



**FASTUS**

*Good Thinking, Good Future*

Long-Distance BGS Laser Sensor

**TOF-L Series**

\* FASTUS is a product brand of Optex FA.



# Ultra-Compact Long-Distance Detection Sensor

Detection  
distance

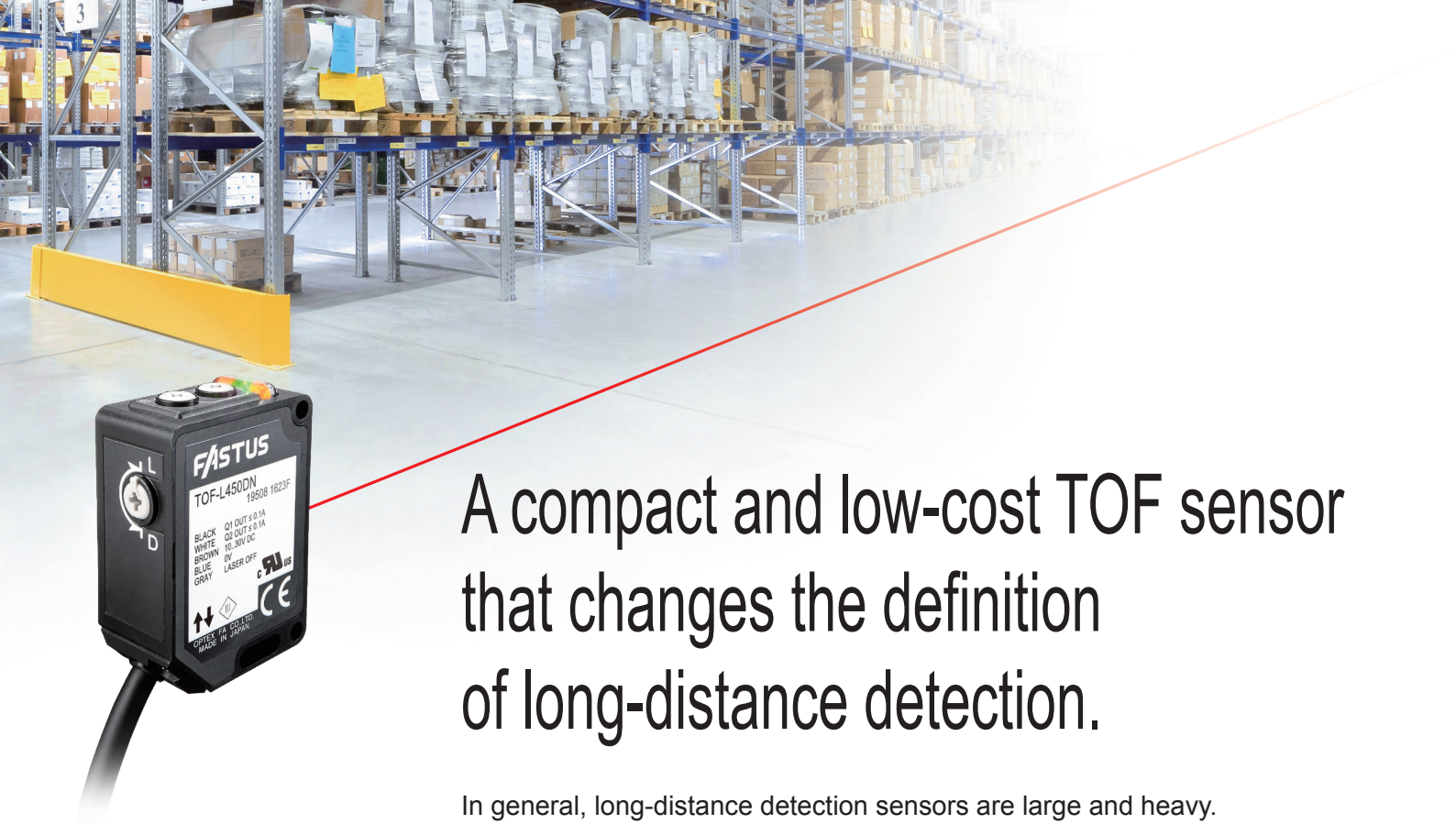
\*With white paper (90%)

**4.5 m** max.

The world's  
smallest  
TOF sensor

Stable detection  
even over long  
distances

**OPTEX FA CO., LTD.**



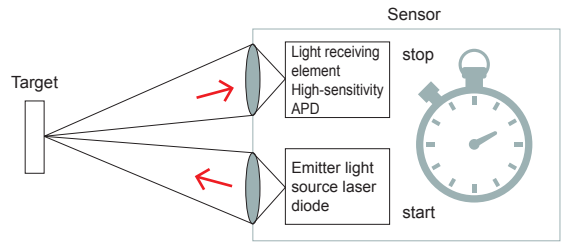
# A compact and low-cost TOF sensor that changes the definition of long-distance detection.

In general, long-distance detection sensors are large and heavy. The FASTUS TOF-L Series is a photoelectric sensor with a built-in amplifier that aims to change that characterization. In addition to being the world's smallest\*<sup>1</sup> TOF sensor, the TOF-L Series also features a high-sensitivity APD in the light receiving element for high-speed responses of 0.5 ms and maximum detection distances of up to 4.5 m\*<sup>2</sup>.

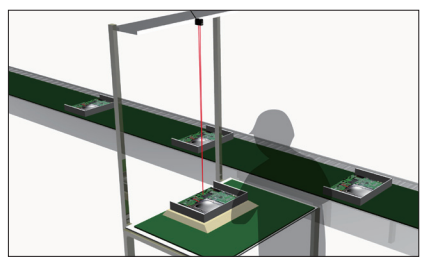
\*1 Among sensors that employ the TOF method. Optex FA examination performed September 2015.  
 \*2 With white paper (90%)

## TOF (Time Of Flight) method

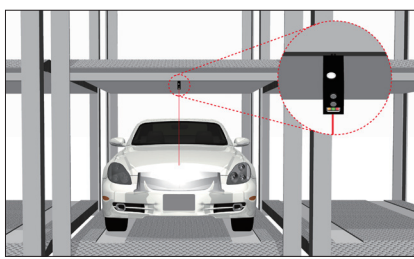
The TOF method measures the time it takes a pulse-emitted laser to hit a target and return, and the measurement is then converted into distance. With strong resistance to influences from the target's surface conditions, this method is capable of producing stable detection.



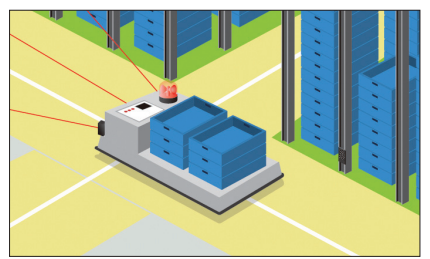
## Applications



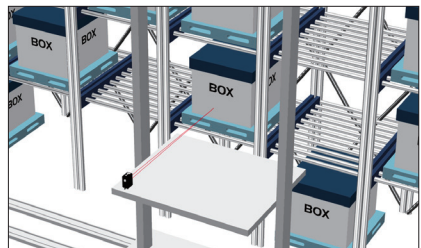
Workpiece seating verification in cell production systems



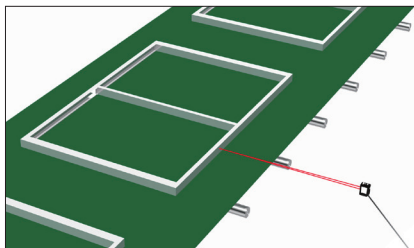
Vehicle detection in parking structures



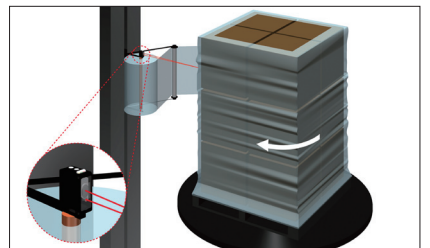
Position detection in unmanned transport vehicles



Inventory verification in automated warehouses



Long-distance aluminum frame detection

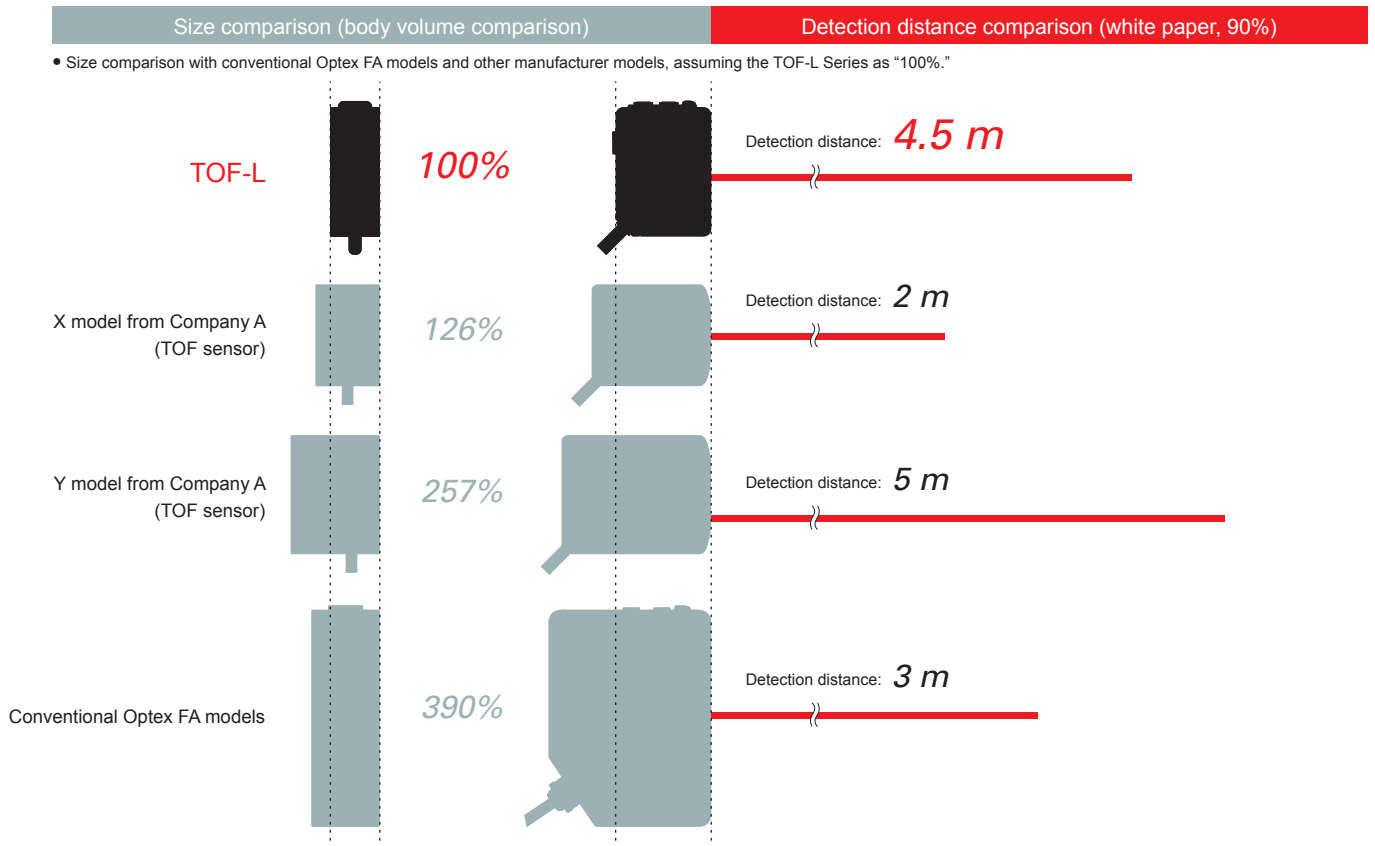


Height detection in wrapping machines

# The World's Smallest TOF Sensor

At just 17 × 32.8 × 44.4 (W × D × H) mm, the TOF-L Series photoelectric sensor is the world's smallest\*1 TOF sensor. In addition to measuring only about one-fourth the volume of conventional sensors for significantly more compactness, the TOF-L is capable of long-distance detection at distances up to 4.5 m.

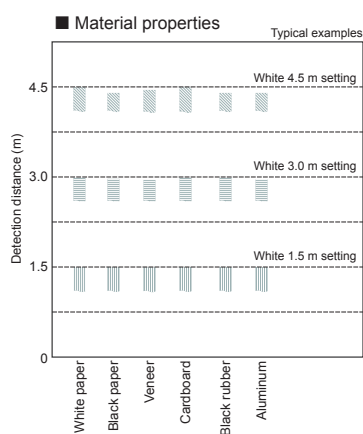
\*1 Among sensors that employ the TOF method. Optex FA examination performed September 2015.



# Stable Detection even over Long Distances

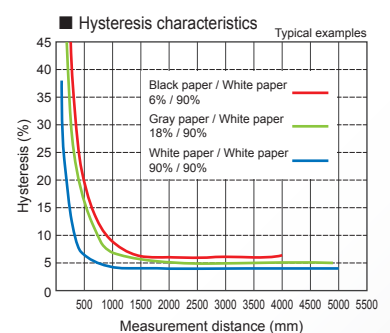
Stable detection even with glossy or low-reflectance workpieces

By relying on distance to a workpiece rather than differences in the amount of received light for turning ON/OFF, the TOF-L Series makes it possible to achieve stable long-distance detection with a variety of workpieces, including low-reflectivity targets such as black rubber and glossy targets such as metal workpieces.



Stable detection even when determining level differences

The TOF-L Series is capable of low hysteresis for white objects of less than or equal to 5% (typical). The sensor also delivers level-difference detection such as when inspecting for the presence of parts from remote locations. In addition, adoption of the TOF method helps reduce black/white errors without sacrificing detection accuracy even over long distances.



# Class 1 Laser in Emitter Light Source

The TOF-L Series sensor achieves long-distance detections at distances up to 4.5 m while using a Class 1 laser. This class of laser is also safe on the eyes, so there's no need for workers to wear eye protection. In addition, the spot beam is clearly visible, making light axis adjustments easy.



## Specifications

Model	Cable type		M12 pig tail type	M8 connector type
	NPN	PNP	TOF-L450DN	TOF-L450DM12N TOF-L450DM12P
Detection distance*1	0 to 4.5 m			
Emitter light source	Red laser, wavelength: 650 nm			
Laser class	Class 1 (IEC/JIS/FDA*2)			
Spot size*3	Approx. $\phi 17$ mm (at a distance of 4.5 m)			
Response time	0.5 ms or less			
Hysteresis distance	15% or less			
Gain adjustment	4-turn potentiometer			
Indicators	Output Ch. 1 and 2 indicator (orange); Stability indicator (green); Instability indicator (red)			
External input	Laser emission stop input			
Control output	Type	NPN/PNP open collector output, max. 100 mA / 30 VDC, residual voltage 1.8 V max.		
	No. of outputs	2 channels		
Output mode	Light ON / Dark ON selectable (same output mode for Ch. 1 and Ch. 2)			
Connection mode	$\phi 4.5$ mm, 2 m cable	Cable with M12, 5-pin connector 300 mm	M8, 4-pin connector	
	Protection circuit			
Rating	Power supply voltage	10 to 30 VDC, including 10% ripple (p-p)		
	Current consumption	85 mA or less*4		
Applicable regulations	EMC directive (2004/108/EC) / FDA regulations (21 CFR 1040.10 and 1040.11*5)			
Applicable standards	EN 60947-5-2 / IEC 60825-1			
Optex FA standards	Noise resistance: Feilen Level 4 cleared			
Environmental resistance	Operating temperature/humidity	-10 to +50°C (no freezing) / 35 to 85% (no condensation)		
	Operating illuminance	Sunlight: 4,000 lx or less (at 1 m), fluorescent lamp: 3,000 lx or less (at 1 m)		
	Vibration resistance	10 to 55 Hz; double amplitude 1.5 mm; 2 hours in each of the X, Y, and Z directions		
	Shock resistance	500 m/s <sup>2</sup> (approx. 50 G), 3 times in each of the X, Y, and Z directions		
	Protection category	IEC standard, IP67		
Material	Case: ABS, Front cover: PMMA			
Weight (excl. cable)	Approx. 25 g			
Accessories	Mounting bracket: BEF-WK-190, mounting screws (M3 × 20 mm)			

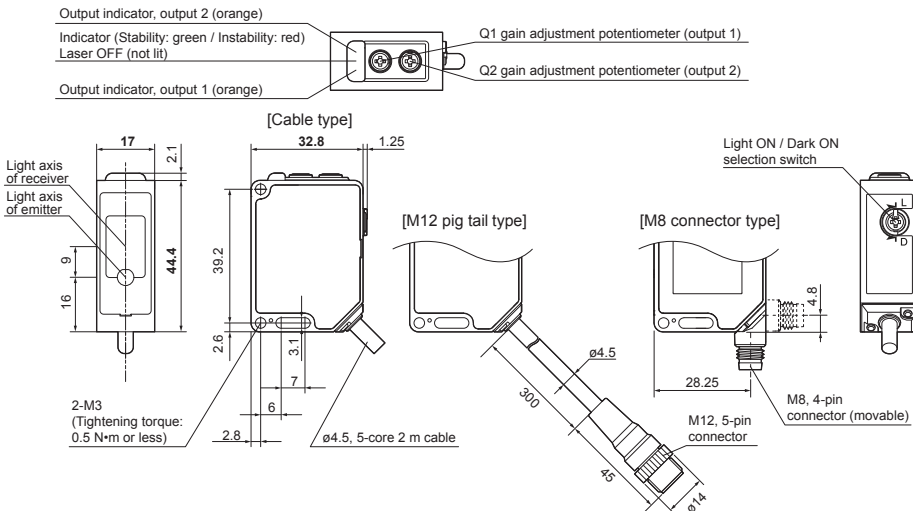
\*1 Using a 200 × 200 mm white sheet of paper.

\*2 In accordance with the FDA provisions of Laser Notice No. 50, the laser is classified as Class 1 per the IEC 60825-1 standard.

\*3 Defined with 1/e<sup>2</sup> (13.5%) of the center strength at the maximum detection distance. The sensor may be affected by light leakage at spot sizes other than the default and when there is a highly reflective object close to the detection area.

\*4 Not including control output load current. \*5 Excluding differences per Laser Notice No. 50.

## Dimensions [mm]



## Attention: Not to be Used for Personnel Protection.

Never use these products as sensing devices for personnel protection. Doing so could lead to serious injury or death.

These sensors do not include the self-checking redundant circuitry necessary to allow their use in personnel safety applications.

A sensor failure or malfunction can cause either an energized or de-energized sensor output condition.

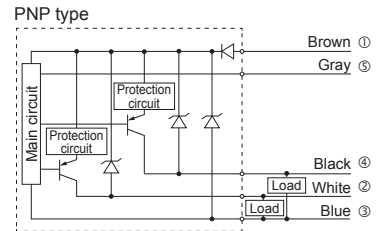
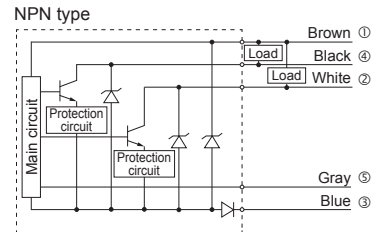
Please consult our distributors about safety products which meet OSHA, ANSI and IEC standards for personnel protection.

● Specifications are subject to change without prior notice.

● Specifications and technical information not mentioned here are written in Instruction Manual. Or visit our website for details.

● All the warnings and cautions to know prior to use are given in Instruction Manual.

## I/O Circuit Diagram



① 10 to 30 VDC ② Control output 2 ③ 0 V

④ Control output 1

⑤ External input (laser emission stop input)

## Options

(Required for M12 pig tail types)



Connector cable  
DOL-1205-G02M  
Cable length: 2 m  
\*5 m and 10 m cables are  
separately available.  
\*Robot cables are also  
available.

M12 pig tail type connector  
pin layout



① 10 to 30 VDC

② Control output 2

③ 0 V

④ Control output 1

⑤ External input

(laser emission stop input)

M8 connector type  
connector pin layout



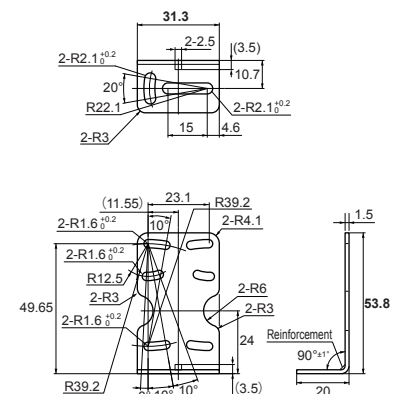
① 10 to 30 VDC

② Output 2

③ 0 V

④ Output 1

BEF-WK-190 mounting bracket



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