IEC IP67	IEC IP67	IEC IP67	IEC IP67