

Compact Time-Of-Flight Laser Sensor

TOF-DL Series

Object Detection in Long Distance

- IO-Link connection supported
- Measurement range: 0.25 to 2.5m
- The smallest TOF sensor in class
- Built-in digital display for simple setup

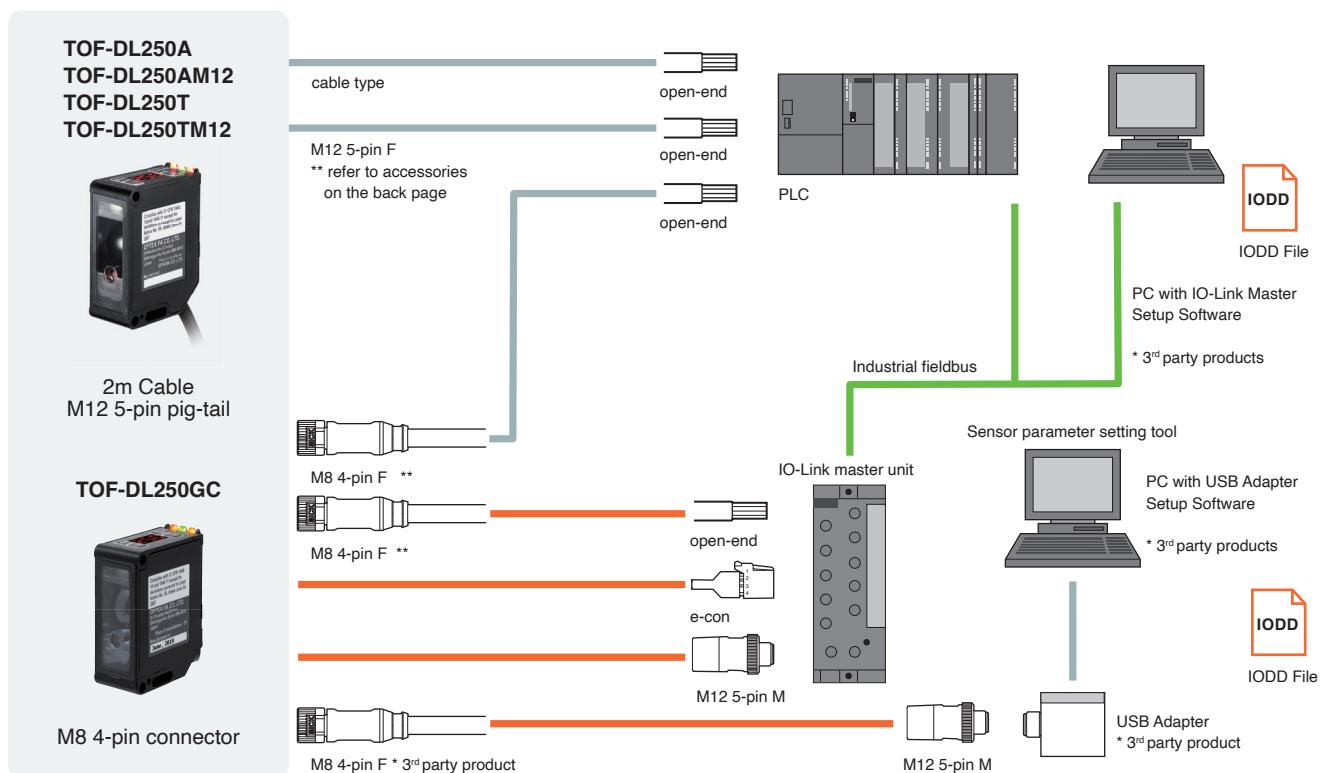


Photo: Cable type

 Lineup

| Type | Measurement range | Laser class (IEC/FDA) | IO-Link | I/O | Connection type | Model |
|------|---|-----------------------|---------|---|-----------------|----------------------|
| TOF |  0.25 to 2.5 m | Class 1 | ✓ | Control output x2 (External input) | M8 connector | TOF-DL250GC |
| | | | — | Analog output Control output External input | Cable | TOF-DL250A |
| | | | — | External input | M12 pig-tail | TOF-DL250AM12 |
| | | | — | Control output x3 (External input) | Cable | TOF-DL250T |
| | | | — | | M12 pig-tail | TOF-DL250TM12 |

/ System structure



Specifications

| Type | Analog output type | Three-output type | IO-Link type | |
|---|--|---|--|--|
| Model | Cable type | TOF-DL250A | TOF-DL250T | |
| | M12 Pig-tail type | TOF-DL250AM12 | TOF-DL250TM12 | |
| | M8 connector type | - | TOF-DL250GC | |
| Measurement range ^{*1} | 0.25 to 2.5 m | | | |
| Light source | Medium/Wavelength | Red semiconductor laser, 650 nm | | |
| | Average output | 390 μW or less | | |
| Laser class | Class 1 (IEC/JIS/FDA ^{*2}) | | | |
| Spot size ^{*3} | φ10 mm (At a distance of 2.5 m) | | | |
| Sampling period / Response time | 0.2 ms / 0.5 ms or less (When performing moving average once) | | | |
| Hysteresis | 3% or less (Moving average: 64 times/256 times, Distance: 1 to 2.5 m) | | | |
| Sensitivity adjustment | Teaching + Manual adjustment | | | |
| Indicators | Output, Stability/Laser OFF | Output 1 to 3, Stability/Laser OFF | Detection 1 and 2 Power/IO-Link | |
| Digital display | 7-segment, 3-digit LED display (Display unit: cm) | | | |
| External input | Selectable by setting | | | |
| Control output | No. of outputs | 1 | 3 | |
| | Type | NPN/PNP open collector | | |
| | Max. current, Residual volt. | Max. 100 mA/30 VDC, 1.8 V Max. | | |
| | Stability output | Output 1 switchable to stability output | - | |
| Analog output, IO-Link | Output mode | Light ON / Dark ON selectable | Invertable | |
| | | | Ver. 1.1, | |
| | | | COM 3 (230.4 kbps), P-data length: 4 byte, Min. cycle time: 1.0 ms | |
| | | | | |
| Supply voltage (Including 10% ripple (p-p)) | 12 to 30 VDC ^{*4} | 10 to 30 VDC | IO-Link: 18 to 30 VDC SIO: 10 to 30 VDC | |
| Current consumption | 60 mA or less ^{*5} | | | |
| Applicable regulations | EMC | EMC directive (2014/30/EU) | | |
| | Environment | RoHS directive (2011/65/EU), China RoHS (MIIT Order No. 32) | | |
| | Safety | FDA regulations (21 CFR 1040.10 and 1040.11 ^{*6}) | | |
| Applicable standards | EN 60947-5-2 / IEC 60825-1 | | | |
| NRTL certifications | UL Recognized Components Proximity Switch Certified for US and Canada | | UL Listed Proximity Switch Certified for US and Canada | |
| 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 | | | |
| Protection category | IP67 (IEC 60529) | | | |
| Material | Housing: PC, Front cover: PMMA | | | |
| Weight | Cable: 88 g, Pig-tail: 48 g | 30 g | | |
| Included accessories | Mounting bracket: BEF-WK-190, Mounting screws (M3 × 20 mm) | | | |

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

*2. In accordance with the FDA provisions of Laser Notice No. 56, the laser is classified as Class 1 per the IEC 60825-1:2014 standards.

*3. Defined with 1/e² (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. Use a power supply voltage of 12.0 VDC or higher to obtain normal output.

*5. Not including control output load current.

*6. Excluding differences per Laser Notice No. 56.

Wiring & pin assignments

M12 pig-tail type

Analog output type

| Pin | Wire | Connection |
|-----|-------|----------------|
| ① | Brown | 12 to 30 VDC |
| ② | White | Analog output |
| ③ | Blue | 0 V |
| ④ | Black | Output |
| ⑤ | Gray | External input |

Three-output type

| Pin | Wire | Connection |
|-----|-------|-------------------------|
| ① | Brown | 10 to 30 VDC |
| ② | White | Output 2 |
| ③ | Blue | 0 V |
| ④ | Black | Output 1 |
| ⑤ | Gray | External input/output 3 |

M8 connector type pin

IO-Link type

| Pin | Wire | Connection |
|-----|-------|-------------------------|
| ① | Brown | 10 to 30 VDC |
| ② | White | Output 2/External input |
| ③ | Blue | 0 V |
| ④ | Black | Output 1/IO-Link |

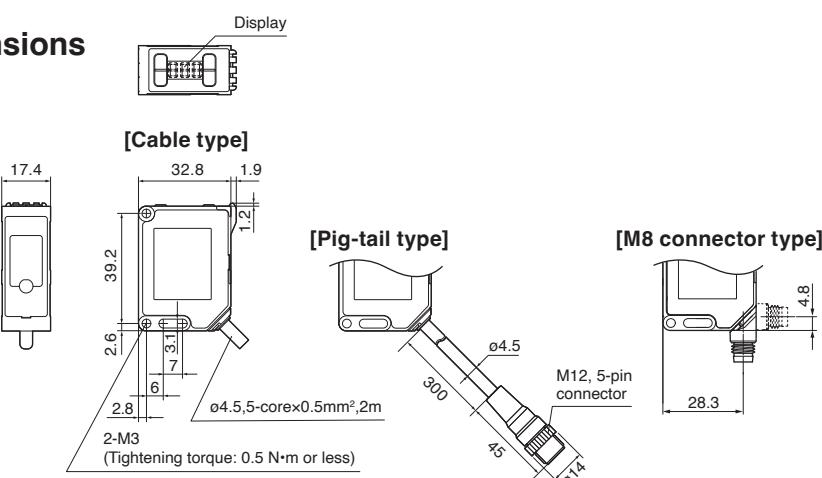
M12 pig-tail pin No.



M8 connector pin No.



Dimensions



Never use these products as sensing devices for personnel protection.

Doing so could lead to serious injury or death.

Before use please read an instruction manual.

• Specifications are subject to change without prior notice.

Accessories

| M12 5-pin open-end cables | | |
|---------------------------|-----|--------------------|
| Straight | 2m | YF2A15-020VB5XLEAX |
| | 5m | YF2A15-050VB5XLEAX |
| | 10m | YF2A15-100VB5XLEAX |
| M8 4-pin open-end cables | | |
| Straight | 2m | M84CN-2S |
| | 5m | M84CN-5S |
| | 10m | M84CN-10S |
| L-shaped | 2m | M84CN-2L |
| | 5m | M84CN-5L |
| | 10m | M84CN-10L |

Notes for sensor usage

This product emits a Class 1 (I) visible laser beam that is compliant with JIS C 6802/IEC 60825-1/2014 laser safety standards. Warning and explanation labels are affixed to the sides of the sensor.



Do not look directly at the laser or intentionally shine the laser beam in another person's eyes. Doing so may cause damage to the eyes or health.

TOF-DL250□□

Complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed. 3, as described in Laser Notice No. 56, dated November 12, 2014.

OPTEX FA CO., LTD.

91 Chidoriga-ave-1-chome

Shinjuku-ku, Tokyo, Japan

Phone: +81-3-5360-0111

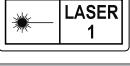
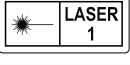
Fax: +81-3-5360-0112

Web: www.optexfa.com

E-mail: optexfa@optexfa.com

Place of manufacture: OF

Manufactured:



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