FASTUS

*FASTUS is a product brand of OPTEX FA

Got Questions? Need Application Support?
Contact Ramco Innovations today!

Laser Displacement Sensor

CD2H Series

Best-in-class, All-in-one Middle-range Sensors

- **New model** — CD2H-130 for measurements from 60 to 200
- **Wide measurement range** — Measurement in the long distance up to 1,200 mm
- **First in industry** — Waveform of received light can be displayed on OLED display

OPTEX FA CO., LTD

Ramco Innovations (800) 280-6933 www.optex-ramco.com email us at nsales@ramcoi.com

Highest-in-class* | Fastest-in-class*

Repeat Accuracy **Sampling Period**

0.25 µm 133.3 µs

(CD2H-30□/CD2H-50□)

Highest-in-class*Repeat Accuracy and Sampling Period are achieved by originally developed ultra-sensitive C-MOS image sensor. These features contribute quality improvement and faster operation of production lines in a broad range of manufacturing.

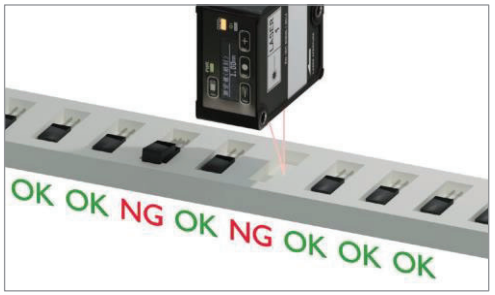
CD2H Series is the C-MOS Laser Displacement Sensor that achieves the Fastest-in-class Repeat Accuracy of 0.25 µm and Sampling Period up to 133.3 µs.
The long-range models that are capable to measure in a distance up to 1,200 mm can be used in a wide range of application, such as measurement of a sheet-roll diameter and stack height.
The OLED display and IO-Link are supported as standard.
These are high-performance displacement sensors that support measurement requirements for high accuracy.

*Among laser displacement sensors with the repeat accuracy of 1 µm
(Investigated by OPTEX FA in November 2021)

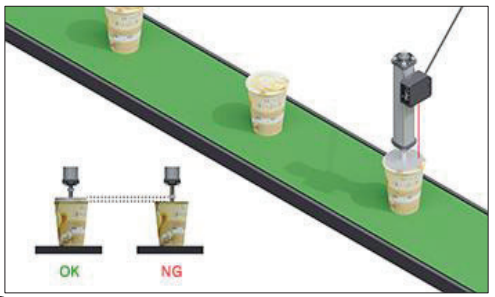
Applications

Height Measurement of Mounted Components

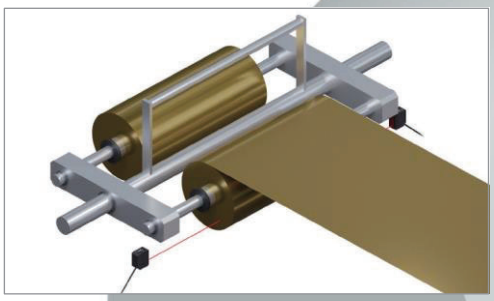
Presence Detection of Electronics Components



Sealing Inspection of Cupped Foods



Wind-off Measurement of Secondary Battery Film



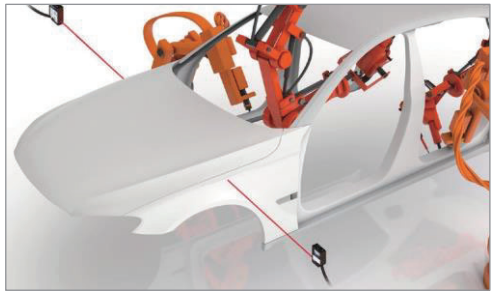
Lineup

Reflection mode	Measurement range	Repeat accuracy*1	Linearity	Light source Laser class	I/O	Model	
						Cable	Pigtail cable
Diffuse reflective	30±5 mm (25 to 35 mm)	0.25 µm	±0.1 % of F.S.	Red semiconductor Laser CLASS 1	2 Control output Analog output External input IO-Link	CD2H-30A	CD2H-30M12A
	50±10 mm (40 to 60 mm)	0.25 µm				CD2H-50A	CD2H-50M12A
	130±70 mm (60 to 200 mm)	4 µm				CD2H-130	CD2H-130M12
	245±175 mm (70 to 420 mm)	10 µm		Red semiconductor Laser CLASS 2		CD2H-2452	CD2H-245M122
	350±250 mm (100 to 600 mm)	20 µm				CD2H-3502	CD2H-350M122
	700±500 mm (200 to 1200 mm)	100 µm	±0.1 % of F.S. (200 to 700 mm) ±0.3 % of F.S. (700 to 1200 mm)			CD2H-7002	CD2H-700M122

• For the pigtail type, please purchase an optional connector cable.

Detecting seal material on pressed products

Measurement of Automobile Body Position



Accessories

Standard Connector cables

YF2A15-020VB5XLEAX Cable length: 2 m
YF2A15-050VB5XLEAX Cable length: 5 m
YF2A15-100VB5XLEAX Cable length: 10 m

Minimum bending radius: When fixed in place: 26 mm

Bending resistant Connector cable

DOL-1205-G02M-R Cable length: 2 m
DOL-1205-G05M-R Cable length: 5 m

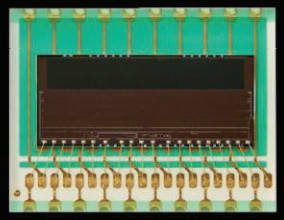
Minimum bending radius: When fixed in place: 10 mm
When movable: 30 mm

Reasons for first-in-class performance

Equipped with the ATOMOS image sensor

The Best-in-class preformation is achieved by the ultra-sensitive ATMOS image sensor that was originally developed for the most advanced displacement sensor, CDX Series.

ATMOS: Auto Tuning C-MOS

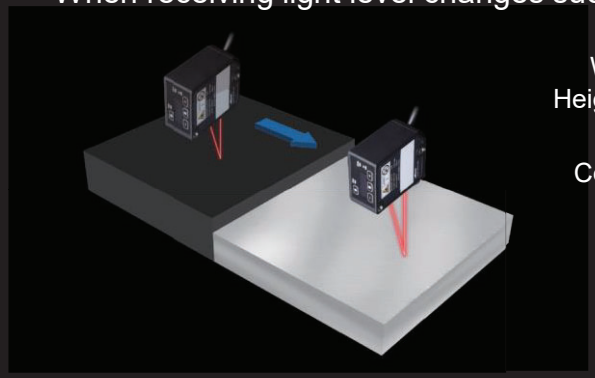


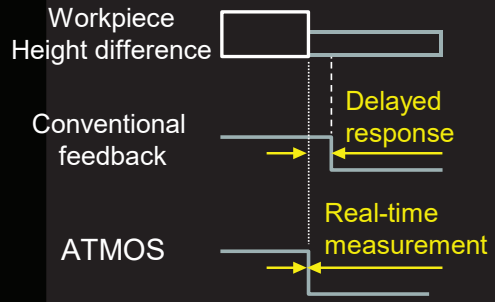
Only in the industry

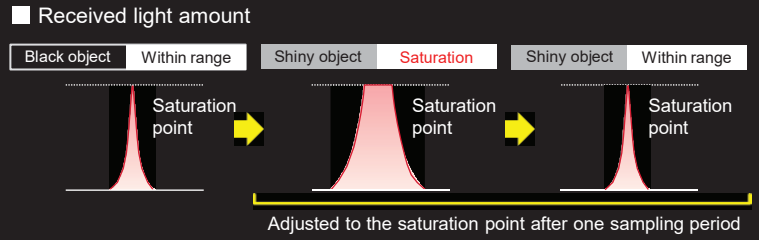
Feedback-free high-speed shutter

The unique algorithm realizes measurement without feedback process. Real-time measurement is realized, as momentary errors of measurement and delay in response are eliminated.

When receiving light level changes suddenly







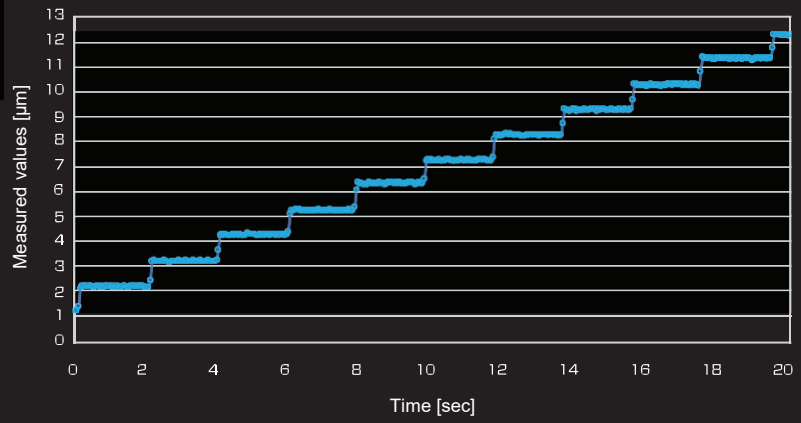
The shutter is closed just before the saturation point to stop receiving light, so that no feedback time is needed.

Highest in class Resolution*

Even 1 µm steps can be reliably detected.

CD2H-30□: 0.25 µm
CD2H-50□: 0.25 µm

Resolution data of CD2H-30: actual values moved by 1 µm (Moving average = 512 count)



Fastest-in-class Sampling Period*

CD2H Series	133.3 µs
Conventional models	500.0 µs

Approx. 3.8 times faster!

Highest-in-class Linearity*

This is especially effective for measurement in a long distance or wide range.

Long distance 700 mm type:
±0.1 % of F.S. (200 to 700 mm)/±0.3 % of F.S. (700 to 1200 mm)

*Among laser displacement sensors with the repeat accuracy of 1 µm (Investigated by OPTEX FA in November 2021)

Ramco Innovations (800) 280-6933 www.optex-ramco.com email us at nsales@ramcoi.com

Visualized various data on the display

Easy-to-read OLED display

Improved visibility **Improved operability**

Menu texts can be displayed in 7 languages.
Display of measurement values can be selected among 3 modes of relative value, analog output value and bar graph.
Maintenance data such as internal temperature and total operating time can be also displayed for predictive maintenance.

Relative value
(Distance from a reference point)

Analog value

Bar graph display

Waveform of received light can be displayed

First in industry*

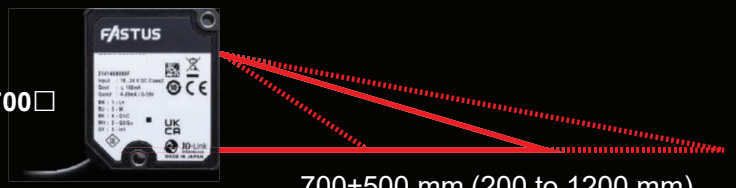
Monitoring of waveform helps to check amounts of received light and an installation angle.
The masking function of unwanted ambient light is also available to reduce such interference.

Received light waveforms

*with amplifier built-in displacement sensors
Investigated by OPTEX FA in December 2021

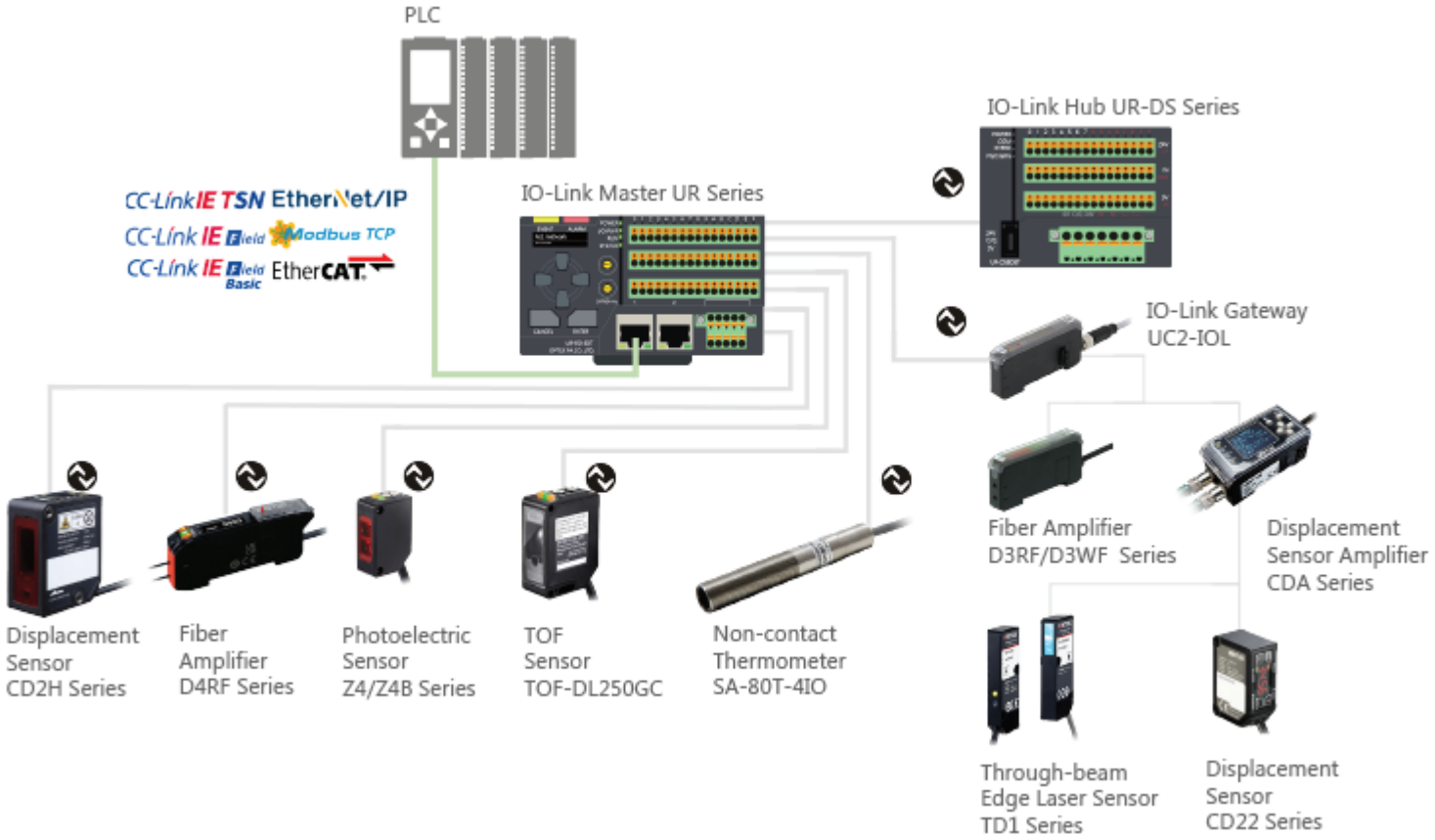
Wide lineup of measurement ranges

Narrow measurement ranges of displacement sensors have required to adjust installation or model of the sensors to measure the distance to objects.
CD2H-700 with the longest distance of measurement range of 700±500 mm reduces work and time of setup changes.



New Lineup of IO-Link compatible displacement sensors

IO-Link is one of technology that connects sensors and actuators to Industrial Ethernet using digital signals to promote smart factories.
OPTEX FA contributes to the development of smart factories by expanding the range of IO-Link compatible products.



Advantages of IO-Link Introduction 1

Sensor information status monitoring leads to predictive maintenance and reduced downtime.

Advantages of IO-Link Introduction 2

The storage of sensor setting information allows for immediate restoration even if the sensor is replaced, improving maintainability.

Advantages of IO-Link Introduction 3

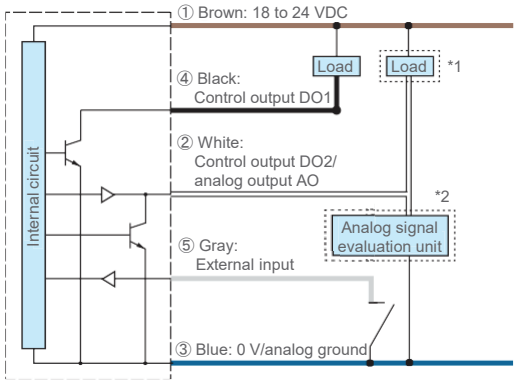
Converts measured value to digital signals for transmission to PLC, making them resistant to noise and enabling long-distance communication.

Software CD2H_URES_Navigator (Free software)

Software is available to check settings and light-receiving waveforms and log measured values on a PC using IO-Link Master (UR-ES16DT).
It can be downloaded from our website.

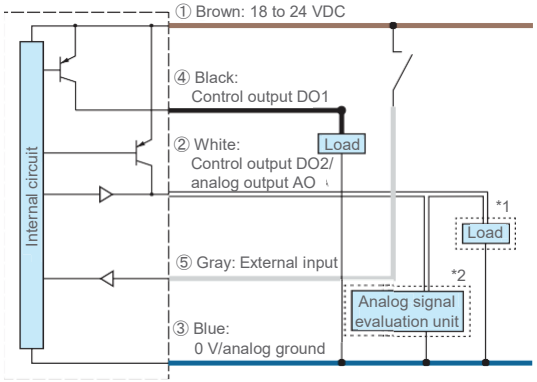
I/O circuit diagram

SIO mode (standard I/O mode) with the NPN setting



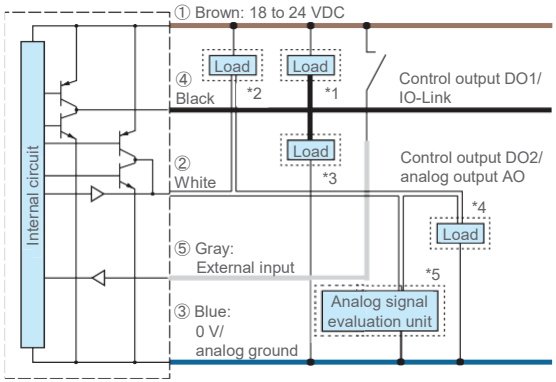
*1. When used as control output DO2
*2. When used as analog output AO

SIO mode (standard I/O mode) with the PNP setting



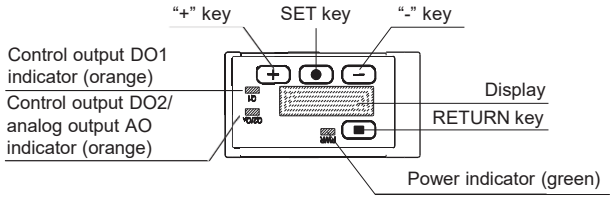
*1. When used as control output DO2
*2. When used as analog output AO

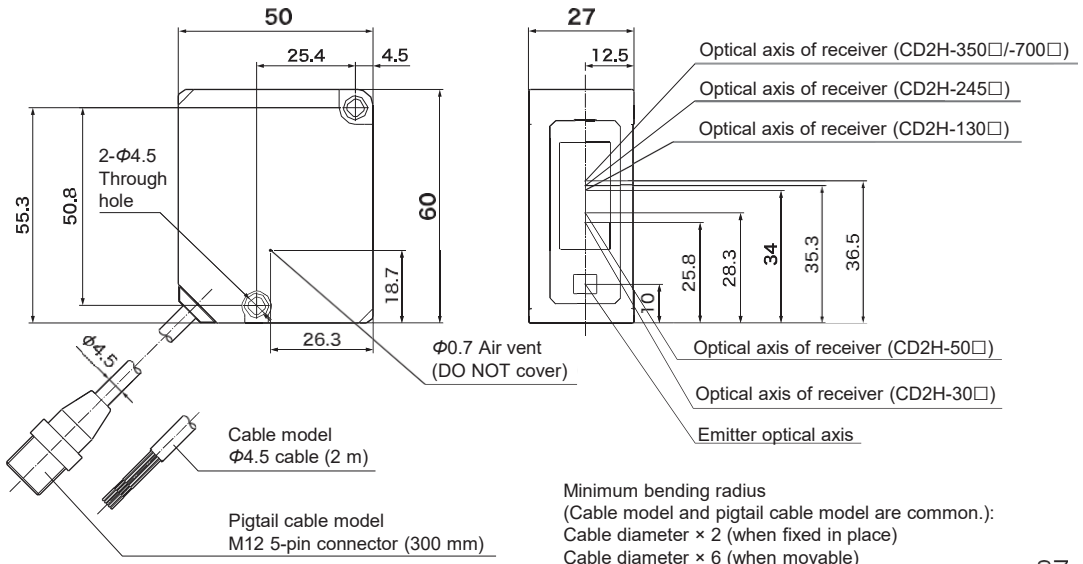
IO-Link mode or the Push-Pull setting



*1. When used as control output DO1 and the sensor is connected with plus common circuits
*2. When used as control output DO2 and the sensor is connected with plus common circuits.
*3. When used as control output DO1 and the sensor is connected with minus common circuits.
*4. When used as control output DO2 and the sensor is connected with minus common circuits.
*5. When used as analog output AO

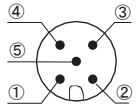
Dimensions (Unit : mm)





Minimum bending radius
(Cable model and pigtail cable model are common.):
Cable diameter × 2 (when fixed in place)
Cable diameter × 6 (when movable)

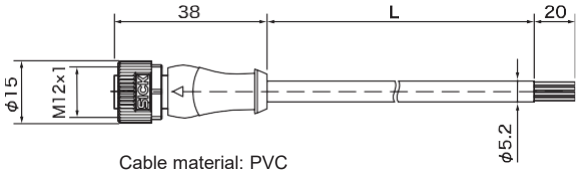
M12 connector pin layouts



① 18 to 24 VDC ±10 %
② Control output DO2/analog output AO
③ 0 V/analog ground
④ Control output DO1/IO-Link
⑤ External input

M12 5-pin connector cables

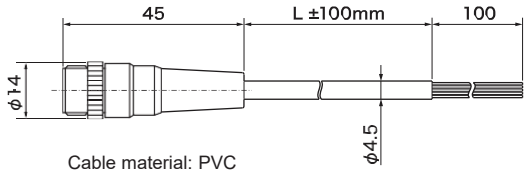
YF2A15-020VB5XLEAX
YF2A15-050VB5XLEAX
YF2A15-100VB5XLEAX
Minimum bending radius:
Cable diameter × 5
(when fixed in place)



Cable material: PVC
Conductor cross-section: 5-wire × 0.34 mm²
L = 2000 mm (YF2A15-020VB5XLEAX)
= 5000 mm (YF2A15-050VB5XLEAX)
= 10000 mm (YF2A15-100VB5XLEAX)

M12 5-pin connector cables (bending resistant)

DOL-1205-G02M-R
DOL-1205-G05M-R
Minimum bending radius:
Cable diameter × 2 (when fixed in place)
Cable diameter × 6 (when movable)



Cable material: PVC
Conductor cross-section: 5-wire × 0.3 mm²
L = 2000 mm (DOL-1205-G02M-R)
= 5000 mm (DOL-1205-G05M-R)

Specifications

【Model specifications】

Model	Cable	CD2H-30A	CD2H-50A	CD2H-130	CD2H-2452	CD2H-3502	CD2H-7002
	Pigtail cable	CD2H-30M12A	CD2H-50M12A	CD2H-130M12	CD2H-245M122	CD2H-350M122	CD2H-700M122
Center of measurement range		30 mm	50 mm	130 mm	245 mm	350 mm	700 mm
Measurement range		±5 mm (25 to 35 mm)	±10 mm (40 to 60 mm)	±70 mm (60 to 200 mm)	±175 mm (70 to 420 mm)	±250 mm (100 to 600 mm)	±500 mm (200 to 1200 mm)
Light source	Medium	Red semiconductor laser					
	Wavelength	655 nm					
	Max. output	0.39 mW			1 mW		
Laser class	JIS/IEC/FDA*1	CLASS 1			CLASS 2		
Spot size*2		Φ 50 µm	Φ 70 µm	Φ 0.3 mm	Φ 0.5 mm	Φ 0.6 mm	Φ 1.0 mm
Linearity		±0.1 % of F.S. (±0.01 mm)	±0.1 % of F.S. (±0.02 mm)	±0.1 % of F.S. (±0.14 mm)	±0.1 % of F.S. (±0.35 mm)	±0.1 % of F.S. (±0.5 mm)	200 to 700 mm ±0.1 % of F.S. (±1 mm) 700 to 1200 mm ±0.3 % of F.S. (±3 mm)
Resolution*3		0.25 µm	0.25 µm	4 µm	10 µm	20 µm	100 µm
Repeat accuracy*4		0.25 µm	0.25 µm	4 µm	10 µm	20 µm	100 µm
Sampling period*5		133.3 µm/150 µm/200 µm/300 µm/500 µm/1 ms/2 ms/5 ms/Auto					
Temperature characteristic*6		±0.06 % of F.S./°C					
Weight		Cable model: Approx. 140 g, Pigtail cable model: Approx. 90 g					

【Measurement condition】 The measurement conditions are as follows unless otherwise designated:
Ambient temperature: 25 °C (room temperature), supply voltage: 24 VDC, sampling period: 200 µs, moving average performed: 128, median filter: 31, center of measurement range, standard measured object (white ceramic). Furthermore, the sensor is fixed in place with an aluminum bracket when measurements are performed.

*1: In accordance with the FDA provisions of Laser Notice No. 56, the laser is classified per the IEC 60825-1:2014 standard.
*2: Defined with center strength $1/e^2$ (13.5 %) at the center of the measurement range. There may be leak light other than the specified spot size. The sensor may be affected when there is a highly reflective object close to the detection area.
*3: The smallest determinable step when changing the distance between the sensor and the target one step at a time (at moving average of 512).
*4: Peak to peak value of measurement in stationary state (at moving average of 512).
*5: Set to 200 µs by default.
*6: Typical example when the object (white ceramic) is measured while the object and the sensor are fixed in place with aluminum brackets. This object is placed at the center of the measurement range.
*7: Value when DO2 is set to analog output (current) and measurement is not possible (outputting a current of 21 mA).
*8: Set to analog current output by default.
*9: Set to laser off by default.
*10: Excluding differences per Laser Notice No. 56.

【Common Specifications】

Supply voltage		18 to 24 VDC (±10 %, including ripple)
Current consumption*7		80 mA (at 18 VDC), 70 mA (at 24 VDC)
IO-Link	Specifications	Ver. 1.1
	Baud rate	COM3 (230.4 kbps)
	Number of process input data bytes	6 bytes
	Minimum cycle time	0.7 ms
Control output (DO1/DO2*8)	Number of outputs	2 (DO1 can be switched to IO-Link.)
	Polarity	NPN/PNP open collector or Push-Pull (selectable by setting)
Analog output QA*8	Current	4 to 20 mA, load impedance: 300 ohm or less
	Voltage	0 to 10 V, output impedance: 100 ohm or less
External input *9		Switchable between Off, Multi operations, Hold, Zero point teach and Laser off
Display		0.9-inch OLED display (128 x 36 pixel) Menu languages: English, German, Spanish, Japanese, Simplified Chinese, Traditional Chinese, Korean
Indicators		Power indicator (green), output indicators (orange x 2), IO-Link communication indicator (flashing green)
Connection		Cable model: ø 4.5 mm, 2 m cable Pigtail cable model: ø 4.5 mm, 300 mm cable with M12 5-pin connector Minimum bending radius: cable diameter x 2 (when fixed in place), cable diameter x 6 (when movable)
Protection circuit		Reverse connection protection, overcurrent protection
Environmental resistance	Degree of protection	IP67 (including M12 connector of pigtail cable model)
	Ambient temp./humidity	-10 to +50 °C/35 to 85 % RH (without freezing or condensation)
	Storage temp./humidity	-20 to +60 °C/35 to 85 % RH (without freezing or condensation)
	Ambient illuminance	Incandescent light: 10,000 lx max., Fluorescent light: 10,000 lx max.
	Vibration resistance	10 to 55 Hz, Double amplitude 1.5 mm, 2 hours in each X, Y and Z direction
	Shock resistance	Approx. 50 G (500 m/s^2) 3 times in each X, Y and Z direction
Applicable regulations	EMC	EU EMC Directive (2014/30/EU), UK EMC (Electromagnetic Compatibility Regulations 2016)
	Environment	RoHS Directive (2011/65/EU), UK RoHS (The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012), China RoHS (MIIT Order No. 32)
	Safety	FDA Regulations (21 CFR 1040.10 and 1040.11)*10
Applicable standards		NRTL certification
NRTL certification		UL Recognized Components Proximity Switch Certified for US and Canada.
Company standards		Noise resistance: Feilen Level 3 cleared
Warm-up time		Approx. 30 minutes
Material		Housing: PBT, Front window: PMMA

● Specifications are subject to change without prior notice.

The information in this catalog is correct as of January 2023.

OPTEX FA CO., LTD
91 Chudoji-Awata-cho, Shimogyo-ku, Kyoto 600-8815 JAPAN
TEL. +81-75-325-1314 FAX. +81-75-325-2936
https://www.optex-fa.com