# Photoelectric Sensors Selection Guide

## MS Series DC
- **Description**: 18mm plastic with background suppression, DC
- **Sensing Distances**: Diffuse reflection: 30 to 130 mm, Standard distance models: 50 mm, Extended distance models: 100 mm
- **Output State**: N.O. / N.C. selectable
- **Logic Output**: NPN / PNP selectable
- **Connection Type**: Axial cable / M12 connector
- **Supply Voltage**: 10 to 30 VDC
- **Switching Frequency**: 80 Hz
- **Rating**: IEC IP67

## FARS Series DC
- **Description**: 18mm diffuse with background suppression
- **Sensing Distances**: Diffuse: 300 mm, Reflective: 20 m
- **Output State**: N.O. / N.C. selectable
- **Logic Output**: NPN / PNP
- **Connection Type**: Axial cable / M12 connector
- **Supply Voltage**: 10 to 30 VDC
- **Switching Frequency**: 1 kHz
- **Rating**: IEC IP67

## FF Series
- **Description**: IP69K sensors, 18 mm stainless steel, DC
- **Sensing Distances**: Diffuse: 400 mm, Polarized reflective: 2.5 m, Through-beam: 8 m
- **Output State**: Light-on, Dark-on selectable
- **Logic Output**: NPN / PNP
- **Connection Type**: M12 connector
- **Supply Voltage**: 10 to 30 VDC
- **Switching Frequency**: Standard: 1 kHz, Shiny: 400 Hz
- **Rating**: IEC IP69K

## FFRS Series
- **Description**: IP69K sensors, 18mm stainless steel
- **Sensing Distances**: Diffuse: 100 mm, 200 mm, 400 mm, Reflective: 2 m, Through-beam: 8 m
- **Output State**: N.O. / N.C. selectable
- **Logic Output**: NPN / PNP
- **Connection Type**: M12 connector
- **Supply Voltage**: 10 to 30 VDC
- **Switching Frequency**: Diffuse and reflective models: 250 Hz, Through-beam models: 25 Hz
- **Rating**: IEC IP69K

## FA Series LED DC
- **Description**: 18mm plastic, DC
- **Sensing Distances**: Diffuse models: 1m, Reflective models: 3m, Through-beam: 20m
- **Output State**: Complementary N.O. / N.C.
- **Logic Output**: NPN / PNP
- **Connection Type**: Axial cable / M12 connector
- **Supply Voltage**: 10 to 30 VDC
- **Switching Frequency**: 250 Hz
- **Rating**: IEC IP67

## FA Series Laser DC
- **Description**: 18mm plastic or metal, DC
- **Sensing Distances**: Diffuse models: 300 mm, Reflective models: 20 m, Through-beam: 50 m
- **Output State**: Complementary N.O. / N.C.
- **Logic Output**: NPN / PNP
- **Connection Type**: Axial cable / M12 connector
- **Supply Voltage**: 10 to 30 VDC
- **Switching Frequency**: Through-beam models: 1 kHz
- **Rating**: IEC IP67

## FB Series
- **Description**: 18mm plastic, DC
- **Sensing Distances**: Diffuse models: 100m, 400m, 800 mm, Polarized reflective: 4m, Through-beam: 20 m, Retro-reflective: 1 m
- **Output State**: Light-on, Dark-on selectable
- **Logic Output**: NPN / PNP
- **Connection Type**: M12 connector
- **Supply Voltage**: 10 to 30 VDC
- **Switching Frequency**: Diffuse and reflective models: 800 Hz, Through-beam models: 1 kHz
- **Rating**: IEC IP65

## SS Series DC
- **Description**: 18mm plastic, DC
- **Sensing Distances**: Diffuse models: 100mm, 200mm, 400mm, Reflective models: 2m, Through-beam models: 8m
- **Output State**: N.O. / N.C. selectable
- **Logic Output**: NPN / PNP
- **Connection Type**: Axial cable / M12 connector
- **Supply Voltage**: 10 to 30 VDC
- **Switching Frequency**: Diffuse, Polarized reflective and Retro-reflective: 500 Hz, Through-beam: 250 Hz
- **Rating**: IEC IP68, IP69K
# Photoelectric Sensors Selection Guide

## Specification

### MQ Series AC
- **Description**: 18mm diffuse with background suppression, 90° radial optic
- **Sensing Distances**: Standard distance models: 50mm Extended distance models: 100mm
- **Output State**: N.O. / N.C. background suppression
- **Logic Output**: Triac
- **Connection Type**: M12 quick disconnect
- **Operating Voltage**: 20 – 253 VAC
- **Switching Frequency**: 25Hz
- **Rating**: IEC IP67

### MV Series AC
- **Description**: 18mm plastic, AC
- **Sensing Distances**: Diffuse: 100mm, 200mm, 400mm Retroreflective: 3m Through-beam: 16m
- **Output State**: N.O. / receiver dependent
- **Logic Output**: Triac
- **Connection Type**: Axial cable / M12 connector
- **Operating Voltage**: 20 – 253 VAC
- **Switching Frequency**: 25Hz
- **Rating**: IEC IP67

### C5 Series DC
- **Description**: 5mm stainless steel, DC
- **Sensing Distances**: Diffuse models: 50mm Through-beam models: 250mm
- **Output State**: N.O. / receiver dependent
- **Logic Output**: Triac
- **Connection Type**: Axial cable / M8 connector
- **Operating Voltage**: 10 – 30 VDC
- **Switching Frequency**: 25Hz
- **Rating**: IEC IP67

### HE/HER Series DC
- **Description**: 12mm nickel-plated brass with Teach operating distance function, DC
- **Sensing Distances**: Diffuse models: 100mm, 300mm Retroreflective models: 2m Through-beam: 4m
- **Logic Output**: Triac
- **Connection Type**: Axial cable / M12 connector
- **Operating Voltage**: 10 – 30 VDC
- **Switching Frequency**: 1kHz
- **Rating**: IEC IP67

### DM Series DC
- **Description**: 12mm nickel-plated brass with Teach operating distance function, DC
- **Sensing Distances**: Diffuse models: 100mm, 300mm Retroreflective models: 2m Through-beam: 4m
- **Logic Output**: Triac
- **Connection Type**: Axial cable / M12 connector
- **Operating Voltage**: 10 – 30 VDC
- **Switching Frequency**: 1kHz
- **Rating**: IEC IP67

## Specification

### C18 Series DC
- **Description**: 18mm nickel-plated brass, DC
- **Sensing Distances**: Diffuse models: up to 600mm Diffuse models w/ background suppression: 10–120 mm Retroreflective models: Up to 2m Through-beam models: Up to 6m
- **Output State**: N.O. / receiver dependent
- **Logic Output**: Triac
- **Connection Type**: Axial cable / M8 quick disconnect
- **Operating Voltage**: 10 – 30 VDC
- **Switching Frequency**: 1kHz
- **Rating**: IEC IP67

### GX Series DC
- **Description**: 18mm rectangular plastic, DC
- **Sensing Distances**: Diffuse models w/ background suppression: Up to 150mm Retroreflective models: Up to 4m Through-beam models: Up to 20m
- **Output State**: N.O. / receiver dependent
- **Logic Output**: Triac
- **Connection Type**: Axial cable / M8 connector
- **Operating Voltage**: 10 – 30 VDC
- **Switching Frequency**: 25Hz
- **Rating**: IEC IP67

### QM Series DC
- **Description**: Harsh Duty, rectangular metal, DC
- **Sensing Distances**: Diffuse models: 100mm, 400mm, 1m, 1.5m, 4m Through-beam: 20m, 30m
- **Output State**: N.O. / receiver dependent
- **Logic Output**: Triac
- **Connection Type**: Axial cable / M8 quick disconnect
- **Operating Voltage**: 10 – 30 VDC
- **Switching Frequency**: 1kHz
- **Rating**: IEC IP67

### HE/HER Series DC
- **Description**: 18mm plastic, DC
- **Sensing Distances**: Diffuse models w/ background suppression: 200mm, 400mm Retroreflective models: 7m Retroreflective transparent objects: 1m, 1.5m, 4m Through-beam: Up to 10m
- **Output State**: N.O. / receiver dependent
- **Logic Output**: Triac
- **Connection Type**: Axial cable / M8 quick disconnect
- **Operating Voltage**: 10 – 30 VDC
- **Switching Frequency**: 1kHz
- **Rating**: IEC IP67

### FM Series DC
- **Description**: Harsh Duty, rectangular metal, DC
- **Sensing Distances**: Diffuse models: 15m, 25m Food and drink models: 1.5m, 7m Retroreflective models: 2m Through-beam: Up to 10m
- **Output State**: N.O. / receiver dependent
- **Logic Output**: Triac
- **Connection Type**: Axial cable / M8 quick disconnect
- **Operating Voltage**: 10 – 30 VDC
- **Switching Frequency**: 1kHz
- **Rating**: IEC IP67
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<th>OPT (Transit Time) Series</th>
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<td>Mini-rectangular plastic, DC</td>
<td>Photoelectric reflex laser distance measuring sensors, 50 x 50 mm rectangular housing.</td>
<td>Photoelectric transit time laser distance measuring sensor, 32 x 22 mm, 50 x 50 mm, and 81 x 55 mm rectangular housing.</td>
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<tr>
<td><strong>Sensing Distances</strong></td>
<td>Diffuse models: 800mm Retractable models: 4m Through-beam: 12m</td>
<td>Diffuse models: up to 600mm Diffuse models w/ background suppression: 15–150 mm Retractable models: Up to 2m Through-beam models: Up to 6m</td>
<td>Diffuse models: 80mm, 160mm, 350mm, 660mm</td>
<td>Diffuse models: 1m, 3m, 3.05 m, 6.2 m, 10.1 m Retractable models: 100.2 m</td>
</tr>
<tr>
<td><strong>Output State</strong></td>
<td>Light-on/Dark-on selectable</td>
<td>NO</td>
<td>Diffuse models: Analog NO / NC selectable (OPT2001-OPT2006) NO / NC selectable</td>
<td>Diffuse models: Analog NO / NC selectable NO / NC selectable Two selectable NO / NC Antivalent NO/NC selectable Retractable models: 2 NO / NC selectable</td>
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<tr>
<td><strong>Logic Output</strong></td>
<td>NPN / PNP</td>
<td>NPN / PNP</td>
<td>PNP, NPN or Push-Pull</td>
<td>PNP or PNP/NPN</td>
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<tr>
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<td>Axial cable / M8 connector</td>
<td>Axial cable / M8 connector</td>
<td>5-pin M12 connector 9-pin M12 connector</td>
<td>4-pin M8, 4-pin M12, 5-pin M12, 8-pin M12, and pigtail connectors</td>
</tr>
<tr>
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<td>10–36 VDC</td>
<td>18–30 VDC, 10–30 VDC</td>
<td>18–30 VDC, 10–30 VDC</td>
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<tr>
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<td>Diffuse models: 1kHz Diffuse models w/ background suppression: 500Hz Retractable models: 1kHz Through-beam models: 1kHz</td>
<td>100Hz</td>
<td>50Hz, 250Hz, 1kHz</td>
</tr>
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<td><strong>Rating</strong></td>
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<td>Contrast Sensors</td>
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<td>30–40 mm</td>
<td>12–40 mm</td>
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<tr>
<td><strong>Output State</strong></td>
<td>Light-on/Dark-on selectable</td>
<td>OPT2024 / OPT2025; NO All other models: NO and NC Complementary</td>
</tr>
<tr>
<td><strong>Logic Output</strong></td>
<td>NPN or PNP</td>
<td>NPN or PNP</td>
</tr>
<tr>
<td><strong>Connection Type</strong></td>
<td>8-pin M12</td>
<td>OPT2024 / OPT2025; 4-pin M12 quick-disconnect All other models: 8-pin M12 quick-disconnect</td>
</tr>
<tr>
<td><strong>Operating Voltage</strong></td>
<td>10–30 VDC</td>
<td>10–30 VDC</td>
</tr>
<tr>
<td><strong>Switching Frequency</strong></td>
<td>1.8 kHz</td>
<td>OPT2024 / OPT2025; 5kHz All other models: 5kHz</td>
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<tr>
<td><strong>Rating</strong></td>
<td>IP68</td>
<td>IP67</td>
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</tbody>
</table>
# Photoelectric Sensors Selection Guide

## Specification | FW Series DC | CH Enhanced 50 Series
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**Description** | 30mm mount, metal, DC | Fiber-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 (152 m)
- Diffuse models: 10 feet (3 m)
- 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 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

**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: 1000Hz
- Through-beam: various

**Rating** | IEC IP67 | IEC IP67

## 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
- 10 to 30 VDC
- 10 to 30 VDC
- 10 to 30 VDC
- 10 to 30 VDC

**Switching Frequency**
- 1.5 kHz
- 1.5 kHz
- 2 kHz
- 4 kHz
- 2 kHz
- 2 kHz

**Rating** | IEC IP64 | IEC IP64 | IEC IP64
# Photoelectric Sensors Selection Guide

## SSF Series Fiber Amp
- **Description**: 18mm plastic fiber optic amplifier, DC
- **Sensing Distances**: See Optical Fiber Tables following the amplifier's specifications
- **Output State**: Light-on / Dark-on selectable
- **Logic Output**: NPN / PNP
- **Connection Type**: Axial cable / M12 connector
- **Supply Voltage**: 10 to 30 VDC
- **Switching Frequency**: 800Hz
- **Rating**: IEC IP67

## OPT Series Plastic Fibers
- **Description**: Cuttable diffuse reflection and through-beam fiber optic cables (2.2mm diameter)
- **Sensing Distances**: Amplifier dependent. Refer to fiber optic tables for sensing distances.
- **Output State**: Amplifier dependent
- **Logic Output**: Amplifier dependent
- **Connection Type**: Amplifier dependent
- **Supply Voltage**: Amplifier dependent
- **Switching Frequency**: Amplifier dependent
- **Rating**: IEC IP67

## OPT Series Glass Fibers
- **Description**: Glass fiber optic cables diffuse reflection and through-beam (1.6 mm Diameter)
- **Sensing Distances**: Amplifier dependent. Refer to Fiber Optic cables for sensing distances.
- **Output State**: Amplifier dependent
- **Logic Output**: Amplifier dependent
- **Connection Type**: Amplifier dependent
- **Supply Voltage**: Amplifier dependent
- **Switching Frequency**: Amplifier dependent
- **Rating**: IEC IP67

## CF Series Optical Fibers
- **Description**: Cuttable diffuse reflection and through-beam fiber optic cables (2.2mm diameter)
- **Sensing Distances**: Amplifier dependent. Refer to fiber optic tables for sensing distances.
- **Output State**: Selectable Light on/Dark on
- **Logic Output**: NPN / PNP
- **Connection Type**: M8 Connector or M12 Connector
- **Supply Voltage**: 10 to 30 VDC
- **Switching Frequency**: 25 kHz
- **Rating**: IEC IP67/IP69K

## PS Series Forks
- **Description**: Visible Red, Infrared and Laser Fork Sensors
- **Sensing Distances**: 5mm (0.2 in) to 220mm (8.66 in)
- **Output State**: Selectable light on/dark on
- **Logic Output**: NPN / PNP
- **Connection Type**: M8 Connector or 150mm M12 Connector
- **Supply Voltage**: 10–30 VDC
- **Switching Frequency**: See specifications for specific switching frequencies.
- **Rating**: IEC IP67/IP69K

## S8 Series Contrast Print Mark Sensors
- **Description**: Metal or plastic contrast print mark sensors
- **Sensing Distances**: 6–12 mm [0.2–0.5 in]
- **Output State**: Selectable light on/dark on
- **Logic Output**: NPN / PNP
- **Connection Type**: M8 Connector or 150mm M12 Connector
- **Supply Voltage**: 10–30 VDC
- **Switching Frequency**: 25 kHz
- **Rating**: IEC IP67 (S8-PR) / IEC IP69K (S8-MR)
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![Photoelectric Sensors](image)

<table>
<thead>
<tr>
<th>Specification</th>
<th>TL Series Contrast Print Mark Sensors</th>
<th>CX0 Series Area Sensors</th>
<th>CX2 Series Area Sensors</th>
<th>BX Series Light Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>Basic, standard, or low jitter contrast sensor</td>
<td>Area sensor, sender/receiver pair, object detection, 5mm or 10mm pitch</td>
<td>Area sensor, sender/receiver pair, object detection, 5mm or 10mm pitch</td>
<td>Rectangular plastic high resolution area sensor, DC</td>
</tr>
<tr>
<td><strong>Sensing Distances</strong></td>
<td>6–12 mm (0.2–0.5 in)</td>
<td>3m – 6m (9.8 –19.7 in) with up to 320mm height</td>
<td>3m – 6m (9.8 –19.7 in) with up to 960mm height</td>
<td>Through-beam: 2m with 70mm height area</td>
</tr>
<tr>
<td><strong>Output State</strong></td>
<td>Selectable light on/dark on. Analog output on select models.</td>
<td>NO/NC configurable</td>
<td>NO/NC configurable, 0-10V, 4-20mA analog out</td>
<td>Selectable N.O / N.C.</td>
</tr>
<tr>
<td><strong>Logic Output</strong></td>
<td>NPN / PNP</td>
<td>PNP</td>
<td>PNP</td>
<td>NPN / PNP</td>
</tr>
<tr>
<td><strong>Connection Type</strong></td>
<td>M12 Connector</td>
<td>(1) 4-pin and (1) 5-pin M12 quick-disconnect</td>
<td>(1) 4-pin and (1) 8-pin M12 quick-disconnect</td>
<td>M12 connector</td>
</tr>
<tr>
<td><strong>Supply Voltage</strong></td>
<td>10–30 VDC</td>
<td>16.8–30 VDC</td>
<td>16.8–30 VDC</td>
<td>12 to 24 VDC</td>
</tr>
<tr>
<td><strong>Switching Frequency</strong></td>
<td>TL46-W - 15 kHz</td>
<td>12.3 Hz – 280 Hz, depending on model.</td>
<td>12.3 Hz – 280 Hz, depending on model.</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Rating</strong></td>
<td>IEC IP67</td>
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