

DISPLACEMENT SENSORS

CD3 Series



(Sensing range : 30±4mm)
• CD3-30N / P / CN / CP

(Sensing range : 250±150mm)
• CD3-250N / P / CN / CP

(Sensing range : 50±10mm)
• CD3-50N / P / CN / CP

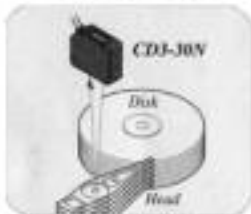
(Sensing range : 80±15mm)
• CD3-80N / P / CN / CP

(Sensing range : 100±40mm)
• CD3-100N / P / CN / CP

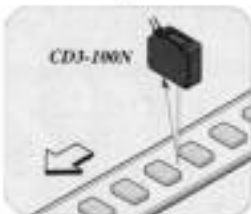
Applications



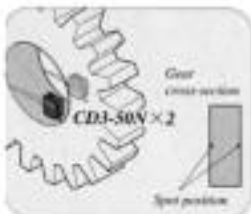
Detection of Warp in Circuit Board



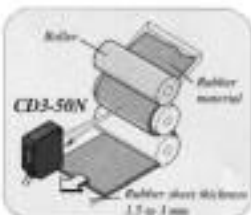
Detection of Warp in HDD Assembly and Actuator



Measurement of product thickness



Interior diameter inspection of gear



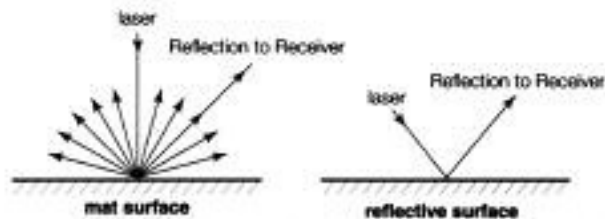
Thickness Measurement of Rubber Sheets

- **CMOS Image Sensor for high accuracy displacement measurement.**
- **Span adjustment and Offset functions for flexible control of analogue output.**
- **Preset alarm for Peak/Bottom limit of analogue value.**
- **Accurate detection of dark colored targets.**

Measurement Principle - CMOS Image Sensor

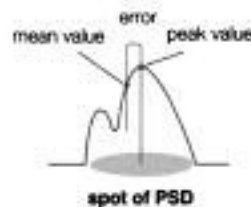
CMOS Image Sensor CD3 Series Displacement Sensors use a Triangulation Measurement System. The CMOS image element provides accurate measurement that has been impossible with conventional products.

While PSD type displacement sensors are sometimes influenced by the surface condition of the target.

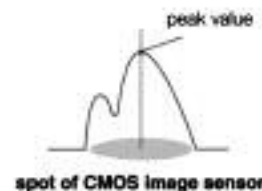


Displacement sensors operate by detecting the reflection of the projected light from the surface, this reflection can sometimes be effected if the surface is rough or reflective.

The CD3 series "CMOS Image" type displacement sensor gives stable and accurate measurement by detecting the "real peak value" for precise distance calculation.



A conventional displacement sensors that uses a PSD sensing element detects the mean value of the reflected light. This can sometimes be at a different location than the peak value of incoming reflected light if the surface is too reflective.



The CD3 Series displacement sensor uses a CMOS image sensing system that detects the peak value without being influenced by the dispersion of light from the surface. This method minimizes errors and provides accurate measurement.

DISPLACEMENT SENSORS

Simple Pushbutton Teach, and Easy-to-view display

stability indicator

- Green — Stable operation
- Dark — Unstable operation
- Red — No operation due to low light or too much light

distance indicator

Actual distance between sensor and object as below.

green / red blinking	Out of range
red	Near limit
orange	+/- 5% of reference distance
green	Far limit
red / green blinking	Out of range

Remarks : The border between the Near / Far Limit and Out of range depends upon the sensor model.

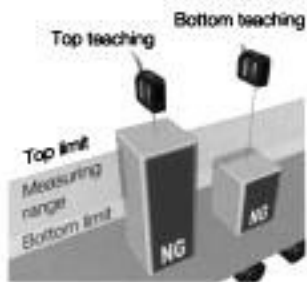
output indicator

(operation panel)

- Run Indicator
- Function indicator
- Adjustment Indicator
- Down
- Up
- Mode selection

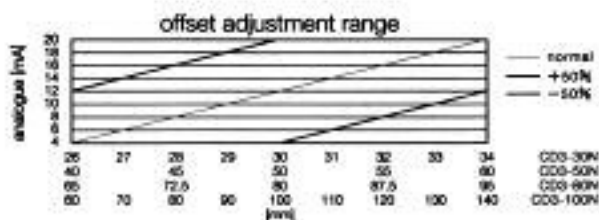
Adjustable Measuring Range.

The Upper and Lower threshold values are easily set with the pushbutton Teach function. Making adjustments to the sensor are simple by using the built-in digital panel control.

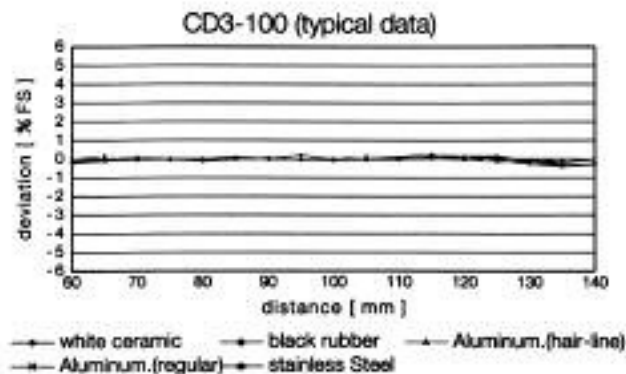


Offset

The Offset Function shifts the analog output value in either the positive or the negative direction. This is adjustable within +/- 50% of the rated distance of the sensor.

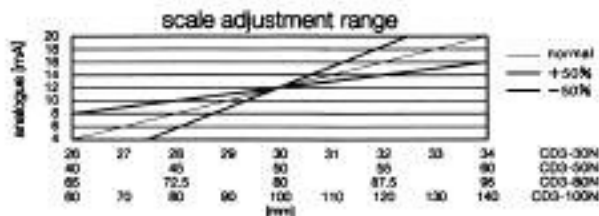


Stable Measurement of Highly Reflective Targets (such as glass) or Black Materials.



Span Adjustment

The Span adjustment changes the proportion of the output value (displacement) to the distance. This is adjustable within +/- 50% of the rated distance.



DISPLACEMENT SENSORS

Response Time vs Averaging

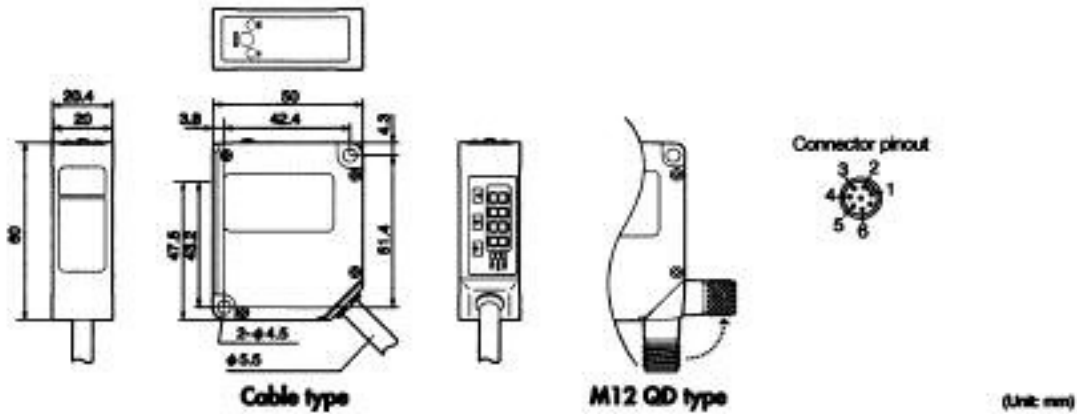
With Fixed Sensitivity (any value between 1 - 20)

Averaging Value	Analogue output	Control Output
1	1.00 msec	2.2 msec
4	4.06 msec	5.06 msec
16	16.2 msec	17.2 msec
64	64.8 msec	65.8 msec
256	259 msec	260 msec
1024	1037 msec	1038 msec

With Auto Sensitivity

Averaging Value	Analogue output	Control Output
1	21.0 msec	22.5 msec
4	24.1 msec	25.5 msec
16	36.2 msec	37.2 msec
64	64.8 msec	65.8 msec
256	279 msec	280 msec
1024	1057 msec	1058 msec

Dimensions



Specifications

CD3 Series, CMOS Image Laser Displacement Sensor					
Cable	CD3-30N/P	CD3-50N/P	CD3-80N/P	CD3-100N/P	CD3-250N/P
M12 Connector	CD3-30CN/CP	CD3-50CN/CP	CD3-80CN/CP	CD3-100CN/CP	CD3-250CN/CP
Transistor output	N = NPN output, P = PNP output				
Measuring range	30 +/- 4mm	50 +/- 10mm	80 +/- 15mm	100 +/- 40mm	250 +/- 150mm
FS (full scale)	8mm	20mm	30mm	80mm	300mm
Light source	Class 2 Laser, 650nm, Max 1mW				
Projected spot size	φ 0.5 mm	φ 0.8 mm	1 X 1.5mm	1 X 1.5mm	3 X 1.5mm
Power supply	12 - 24V DC (-5 to +10%)				
Sensitivity adjustment	Nominal value 1-20, or AUTO				
Current consumption	Max 120mA (DC12V), 80mA (DC24V), including analog output current				
Resolution (typical value)	(Unit: Micron. Under AUTO sensitivity, White ceramic as an object)				
(Averaging 64; default value)	4	10	10	30	150
(Averaging 1)	12	30	40	80	2mm
(Averaging 4)	8	20	30	60	800
(Averaging 16)	6	12	20	40	400
(Averaging 256)	2	8	8	20	100
(Averaging 1024)	below 2	below 8	below 8	below 10	50
Linearity	±1% FS				±1.5%FS (up to 250mm) ±2.5%FS (up to 400mm)
Temperature drift	±0.08% FS / Celsius				
Response speed (at Averaging 1)	Max 2.2ms (at fixed sensitivity between 1-20), Max 22.5ms (at Auto sensitivity)				
Analogue output	See Page 6 for Response Time				
Control output	4-20 mA				
Timer	NPN or PNP, Max 100mA/DC24V, Residual Voltage Max 1.8V				
Distance indicator	On delay / Off delay / Oneshot. 1msec increment for 0-999ms, 1sec for 0-10 sec)				
Stability indicator	Red = Near, Orange = Middle, Green = Far, Red/Green = Error *Remark : Errors as "out of measuring range", "Too high reflection", etc				
Control output indicator	Orange = Output (NPN or PNP)				
Ambient Illuminance	Sun light : Max 10,000 lux, Incandescent Lamp = Max 3,000 lux				
Temperature / Humidity	-10 to 40 degree C, 35 to 95% RH				
Insulation resistance	20 MΩ / DC 500V				
Material	Zinc diecast				
Protection / Noise regulation	IP67, CE				
Warm-up period	30 minutes				