Compact laser displacement sensor

CD22 series

Smallest displacement sensor in class

*Among devices equipped with displays in the 1 µm repeat accuracy class. Optex FA examination performed November 2015.

- Newly added amplifier unit that can be connected with CC-Link communication units
- Built-in amplifier & digital 4-digit display
- Featuring high performance functionality like high-end models

FASTUS is a product brand of Optex FA.

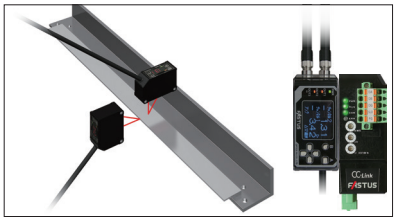
Related products

Remote operation/calculation
CDA
P.450

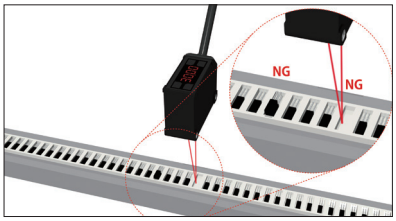
CC-Link communication
UC1
P.118

Specular reflection type
CD33
P.472

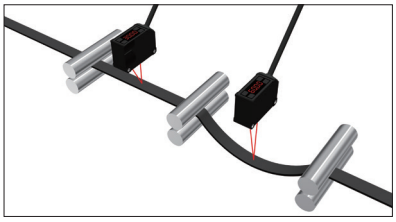
Positioning for metal plate mounting



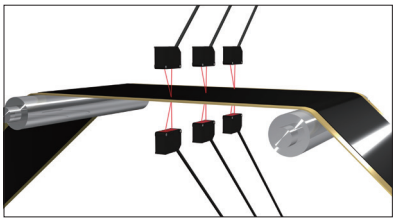
Detection of presence/height of electronic components



Slackness measurements for rubber materials



Electrode thickness measurement



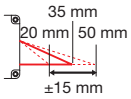
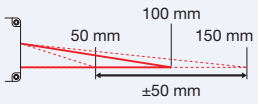
Smallest in class*

W18 × D31 × H44 mm

18 × 31 × 44 mm (W × D × H). The FASTUS CD22 series has achieved being the smallest displacement sensor in its class by adopting a new type of hybrid lens for the optical system and by integrating accumulated optical technology. By utilizing Optex FA's know-how regarding the completion of measurement processing inside the sensor head, a feedback circuit that is the same as those on high-end displacement sensors has been equipped within the compact body.

*Among devices equipped with displays in the 1 µm repeat accuracy class.
Optex FA examination performed November 2015.

Selection table

Type	Measurement range	Repeat accuracy	Analog output/serial interface	Control output	Connection type	Model
Diffuse-reflective type		1 µm	4 to 20 mA	NPN/PNP selectable by setting	Cable type	CD22-15A
					Pig tail type	CD22-15AM12
			0 to 10 V	NPN/PNP selectable by setting	Cable type	CD22-15V
					Pig tail type	CD22-15VM12
			RS-485	—	Pig tail type	CD22-15-485M12
		6 µm	4 to 20 mA	NPN/PNP selectable by setting	Cable type	CD22-35A
					Pig tail type	CD22-35AM12
			0 to 10 V	NPN/PNP selectable by setting	Cable type	CD22-35V
					Pig tail type	CD22-35VM12
			RS-485	—	Pig tail type	CD22-35-485M12
		20 µm	4 to 20 mA	NPN/PNP selectable by setting	Cable type	CD22-100A2
					Pig tail type	CD22-100AM122
			0 to 10 V	NPN/PNP selectable by setting	Cable type	CD22-100V2
					Pig tail type	CD22-100VM122
			RS-485	—	Pig tail type	CD22-100-485M122

- For the pig tail type, please purchase an optional connector cable.
- When using a CDA amplifier unit, please select the RS-485 communication type.

Regarding stainless steel housing type (made-to-order)

A type that features SUS316L for the housing can also be made.

Options

Connector cables

DOL-1205-G02M
Cable length: 2 m
DOL-1205-G05M
Cable length: 5 m
DOL-1205-G10M
Cable length: 10 m

DOL-1205-G02M-R
Cable length: 2 m, robot cable type
DOL-1205-G05M-R
Cable length: 5 m, robot cable type

*Image shows DOL-1205-G02M. Robot cable type feature black instead of orange and shapes vary slightly.

Displacement sensor amplifier unit CDA series

CDA-M
(master unit)
CDA-S (slave unit)

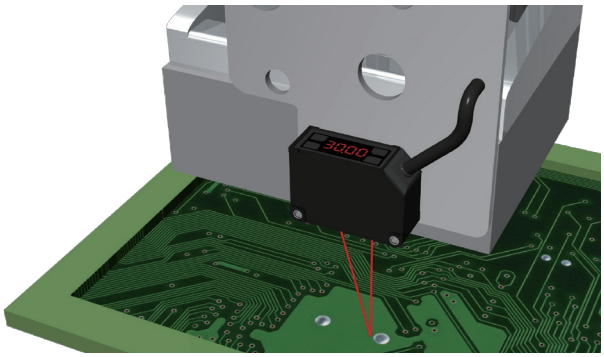
Features an organic EL display that can display clearly in both Japanese and English.
This external amplifier can be used for calculations using two CD22 series units or connected to a CC-Link communication unit.

*For details, refer to page 450.

Features

Ideal for robot mounting

CD22 series models feature a compact and lightweight body, and because of their built-in amplifier, there are few limitations on installation space and wiring, meaning that sensors themselves can be mounted on robots or on moving parts.



The housing features aluminum die-casting that suppresses measurement errors caused by temperatures or housing distortion.

Easy-to-see digital panel

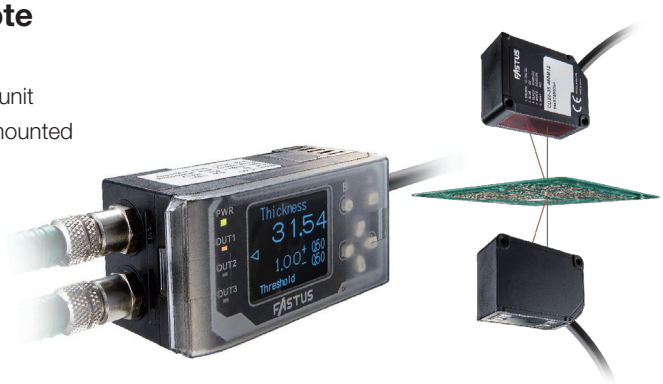
Featuring an ultra-small body and easy-to-see built-in 4-digit digital panel meter.
Confirmation of distance can be performed on the spot and the 4 operation buttons provide multi-functionality while enabling easy operation.

The external amplifier unit enables remote operation and easy calculation setting

With its excellent visibility and operability, the external amplifier unit enables the CD22 series to be operated remotely even when mounted in narrow spaces such as inside machinery.

Calculation of thickness and height differences can be performed easily using 2 sensor heads.

NEW Displacement sensor amplifier unit
CDA series *For details, refer to page 450.



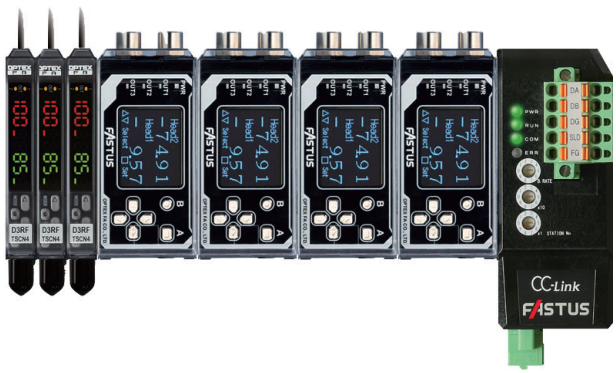
Connect with CC-Link to achieve "sensor visibility"

By connecting a CDA series to a communication unit, connection to a CC-Link network is possible.

It supports Mitsubishi iQ Sensor Solution (iQSS) and batch management of sensors can be performed easily with GX Works2.

CC-Link iQSS

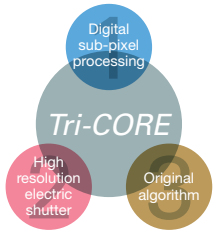
NEW CC-Link communication unit
UC1 series *For details, refer to page 118.



CC-Link communication unit UC1

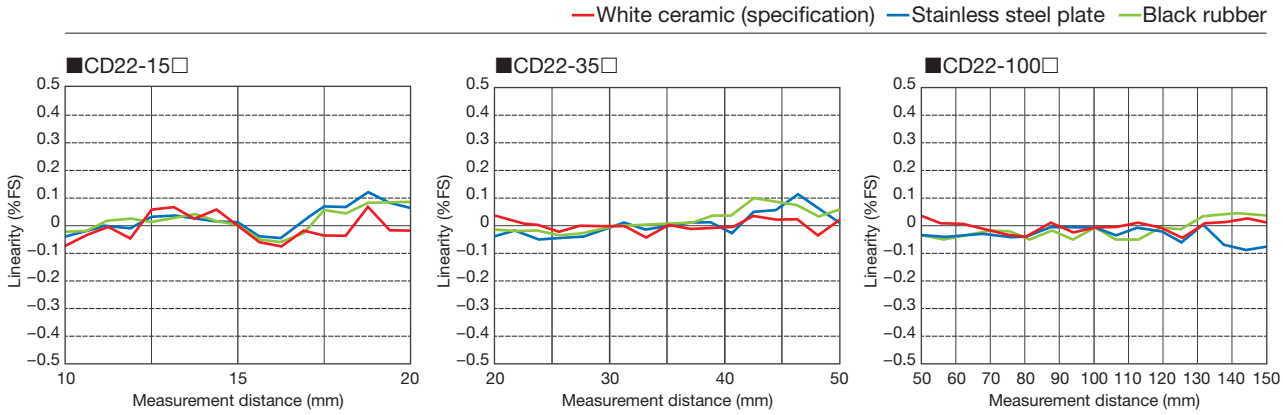
High-accuracy

With the CD22 series, the causes of all measurement errors can be eliminated even in the case of workpieces in which highly accurate measurements were difficult thanks to “Tri-CORE” optimization technology that corrects receiving light waveforms by way of “digital sub-pixel processing”, a “high resolution electric shutter” and “unique algorithm”.



Repeat accuracy: 1 µm (CD22-15□) | **Linearity: ±0.1% F.S.**

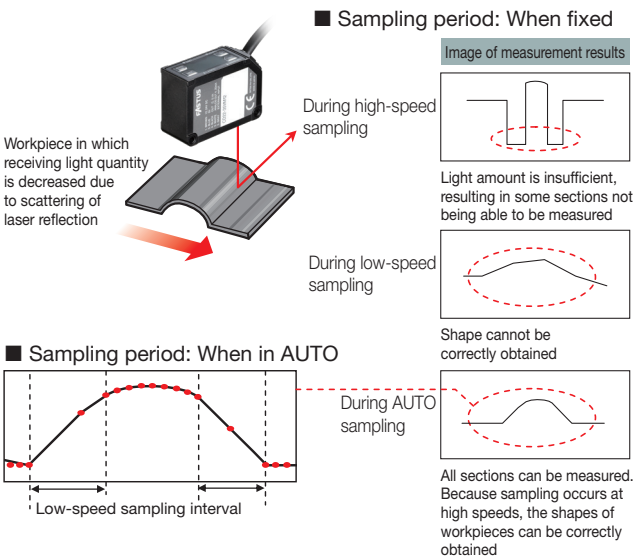
Linearity characteristics data — Low deviation depending on the workpiece



Automatic sampling function

With the CD22 series, in addition to normal receiving light quantity feedback, a “Sampling period: AUTO” mode has also been equipped that automatically adjust the sampling period when there are only low levels of reflected light from the workpiece.

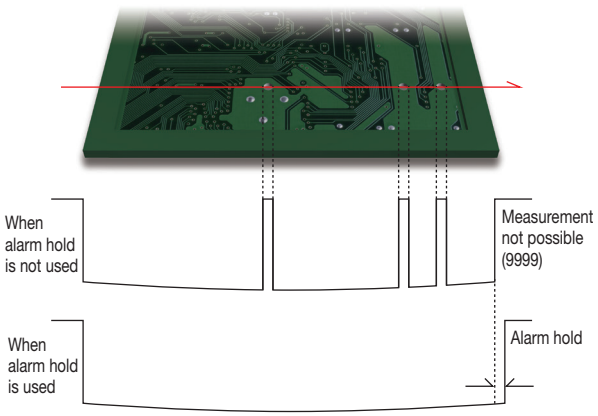
Thanks to this, high-speed measurements of even black workpieces and metal workpieces with low levels of reflected light are possible.



Alarm hold function

Alarms may be generated during measurement due to small holes in the workpiece, etc.

CD22 series models are equipped with an “alarm hold function” that enables the time until an alarm is identified to be set. It is possible to configure settings so that an alarm is not generated in the case of small holes, but is generated when there is no workpiece.



Specifications

■ **Analog output type**

Model	Analog Current type	Cable type	CD22-15A	CD22-35A	CD22-100A2
		Pig tail type	CD22-15AM12	CD22-35AM12	CD22-100AM122
	Analog Voltage type	Cable type	CD22-15V	CD22-35V	CD22-100V2
		Pig tail type	CD22-15VM12	CD22-35VM12	CD22-100VM122
Center of measurement range			15 mm	35 mm	100 mm
Measurement range			±5 mm	±15 mm	±50 mm
F.S. (full scale)			10 mm	30 mm	100 mm
Light source	Medium/wavelength		Red semiconductor laser, wavelength: 655 nm		
	Max. output		390 μW		1 mW
Laser class	IEC/JIS		Class 1		Class 2*1
	FDA		Class 1*2		Class 2*2
Spot size*3			Approx. 0.5 × 0.7 mm	Approx. 0.45 × 0.8 mm	Approx. 0.6 × 0.7 mm
Linearity			±0.1% F.S.		
Repeat accuracy*4			1 μm	6 μm	20 μm
Sampling period			500 μs/1000 μs/2000 μs/4000 μs/AUTO		
Temperature drift			±0.02%/°C F.S.		±0.05%/°C F.S.
Indicators			Laser emission indicator (green)/zero reset indicator (red)/output indicator (orange)/mode indicator (red)		
External input			Laser OFF, teaching, sample & hold, one-shot, zero reset (selectable)		
Analog output	Current type		4 to 20 mA, Load impedance: 300 Ω or less		
	Voltage type		0 to 10V, output impedance: 100 Ω		
Control output			NPN/PNP open collector (selectable by setting), Max. 100 mA / 30 VDC, residual voltage 1.8 V		
Supply voltage			12 to 24 VDC ±10%*5		
Current consumption			70 mA or less (at 24 VDC)		
Connection type			Cable type: Cable length: 2 m, ø4.5 Pig tail type: Cable with M12, 5-pin connector, 300 mm length		
Protection circuit			Reverse connection protection, overcurrent protection		
Environmental resistance	Degree of protection		IP67 (including joint of pig tail type)		
	Ambient temperature/humidity		-10 to +50°C / 35 to 85% RH (no freezing or condensation)		
	Ambient illuminance		Incandescent lamp 3,000 lx or less		
	Vibration resistance		10 to 55 Hz; double amplitude 1.5 mm; 2 hours in each of the X, Y, and Z directions		
	Shock resistance		Approx. 50 G (500 m/s^2), 3 times in each of the X, Y, and Z directions		
Applicable regulations			EMC directive (2004/108/EC) / FDA regulations (21 CFR 1040.10)		
Applicable standards			EN 60947-5-7		
Warm-up time			Approx. 5 minutes		
Material			Housing: Aluminum die-cast Front cover: PPSU Display: PET Cable: PVC		
Weight			Cable type: Approx. 90 g Pig tail type: Approx. 60 g		

<Measurement conditions>
The measurement conditions are as follows unless otherwise designated: Ambient temperature: 23°C (normal temperature), Supply voltage: 24 VDC, Sampling period: 500 μs, Average number of times: 64, Center of measurement range, Measurement target: white ceramic.

*1 A Class 1 type can also be made available (made-to-order product).
*2 In accordance with the FDA provisions of Laser Notice No. 50, the laser is classified as Class 1 or Class 2 per the IEC 60825-1 standard.
*3 Defined with center strength 1/e^2 (13.5%) at the center of 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.
*4 With an average of 512 times
*5 In the case of the analog voltage output type, use a supply voltage of 12.0 VDC Minimum to obtain the proper output.

■ **RS-485 communication type**

Model		CD22-15-485M12	CD22-35-485M12	CD22-100-485M122
Center of measurement range		15 mm	35 mm	100 mm
Measurement range		±5 mm	±15 mm	±50 mm
F.S. (full scale)		10 mm	30 mm	100 mm
Light source	Medium/wavelength	Red semiconductor laser, wavelength: 655 nm		
	Max. output	390 µW		1 mW
Laser class	IEC/JIS	Class 1		Class 2*1
	FDA	Class 1*2		Class 2*2
Spot size*3		Approx. 0.5 × 0.7 mm	Approx. 0.45 × 0.8 mm	Approx. 0.6 × 0.7 mm
Linearity		±0.1% F.S.		
Repeat accuracy*4		1 µm	6 µm	20 µm
Sampling period		500 µs/1000 µs/2000 µs/4000 µs/AUTO		
Temperature drift		±0.02%/°C F.S.		±0.05%/°C F.S.
Indicators		Laser emission indicator (green)/zero reset indicator (red)/output indicator (orange)/mode indicator (red)		
Serial interface*5		RS-485 half duplex communication (9.6 k to 1,250 kbps)		
Supply voltage		12 to 24 VDC ±10%		
Current consumption		70 mA or less (at 24 VDC)		
Connection type		Pig tail type: Cable with M12, 5-pin connector, 300 mm length		
Protection circuit		Reverse connection protection		
Environmental resistance	Degree of protection	IP67 (including joint of connector)		
	Ambient temperature/humidity	-10 to +50°C / 35 to 85% RH (no freezing or condensation)		
	Ambient illuminance	Incandescent lamp 3,000 lx or less		
	Vibration resistance	10 to 55 Hz; double amplitude 1.5 mm; 2 hours in each of the X, Y, and Z directions		
	Shock resistance	Approx. 50 G (500 m/s^2), 3 times in each of the X, Y, and Z directions		
Applicable regulations		EMC directive (2004/108/EC) / FDA regulations (21 CFR 1040.10)		
Applicable standards		EN 60947-5-2		
Warm-up time		Approx. 5 minutes		
Material		Housing: Aluminum die-cast Front cover: PPSU Display: PET Cable: PVC		
Weight		Approx. 60 g		

<Measurement conditions>
The measurement conditions are as follows unless otherwise designated: Ambient temperature: 23°C (normal temperature), Supply voltage: 24 VDC, Sampling period: 500 µs, Average number of times: 64, Center of measurement range, Measurement target: white ceramic.

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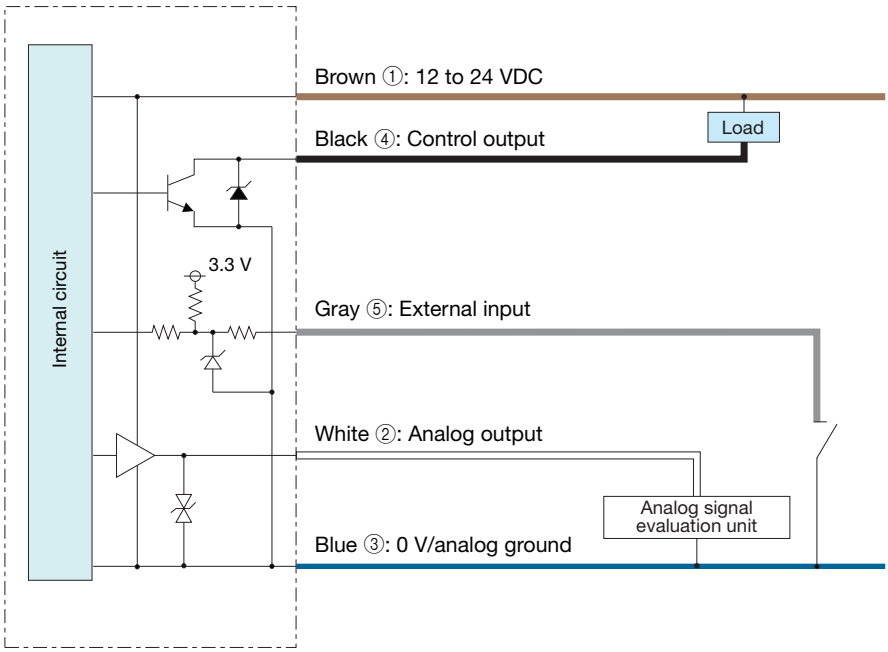
*3 Defined with center strength 1/e^2 (13.5%) at the center of measurement range. There may be leak light other than the specified spot size. The sensor may be affected when there is a highly reflective object close to the detection area.

*4 With an average of 512 times

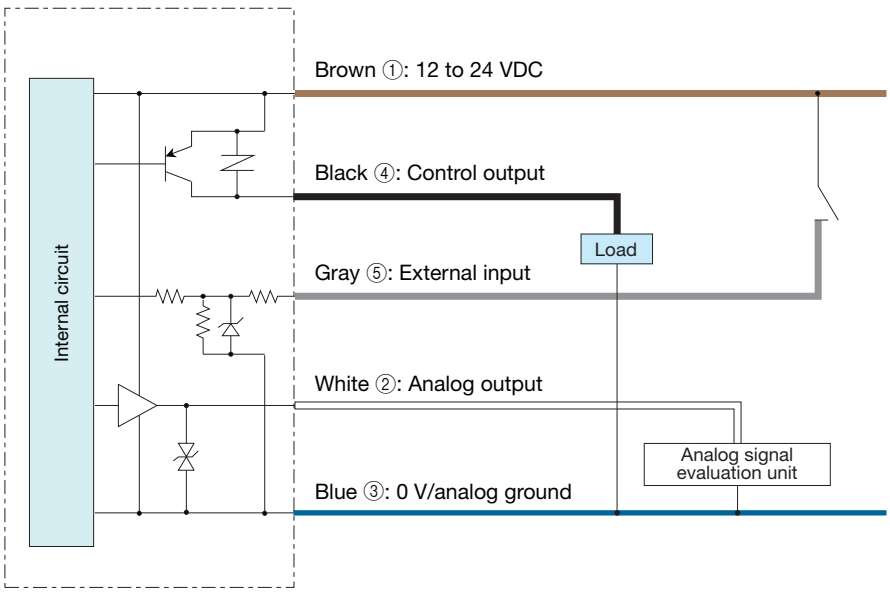
*5 Multi-drop connections by way of station number settings are not supported

I/O circuit diagram

Analog output type: With the NPN setting



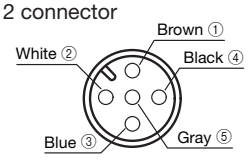
Analog output type: With the PNP setting



Connector pin configuration

(Sensor side)

M12 connector



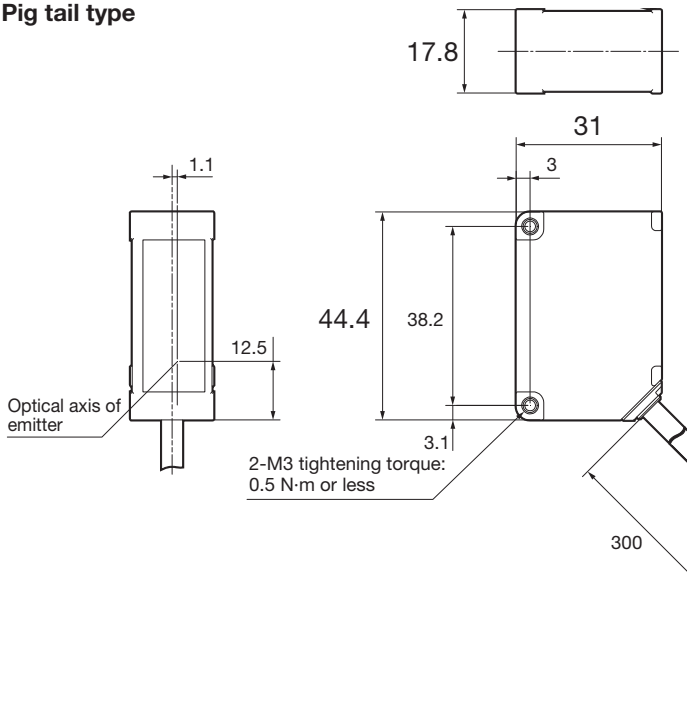
Analog output type	RS-485 communication type
Brown ① 12 to 24 VDC	Brown ① 12 to 24 VDC
Black ④ Control output	Black ④ RS-485 (A)
Gray ⑤ External input	Gray ⑤ Not used
White ② Analog output	White ② RS-485 (B)
Blue ③ 0 V	Blue ③ 0 V

Dimensions

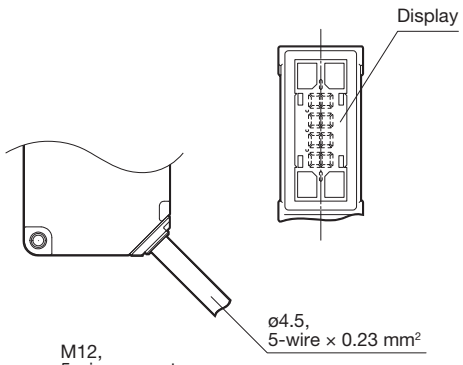
Sensor

(Unit: mm)

Pig tail type

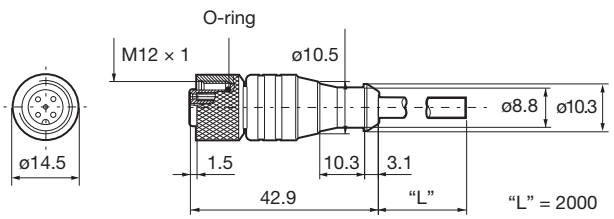


Cable type



Connector cables

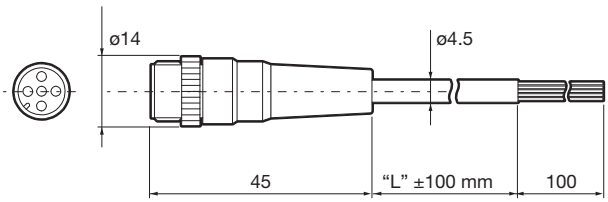
- DOL-1205-G02M
- DOL-1205-G05M
- DOL-1205-G10M



Cable section material: PVC
Conductor cross-section: 5-wire × 0.5 mm²

Connector cable (robot cable specification)

- DOL-1205-G02M-R
- DOL-1205-G05M-R



Cable section material: PVC
Conductor cross-section: 5-wire × 0.3 mm²

Precautions for laser use

This product emits a Class 1 or Class 2 visible laser beam that is compliant with JIS C6802/IEC -60825-1/FDA laser safety standards. Labels for applicable standards are affixed and attached to the sides of the sensor.

Type of laser used in this product

Type	Red semiconductor laser
Wavelength	655 nm
Output	390 μW/1 mW

● Export to the United States
If this product is to be exported to the United States, it is necessary to follow laser standards as stipulated by the American Food and Drug Administration (FDA). This product has already been submitted to the CDRH (Center for Devices and Radiological Health). If exporting to the United States, apply the attached seal to the product or replace the seal.