

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

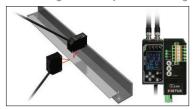








Positioning for metal plate mounting



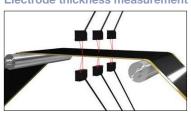
Detection of presence/height of electronic components



Slackness measurements for rubber materials



Electrode thickness measurement





Smallest in class*

 $W18 \times D31 \times H44 \text{ mm}$

 $18 \times 31 \times 44$ 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.



Compact

CDX

LS

CD4

CD5

UQ1-01

Selection table

Туре	Measurement range	Repeat accuracy	Analog output/serial interface	Control output	Connection type	Model
	_ _@ 15 mm		4 to 20 mA	NPN/PNP selectable by setting	Cable type	CD22-15A
					Pig tail type	CD22-15AM12
	10 mm 20 mm	1 µm	0 to 10 V	NPN/PNP selectable by setting	Cable type	CD22-15V
	±5 mm				Pig tail type	CD22-15VM12
			RS-485	_	Pig tail type	CD22-15-485M12
			4 to 20 mA	NPN/PNP selectable by setting	Cable type	CD22-35A
0	35 mm				Pig tail type	CD22-35AM12
Diffuse-	20 mm 50 mm	6 µm	0 to 10 V	NPN/PNP selectable by setting	Cable type	CD22-35V
reflective type	±15 mm				Pig tail type	CD22-35VM12
			RS-485	-	Pig tail type	CD22-35-485M12
		n 20 μm	4 to 20 mA	NPN/PNP selectable by setting	Cable type	CD22-100A2
	100 mm				Pig tail type	CD22-100AM122
	50 mm 150 mm ±50 mm		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

- \bullet 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.



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<u>aser Displacement</u>

Photoelectric Sensors

Specialized Photoelectric Sensors

CDA

LS

UQ1-01

UQ1-02

Compact laser displacement sensor CD22 series

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.



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.





*For details, refer to page 118.





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".

Digital sub-pixel processing

Tri-CORE

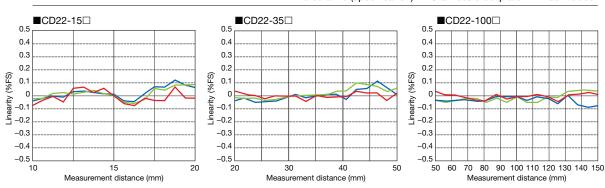
High resolution electric shutter

Repeat accuracy: 1 µm (CD22-15□)

Linearity: ±0.1% F.S.

Linearity characteristics data Low deviation depending on the workpiece

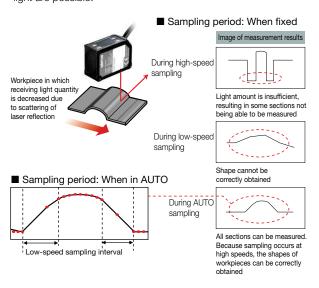
-White ceramic (specification) -Stainless steel plate -Black rubber



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.

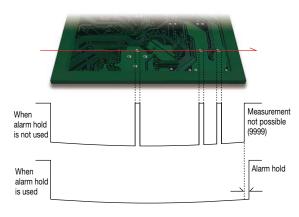
Thanks to this, high-speed measurements of even black workpieces and metal workpieces with low levels of reflected light are possible.



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.



Photoelectric Sensors

Specialized Photoelectric Sensors

Laser Displacement Sensors

Compact

CDX

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Laser Displacement Sensors

Photoelectric Sensors

Specialized Photoelectric Sensors

Laser Displacement Sensors

CDA

LS

CD22

CD4

CD5

UQ1-01 UQ1-02 Compact laser displacement sensor CD22 series

Specifications

Analog output type

The component of th		Analog	Cable type	CD22-15A	CD22-35A	CD22-100A2		
Voltage type Pig tail type CD22-15VM12 CD22-35VM12 CD22-100VM122	del	Current typ	Pig tail type	CD22-15AM12	CD22-35AM12	CD22-100AM122		
Center of measurement range 15 mm 35 mm 100 mm FS. (full scale) 10 mm ±15 mm ±50 mm FS. (full scale) 10 mm 30 mm 100 mm Light Source Medium/wavelength Red semiconductor laser, wavelength: 655 nm Source Max. output 390 μW 1 mW Laser class IEC/JIS Class 1 Class 2° Spot size*3 Approx. 0.5 x 0.7 mm Approx. 0.45 x 0.8 mm Approx. 0.6 x 0.7 mm Linearity ±0.1% F.S. ±0.1% F.S. Repeat accuracy*4 1 μm 6 μm 20 μm Sampling period 500 μs/1000 μs/2000 μs/4000 μs/4000 μs/4000 μs/AUTO ±0.05%/°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 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 Current type 4 to 20 mA, Load impedance: 300 Ω or less Supply voltage 10 to 10V, output impedance: 100 Ω NPN/PNP op	Š Ana	Analog	Cable type	CD22-15V	CD22-35V	CD22-100V2		
Measurement range		Voltage typ	Pig tail type	CD22-15VM12	CD22-35VM12	CD22-100VM122		
F.S. (full scale) 10 mm 30 mm 100 mm 100 mm Light source Laser EC/JIS Class 1 Class 2¹ Class 2¹ Class 2²	Cer	nter of meas	surement range	15 mm	35 mm	100 mm		
Light source Max. output 390 μW 1 mW	Me	asuremen	range	±5 mm	±15 mm	±50 mm		
Source Max. output 390 μW 1 mW Laser IEC/JIS Class 1 Class 1² Class 2² Spot size³ Approx. 0.5 × 0.7 mm Approx. 0.45 × 0.8 mm Approx. 0.6 × 0.7 mm Linearity ±0.1% F.S. Repeat accuracy⁴ 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 Voltage type 0 to 10V, output impedance: 300 Ω or less output 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%³ Current consumption 70 mA or less (at 24 VDC) Connection type Cable type: Cable length: 2 m, e4.5 Pig tail type: Cable with M12, 5-pin connector, 300 mm length Protection circuit Reverse connection protection, overcurrent protection Begree of protection Performentarie/humidity -10 to +50°C / 35 to 85% RH (no freezing or condensation) Ambient lilluminance Incandescent lamp 3,000 k or less Shock resistance Approx. 50 G (500 m/s²), 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 ENG 6947-5-7 Warm-up time Approx. 5 minutes Material Housing: Aluminum die-cast Front cover: PPSU Display: PET Cable: PVC	F.S	. (full scale)	10 mm	30 mm	100 mm		
Laser class IEC/JIS Class 1 Class 2° FDA Class 1°2 Class 2°2 Spot size** 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 ±0.05%/°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 output 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, e4.5 Pig tail type: Cable with M12, 5-pin connector, 300 mm length Protection circuit Reverse connection protection, overcurrent protection Ambient t	Lig	ht Medi	um/wavelength	Red semiconductor laser, wavelength: 655 nm				
class 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. ±0.1% F.S. Repeat accuracy*4 1 μm 6 μm 20 μm Sampling period 500 μs/1000 μs/2000 μs/4000 μs/4000 μs/AUTO ±0.05%/°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 emission indicator (green)/zero reset indicator (red)/output indicator (orange)/mode indicator (red) External input Laser emission indicator (green)/zero reset indicator (red)/output indicator (orange)/mode indicator (red) External input Laser emission indicator (green)/zero reset indicator (red)/output indicator (orange)/mode indicator (red) External input Laser emission indicator (green)/zero reset indicator (red)/output indicator (orange)/mode indicator (red) External input Laser emission indicator (green)/zero reset indicator (red)/output indicator (red)/output indicator (orange)/mode indicator (red)/output indicator (red)/output indicator (red)/output indicator (preset feet indicator (red)/output	SOL	ırce Max.	output	390 μW 1 mW				
Spot size*3 Approx. 0.5 x 0.7 mm Approx. 0.45 x 0.8 mm Approx. 0.6 x 0.7 mm Linearity ±0.1% F.S. Repeat accuracy** 1 μm 6 μm 20 μm Sampling period 500 μs/1000 μs/2000 μs/4000 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 4 to 20 mA, Load impedance: 300 Ω or less output 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%** Current consumption 70 mA or less (at 24 VDC) Connection type Cable type: Cable length: 2 m, e4.5 Pig tail type: Cable with M12, 5-pin connector, 300 mm length Protection circuit Reverse connection protection, overcurrent protection Degree of protection IP67 (including joint of pig tail type) Ambient illuminance Incandescent lamp 3,000 k or less Shock resistance	Las	ser IEC/	IIS	Clas	Class 2 ^{*1}			
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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	neu	Ambienttem	perature/humidity	-10 to +50°C / 35 to 85% RH (no freezing or condensation)				
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	Ambient illuminance		Iluminance	Incandescent lamp 3,000 lx or less				
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	Vibration resistance		resistance	• • • • • • • • • • • • • • • • • • • •				
Applicable standards EN 60947-5-7 Warm-up time Approx. 5 minutes Material Housing: Aluminum die-cast Front cover: PPSU Display: PET Cable: PVC	Ш	Shock re	sistance	Approx. 50 G (500 m/s²), 3 times in each of the X, Y, and Z directions				
Warm-up time Approx. 5 minutes Material Housing: Aluminum die-cast Front cover: PPSU Display: PET Cable: PVC	Applicable regulations		gulations	EMC directive (2004/108/EC) / FDA regulations (21 CFR 1040.10)				
Material Housing: Aluminum die-cast Front cover: PPSU Display: PET Cable: PVC	Applicable standards		andards	EN 60947-5-7				
	Warm-up time		Э	Approx. 5 minutes				
Weight Cable type: Approx. 90 g Pig tail type: Approx. 60 g	Material							
	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
- *3 Defined with center strength 1/e² (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.



CD5 UQ1-01

UQ1-02

■ 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	
Ligh	nt Medium/wavelength	Red semiconductor laser, wavelength: 655 nm			
sou	rce Max. output	390	μW	1 mW	
Lase	er IEC/JIS	Clas	Class 2*1		
clas	s FDA	FDA Class 1 ⁻²		Class 2*2	
Spo	t size ^{*3}	Approx. $0.5 \times 0.7 \text{ mm}$	Approx. 0.45 × 0.8 mm	Approx. 0.6 × 0.7 mm	
Line	earity	±0.1% F.S.			
Rep	eat accuracy*4	1 μm	6 μm	20 μm	
Sam	pling period	500 μs/1000 μs/2000 μs/4000 μs/AUTO			
Temperature drift		±0.02%	±0.05%/°C F.S.		
Indi	cators	Laser emission indicator (green)/zero reset indicator (red)/output indicator (orange)/mode indicator (red)			
Seri	al 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, overcurrent protection			
<u>a</u>	Degree of protection	IF	P67 (including joint of connector	or)	
nen	Ambient temperature/humidity	-10 to +50°C / 35 to 85% RH (no freezing or condensation)			
onn ista	Ambient illuminance	Incandescent lamp 3,000 lx or less			
Environmental resistance	Vibration resistance	10 to 55 Hz; double amplitude 1.5 mm; 2 hours in each of the X, Y, and Z directions			
ப் Shock resistance		Approx. 50 G (500 m/s²), 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.

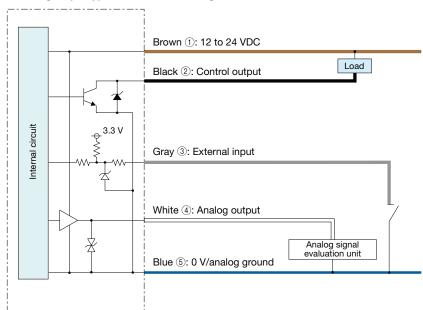
- *1 A Class 1 type can also be made available (made-to-order product).
- *2 In accordance with the FDA provisions of Laser Notice No. 50, the laser is classified as Class 1 or Class 2 per the IEC 60825-1 standard.
- *3 Defined with center strength 1/e2 (13.5%) at the center of measurement range. There 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

Laser Displacement

I/O circuit diagram

Analog output type: With the NPN setting

Compact laser displacement sensor CD22 series



Photoelectric Sensors

Specialized Photoelectric Sensors

Displacement Sensors

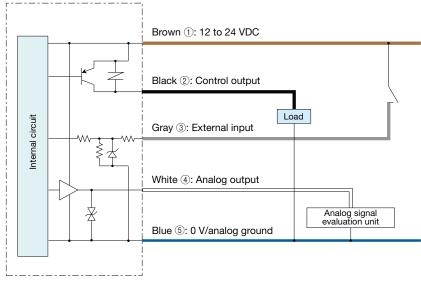
CDA LS

CD33

CD4

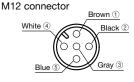
CD5

UQ1-01 UQ1-02 Analog output type: With the PNP setting



■ Connector pin configuration

(Sensor side)



Analog output type

Brown ① 12 to 24 VDC Black ② Control output Gray 3 External input White 4 Analog output Blue ⑤ 0 V

RS-485 communication type

Brown (1) 12 to 24 VDC Black ② RS-485 (A) Gray 3 Not used White 4 RS-485 (B) Blue 5 0 V



Photoelectric Sensors

Specialized Photoelectric Sensors

CDX

CDA

LS

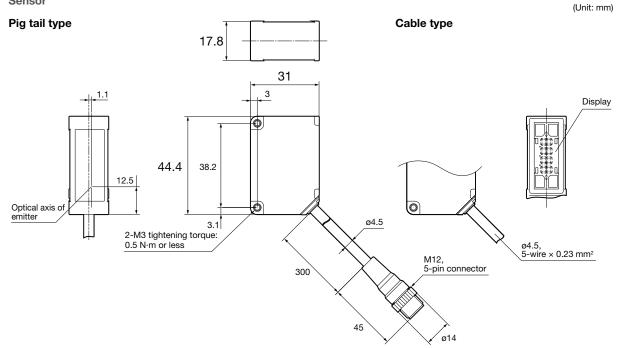
CD4

UQ1-01

UQ1-02

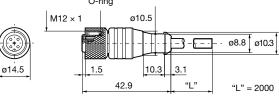
Dimensions

Sensor



Connector cables

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

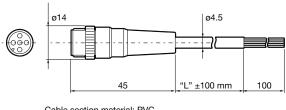


Cable section material: PVC Conductor cross-section: 5-wire × 0.5 mm²

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.

