

LED Displacement Sensor

Z4W-V

Easy to use LED displacement sensor, suitable for 0.1-mm tolerance dimension inspection



Features

Easily inspects dimension tolerances of 0.1 mm

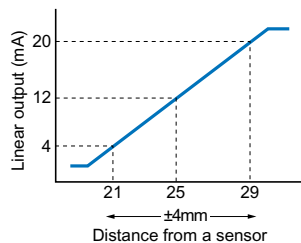
10- μ m resolution enables inspection of dimension tolerances of 0.1 mm.

Red spot light lets you identify the inspection location at a glance.

A high-luminance LED is used for the light source. The red spot light lets you check the detection location at a glance. A laser is not used, so special safety measures are not required.

4- to 20-mA analog output

4- to 20-mA linear output of 25 \pm 4 mm displacement (distance from sensor to object). A linear decision unit (Z4W-DD1C) or various digital panel meters (K3NX, K3TS) can be connected to enable output decisions such as PASS and NG.



Easy to view 2-color indicator lamp

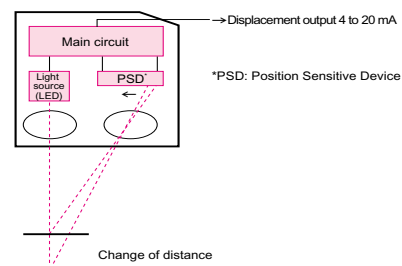


- Range display LED (RANGE)
Shows whether or not the work is in the detection range.
In measurement range: green
Out of measurement range: red
- Light intensity display LED (STABILITY)
Shows whether operation is stable or whether the light intensity is too low.
Operation stable: green
Light intensity too low: red

In-amplifier type

This type is built into the amplifier. It outputs a standard analog signal (4 to 20 mA), so it can be directly connected to a linear decision unit, digital panel meter, or the A/D unit of a programmable controller.

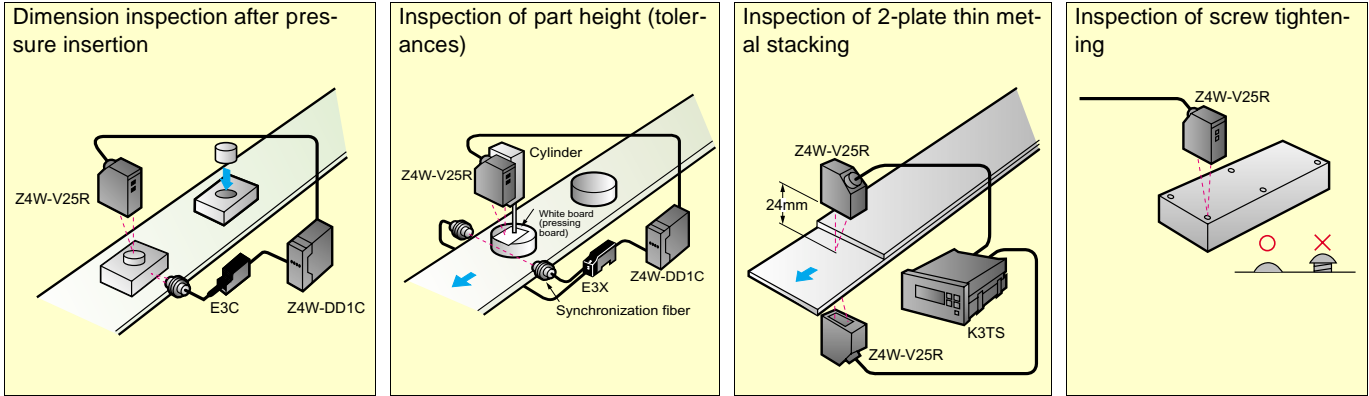
Principle of detection



Tough IP66 protective structure

The protective structure of the sensor meets the requirements of IEC Standard IP66, so there is no concern even if water splashes on the sensor. Note that any water drops on the lens must be wiped off before measuring.

Application



Ordering Information

Red light

Sensing distance	Resolution	Model
 25 ± 4 mm	10 μm	Z4W-V25R

Rating/performance

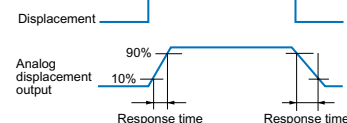
Measurement range	±4 mm
Measurement center distance	25±1 mm
Light source (wave length)	Red LED (700 nm)
Spot Diameter	2-mm dia. (at measurement center distance)
Resolution	10 μm
Linearity	±3%FS
Response time	5 ms (In case of white alumina ceramic. Linearity change according to object.)
Temperature drift	±0.3% FS/°C
Warming up time	3 min (no more than ±1% from stable value)
Indicator lamp	STABILITY (light intensity indicator) Stable range: Lit green Operating range: Not lit Dark: Lit red
	RANGE (range indicator) In range: Green Out of range: Red
Output	Analog output 4 to 20 mA/±4 mm, permissible load resistance: 0 to 300 Ω
	DARK output NPN open collector output 30 VDC, 50 mA max. (Residual voltage: 1 V max.)
Ambient illuminance	3,000 ln (incandescent light)
Vibration resistance	10 to 55 Hz (vibration width: 1.5 mm), 3 directions, 15 min × 2 sweeps in each direction
Shock resistance	500 m/s ² , 3 times each in 3 directions (up/down, left/right, forward/backward)
Power supply voltage	12 to 24 V DC ±10%, ripple (p-p) 10% or less
Current consumption	80 mA max.
Ambient temperature	Operating: -10°C to 55°C, Storage: -20°C to 65°C (with no icing or condensation)
Ambient humidity	Operating/Storage: 35% to 85%RH (with no condensation)
Protective structure	IEC 60529 IP66
Material	Case : ABS
Connection method	Pre-wired (standard length: 5 m)
Weight (Packed state)	Approximately 220 g (unit: approx. 150 g (with 5-m cable), approx. 50 g (without cable))
Accessories	Clamps, 12 M4-length screws, 250-Ω 1/2-W resistor, operation manual

*1. Resolution Peak-to-peak displacement conversion value of analog displacement output (measurement conditions: white alumina ceramic used for object, measurement center distance)



*2. Using white alumina ceramic. The precision may vary depending on the object.

*3. Response Time The delays are the 10% to 90% rising and falling times of the analog output in response to a sudden change in the displacement.

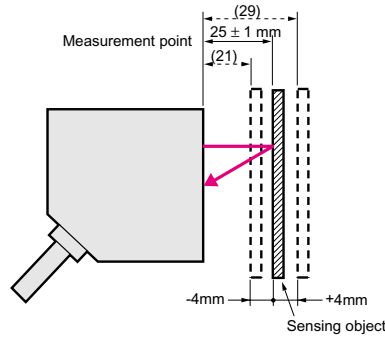
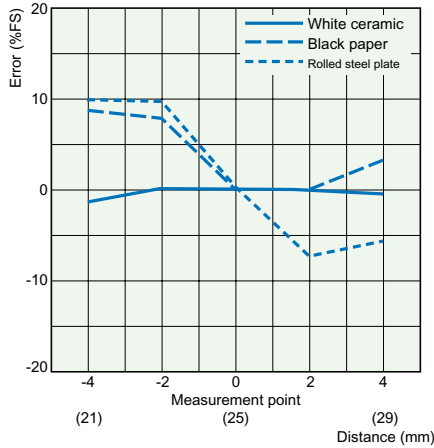


Characteristic data (typical)

Linearity Characteristics vs. Objects

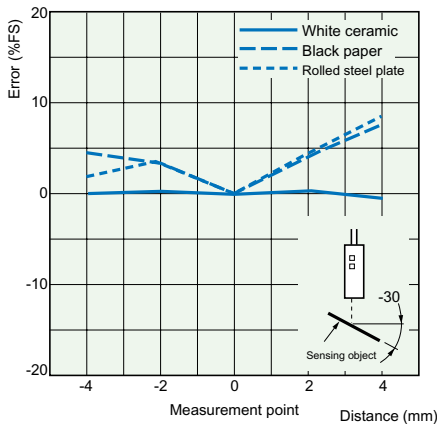
- The linear characteristics are a plot of the error in the analog output in the measurement range.
- The error of the LED displacement sensor increases when the surface of the measured object has a low reflectance (black) or is glossy.

Angle: 0°

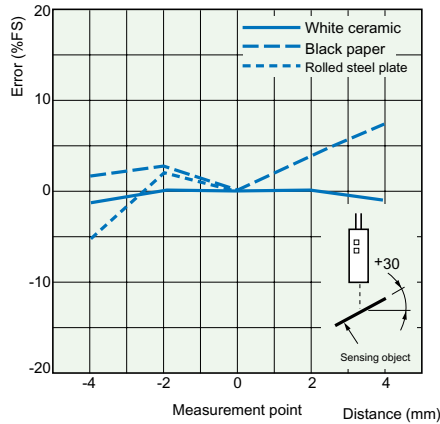


When there is inclination in the vertical direction

Angle: -30°

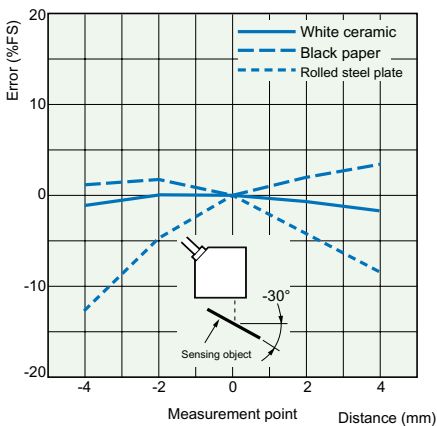


Angle: +30°

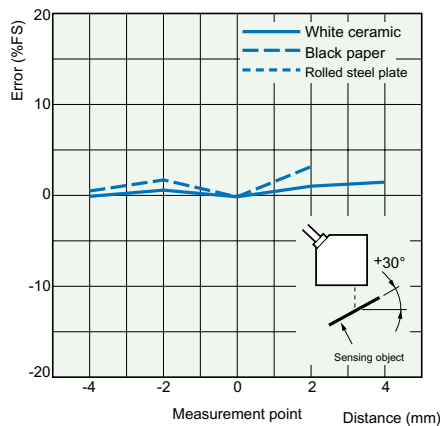


When there is inclination in the horizontal direction

Angle: -30°



Angle: +30°



Note:

The LED Displacement Sensor cannot detect an object accurately if the object is positioned at an angle is large, detection is not possible because of insufficient reflection of light. This must be taken into consideration when installing the sensor.

Linearity Characteristics vs. Objects

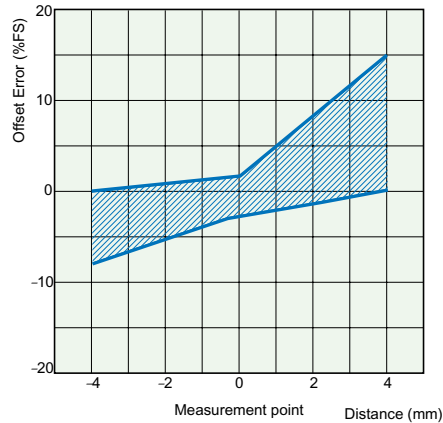
Sensing Various Objects Offset Error vs. Object Material

When detecting a variety of objects successively, refer to the offset error graph below.

The graph illustrates the change in sensor output characteristics when black paper is compared to white paper.

To reduce the offset error value, install the Sensor so that objects are detected at or as close as possible to the measurement point.

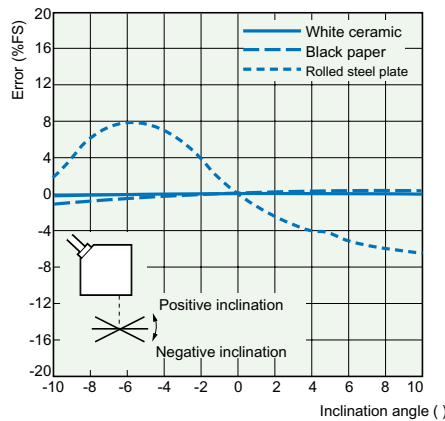
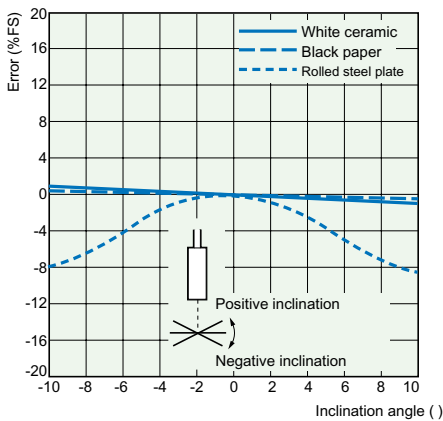
Offset Error Range



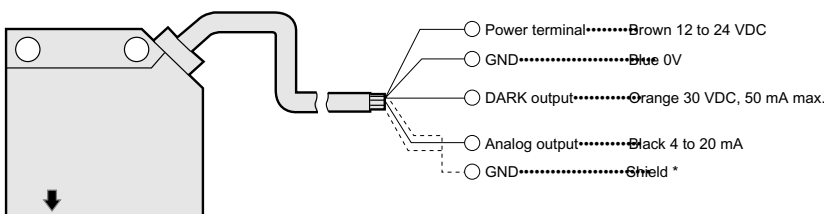
Angular Characteristics (Y-direction)

- The angle characteristics were obtained by detecting an object with different angles of inclination at the measurement point and plotting the analog output error resulting from each operation.
- It is standard to mount the LED displacement sensor so that it is perpendicular to the measured object. Error may occur if the object is inclined.

Angular properties of vertical inclination - Angle characteristics with respect to horizontal inclination

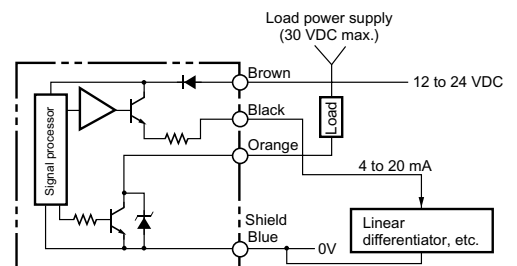


Connections/Output Circuits

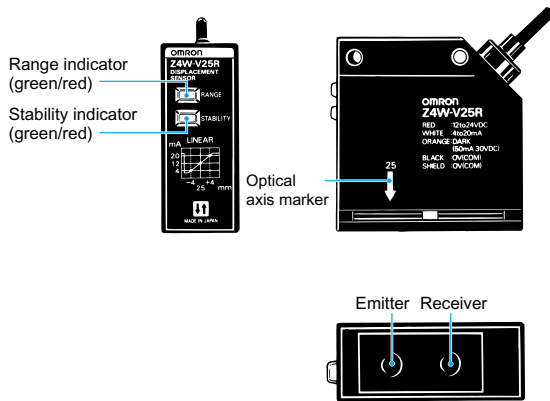


* The two ground terminals (black and shield) are internally connected. However, the black ground must be used with the red terminal for the power supply and the shield ground must be used with the white terminal for the analog output.

- Note: 1 . Be sure to connect correctly. Incorrect connection may damage the unit.
 2 . Make sure the power is off before connecting.



Nomenclature:

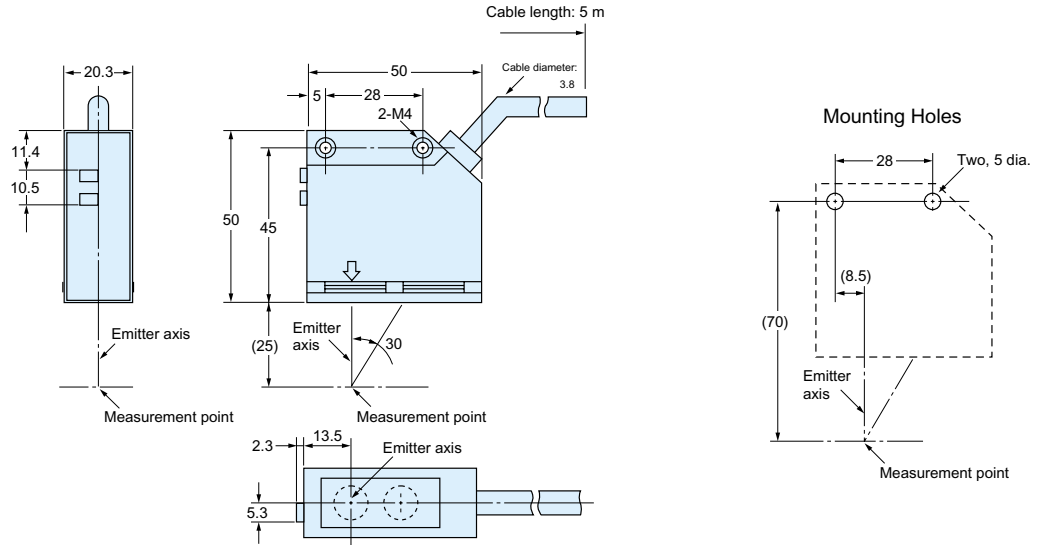
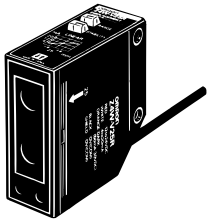


Functions

Name	Functions	Remarks
Range display LED	<ul style="list-style-type: none"> The green indicator is lit when the object is within the measurement range. The red indicator is lit when the object is not within the measurement range. 	When the received light intensity is too low (DARK output ON, light intensity display LED (red) illuminates), the display LED goes off regardless of whether or not there is an object in the measurement range.
Light intensity display LED	<ul style="list-style-type: none"> These indicators indicate the intensity of the light input. The object in the measurement range is detected when the green indicator is lit or OFF. The red indicator is lit when there is no object in the measurement range or the intensity of light input is insufficient. If this green indicator is lit when there is an object in the measurement range, the light source control circuit and light input sensitivity control circuit of the Sensor operate. Even if the green indicator is OFF, the Sensor works as long as the internal light source control circuit and the light input sensitivity circuit are within the operating range. In this case the red indicator is also OFF. When the Sensor is active for a long duration, the green indicator may turn OFF. This does not mean that the Sensor has malfunctioned. 	---
DARK output	<ul style="list-style-type: none"> The orange indicator (DARK output) is ON when there is no object in the measurement range or when the input light intensity is insufficient. (The light intensity display LED (red) also illuminates at this time.) The output form is open collector (30 V DC, 50 mA or less). (Normally OFF) 	---
Analog output	<ul style="list-style-type: none"> An analog signal is output from the black (white) analog output wire in accordance with the measurement distance. Output: 4 to 20 mA/21 to 29 mm (± 4 mm) Load impedance: 300 Ω max. The output range lies between 20.5 and 26 mA when DARK output is ON. <p>●Distance vs Analog Output Characteristics (Typical Example)</p>	---

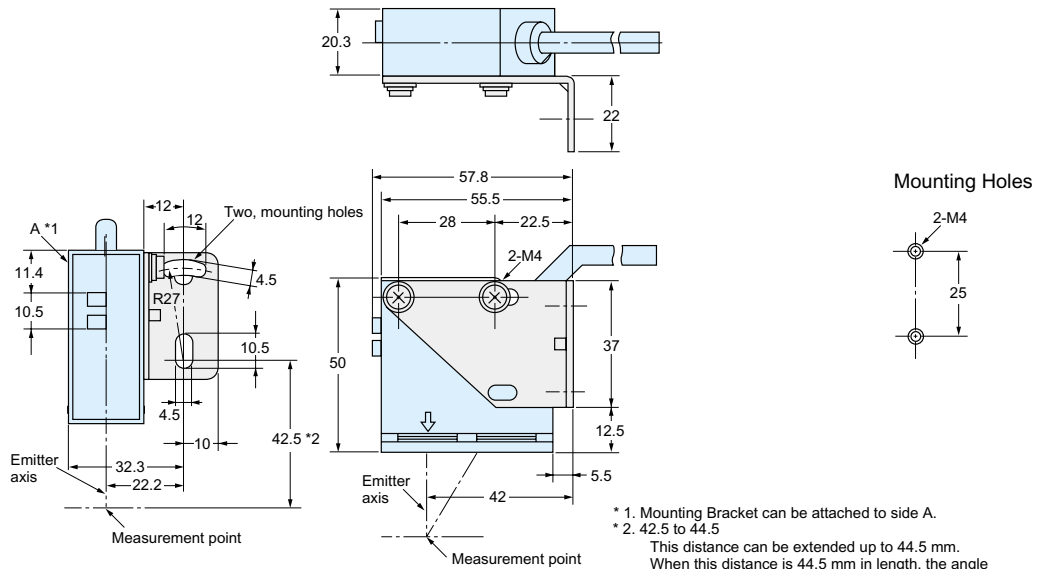
Dimensions (Unit: mm)

Z4W-V25R unit



CAD file Z4W_01

With Mounting Blanket Attached (Horizontal mounting)



* 1. Mounting Bracket can be attached to side A.
 * 2. 42.5 to 44.5
 This distance can be extended up to 44.5 mm.
 When this distance is 44.5 mm in length, the angle of the optical axis can be adjusted after mounting by approximately ± 5 max.

**With Mounting
Blanket Attached
(Vertical mounting)**

