

Visible Beam Class II Laser Displacement Sensor Provides High-Speed Ultra-Precision Distance Measurement Of Highly Reflective Metal Surfaces, Quick Setup, Flexible Operation, and Programmable Discreet Setpoint Outputs

- FDA class II, IEC class 2 visible RED laser with 50 micron beam diameter
- 0.4 micron resolution maximum
- 4 to 20 mA analog and 12-bit binary output
- 2 one-touch programmable setpoint outputs with yellow indicators
- Sensitivity and laser power settings are selectable
- Far and near range indicators on sensor and amplifier
- Stability indicator on amplifier
- 2 selectable response times: 1 or 100 ms



## Ordering Information

### ■ SENSOR

Sensing distance range ± measurement range	Resolution (at response time)	Part number
30±2 mm (1.18 ± 0.08 in)	0.4 μm (100 ms) 4 μm (1 ms)	Z4M-N30V

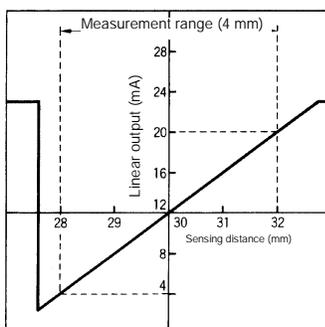
### ■ ACCESSORIES (ORDER SEPARATELY)

#### Extension Cable

Description	Length	Part number
Extension cable	3 m (9.84 ft)	Z49-C1 3M
	8 m (26.25 ft)	Z49-C1 8M

### ■ LINEAR OUTPUT VS. SENSING DISTANCE

#### Z4M-N30V



#### Conditions When Linear Output of the Sensor Is Locked Between 21 and 26 mA:

- When the target is outside the measurement range.
- When insufficient or excessive light is received back to the receiver portion of the sensor.

# Specifications

## RATINGS

Item	Z4M-N30V	
Measurement range	±2 mm	
Measurement point	30 mm	
Light source	Visible-light semiconductor lasers with a wavelength of 670 nm and an output of 1 mW max.; class 2 (EN/IEC), class II (FDA)	
Spot diameter (See Note 1.)	100 μm dia. max. (at measurement point)	
Linearity (See Note 2.)	±0.5% FS (The full-scale value is 4 mm.)	
Temperature drift (See Note 3.)	Sensor: 0.03% FS/°C Amplifier: 0.02% FS/°C	
Analog output	Current output	4 to 20 mA/28 to 32 mm Output impedance: 300 Ω max.
	Resolution	4 μm (1 ms) or 0.4 μm (100 ms) (See Note 4.)
	Response time	1/100 ms, switch-selectable (See Note 5.)
Digital output	Output	12-bit binary output at a transmission cycle of 0.1 ms
	Repeat accuracy	10 μm (See Note 6.)
	Response time	0.4 ms
Control outputs	Output	NPN open collector, 100 mA max. at 30 VDC, residual voltage: 1 V max.
	Hysteresis	±1% FS
	Response time	0.4 ms
Enable output	NPN open collector, 100 mA max. at 30 VDC	
Laser emission OFF input	ON with a max. current of 15 mA at a min. ON voltage of 10.2 V: Laser emission will be turned OFF. Open at a max. OFF voltage of 3 V: Laser emission will be turned ON. A function holding all output and indicator statuses incorporated.	

- Note:**
- The spot diameter is defined by  $1/e^2$  (13.5%) of the Sensor's laser beam center. An object may not be detected accurately if there is light leakage outside the defined spot or within the object environment.
  - The linearity of the Sensor is checked with white alumina ceramic. The value deviated from the displacement linear output current is within the specified range as shown in the graph. The deviation value may vary with the object. (See Figure A.)
  - The temperature drift in the table will be ensured if a white alumina ceramic is detected while a white alumina ceramic is fixed to the Sensor with an alumina jig.
  - The resolution is the peak-to-peak displacement conversion value of the analog output while a white alumina ceramic is at the center of the measurement point. The values may not be guaranteed if the sensing object is in a strong electromagnetic field.
  - The response time of the Sensor is the time required for the analog displacement output to increase from 10% to 90% of the full value (at the rise time) or decrease from 90% to 10% of the full value (at the fall time). To decrease the error ratio to within 1% at the rise time or at the fall time, the time required will be two or three times as long as the specified value. (See Figure B.)
  - The repeat accuracy of the Sensor is a value obtained by converting the sampling data of digital output into distance data at  $\pm 3\sigma$  when measuring a white alumina ceramic at the measurement point.

Figure A

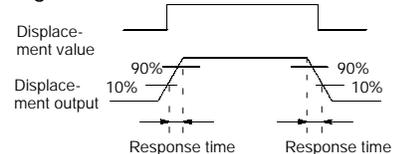
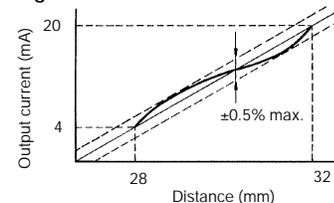


Figure B

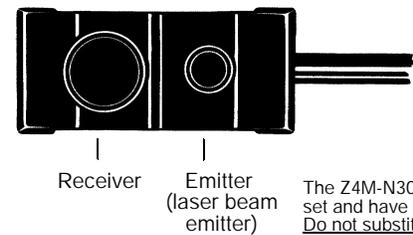
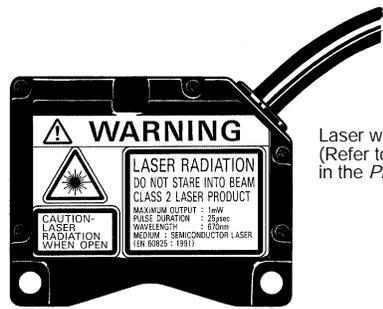
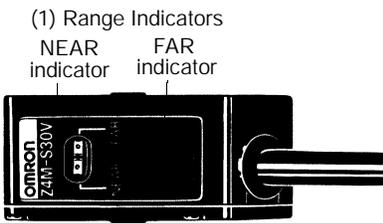


## CHARACTERISTICS

Item	Z4M-N30V
Power supply voltage	12 to 24 VDC ±10%; ripple (p-p): 10% max.
Current consumption	200 mA max.
Dielectric strength	Sensor: 1,000 VAC, 50/60 Hz for 1 min.; Amplifier: 300 VAC, 50/60 Hz for 1 min.
Vibration resistance	10 to 55 Hz (1.5-mm double amplitude) for 32 min. each in X, Y, and Z directions
Ambient temperature	Operating: 0°C to 50°C (32°F to 122°F) with no icing
Ambient humidity	Operating: 35% to 85% (with no condensation)
Ambient illuminance	Operating: 3,000 lux max. (incandescent lamp)
Weight	Sensor: approx. 250 g. Amplifier: approx. 250 g
Material	Sensor: aluminum diecast. Amplifier: ABS
Degree of protection	Sensor: IP40 (IEC529). Amplifier: IP20 (IEC529)

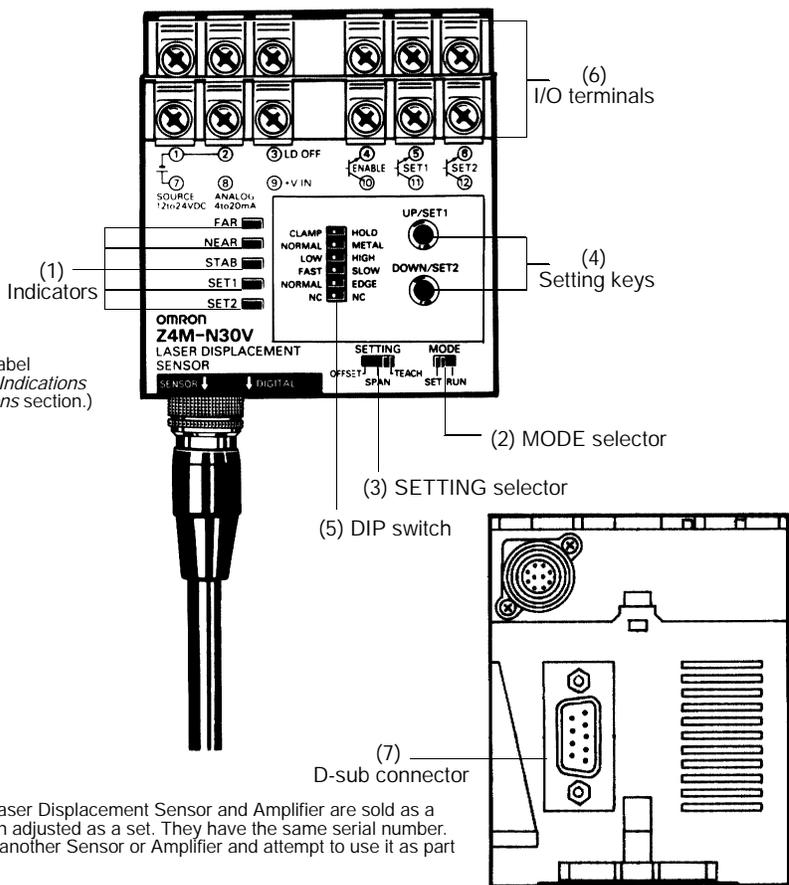
# Nomenclature

## ■ SENSOR



The Z4M-N30V Laser Displacement Sensor and Amplifier are sold as a set and have been adjusted as a set. They have the same serial number. Do not substitute another Sensor or Amplifier and attempt to use it as part of this set.

## ■ AMPLIFIER



## ■ NOMENCLATURE DEFINITIONS

Classification (See above for numbered items.)		Description
(1) Indicators	FAR/NEAR (green)	Range Indicators (Sensor and Amplifier) Near: NEAR indicator is lit. Measurement point: NEAR and FAR indicators are lit. Far: FAR indicator is lit. Outside the range or insufficient or excessive light: Both the NEAR and FAR indicators flash.
	STAB (green)	Stability indicator (Amplifier)
	SET1/ SET2 (yellow)	Control output status indicator (Amplifier)
(2) MODE Selector		RUN/SETTING Selection Set the MODE selector to RUN for set value processing and measurement. Be sure to set this selector to RUN before starting measurement.
(3) SETTING Selector		Setting Selection Using Setting Keys OFFSET for offset setting SPAN for span adjustment TEACH for set values for SET1/SET2 teaching
(4) Setting Keys	UP/SET1	Keys for offset/span adjustment and teaching for SET1/SET2 set values.
	DOWN/SET2	
(5) DIP Switches (See Dip Switch table on the next page.)	CLAMP/HOLD	Output status selection when the object is outside the measurement range.
	NORMAL/METAL	Laser power control
	LOW/HIGH	Sensitivity selection
	FAST/SLOW	Response speed selection (analog outputs)
	NORMAL/EDGE	Analog output status selection
	NC/NC	Not used
(6) I/O Terminals (See I/O table—on next page)		---

# Operation

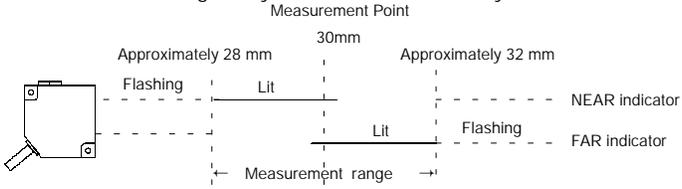
## ■ DIP SWITCHES

<b>CLAMP/HOLD</b>	Output status selection when the sensing target is outside the measurement range. CLAMP: For normal measurement. Analog output is locked between 21 and 26 mA. HOLD: for obtaining stable measurement results without being affected by flaws, hair lines, or level differences in the sensing targets such as metals. The previous status of each output will be on hold.
<b>NORMAL/METAL</b>	Laser power control depending on the targets. NORMAL: for normal measurement. METAL: For measuring objects with high light reflection rates and those with low light reflection rates alternately, such as angled IC pins.
<b>LOW/HIGH</b>	Sensitivity selection. LOW: for normal measurement. HIGH: For measuring objects with low light reflection rates, such as black paper and rubber.
<b>FAST/SLOW</b>	Analog output response speed selection FAST: 1 ms SLOW: 100 ms.
<b>NORMAL/EDGE</b>	Analog output status selection. NORMAL: for normal measurement, EDGE: For sensing subtle level differences. Variations in level differences are differentiated for analog outputs. The analog output is fixed at 12 mA for flat surfaces irrespective of different displacements.

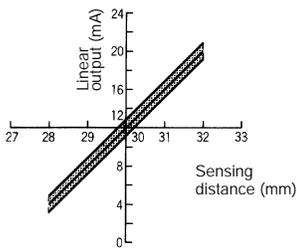
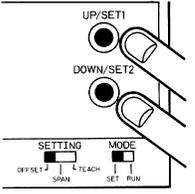
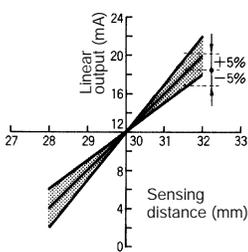
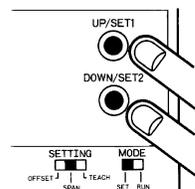
## ■ INPUTS/OUTPUTS

Classification	Description
<b>I/O Terminals</b>	<b>Analog Output</b> An analog current signal will be output according to the sensing distance. Current output: 4 to 20 mA/28 to 32 mm Output impedance: 300 Ω max. The output will be locked between 21 and 26 mA when the object is outside the measurement range or in the case of insufficient or excessive light. In the case of measuring a metal or shiny object, an output of 4 to 20 mA may be ON even if the object is outside the measurement range.
	<b>SET1/SET2 Outputs (detection output)</b> The SET1 or SET2 output will be ON if the present displacement data is close to the distance set after teaching with the push-button switches. The SET1 or SET2 output will be OFF if the data is far from the distance. The SET1 output operates according to the UP/SET1 setting, and the SET2 output operates according to the DOWN/SET2 setting. An open collector output of 100 mA maximum at 30 VDC will be obtained. When the object is outside the measurement range or in the case of insufficient or excessive light, the SET1 or SET2 output will be OFF. When measuring a metal or shiny object, the SET1 or SET2 output may be ON even if the object is outside the measurement range.
	<b>Enable Output</b> The enable output is ON when the Sensor is in measuring operation. The enable output will be OFF when there is no object in front of the Sensor or in case of insufficient or excessive light. An open collector output of 100 mA at 30 VDC will be obtained. When measuring a metal or shiny object, the enable output may be ON even if the object is outside the measurement range.
	<b>Laser-OFF Input</b> The laser OFF input controls laser emission. Laser emission will be turned ON when there is no laser-OFF input. Laser emission will be turned off when a 12- to 24-V input is imposed on the power supply terminal and the laser-OFF input is short-circuited to the ground terminal of the external power supply. When laser emission is OFF, all displacement outputs and indicator status will be On Hold. The response time required to turn on or off laser emission is 3 ms.
<b>D-sub Connector Output</b>	<b>Digital Output</b> The digital output of the Sensor can be used for processing displacement data, such as average processing, after the displacement data is sampled at high speed. Refer to <i>Connections</i> for details. A 12-bit digital displacement signal within a range between 1000 and 3000 (decimal) will be output according to the sensing distance (i.e., 28 to 32 mm). The signal will be in 4-bit blocks from the leftmost bit and output at a transmission cycle of 0.1 ms. The least readable value corresponds to 2 μm. An open collector output of 20 mA will be obtained. The supply voltage must not exceed the supply voltage imposed on the Amplifier. When the object is outside the measurement range or in the case of insufficient or excessive light, the output will be set to 4000 (decimal). When measuring a metal or glossy object, a data output within a range between 1000 and 3000 may be ON even if the object is outside the measurement range. The length of the digital output cable must be 2 m maximum.
<b>Laser Emission Delaying Function (sensor and amplifier)</b>	When the Sensor is turned on, the NEAR and FAR indicators will flash for 2 to 6 s, alerting the user to laser emission. During this period, the output will be as follows: Analog output: 3 mA max. Digital output: 0 (decimal) Control outputs: OFF Enable output: OFF

## INDICATORS AND ADJUSTMENTS

Classification	Function
<b>Range Indicators (NEAR and FAR)</b> —also used as laser warning lights (sensor and amplifier)	<p>The FAR green indicator and NEAR green indicator will be lit when the object is within the measurement range of the sensor.</p> <p>When the object is outside the measurement range or when there is insufficient or excessive light, both the NEAR indicator and FAR indicator will flash. If the object is near the sensor and outside the measurement range, only the NEAR indicator may flash.</p> <p>Z4M-N30V</p>  <p>Mount the sensor so that both the NEAR indicator and FAR indicator will be lit when the object is placed in front of the sensor.</p> <p>The NEAR indicator and FAR indicator are also used as laser warning lights. When the sensor is turned ON, the NEAR indicator or FAR indicator or both the indicators will be lit or flash. When the laser OFF input is ON, the previous condition will be <i>on hold</i> (i.e., the indicator(s) will be lit or flash), alerting the user that the laser beam will be turned ON when the laser OFF input is turned OFF.</p>
<b>Laser Emission Delaying Function</b> (sensor and amplifier)	<p>When the sensor is turned ON, the range indicators (green) will flash for 2 to 6 seconds, alerting the user to laser emission, and the linear output is locked between 21 to 26 mA. After this time, the laser beam will be turned ON.</p>
<b>Stability Indicator</b> (amplifier)	<p>The indicator will be lit in yellow when the target is within the measurement range and the receiver receives enough intense light reflected from the object. When the indicator is green, the sensor's measuring operation is stable.</p>
<b>Sensitivity Selector</b> (amplifier)	<p>Select low position for normal measurement.            Select high position for targets with low light reflection rates, such as a black rubber or paper</p>
<b>Response Speed Selector</b> (amplifier)	<p>Fast setting: 1 ms            Slow setting: 100 ms</p>

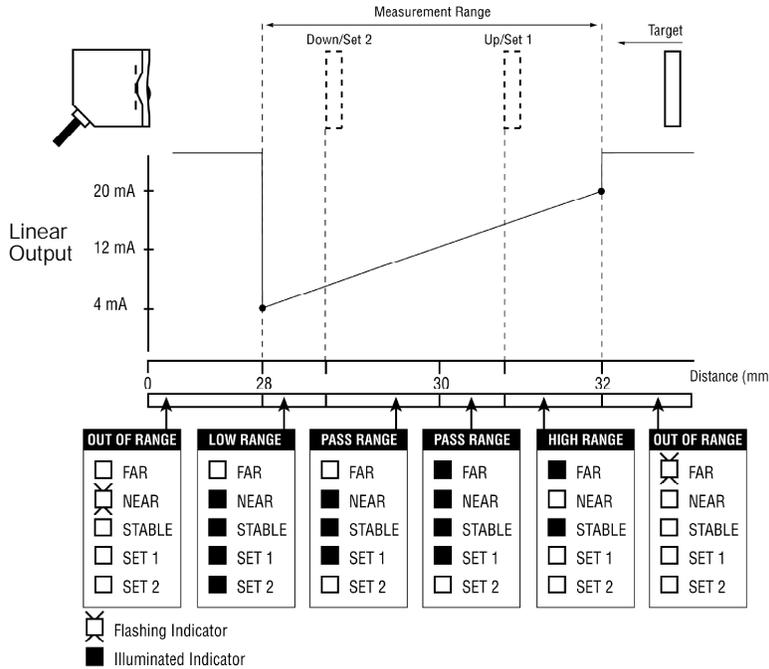
## OFFSET AND SPAN ADJUSTMENT (DISPLACEMENT OUTPUT)

<b>Offset Adjustment</b>	<p>Offset and span adjustments are made before shipping with white ceramic.</p> <p>To calibrate the displacement output scale for the target, make the offset adjustment first and then the span adjustment. Set the MODE selector to SET and the SETTING selector to OFFSET for offset adjustment. The measurement point (30 mm) becomes the reference measurement position.</p>	<p>Offset adjustment</p>  
<b>Span Adjustment</b>	<p>Set the MODE selector to SET and the SETTING selector to SPAN for span adjustment. Locate the target object at the standard distance. Then, press the UP/SET1 or DOWN/SET2 Key while moving the target so that displacement of the Sensor output will change according to the displacement of the sensed target. The adjustable range is <math>\pm 5\%</math> of measurement range.</p>	<p>Span adjustment</p>   <p>Span adjustment</p>

**CONTROL OUTPUT**

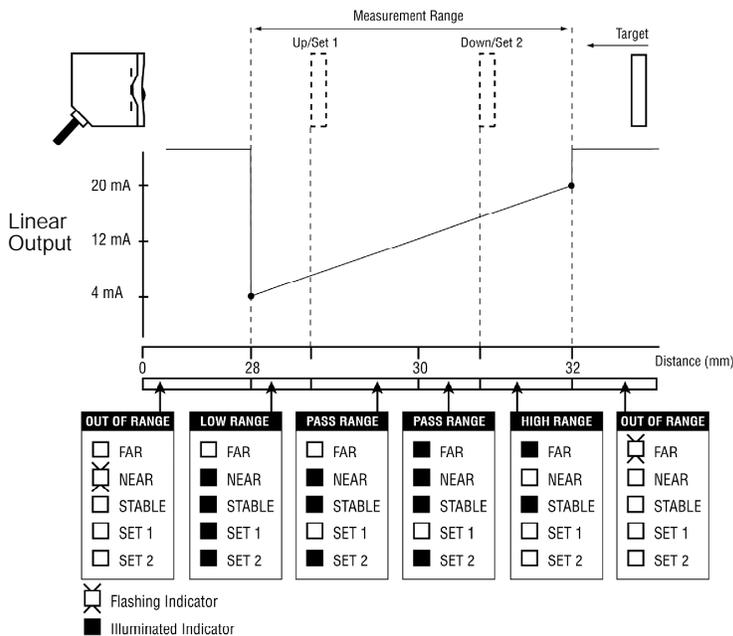
<p><b>SET 1/SET2 Value Teaching</b></p>	<p>To discriminate whether the target is within the desired range, set the upper and lower limits of the desired range.</p> <p>To set the upper and lower limits, set the MODE selector to SET and the SETTING selector to TEACH.</p> <p>Move the sensing object closest to the upper limit and press the UP/SET1 Key. Move the sensing object closest to the lower limit and press the DOWN/SET2 Key.</p> <p>Set the MODE selector to RUN, and the set value will be stored.</p>	
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**Output on Setpoint 1**



Setpoints 1 and 2 can be located at any position within the 28 - 32 mm distance from the sensor face.

**Output on Setpoint 2**



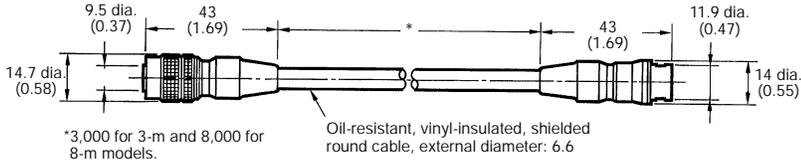
Setpoints 1 and 2 can be located at any position within the 28 - 32 mm distance from the sensor face.



Unit: mm (inch)

■ EXTENSION CABLE

Z49-C1

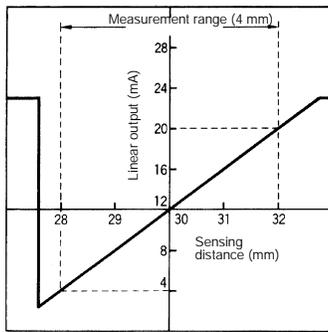


**Note:** A Z49-C1 Extension Cable (3- or 8-m long) can be connected to the sensor cable or amplifier cable. The total length of the sensor cables or amplifier cables, however, must not exceed 10 m. Use a shielded cable to extend the amplifier cable — the same kind of shielded cable as the amplifier's cable.

Engineering Data

■ LINEAR OUTPUT VS. SENSING DISTANCE

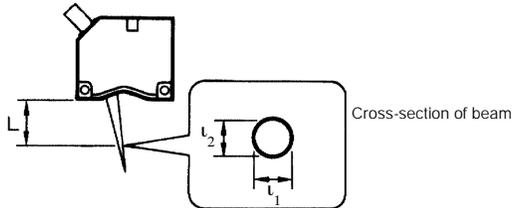
Z4M-N30V



Conditions when linear output of the sensor is locked between 21 and 26 mA:

- When the target is outside the measurement range
- When insufficient or excessive light is reflected back to the receiver portion of the sensor.

■ SPOT DIAMETER (TYPICAL EXAMPLE)



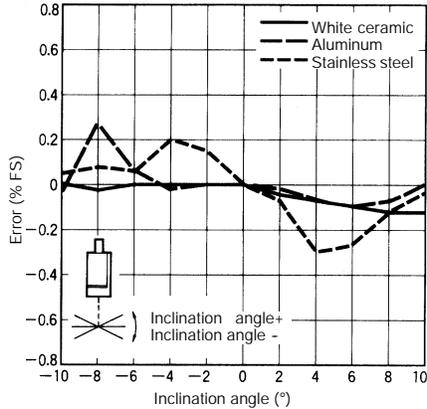
L	28 mm	30 mm	32 mm
l <sub>1</sub>	96 μm	64 μm	58 μm
l <sub>2</sub>	96 μm	55 μm	47 μm

**Note:** Defined by 1/e<sup>2</sup> (13.5%) of the Sensor's laser beam center.

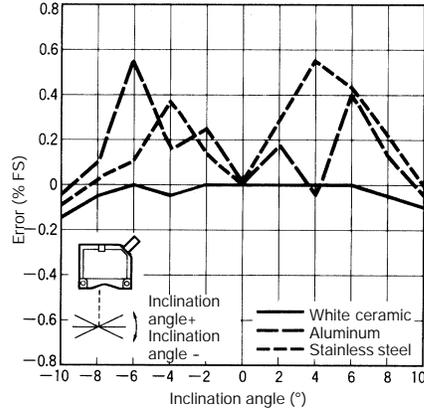
### ANGLE CHARACTERISTICS (TYPICAL EXAMPLE)

The angle characteristics are obtained by detecting an object with different angles of inclination at the measurement point and plotting the linear output error resulting from each operation.

**Inclined Object**

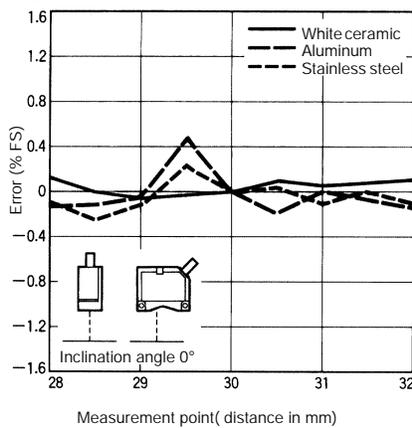


**Obliquely Positioned Object**

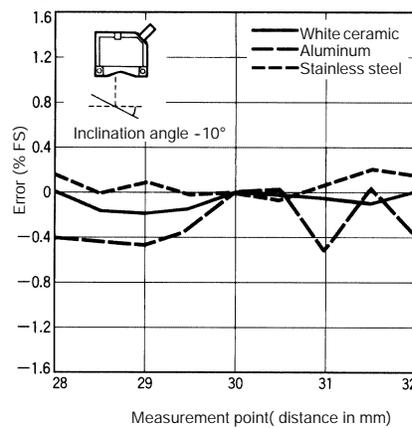


**Inclined Object**

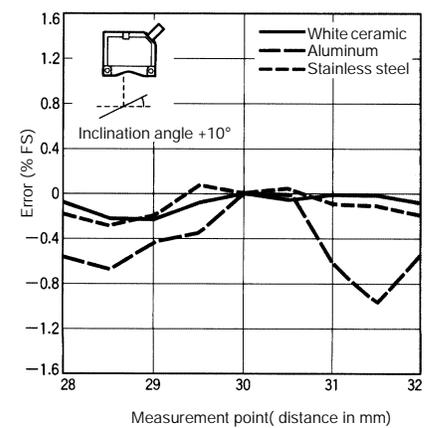
Angle: 0°



Angle: -10°



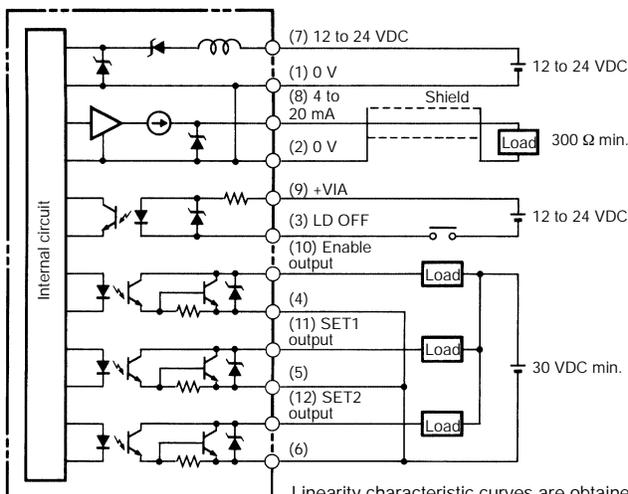
Angle: 10°



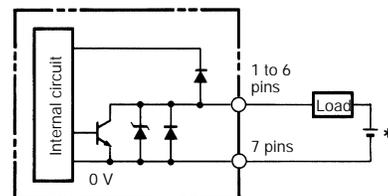
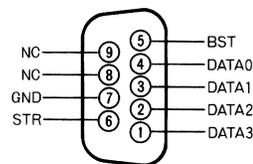
## Installation

### AMPLIFIER OUTPUT CIRCUIT DIAGRAM

**Terminal Block**



**D-sub Connector Output**

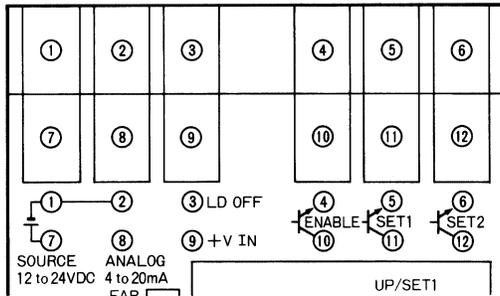


\* The supply voltage must not exceed the permissible voltage imposed on terminal 7.

Linearity characteristic curves are obtained by detecting an object at different positions within the measurement range and plotting the linear output error resulting from each operation.

**AMPLIFIER CONNECTIONS**

**Terminal Block**



**(1) 0 V**

0-V terminal

**(2) 0 V**

Used as a ground terminal for analog outputs to the Sensor Controller.

**(3) Laser-OFF input**

Laser emission will be turned off if the voltage between terminals 9 and 3 is 10.2 V min. Laser emission will be turned on if the voltage between terminal 9 and 3 is 3 V max. or these terminals are open. The laser-OFF input is an open collector input.

**(4) to (6) Common terminals**

Used for control output and enable output

**(7) Power supply**

Supply 200 mA min. at 12 to 24 VDC.

**(8) Analog output**

A current output of 4 to 20 mA will be obtained according to the displacement.

**(9) Laser-OFF input (power supply of laser-OFF input)**

To turn laser emission off, supply 15 mA min. at 12 to 24 VDC.

**(10) Enable output**

Turned on with open collector output when the Sensor can be operated.

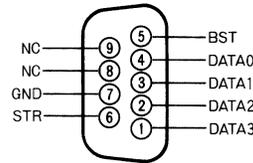
**(11) Control output (SET1)**

Operates according to the displacement values stored with UP/SET1 setting.

**(12) Control output (SET2)**

Operates according to the displacement values stored with DOWN/SET2 setting.

**D-sub Connector**



**Pins 1 to 4**

Twelve-bit binary data is output from these pins in 4-bit blocks at 25-μs intervals and a transmission cycle of 0.1 ms.

**Pin 5**

A signal indicating the start of 12-bit binary data is output.

**Pin 6**

A strobe signal indicating the reception timing for 1- to 5-pin signals is output.

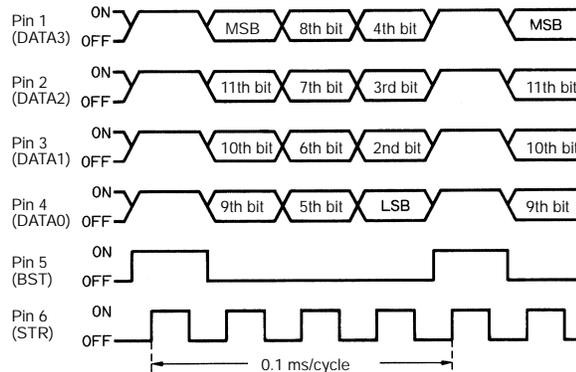
**Pin 7**

A common ground pin for 1- to 6-pin outputs. This pin is connected to the internal ground terminal.

**Pins 8 and 9**

Not used. Refer to the following timing chart for 1- to 6-pin input timings.

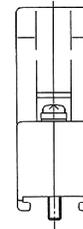
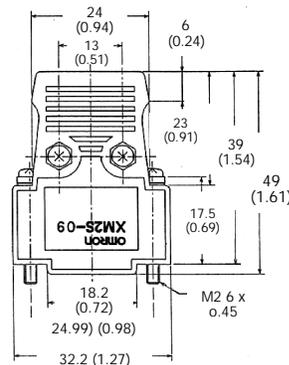
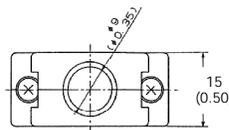
**Open Collector Output**



**Plug: XM2S-0911 (9-Pin Female)**

Use XM2S-0911, a D-sub connector plug, sold separately.

Unit: mm (inch)



## ■ CONFIRMATION OF MEASUREMENT STATUS

Stable measurement can be confirmed through the STAB indicator.

The indicator will be lit when the object is within the measurement range and the receiver receives intense enough light reflected from the object.

The indicator will not be lit when the object is outside the measurement range or when there is insufficient or excessive light.

The indicator will flash if the receiver does not receive an intense enough light reflected from the object.

The SET1 or SET2 indicator will not be lit when the object is outside the measurement range or if the receiver does not receive an intense enough light reflected from the target.

## ■ MUTUAL INTERFERENCE

Sensors can be closely mounted. Never attempt to make the laser beams closer, or the Sensors may malfunction.

## ■ WIRING

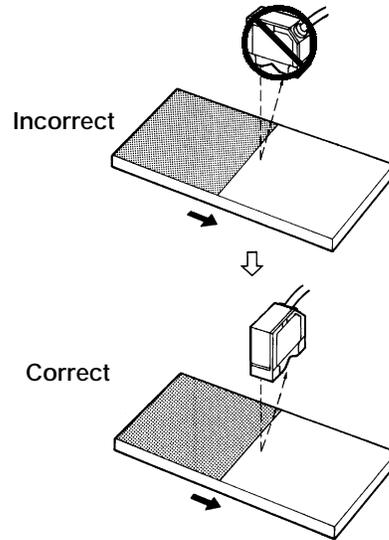
To avoid damage to the Sensor, do not impose voltage exceeding the rated voltage. Do not short-circuit the load supplied with open collector output.

To prevent interference, damage, or malfunction, do not install power supply cable for the Z4M in the same conduit with high-voltage lines or power lines.

A Z49-C1 Extension Cable (3- or 8-m long) can be connected to the sensor cable or amplifier cable. The total length of the sensor cables or amplifier cables, however, must not exceed 10 m. Use a shielded cable to extend the amplifier cable — the same kind of shielded cable as the amplifier's cable.

## ■ SENSOR MOUNTING POSITION

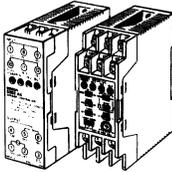
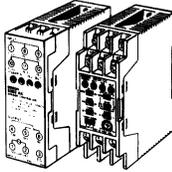
An error may result if the sensing object has a border dividing the object into two portions that are different in color or material. To minimize errors, mount the Sensor so that the mounting direction of the Sensor will be parallel to the border, as shown in the following illustration.



# Configuring Z4M-N30V with A Controller

## SELECTING A CONTROLLER — ORDERING INFORMATION

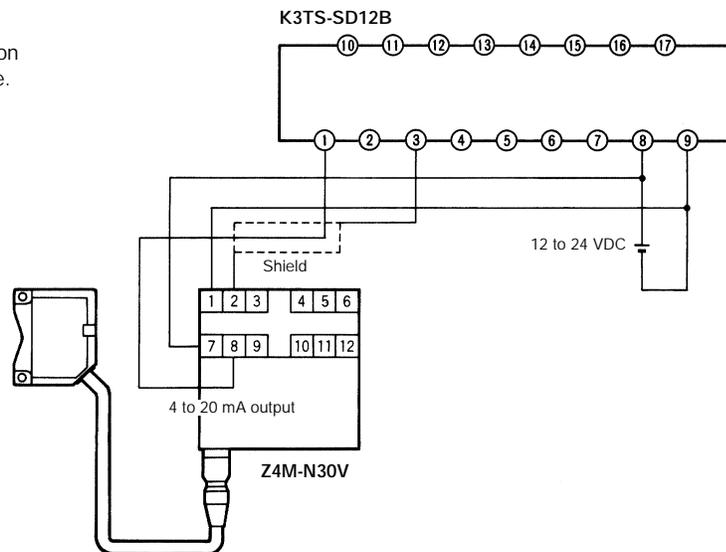
To display the linear output of the Z4M or use the Z4M for discriminating operation purposes, use the Z4M with one of the following Controllers.

Item	Intelligent Signal Process Meter	Scaling Meter	Sensor Controller	Sensor Controller	Linear Sensor Interface Unit
Unit					
Part number	<b>K3TS-SD1□B</b> 1=100 to 240 VAC supply voltage 2=12 to 24 VDC supply voltage	<b>K3TJ-A11□□</b> <i>In place of 1st box:</i> 1= 100 to 240 VAC supply voltage. 6 (24 VDC) supply voltage. <i>In place of 2nd box:</i> R (Red) or G (Green)	<b>S3D2-□K-US</b> A = AND/OR Logic only. C = AND/OR Logic plus ON/OFF delay timing 0.1 to 1.0 sec	<b>S3D2-CC-US</b>	<b>CQM1-LSE01/02</b>
Features	High-speed sampling of 1.04 ms. Dual inputs with arithmetic functions. Forced zero function and other versatile functions incorporated. A sensor power supply with a capacity of 80 mA at 12 VDC incorporated. Five-level discrimination.	DC voltage input, wide scalability, including negative scaling. Highly-visible (14.2 mm) red or green display. Average process setting available.	Input response as short as 0.1 ms. Ideal for the control of two NPN input signals. A 12 VDC sensor power supply with a capacity of 200 mA incorporated. Supply voltage 100 to 240 VAC. SPDT output contact rated 3A, 250 VAC.	Input response as short as 0.1 ms. Ideal for the control of two NPN input signals. A 12 VDC sensor power supply capacity of 200 mA incorporated. NO/NC NPN outputs. AND/OR Logic plus ON/OFF delay timing 0.1 to 1.0 sec supply voltage 100 to 240 VAC.	High-speed sampling of 1 ms (0.3 ms for timing input) without CQM1 programs. A forced-zero function lets you easily change reference points for different workpieces. Monitor output available with CQM1-LSE02.

## ELECTRICAL CONNECTION TO PROCESS METER

### Connection with K3TS Process Meter

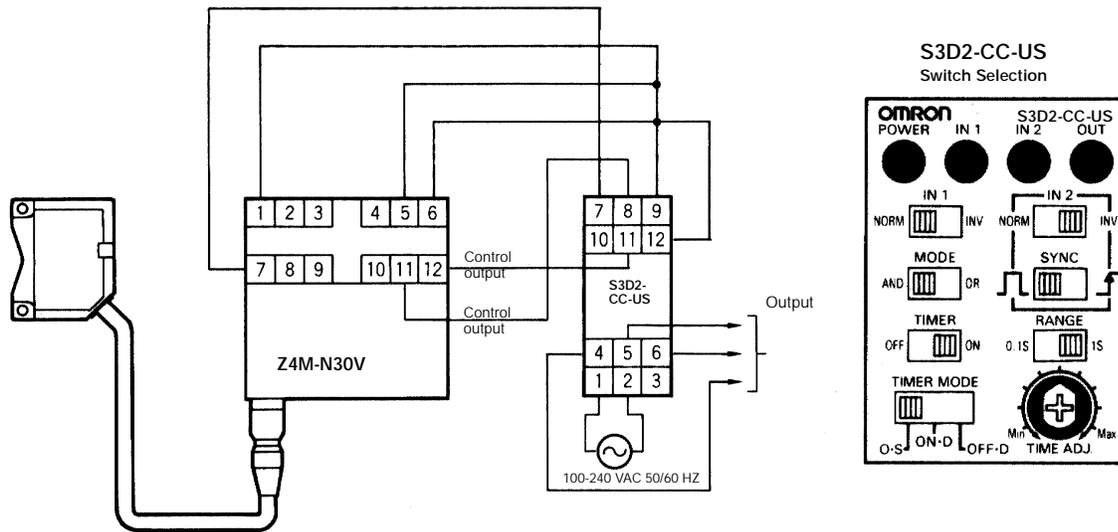
Distance indication, high-speed and high-precision operation, and 5-level discrimination are possible.



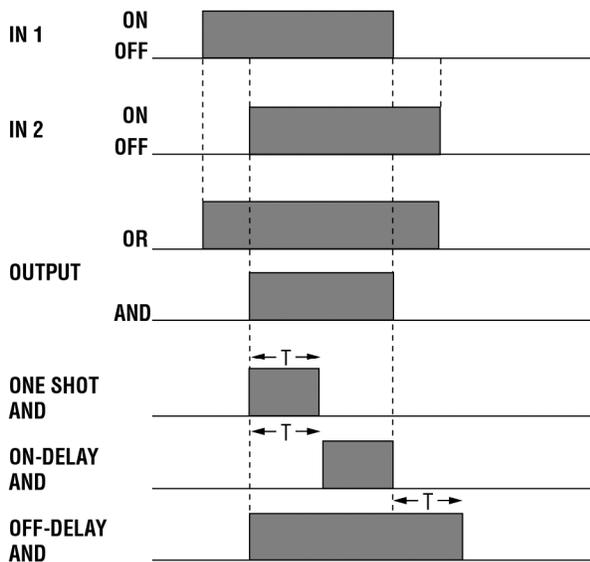
■ CONNECTION WITH S3D2 SENSOR CONTROLLER

Connection Example of Control Outputs

Discriminating whether the sensing object is within the desired range.



Control Output with S3D2-CC-US Sensor Controller



T = Timer setting  
 T = 0.1 to 1 second for S3D2-CK-US  
 T = 0.1 to 10 seconds for S3D2-CC-US

# Precautions

## OPERATING PRECAUTIONS

The Z4M-N30V Regular Reflective Displacement Sensor, is a Class 2 Laser Product according to EN60825 (IEC825) and JIS C6802 and a Class II Laser Product according to FDA (21 CFR1040.10) (see note). The Z4M-N30V is meant to be built into final system equipment. Follow these precautions when using the product:

### To Avoid Exposure to Hazardous Laser Radiation

Use this product as specified in this data sheet.

Do not expose your eyes directly to the laser radiation or indirectly to laser radiation reflected from mirror or shiny surfaces.

Do not displace or remove the protective housing during operation, maintenance, or at any other time.

For *all* repairs and servicing: return the product to OMRON.

### FDA/ANSI

Class	FDA definition	ANSI description
Class II/2	Limits applicable to products that have emissions in the visible spectrum (400 to 710 nm) for emission durations in excess of 0.25 second, providing that emissions for other durations and/or wavelengths do not exceed the Class I limits. Class II products are considered hazardous for direct long-term ocular exposure.	A Class 2 laser emits in the visible portion of the spectrum (0.4 to 0.7 μm) and eye protection is normally afforded by the aversion response including the blink reflex.

### In Countries Outside the U.S.

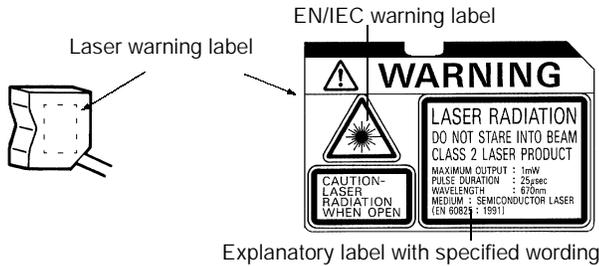
Observe the regulations and standards specified by each country.

**Note:** Europe: Class 2 of EN60825: 1991 = IEC825: 1984 & IEC825-A1: 1990 Japan: Class 2 of JIS C6802: 1991 U.S.A.: Class II of FDA (21 CFR1040.10)



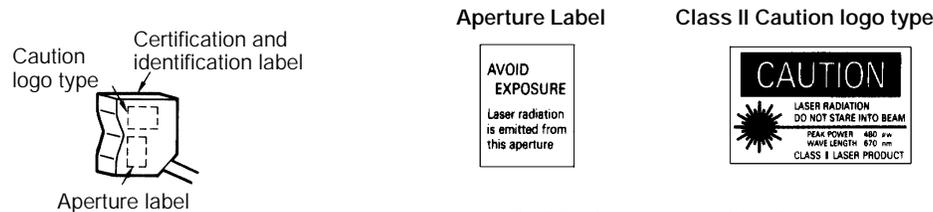
## LABEL INDICATIONS

EN

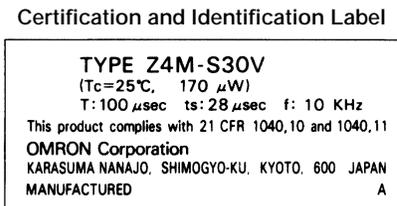


**Note:** Use of controls, adjustments, or procedures other than those specified here may result in hazardous radiation exposure.

FDA



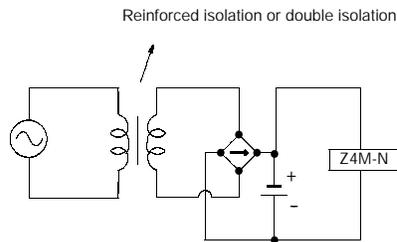
**Note:** Use of controls, adjustments, or procedures other than those specified here may result in hazardous radiation exposure.



## ■ PRECAUTIONS WHEN USING POWER SUPPLY

Use an isolated DC power supply such as:  
UL/CSA: Class 2 power source EN/IEC standards: Safety Extra  
Low Voltage (SELV) power source

### Example: SELV Power Source



## ■ APPROPRIATE USE

The Regular Reflective Displacement Sensor cannot accurately detect the following types of objects: mirror-like objects, transparent objects, objects with an extremely low reflection ratio, objects smaller than the Sensor's sensing spot diameter, or largely inclined objects.

## ■ INSTALLATION PRECAUTIONS

### Compatibility

The Sensor and Amplifier are adjusted as a set and have the same serial number. They must be used as a set. Do not replace either the amplifier or the sensor with one from elsewhere.

### Operating Environment

Do not use the Regular Reflective Displacement Sensor in strong electromagnetic fields or in environments where the operation of the Sensor is subject to the reflection of intensive light (such as other laser beams or electric arc welding machines).

Install the Sensor in a clean environment and keep the filter on the front panel of the Sensor free from oil and dust. If affected by oil or dust, clean the filter as follows. Use a camera lens type blower brush to blow away large dust particles from the surface. Do not blow the dust away with your mouth. Use a soft lens cloth with a little alcohol to remove the remaining dust.

**Note:** Do not use a scrubbing action when cleaning. Scratches on the filter could result in Sensor malfunction.

**NOTE: DIMENSIONS SHOWN ARE IN MILLIMETERS. To convert millimeters to inches divide by 25.4.**

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