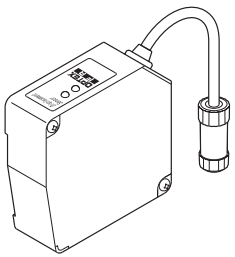
OPTEX FA

Sensor Head Instruction Manual

Displacement Sensor CD5 Series

Laser Type

(CD5-L_25,CD5-_30,CD5-_85,CD5-_150,CD5-W350,CD5-W500,CD5-W2000)



- **Read this Instruction Manual before use for the safe and correct operation.**
- **Keep this Instruction Manual for the future reference and refer to it whenever necessary.**

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Manufactured and sold by :

OPTEX FA **OPTEX FA CO., LTD.**

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FOREWORD

Thank you for purchasing the Displacement Sensor CD5 Series. We hope you are fully satisfied with this product and enjoy its performance. To ensure your satisfaction, please follow the instructions below.

- Carefully read this instruction manual and keep it for future reference.
- If you have any question about the instructions here or a request for replacing the lost instruction manual, contact the sales office or store where you purchased this product.
- The contents in this instruction manual are protected by copyright and all rights are reserved by OPTEX FA CO., LTD. The descriptions and information included in this manual shall not be copied nor reproduced to any other form.

This products may be listed as articles to be regulated for export such as strategic materials by the Foreign Exchange and Foreign Trade Control Act. Therefore, if you intend to export these, be sure to follow the necessary procedures, such as application for an export permit from the Government.

Warranty

Whereas all of our products are tested in accordance with the strict internal standard, a faulty unit may unexpectedly be distributed. If this is the case with your product, identify its status and contact the sales office or store where you purchased it.

- The warranty period shall be one(1) year after its delivery to the customer.
- If the failure results from a manufacturer' s fault, the manufacturer will replace the product (by sending a substitute) without charge except the following cases :
  1. Failure due to any abuse or misuse
  2. Failure due to a cause other than the product
  3. Failure due to unapproved modification or repair
  4. Failure due to acts of God

This warranty is limited to the delivered product only.
This warranty shall not cover the secondary damage caused by the faulty product.

SAFETY PRECAUTIONS

Carefully read and understand the safety precautions before operation.

They provide the important information to protect your health and property. Strictly follow this instruction manual, and do not apply any other installing/operating procedure which is not described in this manual.

Meanings of Safety Symbols

⚠WARNING	Indicates a possible hazard that may result in death or serious injury if the product is used without observing the stated instructions.
⚠CAUTION	Indicates a possible hazard that may result in personal injury or property damage if the product is used without observing the stated instructions.

Mandatory Requirements

⚠WARNING

- **This product cannot be used as a safety device to protect human body.**
- **Do not stare into laser beam or point laser beam at eyes since it may damage the eyesight.**
- **Do not disassemble or modify the product since it is not designed automatically to stop the laser emission when it is opened. Disassembling or modifying at customer's end may cause personal injury, fire or electric shock.**
- **Use only the special controller and an extension cable to connect the sensor head. Other units/ cables may cause an accident or damage the product.**
- **Use the product following specifications such as the rated value and environmental condition.**
- **Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.**

⚠CAUTION

- **Do not apply a shock to the glass cover of the emitting/ receiving part. It may break the cover.**

Precautions for Installation

⚠CAUTION

- **Do not install or use the product at the following places. It may lower accuracy or cause a failure.**
  A place where;

  The operating temperature or humidity exceeds the specified value;
  The receiving part is directly exposed to sunlight or ambient light. (Use a tool like a sun visor for improved accuracy);
  Condensation occurs by temperature change;
  There is much dust or iron powder;
  Water, oil, agent or organic solvent scatters or attaches to the product.
  The product receives too much vibration or shock.

- **Install the product away from noise generating devices such as high voltage cable, power line or inverter drive motor. Noise may cause a malfunction.**
- **Do not pull or apply excess power to a cable. It may damage the product.**

Operating Precautions

- Do not use the product just after turning on. A warm-up operation over 30 minutes is required before use.
- The sensor performance may depend on the individual units.
- Wipe off dirt on the cover (glass) of the emitting/receiving parts using a soft cloth etc., at every operation since it may cause incorrect detection.

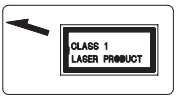
Cautions for Laser Product

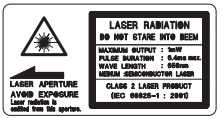
This sensor emits visible laser beam compliant with JIS C6802/IEC/FDA, laser safety standard Class 1, 2 (Ⅱ) or 3R (Ⅲa).

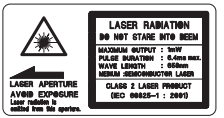
The warning and description labels are stuck on the side of the product.

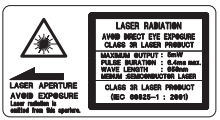
Laser type of this product

Type	Red Laser Diode
Wavelength	650 nm / 658 nm
Output	390 μW / 1 mW / 5 mW







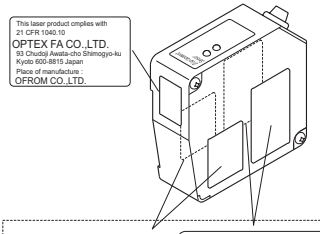


This sensor is subject to the FDA laser standard when exported to U.S.A. The report of this sensor has been submitted to Center for Devices and Radiological Health (CDRH).

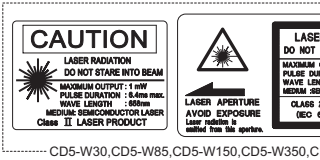
Label of each model

- CD5-30 / CD5-30W
- CD5-85 / CD5-85W
- CD5-150 / CD5-W150
- CD5-W350
- CD5-W500
- CD5-W2000

- CD5-L25 / CD5-LW25

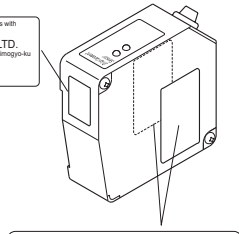


CD5-30,CD5-85,CD5-150



CD5-W30,CD5-W85,CD5-W150,CD5-W350,CD5-W500

CD5-W2000



Specifications

Model No.	CD5-L25	CD5-LW25	CD5-30	CD5-W30	CD5-85	
Optical method	Specular reflection					
Center	25mm		30mm		85mm	
Measuring range	±1mm		±5mm		±20mm	
Light source	Red Laser Diode					
	Wavelength 650nm / Maximum output 390μW		Wavelength 650nm / Maximum output 1mW	Wavelength 658nm / Maximum output 1mW	Wavelength 650nm / Maximum output 1mW	Wav Maxi
Laser Class IEC/JIS	CLASS 1					
Laser Class FDA	Class Ⅱ					
Spot size *1	Appx.25x35μm	Appx.100x700μm	Appx.30x100μm	Appx.260x1,000μm	Appx.70x290μm	Appx
Light receiving element	Linear image sensor					
Linearity	±0.08% F.S.		±0.08% F.S.	±0.08% F.S.		
Resolution *2	0.02μm		0.2μm		1μm	
Sampling period *3	100/200/400/800/1600/3200μs Setu					
Temperature drift *4	±0.01% F.S. / ℃	±0.05% F.S. / ℃				
Supply voltage	Supplied from special controller					
Indicator	Laser emission indicator : Green (ON during laser emission)					
	Distance indicator : Orange (Lights around center)					
	Distance indicator : Red (Lights at the near side)					
	Distance indicator : Green (Lights at the far side)					
	Distance indicator : Alternative Red/ Green(Lights alternatively outside the ran					
Protection category	IP67 (Including connecting part)					
Operating temperature	-10 to +50℃ (Free from condensation or icing) / For storage : -20 to +60℃					
Operating humidity	35% to 85%RH / For storage : 35% to 85%RH					
Ambient light	Max. 3,000lx (Surface illuminance, Incandescent lamp)					
Vibration resistance	10 to 55Hz Double amplitude 1.5mm 2 h per XYZ axes					
Material	Sensor Head housing : Diecast Aluminum Cover of Emitting/receiving part : Glass					
Cable extension	Up to 50 m using an optional extension cable (unbundled)					
Weight	Appx. 250 g (Including cable)					

<Measurement condition>
Unless otherwise designated, measurement condition is as follows. Using special controller/ operating te
(depending on models)/ 256 times in average/ center/ standard testing object (specular reflection: evapo

*1 : Defined with center strength $1/e^2$(13.5%) at the center. There may be leak light other than the specified spot si
*2 : 4096 times in average. Other conditions are same as the above condition.
*3 : Default setting of sampling period is as follows.
CD5-□□25 ～ □150 :100μs
CD5-W350 ～ W2000 :800μs
*4 : The typical value in the above condition.

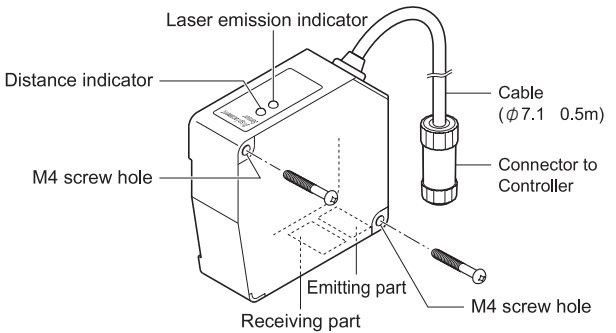
	CD5-W85	CD5-150	CD5-W150	CD5-W350	CD5-W500	CD5-W2000
		Diffuse reflection				
	5mm	150mm		350mm	500mm	2,000mm
	20mm	±40mm		±100mm	±200mm	±500mm
	W Wavelength 658nm / Maximum output 1mW	Wavelength 650nm / Maximum output 1mW	Wavelength 658nm / Maximum output 1mW			Wavelength 658nm / Maximum output 5mW
		CLASS 2				CLASS 3R
						Class Ⅲa
	Appx.260x1,200μm	Appx.φ180μm	Appx.330x1,600μm	Appx.700x2,400μm	Appx.1,000x3,700μm	Appx.2,100x7,800μm
	±0.05% F.S.			±0.08% F.S.	±0.08% F.S.	±0.1% F.S.
	1μm	2μm		5μm	10μm	30μm
	s Setup to be done through the controller (CD5A series)					
	±0.01% F.S. / ℃					±0.05% F.S. / ℃
	he range)					
						Appx. 450g (Including cable)

ting temperature, 23 ℃ (ordinary temperature)/ supply voltage, 24 V DC/ sampling period, 100 μs or 800 μs
evaporated aluminum mirror, diffuse reflection: white ceramic)/ digital measured value.

spot size. The sensor may be affected when there is a highly reflective object close to the detection area.

BASIC INFORMATION BEFORE USE

Parts Identifications of Sensor Head

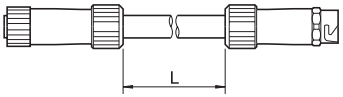


Package Descriptions

- Sensor Head Main Unit
- Screw(3 pcs.)
- Instruction Manual (This document)
- Laser Label to stick on the device

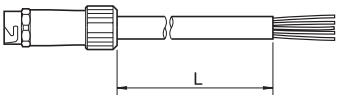
Option

●Extension cable between sensor head and controller



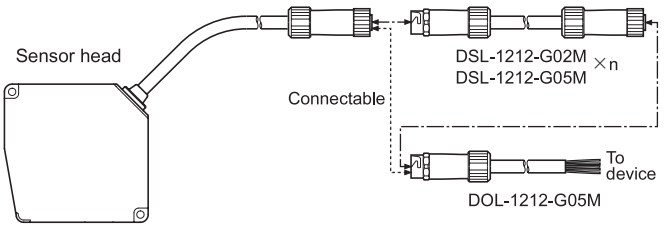
Length (L)	Cable type
2m	DSL-1212-G02M
5m	DSL-1212-G05M

●Extension cable for sensor head
(For independent use of sensor head)



Length (L)	Cable type
5m	DOL-1212-G05M

It is possible to use the CD5 sensor head without the special controller by connecting the CD5 sensor head directly to the device. The figure below shows how to connect the cable.
Contact OPTEX FA for communicative specifications (RS422) or wiring.



Sensor Head Installation

⚠WARNING

- **Avoid the position of operator's eye height for sensor head installation.**
- **Turn off the controller before connecting/disconnecting the sensor head to/from the controller.**

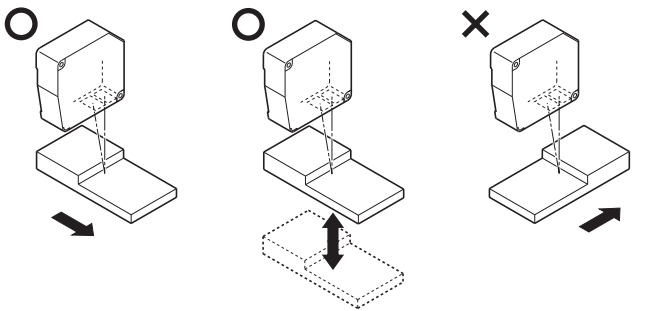
⚠CAUTION

- **Do not drop or apply a shock to the product. It may damage the product or lower the accuracy.**

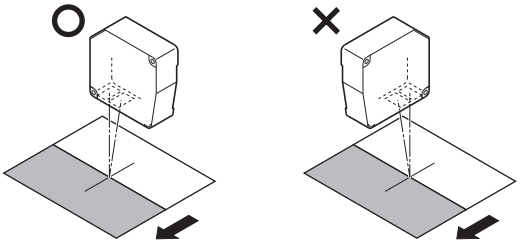
Installing Direction

For a stable and accurate measurement, install the sensor head in the following direction to the target object.

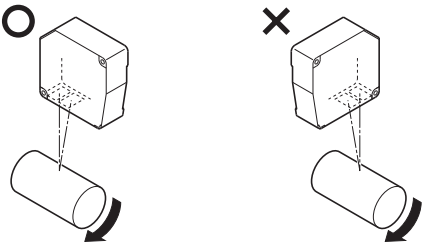
● **Object with steps**



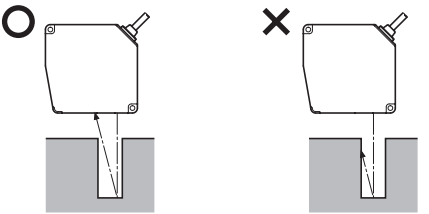
● **Object of two or more materials or colors**



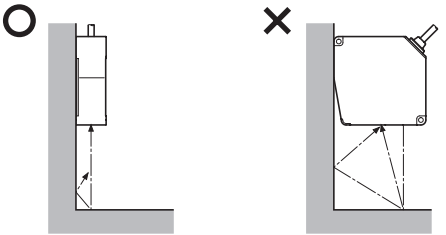
● **Rotating object**



● **To measure hole or concave**



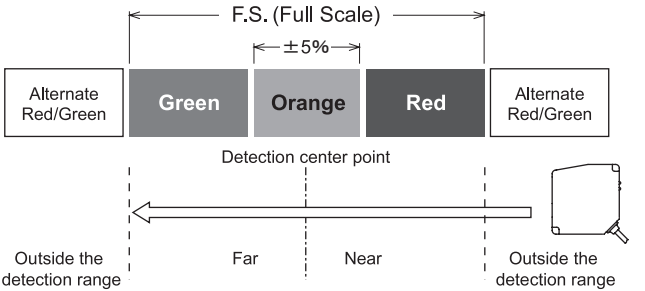
● **To fix the sensor head on the wall**



The detection surface (the side of the emitting/receiving parts) should be parallel to the target object. Adjust the spot to conform to the detection point. Ensure that the distance indicator turns orange when the detection point (the center of displacement) passes the spot point.

Distance indicator

A distance indicator lights as follows.



Sensor head Installation

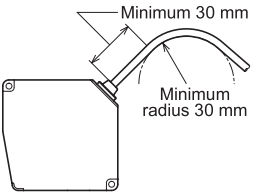
⚠CAUTION

- **Follow the instructions below when handling a cable or an extension cable. An excess stress may cause cable breakage.**

  Do not pull the cable with the power of 29.4 N and more.

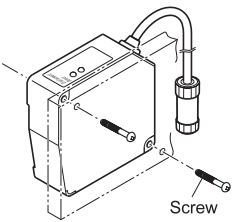
  Do not bend the cable with its radius less than 30 mm.

  Do not bend the cable less than 30 mm to the sensor head.



- **When fixing the sensor head, tighten a provided screw with 0.8 N·m torque or less. Excess torque may damage the sensor head.**

1 Fix the sensor head on a wall or bracket with provided screws.

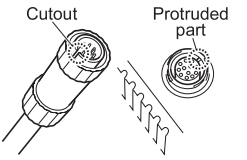


Connecting Connectors for Sensor Head

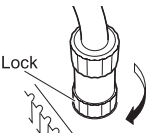
⚠CAUTION

- **Ensure the cutout of connector smoothly fits the protruded part of controller. Forced connector insertion can damage the connector pin seriously, causing bend or other problems.**

1 Insert the connector cutout to the protruded part of controller.



2 Turn the connector lock to the direction of arrow mark (clockwise direction) until it clicks.



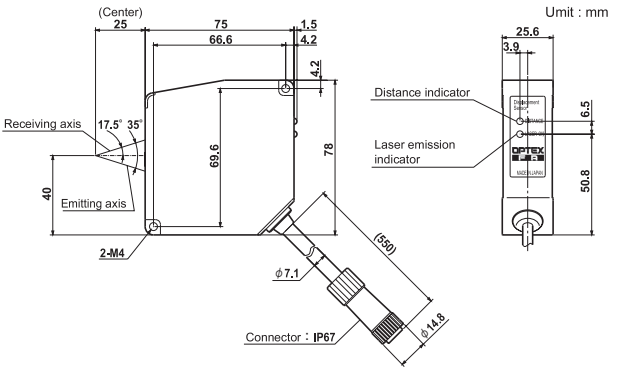
Memo

- To remove connector from the controller, turn the lock in counterclockwise direction.

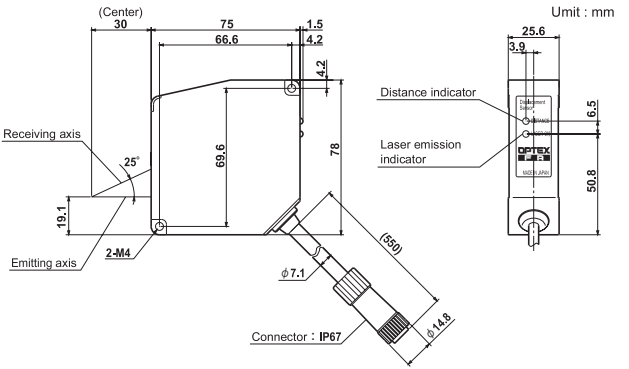
APPENDIX

Dimensional Drawing

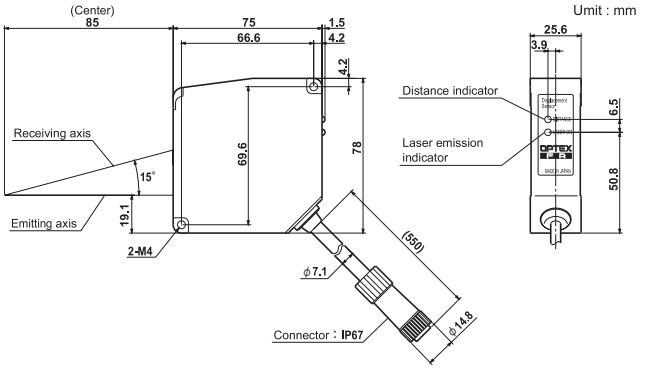
CD5-L25 / CD5-LW25



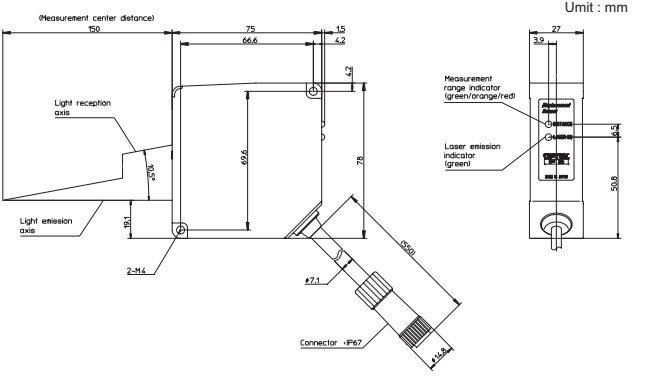
CD5-30 / CD5-W30



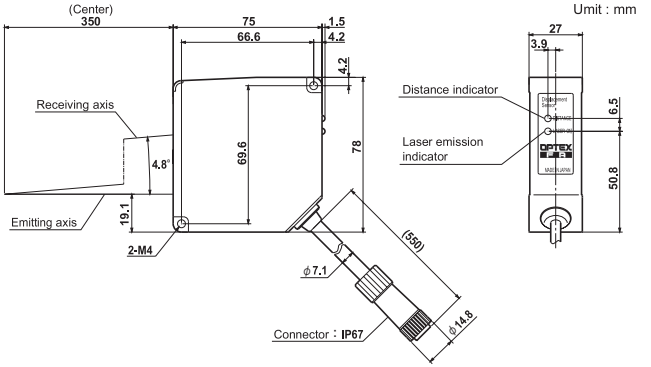
CD5-85 / CD5-W85



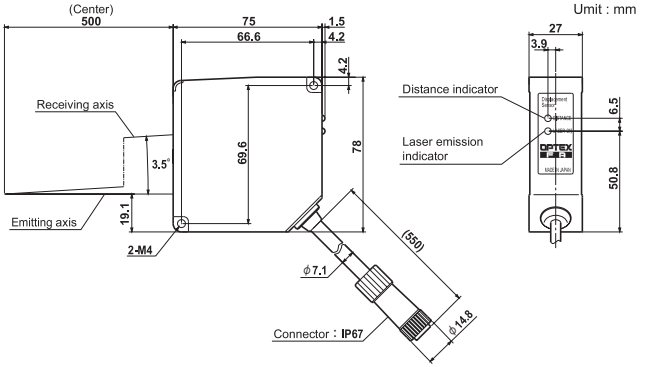
CD5-150 / CD5-W150



CD5-W350



CD5-W500



CD5-W2000

Umit : mm