


High-precision Measurement Sensor that Can See and Measure Shapes

- 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.



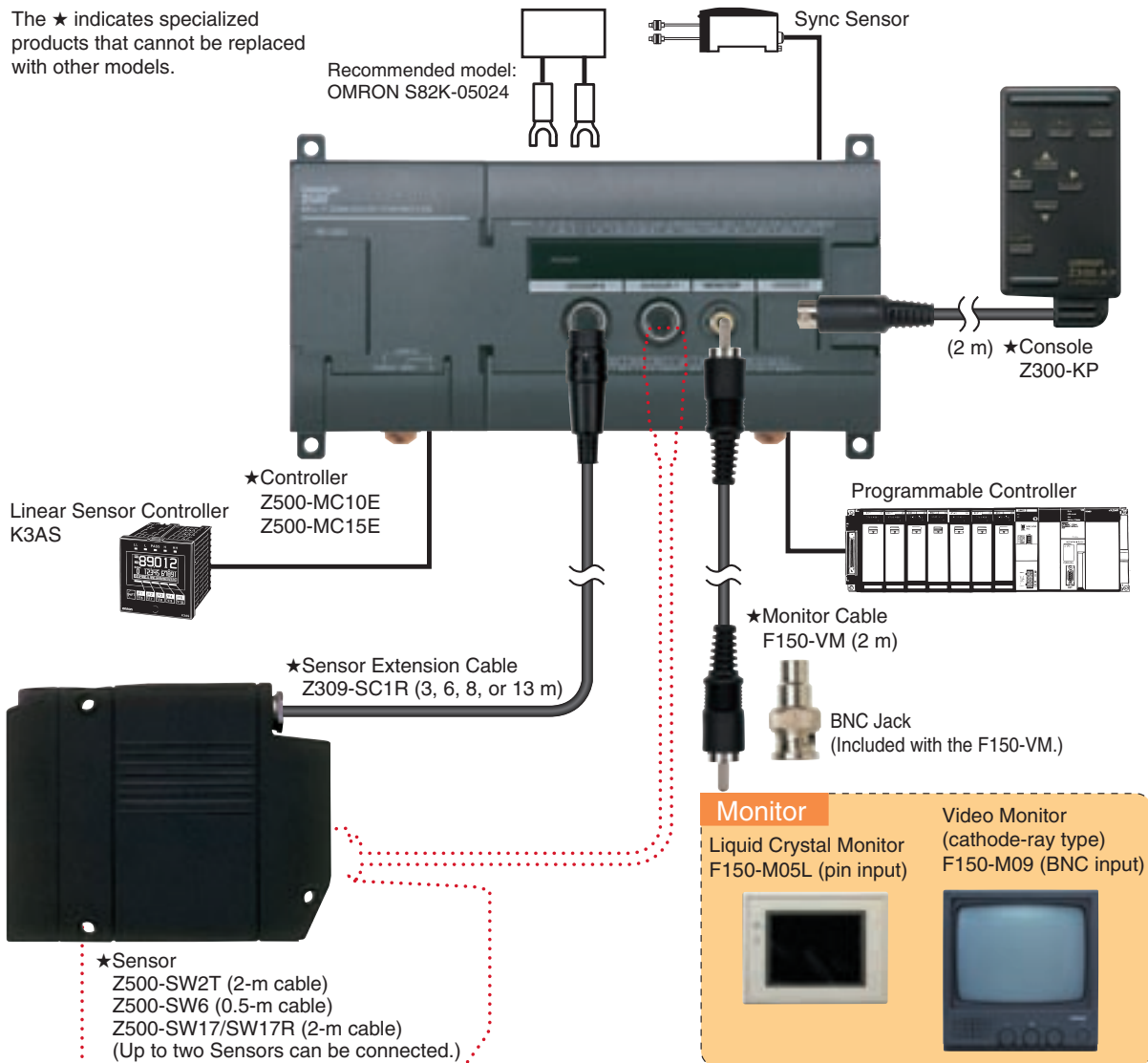
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 Be sure to read *Safety Precautions* on page 393.

System Configuration

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

Recommended model:
OMRON S82K-05024

Displacement/
Length
SensorsSensing
GuideSmart
SensorsDisplacement
SensorsLength
SensorsOther
Information

Z300

Z500

Z550

Z4D-F

Z4W-V

E4PA-N

E4DA

D5V



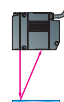
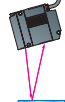
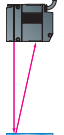
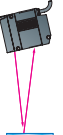
Ordering Information

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

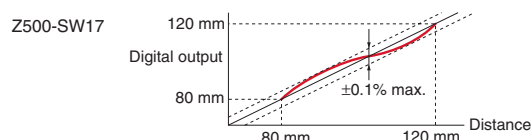
Model		Z500-SW2T		Z500-SW6		Z500-SW17/Z500-SW17R	
		Diffuse reflection	Regular reflection	Diffuse reflection	Regular reflection	Diffuse reflection	Regular reflection
Measurement mode							
Item							
Measurement distance at center	5.2 mm		20 mm (16 mm with beam cover mounted)	50 mm	44 mm	100 mm	94 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 the 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.

Displacement/
Length
Sensors

Sensing
Guide

Smart
Sensors

Displacement
Sensors

Length
Sensors

Other
Information

Z300

Z500

Z550

Z4D-F

Z4W-V

E4PA-N

E4DA

D5V

Controller: Z500-MC10E/Z500-MC15E

Item		Specification
Displacement/ Length Sensors Sensing Guide Smart Sensors Displacement Sensors Length Sensors Other Information	Number of Sensors	Up to 2 Sensors can be connected.
	Number of scenes	16
	Averaging number	9 levels (1 to 256 times)
	Light intensity tracking function	Automatic (The light intensity tracking range can be specified.) Fixed (Select one of 31 stages.) Multi (The light intensity range can be specified.)
	Measurement items	Select one of the following 8 items: Height; Step: 2 pts; Step: 3 pts; Edge position; Width; Edge center; Peak/bottom; Define
	Region specification	A region can be specified in the direction of the line beam.
	Holding functions	Sampling, peak, bottom, peak-to-peak, averaging
	Measurement data	8 outputs max. per scene
	Results output	<ul style="list-style-type: none"> • Judgement output A (HIGH, PASS, LOW, ERROR) <ul style="list-style-type: none"> ↳ RS-232C output ↳ Terminal block output (4 simultaneous outputs) • Judgement output B (OK, NG) <ul style="list-style-type: none"> ↳ Terminal block output (8 simultaneous outputs) • Measurement value output (measurement value) <ul style="list-style-type: none"> ↳ RS-232C output ↳ Analog output
	Terminal block	11 input points: TRIGGER, LD-OFF, RESET, D10 to D17 21 output points: DO0 to DO19, GATE
	Input/output type	Z500-MC10E: NPN Z500-MC15E: PNP
	Monitor interface	1 channel (for pin jack or overscan monitor)
	Analog output resolution	The full-scale output can be divided into 40,000 gradations max. Resolution *: 0.25 mV (± 5 V) 0.4 µA (4 to 20 mA)
General Specifications	Power Supply voltage	21.6 to 26.4 VDC
	Current consumption	1 A max. (with 2 Sensors connected)
	Insulation resistance	20 MΩ min. (at 100 V DC) between DC external terminals and GR terminal (with internal surge absorber removed)
	Dielectric strength	1,000 VAC, 50/60 Hz between DC external terminals and GR terminal (with internal surge absorber removed)
	Leakage current	10 mA max.
	Noise resistance	1,500 V _{P-P} ; pulse width: 0.1 µs/1 µs; rising edge: 1-ns pulse
	Vibration resistance	10 to 150 Hz (double amplitude of 0.1 mm) for 8 minutes each in the X, Y, and Z directions
	Shock resistance	200 m/s ² 3 times each in 6 directions
	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)
	Atmosphere	No corrosive gases
	Grounding	Less than 100 Ω
	Degree of protection	IP20 (In-panel) (IEC)
	Material	Case: ABS
Z300 Z500 Z550 Z4D-F Z4W-V E4PA-N E4DA D5V	Weight (packed)	Approx. 1,300 g (Controller: Approx. 700 g)
	Accessories	Two manuals, one resistor (250 Ω, 1/2 W)

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

Monitor

Item	Name Model Number	Liquid Crystal Monitor F150-M05L	Video Monitor 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

Displacement/
Length
SensorsSensing
GuideSmart
SensorsDisplacement
SensorsLength
SensorsOther
Information

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.

**Precautions for Correct Use**

Do not use the product in atmospheres or environments that exceed product ratings.

Laser Safety

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

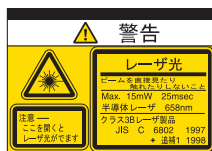
Item	Model	Z500-SW2T	Z500-SW6/ SW17	Z500-SW17R
Wavelength		650 nm	658 nm	
Maximum pulse width		10 m	17.5 m	
Cycle		0.5 to 10 ms	0.5 to 25 ms	
Maximum output		1 mW max.	15 mW max.	
Class		2	3B	2

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



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

Displacement/ Length Sensors

Sensing Guide

Smart
Sensors

Displacement Sensors



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.



Z500-SW2T



Z500-SW6
Z500-SW17

(Unit: mm)

Length Sensors

Other
Information



CAD data



Z500

Z550

Z4D-F

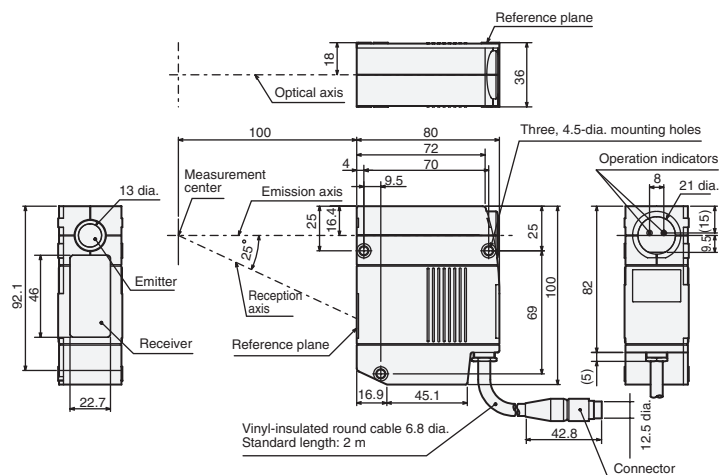
Z4W-V

E4PA-N

E4DA

D5V

Z500-SW17/SW17R



Displacement/ Length Sensors

Sensing Guide

Smart
Sensors

Displacement Sensors

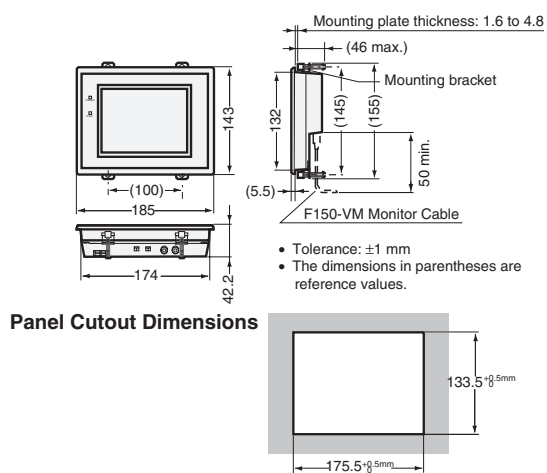
Length Sensors

Other Information

Liquid Crystal Monitor

F150-M05L

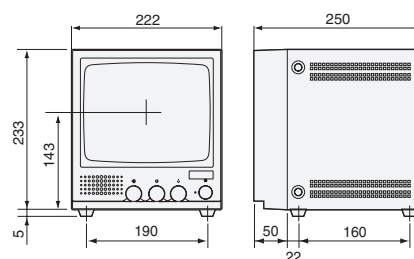
CAD data



Video Monitor

F150-M09

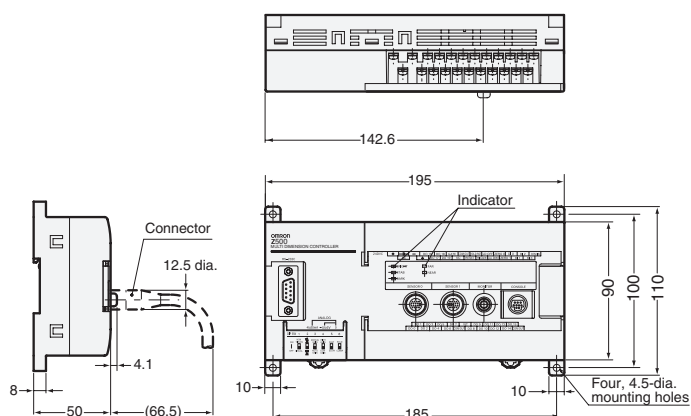
CAD data



Controller

Z500-MC10E/Z500-MC15E

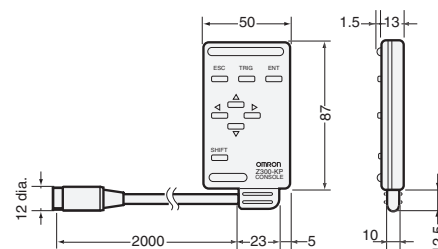
CAD data



Console

Z300-KP

CAD data



Z300

Z500

Z550

Z4D-F

Z4W-V

E4PA-N

E4DA

D5V