High-performance multi laser displacement sensor

CD5 series

Next level integration of accuracy, stability, and operability

- **Highest-in-class repeat accuracy and linearity**
- **Measurement is possible using only the sensor head**
- **Control unit for use with Mitsubishi Electric PLC is available**

Related products

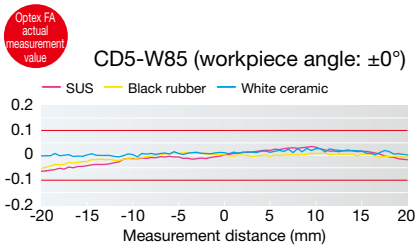
Compact type **CD22** ● P.464

Ultra-high accuracy **CDX** ● P.438

Connecting to MELSEC-Q **UQ1-01** ● P.518

Featuring superb linearity of ±0.05% F.S.*

Can be used to perform stable measurement of various types of workpieces.

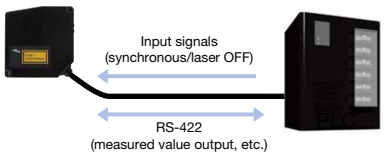


*Values in diffuse mode of CD5-W85 Refer to page 506 for measurement conditions, etc.

Ultra high accuracy

Highest-in-class repeat accuracy and linearity

Superb linearity of ±0.05% F.S.* (catalog specifications, target workpiece: white ceramic). CD5 series also can be used on materials for which stable measurement can be difficult such as SUS and black rubber, and provide a smooth linearity curve.

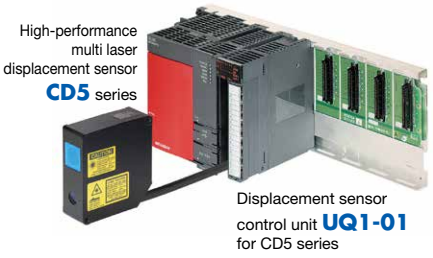


First-in-class

Measurement is possible using only the sensor head

Patent pending

The sensor head features a built-in displacement measurement function. Measured value output by way of RS-422, as well as laser OFF input/ synchronous input can be controlled without use of an amplifier unit.



Partner product

Direct connection to Mitsubishi Electric PLCs

Displacement sensor control unit **UQ1-01**

A control unit for use with CD5 series displacement sensors that performs automatic recognition just by being connected to a MELSEC-Q series base unit has been newly developed. This is a revolutionary product that can be set up by anyone and which features high-speed data processing and a low cost.

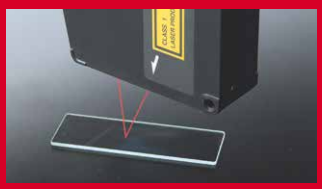
UQ1-01 description ● **P.518**

CD5-L25A (Narrow spot type)
CD5-LW25A (Wide spot type)
Specular reflection type

Transparent object/specular object measurement

Measurement of glass thickness is possible!

Measurement range: 25 ±1 mm
Repeat accuracy: 0.37 µm
Linearity: ±0.08% F.S.



Glass thickness measurement

CD5-30A (Narrow spot type)
CD5-W30A (Wide spot type)
Switchable between diffuse-reflective/ specular modes

Short range

Five times the repeat accuracy of conventional products!

	Diffuse mode	Specular mode
Measurement range:	30 ±5 mm	26.1 ±2.5 mm
Repeat accuracy:	0.46 µm	0.23 µm
Linearity:	±0.08% F.S.	

Diffuse mode Substrate warpage measurement

Specular mode Dispenser nozzle height control

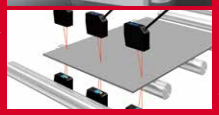
CD5-85 (Narrow spot type)
CD5-W85 (Wide spot type)
Switchable between diffuse-reflective/ specular modes

Middle range

Featuring best-in-class linearity!

	Diffuse mode	Specular mode
Measurement range:	85 ±20 mm	82.3 ±10 mm
Repeat accuracy:	1 µm	0.5 µm
Linearity:	±0.05% F.S.	±0.08% F.S.

Diffuse mode Measurement of sealant application amount



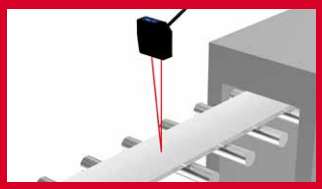
Specular mode Measurement of solar cell substrate thickness

CD5-150 (Narrow spot type)
CD5-W150 (Wide spot type)
Diffuse-reflective type

Semi-long range

Achieves high-accuracy measurement even at middle and long ranges!

Measurement range: 150 ±40 mm
Repeat accuracy: 2 µm
Linearity: ±0.05% F.S.



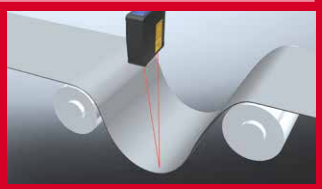
Aluminum material thickness measurement

CD5-W350 (Wide spot type)
Diffuse-reflective type

Long range

Wide spot type that provides highly accurate and stable measurement!

Measurement range: 350 ±100 mm
Repeat accuracy: 5 µm
Linearity: ±0.08% F.S.



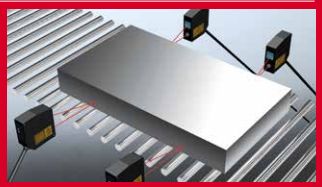
Slackness control of sheet materials

CD5-W500 (Wide spot type)
Diffuse-reflective type

Super long range

Featuring top class accuracy even at long ranges!

Measurement range: 500 ±200 mm
Repeat accuracy: 10 µm
Linearity: ±0.08% F.S.



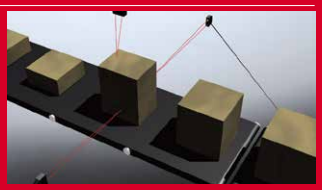
Steel plate tilt measurement

CD5-W2000 (Wide spot type)
Diffuse-reflective type

Ultra long range

Featuring ultra long distance measurement with a longest-in-industry range of 2000 mm!

Measurement range: 2000 ±500 mm
Repeat accuracy: 30 µm
Linearity: ±0.1% F.S.



Size detection for transported items

Achieving measurement stability through the newly developed “Tri-CORE” Technology

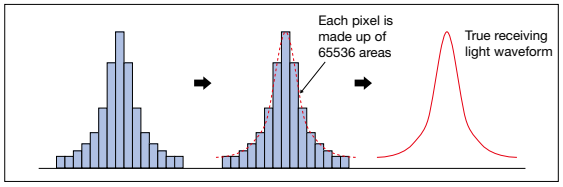
The highly reliable Tri-CORE engine was developed to overcome the flaws of optical displacement sensors. Thanks to its Triple Compensation & Optimization technology, the causes of all measurement errors have been eliminated, including for workpieces in which high-accuracy measurement has been difficult, such as metallic workpieces, semi-transparent workpieces, and black rubber workpieces.

Tri-CORE: Triple Compensation and Optimization by Reliable Engine

Employs digital sub-pixel processing

Newly developed True receiving light waveform recognition

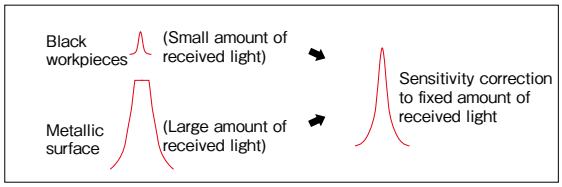
Digital sub-pixel processing that performs recognition with 65536 areas per pixel is newly employed. By obtaining a true receiving light waveform, a linearity that is up to twice that of conventional models can be achieved.



Thanks to high resolution electric shutter

Newly designed Automatic level correction

In addition to featuring electric shutter control with a sampling period of 1/485, receiving light waveforms of a fixed height can be obtained for almost any targets, resulting in a reduction of errors between materials.

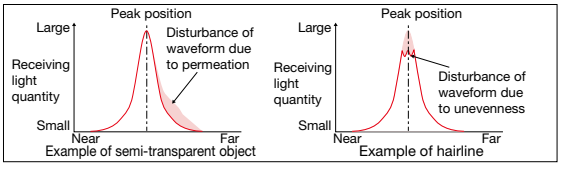


For objects with uneven surfaces, colors, and glossy or matte surfaces

Newly developed Original algorithm

Patent pending

This unique algorithm consistently identifies true peak position even in the case of receiving light waveforms that are stretched to the far side such as in the case of semi-transparent objects, as well as near-peak received light waveforms that become disturbed due to hairline.

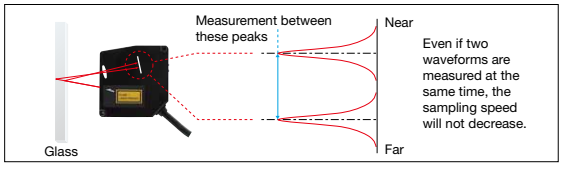


By one sensor head

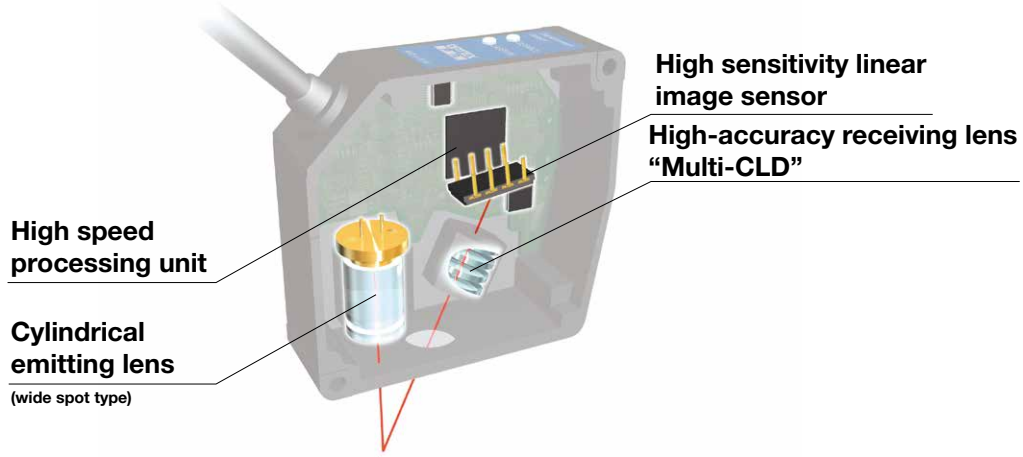
Newly designed Reliable glass thickness measurement

(In specular mode of CD5-L□25 and CD5-□30/-□85)

Using one sensor head, it can provide highly accurate and stable measurement of glass thickness by simultaneously measuring the front and rear surfaces.



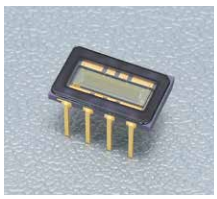
Newly developed sensor head specially designed for high-accuracy measurement



Next level balance between accuracy, speed and sensitivity

Newly developed High sensitivity linear image sensor

A high sensitivity linear image sensor is employed to capture reflected light from workpieces both with high levels of speed and accuracy. It features 5 times improved accuracy and 10 times increased speed when compared to conventional models.



Processing measurement results with high levels of speed and accuracy

Ultra high-speed High speed processing unit

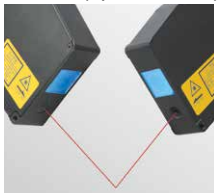
A high speed processing unit for CD5 series models embedded within the sensor. This enables data obtained from the linear image sensor to be instantaneously corrected and optimized before being output as measured values. With this, we have succeeded in enabling highly reliable measurement results to be obtained with both high levels of speed and accuracy.

Eliminates malfunctions even when spot light overlaps

Industry first Cross-talk prevention

(up to 2 units)

Cross-talk prevention enables stable measurements to be performed with high accuracy even if spot light overlaps or sensors are close together. Measurements can be performed correctly even for small warpage and tilting of workpieces.
Note: Sampling period will be six times longer.



Low light aberration

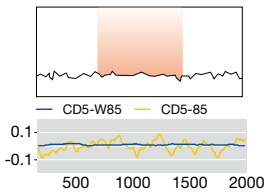
Newly developed "Multi-CLD" lens

The high-accuracy Multi-CLD receiving lens forms highly accurate images from reflected light using a linear image sensor. Using advanced focusing technology in which a camera is also employed, spot distortion caused by errors is significantly reduced.
Multi-CLD: Multi-Combined Low Dispersion

Enhanced moving resolution

Newly designed Wide type

A spot light wide-type that doesn't rely on the surface of measurement targets is now available (CD5-W□□). By the results averaged in the wide-beam, influences from unevenness are eliminated and highly accurate and stable measurements can be performed.



Even in water-filled areas

Newly designed Featuring IP67 level water-resistance

These sensor heads feature a degree of protection on IP67. This means that they can be used without worry in factories or with devices in which contact with water occurs. Extension cables and connectors also feature a IP67 protection, meaning additional countermeasures for water resistance are not required.

Note: Water or oil that adhere to the optical surface could cause light to refract and prevent measurements from being performed correctly.

High-performance multi laser displacement sensor **CD5** series

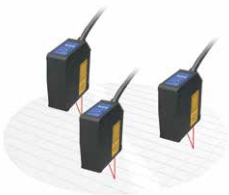
All-in-one amplifier unit featuring both usability and visibility

High-speed multi-point measurements using one amplifier unit

Industry first **3ch multi-calculation function**

Up to three sensor heads can be connected to one amplifier unit. By sending measurement data at high speeds, multi-point measurements such as for thickness, height difference and parallelism can be performed using one amplifier unit.

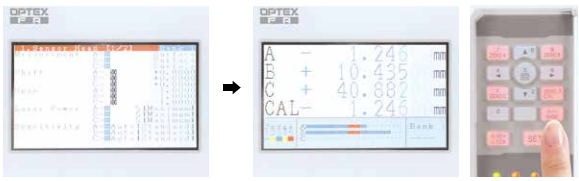
Flatness calculation	Reference height difference calculation
Relative height difference calculation	Twisting calculation
Multi-point thickness calculation	Parallelism calculation
Warpage calculation	Free calculation



Easy setup

Newly designed **Setting wizard**

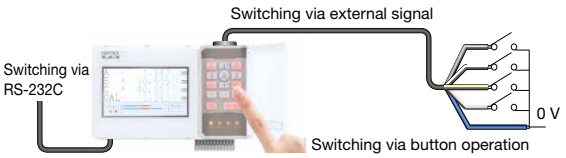
Setup of basic sensor head parameters and calibration can be performed easily and interactively using the numeric keypad and display.



Can be used on various types of production lines

Newly designed **16ch bank function**

This series is equipped with a 16ch bank function that communicates using through amplifier unit button operation or RS-232C, and that can have its setting switched (recall) to receive external signals from PLC, etc. This eliminates time wasted when changing setup of multi-product lines.

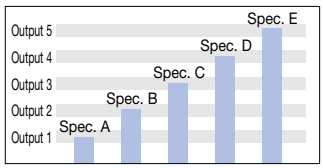


Convenient for sorting of workpieces with various sizes

Newly designed **Five comparator outputs**

These models are equipped with five comparator units for which setting of upper and lower limits is possible. This is an extremely convenient function for sorting workpieces of various sizes or identifying various types of workpieces.

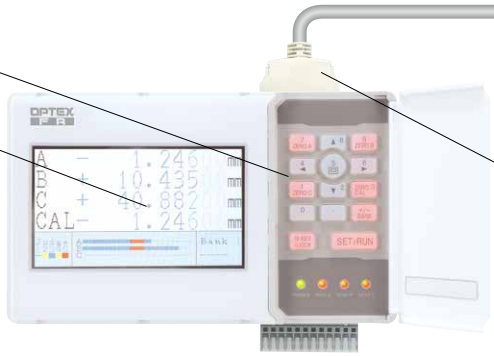
Setting example
Output 1 = 0.9 to 1.1 mm (Spec. A)
Output 2 = 1.9 to 2.1 mm (Spec. B)
Output 3 = 2.9 to 3.1 mm (Spec. C)
Output 4 = 3.9 to 4.1 mm (Spec. D)
Output 5 = 4.9 to 5.1 mm (Spec. E)



Multiple interface function with excellent expandability to PCs or PLC connections

Numeric keypad with pilot LED function

4.3 inch liquid crystal monitor



I/O connection cable (50P)

Bank select input × 4 inputs
Hold input × 4 inputs
Hold reset input
Zero reset input × 4 inputs
Laser OFF input × 3 inputs
Comparator output × 5 outputs
Alarm output × 3 outputs

USB

D-sub 9P
(RS-232C)

Analog current/ voltage output × 3 outputs for each

Further extend cost savings

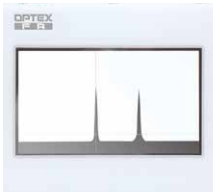
Industry first Up to three sensor heads can be connected

Up to three sensor heads can be connected to one amplifier unit. This eliminates the need to purchase more amplifier units when increasing the number of sensor heads and further extends cost savings.

Checking of waveforms without a PC or external monitor

Industry first Receiving light waveform monitoring function

These models are equipped with a receiving light waveform monitoring function that can detect whether lasers are emitting light to the workpieces at the optimal angle. Fine light axis adjustments can also be performed quickly and easily.



Assists in operations such as setup

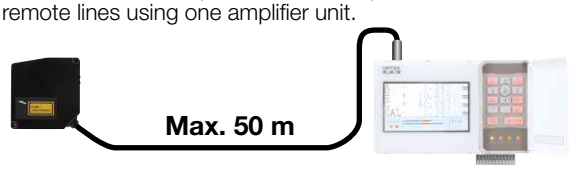
Industry first Numeric keypad with pilot LED function

These models are equipped with Optex FA's original numeric keypad with pilot LED function. With lights that guide every time buttons are pressed during operation, even inexperienced users can perform operations easily.

Operations by one amplifier unit even for remote lines

Industry longest Extendable up to 50 m

Extensions of up to 50 m in length are possible between sensor heads and the amplifier unit (longest in class). This means that unified operations can be performed even for remote lines using one amplifier unit.



Easy remote operation from PCs

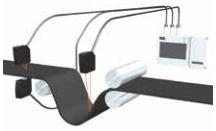
Newly designed Standard-equipped with a USB port

These amplifier units are equipped with a USB port that enables remote operation using a PC. And, because a COM port is also equipped, connection to PCs and PLC, etc., is also possible.

Suitable for a wide range of needs

Newly designed All sensor head types can be connected mixed

Any type of sensor heads can be connected to the amplifier unit. This means that thickness measurements can be performed on the workpiece by short-range heads while deflection measurements are performed by long-range heads. Also, sampling speed will not decrease even if three sensor heads are connected.



High-performance multi laser displacement sensor CD5 series

Selection table

Sensor head

Type		Measurement range	Repeat accuracy	Linearity	Light source (JIS laser class)	Model
Transparent object/ specular object measurement	Narrow	 25 ±1 mm	0.37 µm	±0.08% F.S.	Red semiconductor laser (Class 1)	**CD5-L25A**
	Wide					**CD5-LW25A**
Short range	Narrow	 25 mm 30 mm 35 mm 30 ±5 mm Diffuse mode  23.6 mm 26.1 mm 28.6 mm 26.1 ±2.5 mm Specular mode	Diffuse mode 0.46 µm Specular mode 0.23 µm	±0.08% F.S.	Red semiconductor laser (Class 2)	**CD5-30A**
	Wide					**CD5-W30A**
Middle range	Narrow	 65 mm 85 mm 105 mm 85 ±20 mm Diffuse mode  72.3 mm 82.3 mm 92.3 mm 82.3 ±10 mm Specular mode	Diffuse mode 1 µm Specular mode 0.5 µm	Diffuse mode ±0.05% F.S. Specular mode ±0.08% F.S.	Red semiconductor laser (Class 2)	**CD5-85**
	Wide					**CD5-W85**
Semi-long range	Narrow	 110 mm 150 mm 190 mm 150 ±40 mm	2 µm	±0.05% F.S.	Red semiconductor laser (Class 2)	**CD5-150**
	Wide					**CD5-W150**
Long range	Wide	 250 mm 350 mm 450 mm 350 ±100 mm	5 µm	±0.08% F.S.	Red semiconductor laser (Class 2)	**CD5-W350**
Super long range	Wide	 300 mm 500 mm 700 mm 500 ±200 mm	10 µm	±0.08% F.S.	Red semiconductor laser (Class 2)	**CD5-W500**
Ultra long range	Wide	 1500 mm 2000 mm 2500 mm 2000 ±500 mm	30 µm	±0.1% F.S.	Red semiconductor laser (Class 3R)	**CD5-W2000**

Amplifier unit

Type	Features	No. of connectable sensor heads	Interface	Input/output	Model
Amplifier unit for CD5 	4.3 inch TFT liquid crystal monitor + numeric keypad	Max. 3 units	Analog output Various inputs RS-232C USB	NPN	**CD5A-N**
				PNP	**CD5A-P**

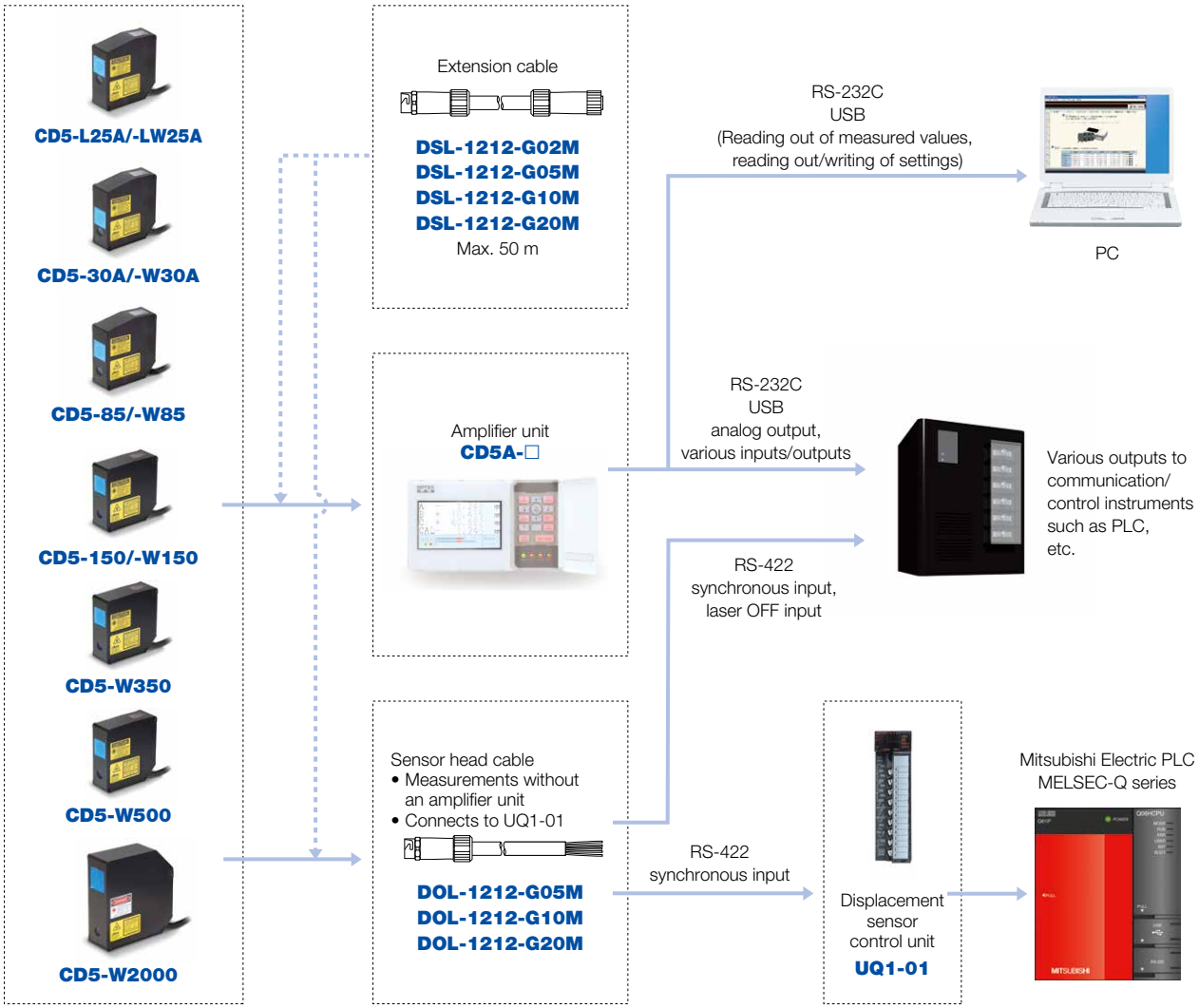
Displacement sensor control unit

Type	Features	No. of connectable sensor heads	Model
Displacement sensor control unit  **Description** **P.518**	Control unit for connecting CD5 directly to MELSEC-Q series *Please use DOL-1212-G□□M for connecting to sensor heads.	Max. 2 units	**UQ1-01**

Options

Type	Specifications		Model
Extension cable	Specialized extension cable for connecting sensor heads and amplifier units Can be extended up to 50 m by connecting multiple cables Robot cable specification	2 m long	**DSL-1212-G02M**
		5 m long	**DSL-1212-G05M**
		10 m long	**DSL-1212-G10M**
		20 m long	**DSL-1212-G20M**
Sensor head cable	Specialized cable for when using only sensor heads or UQ1-01 Robot cable specification	5 m long	**DOL-1212-G05M**
		10 m long	**DOL-1212-G10M**
		20 m long	**DOL-1212-G20M**
I/O connection cable	IEEE1284 Half-pitch 50P	3 m long	**IO-EXP-AOD5**

Example of system configuration



■ Regarding applicability of Export Trade Control Order enacted by Japanese government for the CD5 series

Caution CD5 series sensor heads are products that are subject to "Export Trade Control Order Appended Table 1 2-(12) Measurement devices (including machine tools with a measurement function)". Please inquire for details.

Model	Measurement mode	Resolution
CD5-L25, CD5-LW25	–	0.02 μm
CD5-30, CD5-W30	Diffuse mode	0.2 μm
	Specular mode	0.1 μm

Additional information

There is no differentiation for the applicability of CD5 series amplifier units and the resolution outputted from amplifiers connected to sensor heads is regulated as shown in the table to the left even if the average number of cycles is increased.

Attention: Not to be Used for Personnel Protection.

Never use these products as sensing devices for personnel protection. Doing so could lead to serious injury or death.
These sensors do not include the self-checking redundant circuitry necessary to allow their use in personnel safety applications.
A sensor failure or malfunction can cause either an energized or de-energized sensor output condition.
Please consult our distributors about safety products which meet OSHA, ANSI and IEC standards for personnel protection.

Specifications

Sensor head: Model based specifications

Model		CD5-L25A	CD5-LW25A	CD5-30A		CD5-W30A	
Optical method/mode		Specular reflection		Diffuse mode	Specular mode	Diffuse mode	Specular mode
Center of measurement range		25 mm		30 mm	26.1 mm	30 mm	26.1 mm
Measurement range		±1 mm		±5 mm	±2.5 mm	±5 mm	±2.5 mm
Light source	Medium	Red semiconductor laser					
	Wavelength	650 nm				658 nm	
	Max.output	390 μW		1 mW			
Laser class	IEC/JIS	Class 1		Class 2			
	FDA	Class II					
Spot size*1		Approx. 25 × 35 μm	Approx. 100 × 700 μm	Approx. 30 × 100 μm		Approx. 260 × 1000 μm	
Linearity*2		±0.08% F.S. (F.S. = 2 mm)		±0.08% F.S. (F.S. = 10 mm)	±0.08% F.S. (F.S. = 5 mm)	±0.08% F.S. (F.S. = 10 mm)	±0.08% F.S. (F.S. = 5 mm)
Repeat accuracy*2		0.37 μm		0.46 μm	0.23 μm	0.46 μm	0.23 μm
Sampling period*3		100 μs / 200 μs / 400 μs / 800 μs / 1600 μs / 3200 μs / AUTO					
Temperature drift*4		±0.01% F.S./°C (F.S. = 2 mm)	±0.05% F.S./°C (F.S. = 2 mm)	±0.01% F.S./°C (F.S. = 10 mm)	±0.01% F.S./°C (F.S. = 5 mm)	±0.01% F.S./°C (F.S. = 10 mm)	±0.01% F.S./°C (F.S. = 5 mm)
Weight		Approx. 250 g (including 500 mm connector cable)					

Model		CD5-85		CD5-W85		CD5-150	CD5-W150
Optical method/mode		Diffuse mode	Specular mode	Diffuse mode	Specular mode	Diffuse reflection	
Center of measurement range		85 mm	82.3 mm	85 mm	82.3 mm	150 mm	
Measurement range		±20 mm	±10 mm	±20 mm	±10 mm	±40 mm	
Light source	Medium	Red semiconductor laser					
	Wavelength	650 nm		658 nm		650 nm	658 nm
	Max.output	1 mW					
Laser class	IEC/JIS	Class 2					
	FDA	Class II					
Spot size*1		Approx. 70 × 290 μm		Approx. 260 × 1200 μm		Approx. ø180 μm	Approx. 330 × 1600 μm
Linearity*2		±0.05% F.S. (F.S.= 40 mm)	±0.08% F.S. (F.S. = 20 mm)	±0.05% F.S. (F.S.= 40 mm)	±0.08% F.S. (F.S. = 20 mm)	±0.05% F.S. (F.S. = 80 mm)	
Repeat accuracy*2		1 μm	0.5 μm	1 μm	0.5 μm	2 μm	
Sampling period*3		100 μs / 200 μs / 400 μs / 800 μs / 1600 μs / 3200 μs / AUTO					
Temperature drift*4		±0.01% F.S./°C (F.S.= 40 mm)	±0.01% F.S./°C (F.S. = 20 mm)	±0.01% F.S./°C (F.S.= 40 mm)	±0.01% F.S./°C (F.S. = 20 mm)	±0.01% F.S./°C (F.S. = 80 mm)	
Weight		Approx. 250 g (including 500 mm connector cable)					

Model		CD5-W350	CD5-W500	CD5-W2000
Optical method/mode		Diffuse reflection		
Center of measurement range		350 mm	500 mm	2000 mm
Measurement range		±100 mm	±200 mm	±500 mm
Light source	Medium	Red semiconductor laser		
	Wavelength	658 nm		
	Max.output	1 mW		5 mW
Laser class	IEC/JIS	Class 2		Class 3R
	FDA	Class II		Class IIIa
Spot size*1		Approx. 700 × 2400 μm	Approx. 1000 × 3700 μm	Approx. 2100 × 7800 μm
Linearity*2		±0.08% F.S. (F.S. = 200 mm)	±0.08% F.S. (F.S. = 400 mm)	±0.1% F.S. (F.S. = 1000 mm)
Repeat accuracy*2		5 μm	10 μm	30 μm
Sampling period*3		100 μs / 200 μs / 400 μs / 800 μs / 1600 μs / 3200 μs / AUTO		
Temperature drift*4		±0.01% F.S./°C (F.S. = 200 mm)	±0.01% F.S./°C (F.S. = 400 mm)	±0.05% F.S./°C (F.S. = 1000 mm)
Weight		Approx. 250 g (including 500 mm connector cable)		Approx. 450 g (including 500 mm connector cable)

<Measurement conditions>
The measurement conditions are as follows unless otherwise designated: specialized amplifier unit connected, Ambient temperature: 23°C (normal temperature), Supply voltage: 24 VDC, Sampling period: 100 μs (800 μs for CD5-W350/-W500/-W2000 models), Average number of times: 256, Center of measurement range, Measurement target (specular reflection/specular mode: aluminum deposition mirror, diffuse reflection/diffuse mode: white ceramic), digitally measured values.
*1 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.
*2 With an average of 4096 times. Other conditions are the same as the <Measurement conditions> shown above.
*3 The factory setting is 100 μs for CD5-L(W)25/-(W)30/-(W)85/-(W)150, and 800 μs for CD5-W350/-W500/-W2000.
*4 Typical examples under the <Measurement conditions> shown above.

Sensor head: Common specifications

Supply voltage	12 to 24 VDC ±10% or power supplied from a CD5A-☐ amplifier unit
Current consumption	45 mA or less (at 24 VDC)
Serial interface*	RS-422 9.6 k to 1843.2 kbps
Indicators	Laser emission indicator: Green (lights up during laser OFF) Measurement range indicator: Orange (ON when near the measurement center) Red (ON when at the near distance side of inside the measurement range) Green (ON when at the far distance side of inside the measurement range) Red/green alternating (alternated lighting occurs when outside the measurement range or when measurement is not possible)
Degree of protection	IP67 (including connector)
Ambient temperature	-10 to +50°C (no freezing or condensation) / when stored: -20 to +60°C
Ambient humidity	35 to 85% RH / when stored: 35 to 85% RH
Ambient illuminance	3,000 lx or less (light receiving surface illuminance with incandescent lamp)
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/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 60947-5-7
Warm-up time	Approx. 30 minutes
Material	Housing: Aluminum die-cast, Emitting/receiving part cover: Glass
Cable extension	Up to 50 m using an optional extension cable (not included)

*If using sensor heads without a amplifier unit, this will always be set to 9.6 kbps when power is on. Also, the relationship between sampling periods and the baud rate at which all measurement data can be sent without loss is as follows.
100 µs: 921.6 kbps, 200 µs: 460.8 kbps, 400 µs: 230.4 kbps, 800 µs: 115.2 kbps, 1600 µs: 57.6 kbps, 3200 µs: 38.4 kbps

Amplifier unit

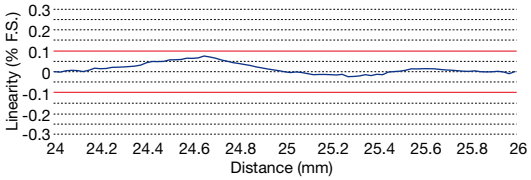
Model	CD5A-N	CD5A-P
No. of connectable sensor heads	Max. 3 units	
Supply voltage	12 to 24 VDC ±10%	
Current consumption	350 mA/24 V (includes analog current output when three sensor heads are connected)	
Temperature drift	±0.01% F.S./°C	
Serial interface	RS-232C/USB	
Analog output	Voltage output: ±10 V/F.S. (output impedance: 100Ω), Current output: 4 to 20 mA/F.S. (load impedance 300 Ω or less)	
Alarm output	NPN open collector	PNP open collector
	Max. 100 mA/24 VDC (residual voltage of Max. 1.8 V) ON when sensor head measurement is not possible	
Control output	NPN open collector	PNP open collector
	Max. 100 mA/24 VDC (residual voltage of Max. 1.8 V) HI/LO settings possible, hysteresis settings possible	
Bank input	ON when connected to ground	ON when connected to 12 to 24 V
	16 bank selectable	
Hold input	ON when connected to ground	ON when connected to 12 to 24 V
	Measured value hold (set using menu)	
Zero reset input	ON when connected to ground	ON when connected to 12 to 24 V
	Zero resetting possible for sensor head A measured value / sensor head B measured value / sensor head C measured value / calculated values	
Laser OFF input	ON when connected to ground	ON when connected to 12 to 24 V
	Turning off is possible for lasers of sensor heads A / B / C	
Display method	Liquid-crystal display	
Degree of protection	IP20	
Ambient temperature	-10 to +45°C (no freezing or condensation) / when stored: -20 to +60°C	
Ambient humidity	35 to 85% RH / when stored: 35 to 85% RH	
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. 20 G (196 m/s²), 3 times in each of the X, Y, and Z directions	
Applicable regulations	EMC directive (2004/108/EC)	
Applicable standards	EN 60947-5-7	
Material	Housing: Polycarbonate Terminal block: Nylon 66	
Weight	Approx. 550 g (including terminal block)	
Amplifier unit sub-functions	Sensor head settings, control output settings, analog output settings, calculation settings, various hold settings, filter settings, bank settings, RS-232C settings, memory copy function, measured value displayed digit settings, display brightness settings, key illumination settings	

● Added CD5-150/-W150 sensor head models can be used with CD5A-☐ Hardware Ver.1.7 and Software Ver.4.3 or later. Please inquire when using an earlier version of CD5A-☐.

Linearity

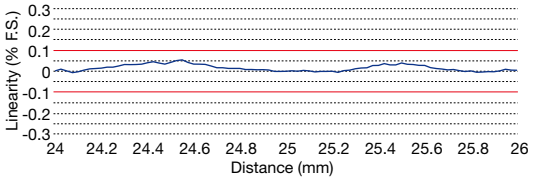
CD5-L25A

Material characteristic: Mirror (typical example)



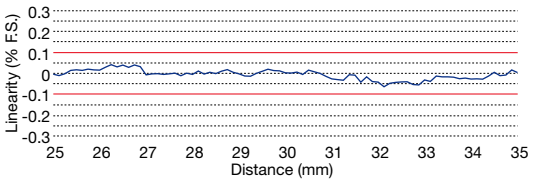
CD5-LW25A

Material characteristic: Mirror (typical example)

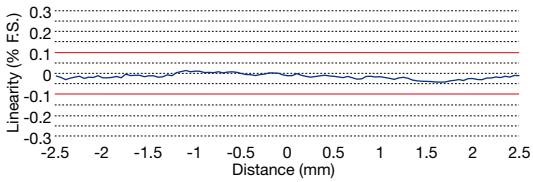


CD5-30A

Material characteristic: White ceramic (typical example)
Diffuse mode

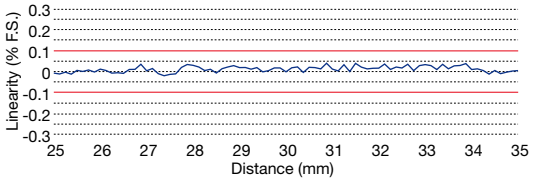


Material characteristic: Mirror (typical example)
Specular mode

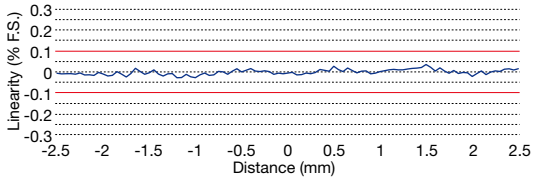


CD5-W30A

Material characteristic: White ceramic (typical example)
Diffuse mode

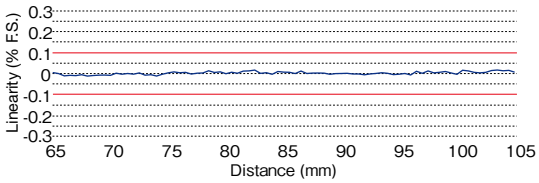


Material characteristic: Mirror (typical example)
Specular mode

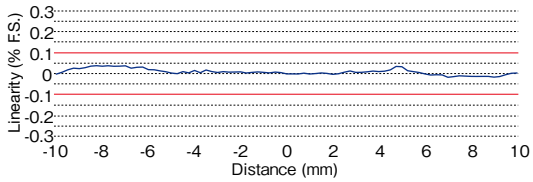


CD5-85

Material characteristic: White ceramic (typical example)
Diffuse mode

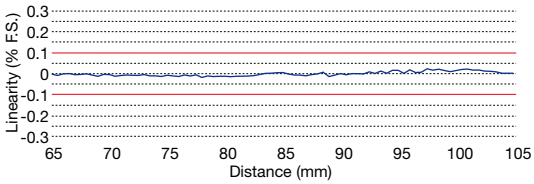


Material characteristic: Mirror (typical example)
Specular mode

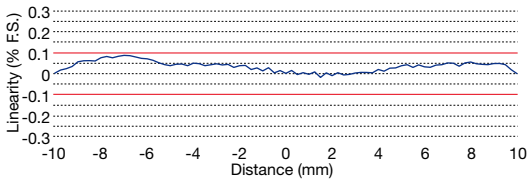


CD5-W85

Material characteristic: White ceramic (typical example)
Diffuse mode

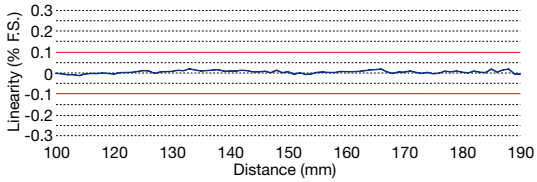


Material characteristic: Mirror (typical example)
Specular mode



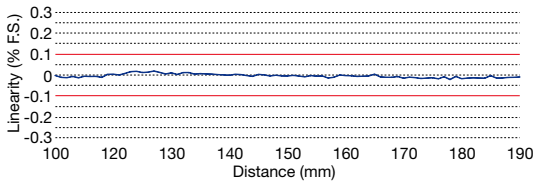
CD5-150

Material characteristic: White ceramic (typical example)



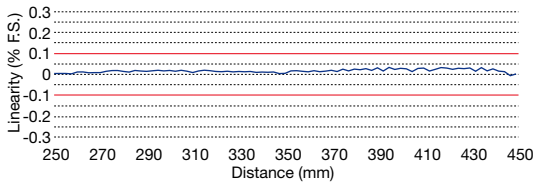
CD5-W150

Material characteristic: White ceramic (typical example)



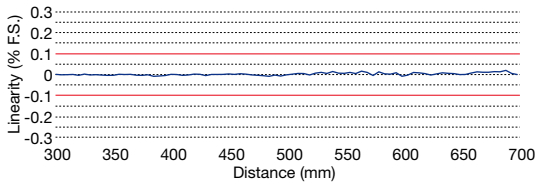
CD5-W350

Material characteristic: White ceramic (typical example)



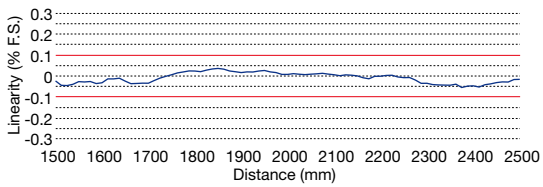
CD5-W500

Material characteristic: White ceramic (typical example)



CD5-W2000

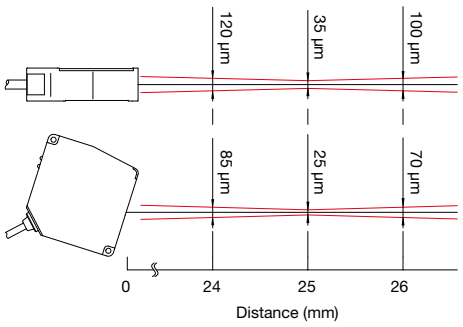
Material characteristic: White ceramic (typical example)



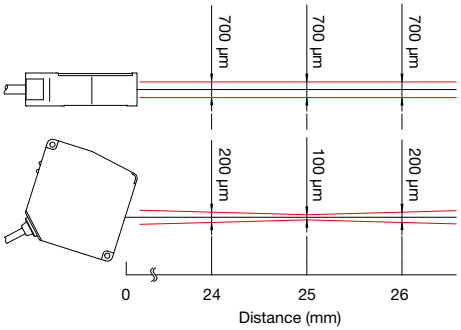
High-performance multi laser displacement sensor CD5 series

Spot size

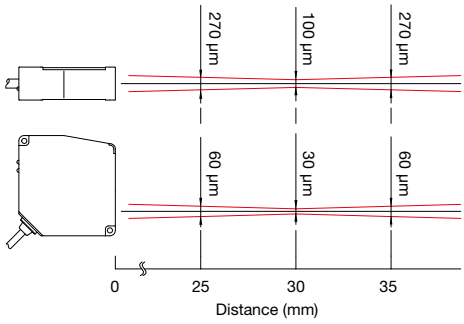
CD5-L25A



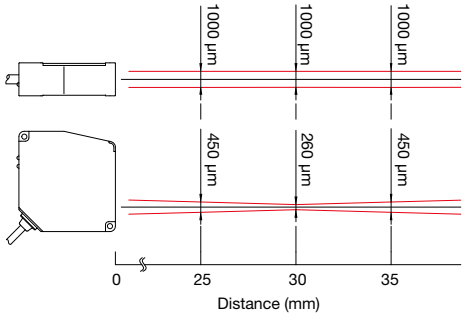
CD5-LW25A



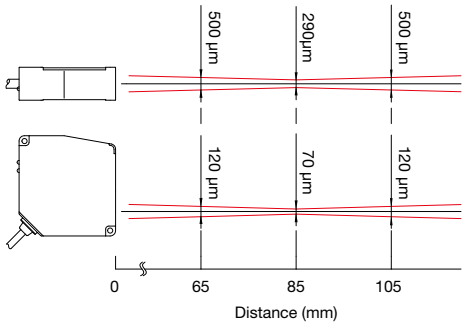
CD5-30A



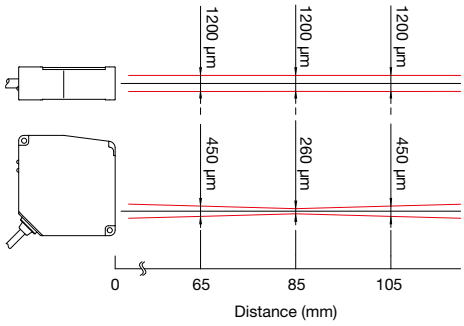
CD5-W30A



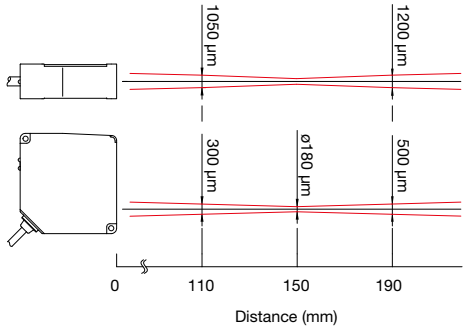
CD5-85



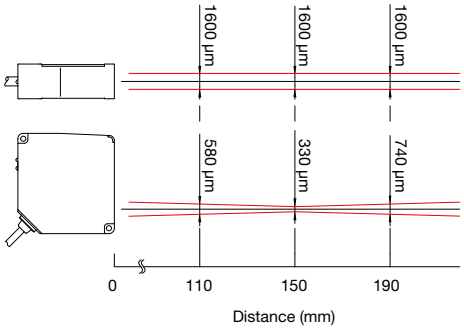
CD5-W85



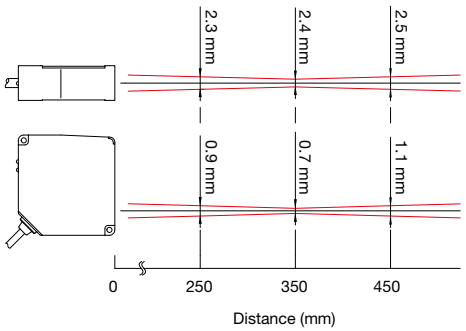
CD5-150



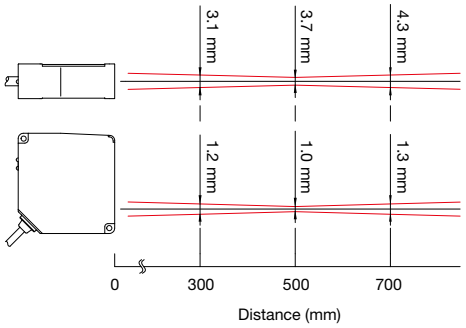
CD5-W150



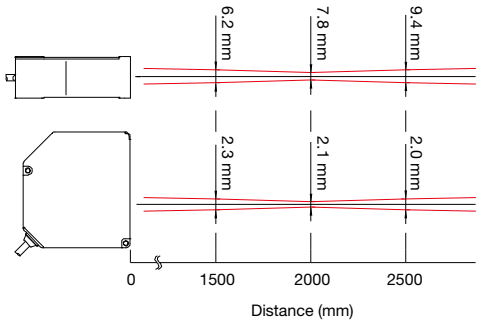
CD5-W350



CD5-W500



CD5-W2000

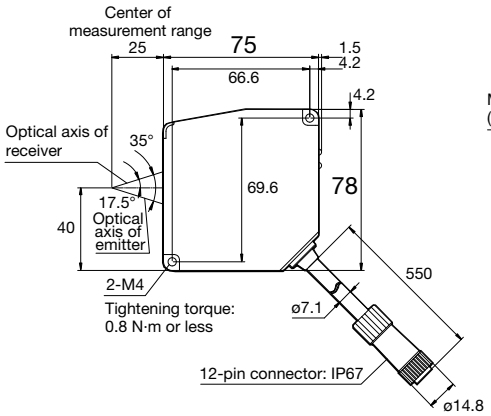


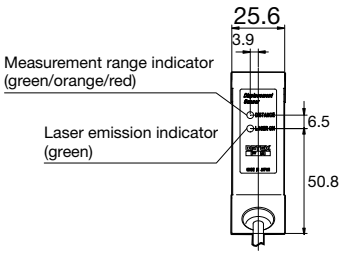
Dimensions

(Unit: mm)

Sensor head

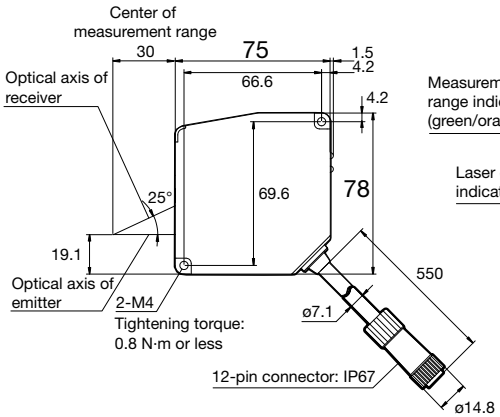
CD5-L25A/-LW25A

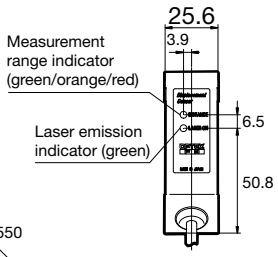




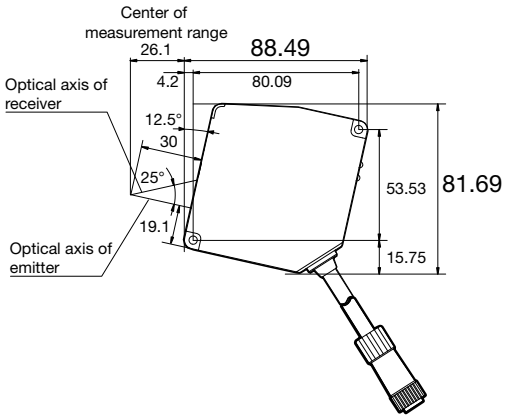
CD5-30A/-W30A

(in diffuse mode)



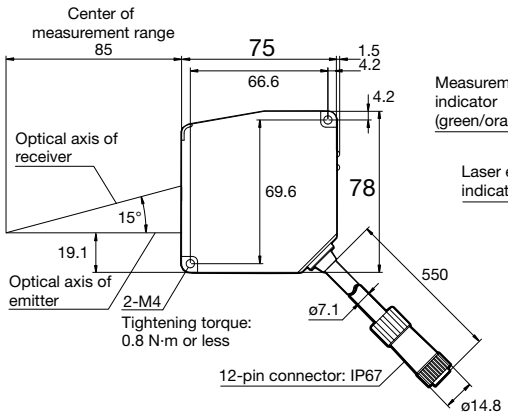


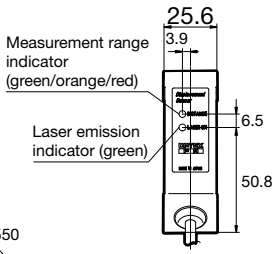
(in specular mode)



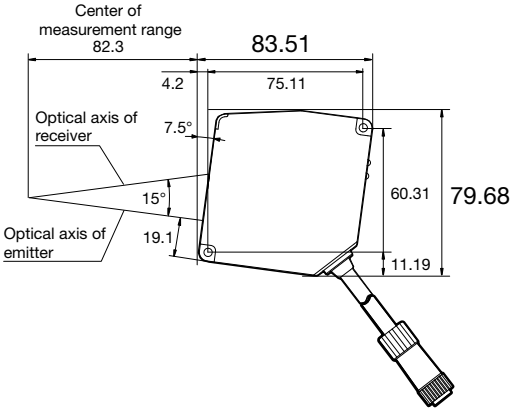
CD5-85/-W85

(in diffuse mode)



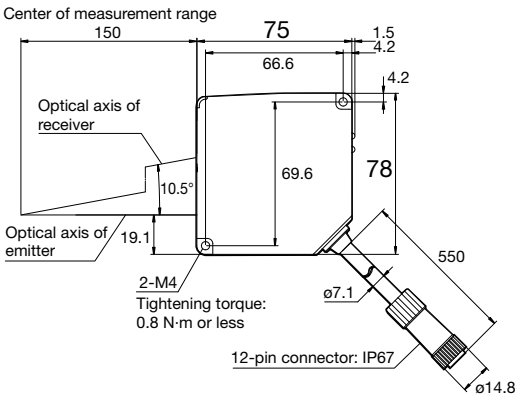


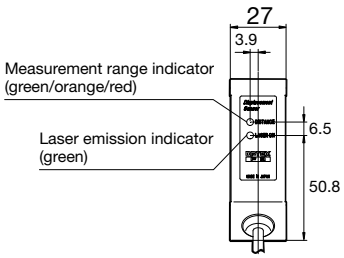
(in specular mode)



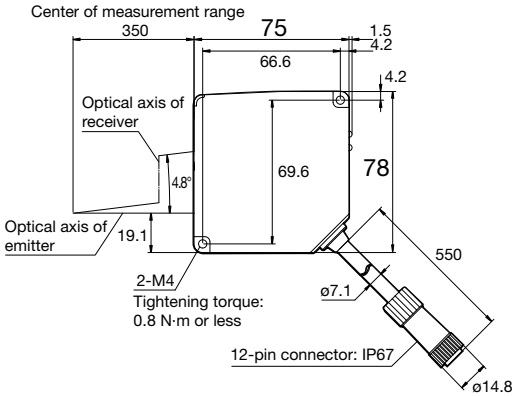
(Unit: mm)

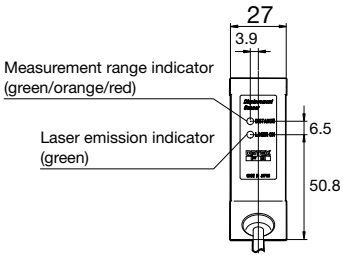
CD5-150/-W150



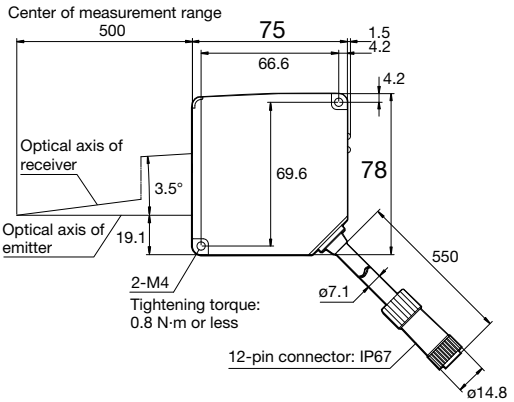


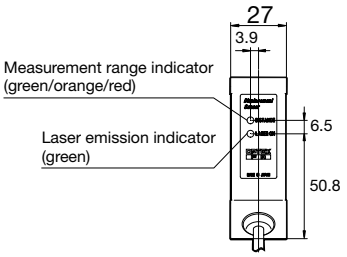
CD5-W350





CD5-W500



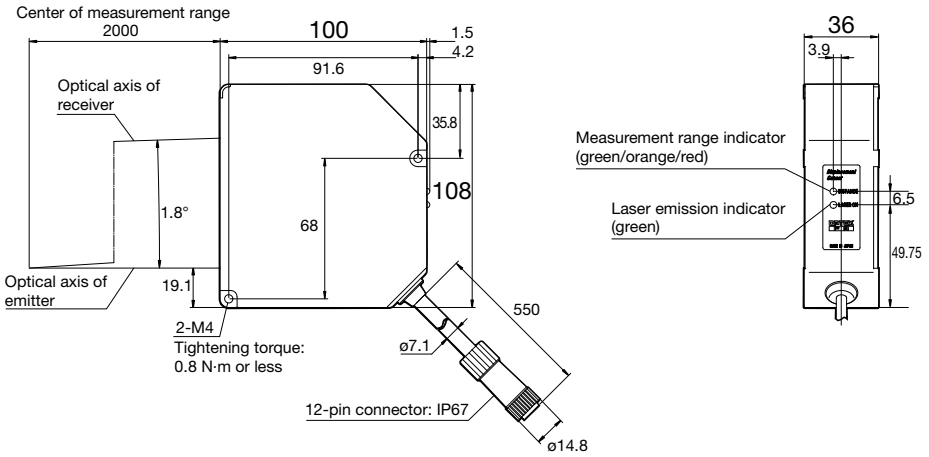


Dimensions

(Unit: mm)

Sensor head

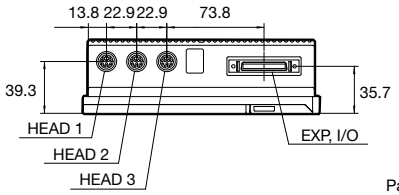
CD5-W2000

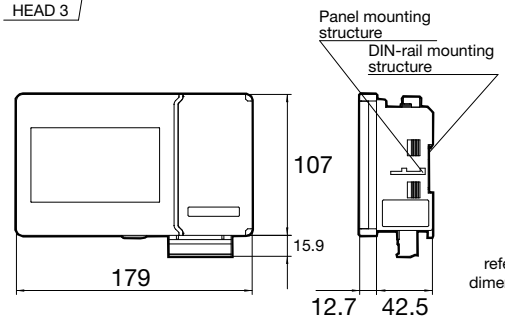


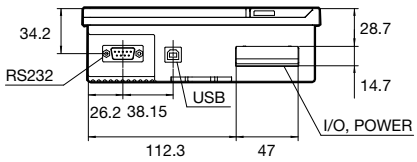
(Unit: mm)

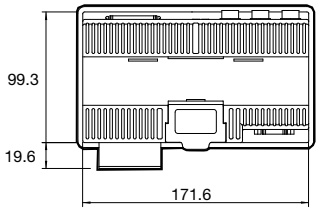
Amplifier unit

CD5A-□

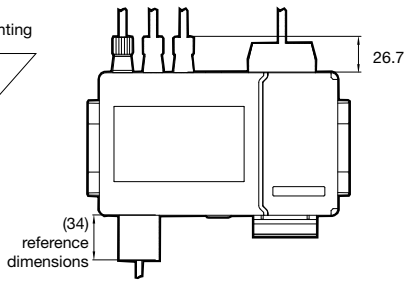


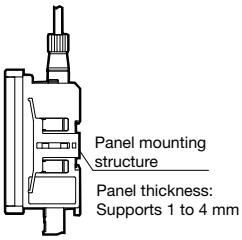


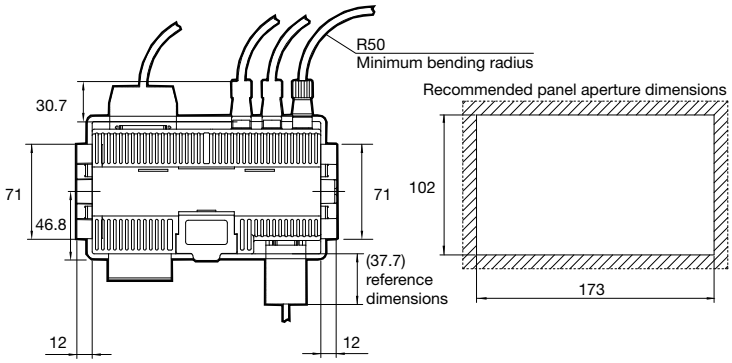




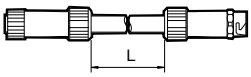
Mounting diagram for panel mount adapter/cable





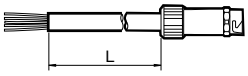


Extension cable between sensor head and amplifier unit



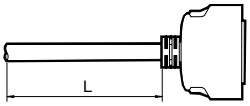
Length (L)	Cable model
2 m	**DSL-1212-G02M**
5 m	**DSL-1212-G05M**
10 m	**DSL-1212-G10M**
20 m	**DSL-1212-G20M**

Sensor head cable



Length (L)	Cable model
5 m	**DOL-1212-G05M**
10 m	**DOL-1212-G10M**
20 m	**DOL-1212-G20M**

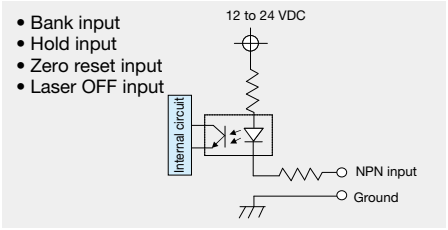
I/O connection cable



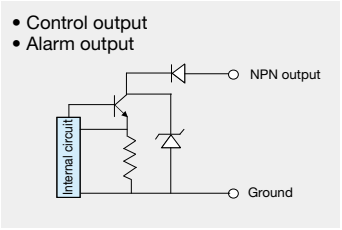
Length (L)	Cable model
3 m	**IO-EXP-AOD5**

I/O circuit diagram and connections

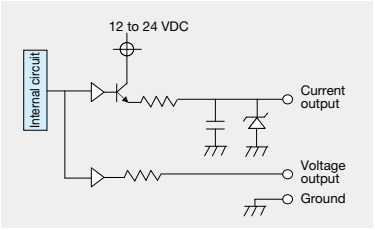
Input circuit diagram (NPN)



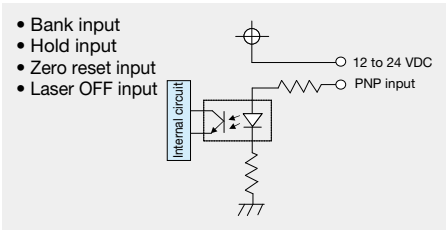
Output circuit diagram (NPN)



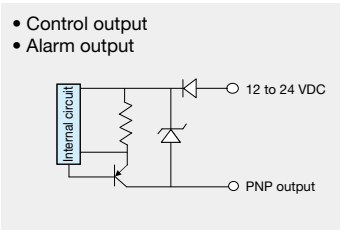
Analog output circuit diagram



Input circuit diagram (PNP)



Output circuit diagram (PNP)



12-pin I/O terminal pin assignment

P1 [V]	: Port 1 analog voltage output
GND	: Ground
P2 [V]	: Port 2 analog voltage output
GND	: Ground
P3 [V]	: Port 3 analog voltage output
P1 [mA]	: Port 1 analog current output
GND	: Ground
P2 [mA]	: Port 2 analog current output
GND	: Ground
P3 [mA]	: Port 3 analog current output
0 V GND	: 0 V (common for all grounds)
24 V	: 12 to 24 VDC (±10%)

*All grounds are connected internally.

Sensor head cable wiring (DOL-1212-G□□M)

Lead wire color	Description
Brown	12 to 24 VDC (±10%)
Blue	0 V
Black (narrow)	RS-422 Received data RxD+
Orange	RS-422 Received data RxD-
Red	RS-422 Reply data TxD+
Yellow	RS-422 Reply data TxD-
White	Laser OFF input
Gray	Synchronous input
Black (wide)	Shield (connected to 0 V)

50-pin I/O terminal pin assignment

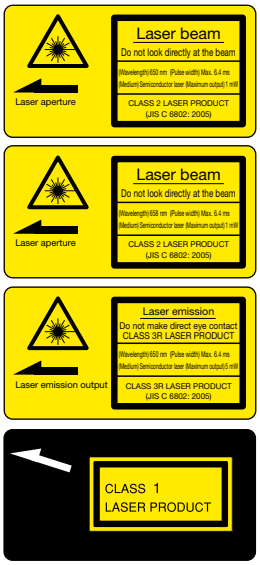
No.	Description
1	Bank select 0 input
2	Bank select 1 input
3	Bank select 2 input
4	Bank select 3 input
5	Hold A input (for Head A)
6	Hold B input (for Head B)
7	Hold C input (for Head C)
8	Hold CAL input (for calculation results)
9	Hold reset input (common)
10	Zero reset A input (for Head A)
11	Zero reset B input (for Head B)
12	Zero reset C input (for Head C)
13	Zero reset CAL input (for calculation results)
14	Laser OFF A input (for Head A)
15	Laser OFF B input (for Head B)
16	Laser OFF C input (for Head C)
17 to 22	—
23	COM terminal (24 V output)
24	—
25	COM terminal (0 V output)
26	Alarm output A (for Head A)
27	Alarm output B (for Head B)
28	Alarm output C (for Head C)
29	Control output 1
30	Control output 2
31	Control output 3
32	Control output 4
33	Control output 5
34 to 50	—

Bank select input

Bank No.	Bank select input			
	3	2	1	0
0	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	**ON**
2	OFF	OFF	**ON**	OFF
3	OFF	OFF	**ON**	**ON**
4	OFF	**ON**	OFF	OFF
5	OFF	**ON**	OFF	**ON**
6	OFF	**ON**	**ON**	OFF
7	OFF	**ON**	**ON**	**ON**
8	**ON**	OFF	OFF	OFF
9	**ON**	OFF	OFF	**ON**
10	**ON**	OFF	**ON**	OFF
11	**ON**	OFF	**ON**	**ON**
12	**ON**	**ON**	OFF	OFF
13	**ON**	**ON**	OFF	**ON**
14	**ON**	**ON**	**ON**	OFF
15	**ON**	**ON**	**ON**	**ON**

Precautions for laser use

This product emits a Class 1/Class 2 (II) or Class 3R (IIIa) visible laser beam that is compliant with JIS C 6802/IEC/FDA laser safety standards.
Because English language warnings indicating the sensor as Class 1 or Class 2 (II) or Class 3R (IIIa), as well as explanation labels, are located on the side of the sensor, please replace these warnings/explanation labels with the Japanese language warnings/ explanation labels included in the box when using in Japan.



Type of laser used in this product

Type	Red semiconductor laser
Wavelength	650 nm/658 nm
Output	390 µW/1 mW/5 mW

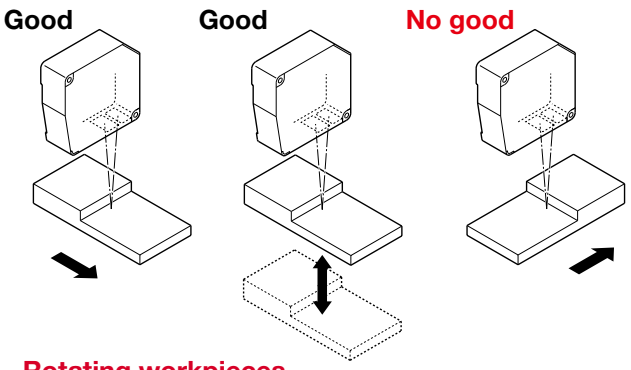
If you install this product in a piece of machinery that will then be exported to the United States, it is necessary to follow laser standards as stipulated by the American Food and Drug Administration (FDA).
This product has already been submitted to the CDRH (Center for Devices and Radiological Health). (Please inquire for details.)

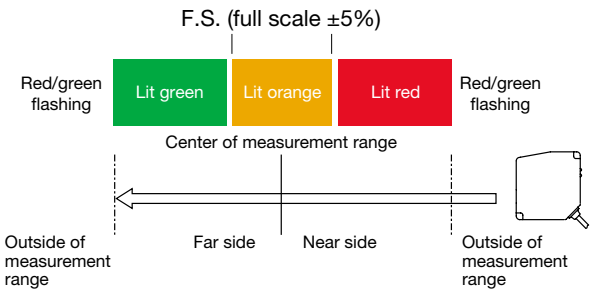
Sensor head mounting

Warning
- Install the sensor head at a height that is not at worker eye level.
- Make sure to turn the amplifier unit power off before connecting or removing sensor heads to and from amplifier units.

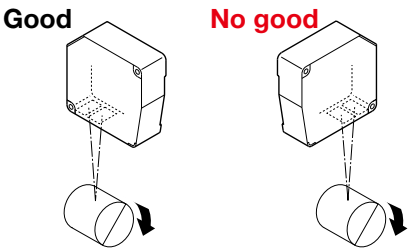
Workpieces with large fluctuations in height difference or color

Mount the sensor head so that the detection surface (emitting/receiving part surfaces) is always parallel to the detection target. Adjust the target so that the spot aligns with the detection position, and ensure that the distance indicator lights up orange at the reference window (center of change).





Rotating workpieces



Warning
Do not look directly at the laser or intentionally aim the laser beam in another person's eyes.
Doing so may cause damage to the eyes or health.

Caution
Because this product is considered a strategic material as stipulated under the "Foreign Exchange and Foreign Trade Act", it is necessary to obtain an export license from the government of Japan as required by the previously stated act when exporting this product to outside of Japan.