PD30 series - Photoelectric Sensors

Sensors
This new range of miniature high-performance sensors comes in three complete product lines: a PD30 STAINLESS STEEL family with IP69K and Ecolab certifications and superior durability, a cost-effective PD30 BASIC and POINTSPOT family with potentiometer adjustment and a refined PD30 ADVANCED family with teach-in function, dust warning, and options for muting and remote teaching. The PD30 sensor family combines excellent sensing abilities with an optimised compact housing design. Featuring a size of only 10.8 x 20 x 30 mm, it follows international industry standards. In addition, the PD30 family covers a wide variety of sensing principles to fit requirements of virtually any application: diffuse-reflective, background suppression, retro-reflective with or without polarization, even for transparent objects, as well as through-beam. These PD30 sensors are eminently suited for applications where space saving and high accuracy in detection are of vital importance.

**Full range of PD30 sensors**

**World-class housing design**
The compact and robust sensor housing in ABS-PMMA offers a high level of water and dust protection (IP 67). The Stainless steel version is IP69K and Ecolab certified.

**High EMC performance**
The microprocessor technology and the compact design ensure excellent EMC performance.

**Environmentally friendly**
This lead-free sensor is designed according to the RoHS directive. The highly advanced microprocessor design optimizes power consumption, allowing a 20% energy reduction compared to other sensors.

**Simplified setup**
Distance and sensing functions are easily set via the teach button or the remote teach wire on the PD30 ADVANCED sensors and via the freely adjustable potentiometer on the PD30 BASIC sensors, the PD30 PointSpot sensors and the PD30 Stainless steel sensors.

**Space optimization**
Despite its small size, PD30 offers the longest sensing range, managing distances formerly reached only by larger sensors.

**Tamper-proof (PD30 Advanced series)**
Connecting the remote teach wire to the power supply disables the push button and makes the sensor tamper-proof.

**Diagnostic warning (PD30 Advanced series)**
Two options are available: a ‘dust output’ that monitors the sensing performance and sends a signal if the sensor gets dirty, and a ‘mute input’ that allows a PLC to check the application for proper sensing operations.

**Approvals**
CE (EN60947-5-2)
cULus (UL508)

*) Only stainless steel
PD30 Series

PD30 Stainless Steel

The PD30 Stainless Steel sensor family is designed for use in harsh or hygienic environments. Built of excellent materials, the housing is resistant to high-pressure washdown, aggressive cleaning agents, and disinfectants. The sturdy stainless steel housing (AISI316L) together with high-quality plastic materials like PEEK, PPSU, and PES sealings of FKM guarantee an outstanding mechanical resistance. IP69K and Ecolab certified, these stainless steel sensors superiorly meet the demands of the food and beverage industry.

PD30 Advanced

Sensitivity adjustment is accessible and highly flexible due to the teach-in and remote teach functions offered by the PD30 Advanced sensor series. Using the remote teach function, the operator can set the sensor from a PLC. Furthermore, the Advanced series features dust warning and mute input, ensuring that sensor malfunctions are timely detected, and costly machine downtime is avoided. The Advanced series offers detection of transparent objects such as PET bottles.

PD30 Basic

The PD30 Basic sensor family presents a range of general-purpose sensors: economical, yet highly efficient! These sensors feature tap or back potentiometer for sensitivity adjustment as well as background suppression (BGS) based on a brand-new sensing principle which considerably increases the sensing distance (200 mm) and improves the detection accuracy of different colours.

PD30 PointSpot

The PD30 Basic sensor family includes a PointSpot version with a visible, small and precise red beam of light. The PointSpot emitter sends out a more concentrated light resulting in a clear-cut light spot without any surrounding halo to disturb the detection. The PointSpot sensors enable detection with precise accuracy.
Miniature photoelectric sensors

**Product types**

**Through-Beam**
Separate emitter and receiver in a separate housing. A sensing distance of 15 m enables the sensor to be used in industrial settings where reliable detection is of primary importance. With a powerful infrared light beam, the sensor can see through various materials and determine whether content is present or not.

**Retro-Reflective and Polarized Reflective**
Emitter and receiver in one and the same housing. The signal from the emitter is sent to a reflector/passive device, and the need for wiring is reduced to one side of the application. The infrared retro-reflective sensor is primarily used in applications where the light beam must be invisible - for instance in entrance systems/doorways. The polarized reflective sensors are also able to detect objects with bright shiny surfaces.

**Retro-Reflective PointSpot**
Emitter and receiver in one and the same housing. The signal from the emitter is sent to a reflector/passive device, and the need for wiring is reduced to one side of the application. The retro-reflective PointSpot sensor emits a highly visible and well-defined light spot without any disturbing “halo”. The polarized reflective sensors are also able to detect objects with bright shiny surfaces.

**Retro-Reflective for transparent objects**
Like retro-reflective sensors - but optimised to detect transparent objects such as PET bottles. The PD30 sensor features a long-range version suitable for supervising the jamming zone on both narrow and wide conveyor belts.

**Diffuse-Reflective**
Emitter and receiver in one and the same housing. A diffuse-reflective sensor without background suppression measures only energy returned from objects, which makes it ideal for structured surfaces because the sensor detects an average amount of light reflected.
Product types

**Diffuse-Reflective - Extremely wide-angle**
Emitter and receiver in one and the same housing. The diffuse-reflective sensor with an extremely wide detection angle can be used to detect PCBs despite large holes in the board, which means the PCB is registered as one PCB in the product cycle.

**Background Suppression**
A background suppression sensor detects an object using triangulation. Unlike a diffuse-reflective sensor, it is not colour-sensitive and is, therefore, capable of detecting a black object in front of, for instance, a white background.

**Background Suppression PointSpot**
A background suppression sensor detects an object using triangulation. The background suppression PointSpot sensor has an excellent colour variation suppression (same distance on all colours). In addition, the PointSpot sensor emits no disturbing halo light but produces a well-defined, visible light spot.

General features and functions

**Electrical and optical design**

**PD30 standard**
An optimised aspherical lens design allows for both a wide sensing angle and a long sensing range. A PCB ‘sandwich construction’ together with microprocessor technology and a robust, functional analogue design provide optimised sensing and EMC performances, exceeding requirements from IEC. PD30 is a sensor optimised for industrial environments!

**PD30 PointSpot**
An optimised lens holder and lens design that generates the PointSpot light beam and eliminates the halo light for a precise and well-defined detection performance. Micro-processor techniques featuring control of the emitter pulses, detection, signal filtration, synchronisation, LED indication control as well as the output and short-circuited detection. The sensitive parts of the sensor are shielded with a metal casing to achieve the best EMC performances. A sensor optimised for Industrial automation.
**PD30 Stainless Steel - features and functions**

**Waterproof sealings**
Flourelastomer (FKM)

**Housing and clips**
AISI316L High-grade stainless steel

**Front glass**
Polyphenylene sulfide (PPSU) or Polymethyl methacrylate (PMMA) organosiloxane-coated

**Large lens**
ensures long sensing range

**4-pin M8 plug connector**
to meet most connection requirements

**Indicator cover**
Polyethersulfone (PES)

**Yellow LED**
Target detected

**Sensitivity trimmer shaft**
Polyetheretherketone (PEEK)

**Green LED**
Power supply and signal stability

**Laser markings**
for better hygiene

**Built-in mounting holes**
2 x M3 for fast mounting
Spacing: 25.4 mm (1”)

**4-wire PVC cable**
Ø3.3 mm to meet most connection requirements

**PD30 Stainless Steel - benefits**

**Highest degree of protection**

The IP69K rating is for applications where high pressure and high temperature washdown is used to sanitize equipment.

The PD30 Stainless steel housing withstands high-pressure cleaning processes with chemicals, and the sensor’s object detection is continuous and reliable even in the harshest conditions. Certified by Ecolab.

<table>
<thead>
<tr>
<th>Tolerates</th>
<th>Description of application</th>
<th>Concentration</th>
<th>Load duration</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topax 56</td>
<td>Acidic foam cleaner for the food industry</td>
<td>5%</td>
<td>240 hours at 50°C</td>
<td>Passed</td>
</tr>
<tr>
<td>P3 Hypochloran</td>
<td>Chlorine-containing disinfectant for the food industry</td>
<td>1%</td>
<td>240 hours at 24°C</td>
<td>Passed</td>
</tr>
<tr>
<td>TOPAZ CL1</td>
<td>Alkaline and chlorine-containing foam cleaner for the food industry</td>
<td>5%</td>
<td>240 hours at 50°C</td>
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<tr>
<td>TOPAZ AC1</td>
<td>Acidic foam cleaner for the food industry</td>
<td>4%</td>
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<tr>
<td>TOPAZ MD3</td>
<td>Alkaline foam cleaner for the food industry</td>
<td>5%</td>
<td>240 hours at 50°C</td>
<td>Passed</td>
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<tr>
<td>P3-topactive OKTO</td>
<td>Acidic foam disinfectant for the food industry</td>
<td>1%</td>
<td>240 hours at 24°C</td>
<td>Passed</td>
</tr>
</tbody>
</table>
**PD30 Stainless Steel - specifications**

<table>
<thead>
<tr>
<th><strong>PD30ET..</strong></th>
<th><strong>Background suppression</strong></th>
<th><strong>Reflective</strong></th>
<th><strong>Reflective with IR light</strong></th>
<th><strong>Retro-reflective</strong></th>
<th><strong>Diffuse-reflective</strong></th>
<th><strong>Through-beam</strong></th>
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</thead>
<tbody>
<tr>
<td><strong>Cable</strong></td>
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<tr>
<td><strong>Plug</strong></td>
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</tbody>
</table>

**Rated operating distance (S<sub>r</sub>)**
- 200 mm (7.9 inches)
- 6 m ER4 reflector
- 4 m ER4060 reflector
- 1 m
- 200 mm
- 15 m (49.2 feet)

**Hysteresis (H)**
- ≤ 10%
- 5% to 20%

**Rated operational voltage**
- 10 to 30 V DC (Ripple included)

**No load supply current (I<sub>NL</sub>)**
- ≤ 40 mA @ U<sub>B</sub> max.
- ≤ 20 mA @ U<sub>B</sub> min.

**Output**
- Open collector, NPN or PNP by sensor type

**Output function**
- N.O. (light switching) and N.C. (dark switching)

**Output current**
- ≤ 100 mA (max. load capacity 100 nF)

**Minimum operational current (I<sub>M</sub>)**
- ≤ 0.5 mA

**Voltage drop (U<sub>d</sub>)**
- ≤ 2 VDC @ I<sub>M</sub> max.

**Sensor protection**
- Short circuit (A), reverse polarity (B) and transients (C)
- B + C

**Response time**
- ≤ 1.0 ms
- ≤ 0.5 ms
- ≤ 1.0 ms

**Power on delay (t<sub>p</sub>)**
- ≤ 200 ms
- ≤ 30 ms
- ≤ 200 ms
- ≤ 30 ms

**Led indications**
- Target detected (Yellow LED), Signal stability and Power ON (Green LED)
- Power ON

**Sensitivity control**
- Potentiometer, 210° electric, integrated in the receiver for through-beam type

**Degree of protection**
- IP68 @ 2 m and 20 h (IEC 60539; EN60947-1), IP69K (DIN40050-9)

**Ambient temperature**
- Operating: -25 to +60°C (-13 to +140°F)
- Storage: -40 to +60°C (-40 to +140°F)

**Ambient humidity**
- Operating: 35 to 95 % RH, Storage: 35 to 95 % RH

**CE marking**
- According to EN 60947-5-2

**Approvals**
- cULus [UL508, CSA C22.2], ECOLAB

**Installation category**
- III (IEC66064; EN60947-1)

**Pollution degree**
- 3 (EN60947-1)

**Vibration**
- 10 to 150 Hz (1.0 mm/15 g; [EN 60068-2-6]) in X, Y and Z direction

**Shock**
- 30 g /11 ms, 6 positive and 6 negative in X, Y and Z direction

**Light source**
- 617 nm
- 850 nm
- 625 nm
- 617 nm
- 850 nm

**Light type**
- Red modulated
- Infrared modulated
- Red modulated
- Infrared modulated

**Material**
- Body: Stainless steel, AISI316L;
- Front glass: Polyphenylene sulfide (PPSU) or Polymethyl methacrylate (PMMA) organosiloxane-coated;
- Trimmer shaft: Polyetheretherketone (PEEK)

**Cable**
- PVC, black, 2 m, 4 x 0.14mm², Ø=3.3 mm

**Connector**
- 4-pin M8, male

**Dimensions**
- 11 x 31.5 x 21 mm

**Weight incl. packaging**
- Cable version ≤ 100 g, Plug version ≤ 65 g

**Accessories**
- (to be purchased separately)

| Mounting bracket: APD30-MB1 or APD30-MB2 |
| Connectors: CO..54NF... series |
**PD30 Advanced - features and functions**

- **Teach-in button**
  - Distance setting
  - Sensing overhead
  - Normally open/
    Normally closed
teach - in
  - Setup while in operation

- **Mute function (sensor blanking)**
  When more than one set of through-beam sensors are mounted close to each other, mutual interference might occur. Controlling the mute function - for instance from a PLC - can form a multiplex system where only one set of sensors is active at a time and neighbouring interference is avoided. The mute function is also used to check the sensor for malfunctions or disconnections. If the emitter is turned on and off periodically, any malfunction will be detected as early as possible and costly breakdowns are prevented.

- **Half mute function (> 3 sec.)**
  When manually aligned sensors are used over a long distance, condensation or dust can cause false signals. Activating the half mute function (> 3 sec.) will set the emitter at half power. Aligning the sensor at half power ensures enough energy to make the sensor function properly when switching back to full power.

- **Dust alarm output**
  To prevent downtime of machinery, sensors have to be kept clean when used in dirty or dusty environments. The sensor will send an alarm signal over the dust output if it receives a low-level signal for more than 20 ms. As a result, operators will know exactly when to clean the sensor, and sensors are cleaned only when necessary.

- **Remote teaching**
  Detection of diverse objects may require frequent modification of the sensor’s settings such as distance and sensing overheads. A PLC connected to the remote teach input enables the operator to change the sensor’s settings while in operation. The teaching procedure is identical to the one used for manual teaching via the teach button.

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**PD30 Advanced - benefits**

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<thead>
<tr>
<th>Cable</th>
<th>Diffuse-reflective</th>
<th>Retro-reflective</th>
<th>Through-beam</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PD30CN</strong></td>
<td><strong>Background suppression</strong></td>
<td><strong>Energetic</strong></td>
<td><strong>Standard</strong></td>
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<tr>
<td>NPN</td>
<td>Remote teach</td>
<td>..B15NPR ..D10NPR ..R06NPR ..P06NPR ..G02NPR ..T15NPR</td>
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<tr>
<td></td>
<td>Dust alarm</td>
<td>-</td>
<td>..D10NPDU ..R06NPDU ..P06NPDU</td>
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<tr>
<td></td>
<td>Mute function</td>
<td>-</td>
<td>..R06NPMU ..P06NPMU ..G02NPMU</td>
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<tr>
<td>PNP</td>
<td>Remote teach</td>
<td>..B15PPRT ..D10PPRT ..R06PPRT ..P06PPRT ..G02PPRT ..T15PPRT</td>
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<td></td>
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<td>-</td>
<td>..D10PPDU ..R06PPDU ..P06PPDU</td>
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<td>Mute function</td>
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<td><strong>Plug</strong></td>
<td>NPN</td>
<td>Remote teach</td>
<td>..B15NPM5RT ..D10NPM5RT ..R06NPM5RT ..P06NPM5RT ..G02NPM5RT ..T15NPM5RT</td>
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<td>..D10NPM5DU ..R06NPM5DU ..P06NPM5DU</td>
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<td>Mute function</td>
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<td>Remote teach</td>
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<td>Mute function</td>
<td>-</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Rated operating distance (Sn)</th>
<th>150 mm</th>
<th>5.9 inches</th>
<th>1 m</th>
<th>3.3 feet</th>
<th>6 m</th>
<th>9.8 feet</th>
<th>6 m</th>
<th>9.8 feet</th>
<th>2 m</th>
<th>6.6 feet</th>
<th>15 m</th>
<th>49.2 feet</th>
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<tr>
<td>Hysteresis (H)</td>
<td>≤ 10%</td>
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<tr>
<td>Rated operational voltage</td>
<td>10 to 30 V DC, Ripple P-P ≤ 10%</td>
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<tr>
<td>No load supply current (I,)</td>
<td>≤ 32 mA @ 24 V DC</td>
<td>≤ 30 mA @ 24 V DC</td>
<td>≤ 25 mA</td>
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<td>Output</td>
<td>Open collector, NPN or PNP by sensor type</td>
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<tr>
<td>Output function</td>
<td>N.O. (light switching) or N.C. (dark switching)</td>
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<td>Output current (I,)</td>
<td>≤ 100 mA [max. Load capacity 100 nF]</td>
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<td>Minimum operational current</td>
<td>≤ 0.5 mA</td>
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<tr>
<td>Off-State current (I,)</td>
<td>≤ 100 μA</td>
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<tr>
<td>Voltage drop (U,)</td>
<td>≤ 2.5 V DC @ 100 mA</td>
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<tr>
<td>Sensor protection</td>
<td>Short circuit [A], reverse polarity [B] and transients [C]</td>
<td>B + C</td>
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<tr>
<td>Response time</td>
<td>≤ 0.5 mS</td>
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<td>Power on delay (t,)</td>
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<tr>
<td>Led indications</td>
<td>Target detected [Yellow LED], Signal stability and Power ON [Green LED]</td>
<td>Power ON</td>
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<tr>
<td>Sensitivity control</td>
<td>Teach-In programming</td>
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<tr>
<td>Degree of protection</td>
<td>IP67 [IEC 60529; 60947-1]</td>
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<tr>
<td>Ambient temperature</td>
<td>-25 to +55°C (-13 to +131°F) no condensation, Storage -40 to +70°C (-40 to +158°F)</td>
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<tr>
<td>Ambient humidity</td>
<td>Operating: 35 to 85 % RH, storage: 35 to 85 % RH</td>
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<td>Ambient light</td>
<td>≤ 10.000 Lux</td>
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<tr>
<td>CE marking</td>
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<tr>
<td>Approvals</td>
<td>cULus (UL508, CSA C22.2)</td>
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<td>III [IEC60664/60664A; 60947-1]</td>
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<tr>
<td>Pollution degree</td>
<td>3 [IEC60664/60664A; 60947-1]</td>
<td></td>
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<tr>
<td>Vibration</td>
<td>10 to 150 Hz (1.0 mm/15 g; IEC 60068-2-6) in X, Y and Z direction</td>
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<tr>
<td>Shock</td>
<td>30 g/11 ms, 3 positive and 3 negative in X, Y and Z direction</td>
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<tr>
<td>Emitting light source</td>
<td>Red LED</td>
<td>Infrared LED</td>
<td>Red LED</td>
<td>Infrared LED</td>
<td></td>
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<tr>
<td>Material</td>
<td>Body, ABS light grey; Front glass, PMMA red; Trimmer shaft, POM dark grey</td>
<td></td>
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<tr>
<td>Cable</td>
<td>PVC, black, 2 m, 4 x 0.14mm², Ø=3.3 mm</td>
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<tr>
<td>Connector</td>
<td>4-pin M8</td>
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<tr>
<td>Dimensions</td>
<td>10.8 x 20 x 30 mm</td>
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<tr>
<td>Weight incl. packaging</td>
<td>Cable version ≤ 40 g, Plug version ≤ 10 g</td>
<td></td>
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<tr>
<td>Accessories</td>
<td>Mounting bracket: APD30-MB1</td>
<td></td>
<td></td>
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<tr>
<td>Accessories, additional</td>
<td>‘Mounting bracket: APD30-MB2, Connectors: CONM54NF...’ Types’</td>
<td></td>
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</tbody>
</table>
PD30 Series
Miniature photoelectric sensors

PD30 PointSpot - features and functions

Yellow LED
Target detected

Green LED
Power supply and signal stability

Housing
Akrylonitril-butadien-styren (ABS)

Front glass
Polymethyl methacrylate (PMMA) SI-coated

Large lens
ensures long sensing range

4-pin M8 plug connector
to meet most connection requirements

Built-in mounting holes
2 x M3 for fast mounting
Spacing: 25.4 mm (1”)

4-wire PVC cable
Ø 3.3 mm to meet most connection requirements

Indicator cover
Thermoplastic polyurethane (TPU)

Sensitivity shaft
Polyoxymethylen, acetal (POM)

Potentiometer
- Manual setting
- Larger adjustability
- Easily set distance
- Back or top

PD30 PointSpot - principle

PD30 with standard emitter
An object with a high reflection placed within the light beam’s halo but outside the primary light beam may cause an erroneous detection because the reflected light will hit the exact same spot on the receiver array.

PD30 with PointSpot emitter
As the PointSpot light has no halo, any object outside the primary beam will not be detected.
## PD30 PointSpot - specifications

<table>
<thead>
<tr>
<th>PD30C...</th>
<th>Reflective</th>
<th>Retro-reflective</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cable</strong></td>
<td>NPN</td>
<td>..CNB25NAPS</td>
</tr>
<tr>
<td></td>
<td>PNP</td>
<td>..CNB25PAPS</td>
</tr>
<tr>
<td><strong>Plug</strong></td>
<td>NPN</td>
<td>..CNB25NAM5PS</td>
</tr>
<tr>
<td></td>
<td>PNP</td>
<td>..CNB25PAM5PS</td>
</tr>
<tr>
<td><strong>Rated operating distance (S&lt;sub&gt;n&lt;/sub&gt;)</strong></td>
<td>≤ 250 mm</td>
<td>≤ 5 m (16.4 feet) with reflector ER4, ≤ 3 m (9.8 feet) with reflector ER4060</td>
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<tr>
<td></td>
<td>≤ 9.8 inches</td>
<td></td>
</tr>
<tr>
<td><strong>Emitter angle</strong></td>
<td>±1.6° @ 100 mm</td>
<td>±1.0° @ 1/2 sensing distance</td>
</tr>
<tr>
<td><strong>Hysteresis (H)</strong></td>
<td>≤ 10%</td>
<td>3% ... 20%</td>
</tr>
<tr>
<td><strong>Rated operational voltage</strong></td>
<td>10 to 30 V DC (Ripple included)</td>
<td></td>
</tr>
<tr>
<td><strong>No load supply current (I&lt;sub&gt;n&lt;/sub&gt;)</strong></td>
<td>≤ 50 mA @ U&lt;sub&gt;n&lt;/sub&gt; min</td>
<td>≤ 25 mA @ U&lt;sub&gt;max&lt;/sub&gt;</td>
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<tr>
<td></td>
<td>≤ 20 mA @ U&lt;sub&gt;n&lt;/sub&gt; max</td>
<td></td>
</tr>
<tr>
<td><strong>Output</strong></td>
<td>Open collector, NPN or PNP by sensor type</td>
<td></td>
</tr>
<tr>
<td><strong>Output function</strong></td>
<td>N.O. and N.C.</td>
<td></td>
</tr>
<tr>
<td><strong>Output current (I&lt;sub&gt;O&lt;/sub&gt;)</strong></td>
<td>&lt;100 mA (Continuous), ≤ 100 mA @ 100 nF load (Short time)</td>
<td></td>
</tr>
<tr>
<td><strong>Minimum operational current</strong></td>
<td>0.5 mA</td>
<td></td>
</tr>
<tr>
<td><strong>Off-State current (I&lt;sub&gt;off&lt;/sub&gt;)</strong></td>
<td>100 µA</td>
<td></td>
</tr>
<tr>
<td><strong>Voltage drop (U&lt;sub&gt;drop&lt;/sub&gt;)</strong></td>
<td>≤ 2 VDC @ I&lt;sub&gt;max&lt;/sub&gt;</td>
<td></td>
</tr>
<tr>
<td><strong>Sensor protection</strong></td>
<td>Short circuit [A], reverse polarity [B] and transients [C]</td>
<td></td>
</tr>
<tr>
<td><strong>Response time</strong></td>
<td>≤ 1.0 ms</td>
<td>≤ 0.5 ms</td>
</tr>
<tr>
<td><strong>Power on delay (t&lt;sub&gt;on&lt;/sub&gt;)</strong></td>
<td>≤ 200 ms</td>
<td>≤ 30 ms</td>
</tr>
<tr>
<td><strong>Led indications</strong></td>
<td>Target detected (Yellow LED), Signal stability and Power ON (Green LED)</td>
<td></td>
</tr>
<tr>
<td><strong>Sensitivity control</strong></td>
<td>Single-turn potentiometer, 210° electrical adjustment, 240° mechanical adjustment</td>
<td></td>
</tr>
<tr>
<td><strong>Degree of protection</strong></td>
<td>IP67 (IEC60539; EN60947-1)</td>
<td></td>
</tr>
<tr>
<td><strong>Ambient temperature</strong></td>
<td>-25 to +60 °C (-13 to +140 °F) no condensation, storage -40 to +70 °C (-40 to +158 °F)</td>
<td></td>
</tr>
<tr>
<td><strong>Ambient humidity</strong></td>
<td>Operating: 35 to 95 % RH, Storage: 35 to 95 % RH</td>
<td></td>
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<tr>
<td><strong>Ambient light</strong></td>
<td>≤ 45 000 Lux</td>
<td></td>
</tr>
<tr>
<td><strong>CE marking</strong></td>
<td>According to EN 60947-5-2</td>
<td></td>
</tr>
<tr>
<td><strong>Approvals</strong></td>
<td>cULus (UL508, CSA C22.2)</td>
<td></td>
</tr>
<tr>
<td><strong>Installation category</strong></td>
<td>III (EN60947-1)</td>
<td></td>
</tr>
<tr>
<td><strong>Pollution degree</strong></td>
<td>3 (IEC60664; EN60947-1)</td>
<td></td>
</tr>
<tr>
<td><strong>Vibration</strong></td>
<td>10 to 150 Hz (1.0 mm/15 g; EN60068-2-6) in X, Y and Z direction</td>
<td></td>
</tr>
<tr>
<td><strong>Shock</strong></td>
<td>30 g/11 ms (6 positive and 6 negative; EN60068-2-27) in X, Y and Z direction</td>
<td></td>
</tr>
<tr>
<td><strong>Light source</strong></td>
<td>621 nm, Red PointSpot</td>
<td></td>
</tr>
<tr>
<td><strong>Material</strong></td>
<td>Body, ABS light grey; Front glass, PMMA red; Trimmer shaft, POM dark grey</td>
<td></td>
</tr>
<tr>
<td><strong>Cable</strong></td>
<td>PVC, black, 2 m, 4 x 0.14mm², Ø=3.3 mm</td>
<td>Cable version ≤ 50 g, Plug version ≤ 20 g</td>
</tr>
<tr>
<td><strong>Connector</strong></td>
<td>4-pin M8</td>
<td></td>
</tr>
<tr>
<td><strong>Dimensions</strong></td>
<td>10.8 x 20 x 30 mm</td>
<td></td>
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<tr>
<td><strong>Weight incl. packaging</strong></td>
<td></td>
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</tbody>
</table>
The new PD30 Stainless Steel and BASIC background suppression sensor (BGS) is based on a brand-new sensing principle. This principle increases the sensing distance considerably (200 mm) and it improves the detection accuracy of different colours, suppressing the background even more efficiently.

This revolutionary sensing technology uses an Active Pixel Sensor (APS) CMOS array of 64 x 1 sensors, where each pixel represents a specific position. It takes advantage of the fact that the reflected light hits the APS array at exactly the same position. This way, the object's mass centre can be found regardless of the energy of the received light. Using this technology, grey, black and white objects are detected at almost exactly the same distance.

Furthermore, unlike traditional CCD arrays, the CMOS array benefits from being immune to the blooming effect - not letting the light bleed onto other pixels and disturbing the detection.
## PD30 Basic - specifications

<table>
<thead>
<tr>
<th>PD30C...</th>
<th>Diffuse-reflective</th>
<th>Retro-reflective</th>
<th>Through-beam</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Back Potentiometer</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cable</td>
<td>NPN</td>
<td>..NB20NASA</td>
<td>..NB20NAMA5</td>
</tr>
<tr>
<td>PNP</td>
<td>..NB20PASA</td>
<td>..NB20PAMA5</td>
<td>..ND10PASA</td>
</tr>
<tr>
<td><strong>Plug</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NPN</td>
<td>..NB20NAM5SA</td>
<td>..NB20NAM5SIS</td>
<td>..ND10NAM5SA</td>
</tr>
<tr>
<td>PNP</td>
<td>..NB20PAM5SA</td>
<td>..NB20PAM5SIS</td>
<td>..ND10PAM5SA</td>
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<tr>
<td><strong>Top Potentiometer</strong></td>
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<tr>
<td>Cable</td>
<td>NPN</td>
<td>..TB20NAMA5</td>
<td>..TD10NAMA5</td>
</tr>
<tr>
<td>PNP</td>
<td>..TB20PAMA5</td>
<td>..TB20PAM5SA</td>
<td>..TD10PAMA5</td>
</tr>
</tbody>
</table>

- **Rated operating distance** (S<sub>r</sub>)
  - 200 mm (7.9 inches)
  - 1 m (3.3 feet)
  - 6 m (9.8 feet)
  - 15 m (49.2 feet)

- **Emitter angle @ 1/2 distance**
  - ±2.5°
  - ±1.5°
  - ±2.0°
  - ±15°

- **Hysteresis (H)**
  - ≤ 10%
  - 5% to 20%
  - < 10%

- **Rated operational voltage**
  - 10 to 30 V DC, Ripple P-P ≤ 10%

- **No load supply current** (I<sub>NL</sub>)
  - ≤ 30 mA @ U<sub>IN</sub> min
  - ≤ 20 mA @ U<sub>IN</sub> max
  - ≤ 25 mA
  - ≤ 20 mA

- **Output**
  - Open collector, NPN or PNP by sensor type

- **Output function**
  - N.O. (light switching) and N.C. (dark switching)

- **Minimum operational current**
  - ≤ 0.5 mA

- **Off-State current** (I<sub>OS</sub>)
  - ≤ 100 μA

- **Voltage drop** (U<sub>op</sub>)
  - ≤ 2 V DC @ I<sub>op</sub> max

- **Response time**
  - ≤ 1 mS
  - ≤ 0.5 mS
  - ≤ 1 mS

- **Power on delay** (t<sub>ON</sub>)
  - ≤ 200 mS

- **Led indications**
  - Target detected (Yellow LED), Signal stability and Power ON (Green LED)

- **Sensitivity control**
  - Potentiometer, 210° electric, integrated in the receiver for through-beam type

- **Degree of protection**
  - IP67 (IEC 60529; 60947-1)

- **Ambient temperature**
  - -25 to +60 °C (-13 to +140 °F) no condensation, storage -40 to +70 °C (-40 to +158 °F)

- **Ambient humidity**
  - Operating: 35 to 85 % RH, storage: 35 to 85 % RH

- **LED emitting light source**
  - Red Led Infrared LED
  - Red LED Infrared LED
  - Red LED
  - - Infrared LED

- **Material**
  - Body, ABS light grey; Front glass, PMMA red; Trimmer shaft, POM dark grey

- **Cable**
  - Pcv, black, 2.0 m, 4 x 0.14mm², Ø=3.3 mm

- **Connector**
  - 4-pin M8

- **Dimensions**
  - 10.8 x 20 x 30 mm

- **Weight incl. packaging**
  - Cable version ≤ 50 g, Plug version ≤ 20 g

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CARLO GAVAZZI Automation Components. Specifications are subject to change without notice. Illustrations are for example only.
Applications

**Meat, fish and poultry**

The food industry’s high demands on hygiene and cleanliness require equipment that can withstand daily washdown at high temperatures, high-pressure cleaning and harsh detergents.

*Our solution*

The PD30 Stainless steel sensors work perfectly even in the harshest environments. The high-quality stainless steel housing guarantees maximum mechanical resistance, and prescribed cleaning schedules are smoothly met without costly machine downtime.

**Dairy and juice production**

Multi-coloured cartons used in the dairy and juice industries constitute a significant challenge to object detection in the manufacturing process. For example in the production lines of yoghurt cups, the presence of lids on the cups must be detected and it is essential that lids are not confused with yoghurt in the cups.

*Our solution*

Our PD30 background suppression sensor superiorly detects all colours on objects in the same distance from the sensor, and its durable design withstands daily cleaning processes including high-pressure water jets (IP69K) as well as aggressive cleaning agents.

**Food handling and packaging**

Typically, packaging lines and production lines in the food industry are not subject to the same stringent requirements. For convenience and simplicity, however, the trend is towards identical cleaning procedures throughout.

*Our solution*

The PD30 Stainless steel sensors are designed for wet as well as dry areas in the Food and Beverage industry. The stainless steel housing and high-end plastic materials guarantee maximum resistance against IP69K and Ecolab cleaning processes. As a consequence, cleaning routines and instructions are kept homogenous and clearly defined all over the plant.

**Printed circuit board manufacturing**

In the PCB Industry considerable problems can arise when it comes to detecting black components on a PCB.

*Our solution*

The PD30 background suppression sensor is positioned below the PCBs which are detected when passing. Since background suppression is based on triangulation, component colours will not affect the detection. To protect operators on the assembly line from being blinded by an upwardly directed sensor, the infrared PD30 sensor is the obvious choice.
Applications

Coffee vending machines

In vending machines sensors often confuse cups and backgrounds such as a person drawing a cup of coffee.

Our solution
The PD30 background suppression sensor enhances the overall ease of use of the vending machine. Using the new BGS technology, it can detect cups in different colours equally well and, at the same time, ignore people and irrelevant background noise in front of the machine.

End of material detection

End of spool detection of material supplied in narrow cassettes can be done using distance measurement. The sides of the cassette, however, can pose a problem because they are so tight that they might influence the detection.

Our solution
The PD30 sensor with PointSpot beam and background suppression ensures an absolutely precise detection which is not influenced by colour or reflections from the sides of the cassette.

Inspection control

An engine block must be examined to make sure that all the holes are present.

Our solution
Our PD30 background suppression sensor with its red visible PointSpot light can detect even tiny holes because of the small beam diameter. Furthermore, since the PointSpot emitter produces no halo light, the surrounding parts of the hole are not unintentionally exposed to detection. Adjustment is easy due to the visible PointSpot beam.