

## High-precision Measurement Sensor that Can See and Measure Shapes

Displacement/  
Length  
SensorsSensing  
GuideSmart  
SensorsDisplacement  
SensorsLength  
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Information

- OMRON's unique line-beam method provides a complete solution to profile measurement problems.
- Measures the shape of a workpiece in a single operation.
- Two-dimensional SW-CCD and multiple incident level control system enable stable measurement of objects.
- Full range of measurement items, including step, width, and edge position, can be selected to suit the specific application.
- Measurement results can be displayed on four types of monitor screens.

 Be sure to read *Safety Precautions* on page 393.

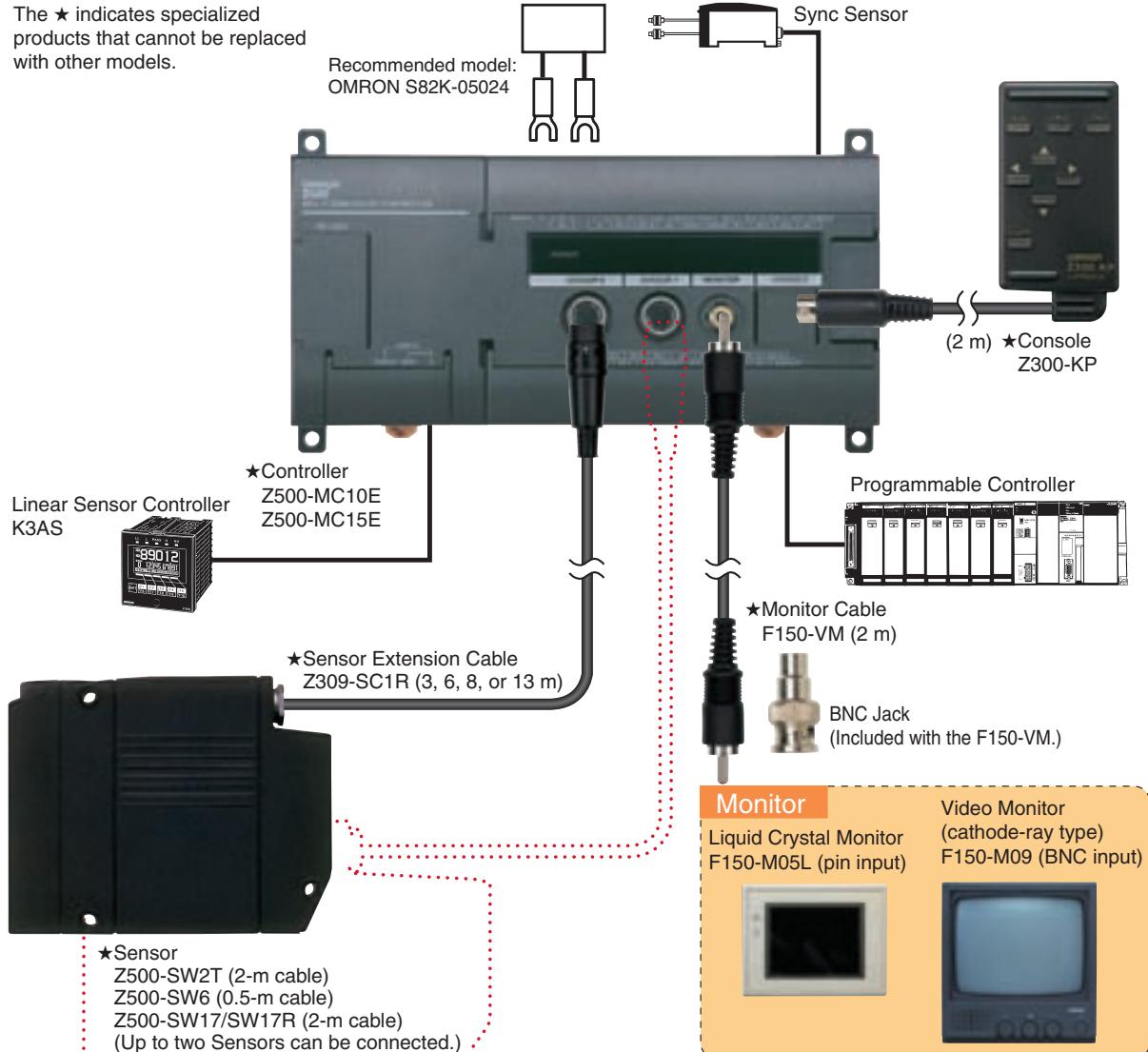


CE

## System Configuration

The ★ indicates specialized products that cannot be replaced with other models.

Recommended model:  
OMRON S82K-05024



## Ordering Information

Name	Item	Model	Remarks
Sensor	Z500-SW2T	Cable length: 2 m	
	Z500-SW6	Cable length: 0.5 m	
	Z500-SW17	Cable length: 2 m	
Controller	Z500-MC10E	NPN input/output	
	Z500-MC15E	PNP input/output	
Console	Z300-KP	---	
Liquid Crystal Monitor	F150-M05L	---	
Video Monitor	F150-M09	---	
Sensor Extension Cable	Z309-SC1R *	Cable length: 3, 6, 8, or 13 m	
Monitor Cable	F150-VM	Cable length: 2 m	

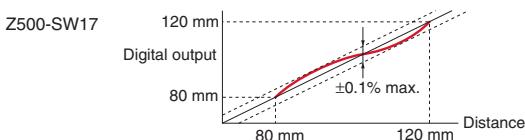
\* Specify the cable length when ordering.

## Ratings and Specifications

## Sensors: Z500-SW2T/-SW6/-SW17/-SW17R

Model	Z500-SW2T		Z500-SW6		Z500-SW17/Z500-SW17R	
	Diffuse reflection	Regular reflection	Diffuse reflection	Regular reflection	Diffuse reflection	Regular reflection
Measurement mode						
Item						
Measurement distance at center	5.2 mm	20 mm (16 mm with beam cover mounted)	50 mm	44 mm	100 mm	94 mm
Measurement range	±0.8 mm		±5 mm	±4 mm	±20 mm	±16 mm
Light source	Visible semiconductor laser (Wavelength: 650 nm, 1 mW max., class 2)		Visible semiconductor laser (Wavelength: 658 nm, 15 mW max., class 3B (Z500-SW6/SW17), class 2 (Z500-SW17R))			
Beam dimensions*1	20 µm × 4 mm typical at the reference distance (2-mm measurement region)		30 µm × 24 mm typical at the reference distance (6-mm measurement region)	60 µm × 45 mm typical at the reference distance (17-mm measurement region)		
Linearity	±0.1% FS (*3)	±0.1% FS (*2)	±0.1% FS (*4)			
Resolution	0.25 µm (*5, *6)		0.3 µm (*7, *8)		1 µm (*7, *8)	
Sampling period	9.96 ms					
LED indicator (Laser indicator)	Lit when the laser is ON.					
Temperature characteristics *9	0.01 FS/°C					
Environmental resistance	Degree of protection	IP64 (IEC)	IP66 (IEC)			
	Ambient operating illumination	Incandescent lamp: 3,000 lx max. (at light-receiving surface)				
	Ambient temperature	Operating: 0 to 50°C (with no icing or condensation) Storage: -15 to 60°C (with no icing or condensation)				
	Ambient humidity	Operating and storage: 35% to 85% (with no condensation)				
	Vibration	Destruction: 10 to 150 Hz (0.35-mm double amplitude) for 8 minutes each in the X, Y, and Z directions				
Materials	Controller: Die-cast aluminum, Cable sheathing: Heat-resistant PVC, Connector: Zinc alloy and brass					
Cable length	2 m	0.5 m		2 m		
Minimum bending radius	68 mm					
Weight (packed state)	Approx. 600 g (Sensor: Approx. 350 g)	Approx. 700 g (Sensor: Approx. 600 g)		Approx. 800 g (Sensor: Approx. 600 g)		
Accessories	Two warning labels					

- \*1. The minimum light intensity at the edges of the beam is defined as  $1/e^2$  (13.5%) of the intensity at the center of the beam. Some light will scatter beyond this beam region and the measurement may be affected if the immediate vicinity around the workpiece is highly reflective.
- \*2. This is the error with respect to the theoretical line of the displacement output when measuring the standard OMRON quartz glass. The linearity may vary depending on the workpiece being used.
- \*3. This is the error with respect to the theoretical line of the displacement output when measuring a standard OMRON stainless-steel block. The linearity may vary depending on the workpiece being used.
- \*4. This is the error with respect to the theoretical line of the displacement output when measuring the standard OMRON white alumina ceramic. The linearity may vary depending on the workpiece being used.



- \*5. This is the displacement output's peak-to-peak displacement conversion value. These figures are for measurement of the standard OMRON quartz glass (regular reflection) or standard OMRON stainless-steel block (diffuse reflection) at the center of the measurement region. The resolution performance characteristics may not be met when operating in a magnetic field.
- \*6. These figures are for Sensors connected to a Z500-MC10E/MC15E and averaged over 16 measurements. The averaged data was transmitted to a PC through an RS-232C connection for storage and processing.
- \*7. This is the displacement output's peak-to-peak displacement conversion value. (These figures are for measurement of the standard OMRON white alumina ceramic at the center of the measurement region.) The resolution performance characteristics may not be met when operating in a strong magnetic field.
- \*8. These figures are for Sensors connected to a Z500-MC10E/MC15E and averaged over 64 measurements. The averaged data was transmitted to a PC through an RS-232C connection for storage and calculations.
- \*9. This is the value measured when the gap between the Sensor and workpiece (white alumina ceramic) is fixed with an aluminum jig.

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Z300

Z500

Z550

Z4D-F

Z4W-V

E4PA-N

E4DA

D5V

## Controller: Z500-MC10E/Z500-MC15E

Item	Specification
Displacement/ Length Sensors	<b>Number of Sensors</b> Up to 2 Sensors can be connected.
	<b>Number of scenes</b> 16
	<b>Averaging number</b> 9 levels (1 to 256 times)
	<b>Light intensity tracking function</b> Automatic (The light intensity tracking range can be specified.) Fixed (Select one of 31 stages.) Multi (The light intensity range can be specified.)
	<b>Measurement items</b> Select one of the following 8 items: Height; Step: 2 pts; Step: 3 pts; Edge position; Width; Edge center; Peak/bottom; Define
	<b>Region specification</b> A region can be specified in the direction of the line beam.
	<b>Holding functions</b> Sampling, peak, bottom, peak-to-peak, averaging
	<b>Measurement data</b> 8 outputs max. per scene
	<b>Results output</b> <ul style="list-style-type: none"> <li>• Judgement output A (HIGH, PASS, LOW, ERROR) <ul style="list-style-type: none"> <li>→ RS-232C output</li> <li>→ Terminal block output (4 simultaneous outputs)</li> </ul> </li> <li>• Judgement output B (OK, NG) <ul style="list-style-type: none"> <li>→ Terminal block output (8 simultaneous outputs)</li> </ul> </li> </ul>
	<b>Terminal block</b> 11 input points: TRIGGER, LD-OFF, RESET, D10 to D17 21 output points: DO0 to DO19, GATE
	<b>Input/output type</b> Z500-MC10E: NPN Z500-MC15E: PNP
	<b>Monitor interface</b> 1 channel (for pin jack or overscan monitor)
	<b>Analog output resolution</b> The full-scale output can be divided into 40,000 gradations max. Resolution *: 0.25 mV ( $\pm 5$ V) 0.4 $\mu$ A (4 to 20 mA)
Sensing Guide	<b>Power Supply voltage</b> 21.6 to 26.4 VDC
	<b>Current consumption</b> 1 A max. (with 2 Sensors connected)
	<b>Insulation resistance</b> 20 M $\Omega$ min. (at 100 V DC) between DC external terminals and GR terminal (with internal surge absorber removed)
	<b>Dielectric strength</b> 1,000 VAC, 50/60 Hz between DC external terminals and GR terminal (with internal surge absorber removed)
	<b>Leakage current</b> 10 mA max.
	<b>Noise resistance</b> 1,500 V <sub>P-P</sub> ; pulse width: 0.1 $\mu$ s/1 $\mu$ s; rising edge: 1-ns pulse
	<b>Vibration resistance</b> 10 to 150 Hz (double amplitude of 0.1 mm) for 8 minutes each in the X, Y, and Z directions
	<b>Shock resistance</b> 200 m/s <sup>2</sup> 3 times each in 6 directions
	<b>Ambient temperature</b> Operating: 0 to 50°C (with no icing or condensation) Storage: -15 to 60°C (with no icing or condensation)
	<b>Ambient humidity</b> Operating and storage: 35% to 85% (with no condensation)
	<b>Atmosphere</b> No corrosive gases
	<b>Grounding</b> Less than 100 $\Omega$
	<b>Degree of protection</b> IP20 (In-panel) (IEC)
	<b>Material</b> Case: ABS
	<b>Weight (packed)</b> Approx. 1,300 g (Controller: Approx. 700 g)
	<b>Accessories</b> Two manuals, one resistor (250 $\Omega$ , 1/2 W)

\* This resolution is for measurements with an OMRON K3AS Linear Sensor Controller connected and values averaged over 64 measurements.

Z300

Z500

Z550

Z4D-F

Z4W-V

E4PA-N

E4DA

D5V

## Monitor

Item	Name Model Number	Liquid Crystal Monitor	Video Monitor
		F150-M05L	F150-M09
Size	5.5 inches	9 inches	
Type	TFT color liquid crystal	CRT monochrome	
Resolution	320 × 240 dots	800 TV lines min. (at center)	
Input signals	NTSC composite video (1.0 V/75 Ω)		
Power Supply voltage	20.4 to 26.4 VDC	100 to 240 VAC (-15%, +10%)	
Current consumption	Approx. 700 mA	Approx. 400 mA	
Ambient temperature	Operating: 0 to 50°C Storage: -25 to 65°C (with no icing or condensation)	Operating: -10 to 50°C Storage: -20 to 65°C (with no icing or condensation)	
Ambient humidity	Operating or storage: 35% to 85% (with no condensation)	10% to 90% (with no condensation)	
Weight (packed)	Approx. 870 g (Monitor: approx. 610 g)	Approx. 5.5 kg (Monitor: approx. 4.5 kg)	
Accessories	Instruction manual and 4 mounting brackets	Instruction manual	

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## Safety Precautions

Refer to **Warranty and Limitations of Liability** on page F-2.**WARNING**

This product is not designed or rated for ensuring safety of persons. Do not use it for such purpose.



Do not expose your eyes to the laser beam either directly or after reflection off the surface of objects.



The laser beam has a high power intensity and exposure may result in loss of sight.

**Laser Safety**

The Z500 uses a laser as its light source. JIS (JIS-C6802) divides lasers into classes.

Model Item	Z500-SW2T	Z500-SW6/ SW17	Z500-SW17R
Wavelength	650 nm	658 nm	
Maximum pulse width	10 m	17.5 m	
Cycle	0.5 to 10 ms	0.5 to 25 ms	
Maximum output	1 mW max.	15 mW max.	
Class	2	3B	2

**Warning Labels Related to Laser Safety**

The following warning labels are attached to the side Z500's Sensor.



Z500-SW2

Z500-SW6  
Z500-SW17**Use in the U.S.**

When a laser product mounted on a certain device is to be used in the U.S., it has to meet the requirements set forth by the FDA (regulations for laser products set forth by the Food and Drug Administration). Three different FDA labels are enclosed in the sensor package. Attach them to the sensor body.

Applications have been approved by CDRH (Center for Devices and Radiological Health) for Z500-SW6 and Z500-SW17. Z500-SW2T should not be used in the U.S. at this moment since the application for this model has not been approved yet.

**FDA Labels for Laser Products**

The Z500 is designed to be built into the finished system unit. Refer to the following technical standard for installation.

21CFR1040.10 and 1040.11

**FDA Labels**

Class III B Caution logo type

15000 μW  
25000 μS  
658 nm**Aperture Label****Certification and Identification Label**

Be sure to attach FDA labels; do not attach EN/IEC WARNING label by mistake.

Z300

Z500

Z550

Z4D-F

Z4W-V

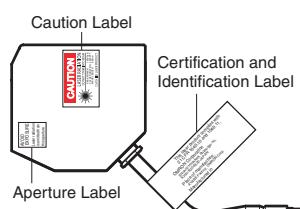
E4PA-N

E4DA

D5V

## Areas to Attach Labels

Z500-SW2T



Sensing Guide

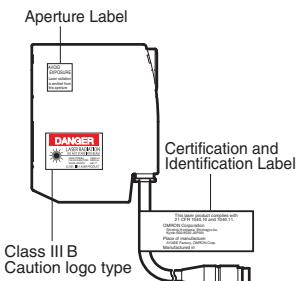
Smart Sensors

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Other Information

Z500-SW6/Z500-SW17



## Use in Countries Other than the U.S.

Replace the warning label in Japanese on the sensor main body with the attached EN/IEC warning label upon use in countries other than the U.S. Attach the label in the area where the original Japanese warning label was provided.

EN60825-1 (IEC60825-1) standard is applied to products exported to European countries. The Z500 conforms to the standard.



1.0 mW  
10 msec  
650 nm

Z500-SW2T



15 mW  
25 msec  
656 nm

Z500-SW6  
Z500-SW17

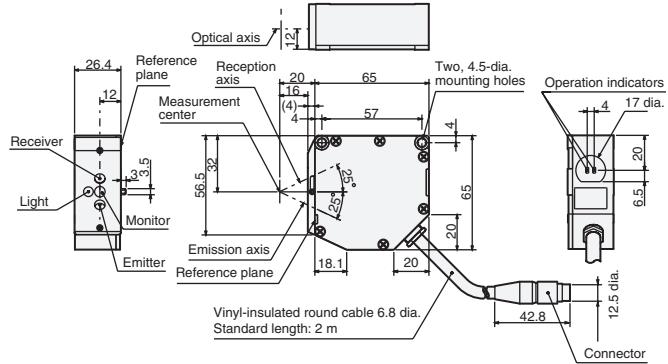
(Unit: mm)

## Dimensions

### Sensor

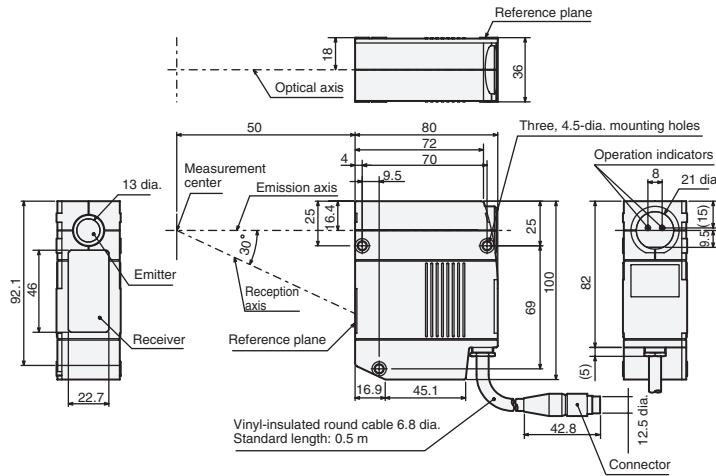
Z500-SW2T

CAD data



Z500-SW6

CAD data



Z300

Z500

Z550

Z4D-F

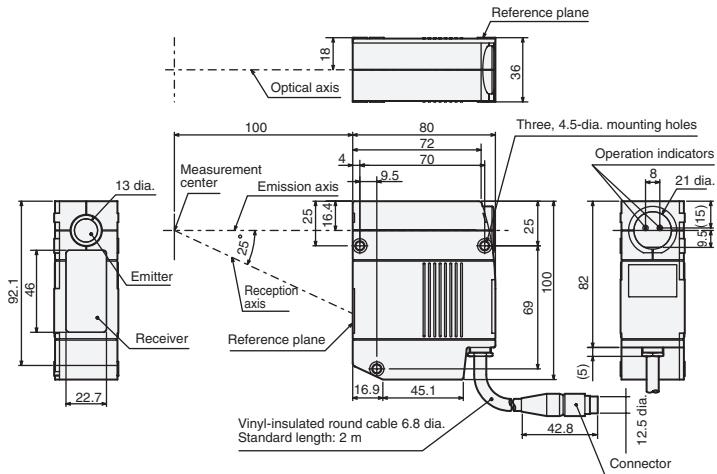
Z4W-V

E4PA-N

E4DA

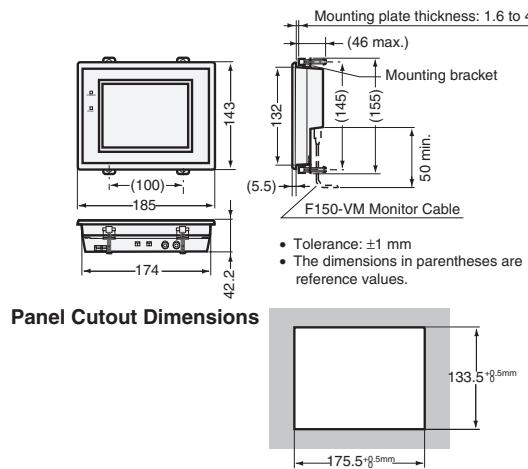
D5V

## Z500-SW17/SW17R

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## Liquid Crystal Monitor

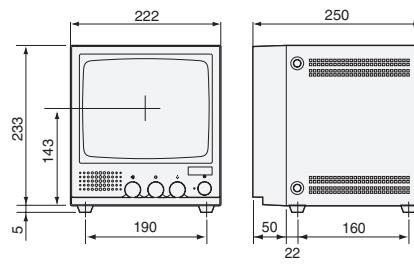
## F150-M05L



## Panel Cutout Dimensions

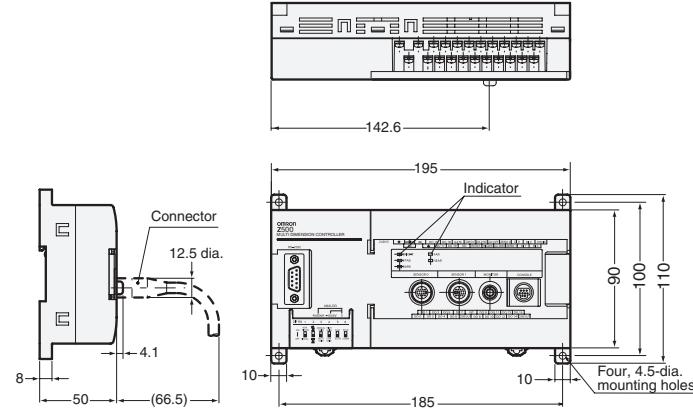
## Video Monitor

## F150-M09

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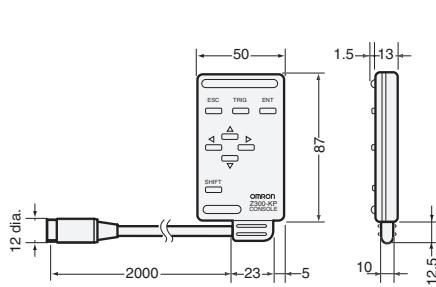
## Controller

## Z500-MC10E/Z500-MC15E



## Console

## Z300-KP



Z300

Z500

Z550

Z4D-F

Z4W-V

E4PA-N

E4DA

D5V

Cat. No. Q801-E1-01

In the interest of product improvement, specifications are subject to change without notice.