Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!


## Contact us

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NEW

OMRON

# Smart Sensors ZS Series

2D CMOS Laser Type

High-precision Displacement Measurement Sensors Bringing Smart Sensors into New Fields.

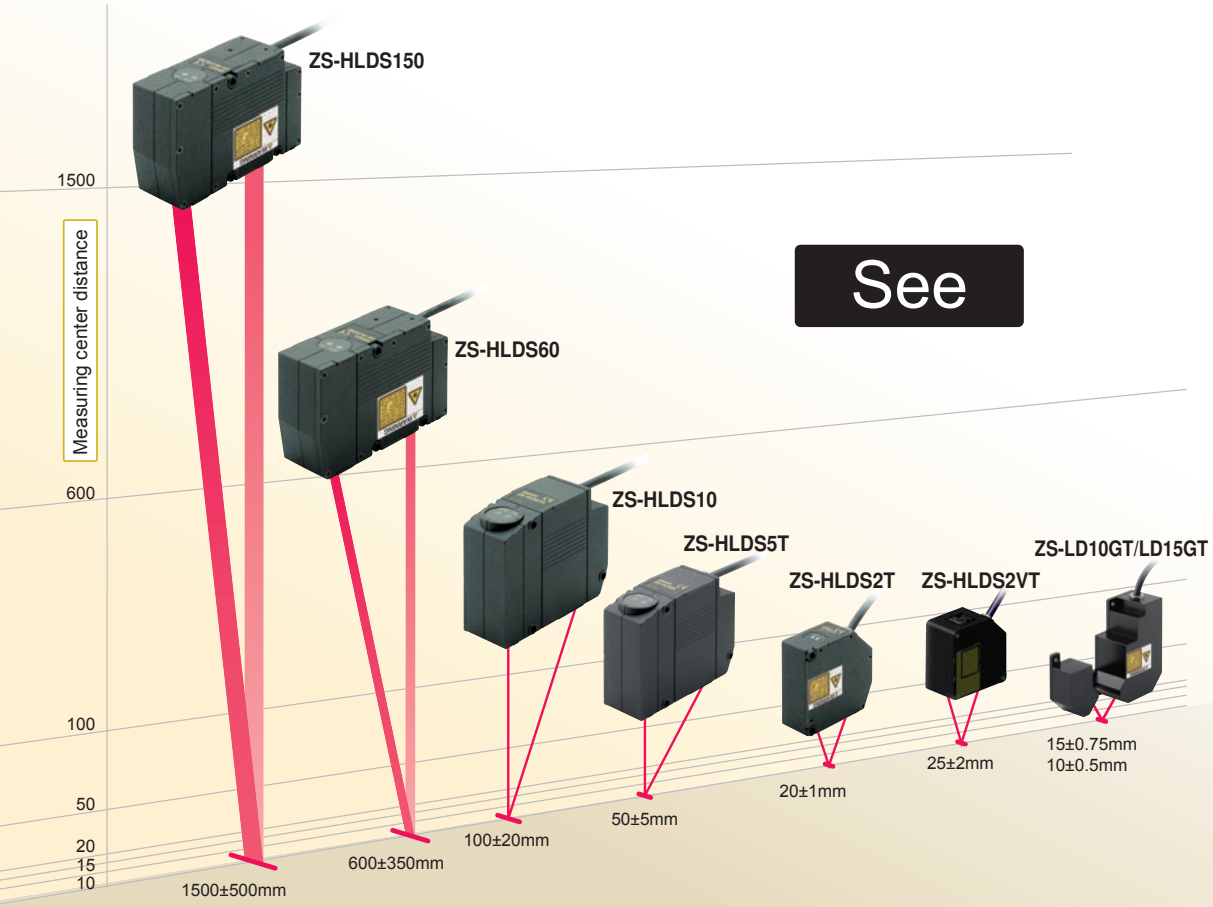
realizing

# ZS-HL Series

More P.6

## Very High-performance Sensors that Support Core Quality from Very Long-range to Extremely Precise Measurements

- Range of models with measuring center distance of 20 to 1,500 mm.
- Achieves maximum resolution of 0.25 μm.
- Maximum response speed of 110 μs.
- Parallel output supported.




See

# Highly Advanced Sensing Fu


## Record

### Data Storage Unit ZS-DSU ZS-DSU

Ideal for ZS Series Data Logging

Enables onsite high-speed logging of data in external memory (compact flash card) for the Sensor Controller or Multi-Controller.
Effective for building traceability systems, statistical process control (SPC), and much more.

High-speed sampling rate: 150 μs
Powerful support for logging data using various trigger functions.

More P.18

## Control

### Multi-Controller ZS-MDC

Enables full application of Sensor Controller information.

Transfers data between multi-connected Sensor Controllers and performs high-speed multiprocessing.

Connects to up to nine Sensor Controllers.

More P.17

# nctions in a Compact Package


## Manipulate

### Sensor Controllers ZS-HLDC/LDC

Enable maximum sensing performance with fully digital processing.

Culmination of OMRON's lead-edge digital technology. Enables easy utilization of the ultimate in measurement performance.

Business card size
USB provided as a standard feature.

More P.12

## Monitor

### SmartMonitor Professional ZS-SW11E V3

Setting Software for the ZS Series

Meets a wide range of logging needs.
Supports high-speed simultaneous multichannel waveform graphs.
Excel macros provided for simple analysis.

More P.19

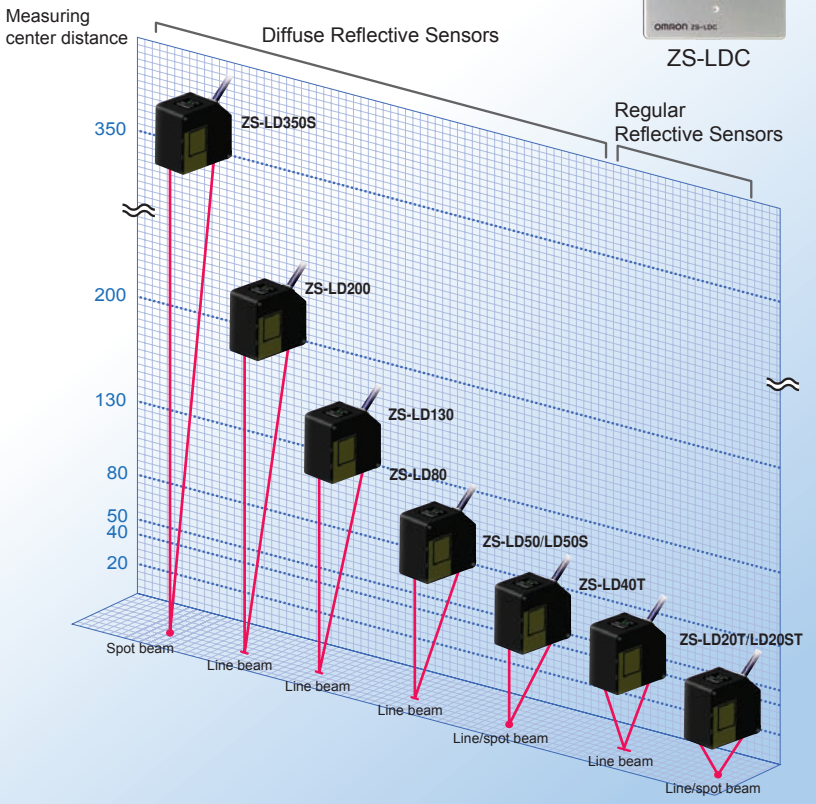
## ZS-L Series

More P.14

Standard Sensors Most Suitable for a Variety of High-precision Displacement Measurements, Including Spot Detection, Wide-range Detection, and Long-distance Detection.

- Beam Shapes
  Spot and line beam selection.
- Wide Range of Products
  Long-range, middle-range, and short-range models.

ZS-LDC

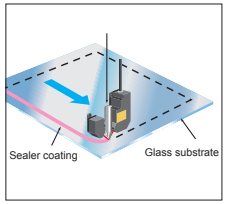


# Main Applications

## High Performance
ZS-HL Series

Very High-performance Sensors that Support Core Quality from Very Long-range to Extremely Precise Measurements


### ZS-LD10GT/LD15GT

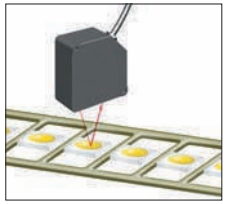



Ideal for measuring and controlling dispenser nozzle gaps when applying sealer.

### ZS-HLDS2T

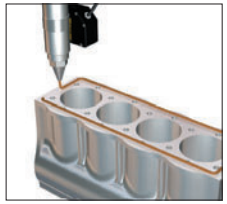
Ideal for measuring the thickness of silicone or compound semiconductor wafers in polishing and testing processes.

### ZS-HLDS2VT



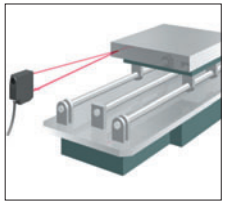
Ideal for measuring the potting resin height for electronic components.

### ZS-HLDS5T



Ideal for measuring liquid gasket (FPIG) application amounts. Prevents defects such as insufficient seal.

### ZS-HLDS10

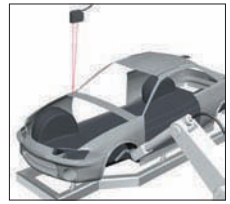


Ideal for confirming positioning and repeatability accuracy of XY stages.

### ZS-HLDS60

Ideal for level detection for liquid crystal coaters and PDP fluorescent substances.

### ZS-HLDS150



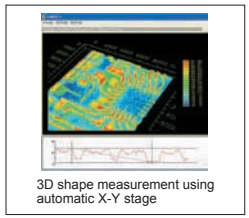
Protruding objects and steps can be measured from a distance for measurement objects that cannot be accessed easily.

---

## Standard
ZS-L Series

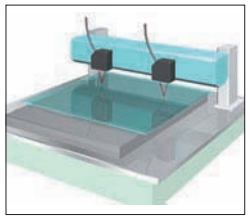
Standard Sensors Ideal for a Variety of High-precision Displacement Measurements, Including Spot Detection, Wide-range Detection, and Long-distance Detection


### ZS-LD20ST



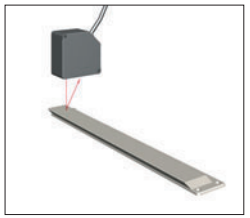

Ideal for measurements requiring discrimination between minute parts or fine shape repeatability.

### ZS-LD40T



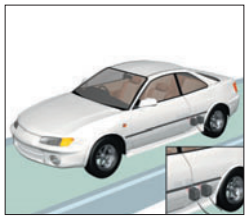
Ideal for measuring glass thickness and nozzle gaps when coating glass with resist or sealer.

### ZS-LD50/LD80



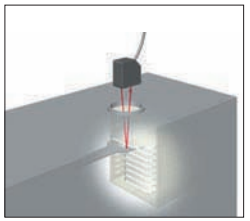
Ideal for measuring the warp of resin blades in copy machine toners.

### ZS-LD200



Ideal for checking the precision of door installations.

### ZS-LD350S



Ideal for checking the flatness of robot arms that transport wafers in load ports.

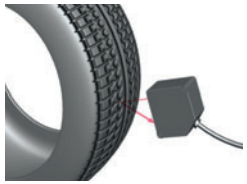
# Applications by Industry

## Automobile and Automotive Parts

### Measuring Car Bodies

### Measuring Door Attachment Offsets

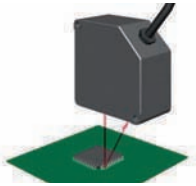
### Measuring Tire Exteriors



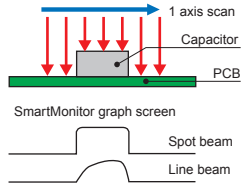
## Electronic Components

### Inspecting Board Heights

### Inspecting for Board Coplanarity



### Measuring Shape for Positioning Laminated Ceramics

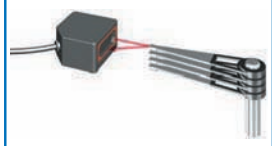



## Semiconductors

### Measuring Electrode Thickness on Compound Semiconductors

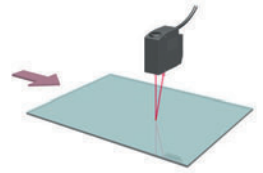
### Measuring Wafer Warping and Thickness

### Measuring Arm Inclination

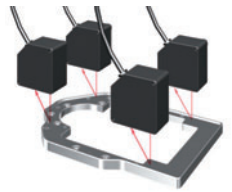


## Household Appliances and Audio-visual

### Simultaneous Measuring of Touch Panel Film Thickness and Gap



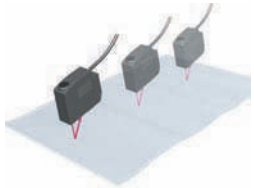
### DVD Chassis Flatness Inspections



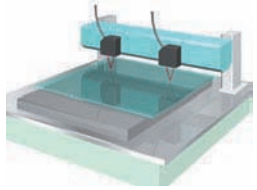
### Digital Camera Tube Lens Inspection

## LCDs and PDPs

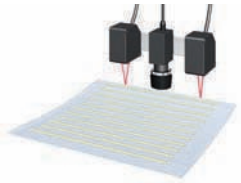
### Measuring Glass Undulation



### Measuring Glass Surfaces

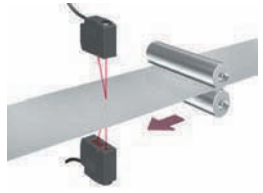


### Inspecting Glass Heights (Autofocus)

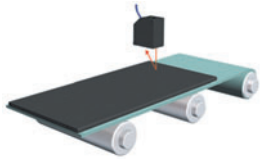


## Rubber, Resin, and Film

### Measuring Electrode Thickness on Dielectrics



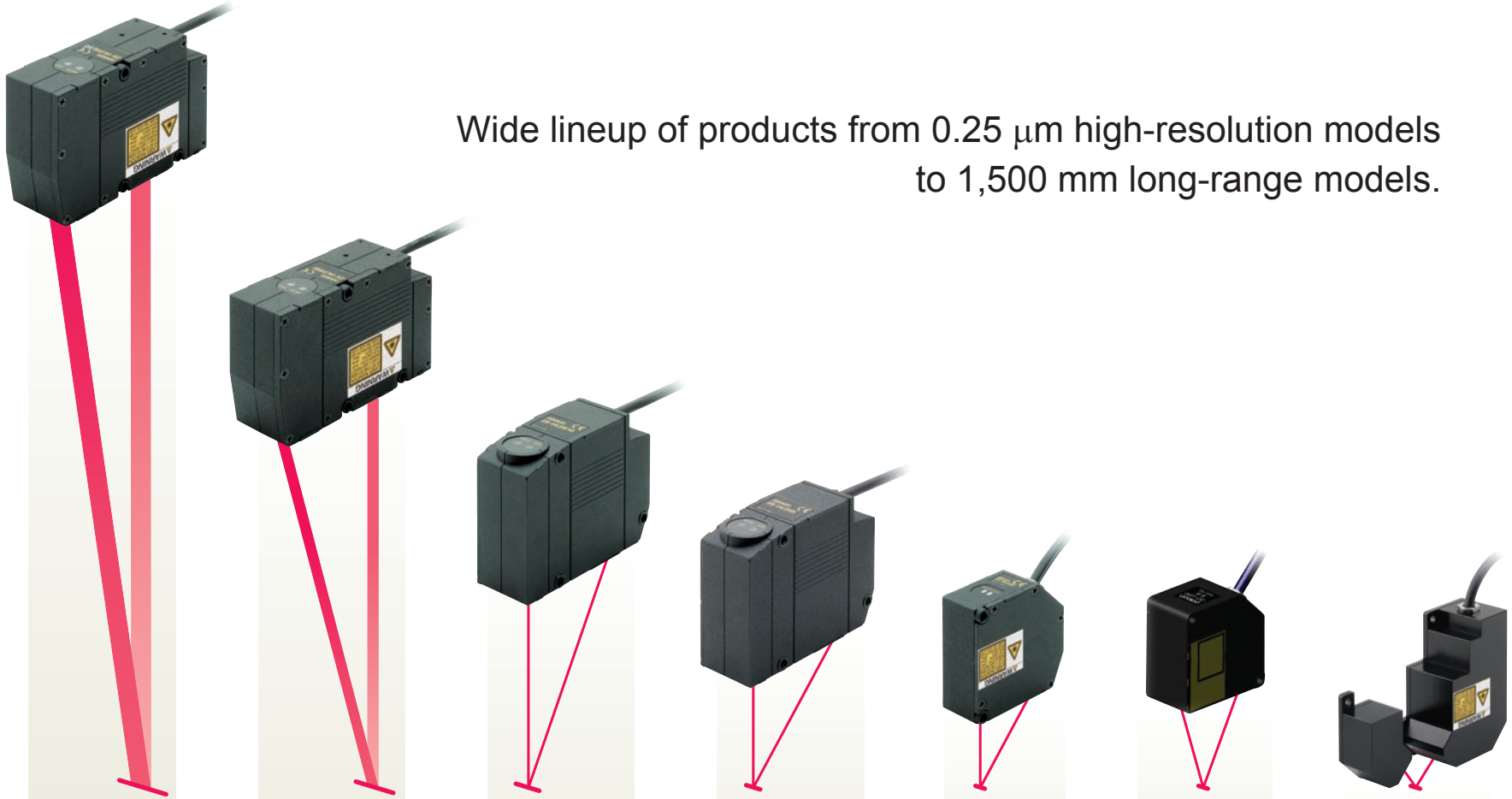
### Moving Workpieces (Black Rubber)



### Measuring Depth of O-Ring Insertion

# ZS-HL Series Product Lineup 2D CMOS High-end Displacement Sensors

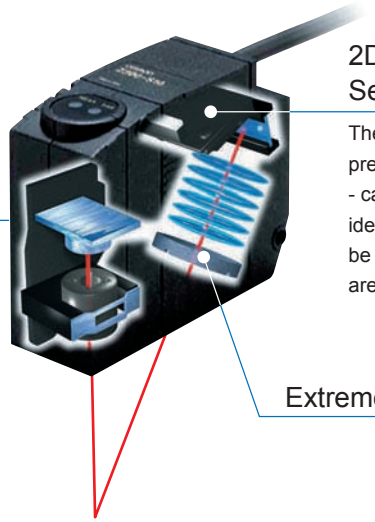
Advanced sensing technology packed into the best Sensor Head for the highest sensing precision



Wide lineup of products from 0.25 μm high-resolution models to 1,500 mm long-range models.

| Model | ZS-HLDS150 | ZS-HLDS60 | ZS-HLDS10 | ZS-HLDS5T | ZS-HLDS2T | ZS-HLDS2VT | ZS-LD10GT/LD15GT |
|---|---|---|---|---|---|---|---|
| Measuring center distance | 1500±500 mm | 600±350 mm | 100±20 mm | 50±5 mm | 20±1 mm | 25±2 mm | 10±0.5 mm /15±0.75 mm |
| Resolution | 500 μm | 8 μm | 1 μm | 0.25 μm | 0.25 μm | 0.6 μm | 0.25 μm |
| Linearity | ±0.2%F.S. | ±0.07%F.S. | ±0.1%F.S. | ±0.1%F.S. | ±0.05%F.S. | ±0.2%F.S. | ±0.1%F.S. |
| Beam shape | 1.5 mm × 40 mm | 0.3 mm × 16 mm | 60 μm × 3.5 mm | 30 μm × 1 mm | 20 μm × 1 mm | 45 μm × 2.2 mm | 25 μm × 900 μm |

# All Models Are Class 2 Lasers.



### Digital Sensing

Totally reliable measurements with completely digital sensing.

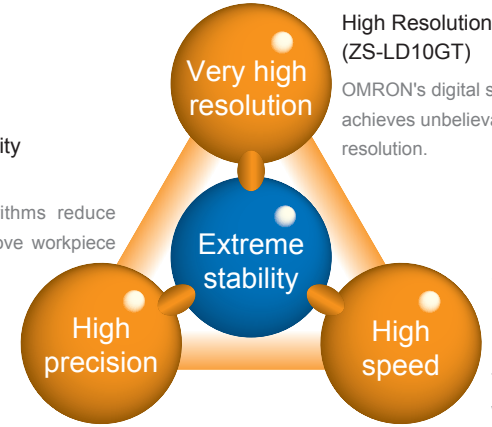
### 2D CMOS Laser Image Sensing Element

The three basics of sensing - precision, speed, and sensitivity - can be balanced because ideal measurement settings can be made for light reception area.

### Extremely Sensitive Lenses

### ±0.05% FS Linearity (ZS-HLDS2T)

Unique OMRON algorithms reduce detection error to improve workpiece measurement accuracy.




### High Resolution at 0.001 µm (ZS-LD10GT)

OMRON's digital sensing technology achieves unbelievably high resolution.

### Super-high-speed Sampling at 110 µs (ZS-HLDS□□/LD□□)

You get exact sensing with superior workpiece following performance. CMOS high-speed data reading accurately catches moving workpieces inline.

## Extreme Stability

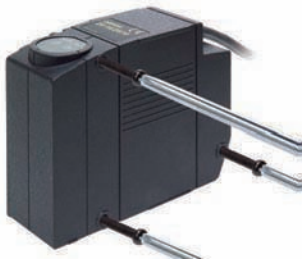
### Ideal Size and Stability

#### Head Size

Complete sensing stability with optimum Sensor Head size for best performance and holding mechanism secured at 3 points. (See note.)

◀ ZS-HLDS60/HLDS150

ZS-HLDS2T ZS-HLDS5T/ HLDS10

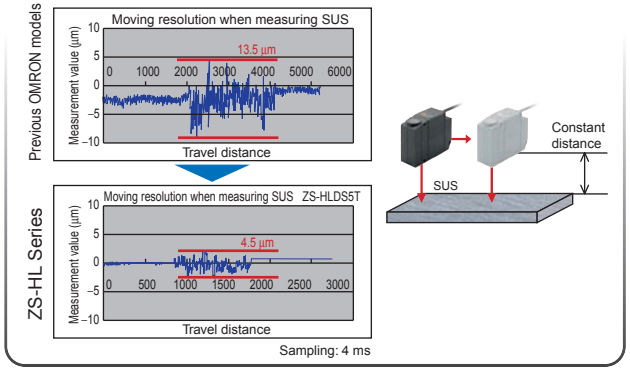


Note: ZS-HLDS2T not applicable.

### Superior Moving Resolution

#### Increased Lens Resolution

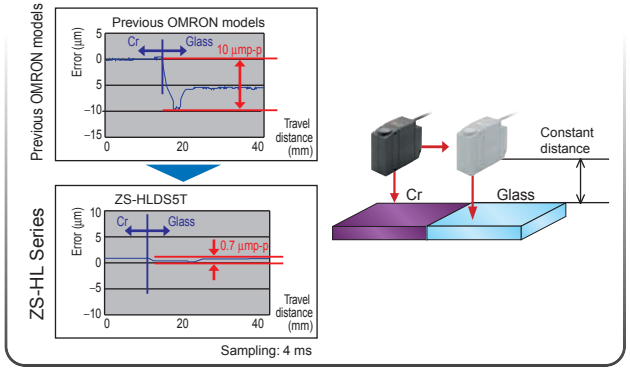
Moving resolution (error based on workpiece surface position) has been reduced dramatically by optimizing the optical system with increased sensitivity and resolution of the light receiving lenses.




### Reduced Error for Different Materials

#### 2D CMOS

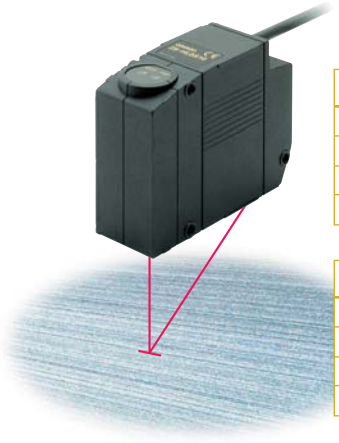
With a CCD, the charge overflows to the next pixel when excessive light is received. This phenomenon does not occur with CMOS, so there are no effects from light fluctuations from different materials or excessive light reception.



## ZS-HLDS5T/HLDS10

# Detect Essentially Any Object

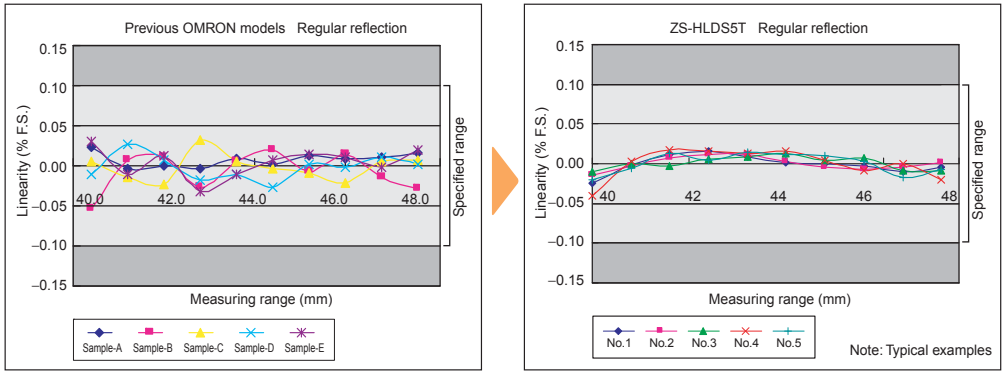
Reduced Variation in Linearity between Different Objects, and Linearity Determines Measurement Accuracy.
Makes it easier to introduce a variety of detection objects.



| Model | ZS-HLDS5T |
|---|---|
| Measuring center distance | 50±5 mm |
| Resolution | 0.25 μm |
| Linearity | ±0.1%F.S. |
| Beam shape | 30 μm × 1 mm |

| Model | ZS-HLDS10 |
|---|---|
| Measuring center distance | 100±20 mm |
| Resolution | 1 μm |
| Linearity | ±0.1%F.S. |
| Beam shape | 60 μm × 3.5 mm |

Linearity Characteristic



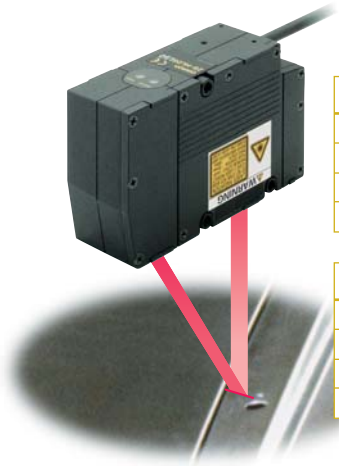

Measuring Car Body Widths
(ZS-HLDS10)

Manage trends by measuring widths of each car model.

## ZS-HLDS60/HLDS150

# A Long Range That Handles Essentially Any Installation Site

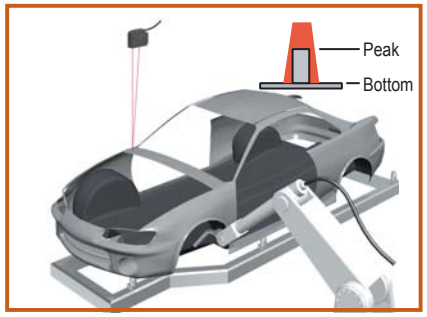
First 1,500 mm long range sensing in the industry enables measurement of previously impossible points.



| Model | ZS-HLDS60 |
|---|---|
| Measuring center distance | 600±350 mm |
| Resolution | 8 μm |
| Linearity | ±0.07%F.S. |
| Beam shape | 0.3 mm × 16 mm |

| Model | ZS-HLDS150 |
|---|---|
| Measuring center distance | 1500±500 mm |
| Resolution | 500 μm |
| Linearity | ±0.2%F.S. |
| Beam shape | 1.5 mm × 40 mm |

Simple Long-distance Step Measurement





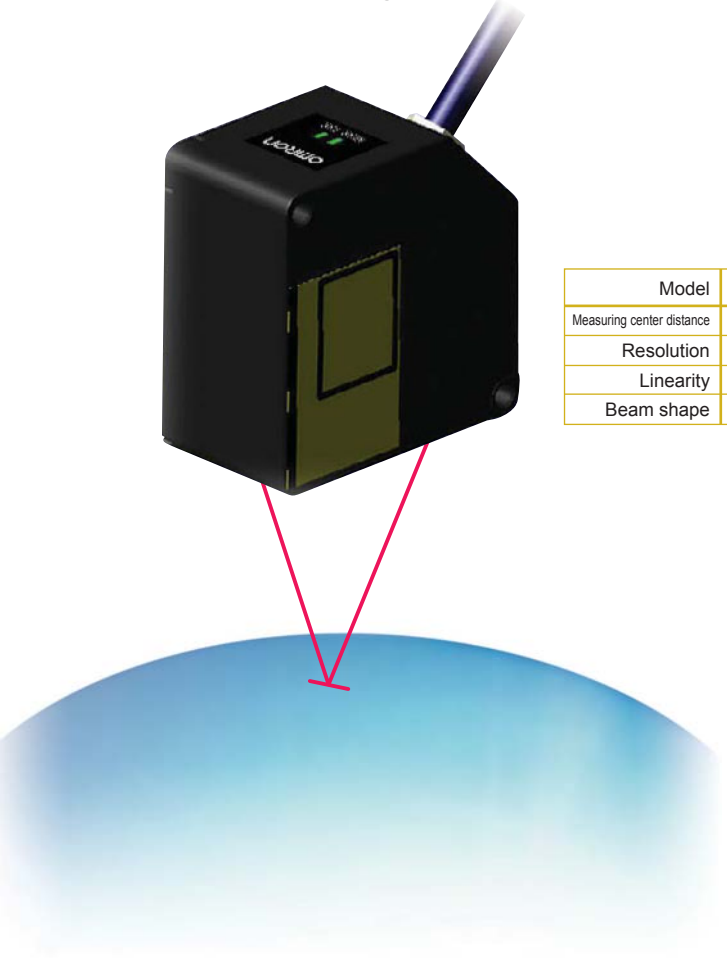
Peak/bottom measurement

Note: This function may not be applicable in bright surrounds.

# ZS-HLDS2VT NEW

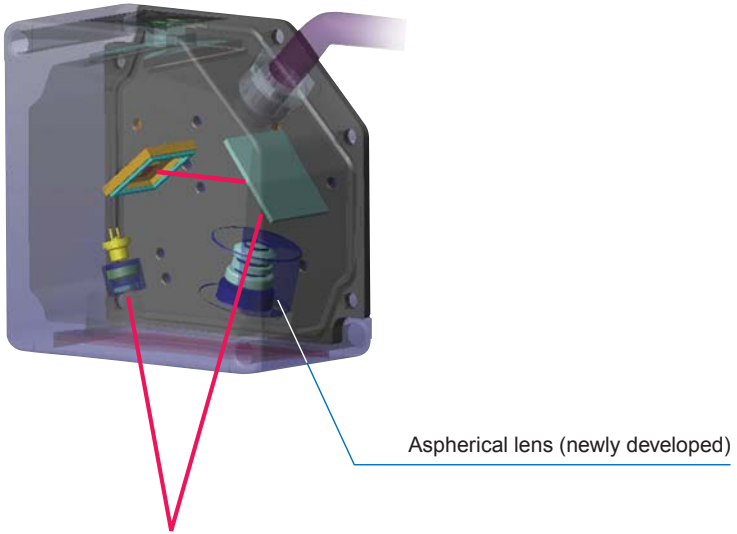
## Ideal for Measuring the Height and Thickness of Transparent Objects

Tilted and moving workpieces can also be stably measured.

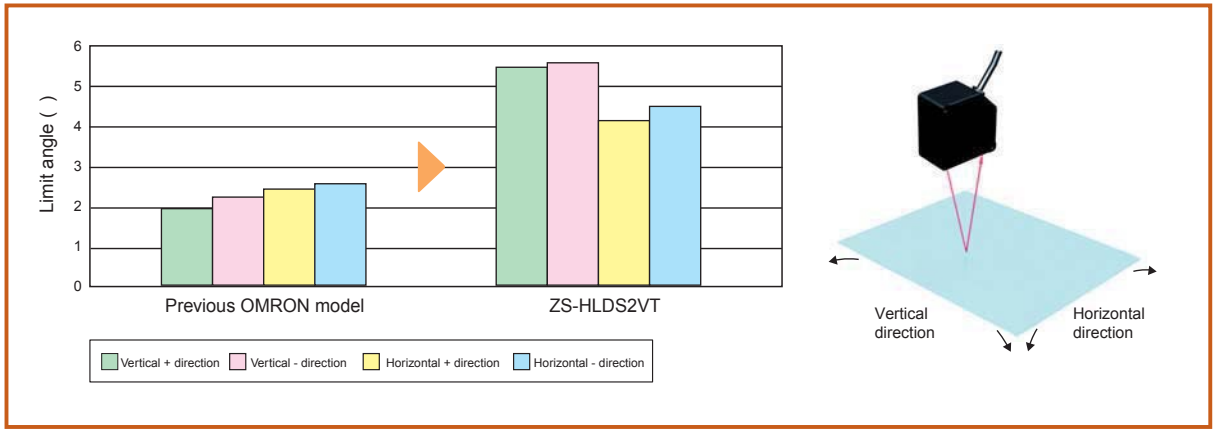


| Model | ZS-HLDS2VT |
|---|---|
| Measuring center distance | 25±2 mm |
| Resolution | 0.6 μm |
| Linearity | ±0.2%F.S. |
| Beam shape | 45 μm × 2.2 mm |

A special aspherical lens was developed for the ZS-HLDS2VT, and the design of the optical structure was optimized for regular-reflective workpieces. This has greatly increased the allowable degree of tilt and improved stability for measuring transparent and regular-reflective workpieces.




### Angle Characteristics



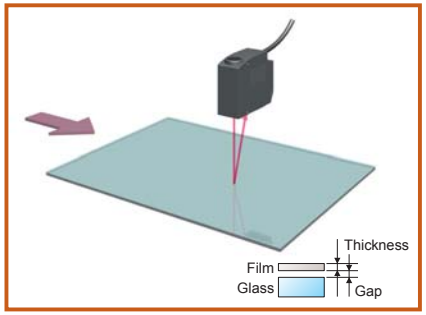
# ZS-HLDS2T/ZS-LD10GT/LD15GT

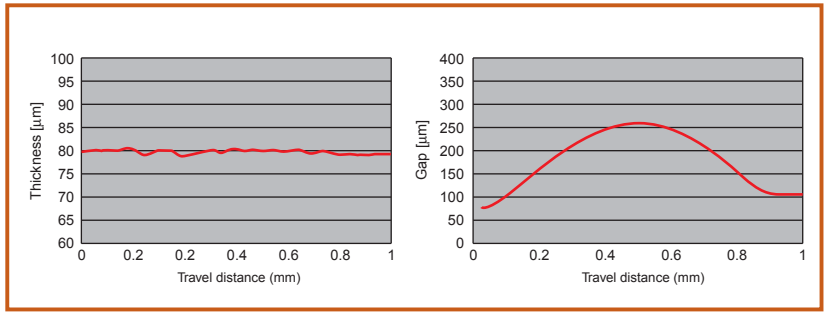
## The Only Way to Very High-precision Measurements

### Superior Features for Semiconductor Wafer, Glass, and Other Measurements Requiring Precision


| Model | ZS-HLDS2T |
|---|---|
| Measuring center distance | 20±1 mm |
| Resolution | 0.25 μm |
| Linearity | ±0.05%F.S. |
| Beam shape | 20 μm × 1 mm |

Simultaneous Measuring of Touch Panel Film Thickness and Gap



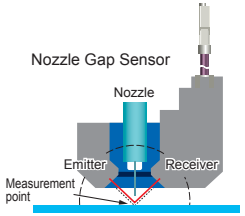

Simultaneous measurement of transparent object thickness and gap

### An unbelievable stationary measurement precision of 0.25 μm, the highest in this product class.

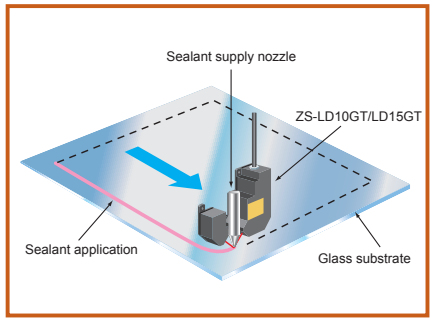
#### Ideal for Measuring Nozzle Gaps!

- Reduced pattern influence for moving measurement, the best in the moving resolution industry.
- Possible to match nozzle drip point and measurement point then measure.
- Sensor Head with separate light emission and reception in one unit to create nozzle space.

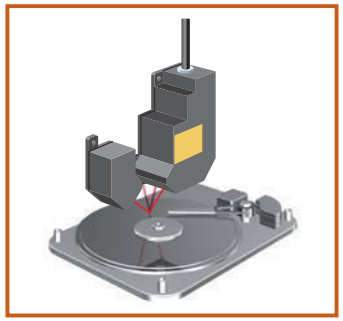
| Model | ZS-LD10GT/LD15GT |
|---|---|
| Measuring center distance | 10±0.5 mm/15±0.75 mm |
| Resolution | 0.25 μm |
| Linearity | ±0.1%F.S. |
| Beam shape | 25 × 900 μm |

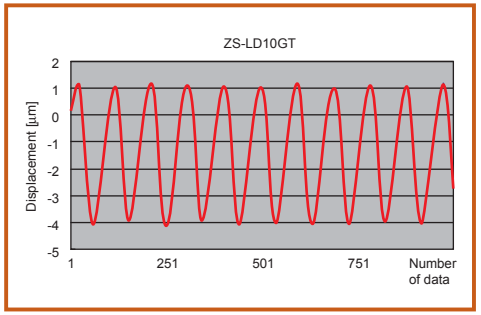



Height Control of Sealant Dispensers




Inspection of Disk Play on HDD Motor Rotating Plate






Measures amplitude undulations of 5 μm.

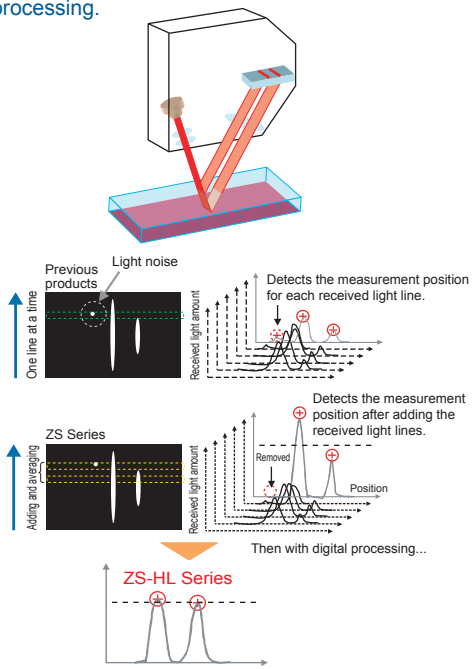
# Technology

With OMRON's sensing technology and newly developed algorithms, stable, high-precision measurement is possible of workpieces that were difficult to measure using laser displacement meters due to laser light penetration, transmission, excessive reflection, or insufficient light.

Mechanisms for Stable Measurement Patent Pending

## No more errors due to reflection coefficients between glass gaps

Stable measurement by adding received light waveform in 2D image and digital zoom processing.

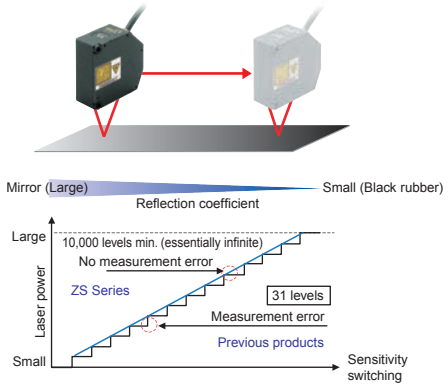



Measurement cycle time 1/8 better than previous models with addition of received light waveform captured by 2D CMOS and simultaneous measurement of front and back glass surfaces with separate sensitivities.

Mechanisms for Stable Measurement Patent Pending

## No more errors due to workpiece reflection coefficients.

Stable measurement using laser power algorithms that can be adjusted to any value.

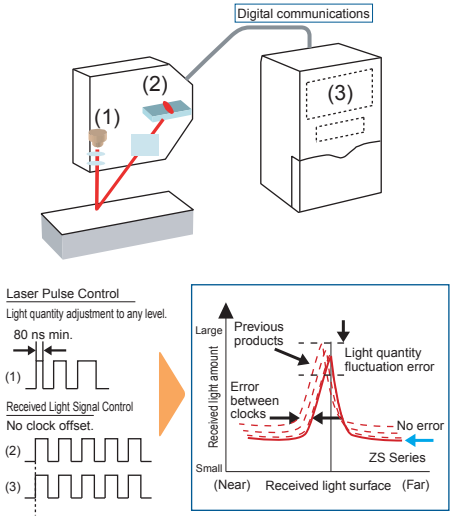



Light quantity adjustment algorithms have evolved for stable measurement of a variety of measurement objects.
Even if the workpiece status changes suddenly, the sensitivity can compensate at any level so there is no measurement error from sensitivity switching.

Mechanisms for High Resolution Patent Pending

## No more resolution errors.

Digital processing technology between the Sensor and Controller provides high resolution.

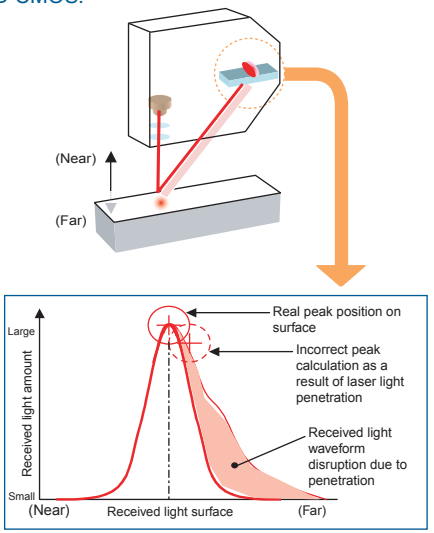



High-speed digital communications (LVDS) used between Sensor and Controller.
Image signal stabilizes because the clock error between the control signal from the Controller and the light reception device disappears. Optimum light quantity adjustment is possible with laser power algorithms that can be adjusted to any level, which facilitates super high resolution.

Mechanisms for Stable Measurement

## No more error due to penetration.

Stable measurements are achieved by correctly recognizing the light reception distribution on the 2D CMOS.



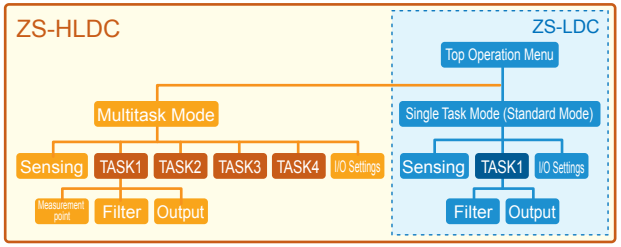

Real surface displacement detected by eliminating penetration effects for PCBs, plastic, and other workpieces penetrated by laser light.

# Sensor Controllers ZS-HLDC (Multitasking)

## Enables maximum sensing performance with fully digital processing and multitasking functions.

A controller the size of a business card filled with OMRON's leading-edge digital technology.
Enables easy utilization of the ultimate in measurement performance.


### Outline of Functions

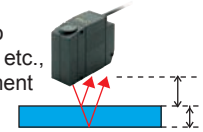



## High-performance Sensing (Multitasking)

### Simultaneous Measurement and Output of Up to 4 Features

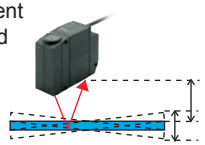
- When simultaneous measurement of distance to glass, glass thickness, gap, etc., required in glass measurement applications

Setting example
■Task 1: Average
■Task 2: Thickness



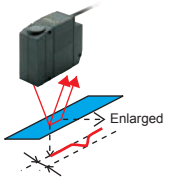
- For simultaneous measurement of HDD surface deflection and distance to HDD surface

Setting example
■Task 1: Average, Average hold
■Task 2: Average, Point-to-point hold



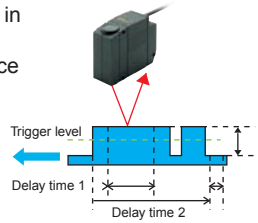
- For detection of small recesses and protrusions in measurement location

Setting example
■Task 1: Step




- For measurement of steps in different locations with moving Sensor or workpiece

Setting example
■Task 1: Average
Self-down trigger
Average hold
With delay
■Task 2: Average
Average hold
With delay
■Task 3: Calculation (Task 2 - Task 1)




### Simultaneous Control in 2 Systems of Data Confirmation and Analysis and Data Collection, Control, and Changeovers

**Control Using CompoWay/F***

Data Confirmation and Analysis
- Checks sensing screen.
- Checks measurement values.
- Logs measurement values.


**Control Using No-protocol Communications**

Data collection, control, and changeovers
- Gets measurement results.
- Resets to zero.
- Switches banks.

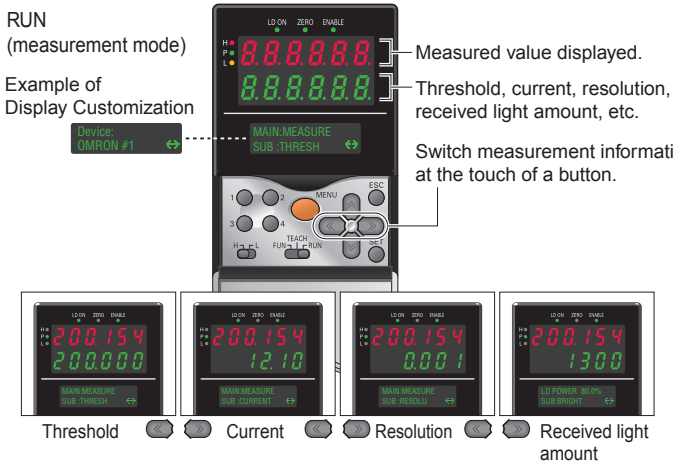
* OMRON's unique communications protocol.

### Improved Total Cycle Time with 1-second High-speed Bank Switching

## Easy Sensing with an HMI That Couldn't Be Easier to Use (Common Functions)

### Information at the Touch of a Button

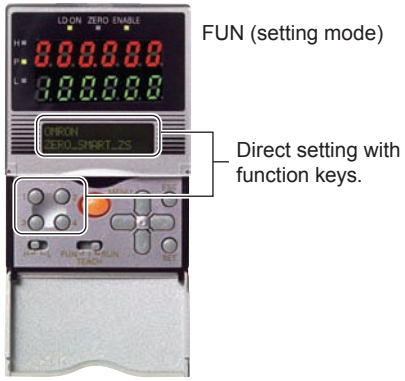
In RUN (measurement) Mode, measured values and information are displayed using 2 rows of 8-segment LEDs. The large LED display improves visibility. Measurement information includes the threshold, current, resolution, and received light amount and is available with simple key operations. LCD screens can be customized to change the display of desired information to easier-to-understand terminology.




### Set Sensing Directly

Patent Pending

In FUN (setting) Mode, setting menus are displayed on the 2 rows of the LCD. Easy-to-understand guidance simplifies setting the many display capabilities of the LCD. Function keys correspond to displayed menu items for intuitive setting of measurement conditions and other parameters. You can also easily switch between Japanese and English displays. Communication with the operator is better than ever before.





## ZS-LDC

### Single Task Controller

Simple Operation
Reasonable Price

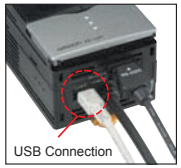
### Mount to DIN Track or directly to control panels.

Patent Pending

Panel Mounting Adapter (Option, Sold Separately)

### Connect directly to a PC using USB.

USB 2.0 and RS-232C provided as standard features. LVDS, a new-generation digital high-speed communications interface, is used between the Sensor Head and Controller, an industry first. If USB is used to connect to the computer, high-speed all digital measurement data transfer is possible.
Firmware can be updated easily using the SmartMonitor WarpEngine.

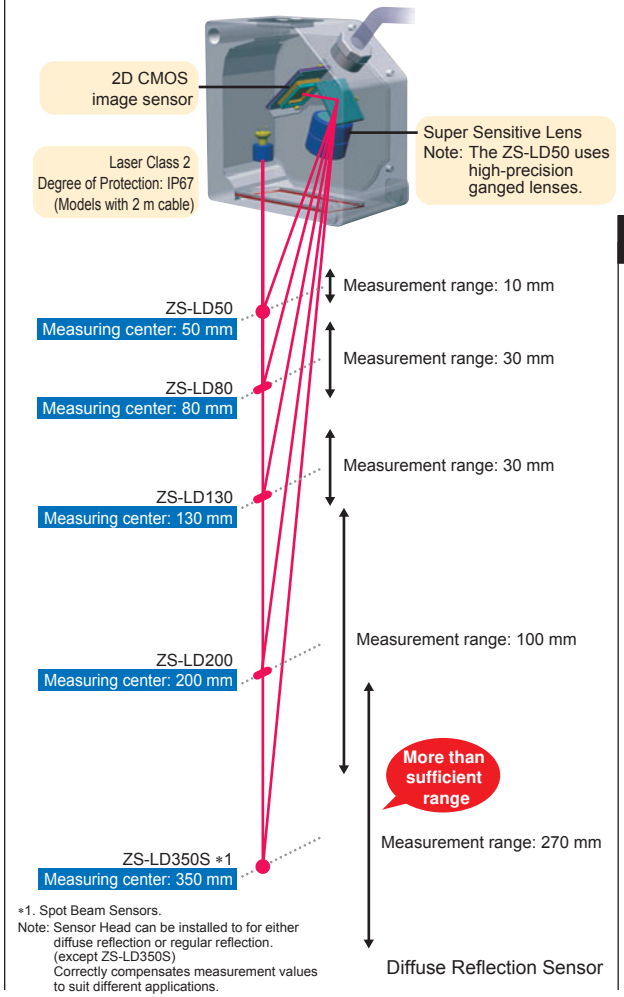


# ZS-L Series Product Lineup 2D CMOS Low-end Displacement Sensors

Advanced sensing technology packed into the smallest Sensor Heads in this class.

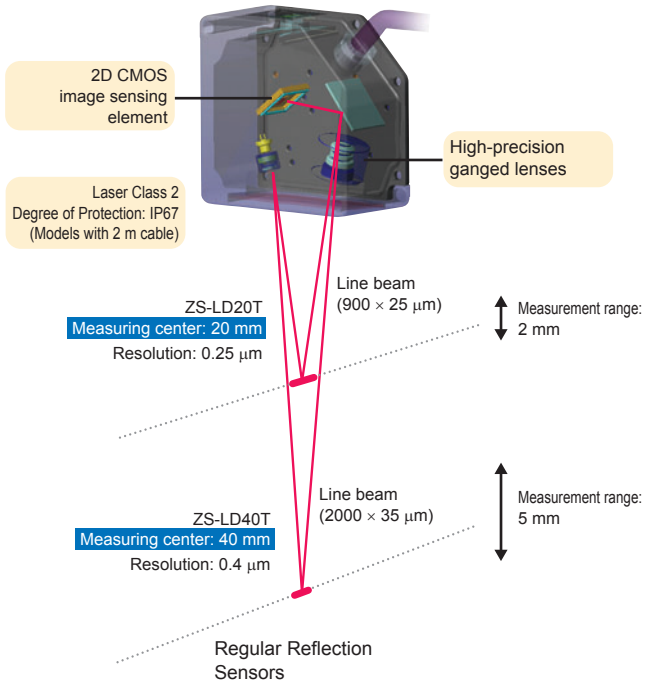
- Smallest size in this class (65 × 65 mm)
- Uniform Sensor Head size
- Line/spot beam type
- Detects black rubber, mirror, and transparent workpieces

## ZS-LD50/LD80/LD130/LD200/LD350S



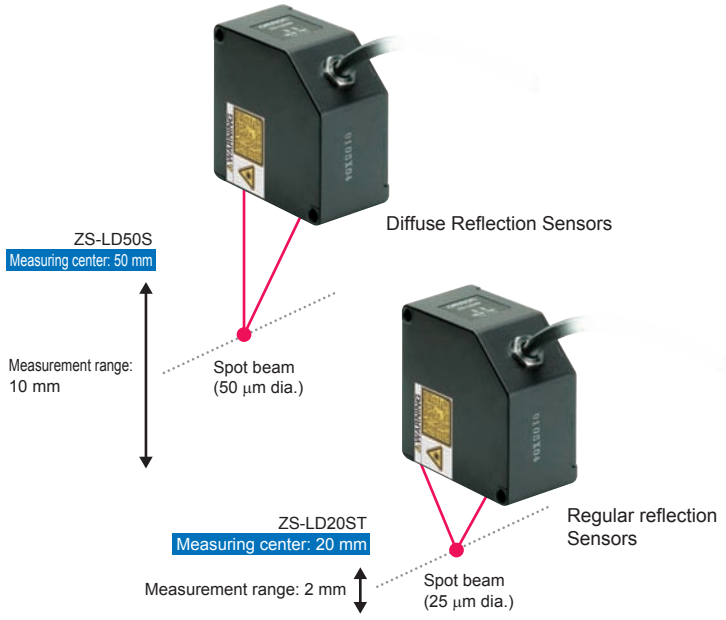

*1. Spot Beam Sensors.
Note: Sensor Head can be installed to for either diffuse reflection or regular reflection. (except ZS-LD350S)
Correctly compensates measurement values to suit different applications.

## ZS-LD20T/LD40T




## ZS-LD20ST/LD50S

Spot Beam Sensors

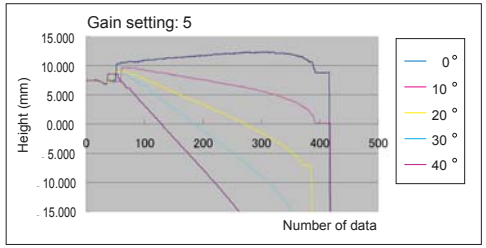


## Stable Measurements for PCBs, Black Resin, and Metal

■ All you need to do is select the proper mode to achieve stable sensing of PCBs, resins, black rubber, and other light-penetrating workpieces (these could not be easily handled with previous reflective laser displacement meters.)

### ZS-LD80

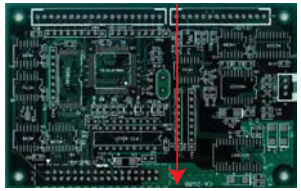
Measuring the Shape of Black Resin Workpieces

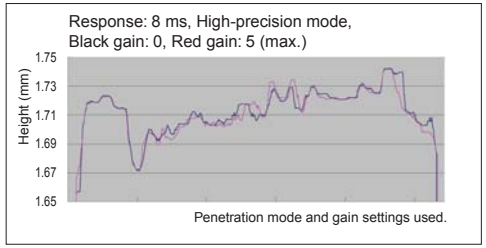



Complete measurement data will be obtained at angles of up to 40°.

### ZS-LD50

Measuring the Shape PCB Surfaces






PCB shapes can be measured without burs or waveform disruptions.

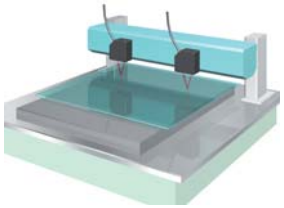
## Stable Measurements for Glass

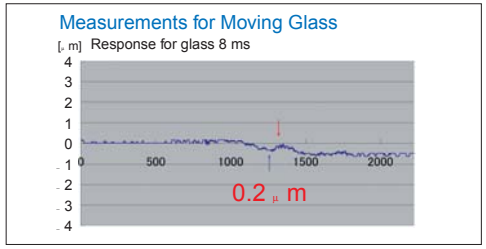
■ Stably measure height and undulations in transparent, coated, or colored glass on work tables. Stable detection at 40 mm with a line beam of 2 mm.

A 2-mm line beam reduces the influence of black and white patterns on granite work tables to achieve stable measurements.

### ZS-LD40T

Measuring Glass Surfaces

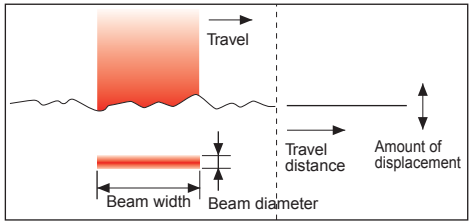





Ideal for measuring glass thickness and slit nozzle gaps when coating glass with resist or sealer.

## Line Beam Sensors for Emphasis on Stable Measurement

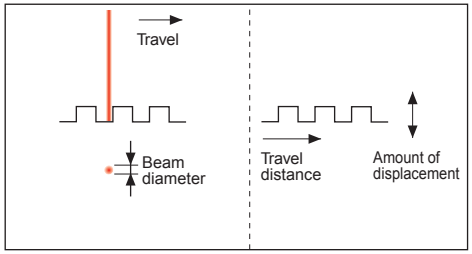
Line beams produce an averaging affect that is less likely to be affected by surface irregularities, creating stable measurements.
Ideal for stable measurements that do not rely on the surface of the target workpiece.




| Line Beam sensors | ZS-LD20T | ZS-LD40T | ZS-LD50 | ZS-LD80 | ZS-LD130 | ZS-LD200 |
|---|---|---|---|---|---|---|
| Beam diameter | 25 μm | 35 μm | 60 μm | 60 μm | 70 μm | 100 μm |
| Beam width | 0.9 mm | 2 mm | 0.9 mm | 0.9 mm | 0.6 mm | 0.9 mm |

## Spot Beam Sensors Ideal for Minute Workpieces and Shape Measurement

Ideal for measurements requiring minute shape repeatability while matching laser beam position with a minute target measurement area.



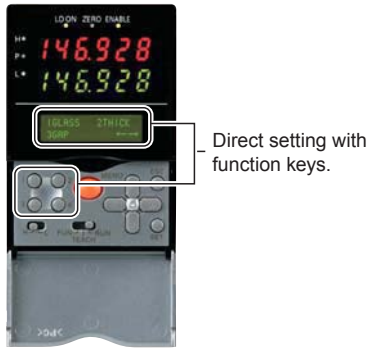

| Spot Beam sensors | ZS-LD20ST | ZS-LD50S | ZS-LD350S |
|---|---|---|---|
| Beam width | 25 μm dia. | 50 μm dia. | 240 μm dia. |

## Easy Sensing with an HMI That Couldn't Be Easier to Use

■ Just select High-precision Mode to stably measure black rubber.
■ Just select Penetration Mode to stably measure PCBs or black resin.

### Set Sensing Directly

FUN (setting mode)



# System Configuration

## Sensors

### ZS-HL Series

### ZS-L Series

## Controllers

### Sensor Controllers

ZS-HLDC ∗1

ZS-LDC ∗2

### Multi-Controllers

ZS-MDC
Calculating measurement results for each sensor.

### Data Storage Units

ZS-DSU
Log measurement Values.

### Expansion I/O Units

ZG-RPD
High-speed binary output of measurement data. ∗3

## Peripheral Devices

### Parallel I/O

PLC

High-speed Input Boards (PC)

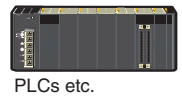
### USB

SmartMonitor (PC)
ZS-SW11V3E

### RS-232C

PLCs etc.

### CompoNet



PLCs etc.

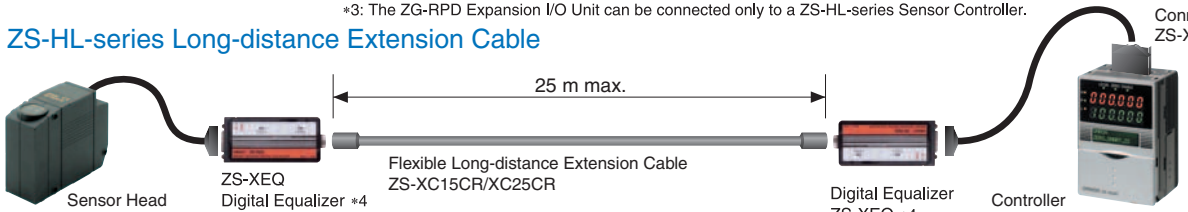
ZS-CRT Sensor Communications Unit

### Analog

Data logger etc.

∗1: The ZS-HLDC can be connected to a ZS-HL/L-series Sensor Head.
∗2: The ZS-LDC can be connected only to a ZS-L-series Sensor Head.
∗3: The ZG-RPD Expansion I/O Unit can be connected only to a ZS-HL-series Sensor Controller.

### ZS-HL-series Long-distance Extension Cable




∗4: ZS-XEQ Digital Equalizer can be connected to ZS-HL Series only.

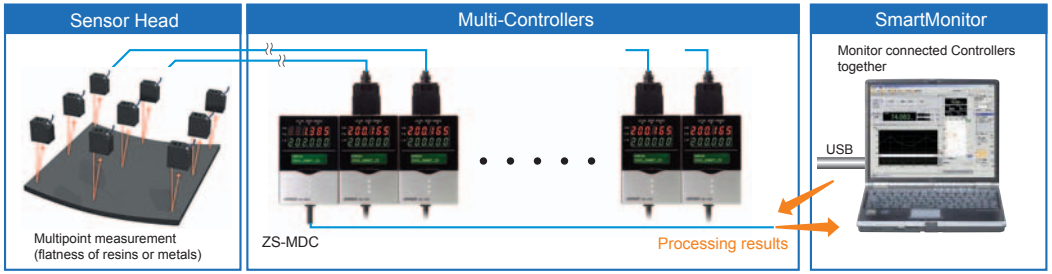
# Multi-Controller ZS-MDC

## Centralized Controller Information Calculations

Transfers data between multi-connected Controllers and performs high-speed multiprocessing.

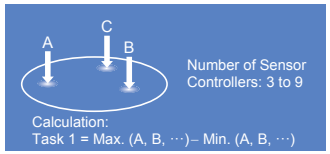
### High-speed Connections for Up To 9 Controllers

See the difference in applications requiring multipoint measurement, such as thickness, steps, and flatness measurements. Connect up to 9 Controllers with the fastest high-speed bus in the industry. Digital processing prevents data dropouts to provide the capability to measure exactly what is seen.
Sampling speed with 3 Controllers connected: 110 μs, Sampling speed with 9 Controllers connected: 380 μs
Note: When using communications commands.

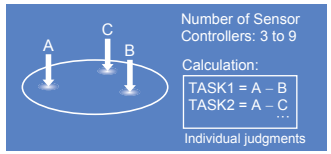



### Processing Enabled by the Multi-Controller

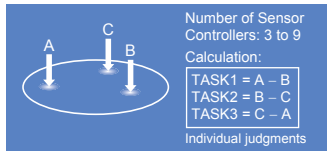
**Flatness Calculations**
Calculating the difference between the maximum and minimum values.



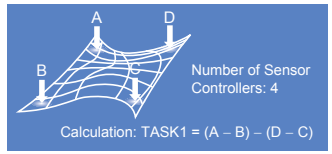

**Reference Step Calculations**
Calculating the difference between a reference point (A) and other points.



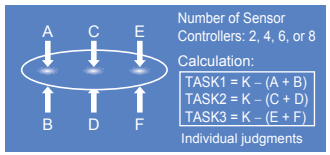

**Relative Step Calculations**
Calculating the difference between all points.



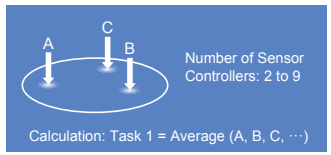

**Twisting Calculations**
Calculating twisting between opposing sides.



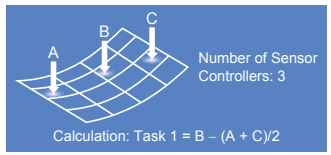

**Multipoint Thickness Calculations**
Calculating the difference between pairs of points.




**Average Height Calculations**
Calculating the average surface height.




**Warp Calculations**
Calculating warping of selected sides




**User-set Calculations**
Formulas can be flexibly set.

[K + mX + nY]


Multi-calculations of Data

Multipoint measurement

High-speed data transfer

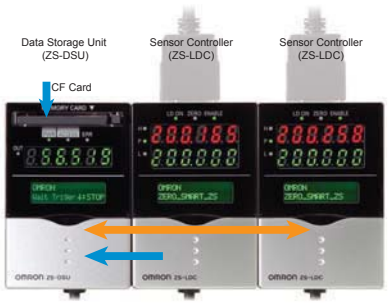
# Data Storage Unit ZS-DSU

## Logging Software for Onsite Installed


Efficiently stores sensing data using a variety of logging functions.
High-speed, long term logging settings can be used to precisely process the required sensing data, which can be reliably and completely collected using USB and an all-digital bus.
Sensor setting data can also be stored.
Data for up to 128 banks can be stored and transferred to the Master Unit for changeovers.

- High-speed sampling rate: 150 μs max.
- Powerful support for logging data using various trigger functions.

| | | |
|---|---|---|
| Config-uration | Number of connectable Controllers | 10 max. (ZS-MDC: 1, ZS-HLDC/LDC: 9 max.) |
| | Connectable Controllers | ZS-HLDC□, ZS-LDC□, ZS-MDC□ |
| Perform-ance | Data resolution | 32 bits |
| | Sampling rate | ・Shortest high-speed logging mode (One-shot Mode)・1<br>・Long-term logging mode (Repeat Mode)・2<br>・Sampling period: 10 ms to 1 h (at 1-ms intervals) |
| Functions | Trigger functions | Start and end triggers can be set separately.<br>External trigger/data trigger (self-trigger)<br>Time triggers |
| | Other functions | ・External bank function<br>・Alarm output function<br>・Saved data format customization function<br>・Time function (timestamps) |
| Software (included) | | ・CSV file generation Software<br>・Excel macros for simple analysis<br>(Equivalent to software provided with SmartMonitor Professional.) |




Data Storage Unit
ZS-DSU

・1) For One-shot Mode
・Connected to ZS-LDC

| Number of channels | Min. sampling interval | Longest logging time |
|---|---|---|
| 1 | 150 μs | 10 min |
| 2 | 200 μs | 6.5 min |
| 4 | 350 μs | 5.5 min |
| 9 | 650 μs | 4.5 min |

Typical examples

・2) For Repeat Mode (Logging time depends on capacity of Memory Card.)
・Example for 64-MB Memory Card

| Number of channels | Min. sampling interval | Longest logging time |
|---|---|---|
| 1 | 10 ms | 20 h |
| 2 | 10 ms | 10 h |
| 4 | 10 ms | 5 h |
| 9 | 10 ms | 2 h |

Typical examples

・Connected to ZS-MDC

| Number of channels | Min. sampling interval | Longest logging time |
|---|---|---|
| 1 | 350 μs | 20 min |
| 2 | 400 μs | 12 min |
| 4 | 500 μs | 8 min |
| 9 | 700 μs | 5 min |

Typical examples

Multipoint data collection

Traceability

Changeover Unit

# Setting Software for ZS Series SmartMonitor V3 Professional ZS-SW11V3E

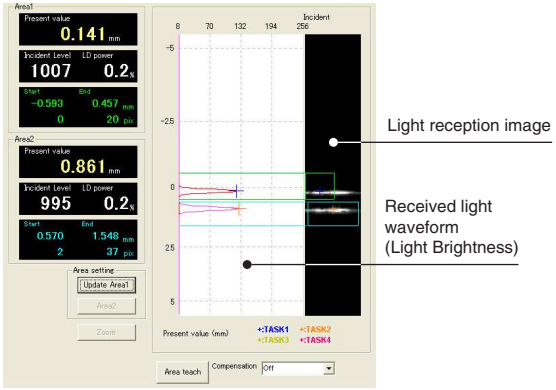
## Use a Computer for Everything from Ideal ZS Settings to Powerful Support of Data Collection and Analysis.

## Easy Settings Using USB.

### More Powerful Setting Support

The CMOS light reception image and the received light waveform can be displayed. The real power of the SmartMonitor is seen when measuring transparent objects and other workpieces that create multiple received light waveforms.

●Received Light Monitor

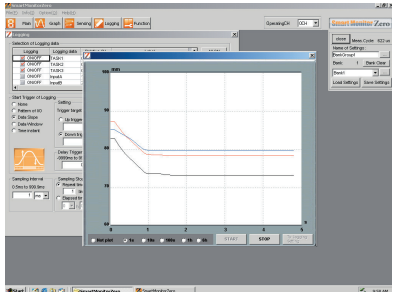



### Meets a wide range of logging needs.

Log measurement results at various times to leave judgment and inspection results.
The fastest sampling interval is 500 µs (see note).

Note: Data may be skipped, depending on the computer system.
Use a computer that meets the recommended system requirements.

●Logging

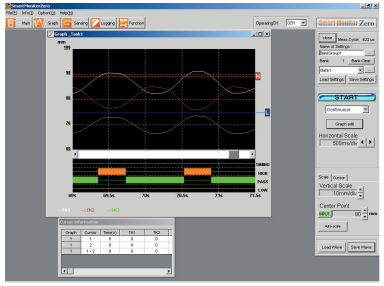


### High-speed simultaneous multichannel waveform graphs.

High-speed display: 2-ms interval at max. speed (see note); Simultaneous multichannel waveform display: Up to 9 waveforms can be displayed.

Note: Data may be skipped, depending on the computer system. Use a computer that meets the recommended system requirements.

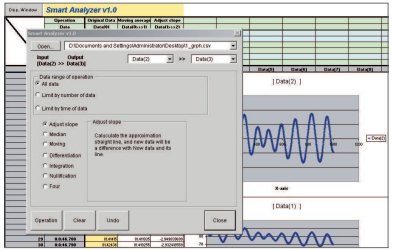
●Multi-channel Waveform Display



### Excel macro provided for simple analysis.

Data collected by logging can be processed with an Excel macro using filters, slope compensation, filter median transitions, differentiation, integration, and arithmetic functions and then used for nominal judgments and other determinations.

●Analysis



Recommended System Requirements
SmartMonitor Professional
OS: Windows 10 (32-bit/64-bit version)
Windows 7 (32-bit/64-bit version)
Windows XP (Service Pack3 or higher, 32-bit version)
CPU: Intel Pentium III 1 GHz or faster (2 GHz min. recommended.)
Memory: 1 GB min.
Available hard disk space: 50 MB min.
Display screen: 1,024 × 768 dots min., 16 million colors min.
Note: If the recommended system requirements are not met, data may be interrupted and waveforms not displayed correctly when using the logging, high-speed graph drawing, and multi-channel waveform drawing functions.
SmartAnalyzer Macro Edition
For Microsoft Excel Macro Programming
Microsoft Excel 2000 or later required.

# Ordering Information

## Smart Sensor

### ZS-HL-series Sensor Heads

| Optical system | Sensing distance | Beam shape | Beam diameter | Resolution (see note) | Cable length | Model |
|---|---|---|---|---|---|---|
| Regular Reflective Models | 20±1 mm | Line beam | 1.0 mm × 20 μm | 0.25 μm | 2 m | ZS-HLDS2T 2M |
| | | | | | 0.5 m | ZS-HLDS2T 0.5M |
| | 25±2 mm | Line beam | 2.2 mm × 45 μm | 0.6 μm | 2 m | ZS-HLDS2VT 2M |
| | | | | | 0.5 m | ZS-HLDS2VT 0.5M |
| Diffuse Reflective Models | 50±5 mm | Line beam | 1.0 mm × 30 μm | 0.25 μm | 2 m | ZS-HLDS5T 2M |
| | | | | | 0.5 m | ZS-HLDS5T 0.5M |
| | 100±20 mm | Line beam | 3.5 mm × 60 μm | 1 μm | 2 m | ZS-HLDS10 2M |
| | | | | | 0.5 m | ZS-HLDS10 0.5M |
| | 600±350 mm | Line beam | 16 mm × 0.3 mm | 8 μm | 2 m | ZS-HLDS60 2M |
| | | | | | 0.5 m | ZS-HLDS60 0.5M |
| | 1500±500 mm | Line beam | 40 mm × 1.5 mm | 500 μm | 2 m | ZS-HLDS150 2M |
| | | | | | 0.5 m | ZS-HLDS150 0.5M |

Note : Refer to the table of ratings and specifications for details.

### ZS-HL-series Sensor Heads (For Nozzle Gaps)

| Optical system | Sensing distance | Beam shape | Beam diameter | Resolution (see note) | Cable length | Model |
|---|---|---|---|---|---|---|
| Regular Reflective Models | 10±0.5 mm | Line beam | 900 × 25 μm | 0.25 μm | 2 m | ZS-LD10GT 2M |
| | | | | | 0.5 m | ZS-LD10GT 0.5M |
| | 15±0.75 mm | Line beam | 900 × 25 μm | 0.25 μm | 2 m | ZS-LD15GT 2M |
| | | | | | 0.5 m | ZS-LD15GT 0.5M |

Note : Refer to the table of ratings and specifications for details.

### ZS-L-series Sensor Heads

| Optical system | Sensing distance | Beam shape | Beam diameter | Resolution (see note) | Cable length | Model |
|---|---|---|---|---|---|---|
| Regular Reflective Models | 20±1 mm | Line beam | 900 × 25 μm | 0.25 μm | 2 m | ZS-LD20T 2M |
| | | | | | 0.5 m | ZS-LD20T 0.5M |
| | | Spot beam | 25 μm dia. | 0.25 μm | 2 m | ZS-LD20ST 2M |
| | | | | | 0.5 m | ZS-LD20ST 0.5M |
| | 40±2.5 mm | Line beam | 2000 × 35 μm | 0.4 μm | 4 m | ZS-LD40T 4M |
| | | | | | 2 m | ZS-LD40T 2M |
| | | | | | 0.5 m | ZS-LD40T 0.5M |
| Diffuse Reflective Models | 50±5 mm | Line beam | 900 × 60 μm | 0.8 μm | 2 m | ZS-LD50 2M |
| | | | | | 0.5 m | ZS-LD50 0.5M |
| | | Spot beam | 50 μm dia. | 0.8 μm | 2 m | ZS-LD50S 2M |
| | | | | | 0.5 m | ZS-LD50S 0.5M |
| | 80±15 mm | Line beam | 900 × 60 μm | 2 μm | 2 m | ZS-LD80 2M |
| | | | | | 1 m | ZS-LD80 1M |
| | | | | | 0.5 m | ZS-LD80 0.5M |
| | 130±15 mm | Line beam | 600 × 70 μm | 3 μm | 2 m | ZS-LD130 2M |
| | | | | | 0.5 m | ZS-LD130 0.5M |
| | 200±50 mm | Line beam | 900 × 100 μm | 5 μm | 2 m | ZS-LD200 2M |
| | | | | | 0.5 m | ZS-LD200 0.5M |
| | 350±135 mm | Spot beam | 240 μm dia. | 20 μm | 2 m | ZS-LD350S 2M |
| | | | | | 0.5 m | ZS-LD350S 0.5M |

Note : No. of samples to average: 128 when set to High-precision Mode.

### ZS-HL-series Sensor Controllers

| Shape | Supply voltage | Control outputs | Model |
|---|---|---|---|
|  | 24 VDC | NPN outputs | ZS-HLDC11 |
| | | PNP outputs | ZS-HLDC41 |

### ZS-L-series Sensor Controllers

| Shape | Supply voltage | Control outputs | Model |
|---|---|---|---|
|  | 24 VDC | NPN outputs | ZS-LDC11 |
| | | PNP outputs | ZS-LDC41 |

### Multi-Controllers

| Shape | Supply voltage | Control outputs | Model |
|---|---|---|---|
|  | 24 VDC | NPN outputs | ZS-MDC11 |
| | | PNP outputs | ZS-MDC41 |

### Data Storage Units

| Shape | Supply voltage | Control outputs | Model |
|---|---|---|---|
|  | 24 VDC | NPN outputs | ZS-DSU11 |
| | | PNP outputs | ZS-DSU41 |

# Accessories (Sold Separately)

## Controller Link Unit

| Shape | Model |
|---|---|
|  | ZS-XCN |

## Panel Mount Adapter

| Shape | Model | |
|---|---|---|
|  | ZS-XPM1 | For 1st Controller |
|  | ZS-XPM2 | For expansion (from 2nd Controller on) |

## RS-232C Cables

| Connected to | Model | Qty |
|---|---|---|
| Personal computer (2 m) | ZS-XRS3 | 1 |
| PLC/PT (2 m) | ZS-XPT3 | 1 |

## Extension Cables for Sensor Heads

| Cable length | Model | Qty |
|---|---|---|
| 1 m | ZS-XC1A | 1 |
| 4 m | ZS-XC4A | 1 |
| 5 m | ZS-XC5B (∗1, ∗2) | 1 |
| 8 m | ZS-XC8A | 1 |
| 10 m | ZS-XC10B (∗1) | 1 |

∗1. Up to two ZS-XC□B Cables can be connected. (22 m max.)
∗2. A Robot Cable (ZS-XC5BR) is also available.

## Long Extension Cables for Sensor Heads (Used with a Digital Equalizer for ZS-HL Series)

| Name | Model | Qty |
|---|---|---|
| Digital Equalizer (Relay) | ZS-XEQ | 1 |
| Extension Cable (long distance, flexible 15 m cable) | ZS-XC15CR | 1 |
| Extension Cable (long distance, flexible 25 m cable) | ZS-XC25CR | 1 |
| Digital Equalizer Connection Cable (0.2 m) | ZS-XC02D | 1 |

## Logging Software

| Name | Model |
|---|---|
| SmartMonitor Professional | ZS-SW11V3E |

## Realtime Parallel Output Unit (for ZS-HL Series)

| Shape | Control outputs | Model |
|---|---|---|
|  | NPN outputs | ZG-RPD11-N |
| | PNP outputs | ZG-RPD41-N |

## CompoNet-compatible Sensor Communications Unit.

| Shape | Model |
|---|---|
|  | ZS-CRT |

## Memory Cards

| Model | Capacity |
|---|---|
| HMC-EF283 | 256 MB |
| HMC-EF583 | 512 MB |

## Quick Reference for Extension Cable Connections

| Extension Cable | | | Sensor Head | | Controller | | Remarks |
|---|---|---|---|---|---|---|---|
| Model | Length | Bend resistant | ZS-LD□ ZS-HLDS2V | ZS-HLDS2/ -HLDS5/-HLDS10/ -HLDS60/-HLDS150 | ZS-LDC□ | ZS-HLDC□ | |
| ZS-XC1A | 1m | | ○ | ○ | ○ | ○ | Only one Extension Cable can be used. |
| ZS-XC4A | 4m | | ○ | ○ | ○ | ○ | |
| ZS-XC8A | 8m | | ○ | ○ | ○ | ○ | |
| ZS-XC5B | 5m | | ○ | ○ | ○ | ○ | Up to two Extension Cables can be used. (The maximum length is 22 m.) |
| ZS-XC10B | 10m | | ○ | ○ | ○ | ○ | |
| ZS-XC5BR | 5m | ○ | ○ | ○ | ○ | ○ | |
| ZS-XC15CR | 15m | ○ | | ○ | | ○ | A ZS-XEQ Digital Equalizar and ZS-XC02D Digital Equalizar Connecting Cable are requied. |
| ZS-XC25CR | 25m | ○ | | ○ | | ○ | |

# Ratings and Specifications

ZS-HL/L-series Sensor Controllers

| Item | Model | | ZS-HLDC11/LDC11 | ZS-HLDC41/LDC41 |
|---|---|---|---|---|
| No. of samples to average | | | 1, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1,024, 2,048, or 4,096 | |
| Number of mounted Sensors | | | 1 per Sensor Controller | |
| External interface | Connection method | | Serial I/O: connector, Other: pre-wired (Standard cable length: 2 m) | |
| | Serial I/O | USB 2.0 | 1 port, Full Speed (12 Mbps max.), MINI-B | |
| | | RS-232C | 1 port, 115,200 bps max. | |
| | Output | Judgment output | HIGH/PASS/LOW 3 outputs<br>NPN open collector, 30 VDC, 50 mA max., residual voltage 1.2 V max. | HIGH/PASS/LOW: 3 outputs<br>PNP open collector, 50 mA max., residual voltage 1.2 V max. |
| | | Linear output | Selectable from 2 types of output, voltage or current (selected by slide switch on bottom).<br>• Voltage output: −10 to 10 V, output impedance: 40 Ω<br>• Current output: 4 to 20 mA, maximum load resistance: 300 Ω | |
| | Inputs | Laser OFF, ZERO reset timing, RESET | ON: Short-circuited with 0 V terminal or 1.5 V or less<br>OFF: Open (leakage current: 0.1 mA max.) | ON: Short-circuited to supply voltage or within 1.5 V of supply voltage.<br>OFF: Open (leakage current: 0.1 mA max.) |
| Functions | | | Display: Measured value, threshold value, voltage/current, received light amount, and resolution/terminal block output ∗2<br>Sensing: Mode, gain, measurement object, head installation<br>Measurement point ∗1: Average, peak, bottom, thickness, step, and calculations<br>Filter: Smooth, average, and differentiation<br>Outputs: Scaling, various hold values, and zero reset<br>I/O settings: Linear (focus/correction), judgments (hysteresis and timer), non-measurement, and bank (switching and clear) ∗2<br>System: Save, initialization, measurement information display, communications settings, key lock, language, and data load<br>Task: ZS-HLDC□1: Single task or multitask (up to 4)<br>ZS-LDC□1: Single task | |
| Status indicators | | | HIGH (orange), PASS (green), LOW (orange), LDON (green), ZERO (orange), and ENABLE (green) | |
| Segment display | | Main digital | 8-segment red LED, 6 digits | |
| | | Sub-digital | 8-segment green LEDs, 6 digits | |
| LCD | | | 16 digits x 2 rows, Color of characters: green, Resolution per character: 5 x 8 pixel matrix | |
| Setting inputs | | Setting keys | Direction keys (UP, DOWN, LEFT, and RIGHT), SET key, ESC key, MENU key, and function keys (1 to 4) | |
| | | Slide switch | Threshold switch (2 states: High/Low), mode switch (3 states: FUN, TEACH, and RUN) | |
| Power supply voltage | | | 21.6 V to 26.4 VDC (including ripple) | |
| Current consumption | | | 0.5 A max. (when Sensor Head is connected) | |
| 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 | | | IP20 (IEC60529) | |
| Materials | | | Case: Polycarbonate (PC) | |
| Cable length | | | 2 m | |
| Weight | | | Approx. 280 g (excluding packing materials and accessories) | |
| Accessories | | | Ferrite core (1), instruction sheet | |

∗1. Can be used with ZS-HLDC□1 when Multitask Mode selected.
∗2. Terminal block output is a function of the ZS-HLDC□1.

# Ratings and Specifications

ZS-HL-series Sensor Heads

| Item / Model | | ZS-HLDS2T | | ZS-HLDS2VT | ZS-HLDS5T | | ZS-HLDS10 | | ZS-HLDS60 | ZS-HLDS150 |
|---|---|---|---|---|---|---|---|---|---|---|
| Applicable Controllers | | ZS-HLDC series | | | | | | | | |
| Optical system | | Regular reflection | Diffuse reflection | Regular reflection | Diffuse reflection | Regular reflection | Diffuse reflection | Regular reflection | Diffuse reflection | Diffuse reflection |
| Measuring center distance | | 20 mm | 5.2 mm | 25 mm | 50 mm | 44 mm | 100 mm | 94 mm | 600 mm | 1500 mm |
| Measuring range | | ±1 mm | ±1 mm | ±2 mm | ±5 mm | ±4 mm | ±20 mm | ±16 mm | ±350 mm | ±500 mm |
| Light source | | Visible semiconductor laser (wavelength: 650 nm, 1 mW max., JIS Class 2) | | | | | | | Visible semiconductor laser (wavelength: 658 nm, 1 mW max., JIS Class 2) | |
| Beam shape | | Line beam | | | | | | | | |
| Beam diameter ∗1 | | 1.0 mm × 20 μm | | 2.2 mm × 45 μm | 1.0 mm × 30 μm | 3.5 mm × 60 μm | | | 16 × 0.3 mm (at 500 mm) | 40 × 1.5 mm (at 1,500 mm) |
| Linearity ∗2 | | ±0.05%F.S. | | ±0.2%F.S. | ±0.1%F.S. | | | | ±0.07%F.S. (250 to 750 mm), ±0.1%F.S. (750 to 950 mm) | ±0.2%F.S. |
| Resolution ∗3 | | 0.25 μm (No. of samples to average: 256) | | 0.6 μm (No. of samples to average: 128) | 0.25 μm (No. of samples to average: 512) | | 1 μm (No. of samples to average: 64) | | 8 μm (No. of samples to average: 64 at 250 mm), 40 μm (No. of samples to average: 64 at 600 mm) | 500 μm (No. of samples to average: 64) |
| Temperature characteristic ∗4 | | 0.01%F.S./°C | | 0.1%F.S./°C | 0.01%F.S./°C | | | | | |
| Sampling cycle | | 110 μs (High-speed Mode), 500 μs (Standard Mode), 2.2 μs (High-precision Mode), 4.4 μs (High-sensitivity Mode) | | | | | | | | |
| LED Indicators | NEAR indicator | Lights near the measuring center distance, and closer than the measuring center distance inside the measuring range.<br>Flashes when the measurement target is outside of the measuring range or when the received light amount is insufficient. | | | | | | | | |
| | FAR indicator | Lights near the measuring center distance, and farther than the measuring center distance inside the measuring range.<br>Flashes when the measurement target is outside of the measuring range or when the received light amount is insufficient. | | | | | | | | |
| Operating ambient illumination | | Illumination on received light surface: 3000 lx or less (incandescent light) | | | | | | | Illumination on received light surface: 1000 lx or less (incandescent light) | Illumination on received light surface: 500 lx or less (incandescent light) |
| 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 ∗5 | | IP64 | | IP67 | Cable length 0.5 m: IP66, cable length 2 m: IP67 | | | | IP66 ∗6 | |
| Materials | | Case: Aluminum die-cast, Front cover: Glass | | | | | | | | |
| Cable length | | 0.5 m, 2 m | | 2 m | 0.5 m, 2 m | | | | | |
| Weight | | Approx. 350 g | | | Approx. 600 g | | | | Approx. 800 g | |
| Accessories | | Laser labels (1 each for JIS/EN, 3 for FDA), ferrite cores (4), insure locks (2), instruction sheet | | Laser labels (1 each for JIS/EN), ferrite cores (2), insure locks (2), instruction sheet | Laser labels (1 each for JIS/EN, 3 for FDA), ferrite cores (4), insure locks (2), instruction sheet | | | | | |

∗1. Defined as $1/e^2$ (13.5%) of the center optical intensity at the actual measuring center distance (effective value). The beam diameter is sometimes influenced by the ambient conditions of the workpiece, such as leaked light from the main beam.

∗2. This is the error in the measured value with respect to an ideal straight line.
Linearity may change according to the workpiece.
The following options are available.

| Model | Diffuse reflection | Mirror reflection |
|---|---|---|
| ZS-HLDS2T | SUS block | Glass |
| ZS-HLDS2VT | --- | Glass |
| ZS-HLDS5T | White alumina ceramic | Glass |
| ZS-HLDS10 | White alumina ceramic | |
| ZS-HLDS60/HLDS150 | White alumina ceramic | --- |

∗3. This is the peak-to-peak displacement conversion value in the displacement output at the measuring center distance in high-precision mode when the number of samples to average is set to within the graph.
The maximum resolution at 250 mm is also shown for the ZS-HLDS60. The following options are available.

| Model | Diffuse reflection | Mirror reflection |
|---|---|---|
| ZS-HLDS2T | SUS block | Glass |
| ZS-HLDS2VT | --- | Glass |
| ZS-HLDS5T | White alumina ceramic | Glass |
| ZS-HLDS10 | White alumina ceramic | |
| ZS-HLDS60/HLDS150 | White alumina ceramic | --- |

∗4. This is the value obtained at the measuring center distance when the Sensor and workpiece are fixed by an aluminum jig. (typical example)

∗5. Protection structure of connector area is IP40.

∗6. Ask your OMRON representative about Sensor Heads with IP67 protection.

# Ratings and Specifications

ZS-L-series Sensor Heads

| Item / Model | | ZS-LD20T | | ZS-LD20ST | | ZS-LD40T | | ZS-LD10GT | ZS-LD15GT |
|---|---|---|---|---|---|---|---|---|---|
| Applicable Controllers | | ZS-HLDC/LDC Series | | | | | | | |
| Optical system | | Regular reflection | Diffuse reflection | Regular reflection | Diffuse reflection | Regular reflection | Diffuse reflection | Regular reflection | |
| Measuring center distance | | 20 mm | 6.3 mm | 20 mm | 6.3 mm | 40 mm | 30 mm | 10 mm | 15 mm |
| Measuring range | | ±1 mm | ±1 mm | ±1 mm | ±1 mm | ±2.5 mm | ±2 mm | ±0.5 mm | ±0.75 mm |
| Light source | | Visible semiconductor laser (wavelength: 650 nm, 1 mW max., JIS Class 2) | | | | | | | |
| Beam shape | | Line beam | | Spot beam | | Line beam | | | |
| Beam diameter ∗1 | | 900 × 25 μm | | 25 μm dia. | | 2000 × 35 μm | | Approx. 25 × 900 μm | |
| Linearity ∗2 | | ±0.1% FS | | | | | | | |
| Resolution ∗3 | | 0.25 μm | | 0.25 μm | | 0.4 μm | | 0.25 μm | 0.25 μm |
| Temperature characteristic ∗4 | | 0.04% FS/°C | | 0.04% FS/°C | | 0.02% FS/°C | | 0.04% FS/°C | |
| Sampling cycle | | 110 μs (High-speed Mode), 500 μs (Standard Mode), 2.2 ms (High-precision Mode), 4.4 ms (High-sensitivity Mode) | | | | | | | |
| LED Indicators | NEAR indicator | Lights near the measuring center distance, and closer than the measuring center distance inside the measuring range.<br>Flashes when the measurement target is outside of the measuring range or when the received light amount is insufficient. | | | | | | | |
| | FAR indicator | Lights near the measuring center distance, and farther than the measuring center distance inside the measuring range.<br>Flashes when the measurement target is outside of the measuring range or when the received light amount is insufficient. | | | | | | | |
| Operating ambient illumination | | Illumination on received light surface: 3000 lx or less (incandescent light) | | | | | | | |
| 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 ∗5 | | Cable length 0.5 m: IP66, cable length 2 m: IP67 | | | | | | IP40 | |
| Materials | | Case: Aluminum die-cast, Front cover: Glass | | | | | | | |
| Cable length | | 0.5 m, 2 m | | | | | | | |
| Weight | | Approx. 350 g | | | | | | Approx. 400 g | |
| Accessories | | Laser labels (1 each for JIS/EN, 3 for FDA), ferrite cores (2), insure locks (2), instruction sheet | | | | | | Laser safety labels (1 each for JIS/EN), ferrite cores (2), insure locks (2) | |

∗1. Defined as $1/e^2$ (13.5%) of the center optical intensity at the actual measuring center distance (effective value). The beam diameter is sometimes influenced by the ambient conditions of the workpiece, such as leaked light from the main beam.
∗2. This is the error in the measured value with respect to an ideal straight line. The standard workpiece is white aluminum ceramics and glass in the regular reflection mode. Linearity may change according to the workpiece.
∗3. This is the peak-to-peak displacement conversion value in the displacement output at the measuring center distance in high-precision mode when the number of samples to average is set to 128 and the measuring mode is set to the high-resolution mode.
The standard workpiece is white aluminum ceramics and glass in the regular reflection mode.
∗4. This is the value obtained at the measuring center distance when the Sensor and workpiece are fixed by an aluminum jig. (typical example)
∗5. Protection structure of connector area is IP40.

# Ratings and Specifications

ZS-L-series Sensor Heads

| Item / Model | | ZS-LD50 | | ZS-LD50S | | ZS-LD80 | | ZS-LD130 | | ZS-LD200 | | ZS-LD350S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Applicable Controllers | | ZS-HLDC/LDC Series | | | | | | | | | | |
| Optical system | | Diffuse reflection | Regular reflection | Diffuse reflection | Regular reflection | Diffuse reflection | Regular reflection | Diffuse reflection | Regular reflection | Diffuse reflection | Regular reflection | Diffuse reflection |
| Measuring center distance | | 50 mm | 47 mm | 50 mm | 47 mm | 80 mm | 78 mm | 130 mm | 130 mm | 200 mm | 200 mm | 350 mm |
| Measuring range | | ±5 mm | ±4 mm | ±5 mm | ±4 mm | ±15 mm | ±14 mm | ±15 mm | ±12 mm | ±50 mm | ±48 mm | ±135 mm |
| Light source | | Visible semiconductor laser (wavelength: 650 nm, 1 mW max., JIS Class 2) | | | | | | | | | | |
| Beam shape | | Line beam | | Spot beam | | Line beam | | Line beam | | Line beam | | Spot beam |
| Beam diameter ∗1 | | 900 × 60 μm | | 50 μm dia. | | 900 × 60 μm | | 600 × 70 μm | | 900 × 100 μm | | 240 μm dia. |
| Linearity ∗2 ±0.1% FS | | ±0.1% FS | | | | | | | ±0.25% FS | ±0.1% FS | ±0.25% FS | ±0.1% FS |
| Resolution ∗3 | | 0.8 μm | | 0.8 μm | | 2 μm | | 3 μm | | 5 μm | | 20 μm |
| Temperature characteristic ∗4 | | 0.02% FS/°C | | 0.02% FS/°C | | 0.01% FS/°C | | 0.02% FS/°C | | 0.02% FS/°C | | 0.04% FS/°C |
| Sampling cycle | | 110 μs (High-speed Mode), 500 μs (Standard Mode), 2.2 ms (High-precision Mode), 4.4 ms (High-sensitivity Mode) | | | | | | | | | | |
| LED Indicators | NEAR indicator | Lights near the measuring center distance, and closer than the measuring center distance inside the measuring range.<br>Flashes when the measurement target is outside of the measuring range or when the received light amount is insufficient. | | | | | | | | | | |
| | FAR indicator | Lights near the measuring center distance, and farther than the measuring center distance inside the measuring range.<br>Flashes when the measurement target is outside of the measuring range or when the received light amount is insufficient. | | | | | | | | | | |
| Operating ambient illumination | | Illumination on received light surface: 3000 lx or less (incandescent light) | | | | | | Illumination on received light surface: 2000 lx or less (incandescent light) | | Illumination on received light surface: 3000 lx or less (incandescent light) | | |
| 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 ∗5 | | Cable length 0.5 m: IP66, cable length 2 m: IP67 | | | | | | | | | | |
| Materials | | Case: Aluminum die-cast, Front cover: Glass | | | | | | | | | | |
| Cable length | | 0.5 m, 2 m | | | | | | | | | | |
| Weight | | Approx. 350g | | | | | | | | | | |
| Accessories | | Laser labels (1 each for JIS/EN, 3 for FDA), ferrite cores (2), insure locks (2), instruction sheet | | | | | | | | | | |

∗1. Defined as $1/e^2$ (13.5%) of the center optical intensity at the actual measuring center distance (effective value). The beam diameter is sometimes influenced by the ambient conditions of the workpiece, such as leaked light from the main beam.
∗2. This is the error in the measured value with respect to an ideal straight line. The standard workpiece is white aluminum ceramics and glass in the ZS-LD50/LD50S regular reflection mode. Linearity may change according to the workpiece.
∗3. This is the peak-to-peak displacement conversion value in the displacement output at the measuring center distance in high-precision mode when the number of samples to average is set to 128 and the measuring mode is set to the high-resolution mode.
The standard workpiece is white aluminum ceramics and glass in the ZS-LD50/LD50S regular reflection mode.
∗4. This is the value obtained at the measuring center distance when the Sensor and workpiece are fixed by an aluminum jig.
∗5. Protection structure of connector area is IP40.