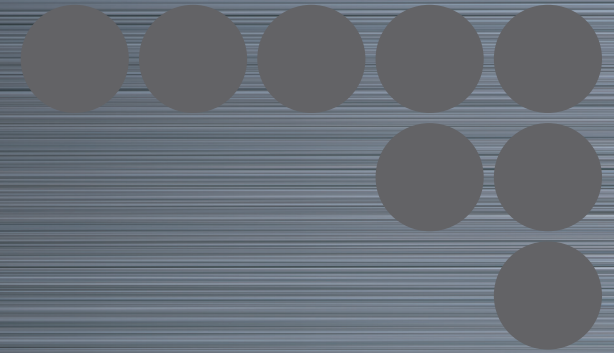# OMRON

Smart Sensors ZS Series

2D CMOS Laser Type

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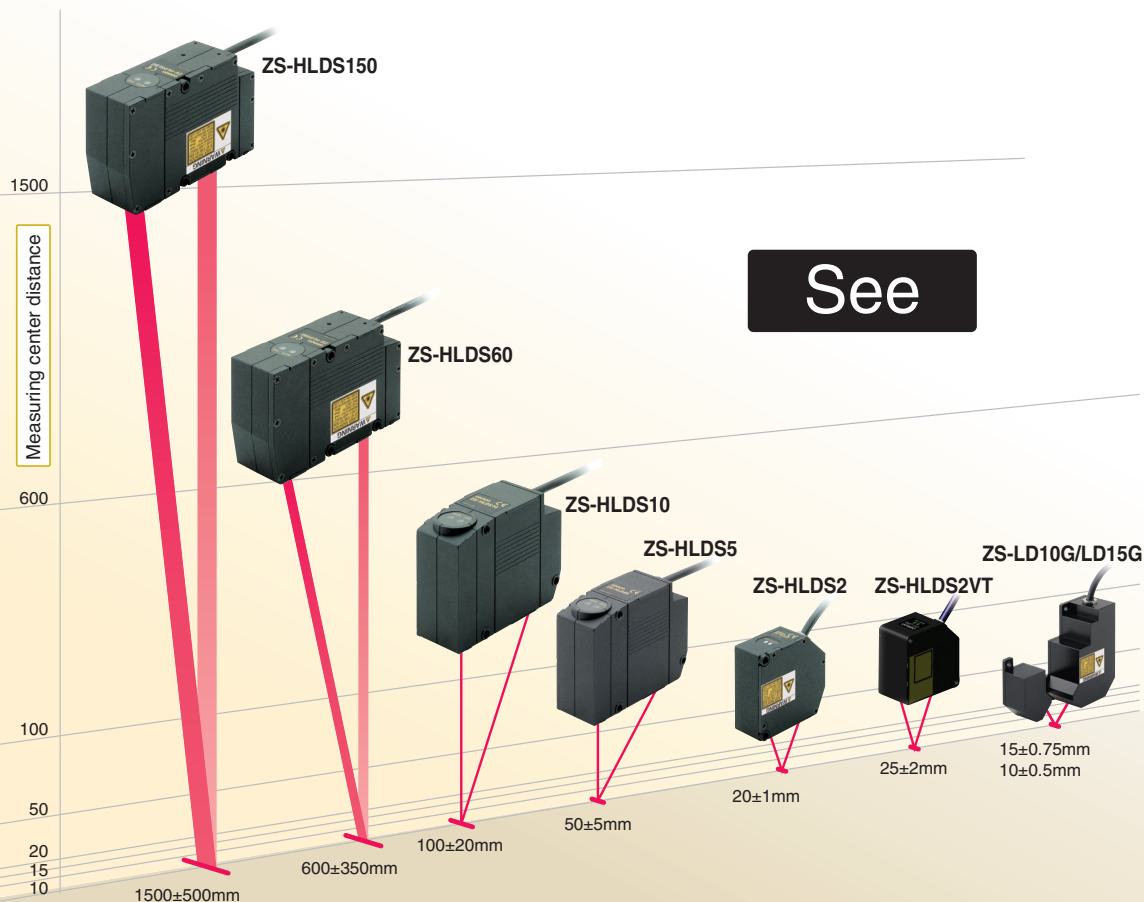
realizing

ZS-HL Series

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 0.02 μm (0.001 μm).
● Maximum response speed of 110 μs.
● Parallel output supported.

Highly Advanced Sensing Fu

See

Measuring center distance

ZS-HLDS150

ZS-HLDS60

ZS-HLDS10

ZS-HLDS5

ZS-HLDS2 ZS-HLDS2VT

ZS-LD10G/LD15G

1500

600

100

50

20
15
10

15±0.75mm
10±0.5mm

25±2mm

20±1mm

50±5mm

100±20mm

600±350mm

1500±500mm

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.

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.

nctions in a Compact Package

Business card size

TARO OMRON
OMRON Corporation
INDUSTRIAL AUTOMATION COMPANY

Sensing Devices and Components Div. H.Co.,
SHIOKOJI HORIKAWA, SHIMOGYO-KU,
KYOTO, 600-8530 JAPAN
PHONE: +xx-xxx-xxx-xxxx
FAX: +xx-xxx-xxx-xxxx
Cable: OMRONKYOTO
Web: http://www.omron.co.jp

OMRON

USB

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.

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.

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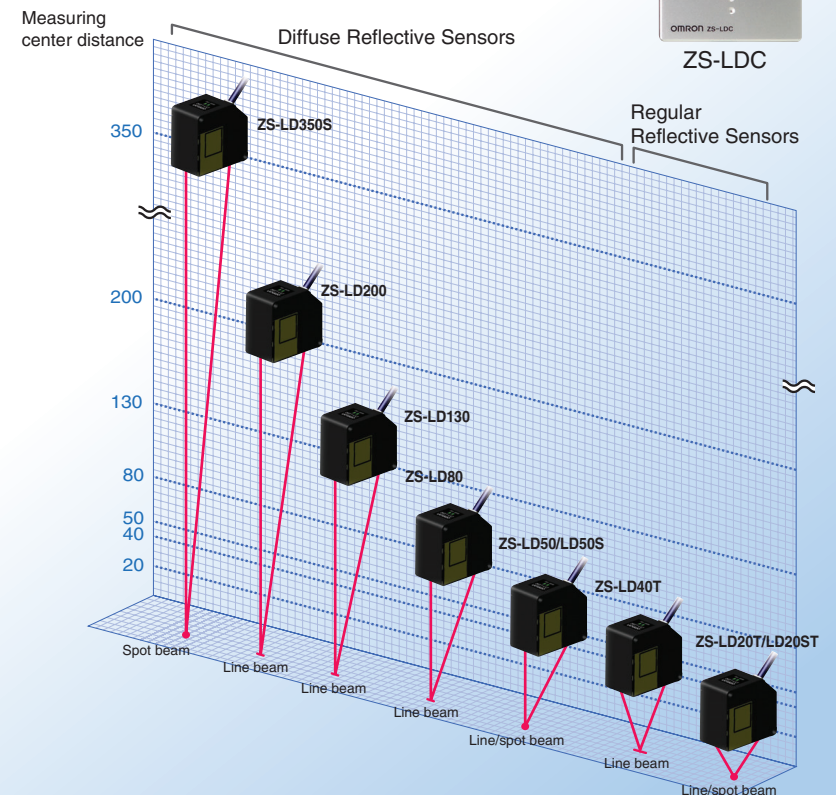
Standard Sensors Most Suitable for a Variety of High-precision Displacement Measurements, Including Spot Detection, Wide-range Detection, and Long-distance Detection.

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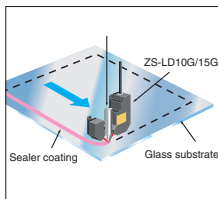 Long-range, middle-range, and short-range models.

ZS-LDC

Measuring center distance

Diffuse Reflective Sensors

Regular Reflective Sensors

350 — ZS-LD350S
200 — ZS-LD200
130 — ZS-LD130
80 — ZS-LD80
50 / 40 — ZS-LD50/LD50S
ZS-LD40T
20 — ZS-LD20T/LD20ST

Spot beam
Line beam
Line beam
Line beam
Line/spot beam
Line beam
Line/spot beam

High-performance Sensors
Standard Sensors
Expansion Units
Ratings and Specifications

Main Applications

High Performance
ZS-HL Series

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

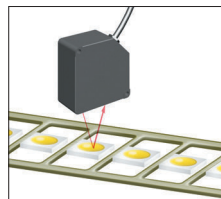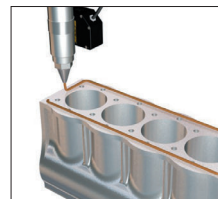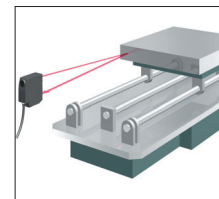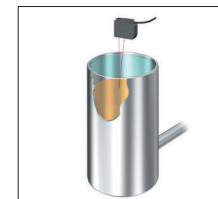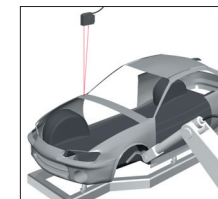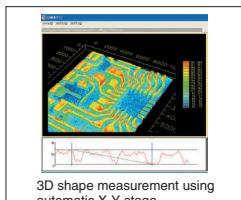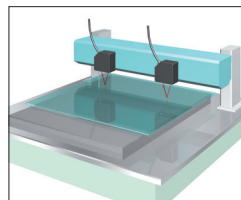| ZS-LD10GT/LD15GT	ZS-HLDS2T	ZS-HLDS2VT	ZS-HLDS5T	ZS-HLDS10	ZS-HLDS60	ZS-HLDS150
Sealer coating / Glass substrate / ZS-LD10G/15G						
Ideal for measuring and controlling dispenser nozzle gaps when applying sealer.	Ideal for measuring the thickness of silicone or compound semiconductor wafers in polishing and testing processes.	Ideal for measuring the potting resin height for electronic components.	Ideal for measuring liquid gasket (FPIG) application amounts. Prevents defects such as insufficient seal.	Ideal for confirming positioning and repeatability accuracy of XY stages.	Ideal for level detection for liquid crystal coaters and PDP fluorescent substances.	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

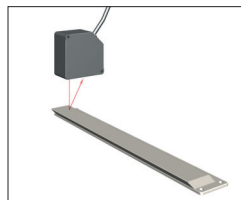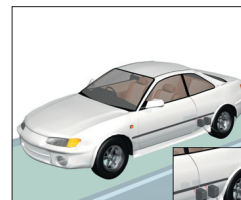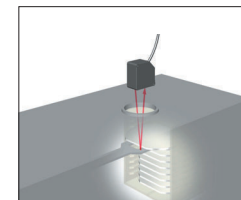| ZS-LD20ST	ZS-LD40T	ZS-LD50/LD80	ZS-LD200	ZS-LD350S
3D shape measurement using automatic X-Y stage				
Ideal for measurements requiring discrimination between minute parts or fine shape repeatability.	Ideal for measuring glass thickness and nozzle gaps when coating glass with resist or sealer.	Ideal for measuring the warp of resin blades in copy machine toners.	Ideal for checking the precision of door installations.	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
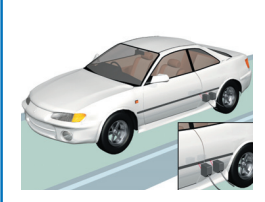
Measuring Tire Exteriors

Electronic Components

Inspecting Board Heights

Inspecting for Board Coplanarity

Measuring Shape for Positioning Laminated Ceramics

1 axis scan
Capacitor
PCB
SmartMonitor graph screen
Spot beam
Line beam
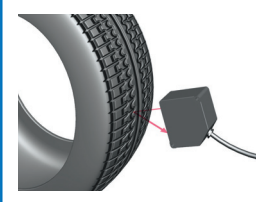
Semiconductors

Measuring Electrode Thickness on Compound Semiconductors
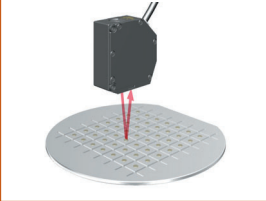
Measuring Wafer Warping and Thickness
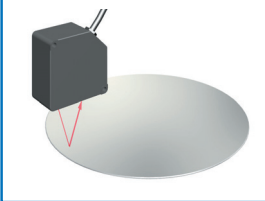
Measuring Arm Inclination

Household Appliances and Audio-visual

Simultaneous Measuring of Touch Panel Film Thickness and Gap

DVD Chassis Flatness Inspections

Digital Camera Tube Lens Inspection
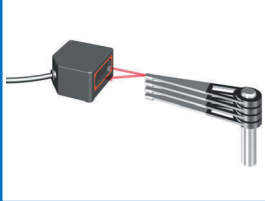
LCDs and PDPs

Measuring Glass Undulation
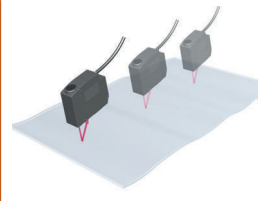
Measuring Glass Surfaces
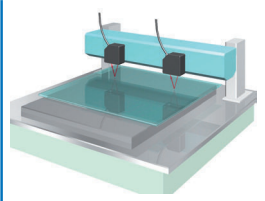
Inspecting Glass Heights (Autofocus)
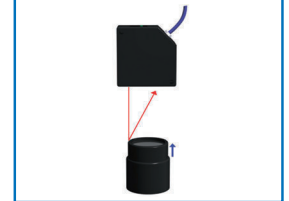
Rubber, Resin, and Film

Measuring Electrode Thickness on Dielectrics
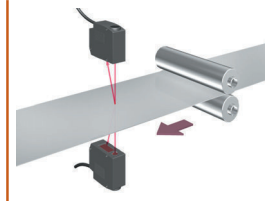
Moving Workpieces (Black Rubber)
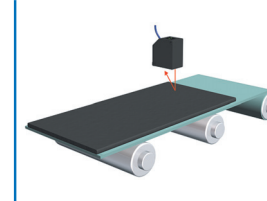
Measuring Depth of O-Ring Insertion
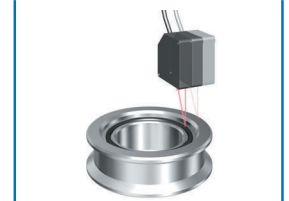
ZS-HL Series Product Lineup 2D CMOS High-end Displacement Sensors

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.

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.

Digital Sensing

Totally reliable measurements with completely digital sensing.

Extremely Sensitive Lenses

±0.05% FS Linearity (ZS-HLDS2T)

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

Very high resolution

Extreme stability

High precision
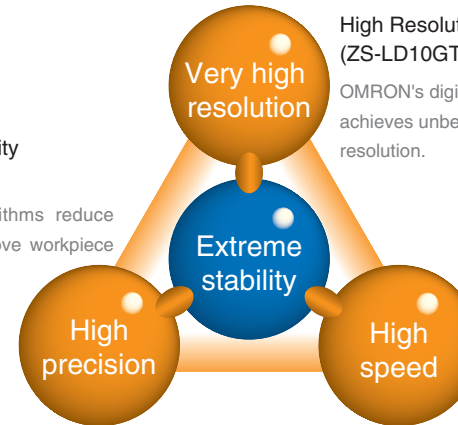
High speed

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
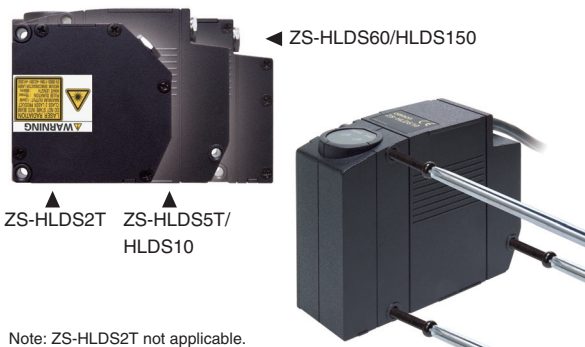
Note: ZS-HLDS2T not applicable.

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.

Previous OMRON models

Moving resolution when measuring SUS

Measurement value (μm)

10 5 0 −5 −10

0 1000 2000 3000 4000 5000 6000

13.5 μm

Travel distance

ZS-HL Series

Moving resolution when measuring SUS   ZS-HLDS5T

Measurement value (μm)

10 5 0 −5 −10

0 500 1000 1500 2000 2500 3000

4.5 μm

Travel distance

SUS

Constant distance

Sampling: 4 ms
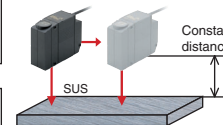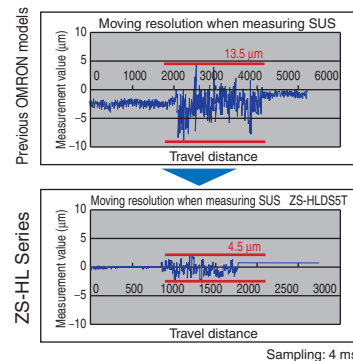
Reduced Error for Different Materials
2D CMOS

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.

Previous OMRON models

Error (μm)

5 0 −10 −15

0 20 40

Cr   Glass   10 μmp-p

Travel distance (mm)

ZS-HL Series

ZS-HLDS5T

Error (μm)

10 5 0 −5 −10

0 20 40

Cr   Glass   0.7 μmp-p

Travel distance (mm)

Cr   Glass

Constant distance

Sampling: 4 ms
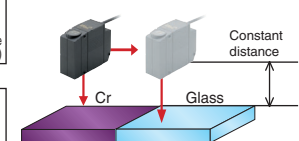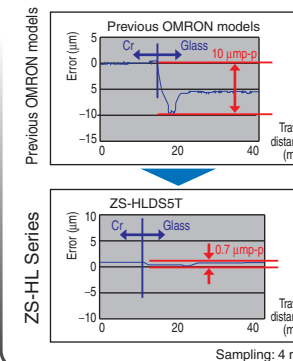
High-performance Sensors

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

Previous OMRON models   Regular reflection

ZS-HLDS5T   Regular reflection

Note: Typical examples
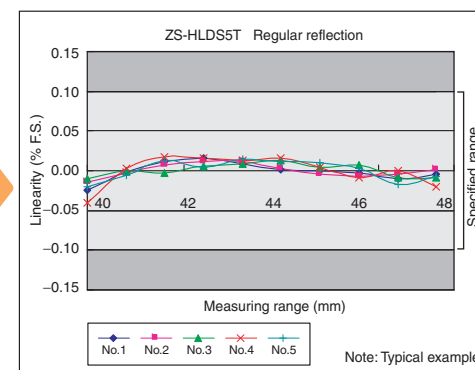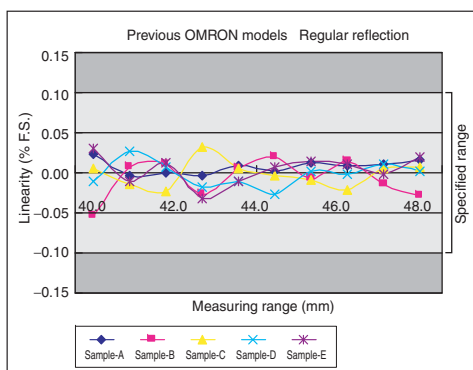
Measuring Car Body Widths (ZS-HLDS10)

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
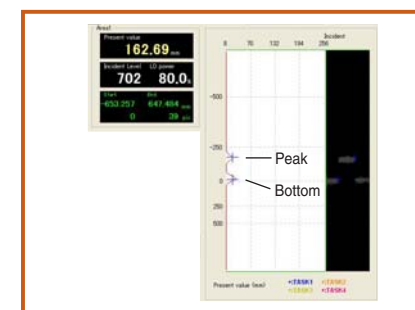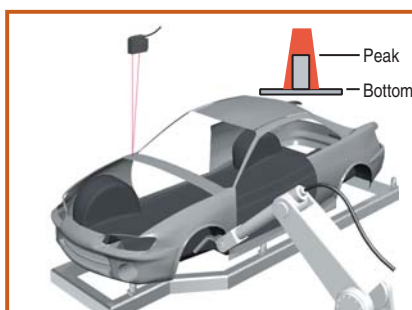
Peak
Bottom

Peak/bottom measurement

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

High-performance Sensors

ZS-HLDS2VT NEW

Ideal for Measuring the Height and Thickness of Transparent Objects

Tilted and moving workpieces can also be stably measured.

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.
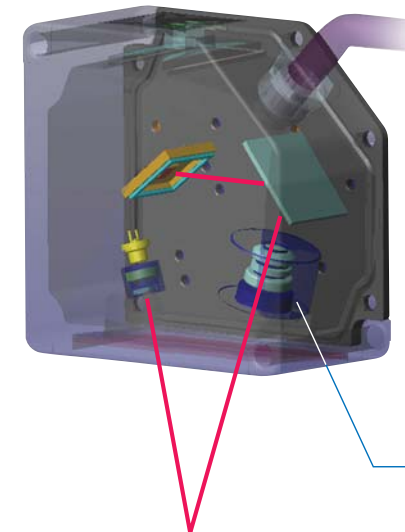
Aspherical lens (newly developed)

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

Angle Characteristics

Limit angle (°)

Previous OMRON model   ZS-HLDS2VT

■ Vertical + direction ■ Vertical - direction ■ Horizontal + direction ■ Horizontal - direction

Vertical direction   Horizontal direction
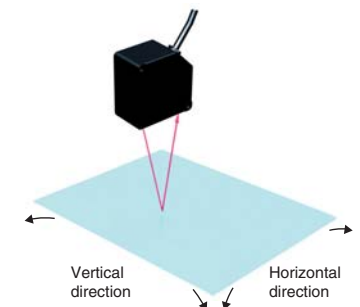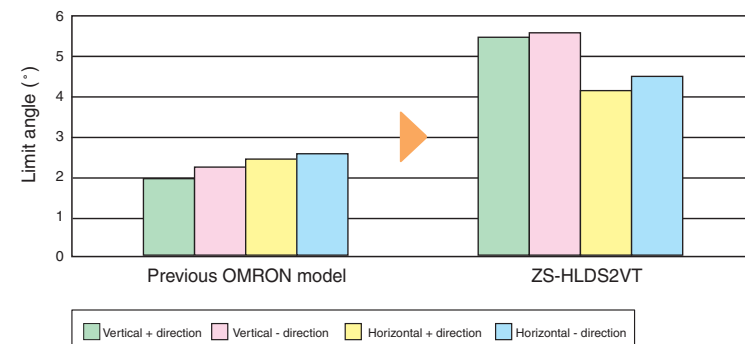
ZS-HLDS2T/ZS-LD10GT/LD15GT
The Only Way to Very High-precision Measurements

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

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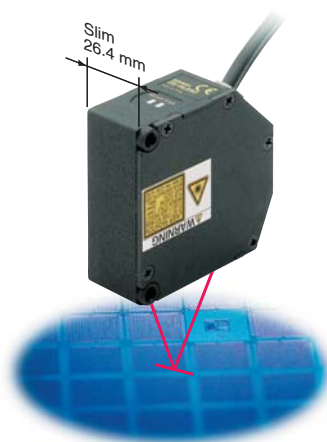
Model	ZS-HLDS2T
Measuring center distance	20±1 mm
Resolution	0.25 μm
Linearity	±0.05%F.S.
Beam shape	20 μm × 1 mm

Simultaneous Measuring of Touch Panel Film Thickness and Gap

Thickness
Film
Glass
Gap

Thickness [μm]
Travel distance (mm)

Gap [μm]
Travel distance (mm)
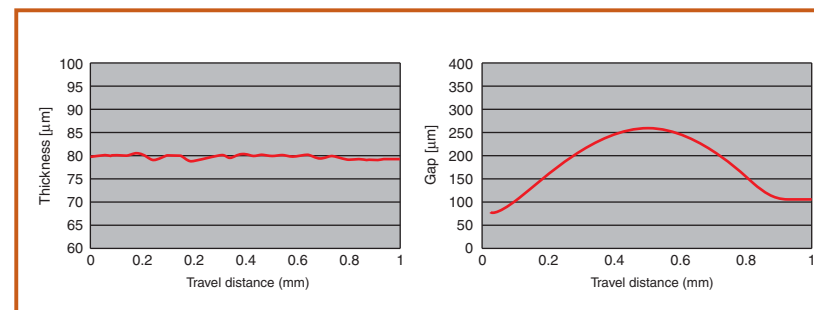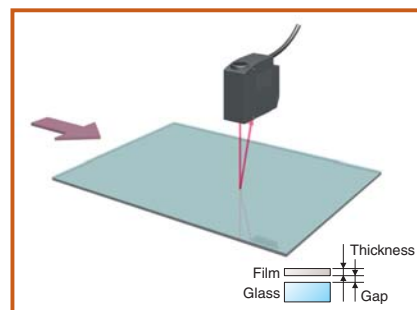
Simultaneous measurement of transparent object thickness and gap

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

Nozzle Gap Sensor
Nozzle
Emitter   Receiver
Measurement point
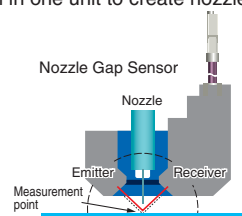
Height Control of Sealant Dispensers

Sealant supply nozzle
ZS-LD10GT/LD15GT
Sealant application
Glass substrate
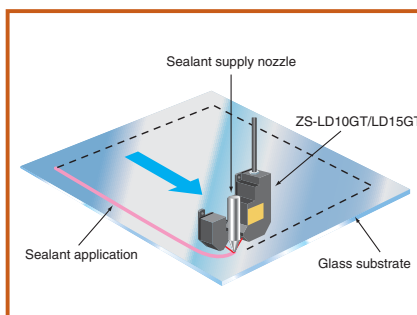
Inspection of Disk Play on HDD Motor Rotating Plate

ZS-LD10GT
Displacement [μm]
Number of data
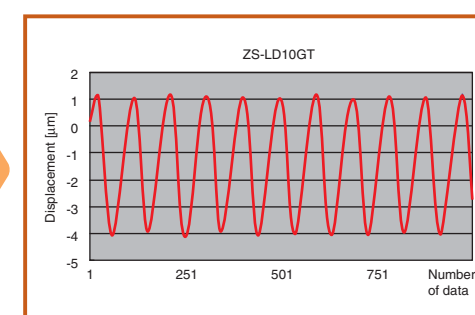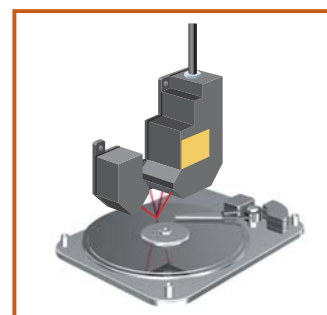
Measures amplitude undulations of 5 μm.

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.

Previous products — Light noise
One line at a time

Detects the measurement position for each received light line.

ZS Series
Adding and averaging
Received light amount

Removed

Detects the measurement position after adding the received light lines.

Position

Then with digital processing...

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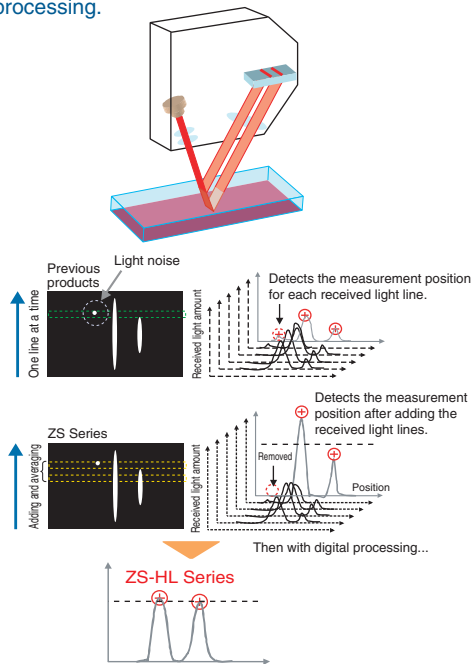
Measurement cycle time 1/8 better than previous models with addition of received light waveform captured by 2D CMOS and simultaneous measurement of front and back glass surfaces with separate sensitivities.

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.

Mirror (Large) — Small (Black rubber)
Reflection coefficient

Large
Laser power
Small

10,000 levels min. (essentially infinite)
No measurement error
ZS Series

31 levels
Measurement error
Previous products

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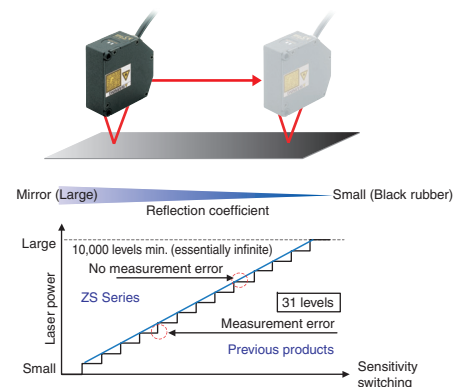
Light quantity adjustment algorithms have evolved for stable measurement of a variety of measurement objects.
Even if the workpiece status changes suddenly, the sensitivity can compensate at any level so there is no measurement error from sensitivity switching.

Mechanisms for High Resolution `Patent Pending`

No more resolution errors.

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

Digital communications

(1) (2) (3)

Laser Pulse Control
Light quantity adjustment to any level.
80 ns min.
(1)

Received Light Signal Control
No clock offset.
(2)
(3)

Large
Received light amount
Small

Previous products
Light quantity fluctuation error
Error between clocks
No error
ZS Series
(Near) Received light surface (Far)
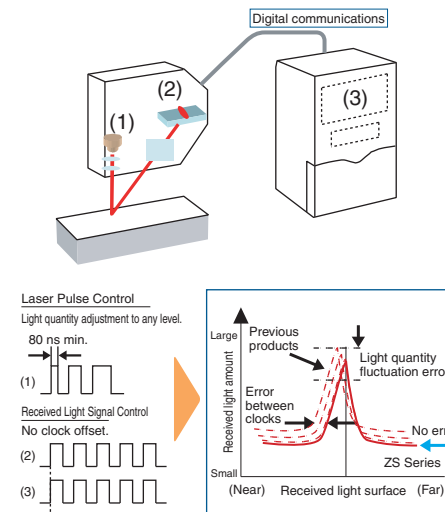
High-speed digital communications (LVDS) used between Sensor and Controller.
Image signal stabilizes because the clock error between the control signal from the Controller and the light reception device disappears. Optimum light quantity adjustment is possible with laser power algorithms that can be 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.

(Near)
(Far)

Large
Received light amount
Small
(Near) Received light surface (Far)

Real peak position on surface
Incorrect peak calculation as a result of laser light penetration
Received light waveform disruption due to penetration
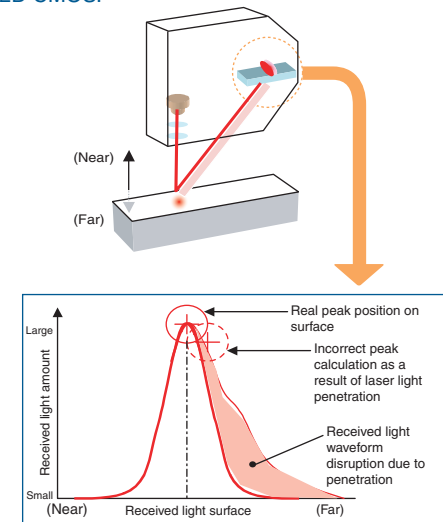
Real surface displacement detected by eliminating penetration effects for PCBs, plastic, and other workpieces penetrated by laser light.

H i g h   g r a d e

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.
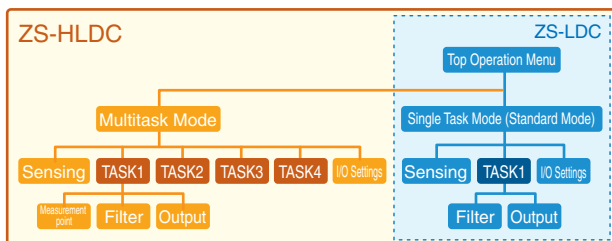
High-performance Sensing   (Multitasking)

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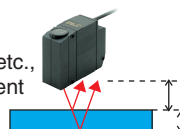
●For simultaneous measurement of HDD surface deflection and distance to HDD surface

Setting example
■Task 1: Average, Average hold
■Task 2: Average, Point-to-point hold
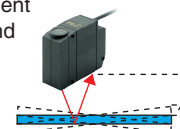
●For detection of small recesses and protrusions in measurement location

Setting example
■Task 1: Step

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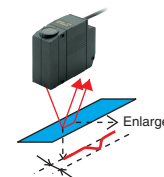
●For measurement of steps in different locations with moving Sensor or workpiece

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)

Trigger level

Delay time 1

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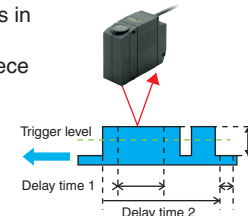
Simultaneous Control in 2 Systems of Data Confirmation and Analysis and Data Collection, Control, and Changeovers

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.

USB   RS-232C

* OMRON's unique communications protocol.

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

Outline of Functions

ZS-HLDC

ZS-LDC

Top Operation Menu

Multitask Mode

Single Task Mode (Standard Mode)

Sensing | TASK1 | TASK2 | TASK3 | TASK4 | I/O Settings

Sensing | TASK1 | I/O Settings

Measurement point | Filter | Output

Filter | Output

Smart Sensor

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.

RUN
(measurement mode)

Measured value displayed.

Example of
Display Customization

Device:
OMRON #1

MAIN:MEASURE
SUB :THRESH

Threshold, current, resolution, received light amount, etc.

Switch measurement information at the touch of a button.

Threshold   Current   Resolution   Received light amount
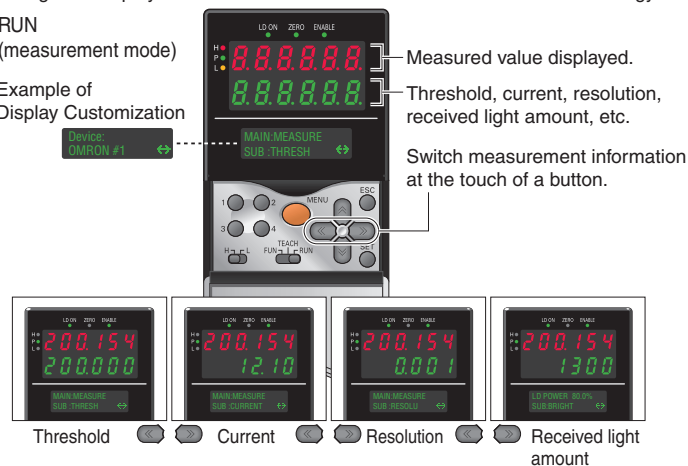
Mount to DIN Track or directly to control panels.

Patent Pending

Panel Mounting Adapter (Option, Sold Separately)

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.

FUN (setting mode)

OMRON
ZERO_SMART_ZS

Direct setting with function keys.
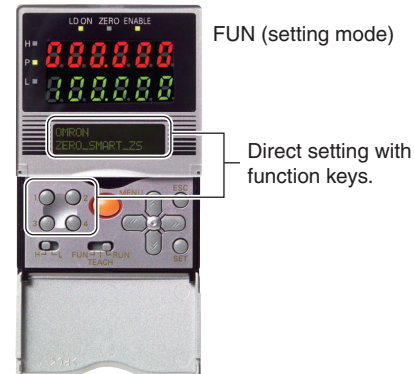
Connect directly to a PC using USB.

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.
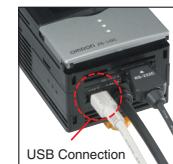
USB Connection

ZS-LDC
Single Task Controller

Simple Operation
Reasonable Price

Standard Sensors

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

2D CMOS image sensor

Super Sensitive Lens
Note: The ZS-LD50 uses high-precision ganged lenses.

Laser Class 2
Degree of Protection: IP67
(Models with 2 m cable)

ZS-LD50
Measuring center: 50 mm

Measurement range: 10 mm

ZS-LD80
Measuring center: 80 mm

Measurement range: 30 mm

ZS-LD130
Measuring center: 130 mm

Measurement range: 30 mm

ZS-LD200
Measuring center: 200 mm

Measurement range: 100 mm

ZS-LD350S *1
Measuring center: 350 mm

More than sufficient range

Measurement range: 270 mm

Diffuse Reflection Sensor

*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

2D CMOS image sensing element

High-precision ganged lenses

Laser Class 2
Degree of Protection: IP67
(Models with 2 m cable)

ZS-LD20T
Measuring center: 20 mm
Resolution: 0.25 μm

Line beam
(900 × 25 μm)

Measurement range: 2 mm

ZS-LD40T
Measuring center: 40 mm
Resolution: 0.4 μm

Line beam
(2000 × 35 μm)

Measurement range: 5 mm

Regular Reflection Sensors

ZS-LD20ST/LD50S

Spot Beam Sensors

Diffuse Reflection Sensors

ZS-LD50S
Measuring center: 50 mm

Measurement range: 10 mm

Spot beam
(50 μm dia.)

Regular reflection Sensors

ZS-LD20ST
Measuring center: 20 mm

Measurement range: 2 mm

Spot beam
(25 μm dia.)
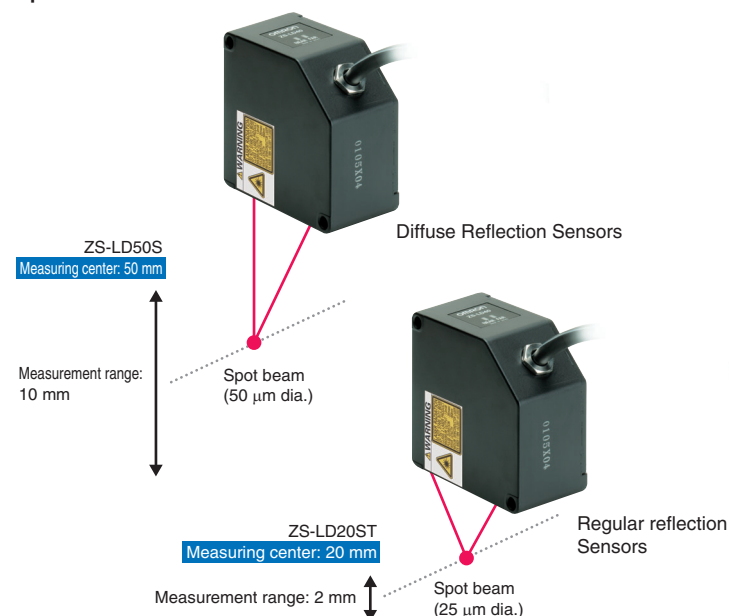
Stable Measurements for PCBs, Black Resin, and Metal

■ 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

Gain setting: 5

Height (mm)	
0 °	
10 °	
20 °	
30 °	
40 °	

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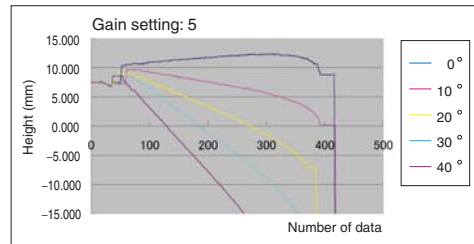
Complete measurement data will be obtained at angles of up to 40°.

ZS-LD50

Measuring the Shape PCB Surfaces

Response: 8 ms, High-precision mode,
Black gain: 0, Red gain: 5 (max.)

Penetration mode and gain settings used.
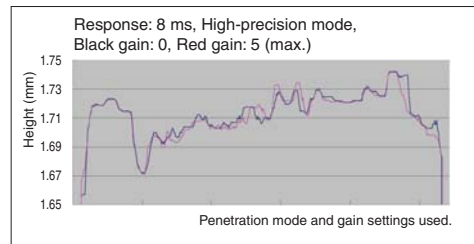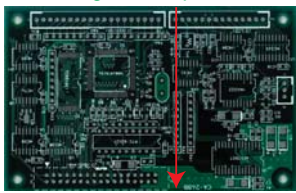
PCB shapes can be measured without burs or waveform disruptions.

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

Measurements for Moving Glass

[μm] Response for glass 8 ms

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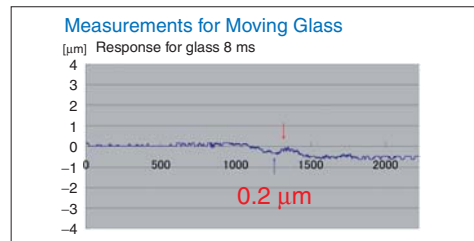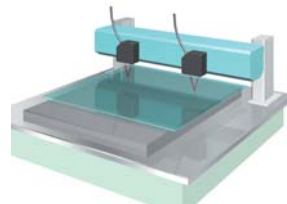
Ideal for measuring glass thickness and slit nozzle gaps when coating glass with resist or sealer.

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.

Travel

Travel distance

Amount of displacement

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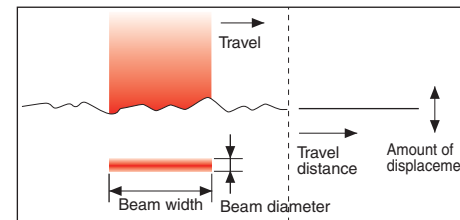
Line Beam sensors	ZS-LD20T	ZS-LD40T	ZS-LD50	ZS-LD80	ZS-LD130	ZS-LD200
Beam diameter	25 μm	35 μm	60 μm	60 μm	70 μm	100 μm
Beam width	0.9 mm	2 mm	0.9 mm	0.9 mm	0.6 mm	0.9 mm

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.

Travel

Beam diameter

Travel distance

Amount of displacement
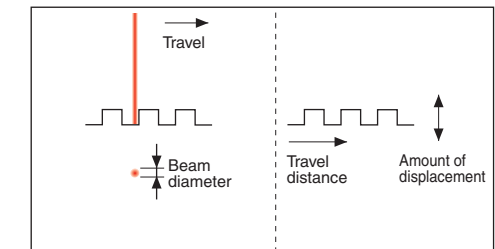
Spot Beam sensors	ZS-LD20ST	ZS-LD50S	ZS-LD350S
Beam width	25 μm dia.	50 μm dia.	240 μm dia.

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)

Direct setting with function keys.

System Configuration

Sensors

ZS-HL Series

ZS-L Series

Controllers

Sensor Controllers

ZS-HLDC *1

Multi-Controllers

Data Storage Units

Expansion I/O Units

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

ZS-LDC *2

ZS-MDC
Calculating measurement results for each sensor.

ZS-DSU
Log measurement Values.
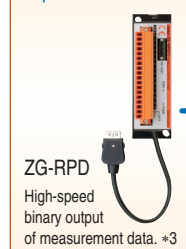
Peripheral Devices

Parallel I/O

PLC

High-speed Input Boards (PC)

USB

SmartMonitor (PC)
ZS-SW□□V3E

ZR-MDR10
Mobile Data Recorder

RS-232C

PLCs etc.

CompoNet

PLCs etc.

ZS-CRT Sensor Communications Unit

Analog

Digital Panel Meter

*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

Connection Cable
ZS-XC02D

25 m max.

Flexible Long-distance Extension Cable
ZS-XC15CR/XC25CR

Sensor Head
ZS-HLDS□

ZS-XEQ
Digital Equalizer *4

Digital Equalizer
ZS-XEQ *4

Controller
ZS-HLDC□

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

Expansion Units
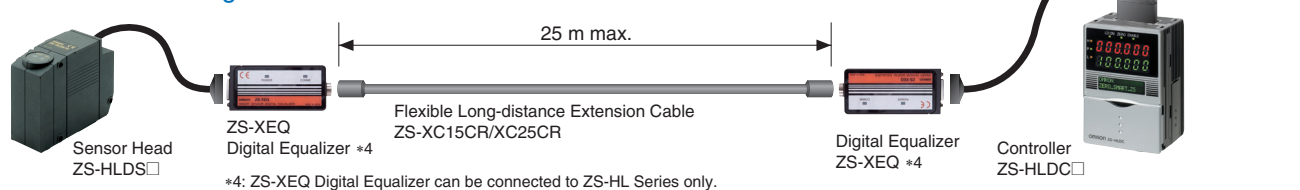
Multi-Controller **ZS-MDC**
Centralized Controller Information Calculations

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.

Sensor Head	Multi-Controllers	SmartMonitor

Multipoint measurement
(flatness of resins or metals)

ZS-MDC

Monitor connected Controllers together

USB

Processing results
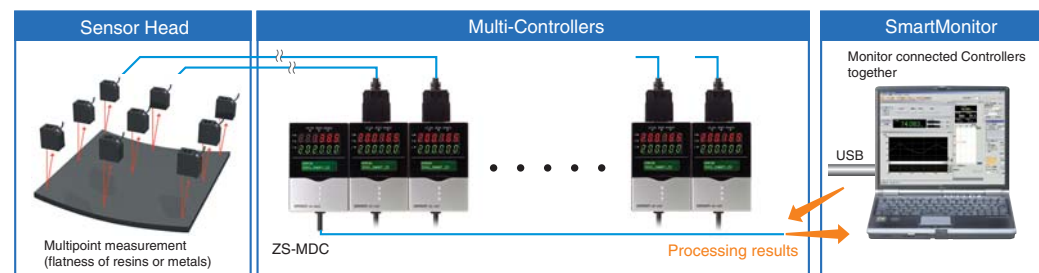
Processing Enabled by the Multi-Controller

Flatness Calculations

Calculating the difference between the maximum and minimum values.

Number of Sensor Controllers: 3 to 9

Calculation:
Task 1 = Max. (A, B, ···) − Min. (A, B, ···)
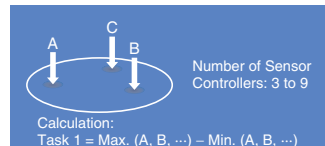
Reference Step Calculations

Calculating the difference between a reference point (A) and other points.

Number of Sensor Controllers: 3 to 9

Calculation:
TASK1 = A − B
TASK2 = A − C
···
Individual judgments
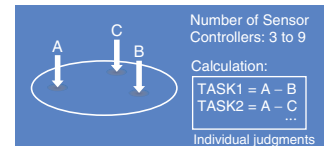
Relative Step Calculations

Calculating the difference between all points.

Number of Sensor Controllers: 3 to 9

Calculation:
TASK1 = A − B
TASK2 = B − C
TASK3 = C − A
Individual judgments
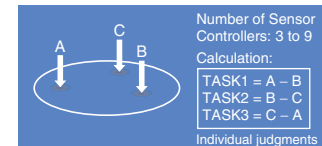
Twisting Calculations

Calculating twisting between opposing sides.

Number of Sensor Controllers: 4

Calculation: TASK1 = (A − B) − (D − C)
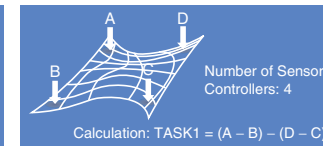
Multipoint Thickness Calculations

Calculating the difference between pairs of points.

Number of Sensor Controllers: 2, 4, 6, or 8

Calculation:
TASK1 = K + (A − B)
TASK2 = K + (C − D)
TASK3 = K + (E − F)
Individual judgments
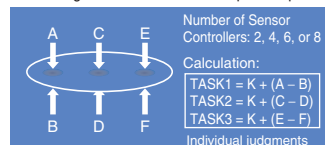
Average Height Calculations

Calculating the average surface height.

Number of Sensor Controllers: 2 to 9

Calculation: Task 1 = Average (A, B, C, ···)
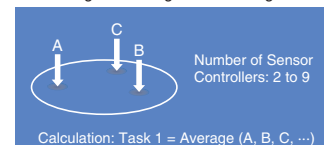
Warp Calculations

Calculating warping of selected sides

Number of Sensor Controllers: 3

Calculation: Task 1 = B − (A + C)/2
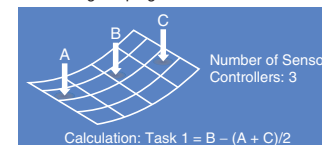
User-set Calculations

Formulas can be flexibly set.

$$[K + mX + nY]$$
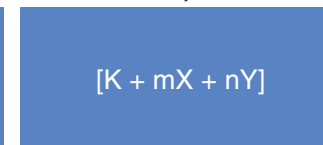
Multi-calculations of Data

Multipoint measurement

High-speed data transfer

Expansion Units

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 • Long-term logging mode (Repeat Mode) ∗2 • Sampling period: 10 ms to 1 h (at 1-ms intervals)
Functions	Trigger functions	Start and end triggers can be set separately. External trigger/data trigger (self-trigger) Time triggers
	Other functions	• External bank function • Alarm output function • Saved data format customization function • Time function (timestamps)
	Software (included)	• CSV file generation Software • Excel macros for simple analysis (Equivalent to software provided with SmartMonitor Professional.)
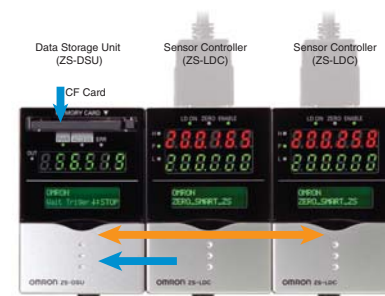
Multipoint data collection

Traceability

Changeover Unit

Data Storage Unit (ZS-DSU) — CF Card
Sensor Controller (ZS-LDC)
Sensor Controller (ZS-LDC)

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

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

Light reception image

Received light waveform
(Light Brightness)
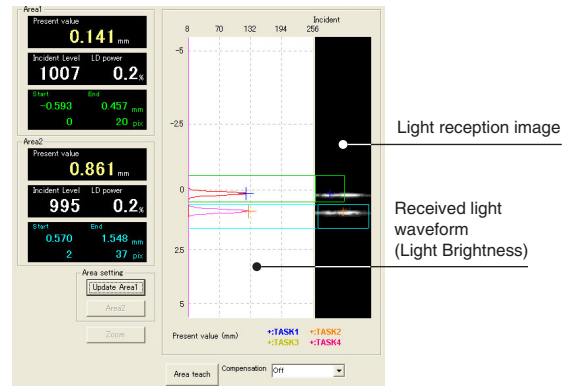
High-speed simultaneous multichannel waveform graphs.

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
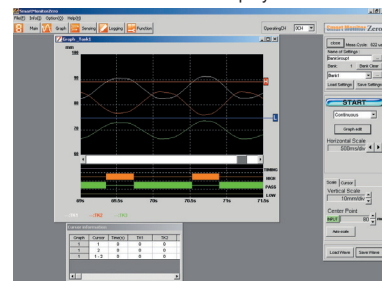
Meets a wide range of logging needs.

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
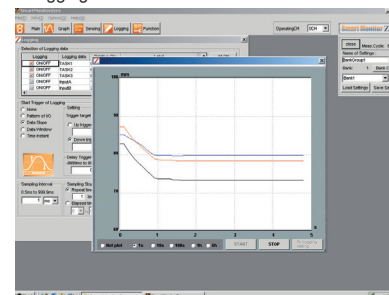
Excel macro provided for simple analysis.

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
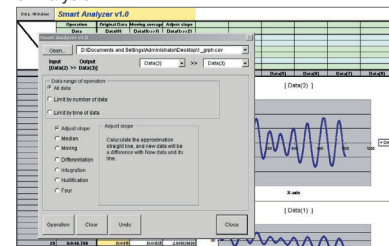
Recommended System Requirements
SmartMonitor Professional
OS: Windows 2000/XP
CPU: Pentium III 850 MHz or greater (2 GHz min. recommended.)
Memory: 128 MB min. (256 MB min. recommended)
Available hard disk space: 50 MB min.
Display screen: 800 × 600 dots, High Color (16 bits) min.
 (1,024 × 768 dots, True Color (32 bits) min. recommended)
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.

Expansion Units

19

Specification

Ordering Information
Smart Sensor

ZS-HL-series Sensor Heads

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

Note 1: Refer to the table of ratings and specifications for details.
2: Specify the cable length when ordering.

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

Optical system	Sensing distance	Beam shape	Beam diameter	Resolution (see note 1.)	Model
Regular Reflective Models	10±0.5 mm	Line beam	900 × 25 µm	0.25 µm	ZS-LD10GT
	15±0.75 mm	Line beam	900 × 25 µm	0.25 µm	ZS-LD15GT

Note 1: Refer to the table of ratings and specifications for details.
2: Specify the cable length when ordering.

ZS-L-series Sensor Heads

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

Note 1: No. of samples to average: 128 when set to High-precision Mode.
2: Specify the cable length when ordering.

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-XRS2	1
PLC/PT (2 m)	ZS-XPT2	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
	PNP outputs	ZG-RPD41

CompoNet-compatible Sensor Communications Unit.

Shape	Model
	ZS-CRT

Memory Cards

Model	Capacity
F160-N128S	128 Mbytes
F160-N256S	256 Mbytes

Ratings and Specifications

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 NPN open collector, 30 VDC, 50 mA max., residual voltage 1.2 V max.	HIGH/PASS/LOW: 3 outputs 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). • Voltage output: −10 to 10 V, output impedance: 40 Ω • 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 OFF: Open (leakage current: 0.1 mA max.)	ON: Short-circuited to supply voltage or within 1.5 V of supply voltage. 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 Sensing: Mode, gain, measurement object, head installation Measurement point *1: Average, peak, bottom, thickness, step, and calculations Filter: Smooth, average, and differentiation Outputs: Scaling, various hold values, and zero reset I/O settings: Linear (focus/correction), judgments (hysteresis and timer), non-measurement, and bank (switching and clear) *2 System: Save, initialization, measurement information display, communications settings, key lock, language, and data load Task: ZS-HLDC□1: Single task or multitask (up to 4) 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. 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. 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		IP64		IP67		Cable length 0.5 m: IP66, cable length 2 m: IP67				IP66 *5	
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), ferrite cores (2), insure locks (2), instruction sheet									

*1. Defined as 1/e² (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. Ask your OMRON representative about Sensor Heads with IP67 protection.

Ratings and Specifications

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		0.25 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. Flashes when the measurement target is outside of the measuring range or when the received light amount is insufficient.							
LED Indicators — FAR indicator	Lights near the measuring center distance, and farther than the measuring center distance inside the measuring range. 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	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)

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 *5	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. Flashes when the measurement target is outside of the measuring range or when the received light amount is insufficient.										
LED Indicators — FAR indicator	Lights near the measuring center distance, and farther than the measuring center distance inside the measuring range. 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	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/e² (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. This value is obtained when the measuring mode is set to the high-speed mode. (typical example)

Ratings and Specifications
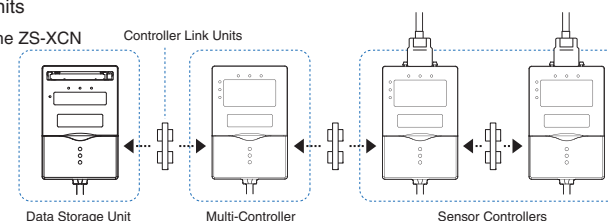
Ratings and Specifications

ZS-MDC□1 Multi-Controllers

Basic specifications are the same as those for the ZS-LDC□1 Sensor Controllers. The following points, however, are different.
1. Sensor Heads cannot be connected.
2. Control Link Units are required to connect up to 9 Controllers.
   Control Link Units are required to connect Controllers.
3. Processing functions between Controllers: Arithmetic functions

Controller Link Units

Connection Using the ZS-XCN

Controller Link Units

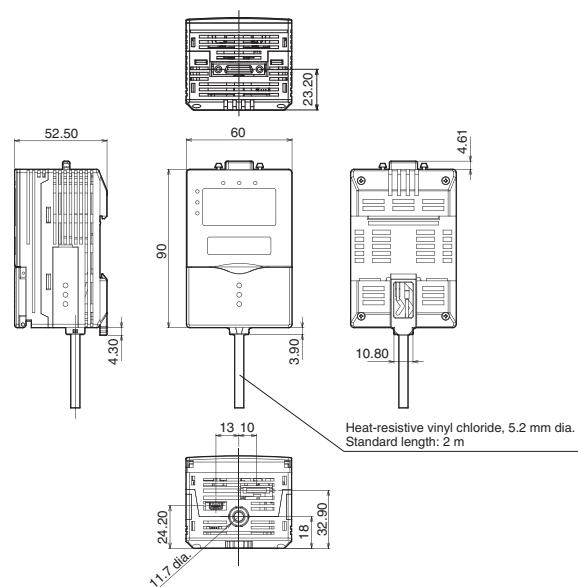Data Storage Unit   Multi-Controller   Sensor Controllers

ZS-DSU□1 Data Storage Unit

Item	Model		ZS-DSU11	ZS-DSU41
Number of mounted Sensor Heads			Cannot be connected	
Number of connectable Controllers			10 max. (ZS-MDC: 1, ZS-HLDC/LDC: 9 max.) *1	
Connectable Controllers			ZS-HLDC□□, ZS-LDC□□, ZS-MDC□□	
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		3 outputs: HIGH, PASS, and LOW; NPN open-collector, 30 VDC, 50 mA max., residual voltage: 1.2 V max.	3 outputs: HIGH, PASS, and LOW; PNP open-collector, 50 mA max., residual voltage: 1.2 V max.
	Inputs		ON: Short-circuited with 0 V terminal or 1.5 V or less; OFF: Open (leakage current: 0.1 mA max.)	ON: Short-circuited to supply voltage or within 1.5 V of supply voltage; OFF: Open (leakage current: 0.1 mA max.)
Data resolution			32 bits	
Functions	Logging trigger functions		Start and stop triggers can be set separately; external triggers, data triggers (self-triggers), and time triggers	
	Other functions		External banks, alarm outputs, saved data format customization, and clock	
Status indicators			OUT (orange), PWR (green), ACCESS (orange), and ERR (red)	
Segment display			8-segment green LEDs, 6 digits	
LCD			16 digits x 2 rows, Color of characters: green, Resolution per character: 5 × 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.	
Ambient temperature			Operating: 0 to 50°C, Storage: 0 to 60°C (with no icing or condensation)	
Ambient humidity			Operating and storage: 35% to 85% (with no condensation)	
Materials			Case: Polycarbonate (PC)	
Weight			Approx. 280 g (excluding packing materials and accessories)	
Accessories			Ferrite core (1), instruction sheet for Data Storage Unit: CSV File Converter for Data Storage Unit/Smart Analyzer Macro Edition	

*1. Control Link Units are required to connect Controllers.

Dimensions

Sensor Controllers
ZS-HLDC□1/LDC□1

Heat-resistive vinyl chloride, 5.2 mm dia.
Standard length: 2 m

Multi-Controllers
ZS-MDC□1

Heat-resistive vinyl chloride, 5.2 mm dia.
Standard length: 2 m

Data Storage Units
ZS-DSU□1

Heat-resistive vinyl chloride, 5.2 mm dia.
Standard length: 2 m

Ratings and Specifications

Dimensions

Sensor Heads

ZS-HLDS2T

(Unit: mm)

Receiver
Reference surface
Reception axis
Measuring center
Emission axis
Reference surface
Emitter
Two, 4.5 mm dia. mounting holes
Operation indicators
Mounting hole dimensions

26.4
12
56.5
32
20
4
57
65
4
20
20
18.1
20
25°
25°
57±0.1
Two, M4
20
6.5

Vinyl insulated round cable, 6.8 mm dia.
Standard length: 0.5 m and 2 m

30.1
42
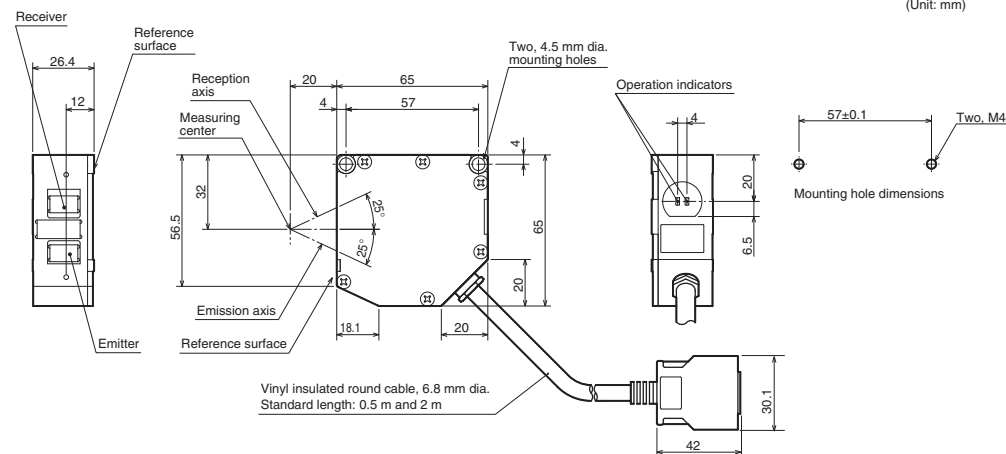
Sensor Heads

ZS-HLDS5T/HLDS10

(Unit: mm)

Reference surface
Optical axis
Emission axis
Measuring center
Reception axis
A° (See note.)
Reference surface
Three, 4.5 mm dia. mounting holes
Emitter
Receiver
Operation indicators
Mounting hole dimensions

18
36
22.7
13 dia.
92.1
46
L (See note.)
80
72
70
4
9.5
25
16.4
25
69
100
16.9
45.1
8
82
(15)
(5)
70±0.1
9.5±0.1
Three, M4
69±0.1
9.5
30.1
42

Vinyl insulated round cable, 6.8 mm dia.
Standard length: 0.5 m and 2 m

Note: L = 50 and A = 30° for the ZS-HLDS5.
      L = 100 and A = 25° for the ZS-HLDS10.

Sensor Heads

ZS-HLDS60/HLDS150

(Unit: mm)

Optical axis
Reference surface
Receiver
Reception axis
Measuring center
Emission axis
Reference surface
A° (See note.)
13 dia.
Emitter
Operation indicators
Mounting hole dimensions

38
19
22.7
115.06
46
L (See note.)
75
65
5
28
47
8
9.5
45
120
102
25
16.4
57
2
(5)
65±0.1
Three, M4
45±0.1
88.75
30.1
42

Vinyl insulated round cable, 6.8 mm dia.
Standard length: 0.5 m and 2 m
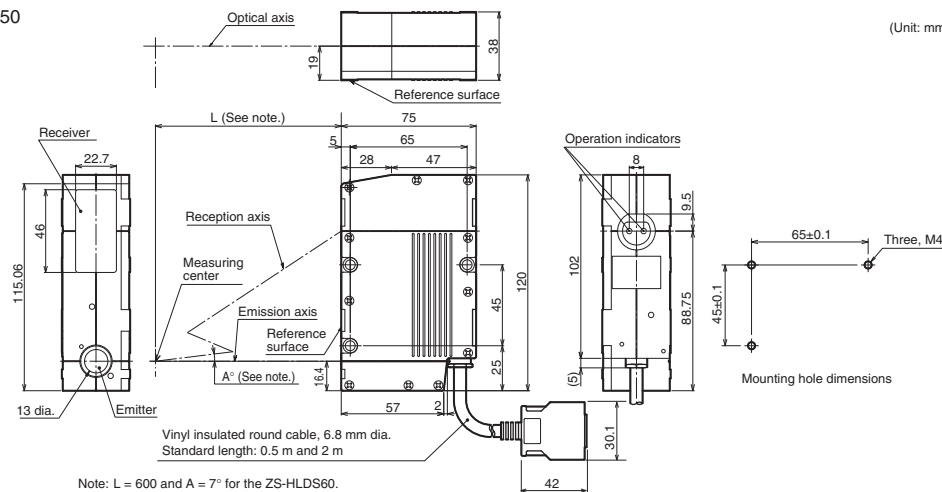
Note: L = 600 and A = 7° for the ZS-HLDS60.
      L = 1500 and A = 3° for the ZS-HLDS150.

Dimensions

Sensor Heads

ZS-LD10GT

(Unit: mm)

ZS-LD15GT

(Unit: mm)

Sensor Heads

ZS-LD50/LD50S/LD80/LD130/LD200/LD350S

(Unit: mm)

Note: L = 50 and A = 30° for the ZS-LD50/50S.
L = 80 and A = 15° for the ZS-LD80.
L = 130 and A = 12° for the ZS-LD130.
L = 200 and A = 8° for the ZS-LD200.
L = 350 and A = 5° for the ZS-LD350S.

ZS-HLDS2VT/LD20T/LD20ST/LD40T

(Unit: mm)

Note: L = 25 and A = 34.5° for the ZS-HLDS2VT.
L = 20 and A = 45° for the ZS-LD20/20S.
L = 40 and A = 32° for the ZS-LD40.

Ratings and Specifications

29

Dimensions

Realtime Parallel Output Unit

ZG-RPD□1

(Unit: mm)

29.60   10   28.40   Two mounting holes

8
30
10.25
15.85   66.50   15.65
9   80   9
89
98

(14.15)   13   (2.85)

11.5
70
55
(150)
30
35.20
32.90
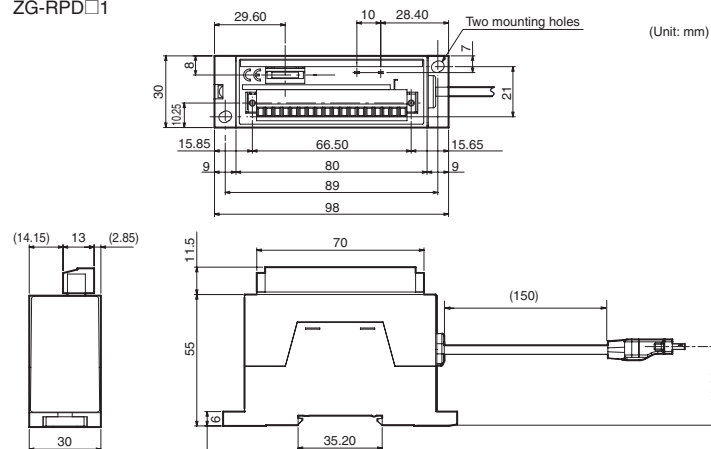
Panel Mount Adapter

ZS-XPM1/XPM2 (Dimensions for Panel Mounting)

(Unit: mm)

(60 × n) + 12
60 × n   Panel
13
3
90   122
(140)
DIN Track
Panel
Panel Mount Adapter
(2)   (37.5)
(See note.)

Panel cutout dimensions

116±1
(60 × n) + 8

n: Number of gang-mounted Controllers (1 to 11)

Note: Dimensions are shown for a panel thickness of 2.0 mm.

Digital Equalizer

ZS-XEQ

(Unit: mm)

POWER   COMM
omron   ZS-XEQ
SMART SENSOR DIGITAL EQUALIZER   MADE IN JAPAN

33
70

11.50
33
Two M4
21   37
3

10.50 dia.
16.50

Mounting bracket

25.5   3
4.5
15°+1° 0   15°+1° 0
4.5
22
37
43   5.5
54

43   5.5
4.5
15°+1° 0   15°+1° 0
4.5
37
22
Three, R2.25

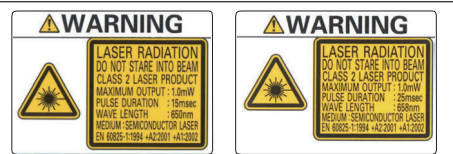90°±1°

Ratings and Specifications

Safety Precautions for Using Laser Equipment

⚠ WARNING
Do not expose your eyes to the laser radiation either directly or indirectly (i.e., after reflection from a mirror or shiny surface). The laser radiation has a high power density and exposure may result in loss of sight.

Laser Label Indications

Attach the following warning label to the side of the ZS series Sensor Head.

⚠WARNING

LASER RADIATION
DO NOT STARE INTO BEAM
CLASS 2 LASER PRODUCT
MAXIMUM OUTPUT : 1.0mW
PULSE DURATION : 15msec
WAVE LENGTH : 650nm
MEDIUM :SEMICONDUCTOR LASER
EN 60825-1:1994 +A2:2001 +A1:2002

⚠WARNING

LASER RADIATION
DO NOT STARE INTO BEAM
CLASS 2 LASER PRODUCT
MAXIMUM OUTPUT : 1.0mW
PULSE DURATION : 25msec
WAVE LENGTH : 658nm
MEDIUM :SEMICONDUCTOR LASER
EN 60825-1:1994 +A2:2001 +A1:2002

READ AND UNDERSTAND THIS DOCUMENT
Please read and understand this document before using the products. Please consult your OMRON representative if you have any questions or comments.

WARRANTY
OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY
OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON's ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

SUITABILITY FOR USE
THE PRODUCTS CONTAINED IN THIS DOCUMENT ARE NOT SAFETY RATED. THEY ARE NOT DESIGNED OR RATED FOR ENSURING SAFETY OF PERSONS, AND SHOULD NOT BE RELIED UPON AS A SAFETY COMPONENT OR PROTECTIVE DEVICE FOR SUCH PURPOSES. Please refer to separate catalogs for OMRON's safety rated products.

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the product.

At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:
• Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document.
• Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
• Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

PERFORMANCE DATA
Performance data given in this document is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability.

CHANGE IN SPECIFICATIONS
Product specifications and accessories may be changed at any time based on improvements and other reasons.

It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the product may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

DIMENSIONS AND WEIGHTS
Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

ERRORS AND OMISSIONS
The information in this document has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

PROGRAMMABLE PRODUCTS
OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

COPYRIGHT AND COPY PERMISSION
This document shall not be copied for sales or promotions without permission.

This document is protected by copyright and is intended solely for use in conjunction with the product. Please notify us before copying or reproducing this document in any manner, for any other purpose. If copying or transmitting this document to another, please copy or transmit it in its entirety.

Ratings and Specifications

A Wide Range of Information Support Tools for Production Lines

Handheld Types

USB
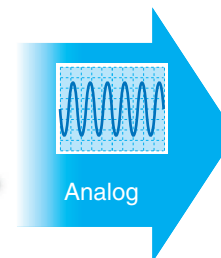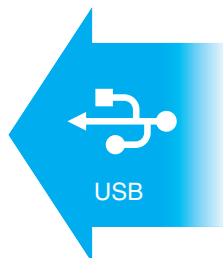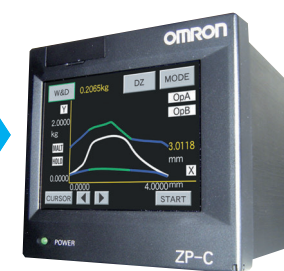
ZR-MDR10 Mobile Data Recorder
The ZR-MDR10 connects to a ZS Smart Sensor via a USB host interface. It lets the operator easily make optimal sensor settings while checking production and sensing conditions on the mobile screen.

Installed Types

Analog

ZP-C☐☐ Graphic Data Controller
The ZP-C☐☐ Graphic Data Controller is ideal for connecting to an analog output device such as a ZS-series Displacement Sensor. Touch-panel operation allows the operator to instantly calculate and compare the resulting input signals, and to display them in a numerical or graphic format.

This document provides information mainly for selecting suitable models. Please read the manual carefully for information that the user must understand and accept before purchase, including information on warranty, limitations of liability, and precautions.

Authorized Distributor:

In the interest of product improvement,
specifications are subject to change without notice.
CSM_1_3_0811
Cat. No. E375-E1-02　　　　　　　　　Printed in Japan

MOSCHIP.RU
ВМЕСТЕ МЫ СОЗДАЕМ БУДУЩЕЕ

ПОСТАВКА
ЭЛЕКТРОННЫХ КОМПОНЕНТОВ

многоканальный

+7 495 668 12 70

info@moschip.ru

Общество с ограниченной ответственностью «МосЧип»   ИНН 7719860671 / КПП 771901001
Адрес: 105318, г.Москва, ул.Щербаковская д.3, офис 1107

Данный компонент на территории Российской Федерации

Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

http://moschip.ru/get-element

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное   производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:
moschip.ru   moschip.ru_6
moschip.ru_4   moschip.ru_9