NEW

OPTEX FA

# High performance multi head laser displacement sensor

# CD5

## New Standard

**Controller**
**CD5A-N**

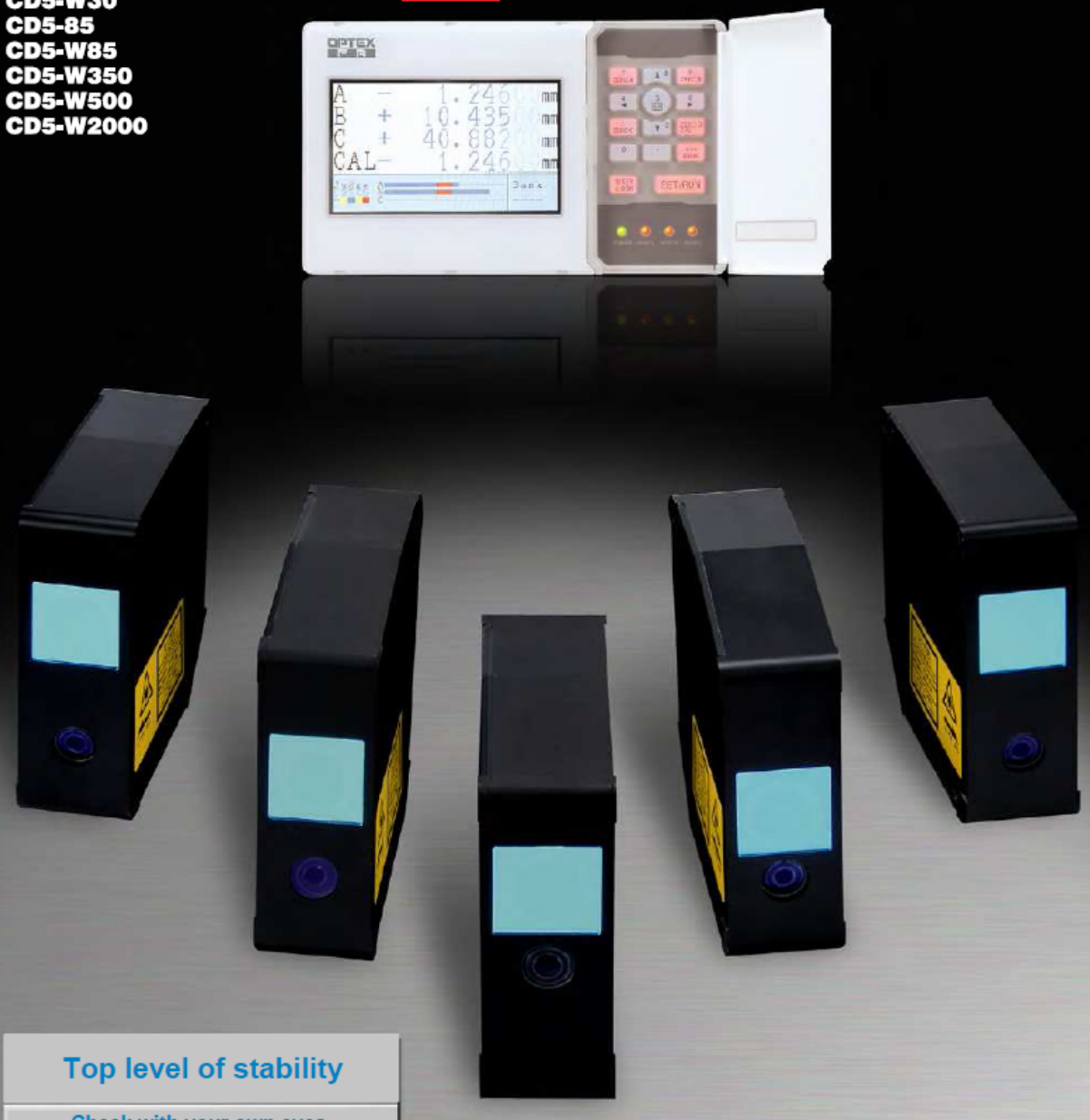
**Sensor Head**
**CD5-L25**
**CD5-LW25**
**CD5-30**
**CD5-W30**
**CD5-85**
**CD5-W85**
**CD5-W350**
**CD5-W500**
**CD5-W2000**

**Stand 1st** Top level of resolution and linearity in the class

**Multi** Multiple calculation with result of 3 head

**Versatile** Head can measure without controller Pattent pending

**Long distance** 2000mm measurement distance




Top level of stability

Check with your own eyes

*the Laser Displacement Sensor*

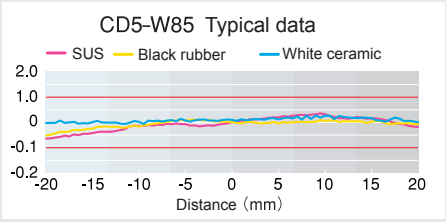
CE

# The CD5 Series Laser Displacement Sensors from Optex-FA have achieved a balance between High Resolution, High Stability and High Functionality

## Sensor head

## Controller

## Linearity: +/- 0.05% F.S.
## Stable performance regardless of target material.




**Performance**

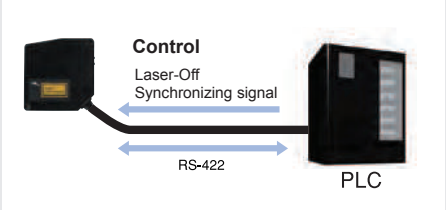
### Highest level of resolution and linearity in this class of laser sensor

The CD5 series features a Linearity of +/- 0.05% F.S. (catalog specification using white ceramic target). The measurement is stable regardless of whether the material is SUS or Black rubber.

**Functionality**

### Multiple calculation functions with support for 3 sensing heads

Up to 3 sensor heads can be connected to the controller. This makes it very flexible, for example it can be used to measure the thickness of material and do loop control at the same time.




**Versatility**

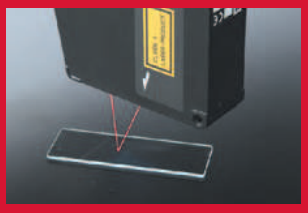
### Sensing head can operate without controller

The sensor head has the basic measurement function built in. You can access the measurement result through RS422 without a controller (control of the Laser-off and Synchronizing inputs is required).

**CD5-L25**
Narrow spot
**CD5-LW25**
Wide spot

Specular type

## For transparent and specular objects



Measurement of glass thickness is available

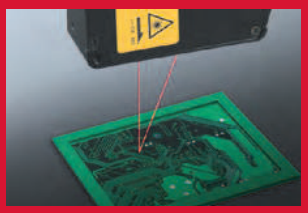
Measurement range: 25 +/- 1 mm
Resolution: 0.02 um

Linearity: +/- 0.08% F.S.

**CD5-30**
Narrow spot
**CD5-W30**
Wide spot

Diffuse type

## Short range



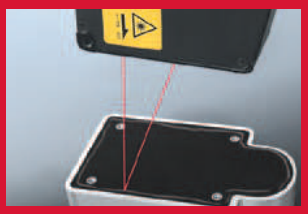
5 times better resolution than conventional models

Measurement range: 30 +/- 5 mm
Resolution: 0.2 um
Linearity: +/- 0.08% F.S.

**CD5-85**
Narrow spot
**CD5-W85**
Wide spot

Diffuse type

## Mid range



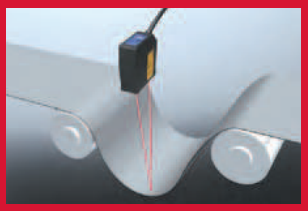
Top level of linearity in this class

Measurement range: 85 +/- 20 mm
Resolution: 1 um
Linearity: +/- 0.05% F.S.

**CD5-W350**
Wide spot

Diffuse type

## Long range



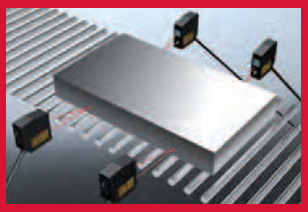
High accuracy & stability by wide spot

Measurement range: 350 +/- 100 mm
Resolution: 5 um
Linearity: +/- 0.08% F.S.

**CD5-W500**
Wide spot

Diffuse type

## Super long range



Top level of accuracy for this range

Measurement range: 500 +/- 200 mm
Resolution: 10 um
Linearity: +/- 0.08% F.S.

**CD5-W2000**
Wide spot

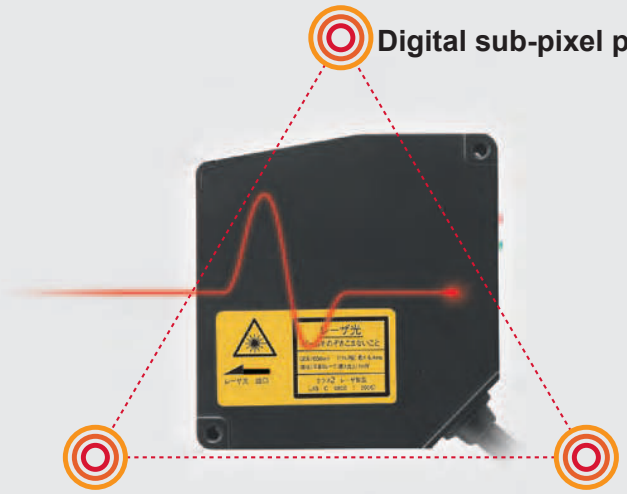
Diffuse type

## Ultra long range

The longest range in the industry

Measurement range: 2000 +/- 500 mm
Resolution: 30um
Linearity: +/-0.1% F.S.

# *Optex-FA's newly developed "Tri-CORE" technology.*



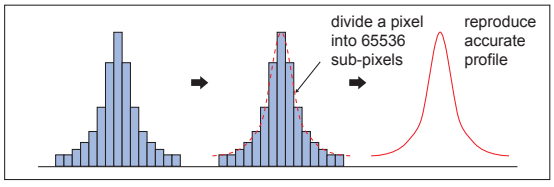

**We have successfully achieved the development of our new sensing technology "Tri-CORE". This fully utilizes the hardware and compensates for most errors. For example, the triple compensation / optimization technology insures reliable measurement of metal, translucent object, black rubber, etc.**

**Tri-CORE: Triple Compensation and Optimization by Reliable Engine**

## Digital sub-pixel processing

**NEW** **Accurate profile reproduction**

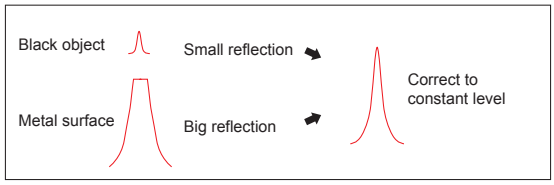
**The linearity has been improved to more than twice that of a conventional product by digital sub-pixel processing. This divides one pixel into 65536 sub-pixels.**




## High resolution electronic shutter

**NEW** **Automatic level correction**

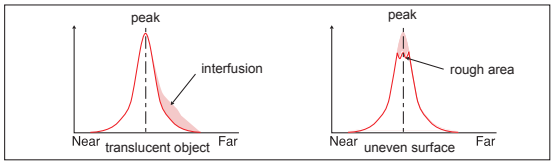
**A high resolution electronic shutter that can be controlled to 1/485th of the sampling period helps to insure stable peak level detection even when unstable surface conditions exist.**




## For uneven and varied luster objects

**NEW** **Original algorithm**

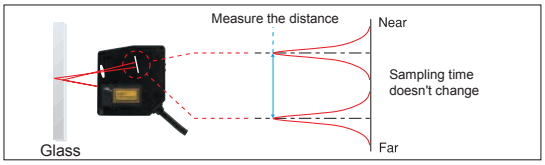
**Even if the object is translucent or its surface is uneven, it can detect the position of the true peak thanks to the original Optex designed algorithm.**



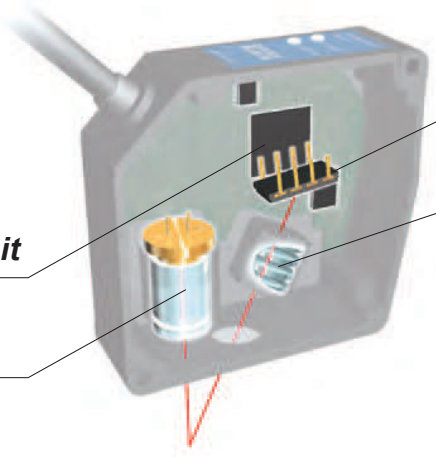

## Standalone operation - no controller required

**NEW** **Reliable glass thickness measurement**

**The Specular type CD5-L25/CD5-LW25 can detect both the surface of glass and measure the thickness without being connected to the controller.**



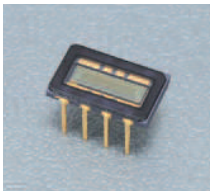
# The CD5 series uses Optex original design cutting edge technology to achieve high accuracy measurement




## High accuracy, High speed, High sensitivity

**NEW** High sensitivity linear image sensor

The CD5 series offers 5 times higher accuracy and 10 times higher speed than a conventional product.



## Low aberration lens

**NEW** "Multi-CLD" lens

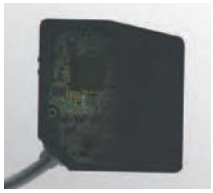
Newly developed lens used in the receiver projects a clear image on the image sensor with very little aberration.

Multi-CLD: Multi Combined Low Dispersion

## High speed and High accuracy

**NEW** High speed processing unit

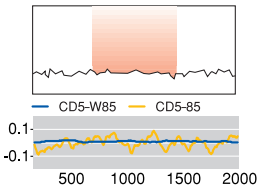
The newly developed processing unit is able to process the measurement data at high speed. It is also able to correct for any distortion and accurately compensates for variations in the readings.



## Highly stable linearity

**NEW** Wide spot type

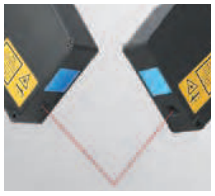
The wide spot type can measure rough surfaces with a high degree of linearity and stability.




## Cross-talk prevention

**NEW** Preventing interference

The newly developed cross-talk prevention function eliminates interference between sensors even when the beams are crossing or are mounted close together.



Note: The sampling period will be 6 times longer

## Water resistance

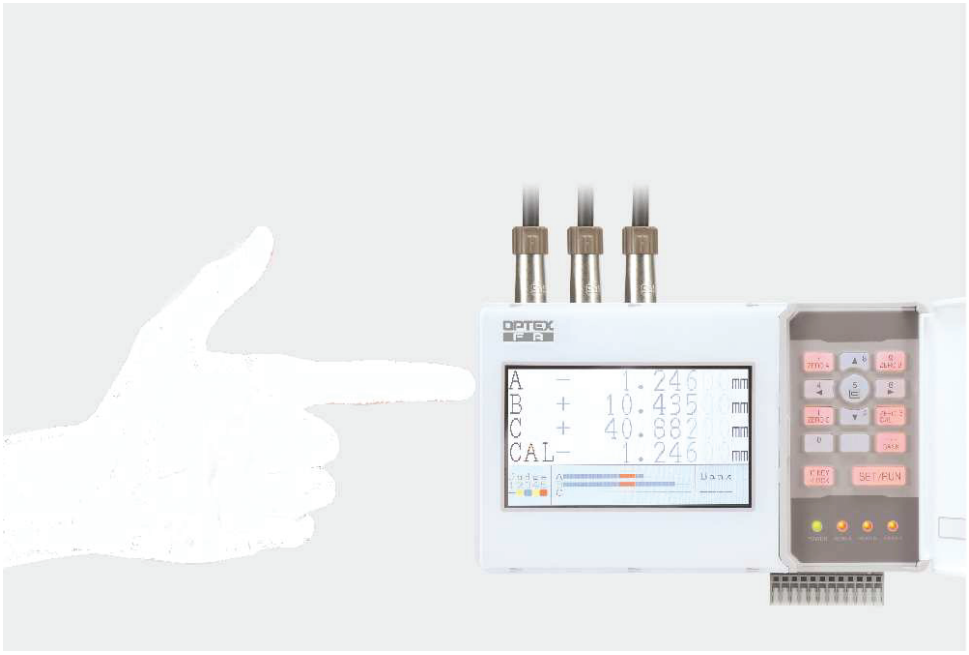
**NEW** IP67

The CD5 series has an IP67 rating not only at the sensor body but also on the extension cable connector. Additional countermeasures to protect the cable from water are not required.

Water droplets on the optical part may cause faulty readings and problems with the measurement.

## Fast and Easy SETUP

The controller has a large display for easy viewing and 10 key input panel for simple adjustment.



### Multiple measurements with one controller

**NEW** 3 heads multiple calculations

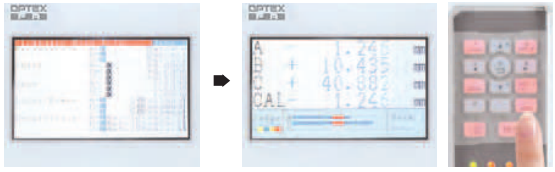
**Up to three sensor heads can be connected to one controller. The heads can operate standalone or be used in the calculation for various applications.**

| | |
|---|---|
| Levelness | Level difference |
| Contortion | Thickness |
| Warpage | Shifting |

### Easy SETUP

**NEW** Backlit ten-key panel and display guide

**Setup of basic sensor parameters and calibration are easily done by using the ten-key panel and display. The backlit ten-key panel shows which keys are currently active.**



### Multiple SETUP is available

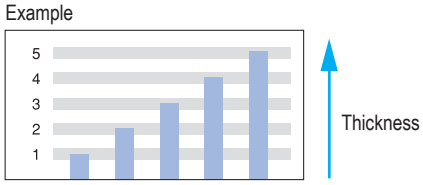
**NEW** 16 Banks for easy changeover

**The controller can store up to 16 sets of measurement parameters for 16 different applications. The active bank is selected by either the ten-key panel, external inputs or RS-232C communication.**

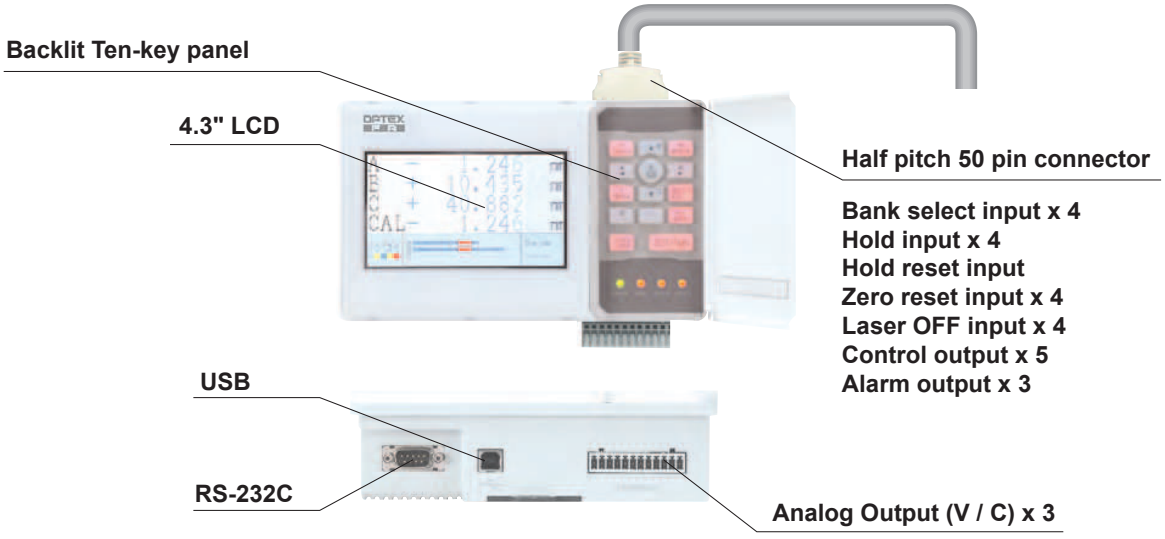

### Effective for sorting

**NEW** 5 Independent outputs

**The CD5 controller has 5 independent outputs. Each output has a separate upper and lower threshold setting. This is useful for sorting applications.**



## Multiple interface for PC, PLC, etc.




### Flexibility and performance

**NEW** Up to 3 sensor heads can be connected

With one controller unit, up to 3 sensor heads can be connected. A separate controller is not required for each sensor head.

### Wave monitoring without PC or external monitor

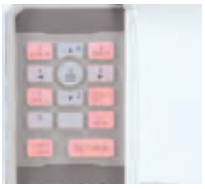
**NEW** Wave monitoring function

You can monitor the wave form and verify if the sensor head and object position are correct by using the wave monitoring function.

### Easy SETUP

**NEW** Backlit Ten-key

The Backlit Ten-key panel shows you which keys are active.



### Remote sensing

**NEW** Maximum distance of 50m

Controller can be located up to a maximum distance of 50m from the sensor head.


### Remote PC control

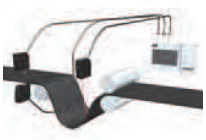
**NEW** USB and RS-232

The controller has both USB and RS-232 ports. Monitoring and control from a remote location is easily performed.

### Flexibility for various applications

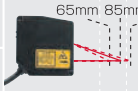
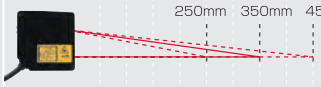
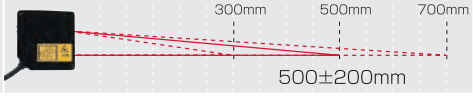
**NEW** Different type/range sensor heads can be used together

Different types and ranges of sensor heads can be connected to the same controller.
Each head can measure separately or can be used in the calculation function to perform specific applications.



# SYSTEM PART NUMBERS

## Sensor head

| Type | | Measurement distance | Resolution | Linearity | Laser Class | Part Number |
|---|---|---|---|---|---|---|
| Specular type | Narrow |  25±1mm | 0.02μm | ±0.08%F.S. | Class II | CD5-L25 |
| | Wide | | | | | CD5-LW25 |
| Short range | Narrow |  25mm 30mm 35mm 30±5mm | 0.2μm | ±0.08%F.S. | Class II | CD5-30 |
| | Wide | | | | | CD5-W30 |
| Mid range | Narrow |  65mm 85mm 105mm 85±20mm | 1μm | ±0.05%F.S. | Class II | CD5-85 |
| | Wide | | | | | CD5-W85 |
| Long range | Wide |  250mm 350mm 450mm 350±100mm | 5μm | ±0.08%F.S. | Class II | CD5-W350 |
| Super long range | Wide |  300mm 500mm 700mm 500±200mm | 10μm | ±0.08%F.S. | Class II | CD5-W500 |
| Ultra long range | Wide |  1500mm 2000mm 2500mm 2000±500mm | 30μm | ±0. 1%F. S. | Class III a | CD5-W2000 |

## Controller

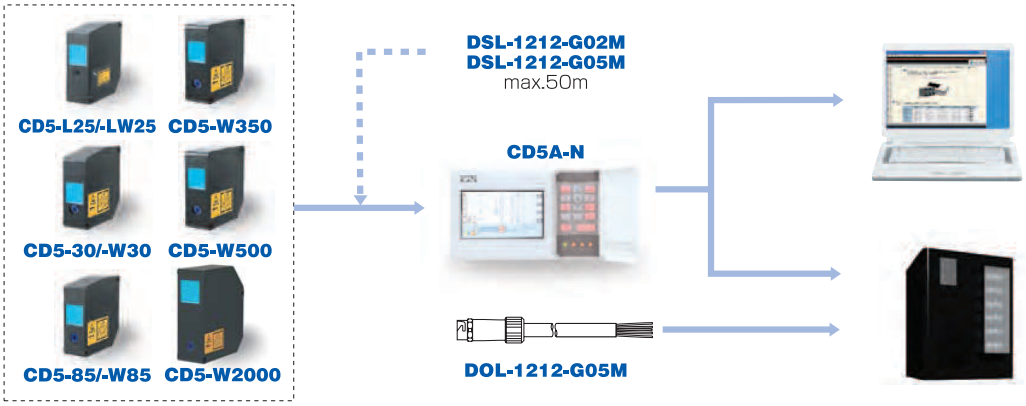
| Type | Description | Interface | Part Number |
|---|---|---|---|
| CD5 controller  | Controller unit for CD5 system with 4.3" TFT LCD display and Backlit Ten-key input panel. | Analog output<br>NPN input/output<br>RS-232C<br>USB | CD5A-N |

## Optional parts

| Type | Description | Length | Part Number |
|---|---|---|---|
| Robotic type sensor head to controller cable * | Cable to connect CD5 sensor heads to controller. Sensing heads can be located up to 50 meters from controller. | 2 M | DSL-1212-G02M |
| | | 5 M | DSL-1212-G05M |
| Robotic type sensor head cable * | Cable for sensor head when used without controller | 5 M | DOL-1212-G05M |
| I/O connection cable | IEEE1284 half pitch 50 pin connection cable | 3 M | IO-EXP-AOD5 |

* 30 mm minimum bend radius

## System configuration example



## Specifications

| Type | | CD5-L25 | CD5-LW25 | CD5-30 | CD5-W30 | CD5-85 | CD5-W85 | CD5-W350 | CD5-W500 | CD5-W2000 |
|---|---|---|---|---|---|---|---|---|---|---|
| Optic Type | | Specular | | Diffuse | | | | | | |
| Measurement Dist. | | 25mm | | 30mm | | 85mm | | 350mm | 500mm | 2000mm |
| Measurement Range | | ±1mm | | ±5mm | | ±20mm | | ±100mm | ±200mm | ±500mm |
| Light Source | Device | | | | | | | | | |
| | W/L | 650nm | | 650nm | 658nm | 650nm | 658nm | | | |
| | Power | 390μW | | 1mW | | | | | | 5mW |
| Laser Class | FDA | CLASS II | | | | | | | | CLASS IIIa |
| Spot size ※1 | | 25×35μm | 100×700μm | 30×100μm | 260×1000μm | 70×290μm | 260×1200μm | 700×2400μm | 1000×3700μm | 2100x7800um |
| Linearity ※2 | | ±0.08%F.S. (F.S.=2mm) | | ±0.08%F.S. (F.S.=10mm) | | ±0.05%F.S. (F.S.=40mm) | | ±0.08%F.S. (F.S.=200mm) | ±0.08%F.S. (F.S.=400mm) | ± 0.1%F.S. (F.S.=1000mm) |
| Resolution ※2 | | 0.02μm | | 0.2μm | | 1μm | | 5μm | 10μm | 30um |
| Sampling Period ※3 | | 100,200,400,800,1600,3200μs | | | | | | | | |
| Temperature Drift ※4 | | ±0.01%F.S./℃ (F.S.=2mm) | ±0.05%F.S./℃ (F.S.=2mm) | ±0.01%F.S./℃ (F.S.=10mm) | | ±0.01%F.S./℃ (F.S.=40mm) | | ±0.01%F.S./℃ (F.S.=200mm) | ±0.01%F.S./℃ (F.S.=400mm) | ±0.05%F.S./℃ (F.S.=1000mm) |
| Serial I/F ※5 | | RS-422 9.6k～1843.2kbps | | | | | | | | |
| Supply Voltage | | DC12～24V ±10% or from CD5A-□ | | | | | | | | |
| Power Consumption | | Max. 45mA (DC24V) | | | | | | | | |
| Indicator LED's | | Laser: Green: Laser is active | | | | | | | | |
| | | Measurement: Orange: Within +/-5% of measurement distance center<br>Red: Within measurement range, near side of center 5%<br>Green: Within measurement range, far side of center 5%<br>Red/Green alternating: Out of range | | | | | | | | |
| Protection Catagory | | IP67 | | | | | | | | |
| Operating Temp/Humid | | -10～+50℃ / 35～85%RH (No condensation) | | | | | | | | |
| Storage Temp/Humid | | -20～+60℃ / 35～85%RH (No condensation) | | | | | | | | |
| Ambient Illuminance | | Max. 3,000 lux (incandescent lamp) | | | | | | | | |
| Vibration Resistance | | 10～55Hz / 1.5mm X,Y,Z 2 hours | | | | | | | | |
| Shock Resistance | | 50G (500m/s²) X,Y,Z 3 times | | | | | | | | |
| Material | | Housing: Aluminum diecast | | | | | | | | |
| Cable | | 500 mm length (can be extended to a maximum distance of 50 meters) | | | | | | | | |
| Weight including 500mm cable | | Approx. 250g | | | | | | | | Approx. 450g |

Conditions for this specification:
Temperature: 23 degrees C, Power supply: 24VDC, Sampling period: 100us (CD5-W350/-W500/-W2000: 800us)
No. of averaging times: 256, Target object: Aluminum vapor deposition Mirror (specular type), White ceramic (diffuse type)

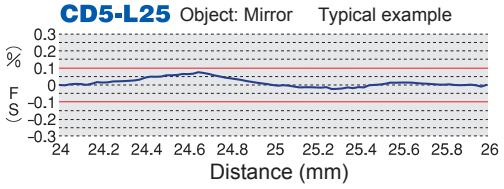
※1. Defined at center strength 1/e2 (13.5%)
※2. No. of averaging times: 4096
※3. Default: CD-L(W)25/-(W)30/-(W)85: 100us, CD5-W350/-W500/-W2000: 800us
※4. Typical data
※5. Without controller. Default setting is 9.6kbps. Following is I/F speed without any missing data.
100μs:921.6kbps、200μs:460.8kbps、400μs:230.4kbps、800μs:115.2kbps、1600μs:57.6kbps、3200μs:38.4kbps

| | CD5A-N |
|---|---|
| Number of Heads | max.3 |
| Supply Voltage | DC12～24V ±10% |
| Power Consumption | 350mA/24V |
| Temperature Drift | ±0.01%F.S./℃ |
| Interface | RS-232C/USB |
| Analog Output | +/- 10V / F.S. (output impedance: 100 ohm), 4 ~ 20mA / F.S. (load : Max. 300 ohm) |
| Alarm Output | NPN Open collector Max. 100mA/DC24V (Residual voltage: Max. 1.8V) * |
| Control Output | NPN Open collector Max. 100mA/DC24V (Residual voltage: Max. 1.8V) |
| Bank Select Input | ON when connected to GND, 16 Banks are selectable |
| Hold Input | ON when connected to GND |
| Zero Reset Input | ON when connected to GND, Measurement value and calculated result can be reset |
| Laser OFF Input | ON when connected to GND |
| Display | 4.3" TFT LCD |
| Protection Category | IP20 |
| Operating Temp/Humid | -10～+45℃ / 35～85%RH (No condensation) |
| Storage Temp/Humid | -20～+60℃ / 35～85%RH (No condensation) |
| Vibration Resistance | 10~55Hz/ 1.5mm X,Y,Z 2hours |
| Shock Resistance | 20G (196m/s²) X,Y,Z 3 times |
| Material | Case: Polycarbonate, Connection terminals: Nylon 66 |
| Weight | Approx. 550g including connection terminals |

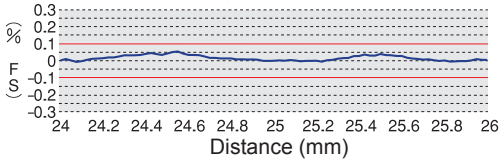
* ON when the controller has problem

## Linearity

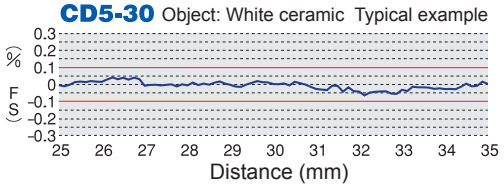
**CD5-L25** Object: Mirror Typical example



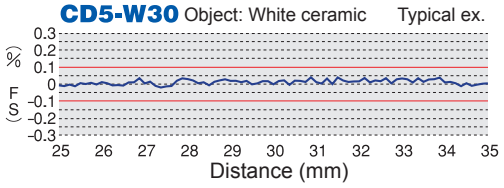

**CD5-LW25** Object: Mirror Typical example



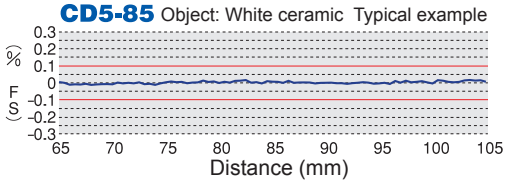

**CD5-30** Object: White ceramic Typical example



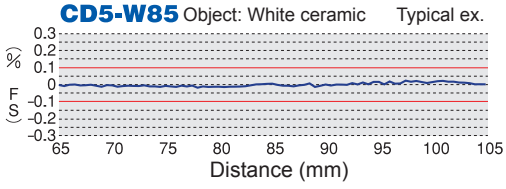

**CD5-W30** Object: White ceramic Typical ex.



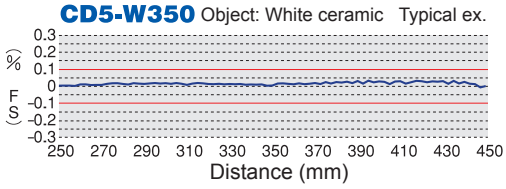

**CD5-85** Object: White ceramic Typical example



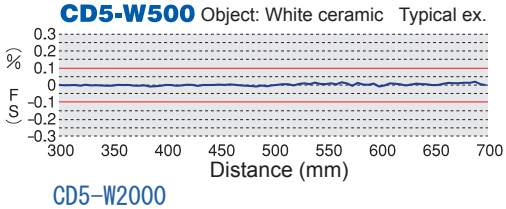

**CD5-W85** Object: White ceramic Typical ex.



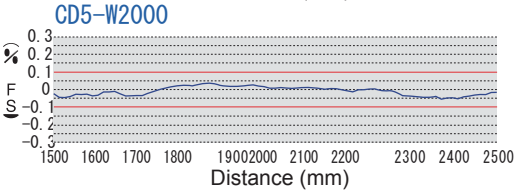

**CD5-W350** Object: White ceramic Typical ex.




**CD5-W500** Object: White ceramic Typical ex.

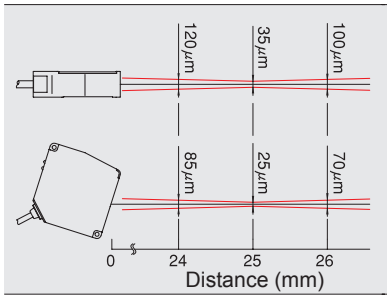



CD5-W2000

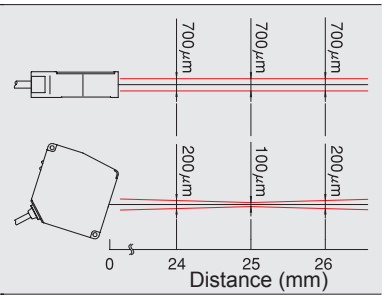



## Spot size

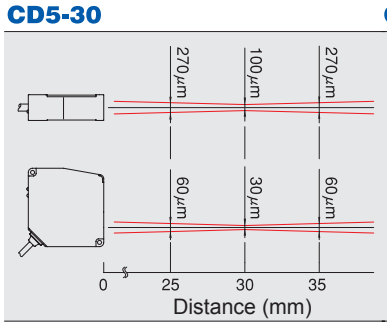
**CD5-L25**



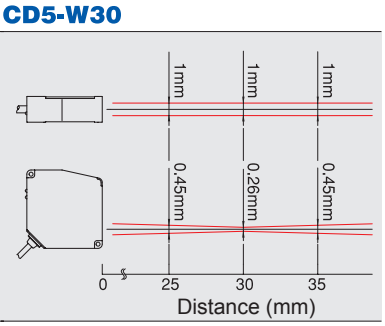

**CD5-LW25**



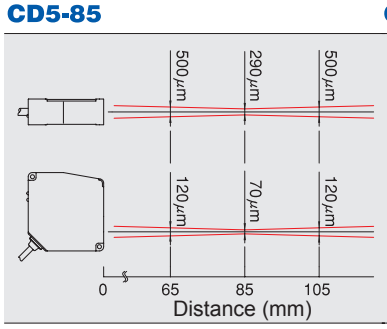

**CD5-30**



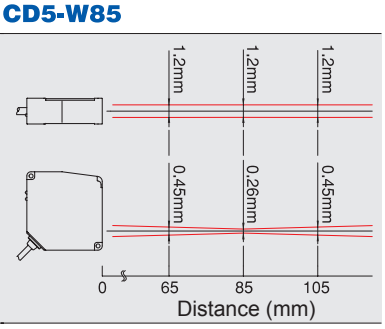

**CD5-W30**



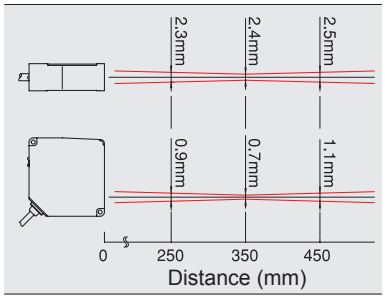

**CD5-85**



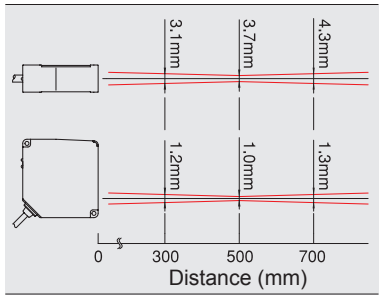

**CD5-W85**



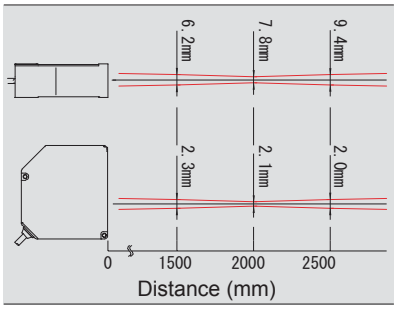

**CD5-W350**




**CD5-W500**



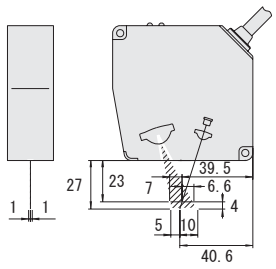

CD5-W2000



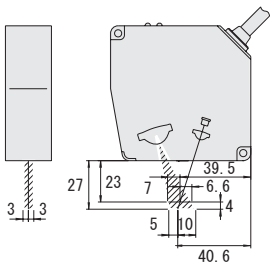
## Interference area

Unit: mm

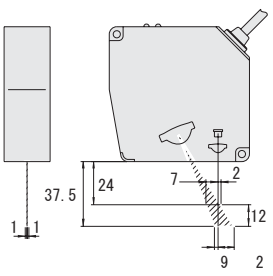
CD5-L25



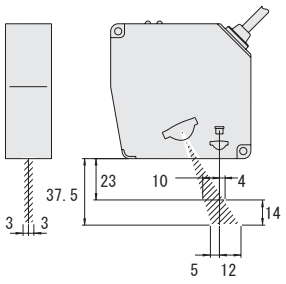

CD5-LW25



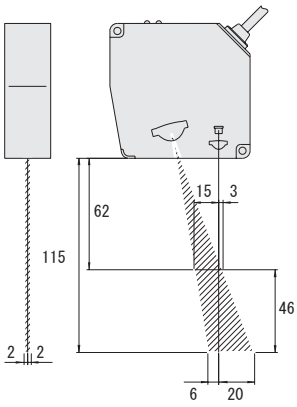

CD5-30



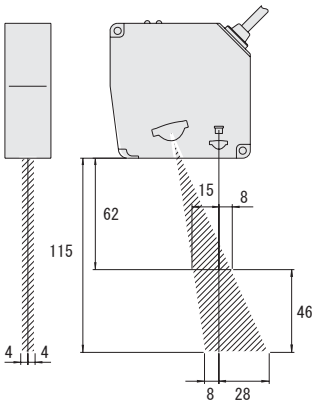

CD5-W30



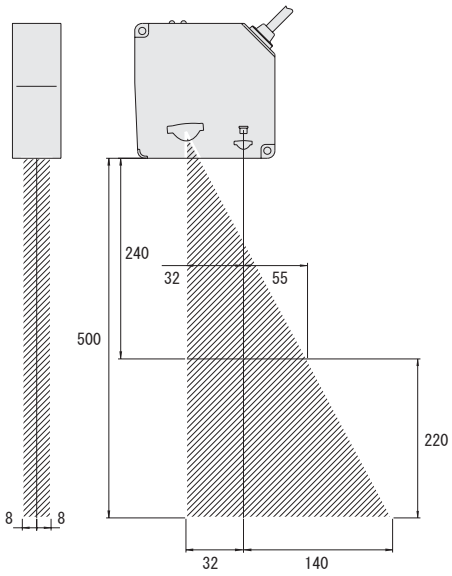

CD5-85



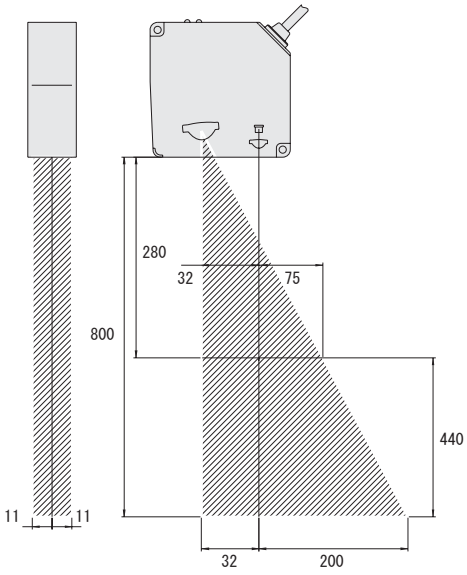

CD5-W85



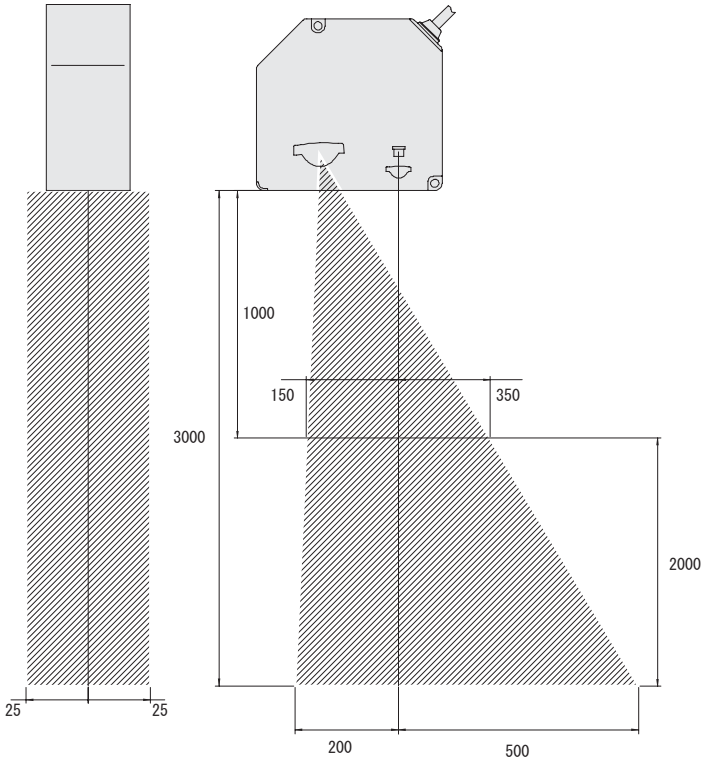

CD5-W350




CD5-W500




CD5-W2000

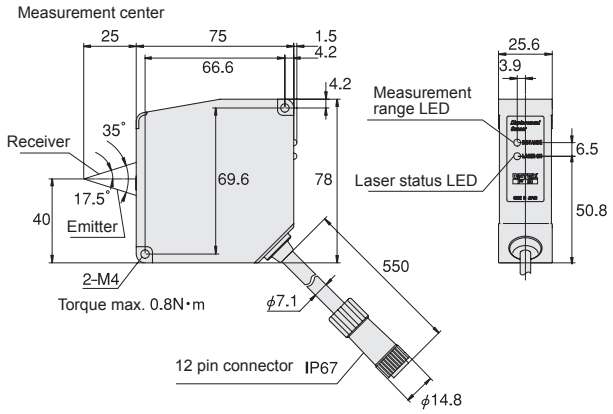


# Dimensions

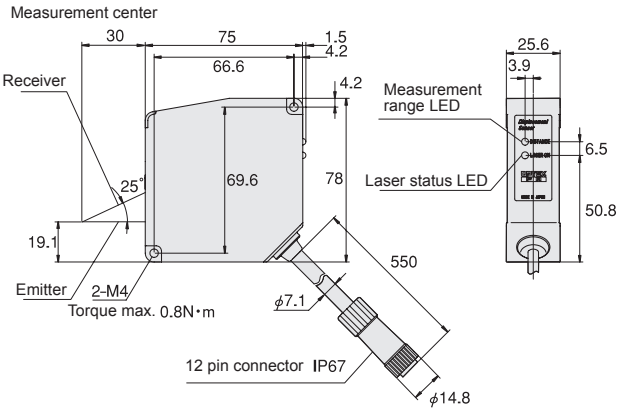
## Sensor head

Unit: mm

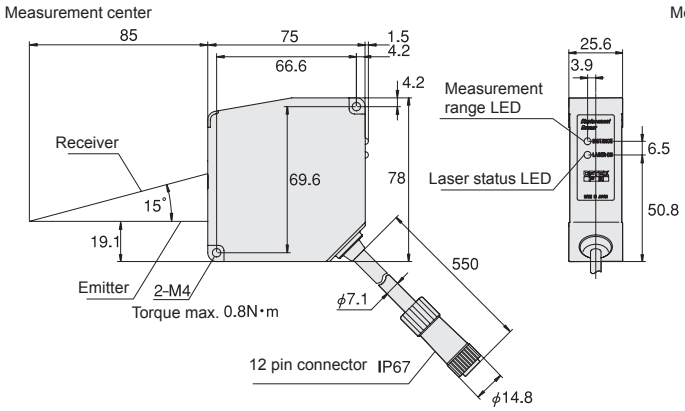
### CD5-L25/-LW25



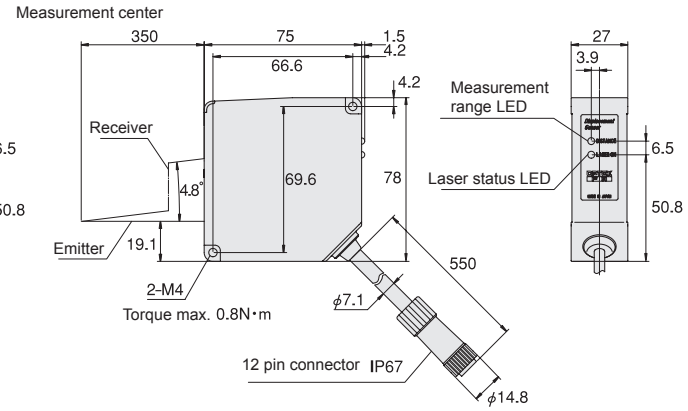

### CD5-30/-W30



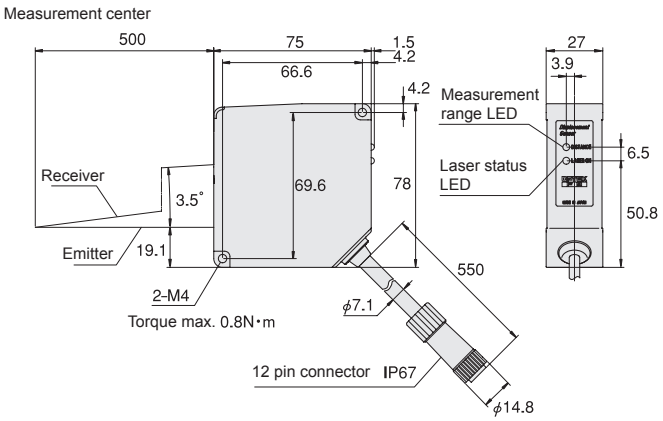

### CD5-85/-W85



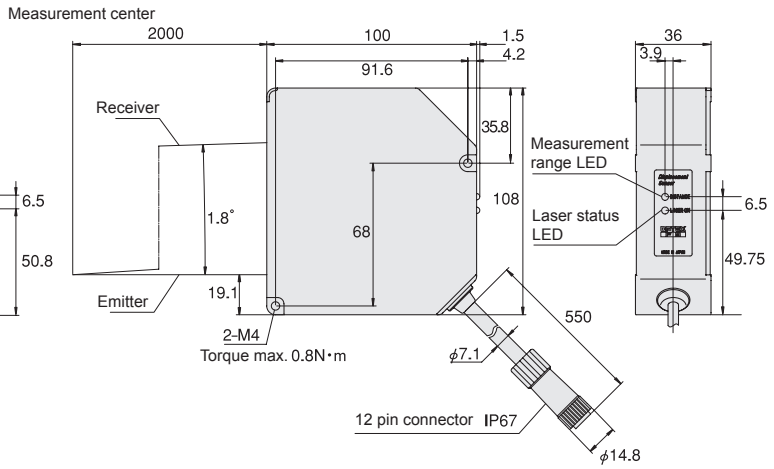

### CD5-W350




### CD5-W500



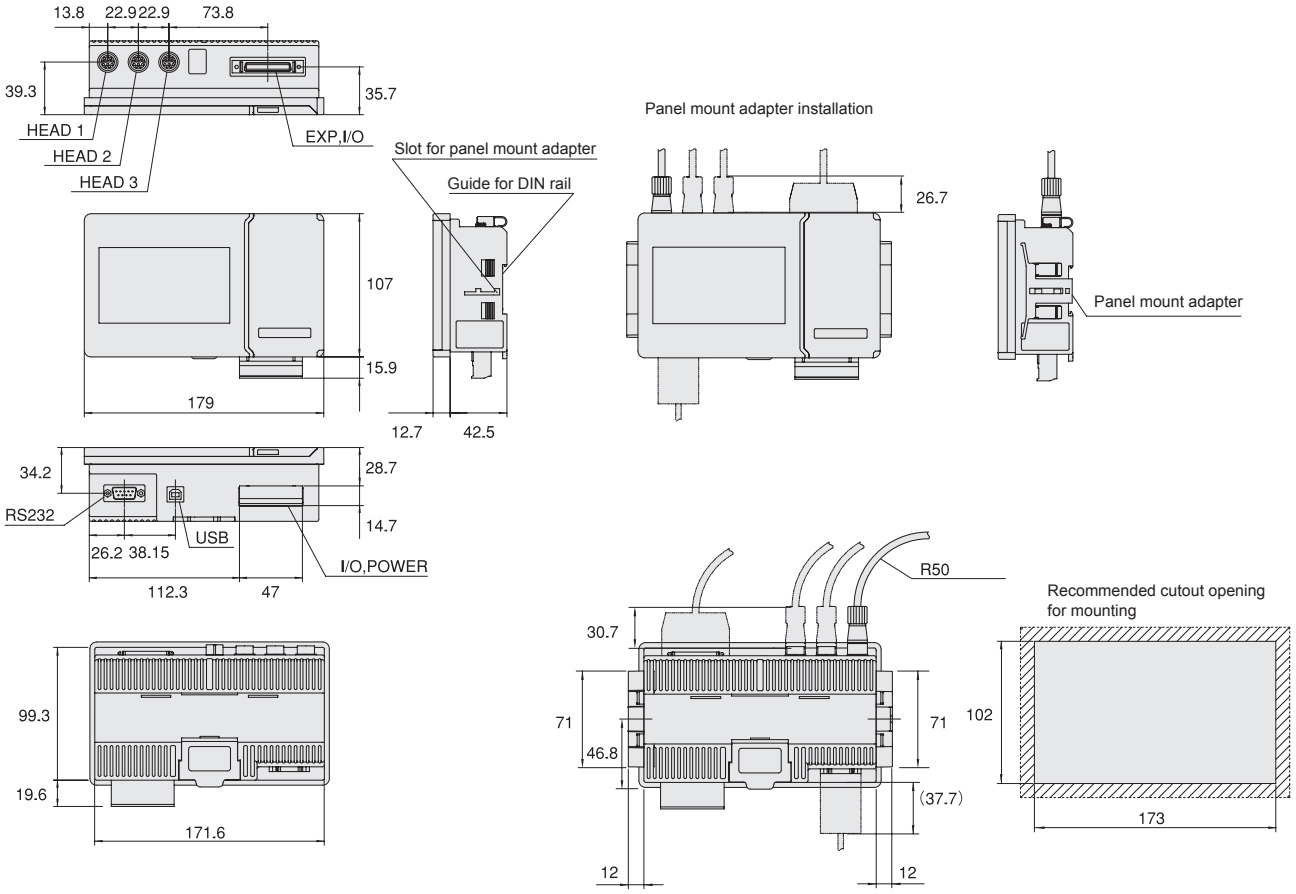

### CD5-W2000



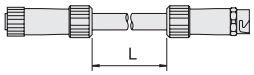
# Dimensions

## Controller

### CD5A-N

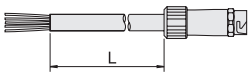



Extension cable
Sensor head - Controller
Robotic type - 30 mm bend radius



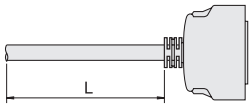

| Length | Part number |
|---|---|
| 2m | DSL-1212-G02M |
| 5m | DSL-1212-G05M |

Sensor head cable
for standalone use
Robotic type - 30 mm bend radius




| Length | Part number |
|---|---|
| 5m | DOL-1212-G05M |

I/O Connector cable



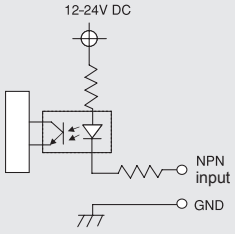

| Length | Part number |
|---|---|
| 3m | IO-EXP-AOD5 |

Analog output terminal
Pin assignment

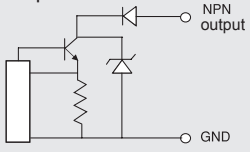
| | |
|---|---|
| P1[V] | : Port 1 |
| GND | : GND |
| P2[V] | : Port 2 |
| GND | : GND |
| P3[V] | : Port 3 |
| P1[mA] | : Port 1 |
| GND | : GND |
| P2[mA] | : Port 2 |
| GND | : GND |
| P3[mA] | : Port 3 |
| 0VGND | : 0V (GND) |
| 24V | : DC12~24V |

### I/O Connection

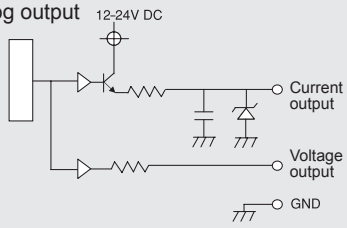
- Bank input
- Hold input
- Zero reset input
- Laser OFF input




- Control output
- Alarm output



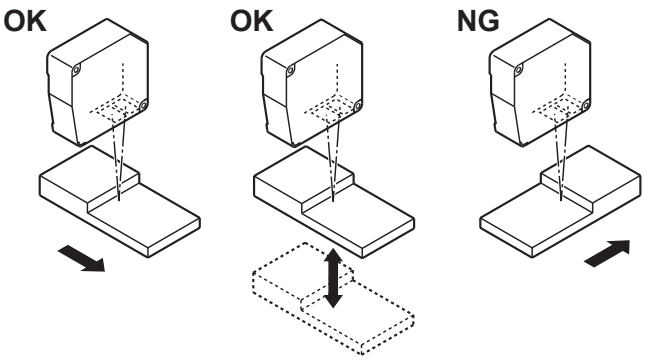

- Analog output

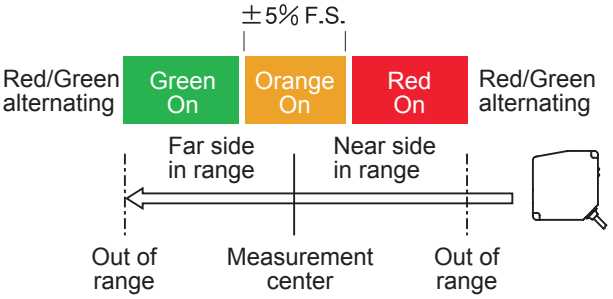


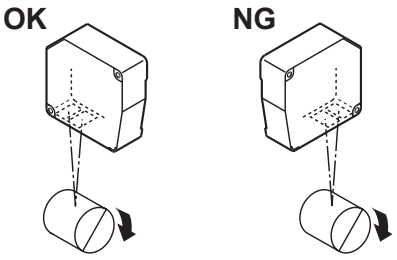
## Laser head mounting precautions

### Measuring height differences with moving objects

Mount the laser head so that the projected laser beam and the direction of travel of the target are parallel, as shown in the following examples.

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http://www.optex-fa.com