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Mitutoyo Quality

CD22 SERIES

Compact Laser Displacement Senor

CD22 Series

By: OPTEX FA CO., LTD.

Bulletin No. 2389

Mitutoyo

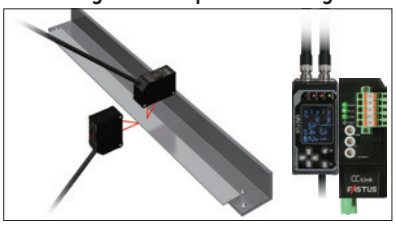
Smallest in class*

W18 × D31 × H44 mm

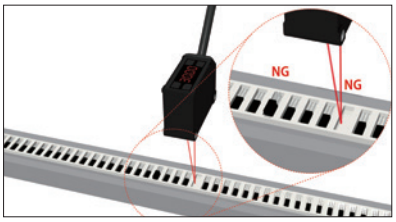
18 × 31 × 44 mm (W × D × H). The FASTUS CD22 series has achieved being the smallest displacement sensor in its class by adopting a new type of hybrid lens for the optical system and by integrating accumulated optical technology. By utilizing Optex FA's know-how regarding the completion of measurement 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.

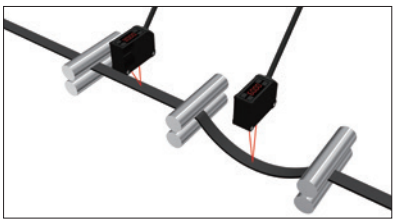
Positioning for metal plate mounting



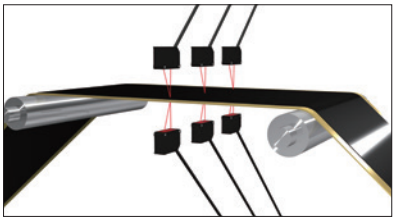
Detection of presence/height of electronic components



Slackness measurements for rubber materials



Electrode thickness measurement



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 digital display**
- **Featuring high performance functionality like high-end models**

FASTUS

FASTUS is a product brand of Optex FA.

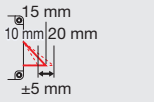
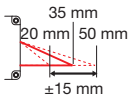
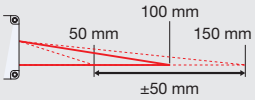
Related products

Remote operation/calculation
CDA
● P.450

CC-Link communication
UC1
● P.118

Specular reflection type
CD33
● P.472

Selection table

Type	Measurement range	Repeat accuracy	Analog output/ serial interface	Control output	Connection type	Model	Order No.
Diffuse-reflective type		1 µm	4 to 20 mA	NPN/PNP selectable by setting	Cable type	CD22-15A	**64PMI311**
					Pig tail type	CD22-15AM12	**64PMI312**
			0 to 10 V	NPN/PNP selectable by setting	Cable type	CD22-15V	**64PMI313**
					Pig tail type	CD22-15VM12	**64PMI314**
			RS-485	—	Pig tail type	CD22-15-485M12	**64PMI315**
		6 µm	4 to 20 mA	NPN/PNP selectable by setting	Cable type	CD22-35A	**64PMI316**
					Pig tail type	CD22-35AM12	**64PMI317**
			0 to 10 V	NPN/PNP selectable by setting	Cable type	CD22-35V	**64PMI318**
					Pig tail type	CD22-35VM12	**64PMI319**
			RS-485	—	Pig tail type	CD22-35-485M12	**64PMI320**
		20 µm	4 to 20 mA	NPN/PNP selectable by setting	Cable type	CD22-100A2	**64PMI321**
					Pig tail type	CD22-100AM122	**64PMI322**
			0 to 10 V	NPN/PNP selectable by setting	Cable type	CD22-100V2	**64PMI323**
					Pig tail type	CD22-100VM122	**64PMI324**
			RS-485	—	Pig tail type	CD22-100-485M122	**64PMI325**

- 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 (contact sales)
Cable length: 2 m

DOL-1205-G05M (contact sales)
Cable length: 5 m

DOL-1205-G10M (contact sales)
Cable length: 10 m

DOL-1205-G02M-R (64PMI329)
Cable length: 2 m, robot cable type

DOL-1205-G05M-R (64PMI330)
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 (64PMI294)
(master unit)

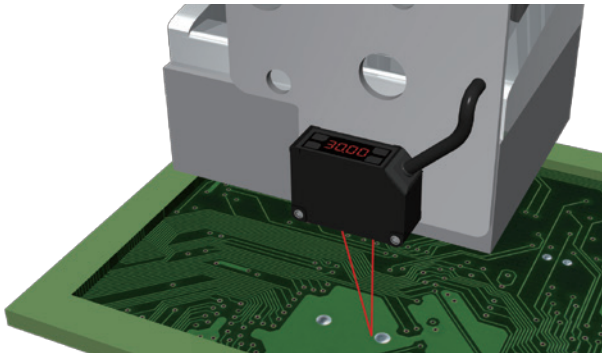
CDA-S (64PMI331)
(slave unit)

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.

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

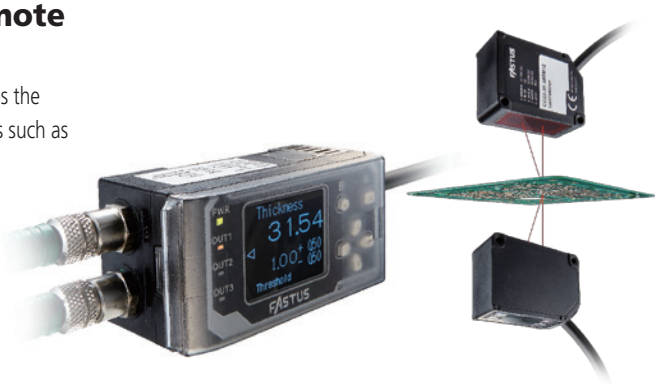
Features an ultra-small body and easy-to-see built-in 4-digit digital panel meter. Confirmation of distance can be performed on the spot and the 4 operation buttons provide multi-functionality while enabling easy operation.

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 two sensor heads.

Displacement sensor amplifier unit

CDA series



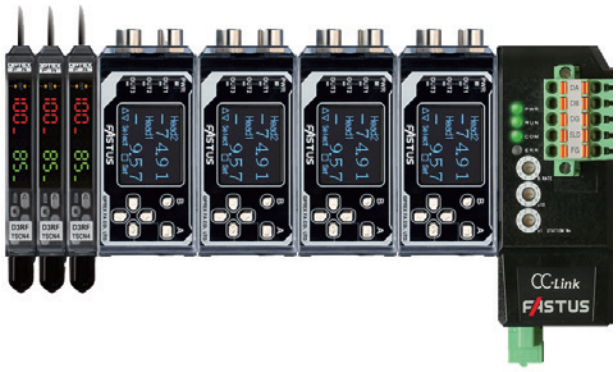
Connect with CC-Link to achieve "sensor visibility"

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 communication unit

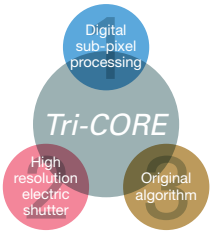
UC1 series



CC-Link communication unit UC1

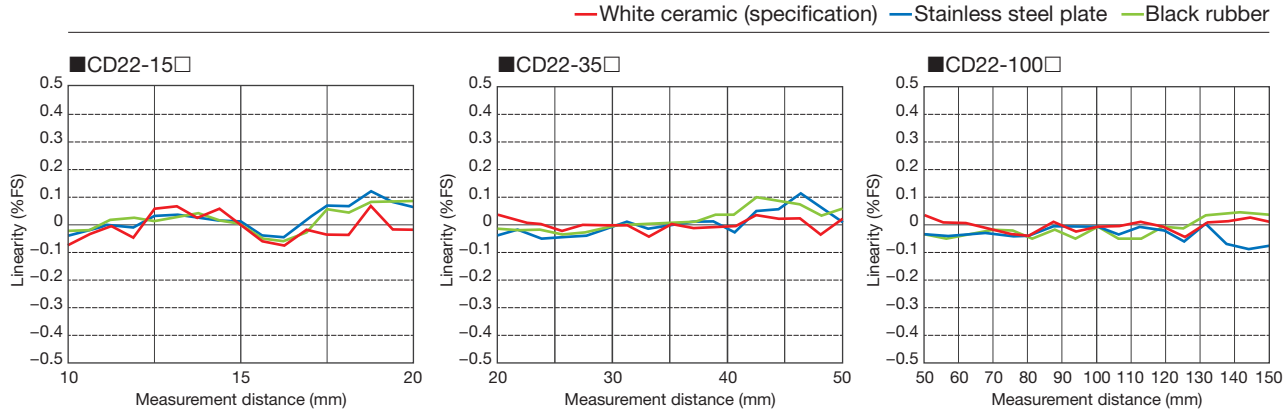
High-accuracy

With the CD22 series, the cause of all measurement errors, even with hard-to-measure workpieces, are eliminated using "Tri_CORE" optimization. This technology corrects receiving light waveforms by way of "digital sub-pixel processing," a "high resolution electric shutter," and unique algorithm" with highly accurate results.



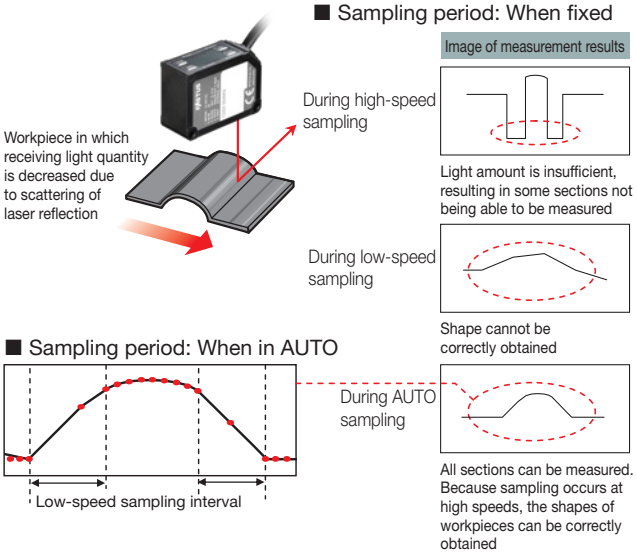
Repeat accuracy: 1 µm (CD22-15□) | **Linearity: ±0.1% F.S.**

Linearity characteristics data — Low deviation depending on the workpiece



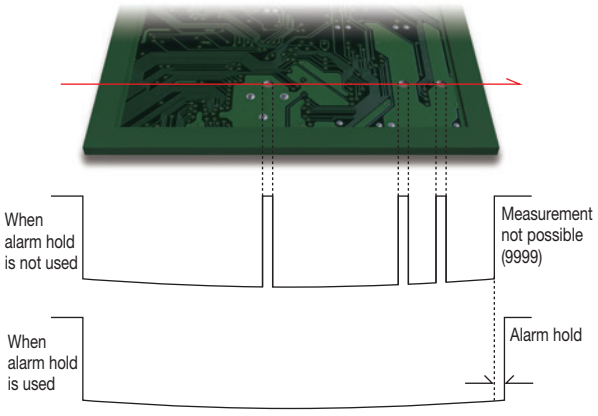
Automatic sampling function

With the CD22 series, in addition to normal receiving light quantity feedback, a "Sampling period: AUTO" mode has also been equipped that automatically adjusts 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 temp/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		

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)		
Control output		NPN/PNP open collector (selectable by setting), Max. 100 mA / 30 VDC, residual voltage 1.8 V		
Connection type		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 connector)		
	Ambient temp/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		

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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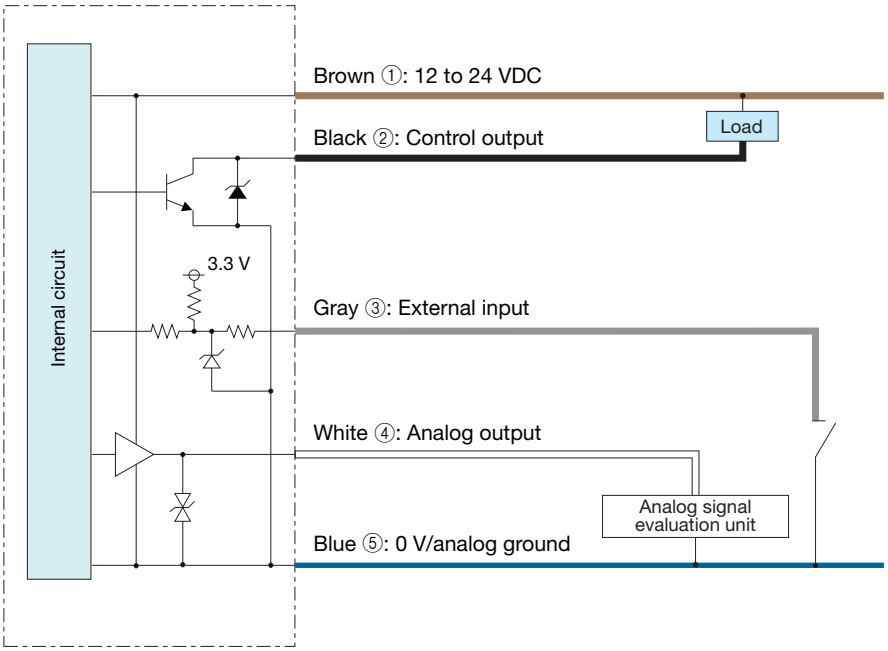
*4 With an average of 512 times

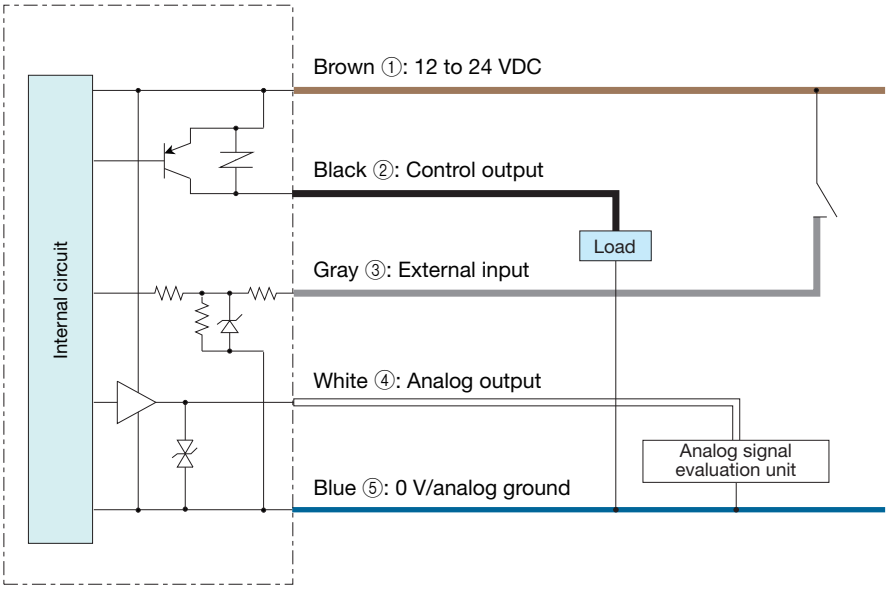
*5 Multi-drop connections by way of station number settings are not supported

I/O circuit diagram

Analog output type: With the NPN setting



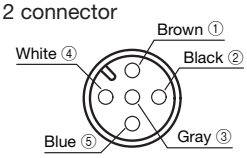
Analog output type: With the PNP setting



Connector pin configuration

(Sensor side)

M12 connector



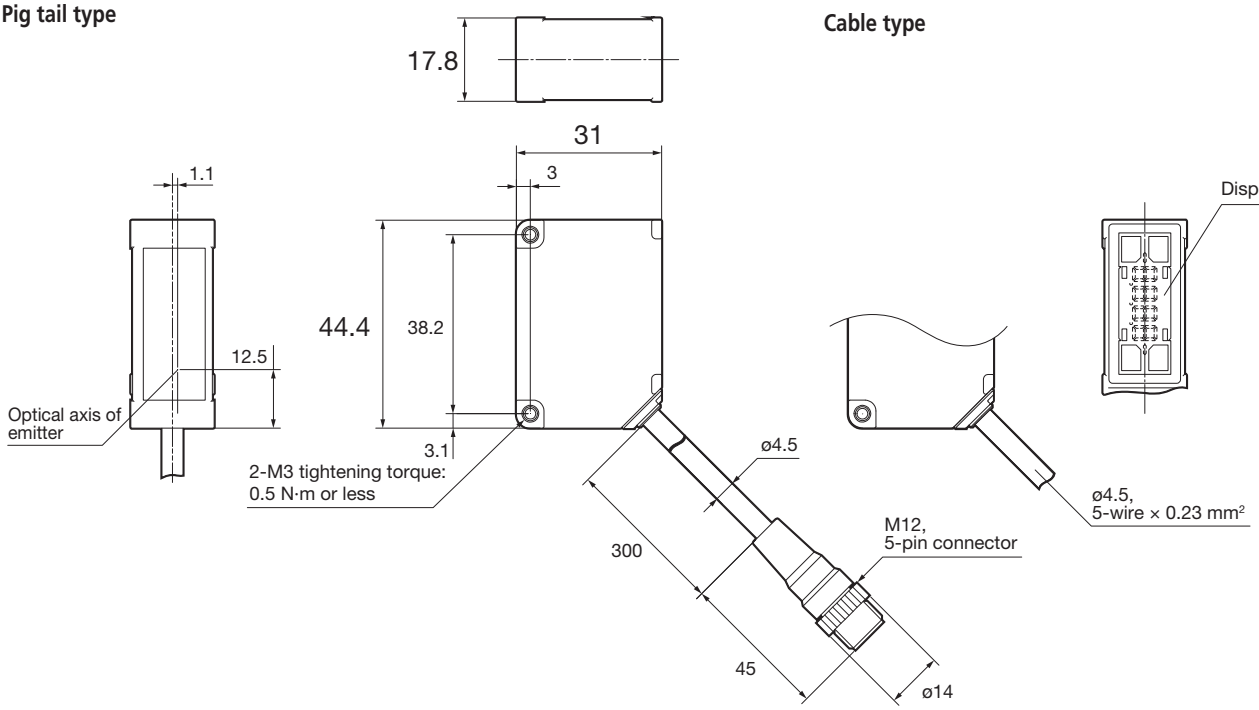
Analog output type	RS-485 communication type
Brown 1 12 to 24 VDC	Brown 1 12 to 24 VDC
Black 2 Control output	Black 2 RS-485 (A)
Gray 3 External input	Gray 3 Not used
White 4 Analog output	White 4 RS-485 (B)
Blue 5 0 V	Blue 5 0 V

Dimensions

Sensor

(Unit: mm)

Pig tail type

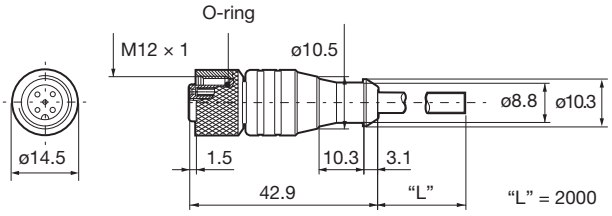


Cable type

Connector cables

- **DOL-1205-G02M** (contact sales)
- **DOL-1205-G05M** (contact sales)

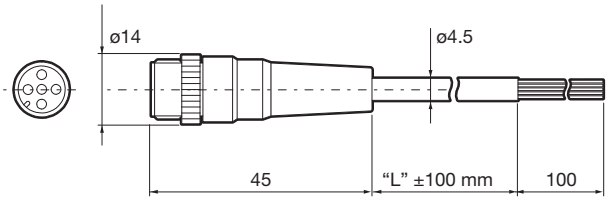
*Contact sales for additional lengths



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

Connector cable (robot cable specification)

- **DOL-1205-G02M-R (64PMI329)**
- **DOL-1205-G05M-R (64PMI330)**



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

Precautions for laser use

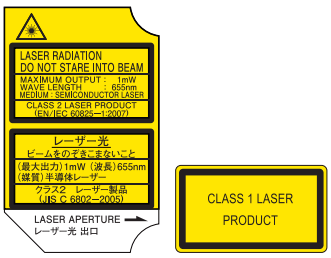
This product emits a Class 1 or Class 2 visible laser beam that is compliant with JIS C6802/IEC -60825-1/FDA laser safety standards. Labels for applicable standards are affixed and attached to the sides of the sensor.

Type of laser used in this product

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

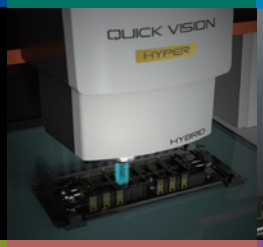
• Export to the United States

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.



Coordinate Measuring Machines

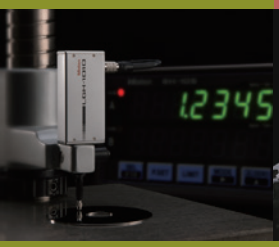
Vision Measuring Systems



Form Measurement

Optical Measuring

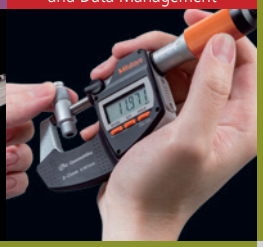
Sensor Systems



Test Equipment

Digital Scale and DRO Systems

Small Tool Instruments and Data Management



Whatever your challenges are, Mitutoyo supports you from start to finish.

Mitutoyo is not only a manufacturer of top quality measuring products but one that also offers qualified support for the lifetime of the equipment, backed up by comprehensive services that ensure your staff can make the very best use of the investment.

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