# Photoelectric Sensors Selection Guide

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## Specification

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<td>18mm plastic, DC</td>
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<td>NPN / PNP</td>
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<tr>
<td>Connection Type</td>
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<td>Axial cable / M12 connector</td>
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<td>10 to 30 VDC</td>
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<td>IEC IP67</td>
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<td>Diffuse: IEC IP65</td>
<td>IEC IP67</td>
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## Specification

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<td>IP69K sensors, 18 mm stainless steel, DC</td>
<td>IP69K sensors, 18 mm stainless steel diffuse with background suppression, DC</td>
</tr>
<tr>
<td>Logic Output</td>
<td>NPN / PNP selectable</td>
<td>NPN/PNP</td>
<td>NPN / PNP</td>
<td>NPN / PNP</td>
</tr>
<tr>
<td>Connection Type</td>
<td>Axial cable M12 connector</td>
<td>Axial cable M12 connector</td>
<td>M12 connector</td>
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</tr>
<tr>
<td>Supply Voltage</td>
<td>10 to 30 VDC</td>
<td>10 to 30 VDC</td>
<td>10 to 30 VDC</td>
<td>10 to 30 VDC</td>
</tr>
<tr>
<td>Switching Frequency</td>
<td>80Hz</td>
<td>1kHz</td>
<td>Diffuse, Polared reflective and Retro-reflective: 500Hz, Through-beam: 250Hz</td>
<td>Standard: 1kHz, Shiny: 400Hz</td>
</tr>
<tr>
<td>Rating</td>
<td>IEC IP67</td>
<td>IEC IP67</td>
<td>IEC IP68, IP69K</td>
<td>IEC IP68, IP69K</td>
</tr>
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</table>
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### 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
- **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**: NPN / PNP
- **Connection Type**: Axial cable / M12 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
- **Output State**: N.O. / N.C. selectable
- **Logic Output**: NPN / PNP
- **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
- **Output State**: N.O. / N.C. selectable
- **Logic Output**: NPN / PNP
- **Connection Type**: Axial cable / M12 connector
- **Operating Voltage**: 10 – 30 VDC
- **Switching Frequency**: 1kHz
- **Rating**: IEC IP67

### 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
- **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**: NPN / PNP
- **Connection Type**: Axial cable / M12 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
- **Output State**: N.O. / N.C. selectable
- **Logic Output**: NPN / PNP
- **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
- **Output State**: N.O. / N.C. selectable
- **Logic Output**: NPN / PNP
- **Connection Type**: Axial cable / M12 connector
- **Operating Voltage**: 10 – 30 VDC
- **Switching Frequency**: 1kHz
- **Rating**: IEC IP67

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### C18 Series DC
- **Description**: 18mm nickel-plated brass, DC
- **Sensing Distances**: Diffuse: 100mm, 200mm, 400mm, Retroreflective: 3m
- **Output State**: N.O. / Dark-on selectable
- **Logic Output**: Triac
- **Connection Type**: M12 quick disconnect
- **Operating Voltage**: 10 – 36 VDC
- **Switching Frequency**: 1kHz
- **Rating**: IEC IP67

### GX Series DC
- **Description**: 18mm rectangular plastic, DC
- **Sensing Distances**: Diffuse: 100mm, 200mm, 400mm, Retroreflective: 3m
- **Output State**: N.O. / receiver dependent
- **Logic Output**: NPN / PNP
- **Connection Type**: Axial cable / M12 connector
- **Operating Voltage**: 10 – 30 VDC
- **Switching Frequency**: 1kHz
- **Rating**: IEC IP67

### QM Series DC
- **Description**: Mini-rectangular plastic, DC
- **Sensing Distances**: Diffuse models: 50mm, Through-beam models: 250mm
- **Output State**: N.O. / receiver dependent
- **Logic Output**: NPN / PNP
- **Connection Type**: Axial cable / M12 connector
- **Operating Voltage**: 10 – 30 VDC
- **Switching Frequency**: 25Hz
- **Rating**: IEC IP67

### HE/HER Series DC
- **Description**: Harsh Duty, rectangular metal, DC
- **Sensing Distances**: Diffuse models: 100mm, 300mm, Retroreflective models: 2m
- **Output State**: N.O. / N.C. selectable
- **Logic Output**: NPN / PNP
- **Connection Type**: Axial cable / M12 connector
- **Operating Voltage**: 10 – 30 VDC
- **Switching Frequency**: 1kHz
- **Rating**: IEC IP67

### DM Series DC
- **Description**: Harsh Duty, rectangular metal, DC
- **Sensing Distances**: Diffuse models: 100mm, 300mm
- **Output State**: N.O. / N.C. selectable
- **Logic Output**: NPN / PNP
- **Connection Type**: Axial cable / M12 connector
- **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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</thead>
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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</td>
<td>Diffuse models: up to 600mm retroreflective models: up to 2m</td>
<td>Diffuse models: 80 mm, 160 mm, 350 mm, 660 mm</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>NO</td>
<td>Diffuse models: Analog NO / NC selectable</td>
<td>Diffuse models: Analog NO / NC selectable, NO / NC selectable, two selectable NO / NC, or Antivalent NO/NC selectable</td>
</tr>
<tr>
<td><strong>Logic Output</strong></td>
<td>NPN / PNP</td>
<td>NPN / PNP</td>
<td>NPN or PNP or Push-Pull</td>
<td>PNP or PNP/NPN</td>
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<tr>
<td><strong>Connection Type</strong></td>
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<td>Axial cable / M8 connector</td>
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<td>4-pin M8, 4-pin M12, 5-pin M12, 8-pin M12, and pigtail connectors</td>
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<tr>
<td><strong>Operating Voltage</strong></td>
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<td>18–30 VDC, 10–30 VDC</td>
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<tr>
<td><strong>Switching Frequency</strong></td>
<td>1 kHz</td>
<td>Diffuse models: 1 kHz</td>
<td>Diffuse models: 10 Hz</td>
<td>50 Hz, 250 Hz, 1 kHz</td>
</tr>
<tr>
<td><strong>Rating</strong></td>
<td>IEC IP67</td>
<td>IEC IP65</td>
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</tbody>
</table>

### OPT Color Series
- Color Sensors

### OPT Contrast Series
- Contrast Sensors
- OPT2024 / OPT2025: NO
- All other models: NO and NC Complementary
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<th>CH Enhanced 50 Series</th>
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<tbody>
<tr>
<td><strong>Description</strong></td>
<td>30mm mount, metal, DC</td>
<td>Fiber-reinforced plastic</td>
</tr>
<tr>
<td><strong>Sensing Distances</strong></td>
<td>Diffuse w/background suppression models: Adjustable 50 to 800 mm; Fixed to 600mm Polarized retroreflective models: 0.1–15 m</td>
<td>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)</td>
</tr>
<tr>
<td><strong>Output State</strong></td>
<td>Diffuse w/background suppression models: Light-on Polarized retroreflective models: Light-on or Dark-on</td>
<td>Light-on/Dark-on selectable</td>
</tr>
<tr>
<td><strong>Logic Output</strong></td>
<td>PNP/NPN</td>
<td>Through-beam: NPN/PNP 250 mA, Solid-state relay 300 mA @ 240 VAC/VDC, SPDT relay 3A @ 120 VAC Diffuse: NPN/PNP 250 mA, Solid-state relay 300 mA @ 240 VAC/VDC, SPDT relay 3A @ 120 VAC Polarized retroreflective: NPN/PNP 250 mA, Solid-state relay 300 mA @ 240 VAC/VDC, SPDT relay 3A @ 120 VAC Clear object detector: NPN/PNP 250 mA, Solid-state relay 300 mA @ 240 VAC/VDC, SPDT relay 3A @ 120 VAC</td>
</tr>
<tr>
<td><strong>Connection Type</strong></td>
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<td>Cable or mini/micro connection</td>
</tr>
<tr>
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<tr>
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<td>Diffuse w/background suppression models: 300Hz Polarized retroreflective models: 1000Hz</td>
<td>various</td>
</tr>
<tr>
<td><strong>Rating</strong></td>
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<th>DFP Series Fiber Amp</th>
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<tr>
<td><strong>Description</strong></td>
<td>Compact rectangular plastic fiber optic amplifier with Teach operating distance function, DC</td>
<td>Compact rectangular plastic fiber optic amplifier, DC</td>
<td>Fiber optic amplifiers. Single and multi-fiber units.</td>
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<tr>
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<td>See Optical Fiber Tables following the amplifier's specifications</td>
<td>See Fiber Optic Cable tables following the amplifier's specifications</td>
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<tr>
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<td>Light-on / Dark-on selectable</td>
<td>Light-on / Dark-on selectable</td>
</tr>
<tr>
<td><strong>Logic Output</strong></td>
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<td>NPN / PNP</td>
<td>NPN / PNP / Push Pull</td>
</tr>
<tr>
<td><strong>Connection Type</strong></td>
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<td>Axial cable / M8 connector</td>
<td>OPT2040/2041: M8 4 pole OPT2042: M12 8 pole</td>
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<tr>
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<td>10 to 30 VDC</td>
<td>OPT2040: 10-30 VDC OPT2041: 18-30 VDC OPT2042: 18-30 VDC</td>
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<tr>
<td><strong>Switching Frequency</strong></td>
<td>1.5 kHz</td>
<td>1.5 kHz</td>
<td>OPT2040: 2kHz OPT2041: 4kHz OPT2042: 2kHz</td>
</tr>
<tr>
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<td>IEC IP64</td>
<td>OPT2040: IEC IP65 OPT2041: IEC IP65 OPT2042: IEC IP50 OPT2043: IEC IP50</td>
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## 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

## 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 – 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 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>BX Series Light Screen</th>
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<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>
<td>IEC IP67</td>
<td>IEC IP67</td>
<td>IEC IP67</td>
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