CARLO GAVAZZI
Automation Components

CARLO GAVAZZI

PD30 series - Photoelectric Sensors

Sensors

PD30 Series
Miniature photoelectric 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 stainlees 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 top 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*

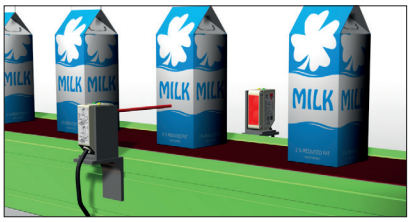
The PD30 Basic sensor family includes a *PointSpot* version with a visible, small and precise red beam of light. The *PointSpot* emitter sends out a more concentrated light resulting in a clear-cut light spot without any surrounding halo light to disturb the detection. The *PointSpot* sensors enable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

PD30 Series
Miniature photoelectric sensors

Product types

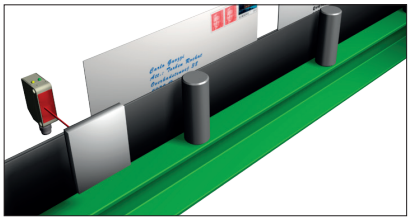
Through-Beam

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.



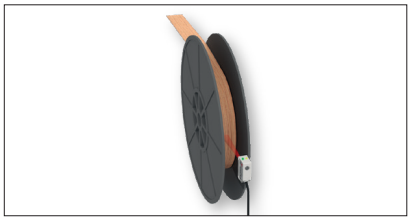
Retro-Reflective and Polarized Reflective

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.



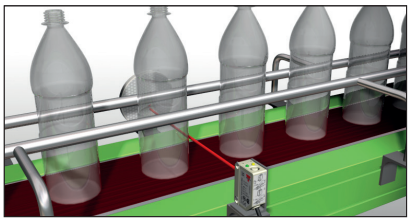
Retro-Reflective *PointSpot*

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.



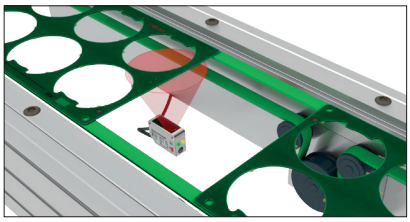
Diffuse-Reflective

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

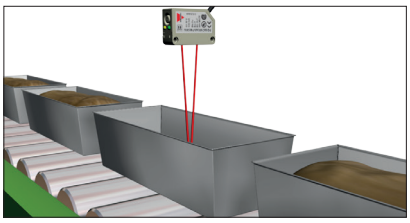
Diffuse-Reflective - Extremely wide-angle

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.



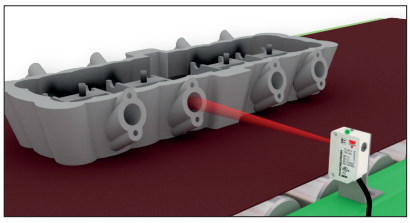
Background Suppression

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.

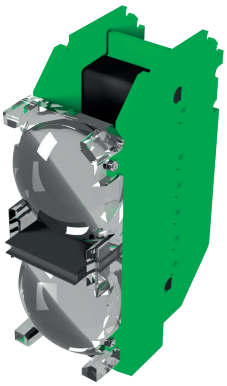


General features and functions

Electrical and optical design

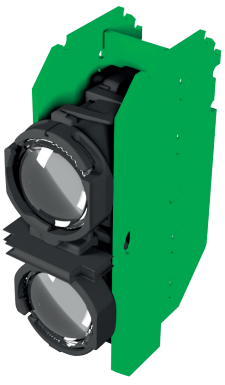
PD30 standard

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 Series
Miniature photoelectric sensors

PD30 Stainless Steel - features and functions

Waterproof sealings
Flourelastomer (FKM)

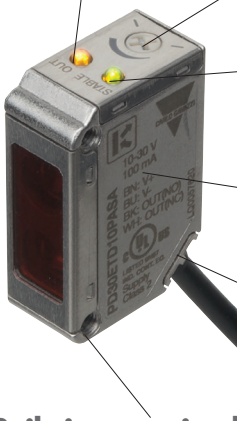
Housing and clips
AISI316L High-grade stainless steel

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

Large lens
ensures long sensing range

Indicator cover
Polyethersulfone (PES)

4-pin M8 plug connector
to meet most connection requirements



Yellow LED
Target detected

Sensitivity trimmer shaft
Polyetheretherketone (PEEK)

Green LED
Power supply and signal stability

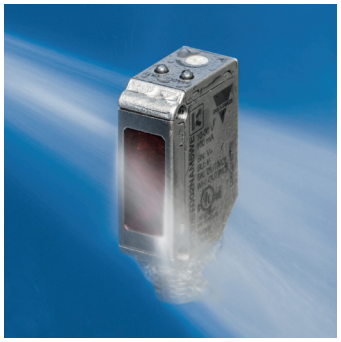
Laser markings
for better hygiene

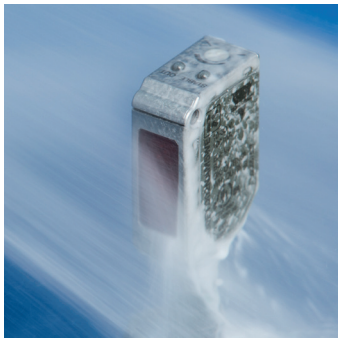
Waterproof sealings

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 wash-down 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.

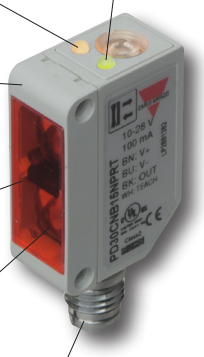
Tolerates	Description of application	Concentration	Load duration	Result
Topax 56	Acidic foam cleaner for the food industry	5%	240 hours at 50°C	Passed
P3 Hypochloran	Chlorine-containing disinfectant for the food industry	1%	240 hours at 24°C	Passed
TOPAZ CL1	Alkaline and chlorine-containing foam cleaner for the food industry	5%	240 hours at 50°C	Passed
TOPAZ AC1	Acidic foam cleaner for the food industry	4%	240 hours at 50°C	Passed
TOPAZ MD3	Alkaline foam cleaner for the food industry	5%	240 hours at 50°C	Passed
P3-topactive OKTO	Acidic foam disinfectant for the food industry	1%	240 hours at 24°C	Passed

PD30 Stainless Steel - specifications

		Background suppression		Retro-reflective		Diffuse-reflective		Through-beam	
PD30ET..		Reflective	Reflective with IR light	Standard	With Polarization filter	Standard	Extremely Wide Angle	Receiver	Emitter
Cable	NPN	..B20NASA	..B20NAIS	..R60NASA	..P60NASA	..D10NASA	..D02NAWE	..T15NASA	..T15
	PNP	..B20PASA	..B20PAIS	..R60PASA	..P60PASA	..D10PASA	..D02PAWE	..T15PASA	
Plug	NPN	..B20NAM5SA	..B20NAM5IS	..R60NAM5SA	..P60NAM5SA	..D10NAM5SA	..D02NAM5WE	..T15NAM5SA	..T15M5
	PNP	..B20PAM5SA	..B20PAM5IS	..R60PAM5SA	..P60PAM5SA	..D10PAM5SA	..D02PAM5WE	..T15PAM5SA	
Rated operating distance (S_n)		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_o)		≤ 40 mA @ U_B max. ≤ 20 mA @ U_B min.		≤ 25 mA @ U_B max.					≤ 20mA @ U_B max.
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_m)		≤ 0,5 mA							-
Off-State current (I_r)		≤ 100 µA							-
Voltage drop (U_d)		≤ 2 VDC @ (I_e) 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_v)		≤ 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 +70°C (-40 to +158°F)		Operating cable version: -25 to +60°C (-13 to +140°F) Operating plug version: -40 to +60°C (-40 to +140°F) Storage: -40 to +70°C (-40 to +158°F)					
Ambient humidity		Operating: 35 to 95 % RH, Storage: 35 to 95 % RH							
Ambient light		≤ 45 000 Lux	≤ 65 000 Lux			≤ 10 000 Lux		≤ 65 000 Lux	
CE marking		According to EN 60947-5-2							
Approvals		cULus (UL508, CSA C22.2), ECOLAB							
Installation category		III (IEC60664; 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 seperately)		Mounting bracket: APD30-MB1 or APD30-MB2 Connectors: CO..54NF... series							

PD30 Series
Miniature photoelectric sensors

PD30 Advanced - features and functions



Yellow LED
Target detected

Green LED
Power supply and signal stability

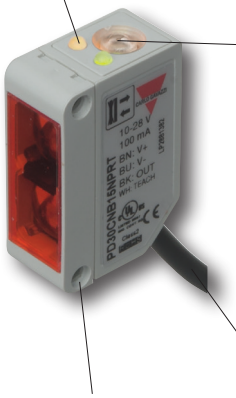
Indicator cover
Polyethersulfone (PES)

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



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

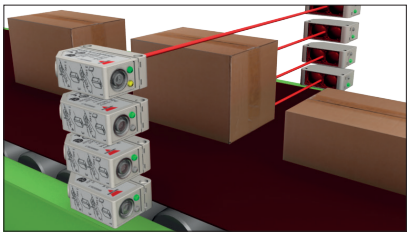
Built-in mounting holes
2 x M3 for fast mounting
Spacing: 25.4 mm (1")

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

PD30 Advanced - benefits

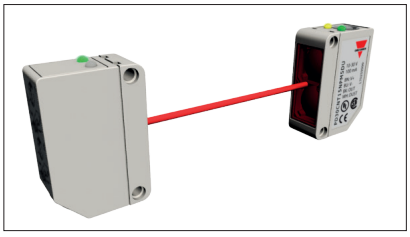
Mute function (sensor blanking)

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.



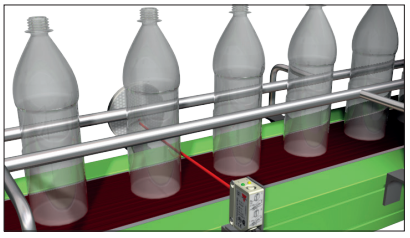
Half mute function (> 3 sec.)

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.



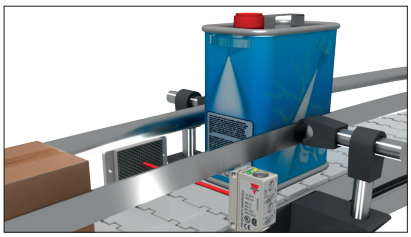
Dust alarm output

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.



PD30 Advanced - specifications

			Diffuse-reflective		Retro-reflective			Through-beam	
PD30CN..			Background suppression	Energetic	Standard	With Polarization filter	For Tranparent Objects	Receiver	Emitter
Cable	NPN	Remote teach	..B15NPRT	..D10NPRT	..R06NPRT	..P06NPRT	..G02NPRT	..T15NPRT	-
		Dust alarm	-	..D10NPDU	..R06NPDU	..P06NPDU	-	..T15NPDU	-
		Mute function	-		..R06NPMU	..P06NPMU	..G02NPMU	-	..T15NMU
	PNP	Remote teach	..B15PPRT	..D10PPRT	..R06PPRT	..P06PPRT	..G02PPRT	..T15PPRT	-
		Dust alarm	-	..D10PPDU	..R06PPDU	..P06PPDU	-	..T15PPDU	-
		Mute function	-	-	..R06PPMU	..P06PPMU	..G02PPMU	-	..T15PMU
Plug	NPN	Remote teach	..B15NPM5RT	..D10NPM5RT	..R06NPM5RT	..P06NPM5RT	..G02NPM5RT	..T15NPM5RT	-
		Dust alarm	-	..D10NPM5DU	..R06NPM5DU	..P06NPM5DU	-	..T15NPM5DU	-
		Mute function	-	-	..R06NPM5MU	..P06NPM5MU	..G02NPM5MU	-	..T15NM5MU
	PNP	Remote teach	..B15PPM5RT	..D10PPM5RT	..R06PPM5RT	..P06PPM5RT	..G02PPM5RT	..T15PPM5RT	-
		Dust alarm	-	..D10PPM5DU	..R06PPM5DU	..P06PPM5DU	-	..T15PPM5DU	-
		Mute function	-	-	..R06PPM5MU	..P06PPM5MU	..G02PPM5MU	-	..T15PM5MU
Rated operating distance (S_n)			150 mm 5.9 inches	1 m 3.3 feet	6 m 9.8 feet	6 m 9.8 feet	2 m 6.6 feet	15 m 49.2 feet	
Hysteresis (H)			≤ 10%						-
Rated operational voltage			10 to 30 V DC, Ripple P-P ≤ 10%						
No load supply current (I_o)			≤ 32 mA @ 24 V DC	≤ 30 mA @ 24 V DC				≤ 30mA	≤ 25mA
Output			Open collector, NPN or PNP by sensor type						-
Output function			N.O. (light switching) or N.C. (dark switching)						-
Output current (I_e)			≤ 100 mA (max. Load capacity 100 nF)						-
Minimum operational current			≤ 0,5 mA						-
Off-State current (I_r)			≤ 100 µA						-
Voltage drop (U_d)			≤ 2.5 V DC @ 100 mA						-
Sensor protection			Short circuit (A), reverse polarity (B) and transients (C)						B + C
Response time			≤ 0,5 mS						-
Power on delay (t_v)			≤ 400 mS	≤ 300 mS					
Led indications			Target detected (Yellow LED), Signal stability and Power ON (Green LED)						Power ON
Sensitivity control			Teach-In programming						
Degree of protection			IP67 (IEC 60529; 60947-1)						
Ambient temperature			-25 to +55°C (-13 to +131°F) no condensation, Storage -40 to +70°C (-40 to +158°F)						
Ambient humidity			Operating: 35 to 85 % RH, storage: 35 to 85 % RH						
Ambient light			≤ 10.000 Lux						
CE marking			According to EN 60947-5-2						
Approvals			cULus (UL508, CSA C22.2)						
Installation category			III (IEC60664/60664A; 60947-1)						
Pollution degree			3(IEC60664/60664A; 60947-1)						
Vibration			10 to 150 Hz (1.0 mm/15 g; IEC 60068-2-6) in X,Y and Z direction						
Shock			30 g /11 ms. 3 positive and 3 negative in X,Y and Z direction						
Emitting light source			Red LED		Infrared LED	Red LED		-	Infrared LED
Material			Body, ABS light grey; Front glass, PMMA red; Trimmer shaft, POM dark grey						
Cable			PVC, black, 2 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 ≤ 40 g, Plug version ≤ 10 g						
Accessories			Mounting bracket: APD30-MB1						
Accessories, additional			'Mounting bracket: APD30-MB2 Connectors: CONM54NF-... Types'						

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

Indicator cover
Thermoplastic polyurethane (TPU)

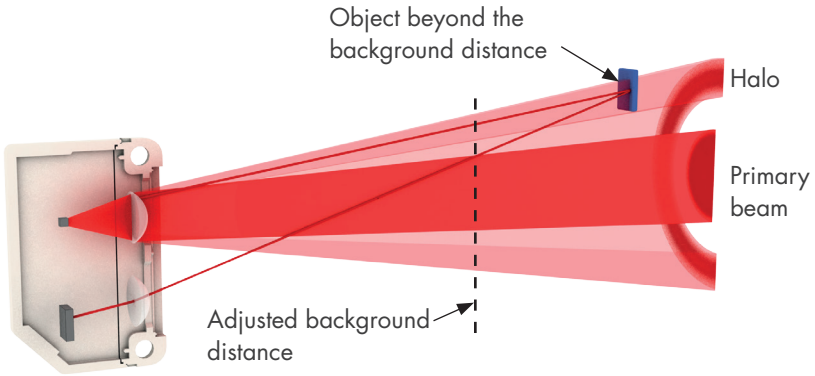
Sensitivity shaft
Polyoxymethylen, acetal (POM)

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

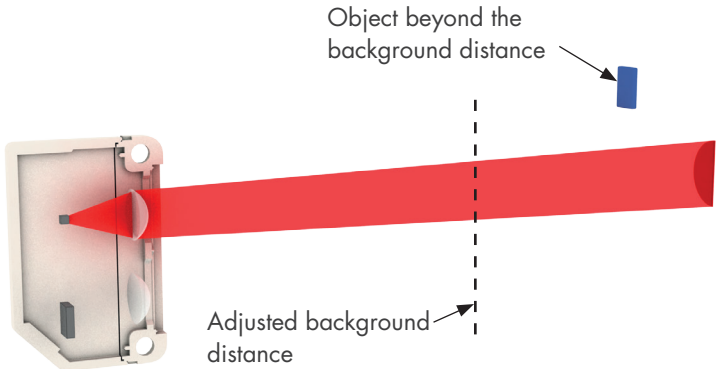
Built-in mounting holes
2 x M3 for fast mounting
Spacing: 25.4 mm (1")

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

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

		Reflective	Retro-reflective
PD30C...		**Background suppression**	**With Polarization filter**
Cable	NPN	**..CNB25NAPS**	**..CNP50NAPS**
	PNP	**..CNB25PAPS**	**..CNP50PAPS**
Plug	NPN	**..CNB25NAM5PS**	**..CNP50NAM5PS**
	PNP	**..CNB25PAM5PS**	**..CNP50PAM5PS**
Rated operating distance (S_n)		≤ 250 mm ≤ 9.8 inches	≤ 5 m (16.4 feet) with reflector ER4, ≤ 3 m (9.8 feet) with reflector ER4060
Emitter angle		±1.6° @ 100 mm	±1.0° @ 1/2 sensing distance
Hysteresis (H)		≤ 10%	3% ... 20%
Rated operational voltage		10 to 30 V DC (Ripple included)	
No load supply current (I_o)		≤ 50 mA @ U_B min ≤ 20 mA @ U_B max	≤ 25 mA @ U_B max
Output		Open collector, NPN or PNP by sensor type	
Output function		N.O. and N.C.	
Output current (I_e)		<100 mA (Continuous), ≤ 100 mA @ 100 nF load (Short time)	
Minimum operational current		0.5 mA	
Off-State current (I_r)		100 µA	
Voltage drop (U_d)		≤ 2 VDC @ I_e max.	
Sensor protection		Short circuit (A), reverse polarity (B) and transients (C)	
Response time		≤ 1.0 ms	≤ 0.5 ms
Power on delay (t_v)		≤ 200 ms	≤ 30 ms
Led indications		Target detected (Yellow LED), Signal stability and Power ON (Green LED)	
Sensitivity control		Single-turn potentiometer, 210° electrical adjustment, 240° mechanical adjustment	
Degree of protection		IP67 (IEC60539; EN60947-1)	
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 95 % RH, Storage: 35 to 95 % RH	
Ambient light		≤ 45 000 Lux	
CE marking		According to EN 60947-5-2	
Approvals		cULus (UL508, CSA C22.2)	
Installation category		III (EN60947-1)	
Pollution degree		3 (IEC60664; EN60947-1)	
Vibration		10 to 150 Hz (1.0 mm/15 g; EN60068-2-6) in X,Y and Z direction	
Shock		30 g /11 ms (6 positive and 6 negative; EN60068-2-27) in X,Y and Z direction	
Light source		621 nm, Red *PointSpot*	
Material		Body, ABS light grey; Front glass, PMMA red; Trimmer shaft, POM dark grey	
Cable		PVC, black, 2 m, 4 x 0.14mm^2, 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	

PD30 Series
Miniature photoelectric sensors

PD30 Basic - 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

Indicator cover
Polyethersulfone (PES)

Sensitivity shaft
Polyoxymethylen, acetal (POM)

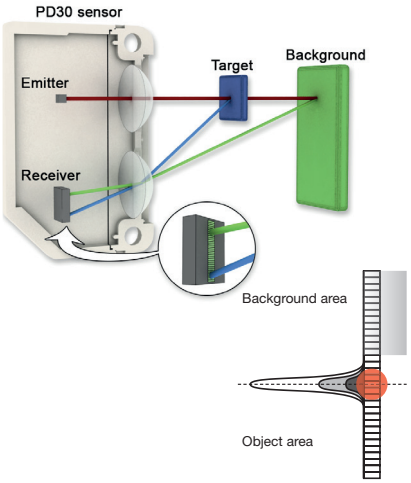
Potentiometer
- Manual setting
- Larger adjustability
- Easily set distance
- Back or Top

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

PD30 Basic and Stainless Steel - new background suppression principle

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

			Diffuse-reflective				Retro-reflective		Through-beam	
PD30C...			Background suppression		Energetic	Energetic Extreme Wide Angle	Standard	With Polarization filter	Receiver	Emitter
Back Potentiometer	Cable	NPN	..NB20NASA	..NB20NAIS	..ND10NASA	-	..NR60NASA	..NP60NASA	..NT15NASA	..NT15
		PNP	..NB20PASA	..NB20PAIS	..ND10PASA	-	..NR60PASA	..NP60PASA	..NT15PASA	
	Plug	NPN	..NB20NAM5SA	..NB20NAM5IS	..ND10NAM5SA	-	..NR60NAM5SA	..NP60NAM5SA	..NT15NAM5SA	..NT15M5
		PNP	..NB20PAM5SA	..NB20PAM5IS	..ND10PAM5SA	-	..NR60PAM5SA	..NP60PAM5SA	..NT15PAM5SA	
Top Potentiometer	Cable	NPN	..TB20NASA	..TB20NAIS	..TD10NASA	..TD02NAWE	-	-	-	-
		PNP	..TB20PASA	..TB20PAIS	..TD10PASA	..TD02PAWE	-	-	-	-
Rated operating distance (S_n)			200 mm 7.9 inches		1 m 3.3 feet	200 mm 7.9 inches	6 m 9.8 feet	6 m 9.8 feet	15 m 49.2 feet	
Emitter angle @ 1/2 distance			±2.5°	±1.5°	±2.0°	±15°	±2.0°		-	±2.0°
Hysteresis (H)			≤ 10%				5% TO 20%		< 10%	-
Rated operational voltage			10 to 30 V DC, Ripple P-P ≤ 10%							
No load supply current (I_o)			≤ 30 mA @ U_B min ≤ 20 mA @ U_B max		≤ 25 mA					≤ 20mA
Output			Open collector, NPN or PNP by sensor type							-
Output function			N.O. (light switching) and N.C. (dark switching)							-
Output current (I_e)			≤ 100 mA (max. load capacity 100 nF)							-
Minimum operational current			≤ 0,5 mA							-
Off-State current (I_r)			≤ 100 µA							-
Voltage drop (U_d)			≤ 2 V DC @ I_e max							-
Sensor protection			Short circuit (A), reverse polarity (B) and transients (C)							B + C
Response time			≤ 1 mS		≤ 0.5 mS				≤ 1 mS	-
Power on delay (t_v)			≤ 200 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			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							
Ambient light			≤ 10.000 Lux							
CE marking			According to EN 60947-5-2							
Approvals			cULus (UL508, CSA C22.2)							
Installation category			III (IEC60664/60664A; 60947-1)							
Pollution degree			3(IEC60664/60664A; 60947-1)							
Vibration			10 to 150 Hz (1.0 mm/15 g; IEC 60068-2-6) in X,Y and Z direction							
Shock			30 g /11 ms, 3 positive and 3 negative in X,Y and Z direction							
Emitting light source			Red Led	Infrared LED	Red LED	Infrared 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 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							