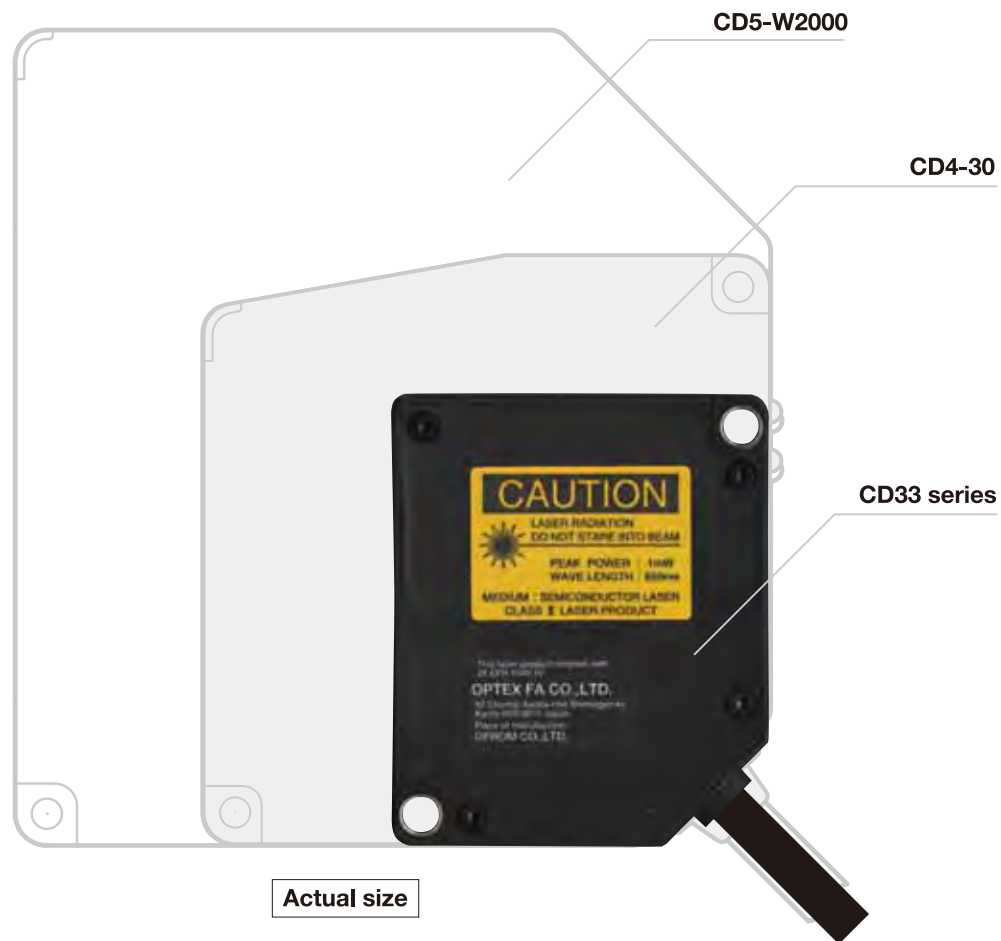


# CD33 series

CMOS sensor with  $\pm 0.1\%$  F.S. linearity packed in a half-palm size, ideal for built-in use with OEM machines.



- Available is CD33-L a Specular Types for high reflection and transparent object even in RS422 serial communications.
- Just connect UQ1-02 to build data logging system to Mitsubishi PLC without any I/F, logging unit and ladder program.
- Analogue output (4-20mA or 0-10V) + 2 control outputs  
Stand-alone design capable of direct operation without controller

# LINEUP

CD5

CD4

CD33

CD3

CD1

UQ-1

Diffuse type

## CD33-30

### 30mm distance type

Warping / Sagging of PC board

Measurement range : 30  $\pm$ 4mm  
Resolution : 4 $\mu$ m (Fast mode)  
Linearity :  $\pm$ 0.1% F.S.



Specular type

## CD33-L30

### 26.3mm distance type

Measurement range : 26.3  $\pm$ 2mm  
Resolution : 1 $\mu$ m  
Linearity :  $\pm$ 0.2% F.S.



## CD33-50

### 50mm distance type

Height of components on the board

Measurement range : 50  $\pm$ 10mm  
Resolution : 8 $\mu$ m (Fast mode)  
Linearity :  $\pm$ 0.1% F.S.



## CD33-L50

### 47.3mm distance type

Measurement range : 47.3  $\pm$ 5mm  
Resolution : 2.5 $\mu$ m  
Linearity :  $\pm$ 0.2% F.S.



## CD33-85

### 85mm distance type

Joint of rubber sheet

Measurement range : 85  $\pm$ 20mm  
Resolution : 15 $\mu$ m (Fast mode)  
Linearity :  $\pm$ 0.1% F.S.



## CD33-L85

### 82.9mm distance type

Measurement range : 82.9  $\pm$ 10mm  
Resolution : 5 $\mu$ m  
Linearity :  $\pm$ 0.2% F.S.



## CD33-120

### 120mm distance type

Loosen rubber sheet

Measurement range : 120  $\pm$ 60mm  
Resolution : 45 $\mu$ m (Fast mode)  
Linearity :  $\pm$ 0.1% F.S.



Application example for specular type  
Measurement of glass thickness is available

## CD33-250

### 250mm distance type

Checking tire

Measurement range : 250  $\pm$ 150mm  
Resolution : 100 $\mu$ m (Fast mode)  
Linearity :  $\pm$ 0.1% F.S.



### Product code

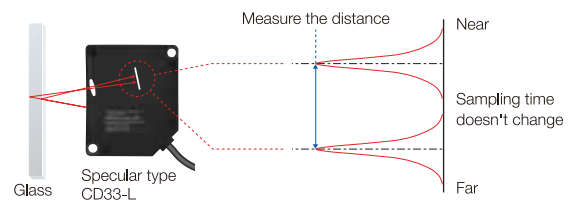
- CD33-□□**NV** (N=NPN, V=0-10V)
- CD33-□□**PV** (P=PNP, V=0-10V)
- CD33-□□□**N**-422 (N=NPN, 422=RS422 I/F)
- CD33-□□□**P**-422 (P=PNP, 422=RS422 I/F)
- CD33-□□**NA** (N=NPN, A=4-20mA)
- CD33-□□**PA** (P=PNP, A=4-20mA)

# CD33 ADVANCED TECHNOLOGY

The CD33 series is a function rich CMOS laser displacement sensor designed in an ultra-compact housing RS-422 type is available for digital connection

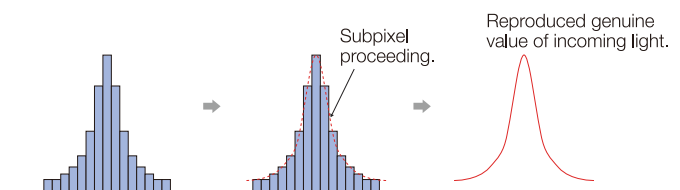
## Reliable glass thickness measurement

The Specular type CD33-L\*\* can detect both surface of glass and measure the thickness.



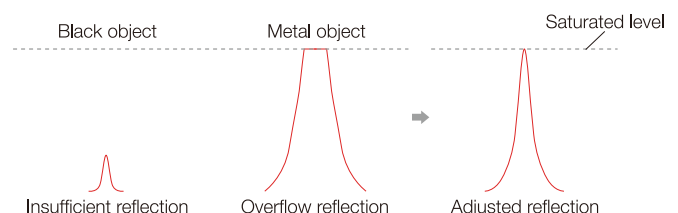
## Digital subpixel processing

Subpixel processing divides one pixel into small pieces that enables accurate measurement by reproducing genuine value of incoming light.



## High resolution electronic shutter

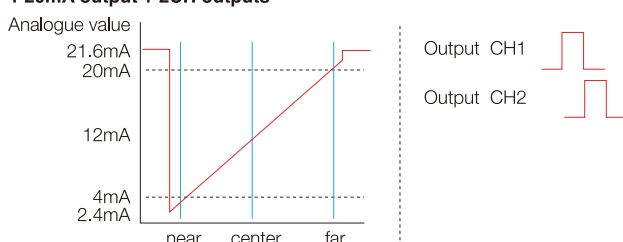
High resolution electronic shutter controls to keeps a constant level according to reflection. This function enables stable peak level detection even when unstable surface conditions exist.



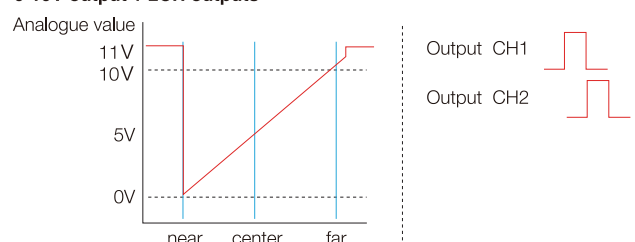
## Easy-to-select models between voltage and current output.

It is common today for sensors to be very complicated requiring long set-up times and many buttons to operate. The CD33 focuses on easier set-up by separating voltage and current output models into two types.

### 4-20mA output + 2CH outputs



### 0-10V output + 2CH outputs



## Ideal for robot mounting

Ideal for mounting on robot cylinder thanks to compact dimensions and the light 65g weight. IP67 water tightness is also secured.



## Control unit UQ1 series to connect sensor head to PLC MELSEC-Q series directly

UQ1-02 enables easy connection of CD33 and PLC MELSEC-Q series. UQ1 setup the sensor head automatically. You don't have to have big ladder program.



## 2CH outputs enables individual setting of measurement range.

Highly accurate comparator output capable of identifying  $12\mu\text{m}$  (with CD33-30 types). Hysteresis is just 0.15% F.S.



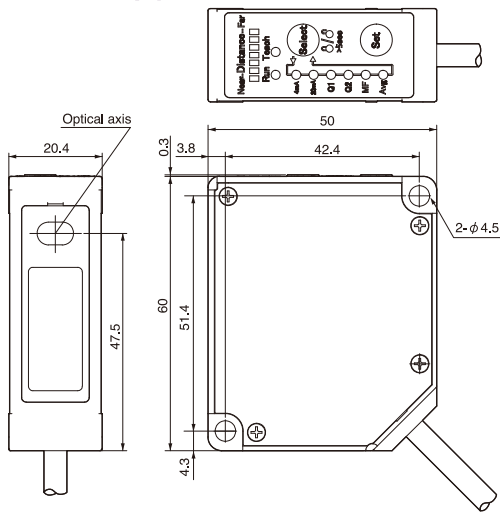
## MF (Multi Function) input for further convenience.

The programmable remote MF input can be set to one of the following: Laser on, External teach, Hold, or One-shot trigger.

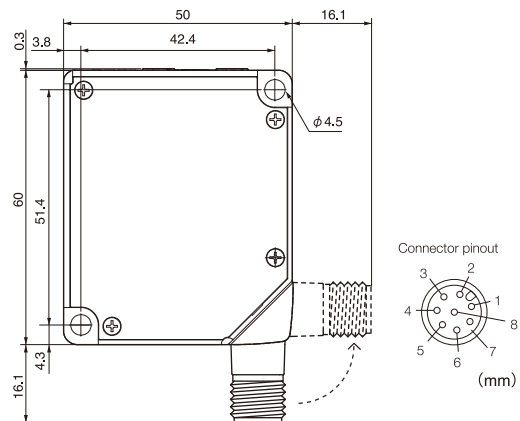


# DIMENSIONS

## Cable type

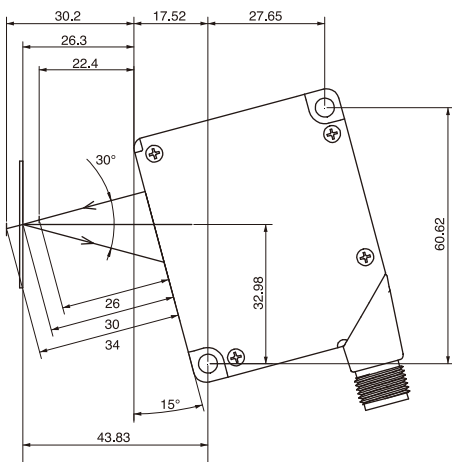


## M12 Connector type

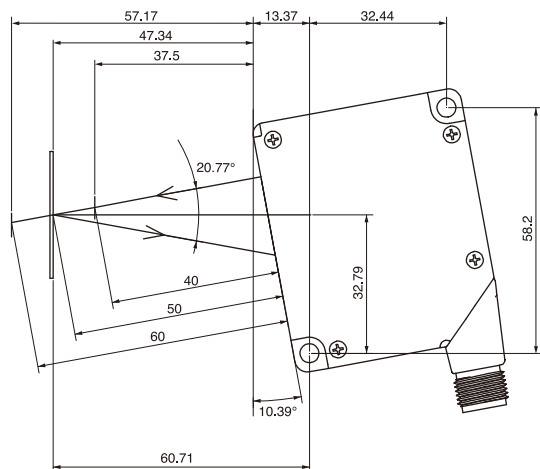


## Mounting of specular type

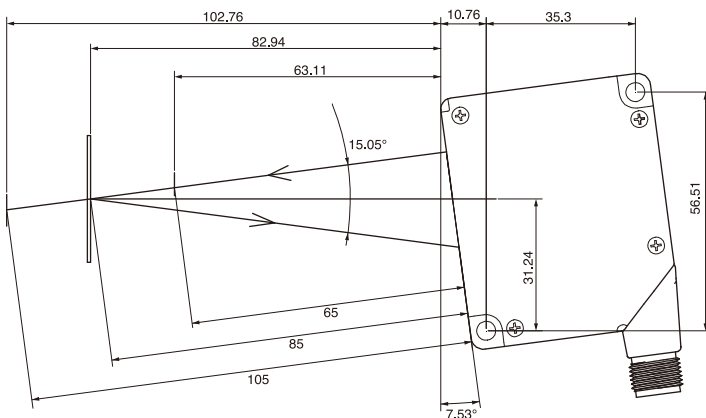
Model No.: CD33-L30



Model No.: CD33-L50



Model No.: CD33-L85



## Accessories

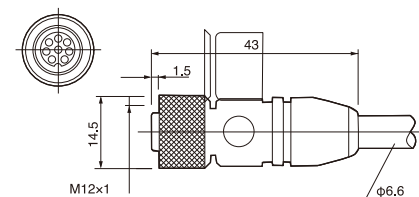
### Cable

Model No. : DOL-1208-G02MF

: 2m extension cable (unbundled)

Model No. : DOL-1208-G05MF

: 5m extension cable (unbundled)



# SPECIFICATIONS

Diffuse type

| Model                             | Cable type            | 2control output                                | CD33-30N / P                                               | CD33-50N / P                   | CD33-85N / P                   | CD33-120N / P                    | CD33-250N / P                                |
|-----------------------------------|-----------------------|------------------------------------------------|------------------------------------------------------------|--------------------------------|--------------------------------|----------------------------------|----------------------------------------------|
|                                   |                       | 2control output + Analog 4-20mA                | CD33-30NA / PA                                             | CD33-50NA / PA                 | CD33-85NA / PA                 | CD33-120NA / PA                  | CD33-250NA / PA                              |
|                                   |                       | 2control output + Analog 0-10V                 | CD33-30NV / PV                                             | CD33-50NV / PV                 | CD33-85NV / PV                 | CD33-120NV / PV                  | CD33-250NV / PV                              |
|                                   |                       | 1control output + RS422                        | CD33-30N-422<br>CD33-30P-422                               | CD33-50N-422<br>CD33-50P-422   | CD33-85N-422<br>CD33-85P-422   | CD33-120N-422<br>CD33-120P-422   | CD33-250N-422<br>CD33-250P-422               |
|                                   | Connector type        | 2control output                                | CD33-30CN / CP                                             | CD33-50CN / CP                 | CD33-85CN / CP                 | CD33-120CN / CP                  | CD33-250CN / CP                              |
|                                   |                       | 2control output + Analog 4-20mA                | CD33-30CNA / CPA                                           | CD33-50CNA / CPA               | CD33-85CNA / CPA               | CD33-120CNA / CPA                | CD33-250CNA / CPA                            |
|                                   |                       | 2control output + Analog 0-10V                 | CD33-30CNV / CPV                                           | CD33-50CNV / CPV               | CD33-85CNV / CPV               | CD33-120CNV / CPV                | CD33-250CNV / CPV                            |
|                                   |                       | 1control output + RS422                        | CD33-30CN-422<br>CD33-30CP-422                             | CD33-50CN-422<br>CD33-50CP-422 | CD33-85CN-422<br>CD33-85CP-422 | CD33-120CN-422<br>CD33-120CP-422 | CD33-250CN-422<br>CD33-250CP-422             |
| Control output                    |                       |                                                | N = NPN output, P = PNP output                             |                                |                                |                                  |                                              |
| Measurement range                 |                       |                                                | 30±4mm                                                     | 50±10mm                        | 85±20mm                        | 120±60mm                         | 250±150mm                                    |
| Full scale                        |                       |                                                | 8mm                                                        | 20mm                           | 40mm                           | 120mm                            | 300mm                                        |
| Light source                      |                       |                                                | Red laser diode (wave length 655nm)                        |                                |                                |                                  |                                              |
| Peak power                        |                       |                                                | 1mW max.                                                   |                                |                                |                                  |                                              |
| IEC/JIS Class                     |                       |                                                | Class 2                                                    |                                |                                |                                  |                                              |
| FDA CLASS                         |                       |                                                | CLASS II                                                   |                                |                                |                                  |                                              |
| Spot size<br>(approx.volume) (*1) | Near                  | 0.15×0.15mm                                    | 0.6×1.2mm                                                  | 0.9×1.5mm                      | 1.2×1.8mm                      | 1.5×2.5mm                        |                                              |
|                                   | Middle                | 0.1×0.1mm                                      | 0.5×1.0mm                                                  | 0.75×1.25mm                    | 1.0×1.5mm                      | 1.75×3.5mm                       |                                              |
|                                   | Far                   | 0.15×0.15mm                                    | 0.4×0.9mm                                                  | 0.6×1.0mm                      | 0.5×0.8mm                      | 2.0×4.5mm                        |                                              |
| Linearity (*2)                    |                       |                                                | ±0.1% F.S.                                                 |                                |                                |                                  |                                              |
| Resolution(*3)                    | Fast                  | 4μm                                            | 8μm                                                        | 15μm                           | 45μm                           | 100μm                            |                                              |
|                                   | Other                 | 2μm                                            | 5μm                                                        | 10μm                           | 30μm                           | 75m                              |                                              |
| Temp drift                        |                       |                                                | ±0.08%F.S. / °C                                            |                                |                                |                                  |                                              |
| Response time (*4)                | Fast                  | 1ms+ selecting sensitivity (averaging : 1)     |                                                            |                                |                                |                                  | 1.5ms+ selecting sensitivity (averaging : 1) |
|                                   | Standard              | 8.5ms+ selecting sensitivity (averaging : 16)  |                                                            |                                |                                |                                  | 13ms+ selecting sensitivity (averaging : 16) |
|                                   | High resolution       | 32.5ms+ selecting sensitivity (averaging : 64) |                                                            |                                |                                |                                  | 49ms+ selecting sensitivity (averaging : 64) |
|                                   | Selecting sensitivity | 4ms max.                                       |                                                            |                                |                                |                                  |                                              |
| Indicators                        | Distance indicator    | bar graph LED                                  |                                                            |                                |                                |                                  |                                              |
|                                   | Output indicator      | ON status : Orange                             |                                                            |                                |                                |                                  |                                              |
| Protection category               |                       |                                                | IP67                                                       |                                |                                |                                  |                                              |
| Operating temp / humidity         |                       |                                                | －10～+45℃ / 35～85%RH (No condensation or freezing)          |                                |                                |                                  |                                              |
| Storage temp / humidity           |                       |                                                | －20～+60℃ / 35～95%RH (No condensation or freezing)          |                                |                                |                                  |                                              |
| Ambient illuminance               |                       |                                                | Sun light : 10,000lx max. Incandescent lamp : 3,000lx max. |                                |                                |                                  |                                              |
| Vibration resistance              |                       |                                                | 10 to 55 Hz, Double amplitude 1.5 mm, 2 h for XYZ axis     |                                |                                |                                  |                                              |
| Shock resistance                  |                       |                                                | 50G (500m/s²)                                              |                                |                                |                                  |                                              |
| Cable extension                   |                       |                                                | Up to 10m using an optional extension cable                |                                |                                |                                  |                                              |
| Material                          |                       |                                                | PBT (Case) PMMA (Front window)                             |                                |                                |                                  |                                              |
| Weight                            | Cable type            | approx.65g (without cable)                     |                                                            |                                |                                |                                  |                                              |
|                                   | Connector type        | approx.70g                                     |                                                            |                                |                                |                                  |                                              |

| Model               |                  | 2 Control output                                                         |                                | + Analog 4-20mA | + Analog 0-10V         | 1 Control output + RS422       |
|---------------------|------------------|--------------------------------------------------------------------------|--------------------------------|-----------------|------------------------|--------------------------------|
| Supply voltage      |                  | 12 - 24VDC (-5%, +10%)                                                   |                                |                 | 18 - 24VDC (-5%, +10%) | 12 - 24VDC (-5%, +10%)         |
| Current consumption |                  | max. 55mA (24VDC)                                                        | max. 85mA (24VDC)              |                 | max. 55mA (24VDC)      |                                |
| Output              | Control output 1 | NPN / PNP open collector 100mA max. / 30VDC (residual voltage max. 1.8V) |                                |                 |                        | —                              |
|                     | Control output 2 | NPN / PNP open collector 100mA max. / 30VDC (residual voltage max. 1.8V) |                                |                 |                        |                                |
|                     | Analog output    | —                                                                        | 4-20mA                         | 0-10V           | —                      |                                |
| Interface           |                  | —                                                                        |                                |                 |                        | RS422                          |
| Cable type          |                  | Dia : 5mm 5core 2m AWG24 (PVC)                                           | Dia : 5mm 6core 2m AWG24 (PVC) |                 |                        | Dia : 5mm 8core 2m AWG24 (PVC) |
| Connector type      |                  | M12 8pin                                                                 |                                |                 |                        |                                |

\*1 Defined with center strength  $1/e^2$  (13.5%). There may be leak light other than the specified spot size. The sensor may be affected when there is a highly reflective object around the targets.

\*2 Averaging : 64 (High resolution), Object : white ceramic.

\*3 Middle of measuring range, Object : white ceramic.

\*4 Response time : response time plus selecting sensitivity time.

## Specular type

| Model                             | Cable type            | 2control output<br>+ Analog 4-20mA                     | CD33-L30NA / PA                                | CD33-L50NA / PA         | CD33-L85NA / PA         |
|-----------------------------------|-----------------------|--------------------------------------------------------|------------------------------------------------|-------------------------|-------------------------|
|                                   |                       | 2control output<br>+ Analog 0-10V                      | CD33-L30NV / PV                                | CD33-L50NV / PV         | CD33-L85NV / PV         |
|                                   |                       | 1control output<br>+ RS422                             | CD33-L30N-422 / P-422                          | CD33-L50N-422 / P-422   | CD33-L85N-422 / P-422   |
|                                   | Connector type        | 2control output<br>+ Analog 4-20mA                     | CD33-L30CNA / CPA                              | CD33-L50CNA / CPA       | CD33-L85CNA / CPA       |
|                                   |                       | 2control output<br>+ Analog 0-10V                      | CD33-L30CNV / CPV                              | CD33-L50CNV / CPV       | CD33-L85CNV / CPV       |
|                                   |                       | 1control output<br>+ RS422                             | CD33-L30CN-422 / CP-422                        | CD33-L50CN-422 / CP-422 | CD33-L85CN-422 / CP-422 |
|                                   | Control output        |                                                        | N = NPN open collector, P = PNP open collector |                         |                         |
| Measurement range                 |                       | 26.3±2mm                                               | 47.3±5mm                                       | 82.9±10mm               |                         |
| Full scale                        |                       | 4mm                                                    | 10mm                                           | 20mm                    |                         |
| Light source                      |                       | Red laser diode, 655nm                                 |                                                |                         |                         |
| Peak power                        |                       | 390μW max.                                             |                                                |                         |                         |
| IEC/JIS Class                     |                       | Class 1                                                |                                                |                         |                         |
| FDA CLASS                         |                       | CLASS II                                               |                                                |                         |                         |
| Spot size<br>(approx.volume) (*1) | Near                  | 0.15×0.15mm                                            |                                                |                         |                         |
|                                   | Middle                | 0.1×0.1mm                                              |                                                |                         |                         |
|                                   | Far                   | 0.15×0.15mm                                            |                                                |                         |                         |
| Linearity (*2)                    |                       | ±0.2% F.S.                                             |                                                |                         |                         |
| Resolution (*3)                   |                       | 1μm                                                    | 2.5μm                                          | 5μm                     |                         |
| Temp drift                        |                       | ±0.08%F.S. / °C                                        |                                                |                         |                         |
| Response time (*4)                | Fast                  | 1ms+ selecting sensitivity (averaging : 1)             |                                                |                         |                         |
|                                   | Standard              | 8.5ms+ selecting sensitivity (averaging : 16)          |                                                |                         |                         |
|                                   | High resolution       | 32.5ms+ selecting sensitivity (averaging : 64)         |                                                |                         |                         |
|                                   | Selecting sensitivity | 4ms max.                                               |                                                |                         |                         |
| Indicators                        | Distance indicator    | bar graph LED                                          |                                                |                         |                         |
|                                   | Output indicator      | ON status : Orange                                     |                                                |                         |                         |
| Protection category               |                       | IP67                                                   |                                                |                         |                         |
| Operating temp / humidity         |                       | －10～+45℃ / 35～85%RH (without condensing)               |                                                |                         |                         |
| Storage temp / humidity           |                       | －20～+60℃ / 35～95%RH (without condensing)               |                                                |                         |                         |
| Ambient illuminance               |                       | Incandescent lamp : 3,000lx max.                       |                                                |                         |                         |
| Vibration resistance              |                       | 10 to 55 Hz, Double amplitude 1.5 mm, 2 h for XYZ axis |                                                |                         |                         |
| Shock resistance                  |                       | 50G (500m/s²) XYZ 3times                               |                                                |                         |                         |
| Cable extension                   |                       | Up to 10m using an optional extension cable            |                                                |                         |                         |
| Material                          |                       | PBT (Case) PMMA (Front window)                         |                                                |                         |                         |
| Weight                            | Cable type            | approx.65g (without cable)                             |                                                |                         |                         |
|                                   | Connector type        | approx.70g                                             |                                                |                         |                         |

\*1 Defined with center strength 1/e<sup>2</sup> (13.5%). There may be leak light other than the specified spot size. The sensor may be affected when there is a highly reflective object around the targets.

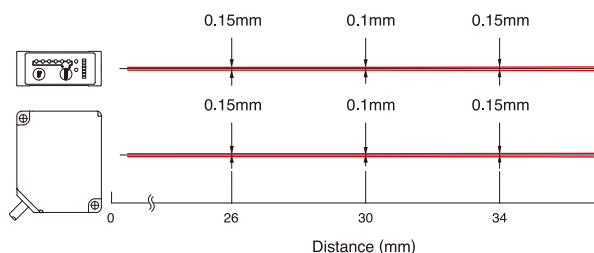
\*2 Averaging : 64 (High resolution), Object : evaporated aluminum mirror.

\*3 Middle of measuring range, Object : evaporated aluminum mirror.

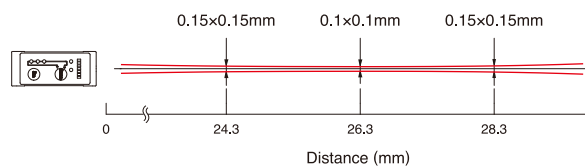
\*4 Response time : response time plus selecting sensitivity time.

# SPOT SIZE

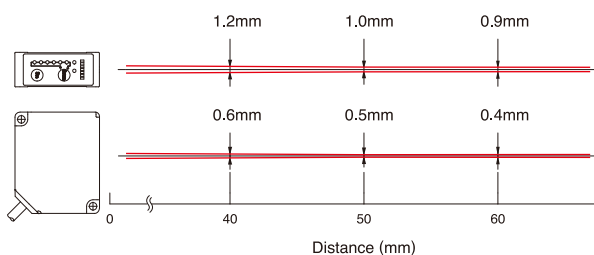
Model No. : CD33-30N□



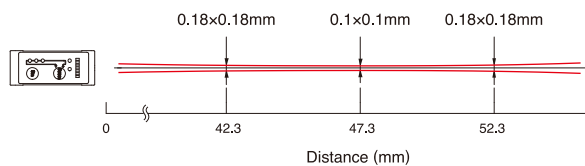
Model No. : CD33-L30N-422



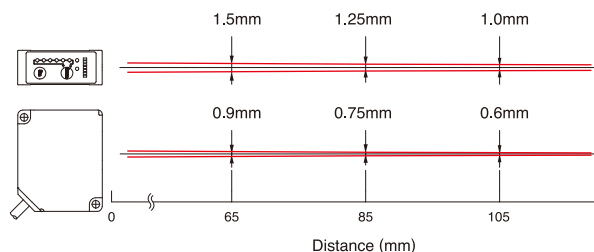
Model No. : CD33-50N□



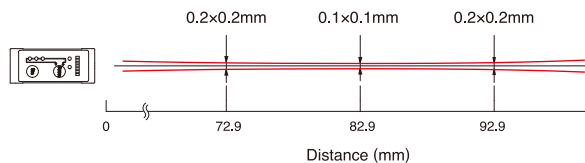
Model No. : CD33-L50N-422



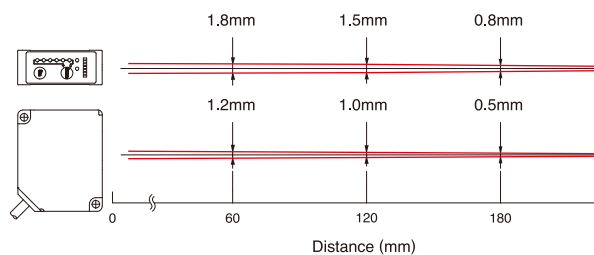
Model No. : CD33-85N□



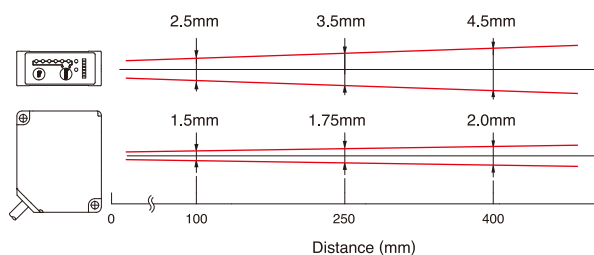
Model No. : CD33-L85N-422



Model No. : CD33-120N□



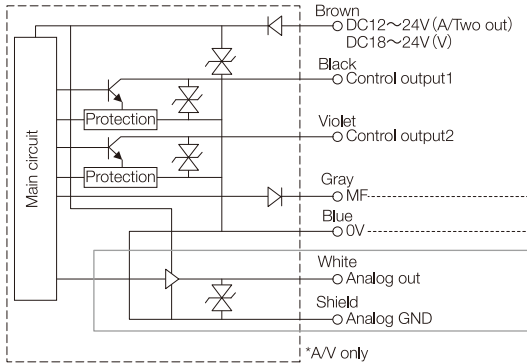
Model No. : CD33-250N□



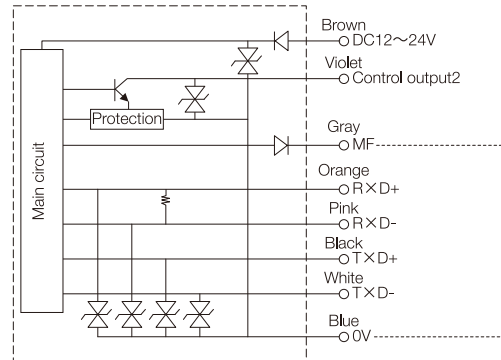


# INPUT / OUTPUT DIAGRAMS

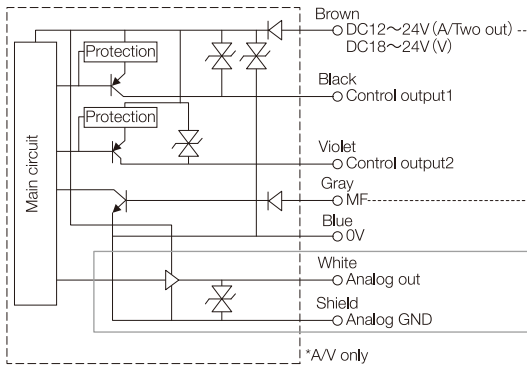
**NPN type (Analogue / Voltage dual)**



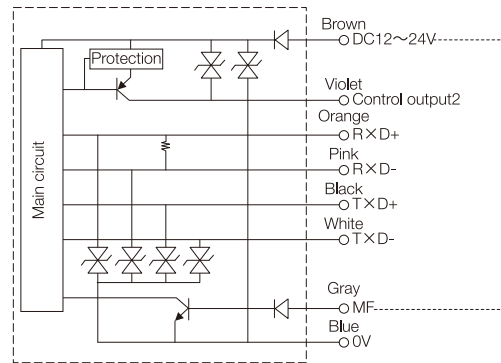
**NPN type (RS422)**



**PNP type (Analogue / Voltage dual)**



**PNP type (RS422)**



Connector pinout

