

370 **New model**

TOF type with built-in digital panel

TOF-DL series



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The World's Smallest TOF Sensor lineup with analog output type

Analog output type and 3-control-output type

The world's smallest TOF sensor

Built-in digital display for simple setup



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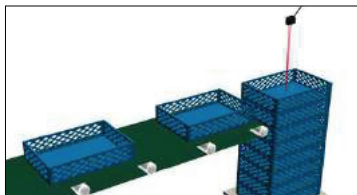


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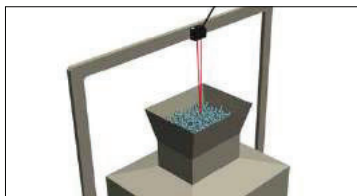
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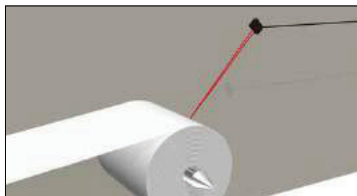
Level control for lifts



Measuring of material level in tank



Monitoring of remaining non-woven fabrics



Loop control for sheet materials



Selection table

Type	Sensing distance	Interface	Model Pig tail types are shown in parentheses
Laser TOF	0.25 to 2.5 m	Analog output Control output External input	TOF-DL250A (TOF-DL250AM12)
		Control output × 3 External input	TOF-DL250T (TOF-DL250TM12)

● For the pig tail type, please order a connector cable.

Options/Accessories

Connector cable



DOL-1205-G02M
Cable length: 2 m

*5 m and 10 m cables are separately available.
*Robot cables are also available.



Ramco National Division
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World's smallest*¹

Size: 17 × 32.8 × 44.4 (W × D × H) mm

Detect from up to 2.5 m away. “Visualize” distances with the TOF-DL compact sensor.

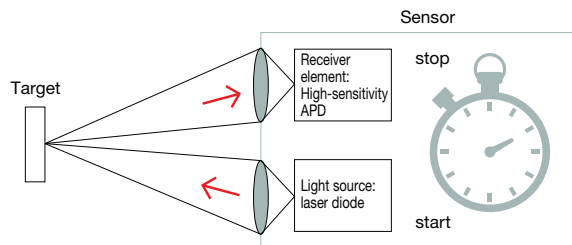
The FASTUS TOF-DL Series is the world's smallest TOF sensor*¹. This ultra-compact laser distance sensor is capable of detecting at distances of up to 2.5 m.

With a built-in digital display, configuring settings is simple. Notably, the TOF-DL Series is most useful with applications requiring height and target distance control, such as level and position detection and loop control at a manufacturing site.

*¹ Optex FA examination performed November 2016.

TOF (Time Of Flight) principle

The TOF principle 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 principle is capable of producing stable detection.



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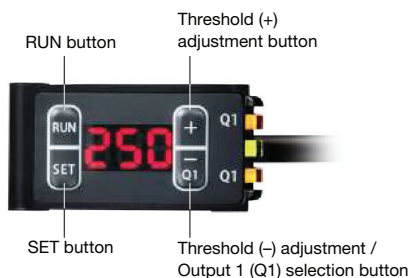
TOF-3V

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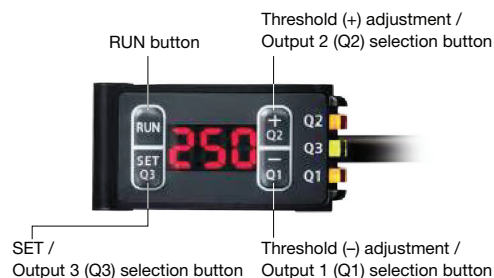
TOF type with built-in digital panel **TOF-DL** series**Features****Easy-to-See Digital Display**

With its ultra-compact size, the TOF-DL Series is equipped with a three-digit, easy-to-see digital display. The display allows users to check the distance showing numerical values. This digital display also makes threshold adjustments easy.

■ Analog output type



■ 3-control-output type

**Easy-to-See Indicators and Stability Output**

The indicators used on the TOF-DL Series allow for easy visibility from any angle.

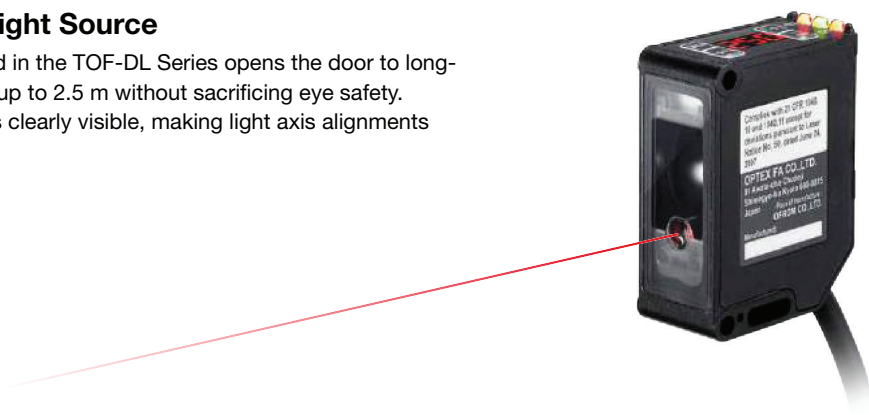
In addition, users are able to switch output 1 to Stability Output. Stability Output turns ON (Central indicator = Green) when detection is stable and turns OFF (Central indicator = Red) when detection is not possible.



Indicators visible from any direction

Class 1 Laser Light Source

The Class 1 laser used in the TOF-DL Series opens the door to long-distance detecting at up to 2.5 m without sacrificing eye safety. In addition, the spot is clearly visible, making light axis alignments easy.

**OPTEX**
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Specifications

Type		Analog output type		3-control-output type	
Model ¹	Cable type	TOF-DL250A		TOF-DL250T	
	Pig tail type	TOF-DL250AM12		TOF-DL250TM12	
Sensing distance ²		0.25 to 2.5 m			
Light source	Medium/Wavelength	Red semiconductor laser, wavelength: 650 nm			
	Average output	390 μW or less			
Laser class		Class 1 (IEC/JIS/FDA ³)			
Spot size ⁴		ø10 mm (At a distance of 2.5 m)			
Sampling period / Response time		200 μs / 500 μs or less (When performing moving average once)			
Hysteresis		15% or less			
Distance adjustment		Teaching (Manual adjustment possible after teaching)			
Indicators		Output indicator (Orange), Stability indicator / laser off indicator: (Green) / (Red) / (Off)		Output 1 indicator (Orange), Output 2 indicator (Orange), Output 3 indicator / Stability indicator / Laser off indicator: (Orange) / (Green) / (Red) / (Off)	
Digital display		7-segment, 3-digit LED display (Display unit: cm)			
External input		Laser OFF input / Teaching input (Selectable by setting)			
Control output	No. of outputs	1		3 (Output 3 available by switching external input)	
	Stability output	Output 1 switchable to stability output (Selectable by setting)			
	Type	Open collector (NPN/PNP selectable by setting), Max. 100 mA / 30 VDC, residual voltage 1.8 V Max.			
	Output mode	Light ON / Dark ON selectable (Output 1 through 3 will be set to same output mode for 3-control-output type)			
Analog output	Current output	4 to 20 mA, Load impedance: 300 Ω or less		Not equipped	
	Voltage output	0 to 10 V, Output impedance: 100 Ω or less			
Connection type		Cable type: ø4.5 mm, 2 m cable, Pig tail type: Cable with M12 5-pin connector, 300 mm			
Protection circuit		Reverse connection protection, Overcurrent protection			
Rating	Supply voltage	12 to 30 VDC, including 10% ripple (p-p) ⁵		10 to 30 VDC, including 10% ripple (p-p)	
	Current consumption	60 mA or less ⁶			
Applicable regulations	EMC	EMC directive (2014/30/EU)			
	RoHS	RoHS directive (2011/65/EU), China RoHS (Directive 32)			
	Safety	FDA regulations (21 CFR 1040.10 and 1040.11 ⁷)			
Applicable standards		EN 60947-5-7 / IEC 60825-1		EN 60947-5-2 / IEC 60825-1	
Environmental resistance	Ambient temperature/humidity	-10 to +50°C (No freezing) / 35 to 85% RH (No condensation)			
	Ambient illuminance	Sunlight: 4,000 lx or less, Fluorescent lamp: 3,000 lx or less			
	Vibration resistance	10 to 55 Hz, double amplitude 1.5 mm, 2 hours in each of the XY and Z directions			
	Shock resistance	500 m/s ² (Approx. 50 G), 3 times in each of the XY and Z directions			
	Degree of protection	IEC standard, IP67			
Material		Housing: PC, Front cover: PMMA			
Weight (Incl. cable)		Cable type: 88 g, Pig tail type: 48 g			
Included accessories		Mounting bracket: BEF-WK-190, Mounting screws (M3 × 20 mm)			

*1 Connector type (M8, 4-pin) also available (Built to order).

*2 For black paper (6% reflectance), gray paper (18% reflectance), and white paper (90% reflectance).

*3 In accordance with the FDA provisions of Laser Notice No. 50, the laser is classified as Class 1 per the IEC 60825-1:2007 and 2014 standards.

*4 Defined with $1/e^2$ (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.

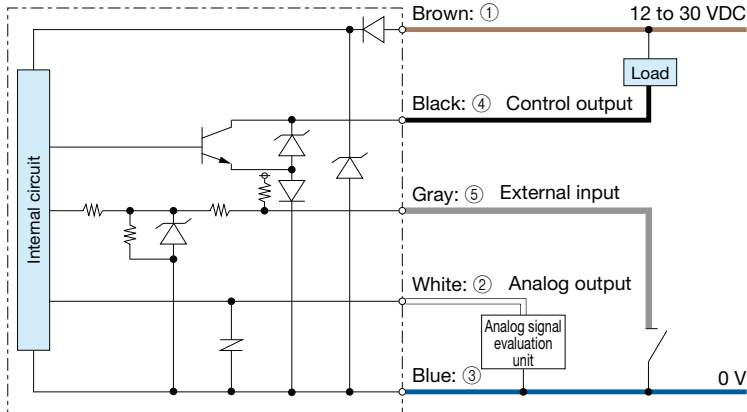
*5 For analog output types, use a power supply voltage of 12.0 VDC or higher to obtain normal output.

*6 Not including control output load current. *7 Excluding differences per Laser Notice No. 50.

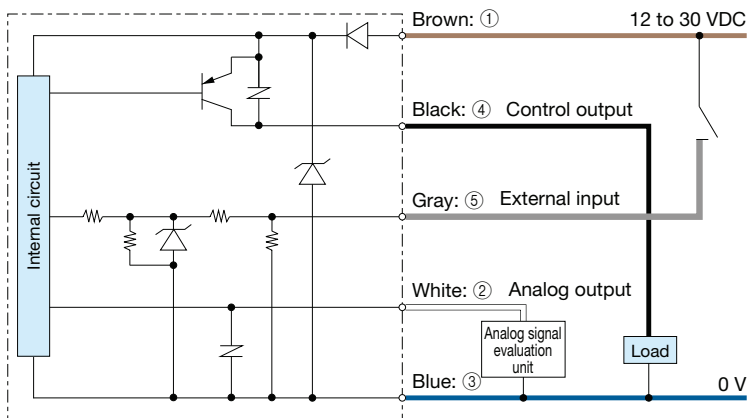
● Note that specifications are subject to change without prior notice for product improvement purposes.

I/O circuit diagram

■ Analog output type: With the NPN setting



■ Analog output type: With the PNP setting



Pig tail type pin No.

■ ① to ⑤ are connector pin No.



Notes

- When using a switching regulator for the power supply, be sure to ground the frame ground terminal.
- Wiring sensor cables with high-voltage or power supply lines can result in malfunctions due to noise, which can cause damage, make sure to wire separately.
- Avoid using the transient state while the power is on (approx. 300 ms).

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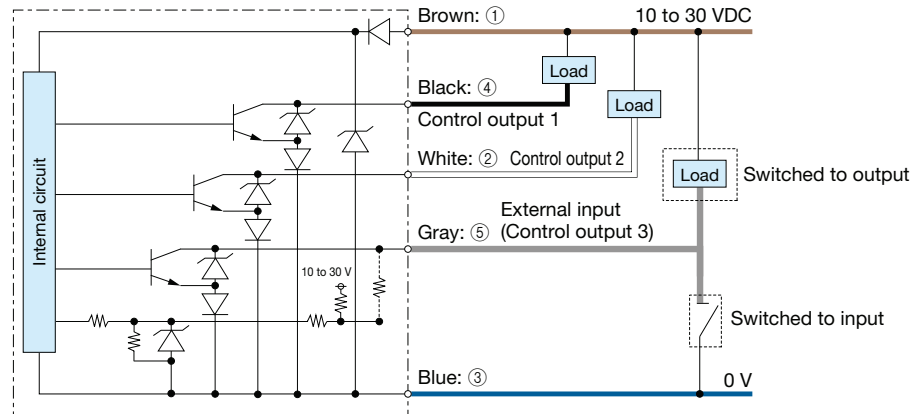
TOF-DL

TOF-3V

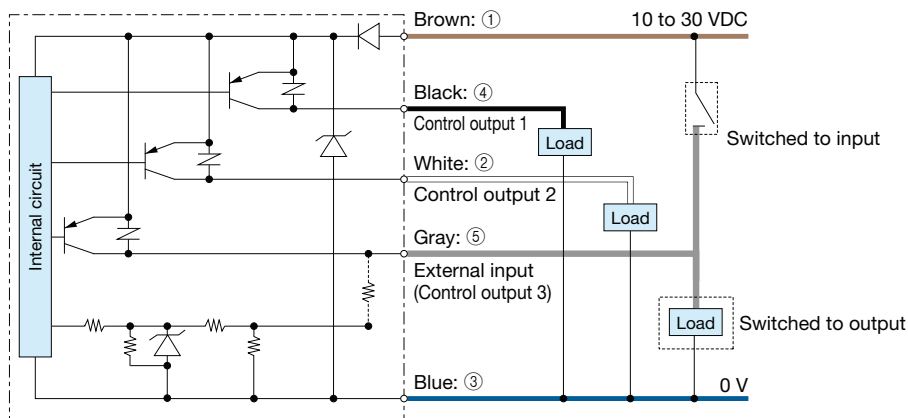
BGS-2V

TOF type with built-in digital panel **TOF-DL** series**I/O circuit diagram**

■ 3-control-output type: With the NPN setting



■ 3-control-output type: With the PNP setting

**Pig tail type pin No.**

■ ① to ⑤ are connector pin No.



- ① 10 to 30 VDC
- ② Control output 2
- ③ 0 V
- ④ Control output 1
- ⑤ External input (Control output 3)

Notes

- When using a switching regulator for the power supply, be sure to ground the frame ground terminal.
- Wiring sensor cables with high-voltage or power supply lines can result in malfunctions due to noise, which can cause damage, make sure to wire separately.
- Avoid using the transient state while the power is on (approx. 300 ms).

Typical characteristic data

TOF-DL250□

