2D Profile Measuring Sensors

ZG - Smart Profile Sensor

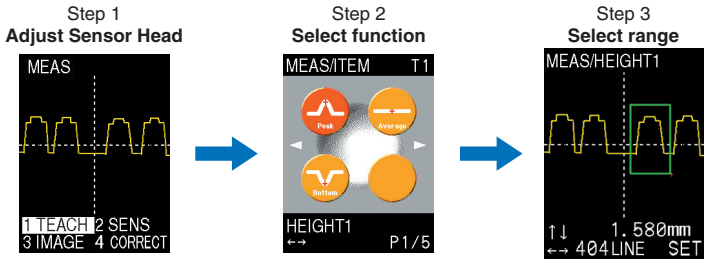
The easy way to get your profile

The smart ZG sensor solves ambitious profile measurement applications. An easy and intuitive user interface enables efficient installation, setup and operation. The advanced processing technology is a break-through for the needs of high speed processes. Precise shape measurement is guaranteed on challenging materials and surfaces. A built-in LCD monitor presents the measurement result in real time.

- Easy to use - intuitive user interface
- Live - built-in LCD monitor for setup and immediate profile display
- Versatile - 18 measurement tools
- Accurate - 5 µm resolution
- Wide profiles - up to 70 mm
- Fast - 5 ms sampling time
- Smart - powerful PC software for configuration and post-processing (optional)

Easy to use

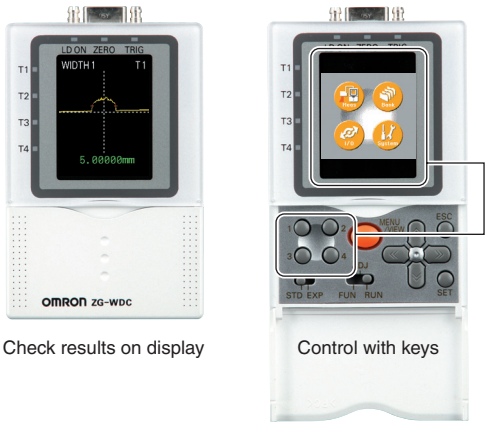
Complex operational procedures are time consuming and costly. The new ZG differentiates from standard products by its usability. The intuitive icon based menu, enables an easy setup and configuration of advanced measurement tasks within 3 steps.



Check on LCD display | Simple ICON menu | Automatic calculation

Live - built-in LCD monitor

The built-in LCD monitor of the ZG represents an intuitive user interface for easy setup and immediate live feedback of measurement result. This helps to save time for the initial configuration, change of measurement task and reduces the training efforts for personnel. A fine tuning of the settings can be achieved in seconds. The LCD monitor enables to check the measurement result at any time during operation, without the need to connect an external PC. The reaction time for maintenance activities can be shortened.

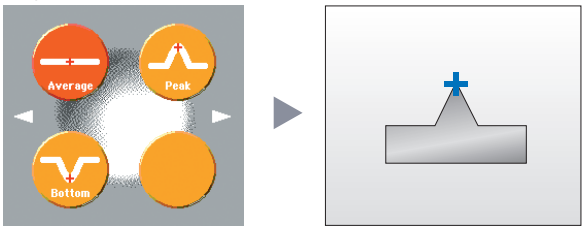


Check results on display | Control with keys

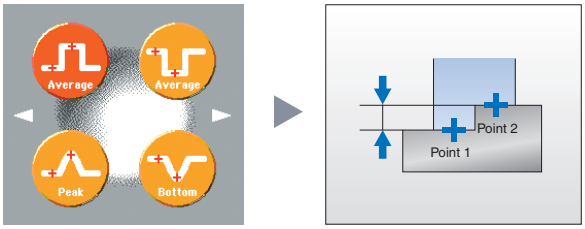
Versatile - diverse measurement functions

The ZG can solve advanced measurement tasks. Up to 18 different functions are available to meet the requirements of the applications. They allow to calculate e.g. the width, height, angle or area of the profile. The measurement functions can be selected from the easy to understand icon based user interface on the LCD monitor.

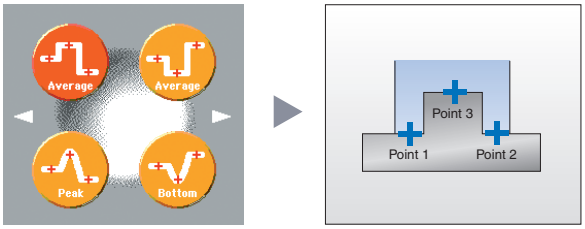
Height



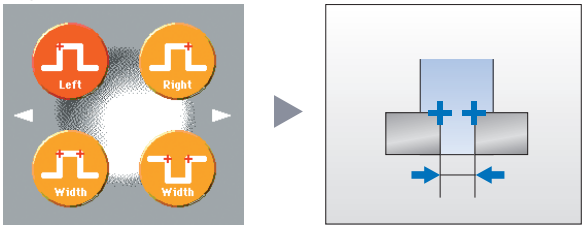
Step



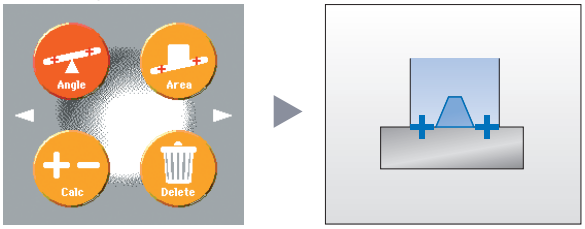
Step from base



Edge and Width



Others (Angle, Area, Calc ...)

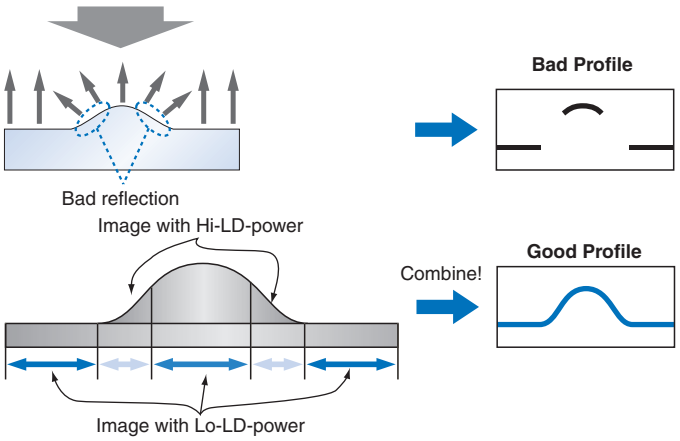


Intelligence inside - automatic adjustment of laser power

In many industrial processes sensors have to deal with difficult or changing materials. In order to avoid time consuming reconfigurations to reliably detect the objects, the sensor by itself has to manage the constraints of the process. The ZG provides an automatic adjustment of the laser power, depending on the surface of the object. The deviation of the reflection, e.g. of different colors can be compensated by increasing or decreasing the laser power to achieve the best result.

Further improvements of the measurement result can be achieved e.g. on shiny surfaces. The reflection level on different parts of the measurement object can be different, which can result in incomplete profiles.

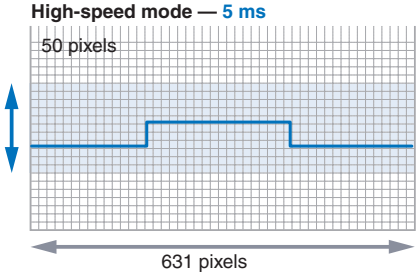
To complement the profile ZG has the capability to take several images and to combine them. The "multi-sensitivity function" allows to adjust the incident light on the different parts of the object and to retrieve a complete shape.



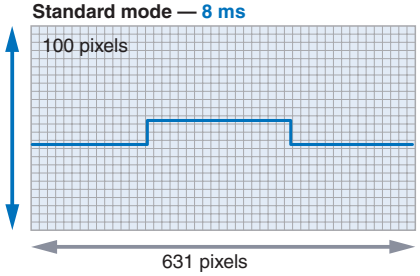
Flexible - balance between speed and accuracy

The ZG Smart profile sensor offers different modes of operation, which allows adjusting the sensor behavior to the application requirements. The optimization can be done either towards high speed or high accuracy. For high speed processes the sampling time can be decreased to 5 ms. In the other direction 5 µm accuracy can be achieved.

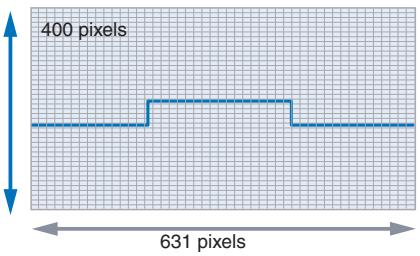
High-speed mode — 5 ms



Standard mode — 8 ms



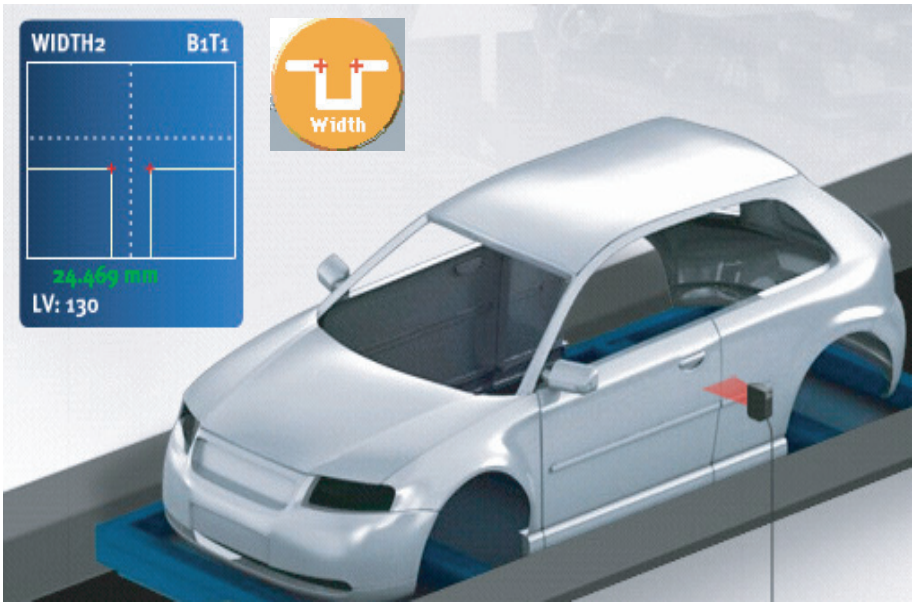
High-precision mode — 16 ms



Applications

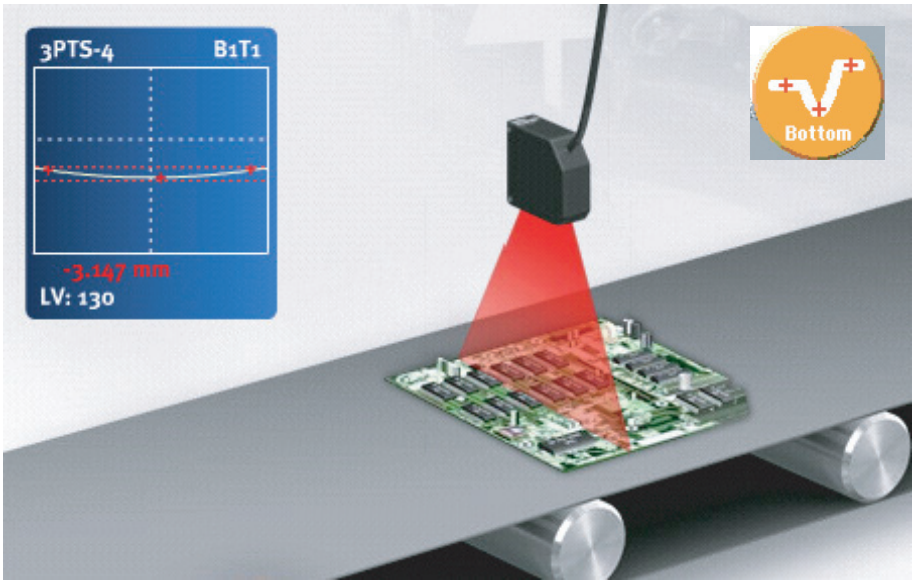
Width measurement - car body

- Task: Measure the gap between different parts of the car body
- Industry: Automotive
- Challenge: Changing colours of the objects
- Solution: Automatic Laser power adjustment in ZG
- Key point: Higher accuracy than vision systems



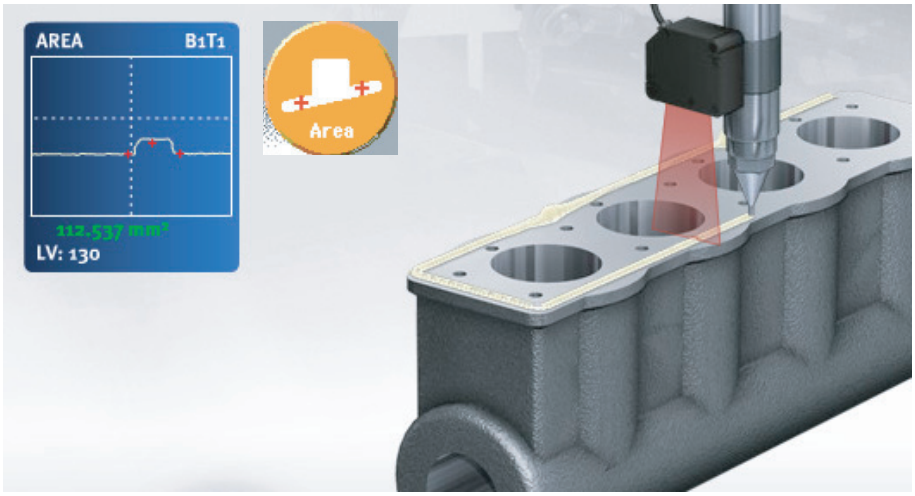
Warpage measurement - PCB

- Task: Measure the warpage of a PCB to avoid soldering or connection defects
- Industry: Electronics



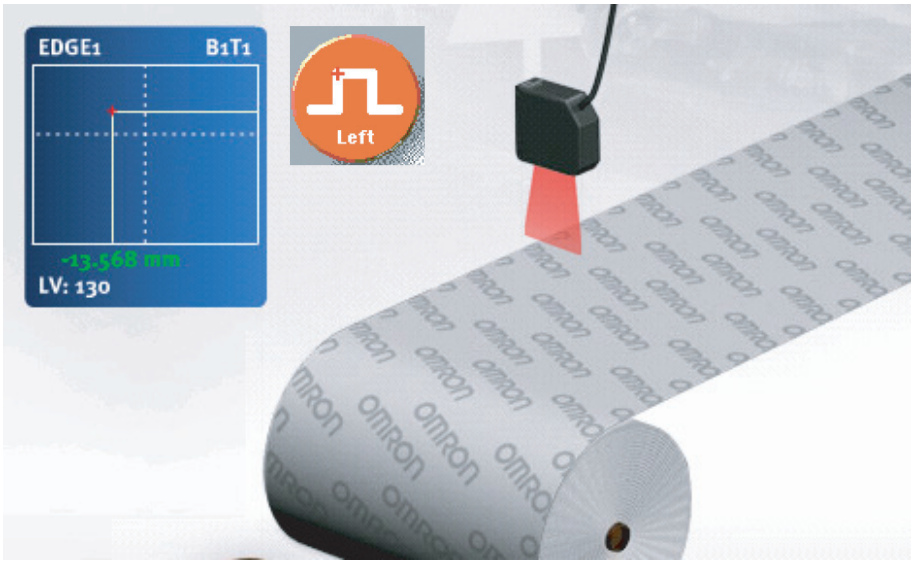
Area measurement - glue bead measurement

- Task: Measure the presence or shape of a glue bead to control the continuous motion of a robot
- Industry: Automotive



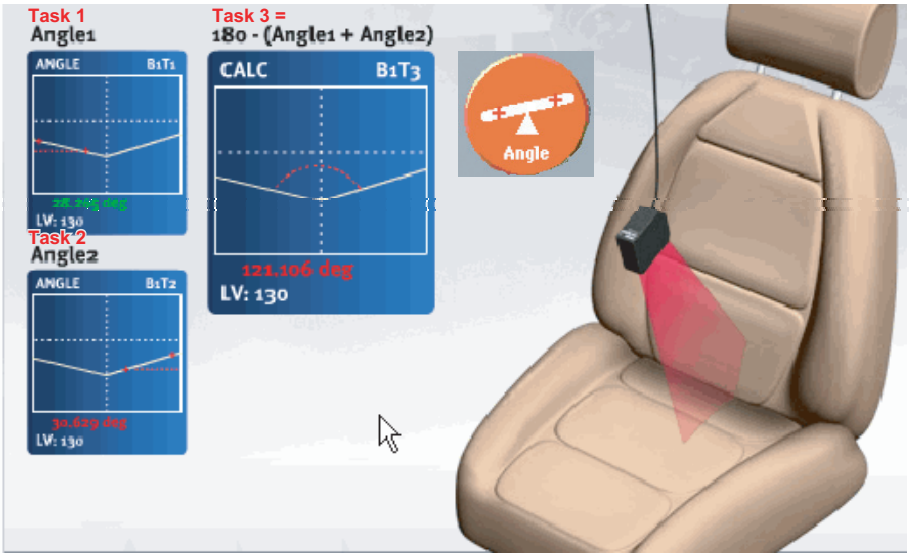
Position measurement - paper

- Task: Control the position of the paper and check whether there is a drift (meandering)
- Industry: Paper



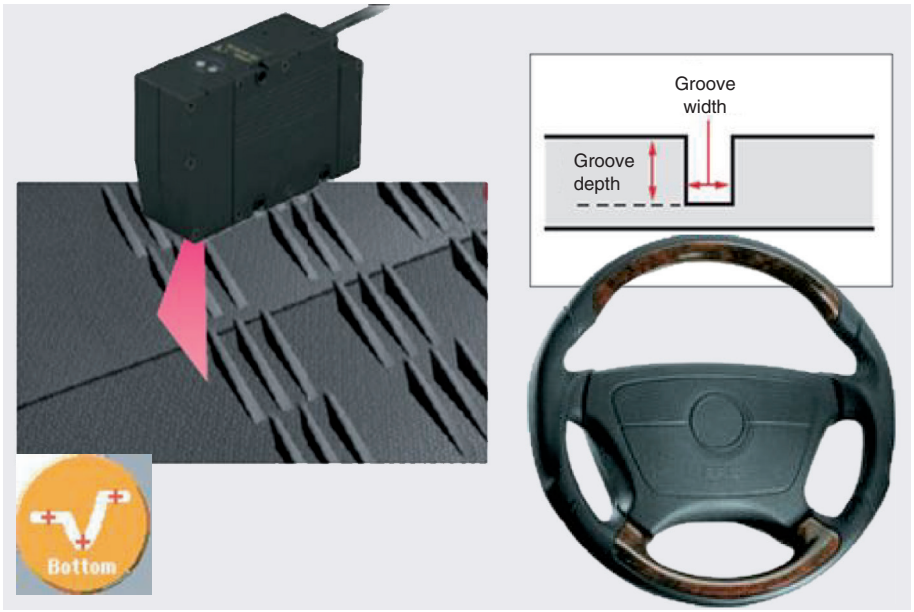
Angle measurement - car seat

- Task: Measure the angle of the car seat
- Industry: Automotive
- Key point: Controller can calculate any angle by defining additional tasks



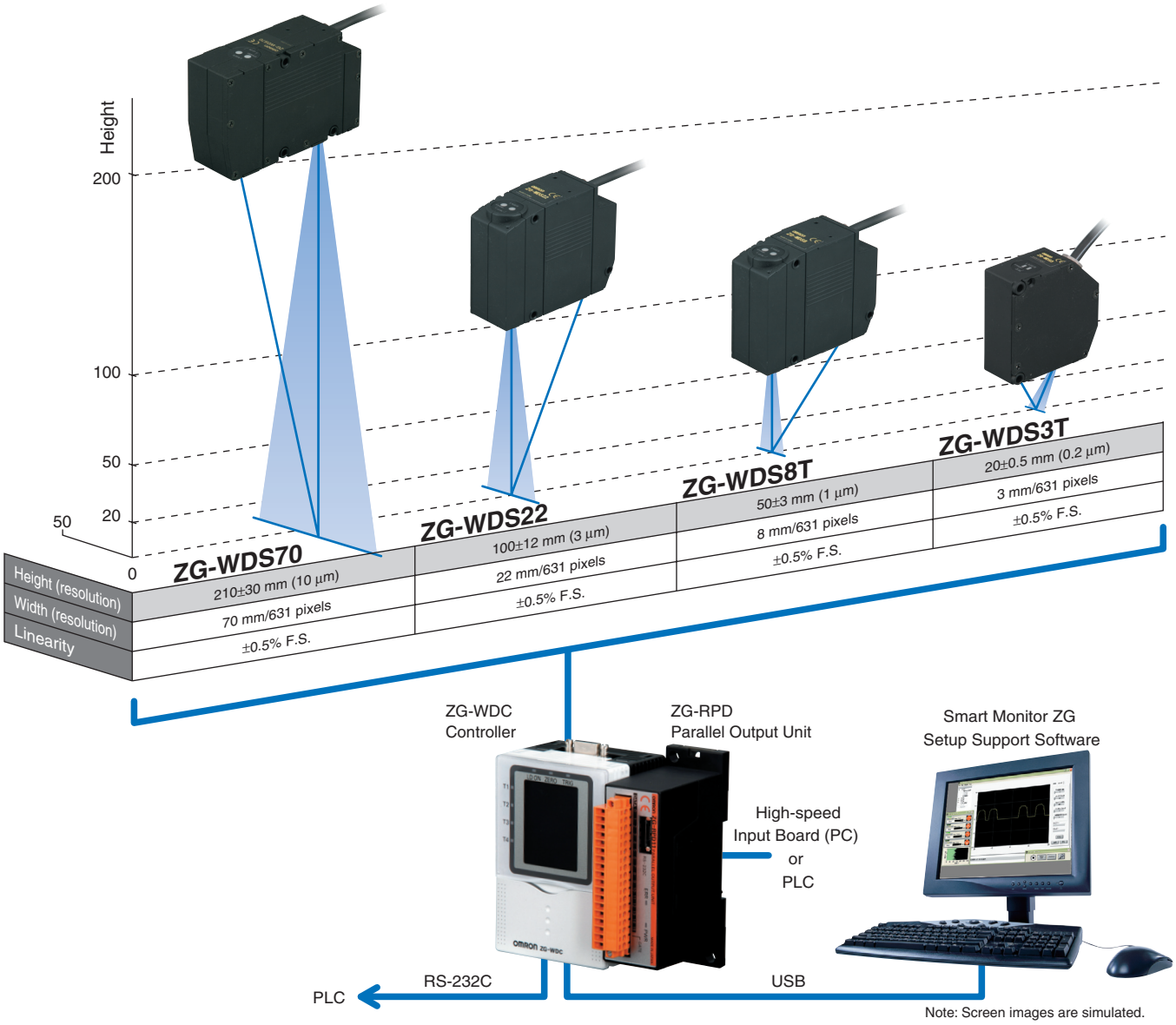
Measuring air-bag notch

- Task: Measure depth and width of an air-bag notch
- Industry: Automotive
- Key point: High accuracy



Basic Configuration

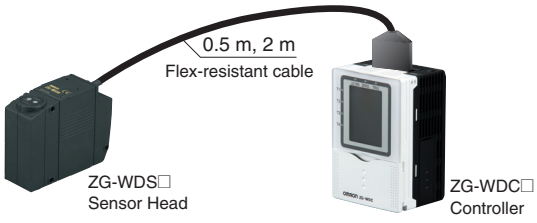
Sensor Heads



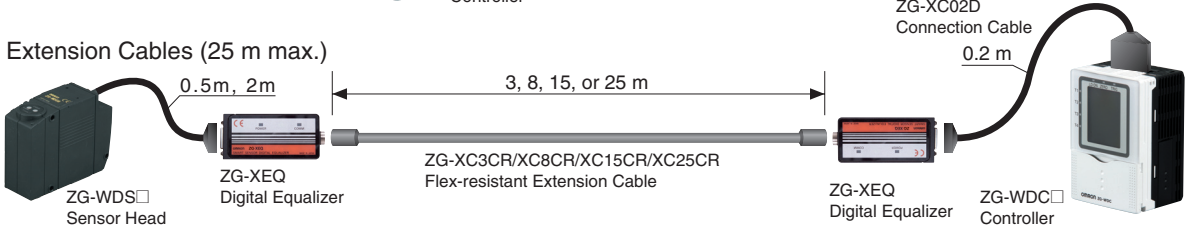
Note: Screen images are simulated.

Cable length between Sensor Head and Controller

Standard Sensor Head cable length



Extension Cables (25 m max.)



Ordering Information

Sensor Heads

Optical method	Sensing distance		Resolution		Model
	Height direction	Width direction	Height direction	Width direction	
Diffuse reflective	210±30 mm	70 mm	10 µm	70 mm/631 pixels	ZG-WDS70
Diffuse reflective	100±12 mm	22 mm	3 µm	22 mm/631 pixels	ZG-WDS22
Diffuse reflective	50±3 mm	8 mm	1 µm	8 mm/631 pixels	ZG-WDS8T
Regular reflective	20±0.5 mm	3 mm	0.25 µm	3 mm/631 pixels	ZG-WDS3T

Sensor Controllers

Appearance	Power supply	Output type	Model
	24 VDC	NPN	ZG-WDC11A*
		PNP	ZG-WDC41A*

* Included with Smart Monitor ZG Setup Support Software and USB cable.

Accessories (Order separately)

Real-time Parallel Unit (for the ZG-WDC-Series)

Appearance	Output type	Model
	NPN	ZG-RPD11
	PNP	ZG-RPD41

RS-232 Cable

Connecting device	Model	Qty
For personal computer connection (2 m)	ZS-XRS2	1
For PLC/PT connection (2 m)	ZS-XPT2	1

Sensor Head Extension Cable

Name	Model	Qty
3 m Extension Cable	ZG-XC3CR	1
8 m Extension Cable	ZG-XC8CR	1
15 m Extension Cable	ZG-XC15CR	1
25 m Extension Cable	ZG-XC25CR	1
Digital Equalizer (Relay Device)	ZG-XEQ	1
0.2 m Digital Equalizer Connection Cable	ZG-XC02D	1

Parallel Mounting Adaptor

Appearance	Model	
	ZS-XPM1	For 1 Unit
	ZS-XPM2	For 2 Units or more

Specifications

Sensor Heads

Item	Model	ZG-WDS70	ZG-WDS22		ZG-WDS8T		ZG-WDS3T	
Optical system		Diffuse reflective	Diffuse reflective	Regular reflective	Diffuse reflective	Regular reflective	Regular reflective	Diffuse reflective
Measurement range	Height direction (in standard mode)	210±30 mm	100±12 mm	94±10 mm	50±3 mm	44±2 mm	20±0.5 mm	5.2±0.4 mm
	Width direction	70 mm (typical)	22 mm (typical)		8 mm (typical)		3 mm (typical)	
Resolution	Height direction *1	10 µm	3 µm		1 µm		0.25 µm	
	Width direction	70 mm/631 pixels	22 mm/631 pixels		8 mm/631 pixels		3 mm/631 pixels	
Linearity (in the height direction) *2		±0.5% F.S.						
Temperature characteristic *3		0.1% F.S./°C						
Light source	Type	Visible semiconductor laser						
	Wavelength	658 nm					650 nm	
	Output	5 mW max. output, 1 mW max. exposure (without using optical instruments)					1 mW max.	
	Laser class	Class 2M (JIS C 6802 2005)					Class 2 (JIS C 6802 2005)	
Beam shape (at measurement center distance) *4		120 µm×75 mm (typical)	60 µm×45 mm (typical)		30 µm×24 mm (typical)		25 µm×4 mm (typical)	
LED		STANDBY: Lights when laser irradiation preparation is complete (indication color: green) LD_ON: Lights when the laser is irradiating (indication color: red)						
Measurement object		Opaque material						
Environment resistance	Ambient light intensity	Incandescent lamp: 1,000 lx max. (light intensity on the receiver surface)						
	Ambient temperature	Operating: 0 to 50°C, Storage: -15 to 60°C (with no icing or condensation)						
	Ambient humidity	Operating and storage: 35 to 85% (with no condensation)						
	Degree of protection	IP66 (IEC 60529)					IP64 (IEC 60529)	
	Vibration resistance (destruction)	10 to 150 Hz with 0.35 mm single amplitude for 80 min each in X, Y and Z directions						
	Shock resistance (destruction)	150 m/s^2, 3 times each in 6 directions (up/down, right/left, forward/backward)						
Materials		Case: Aluminium diecast, Front cover: Glass, Cable insulation: Heat-resistive polyvinyl chloride (PVC), Connector: Zinc alloy or brass						
Cbale length		0.5 m, 2 m						
Minimum bending radius		68 mm						
Weight		Approx. 650 g	Approx. 500 g		Approx. 500 g		Approx. 300 g	
Accessories		Laser Labels (EN, 2 labels), Ferrite Core (1), Instruction Manual						

Note: 1 . Obtained by setting an OMRON standard measurement object at the measurement center distance and determing the average height of the beam line. The conditions are given in the table below. However, satisfactory resolution cannot be attained in strong electromagnetic fields.

Model	CCD Mode	Average No. of Operations	Measurement object	
			Regular reflective	Diffuse reflective
ZG-WDS70/ WDS22/ WDS8T	Standard mode	16	OMRON standard white alumina ceramic object	
ZG-WDS3T	Standard mode	32	OMRON standard mirrored object	OMRON standard diffuse reflective object

2 . The tolerance for an ideal straight line obtained by determing the average height of an OMRON standard measurement object for the beam line. The CCD standard models used. Linearity varies depending on the measurement object.

Model	Measurement object	
	Regular reflective	Diffuse reflective
ZG-WDS70/ WDS22/WDS8T	OMRON standard white alumina ceramic object	
ZG-WDS3T	OMRON standard mirrored object	OMRON standard diffuse reflective object

3 . A value attained by using an aluminium jig to secure the distance between the Head and the measurement object. The CCD standard mode is used.

4 . Defined as 1/e^2 (13.5%) of the center light intensity. This may be influenced when light leakage also exists outside the defined area and the reflectivity of the light around the measurement object is higher than that of measurement object.

Sensor Controllers

Item	Model	ZG-WDC11A	ZG-WDC41A
Input/output type		NPN	PNP
No. of connectable Sensor Heads		1 per Controller	
Measurement cycle *1		16 ms (high-precision mode), 8 ms (standard mode), 5 ms (high-speed mode)	
Min. display unit		10 nm	
Display range		-999.99999 to 999.99999	
Display	LCD monitor	1.8 inch TFT color LCD (557×234 pixels)	
	LEDs	• Judgment indicators for each task (indication color: orange): T1, T2, T3, T4 • Laser indicator (indication color: green): LD_ON • Zero reset indicator (indication color: green): ZERO • Trigger indicators (indication color: green): TRIG	
External interface	Input/output signal lines: Analog outputs	Select voltage or current (using the sliding switch on the bottom surface) • Voltage output: -10 to 10 V, output impedance: 40 Ω • Current output: 4 to 20 mA, maximum load resistance: 300 Ω	
	Input/output signal lines: Judgment output (ALL-PASSING/ERROR)	NPN open collector 30 VDC, 50 mA max. Residual voltage: 1.2 V max.	PNP open collector 50 mA max. Residual voltage: 1.2 V max.
	Input/output signal lines: Trigger auxiliary output (ENABLE/GATE)		
	Input/output signal lines: Laser stop input (LD-OFF)	ON: 0 V short or 1.5 V max. OFF: Open (leakage current: 0.1 mA max.)	ON: Power supply voltage short or power supply voltage -1.5 V min. OFF: Open (leakage current: 0.1 mA max.)
	Input/output signal lines: Zero reset input (ZERO)		
	Input/output signal lines: Measurement trigger input (TRIG)		
	Input/output signal lines: Bank switching input (BANK A, B)		
	Serial I/O: USB2.0	1 port, full speed (12 Mbps), MINI-B	
	Serial I/O: RS-232C	1 port, 115,200 bps max.	
Main functions	No. of setting banks	4	
	Sensitivity adjustment	Multi/auto/fixed	
	Measurement items	Height, 2-point Step, 3-point Step, Edge position, Edge width, Angle/Area Calculation (up to four items can be measured simultaneously)	
	Trigger modes	External trigger/continuous	
Ratings	Power supply voltage	21.6 to 26.4 VDC (including ripple current)	
	Current consumption	0.8 A max.	
	Insulation resistance	20 MΩ at 250 V between lead wires and Controller case	
	Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between lead wires and Controller case	
Environmental resistance	Ambient temperature	Operating: 0 to 50°C, Storage: -15 to 60°C (with no icing or condenstaion)	
	Ambient humidity	Operating and storage: 35 to 85%	
	Degree of protection	IP20 (IEC 60529)	
	Vibration resistance (destruction)	Vibration frequency: 10 to 150 Hz, single amplitude: 0.35 mm, acceleration: 50 m/s^2, 10 times for 8 min each	
	Shock resistance (destruction)	150 m/s^2, 3 times each in 6 directions (up/down, right/left, forward/backward)	
Materials		Case: Polycarbonate (PC), Cable insulation: Heat-resistive polyvinyl chloride (PVC)	
Cable length		2 m	
Weight		Approx. 300 g (including cable) (Packed state: Approx. 450 g)	
Accessories		Large Ferrite Core (1), Small Ferrite Core (2), Insulation lock (1), Instruction Manual, Smart Monitor ZG Setup Support Software (CD-ROM), USB Cable (1 m)	

Note: 1 . The image input periode listed here are for fixed/auto sensitivity. The image input period will be longer for multi-sensitivity or other settings. Use the eco monitor in RUN mode to determine the actual image input period.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. Q150-E2-01-X In the interest of product improvement, specifications are subject to change without notice.