CARLO GAVAZZI
Automation Components

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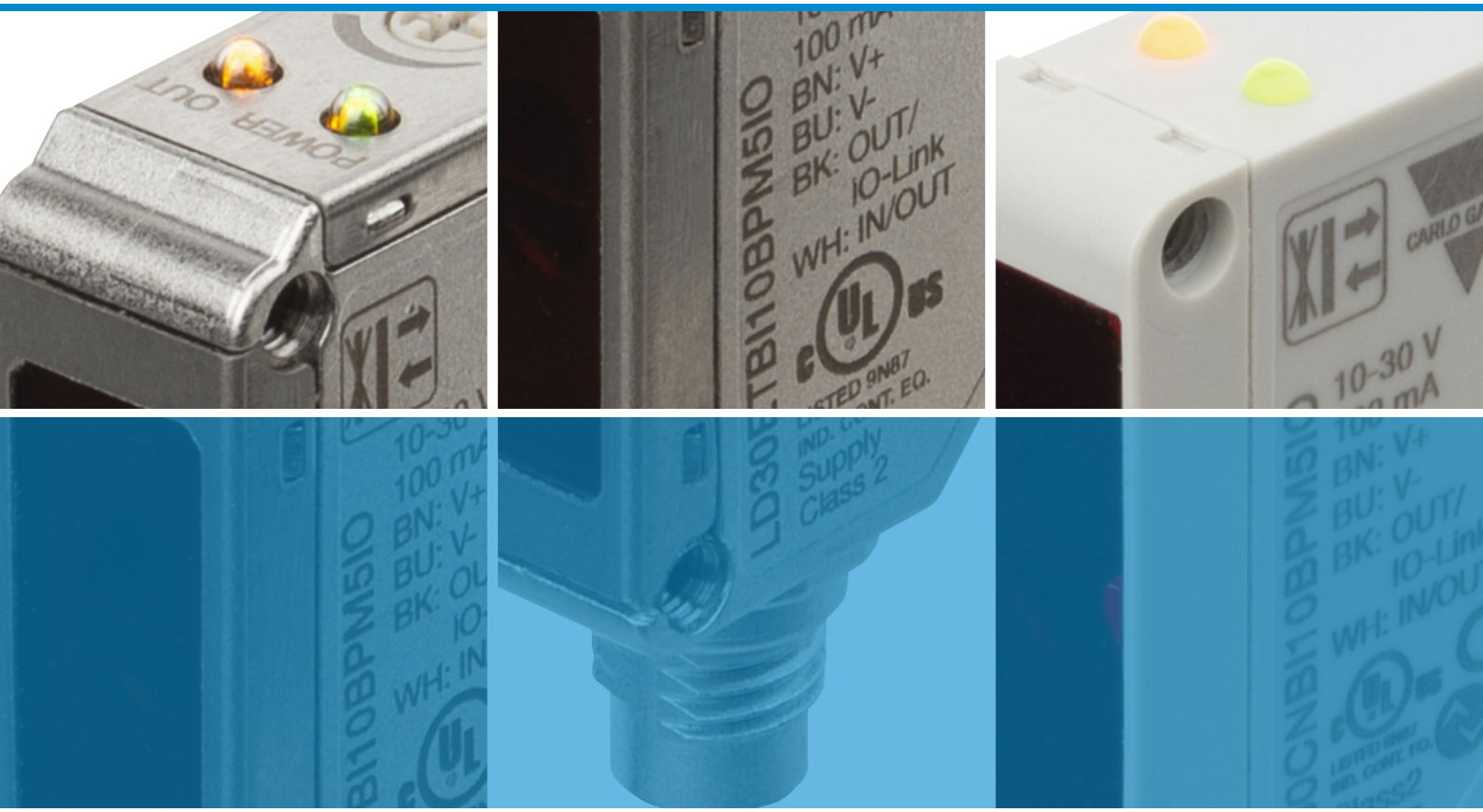
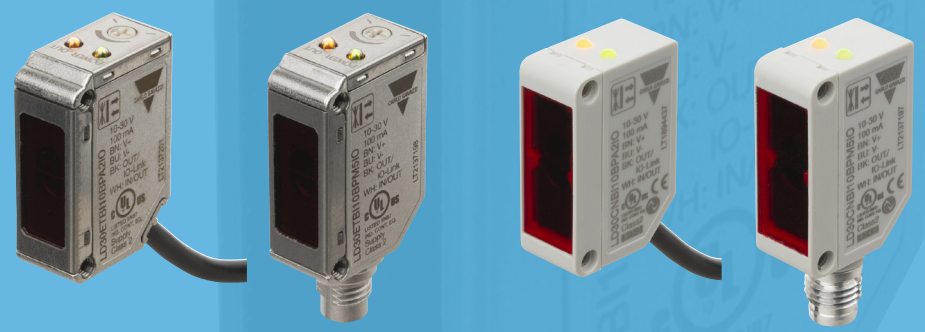


LD30 - Time of Flight photoelectric laser sensors

Sensors

LD30 series
IO-Link photoelectric laser sensors

LD30 Time of Flight (ToF) series of photoelectricis laser sensor from Carlo Gavazzi in a compact housing feature long accurate sensing distance on a verity of objects. By means of the integrated IO-Link communication, the sensors can be easily be customized to the application needs.
LD30 is available in two housing styles, an AISI316L stainless steel version with IP69K and ECOLAB approvals designed for use in harsh or hygienic environments and an ABS plastic version with IP 67 approval.
LD30 can reliable detect objects of various colors, materials or surfaces at a distance up to 1000 mm due to the ToF detection principle. The long sensing range sets the standard of what to achieve in such a compact sensor, and Carlo Gavazzi have increased the distance four times compared to our previous Background suppression sensors.
The compact sensor design is ideally suited to confined spaces.



Universal, smart and easy

Data availability down to the field level
Using IO-Link, the sensors can deliver their data directly into the control system very efficiently.

Device identification
Each IO-Link sensor has an IODD (IO Device Description), which describes the sensor, its capabilities and parameters, process data, diagnosis data and user interface configuration. Furthermore, each sensor is equipped with an internal ID.

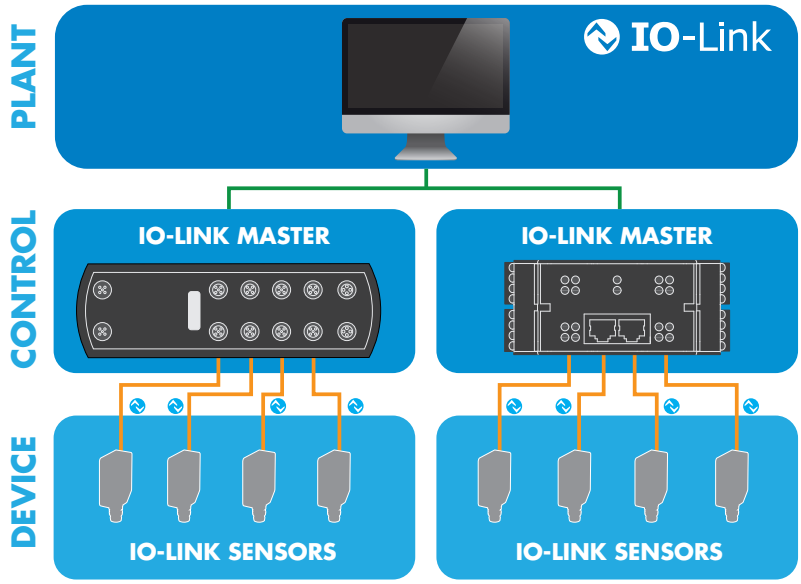
Automatic parameter settings
Initial setup of a new sensor is smooth and easy using previously stored parameters. Once a sensor has been replaced, the IO-Link master simply transmits parameters stored from the old sensor.

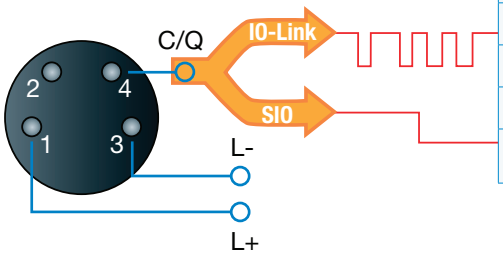
Universal, smart and easy

Centralised configuration and data management
IO-Link enables fast configuration and dynamic change of the sensor parameters on the fly, which considerably reduces downtime in case of product changeover and increases flexibility and diversity of the installation.

Simplified installation
An IO-Link system requires just standard, unshielded 3-wire cables, and a standardised uniform interface for sensors and actuators drastically reduce the complexity of the installation process. In addition, the automated parameter reassignment simplifies sensor replacement in case of defects and prevents incorrect settings. The IO-Link-enabled sensor acts as a standard sensor when installed in a non-IO-Link system, so the same sensor can be stocked for both standard I/O (SIO) applications and IO-Link applications.

IO-Link





Pin	Signal	Remarks
1	L+	24 V
2	OUT	Sensor dependent
3	L-	Ground
4	C/Q	Communication/ switching signal

What is IO-Link?
IO-Link is a universal, open communication standard protocol that allows IO-Link-enabled devices to exchange, collect and analyse data and convert it into actionable information.
IO-Link is recognised worldwide as an international standard (IEC 61131-9), and it is today considered as the "USB interface" for sensors and actuators in the industrial automation environment.

Plug and play
When the IO-Link sensor is connected to an IO-Link port, the IO-Link master sends a wake-up request to the sensor, which automatically switches to IO-Link mode, and a point-to-point bidirectional communication automatically starts between the master and the sensor.

Operating modes
The IO-Link-capable sensor can operate in two different modes; SIO mode (standard I/O) or IO-Link mode.

- SIO mode: the sensor works as a traditional sensor, and pin 4 acts as an ordinary digital output. SIO mode ensures backwards compatibility with standard sensor systems.

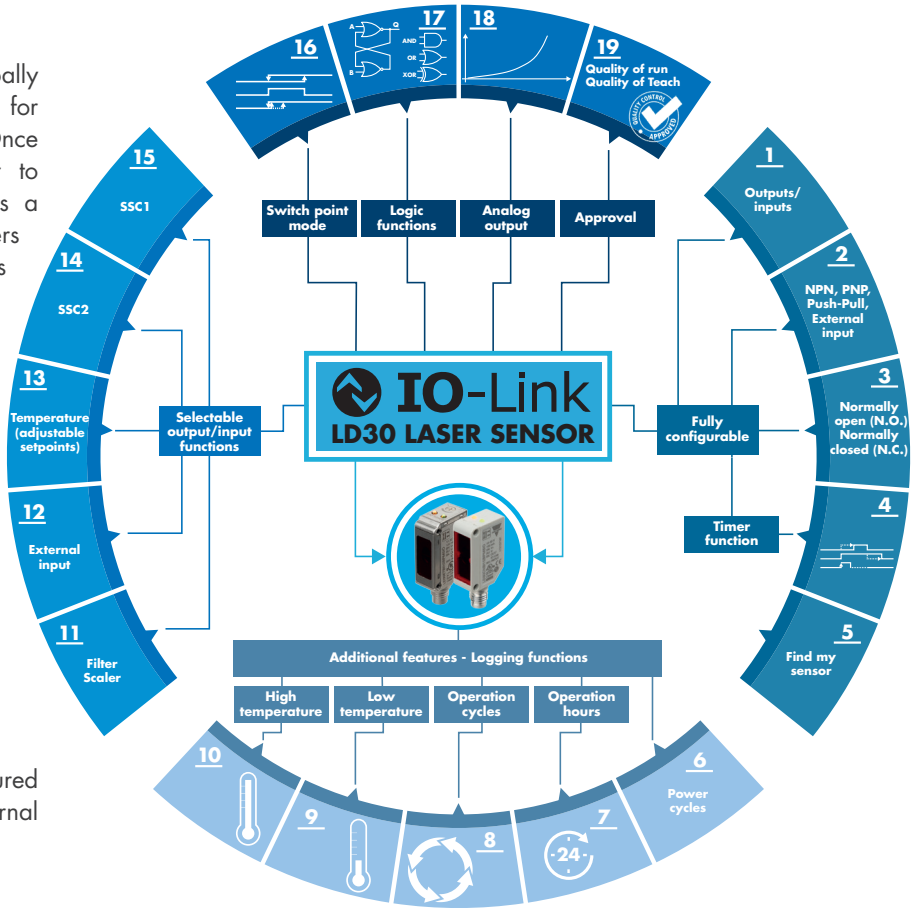
- IO-Link mode: exchange of data between sensor and IO-Link master takes place, and pin 4 is used for the transmission of IO-Link-related data.

IO-Link photoelectric laser sensors

IO-Link functions

Fully configurable

IO-Link provides the first globally standardised interface for communication with the sensor. Once you have connected the sensor to the IO-Link port, you can access a multitude of configuration parameters and advanced functionalities. This way, the sensor can be tailored to meet your individual needs and requirements at a given time. The settings can also stored in the master and can always be changed if the need occurs, or they can be smoothly transferred to a new sensor in case of sensor replacement.



1. Outputs/inputs

The sensor has two I/O terminals.

2. NPN, PNP, Push-pull, External input

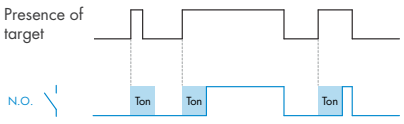
The I/O terminals can be configured as: NPN, PNP, push-pull or external input (only output 2).

3. Normally open (N.O.) Normally closed (N.C.)

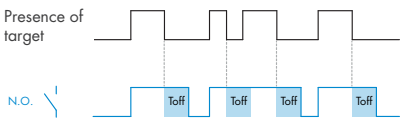
The output can be configured to normally open or normally closed.

4. Timer function

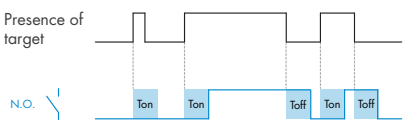
It is possible to activate different timer functions: ON delay, OFF delay, ON and OFF delay or one shot (leading edge or trailing edge).



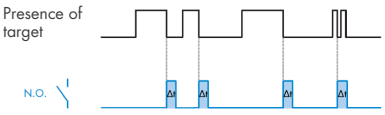
On delay



Off delay



On and Off delay



One shot (trailing edge)

5. Find my sensor

The LEDs can be set to flashing alternating with 2Hz with 50% duty cycle in order to easily locate the sensor.

Additional logging functions

The Carlo Gavazzi capacitive IO-Link sensors offer additional logging functions for advanced diagnostics mechanisms making both real-time and historic data available.

6. Power cycles

Counts and store how many times the sensor has been powered up since its creation.

7. Operation hours

Counts and store number of hours of power connected since its creation.

8. Operation cycle

Number of sensor detections (SSC1) since its creation.

9. Temperature measuring

Two different specifics are measured:
The lowest temperature the sensor has been exposed to since
1. its creation (stored in sensor)
2. since last power-up.

10. Temperature Logging

Two different specifics are logged: The highest temperature the sensor has been exposed to since
1. its creation (stored in sensor)
2. since last power-up.

IO-Link functions

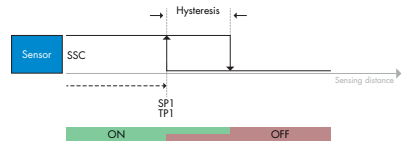
Selectable output/input functions

11. Filter scaler
It is a stabilising filter that increases the immunity of the variation of the sensor's measurements and media. The detection filter can be set to measure the average value of additional 1 to 255 mesurements.

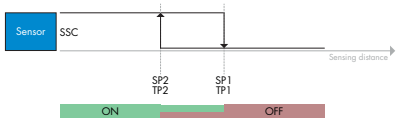
12. External input
The external input can be controlled by outputs from sensors or PLC's.

13. Temperature alarm
The sensor can be configured to give an alarm if the temperature exceeds or drops below a preset value (Tmax or Tmin).

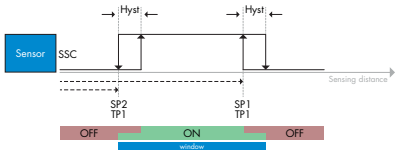
14. SSC1
The Switching Signal Channel 1 (SSC1) output can be configured to the following four detection modes: Single-point mode, two-point mode, windows mode and adjustable hysteresis.
Two individual setpoints and hysteresis can be set.



Single point mode



Two point mode



Windows mode

15. SSC2
The Switching Signal Channel 2 (SSC2) output can be configured to the same modes as SSC1.
Two individual setpoints and hysteresis can be set.

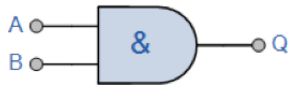
Switch point mode

16. Switch point mode
SSC1 and SSC2 can be configured to single-point mode, two-point mode, windows mode, adjustable hysteresis.

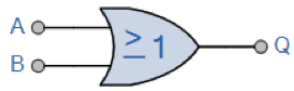
Logic functions

17. Logic functions
In the logic function block the selected signals from the input selector can be added a logic function directly without using a PLC – making decentral decisions possible.
The logic functions available are: AND, OR, XOR and Gated SR-FF.

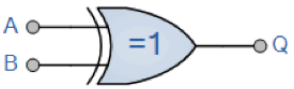
AND



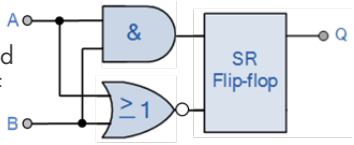
OR



XOR



Gated SR-FF



Analogue output

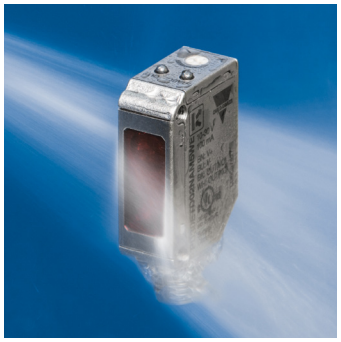
18. Analogue output
16 bit Analogue Output by IO-Link representing the Dielectric value measured by the sensor.

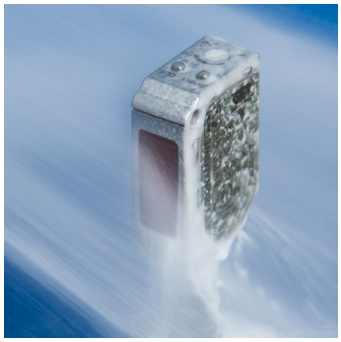
Approval

19. Quality of run
The quality of run value informs about the actual sensing performance compared to the set-points of the sensor, the higher the value the better quality of detection.

19. Quality of teach
The quality if teach value informs about how well the actually teach procedure was done, meaning the margin between the actual setpoints and the environmental influence of the sensor.

The advantages of the LD30 series in stainless steel





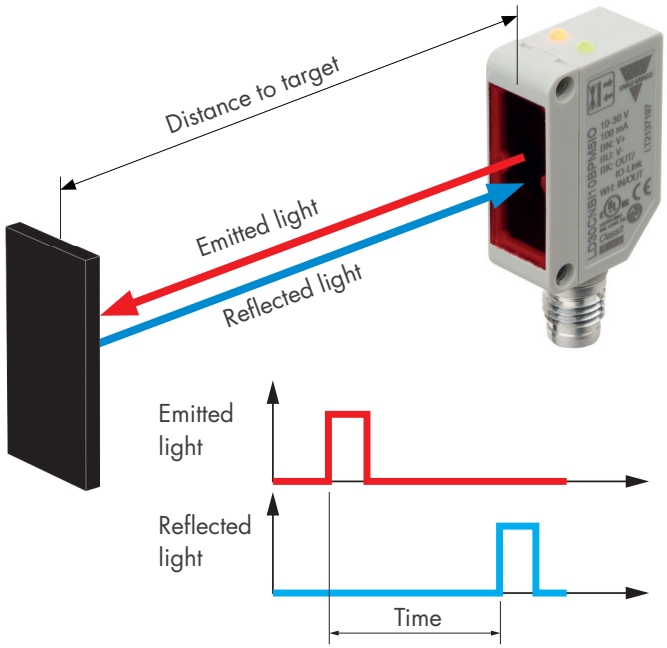
Highest degree of protection

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

The LD30 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.

LD30 series
IO-Link photoelectric laser sensors

Time of Flight principle

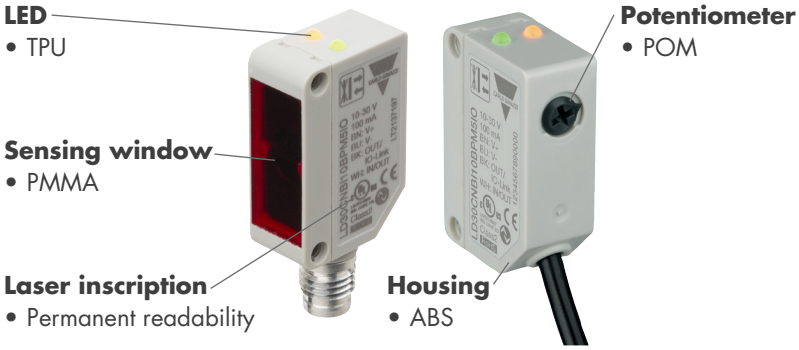


Time of Flight (ToF) principle
In the ToF detection principle, the sensing distance is calculated from the time the light is emitted from the sensor, until the reflected lightbeam is received by the sensor.

Why ToF detection principle is so stable?
As the distance measured is based upon the time elapsed, the detection is not affected by the object colour. The sensor can detect white objects or black objects such as black car tiers. The sensing distance hardly influences by the strength of the light detected.

Features and functions

LD30 series in plastic



Features
- Potentiometer on the back side.
- 4-pin M8 plug or 4-wire PVC cable, 2 m.

ABS = Acrylnitril-Butadien-Styrol
PMMA = Polymethylmethacrylat
POM = Polyoxymethylen
TPU = Thermoplastisches Polyurethan

LD30 series in stainless steel

Features
- High-pressure cleaning.
- Resistant to aggressive cleaning agents.
- ECOLAB® certification for the food industry.
- 4-pin M8 plug or 4-wire PVC cable, 2 m.

PEEK = Polyetheretherketon
PES = Polyethersulfon
PPSU = Polyphenylensulfon

The Time of Flight photoelectric laser IO-Link sensor family

	LD30 Time of Flight with IO-Link			
Housing	**Plastic (ABS)**		**Stainless steel (AISI316L)**	
Connection	Plug	Cable	Plug	Cable
Code	**LD30CNBI10BPM5IO**	**LD30CNBI10BPA2IO**	**LD30ETBI10BPM5IO**	**LD30ETBI10BPA2IO**
Sensing distance	0-1000 mm			
Adjustable distance	50-1000 mm			
IO-Link	Transmission type: COM2 (38.4 k Baud), Revision: 1.1, SDCI standard: IEC 61131-9, Profiles: Smart sensor (Process Data Variable; Device Identification), SIO mode: Yes, Required master port type: A, Min. process cycle time [ms]: 5			
Selectable function output 1	NPN, PNP or Push-Pull			
Selectable function output 2	NPN, PNP, Push-Pull, External input or External teach			
Diagnostic	Operation hours, Power cycles, Detection cyclesmax. and min. Temperatures, Short-circuit, No of Parameter change.			
Logic functions	AND, OR, X-OR, Gated SR-FF			
Timer functions	ON Delay. OFF delay, ON+OFF delay and One shot			
Sensitivity control	Trimmer input, Teach by wire or by IO-Link			
Rated operational voltage (U_B)	10 to 30 V DC (ripple included)			
No load supply current (I_o)	≤ 25 mA @ U_B min, ≤ 12 mA @ U_B max			
Minimum operational current (I_m)	> 0.5 mA			
Off-State current (I_r)	≤ 100 µA			
Voltage drop, digital (U_d)	≤ 1.0 V DC @ 100 mA DC			
Capacitive load	100 nF @ 100 mA			
Frequency of operating cycles (f)	5 Hz			
Response time t_{ON} or t_{OFF}	100 ms			
Power on delay (t_v)	≤ 300 ms			
Hysteresis (adjustable by IO-Link)	Manual: 5-2000 mm (default 50 mm) Auto: ≤ 10% @ Sn (on all objects)			
Led indications	Yellow LED steady: Output ON and signal stability. Yellow LED flashing: Output short-circuit, timer indication and teach. Green LED steady: Power ON and signal stability. Green LED flashing: IO-Link mode. Yellow LED and green LED flashing: Find my sensor			
Sensor protection	Shortcircuit (A), reverse polarity (B) and transients (C)			
Electrostatic discharge	Contact discharge: ±4 kV. Air discharge: ±8 kV (IEC 61000-4-2)			
Electrical fast transients/burst	±2kV/5kHz using the capacitive copling clamp (IEC 61000-4-4)			
Surge	1kV (with 500 Ω)			
Wire conducted disturbances	10 Vrms (IEC 61000-4-6)			
Power - frequency magnetic fields	30 A/m, 38 µ tesla (IEC 61000-4-8)			
Radiated RF electromagnetic fields	10 V/m (IEC 61000-4-3)			
Vibration	10 to 150 Hz, 1 mm/15G in X,Y and Z direction (EN 60068-2-6)			
Shock	30G /11 mS. 6 positive and 6 negative in X,Y and Z direction (EN 60068-2-27)			
Drop test	2 times from 1m, 100 times from 0,5m (EN 60068-2-31)			
Degree of protection	IP67 (IEC60539; EN60947-1)		IP68, IP69K (IEC60539; EN60947-1; DIN40050-9)	
NEMA type	1 (NEMA 250)		1, 2, 4, 4X, 5, 6, 6P (NEMA 250)	
Ambient temperature	Operating: -25 to +50°C (-13 to +122°F). Storage: -40 to +70°C (-40 to +158°F)			
CE marking	According to EN 60947-5-2			
Approvals	cULus (UL508 + C22.2), Class 1 laser (IEC60825-1:2014)		cULus (UL508 + C22.2), Class 1 laser (IEC60825-1:2014), ECOLAB	
Overvoltage category	III (IEC60664; EN 60947-1)			
Pollution degree	3 (EN60947-1)			
$MTTF_d$	132.2 years @ 40°C (104°F)		132.3 years @ 40°C (104°F)	
Material	Body: ABS. Front glass: PMMA, red. Trimmer shaft: POM, grey.		Body: Stainless steel, AISI316L. Front glass: PPSU, red. Trimmer shaft: PEEK, light grey.	
Cable	PCV, black, 2 m, 4 x 0.14 mm², Ø=3.3 mm			
Connector	M8, 4-pin, male			
Dimensions	Cable and Plug: 10.8 x 30 x 20 mm		Cable and Plug: 11 x 31.5 x 21 mm	
Weight incl. packaging	Cable version ≤ 50 g, Plug version ≤ 20 g		Cable version ≤ 100 g, Plug version ≤ 65 g	
Accessories, additional	Connectors: CO..54NF-... -series. Mounting brackets: APD30-MB2			

*) Only stainlees steel

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Automation Components

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