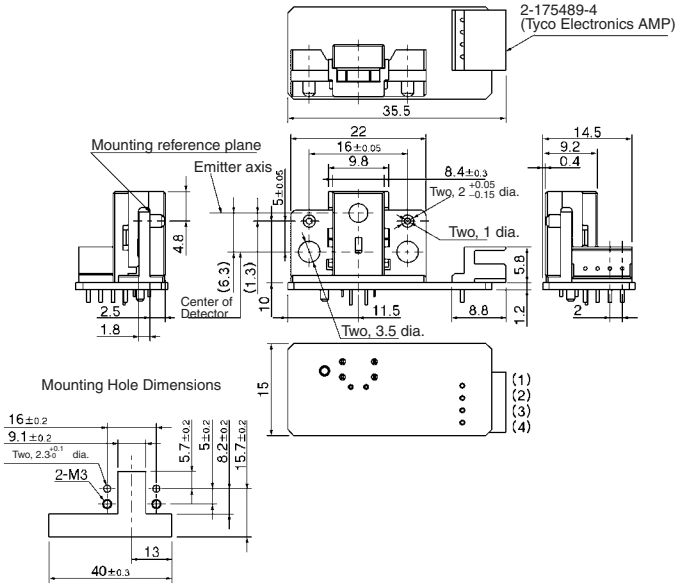
Micro-displacement Sensor
Z4D-B01

■ Dimensions

Note: All units are in millimeters unless otherwise indicated.



Recommended Mating Connectors:
Tyco Electronics AMP
175778-4 (crimp connector)
173977-4 (press-fit connector)

■ Features

- Easier control enabled by built-in processor circuit.
- Resolution: ±10 μm.
- Operating area: 6.5±1 mm.
- Adapts well to changes in reflection factor using division processing.

Pin no.	Remarks
1	PLS
2	V_{CC}
3	OUT
4	GND

Unless otherwise specified, the tolerances are as shown below.

Dimensions	Tolerance
3 mm max.	±0.3
3 < mm ≤ 6	±0.375
6 < mm ≤10	±0.45
10 < mm ≤ 18	±0.55
18 < mm ≤ 30	±0.65
30 < mm ≤ 50	±0.8

■ Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Value	Unit	Remarks
Supply voltage	V_{CC}	7	VDC	---
LED pulse light emission control signal	PLS	7	VDC	LED
LED light emission pulse	t_{FP}	100	ms	---
Operating temperature	T_{opr}	–10 to 65	°C	No icing or condensation
Storage temperature	T_{stg}	–25 to 80	°C	---

■ Electrical and Optical Characteristics (Ta = –10°C to 65°C)

Item	Symbol	Rated value	Remarks
Supply voltage	V_{CC}	5 VDC±10%	Ripple (p-p): 10 mV p-p max.
Output voltage	OUT	0.2 VDC to (V_{CC}–0.3) V	(see note 1)
Response time	tr	100 μs max.	(see note 2)
LED pulse light emission control signal	PLS	3.5 VDC to V_{CC}	(see note 3)

Note: 1. Load impedance (between OUT-GND) is set at more than 10 kΩ.

2. The time for output voltage to rise from 10% to 90% of the full output range.

3. Apply the voltage ranging from 3.5 V to V_{CC} on the LED pulse light emission control signal terminal. In this case, a maximum of 2 mA (TYP 1 mA) current is sunk.

■ Characteristics (Ta = –10°C to 65°C)

Object: N8.5 Munsell paper with a reflection factor of 70%.

Item	Value
Operating area (see note 1)	6.5 ±1 mm
Sensitivity variation (see note 2)	–1.4 mV/μm±10% max.
Resolution (see note 3)	±10 μm max. (Ta = 25°C)
Linearity (see note 4)	2% F.S. (full scale) max.

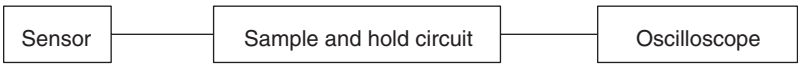
Note: 1. Distance from the mounting reference plane.

2. "Sensitivity" is defined as "inclination of divided output line" and the variation value between individual products of fluctuating divided output voltage per unit length.

$$\text{Sensitivity} = \frac{V_2 - V_0}{2000} \quad \text{(mV/mm)}$$

Where V0: Output voltage when d = 5.5 mm
V2: Output voltage when d = 7.5 mm
d: Distance from reference mounting plane to an object.

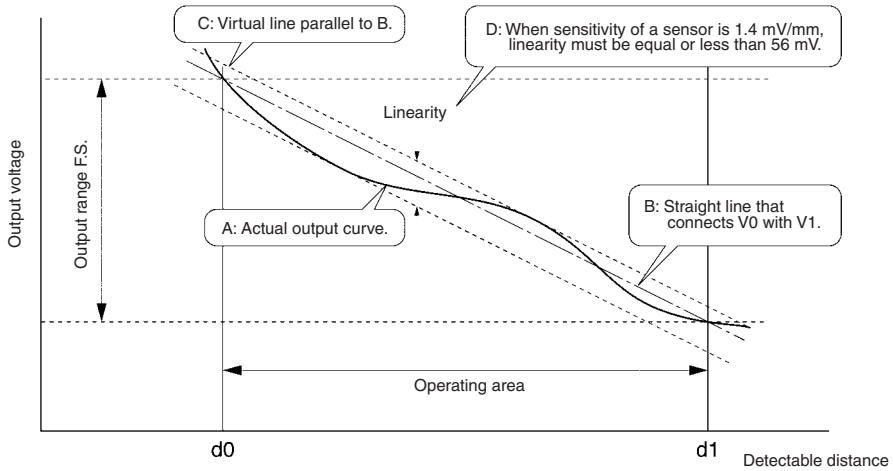
3. Value of electrical noise range of divided output signal converted to distance under the following conditions.



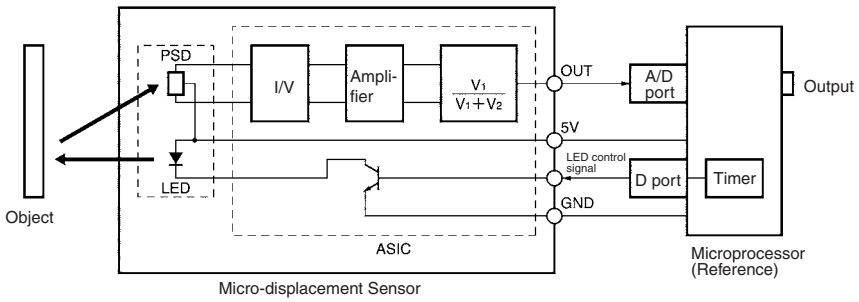
(1) Ripple noise of power supply: 10 mV p-p max.
(2) Sampling time of the sample and hold circuit: 50 μsec
(3) Distance to object: Distance from the reference mounting plane is 6.5 mm±1 mm.

** When the testing conditions are deviated from the above conditions, resolution changes. For details, please consult OMRON sales representative.

4. The peak-to-peak value of the output error from the ideal line.
Calculation, based on a linearity of 2% F.S., is as follows:
(1) The conversion value based on the full scale distance: 2 mm × 0.02 = 0.04 mm (40 μm)
(2) The conversion value based on the output voltage: 1.4 mV/μm × 40 μm = 56 mV
(When the product sensitivity variation is 1.4 mV/μm.)

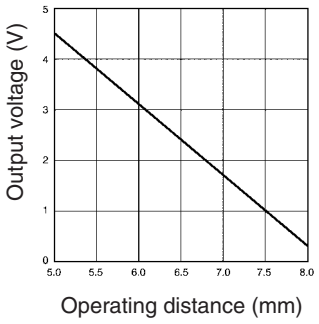


■ Circuit Diagram

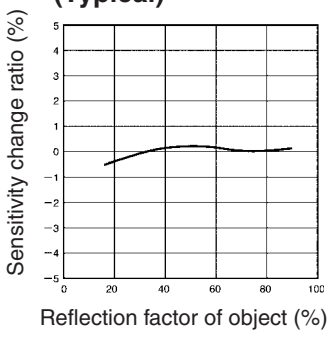


■ Engineering Data

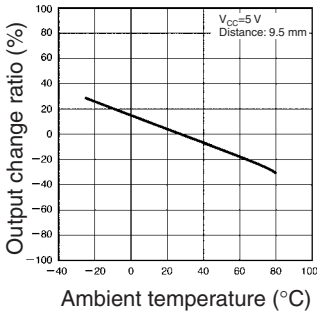
Operating Distance Characteristics (Typical)



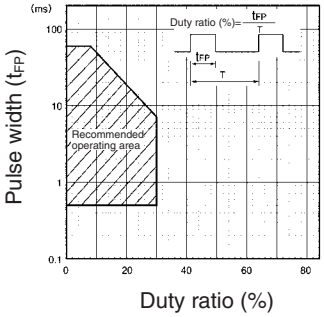
Dependency of Object on Reflection Factor (Typical)



Temperature Characteristics (Typical)



Pulsed Forward Current Rated Curve



■ Typical Application

Paper thickness detection for printers