## Photoelectric Sensors Selection Guide

### Specification MS Series DC | FARS Series DC | FF Series | FFRS Series
--- | --- | --- | ---
**Description** | 18mm plastic with background suppression, DC | 18mm diffuse with background suppression | IP69K sensors, 18 mm stainless steel, DC | IP69K sensors, 18 mm stainless steel, diffuse with background suppression, DC |
**Sensing Distances** | Diffuse Reflection: Standard: 50mm, Extended: 100mm | 30 to 130 mm | Diffuse: 100m, 400m, 800mm | Polart: 4m, Through: 20m, Ret: 1m |
**Output State** | N.O. / N.C. selectable | N.O. / N.C. &/or Dark-on selectable Q20m | N.O. / N.C. Complement; Light-on/Dark-on selectable | N.O. / N.C. Complement; Light-on/Dark-on selectable |
**Logic Output** | NPN/PNP | NPN/PNP | NPN/PNP | NPN/PNP |
**Connection Type** | Axial cable / M12 connector | Axial cable / M12 connector | M12 connector | M12 connector |
**Supply Voltage** | 10 to 30 VDC | 10 to 30 VDC | 10 to 30 VDC | 10 to 30 VDC |
**Switching Frequency** | 80Hz | 1kHz | Diffuse, Polart; Ret: 500Hz, Through: 250Hz | Standard: 1kHz, Shiny: 400Hz |
**Rating** | IEC IP67 | IEC IP67 | IEC IP68, IP69K | IEC IP68, IP69K |
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<tr>
<th>Specification</th>
<th>MQ Series AC</th>
<th>MV Series AC</th>
<th>C5 Series DC</th>
<th>HE/HER Series DC</th>
<th>DM Series DC</th>
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<tbody>
<tr>
<td><strong>Description</strong></td>
<td>18mm diffuse with background suppression, 90° radial optic</td>
<td>18mm plastic, AC</td>
<td>5mm stainless steel, DC</td>
<td>5mm Thru-Beam</td>
<td>12mm nickel-plated brass with Teach operating distance function, DC</td>
</tr>
<tr>
<td><strong>Sensing Distances</strong></td>
<td>Standard distance models: 50mm</td>
<td>Diffuse: 100mm, 200mm, 400mm</td>
<td>Diffuse models: 50mm</td>
<td>Diffuse models: 100mm, 300mm Retroreflective models: 2m</td>
<td>Diffuse models: 100mm, 300mm Retroreflective models: 2m, Through-beam: 4m</td>
</tr>
<tr>
<td><strong>Logic Output</strong></td>
<td>Triac</td>
<td>Triac</td>
<td>NPN / PNP</td>
<td>NPN / PNP</td>
<td>NPN / PNP</td>
</tr>
<tr>
<td><strong>Connection Type</strong></td>
<td>M12 quick disconnect</td>
<td>Axial cable / M12 connector</td>
<td>Axial cable / M8 connector</td>
<td>Axial cable / M8 quick disconnect</td>
<td>Axial cable / M12 connector</td>
</tr>
<tr>
<td><strong>Switching Frequency</strong></td>
<td>25Hz</td>
<td>25Hz</td>
<td>250Hz</td>
<td>10kHz</td>
<td>Diffuse and retroreflective models: 400Hz Though-beam models: 250Hz</td>
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<thead>
<tr>
<th>Specification</th>
<th>C18 Series DC</th>
<th>GX Series DC</th>
<th>QM Series DC</th>
<th>HE/HER Series DC</th>
<th>DM Series DC</th>
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<tbody>
<tr>
<td><strong>Description</strong></td>
<td>18mm nickel-plated brass, DC</td>
<td>18mm rectangular plastic, DC</td>
<td>Mini-rectangular plastic, DC</td>
<td>Harsh Duty, rectangular metal, DC</td>
<td></td>
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<tr>
<td><strong>Sensing Distances</strong></td>
<td>Diffuse models: up to 600mm</td>
<td>Diffuse models w/ background suppression: 10-120 mm Retroreflective models: Up to 2m</td>
<td>Through-beam models: Up to 6m</td>
<td>Through-beam models: 50mm Retroreflective models: 3m</td>
<td>Through-beam: 16m</td>
</tr>
<tr>
<td><strong>Output State</strong></td>
<td>Diffuse: Light-on / Dark-on selectable Polarized retroreflective: Dark-on Through-beam: Light-on / Dark-on / receiver dependent</td>
<td>Diffuse models w/ background suppression: Up to 150mm Retroreflective models: Up to 4m</td>
<td>Through-beam models: Up to 20m</td>
<td>Light-on/Dark-on selectable</td>
<td></td>
</tr>
<tr>
<td><strong>Logic Output</strong></td>
<td>NPN / PNP</td>
<td>NPN / PNP</td>
<td>NPN / PNP</td>
<td>NPN / PNP</td>
<td></td>
</tr>
<tr>
<td><strong>Connection Type</strong></td>
<td>Axial cable / M12 connector</td>
<td>M12 connector</td>
<td>Axial cable / M8 connector</td>
<td>Axial cable / M8 connector / 0.3 m cable with M12 QD connector</td>
<td></td>
</tr>
<tr>
<td><strong>Operating Voltage</strong></td>
<td>10 – 36 VDC</td>
<td>10 – 30 VDC</td>
<td>10 – 30 VDC</td>
<td>10 – 30 VDC</td>
<td></td>
</tr>
<tr>
<td><strong>Switching Frequency</strong></td>
<td>1kHz</td>
<td>1kHz, 2kHz</td>
<td>1kHz</td>
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<th>OPT (Transit Time) Series</th>
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<tr>
<td><strong>Description</strong></td>
<td>Mini-rectangular plastic, DC</td>
<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 sensors, 52 x 22 mm, 50 x 50 mm, and 81 x 55 mm rectangular housing.</td>
</tr>
<tr>
<td><strong>Sensing Distances</strong></td>
<td>Diffuse models: 800mm Retroreflective models: 4m Through-beam: 12m</td>
<td>Diffuse models: up to 600mm Diffuse models w/ background suppression: 15–150 mm Retroreflective 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 Retroreflective models: 100.2 m</td>
</tr>
<tr>
<td><strong>Output State</strong></td>
<td>Light-on/Dark-on selectable</td>
<td>ND</td>
<td>Diffuse models: Analog NO / NC selectable OPT2001-OPT2006 NO / NC selectable Two selectable NO / NC Antivalent NO/NC selectable Retroreflective models: 2 NO / NC selectable</td>
<td></td>
</tr>
<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>
</tr>
<tr>
<td><strong>Connection Type</strong></td>
<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>
<td><strong>Operating Voltage</strong></td>
<td>10–30 VDC</td>
<td>10–36 VDC</td>
<td>18–30 VDC, 10–30 VDC</td>
<td>18–30 VDC, 10–30 VDC</td>
</tr>
<tr>
<td><strong>Switching Frequency</strong></td>
<td>1kHz</td>
<td>Diffuse models: 1kHz Diffuse models w/ background suppression: 500Hz Retroreflective models: 1kHz Through-beam models: 1kHz</td>
<td>100Hz</td>
<td>50Hz, 250Hz, 1kHz</td>
</tr>
<tr>
<td><strong>Rating</strong></td>
<td>IEC IP67</td>
<td>IEC IP65</td>
<td>IEC IP67</td>
<td>IEC IP68</td>
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<tr>
<td><strong>Description</strong></td>
<td>Color Sensors</td>
<td>Contrast Sensors</td>
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<tr>
<td><strong>Sensing Distances</strong></td>
<td>30–40 mm</td>
<td>12–40 mm</td>
</tr>
<tr>
<td><strong>Output State</strong></td>
<td>Light-on/Dark-on selectable</td>
<td>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>OPT2024 / OPT2025; 5kHz All other models: 25kHz</td>
</tr>
<tr>
<td><strong>Switching Frequency</strong></td>
<td>1.8 kHz</td>
<td>OPT2024 / OPT2025; 5kHz</td>
</tr>
<tr>
<td><strong>Rating</strong></td>
<td>IP68</td>
<td>IP67</td>
</tr>
</tbody>
</table>
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## Specification FW Series DC
- **Description**: 30mm mount, metal, DC
- **Fiber optic criterion**: Fiberglass-reinforced plastic
- **Sensing Distances**: Diffuse w/background suppression models: Adjustable 50 to 800 mm; Fixed to 600 mm
  - Polarized retroreflective models: 0.1–15 m
- **Output State**: Diffuse w/background suppression models: Light-on
  - Polarized retroreflective models: Light-on or Dark-on
- **Logic Output**: PNP/NPN
- **Connection Type**: M12 (12mm) connector
- **Operating Voltage**: 10 to 30 VDC
- **Switching Frequency**: Various
- **Rating**: IEC IP67

## Specification CH Enhanced 50 Series
- **Through-beam**: 500 ft (152 m)
- **Diffuse models**: 10 ft (3 m)
- **Polarized retroreflective**: 16 ft (4.9 m)
- **Clear object detector**: 45 in (1.2 m)
- **Logic Output**: Light-on/Dark-on selectable
- **Connection Type**: Cable or mini/micro connection
- **Supply Voltage**: 10 to 40 VDC, 12 to 240 VDC, 24 to 240 VAC
- **Switching Frequency**: Various
- **Rating**: IEC IP67

## Specification DFT Series Fiber Amp
- **Description**: Compact rectangular plastic fiber optic amplifier with Teach operating distance function, DC
- **Logic Output**: NPN / PNP
- **Connection Type**: Axial cable / M8 connector
- **Supply Voltage**: 10 to 30 VDC
- **Switching Frequency**: 1.5 kHz
- **Rating**: IEC IP64

## Specification DFP Series Fiber Amp
- **Description**: Compact rectangular plastic fiber optic amplifier, DC
- **Logic Output**: NPN / PNP
- **Connection Type**: Axial cable / M8 connector
- **Supply Voltage**: 10 to 30 VDC
- **Switching Frequency**: 1.5 kHz
- **Rating**: IEC IP64

## Specification OPT Series Fiber Amp
- **Description**: Fiber optic amplifiers. Single and multi-fiber units.
- **Logic Output**: NPN / PNP / Push Pull
- **Connection Type**: OPT2040/OPT2041: M8 4 pole, OPT2042: M12 4 pole, M12 8 pole
- **Supply Voltage**: OPT2040: 10-30 VDC, OPT2041: 18-30 VDC, OPT2042: 18-30 VDC
- **Switching Frequency**: Various
# 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 (2.2 mm 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 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

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## 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**: N/A
- **Logic Output**: N/A
- **Connection Type**: N/A
- **Supply Voltage**: N/A
- **Switching Frequency**: N/A
- **Rating**: IEC IP67

## 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 M12 Connector
- **Supply Voltage**: 10 – 30 VDC
- **Switching Frequency**: See specifications for specific switching frequencies.
- **Rating**: IEC IP67

## 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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<th>Specification</th>
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<th>CX2 Series Area Sensors</th>
<th>BX Series Light Screen</th>
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<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 TL46-WL - 20 kHz TL46-WJ - 50 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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