

# 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 Thru-beam: IEC IP67	IEC IP67



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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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 Thru-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



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 with 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 with 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

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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 50 mm rectangular housing.	Photoelectric transit time laser distance measuring sensors. 32 x 22 mm, 50 x 50 mm, and 81 x 55 mm 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	NO	Diffuse models: Analog NO / NC selectable (OPT2001–OPT2006) NO / NC selectable	Diffuse models: Analog NO / NC selectable NO / NC selectable Two selectable NO / NC Antivalent NO/NC selectable  Retroreflective models: 2 NO / NC 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



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: NO All other models: NO and NC 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

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Specification	FW Series DC	CH Enhanced 50 Series
<b>Description</b>	30mm mount, metal, DC	Fiberglass-reinforced plastic
<b>Sensing Distances</b>	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)
<b>Output State</b>	Diffuse w/background suppression models: Light-on Polarized retroreflective models: Light-on or Dark-on	Light-on/Dark-on selectable
<b>Logic Output</b>	PNP/NPN	Through-beam: NPN/PNP 250 mA, Solid-state relay 300 mA @ 240 VAC/VDC, SPDT EM relay 3A @ 120 VAC Diffuse: NPN/PNP 250 mA, Solid-state relay 300 mA @ 240 VAC/VDC, SPDT EM relay 3A @ 120 VAC Polarized retroreflective: NPN/PNP 250 mA, Solid-state relay 300 mA @ 240 VAC/VDC, SPDT EM relay 3A @ 120 VAC Clear object detector: NPN/PNP 250 mA, Solid-state relay 300 mA @ 240 VAC/VDC, SPDT EM relay 3A @ 120 VAC
<b>Connection Type</b>	M12 (12mm) connector	Cable or mini/micro connection
<b>Operating Voltage</b>	10 to 30 VDC	10 to 40 VDC, 12 to 240 VDC, 24 to 240 VAC
<b>Switching Frequency</b>	Diffuse w/background suppression models: 300Hz Polarized retroreflective models: 1000Hz	various
<b>Rating</b>	IEC IP67	IEC IP67



Specification	DFT Series Fiber Amp	DFP Series Fiber Amp	OPT Series Fiber Amp
<b>Description</b>	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.
<b>Sensing Distances</b>	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
<b>Output State</b>	Light-on / Dark-on selectable	Light-on / Dark-on selectable	Light-on / Dark-on selectable
<b>Logic Output</b>	NPN / PNP	NPN / PNP	NPN / PNP / Push Pull
<b>Connection Type</b>	Axial cable / M8 connector	Axial cable / M8 connector	OPT2040/OPT2041: M8 4 pole OPT2042: M12 4 pole, M12 8 pole
<b>Supply Voltage</b>	10 to 30 VDC	10 to 30 VDC	OPT2040: 10-30 VDC OPT2041: 18-30 VDC OPT2042: 18-30 VDC
<b>Switching Frequency</b>	1.5 kHz	1.5 kHz	OPT2040: 2kHz OPT2041: 4kHz OPT2042: 2kHz
<b>Rating</b>	IEC IP64	IEC IP64	OPT2040: IEC IP65 OPT2041: IEC IP65 OPT2042: IEC IP50 OPT2043: IEC IP50

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Specification	SSF Series Fiber Amp	OPT Series Plastic Fibers	OPT Series Glass Fibers
<b>Description</b>	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)
<b>Sensing Distances</b>	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.
<b>Output State</b>	Light-on / Dark-on selectable	Amplifier dependent	Amplifier dependent
<b>Logic Output</b>	NPN / PNP	Amplifier dependent	Amplifier dependent
<b>Connection Type</b>	Axial cable / M12 connector	Amplifier dependent	Amplifier dependent
<b>Supply Voltage</b>	10 to 30 VDC	Amplifier dependent	Amplifier dependent
<b>Switching Frequency</b>	800Hz	Amplifier dependent	Amplifier dependent
<b>Rating</b>	IEC IP67	IEC IP67	IEC IP67



Specification	CF Series Optical Fibers	PS Series Forks	S8 Series Contrast Print Mark Sensors
<b>Description</b>	Cutttable diffuse reflection and through-beam fiber optic cables (2.2mm diameter)	Visible Red, Infrared and Laser Fork Sensors	Metal or plastic contrast print mark sensors
<b>Sensing Distances</b>	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]
<b>Output State</b>	N/A	Selectable Light on/Dark on	Selectable light on/dark on
<b>Logic Output</b>	N/A	NPN / PNP	NPN / PNP
<b>Connection Type</b>	N/A	M8 Connector or M12 Connector	M8 Connector or 150mm M12 Connector
<b>Supply Voltage</b>	N/A	10 – 30 VDC	10–30 VDC
<b>Switching Frequency</b>	N/A	See specifications for specific switching frequencies.	25 kHz
<b>Rating</b>	IEC IP67	IEC IP67/IP69K	IEC IP67 (S8-PR) / IEC IP69K (S8-MR)

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Specification	TL Series Contrast Print Mark Sensors	CX0 Series Area Sensors	CX2 Series Area Sensors	BX Series Light Screen
<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.	NO/NC configurable	NO/NC 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