

Smart Sensor 2D Measurement Type ZS

CSM_ZS_DS_E_6_9

A Lineup for Ultra-high-precision Displacement Measurements That Take Smart Sensors into a New Realm



- **ZS-HL Series**
Ultra-high-performance Sensors for core quality for everything from ultra-long ranges to ultra-high precision.
- **ZS-L Series**
Standard Sensors that are ideal for a wide range of high-precision displacement measurements, including spot detection, wide-area detection, and long-distance detection.



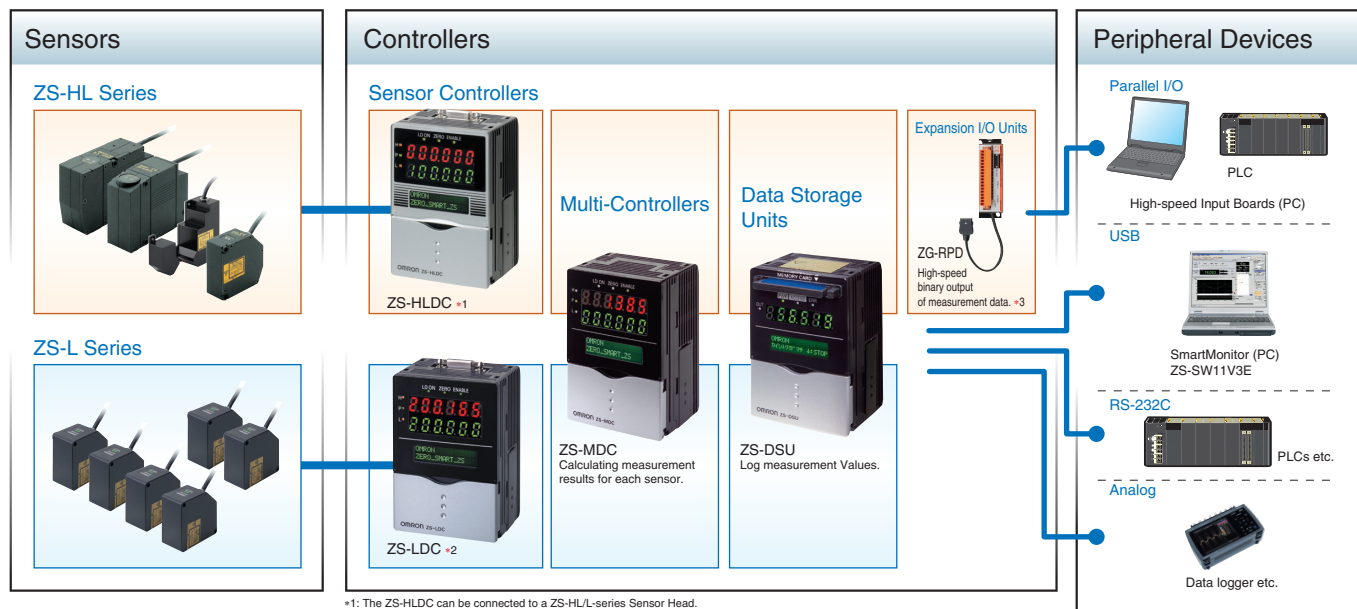
Note: Orders for ZS-HLDS2T and ZS-LD40T 4M have been discontinued at the end of August 2019.
Orders for ZS-LD80 1M have been discontinued at the end of January 2021.

For the most recent information on models that have been certified for safety standards, refer to your OMRON website.



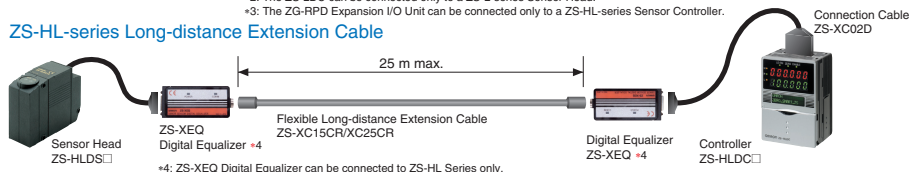
Be sure to read "Safety Precautions" on page 22.

System Configuration



*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



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 | 2m | ZS-HLDS2T 2M * |
| | | | | | 0.5m | ZS-HLDS2T 0.5M * |
| | 25±2 mm | Line beam | 2.2 mm × 45 μm | 0.6 μm | 2m | ZS-HLDS2VT 2M |
| | | | | | 0.5m | ZS-HLDS2VT 0.5M |
| Diffuse Reflective Models | 50±5 mm | Line beam | 1.0 mm × 0 μm | 0.25 μm | 2m | ZS-HLDS5T 2M |
| | | | | | 0.5m | ZS-HLDS5T 0.5M |
| | 100±20 mm | Line beam | 3.5 mm × 60 μm | 1 μm | 2m | ZS-HLDS10 2M |
| | | | | | 0.5m | ZS-HLDS10 0.5M |
| | 600±350 mm | Line beam | 16 mm × 0.3 mm | 8 μm | 2m | ZS-HLDS60 2M |
| | | | | | 0.5m | ZS-HLDS60 0.5M |
| | 1500±500 mm | Line beam | 40 mm × 1.5 mm | 500 μm | 2m | ZS-HLDS150 2M |
| | | | | | 0.5m | ZS-HLDS150 0.5M |

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

* Orders have been discontinued at the end of August 2019.

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 | 2m | ZS-LD10GT 2M |
| | | | | | 0.5m | ZS-LD10GT 0.5M |
| | 15±0.75 mm | Line beam | 900 × 25 μm | 0.25 μm | 2m | ZS-LD15GT 2M |
| | | | | | 0.5m | 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 | 2m | ZS-LD20T 2M |
| | | Spot beam | 25 μm dia. | 0.25 μm | 0.5m | ZS-LD20T 0.5M |
| | 40±2.5 mm | Line beam | 2000 × 35 μm | 0.4 μm | 2m | ZS-LD20ST 2M |
| | | | | | 0.5m | ZS-LD20ST 0.5M |
| | | | | | 4m | ZS-LD40T 4M *1 |
| | | | | | 2m | ZS-LD40T 2M |
| Diffuse Reflective Models | 50±5 mm | Line beam | 900 × 60 μm | 0.8 μm | 0.5m | ZS-LD50 2M |
| | | | | | 2m | ZS-LD50 0.5M |
| | | Spot beam | 50 μm dia. | 0.8 μm | 2m | ZS-LD50S 2M |
| | | | | | 0.5m | ZS-LD50S 0.5M |
| | 80±15 mm | Line beam | 900 × 60 μm | 2 μm | 2m | ZS-LD80 2M |
| | | | | | 1m | ZS-LD80 1M *2 |
| | | | | | 0.5m | ZS-LD80 0.5M |
| | | | | | 2m | ZS-LD130 2M |
| | 130±15 mm | Line beam | 600 × 70 μm | 3 μm | 0.5m | ZS-LD130 0.5M |
| | | | | | 2m | ZS-LD200 2M |
| | 200±50 mm | Line beam | 900 × 100 μm | 5 μm | 0.5m | ZS-LD200 0.5M |
| | | | | | 2m | ZS-LD350S 2M |
| | 350±135 mm | Spot beam | 240 μm dia. | 20 μm | 0.5m | ZS-LD350S 0.5M |

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


*1 Orders have been discontinued at the end of August 2019.

*2 Orders have been discontinued at the end of January 2021.


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 | |

Extension Cables for Sensor Heads

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

*1 Up to two ZS-XC□B Cables can be connected. (22 m max.)

*2 The ZS-XC3BR (3 m) and ZS-XC5BR (5 m) Robot Cables are 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 |

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 | ○ | ○ | ○ | ○ | ○ | A ZS-XEQ Digital Equalizer and ZS-XC02D Digital Equalizer Connecting Cable are required. |
| ZS-XC15CR | 15m | ○ | | ○ | | ○ | |
| 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 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 • Current output: 4 to 20 mA, maximum load resistance: 300 | |
| | 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 | 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.

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 | 1,500 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) | | | | | | | | |
| Beam shape | | Line beam | | | | | | | | |
| Beam diameter *1 | | 1.0mm × 20 μm | | 2.2mm × 45 μm | 1.0mm × 30 μm | | 3.5mm × 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 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. | | | | | | | | |
| | 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 *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 | | ZS-HLDS2V: Laser labels (1 each for JIS/EN), ferrite cores (2), insure locks (2), instruction sheet ZS-HLDS2/-HLDS5/-HLDS10/-HLDS60/-HLDS150: 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.

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. | | 2,000 × 35 μm | | Approx. 25 × 900 μm | |
| Linearity *2 | | ±0.1% F.S. | | | | | | | |
| Resolution *3 | | 0.25 μm | | 0.25 μm | | 0.4 μm | | 0.25 μm | 0.25 μm |
| Temperature characteristic *4 | | 0.04% F.S./°C | | 0.04% F.S./°C | | 0.02% F.S./°C | | 0.04% F.S./°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. | | | | | | | |
| | 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 *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.

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% F.S. | | | | | | | ±0.25% F.S. | ±0.1% F.S. | ±0.25% F.S. | ±0.1% F.S. |
| Resolution *3 | | 0.8 μm | | 0.8 μm | | 2 μm | | 3 μm | | 5 μm | | 20 μm |
| Temperature characteristic *4 | | 0.02% F.S./°C | | 0.02% F.S./°C | | 0.01% F.S./°C | | 0.02% F.S./°C | | 0.02% F.S./°C | | 0.04% F.S./°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. | | | | | | | | | | |
| | 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 *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.

ZS-MDC□1 Multi-Controllers

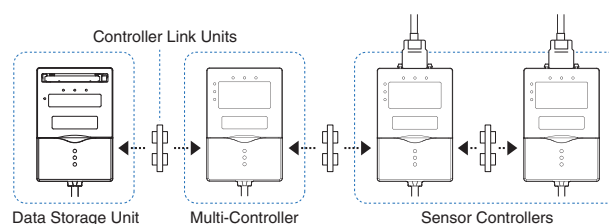
Basic specifications are the same as those for the ZS-LDC□1 Sensor Controllers.

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



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.) * | |
| 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) | |
| Degree of protection | | | IP20 (IEC60529) | |
| 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 | |

* Control Link Units are required to connect Controllers.

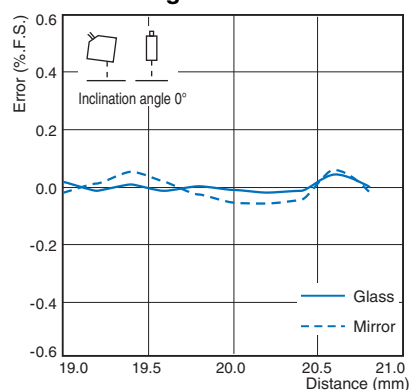
Engineering Data (Reference Value)

Linearity Characteristic by Materials

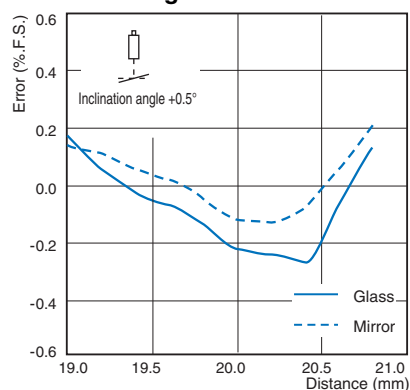
ZS-HLDS2T (mode: High-Resolution)

Regular reflection

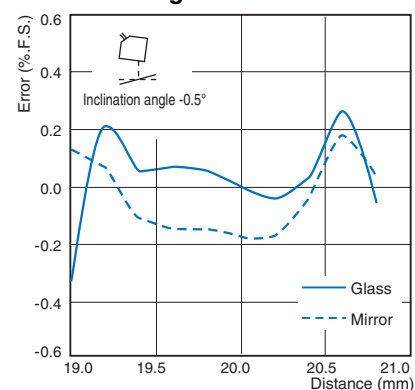
Inclination angle 0°



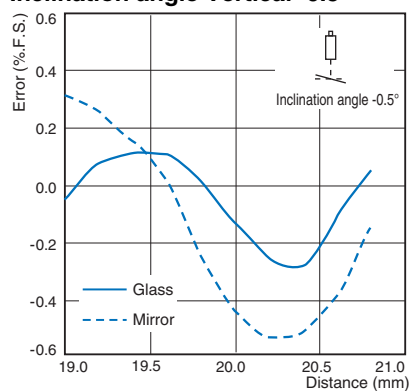
Inclination angle Vertical +0.5°



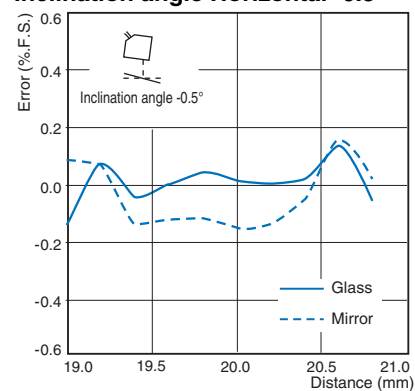
Inclination angle Horizontal +0.5°



Inclination angle Vertical -0.5°

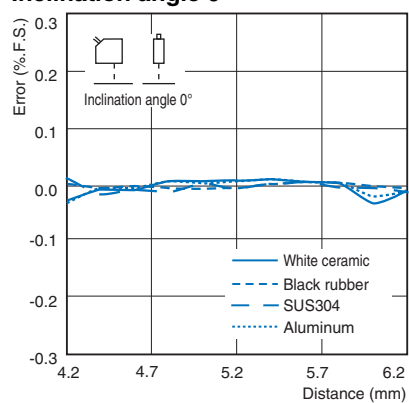


Inclination angle Horizontal -0.5°

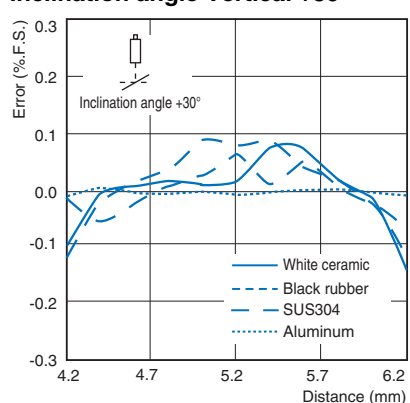


Diffuse reflection

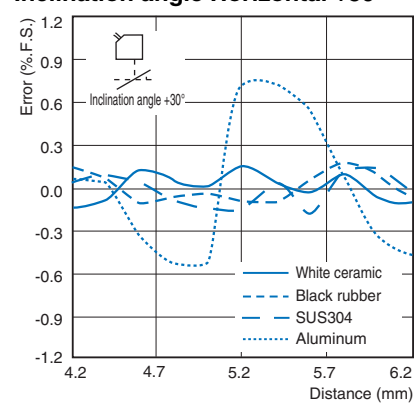
Inclination angle 0°



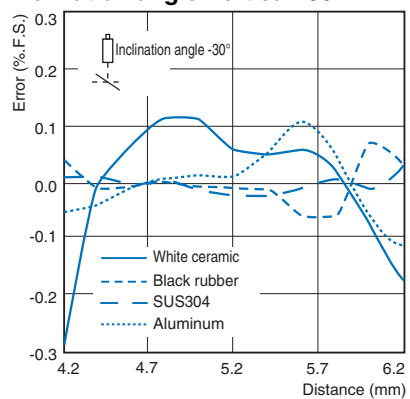
Inclination angle Vertical +30°



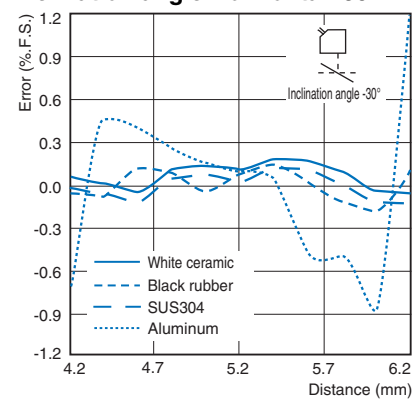
Inclination angle Horizontal +30°



Inclination angle Vertical -30°



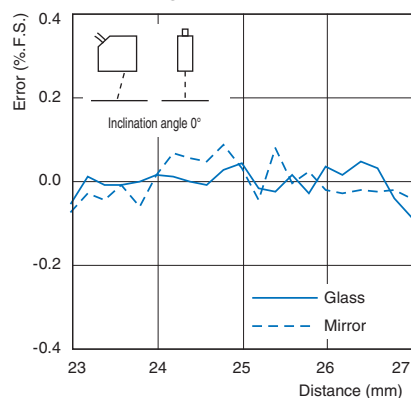
Inclination angle Horizontal -30°



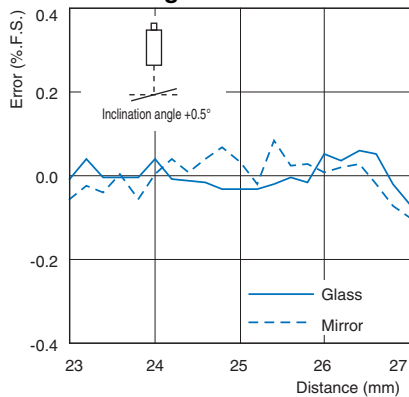
ZS-HLDS2VT (mode: High-Resolution)

Regular reflection

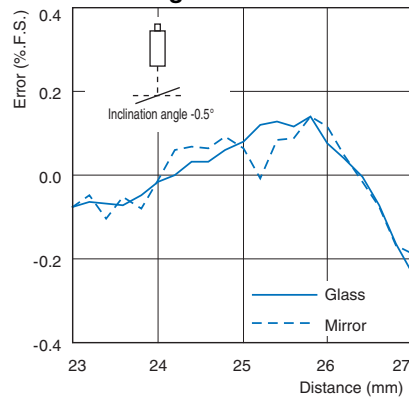
Inclination angle 0°



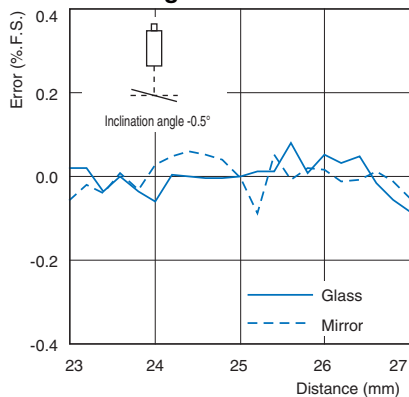
Inclination angle Vertical +0.5°



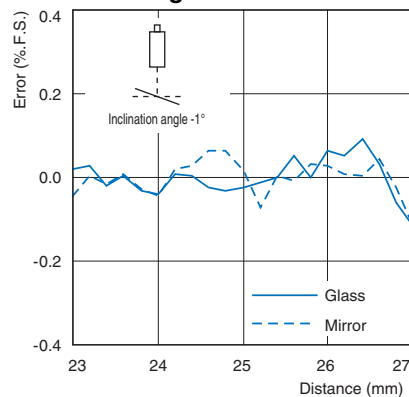
Inclination angle Vertical +1°



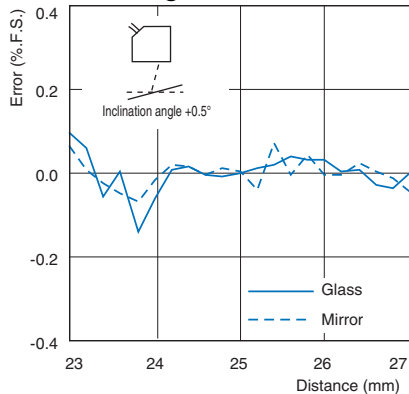
Inclination angle Vertical -0.5°



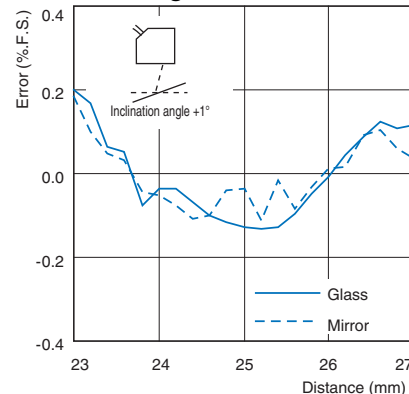
Inclination angle Vertical -1°



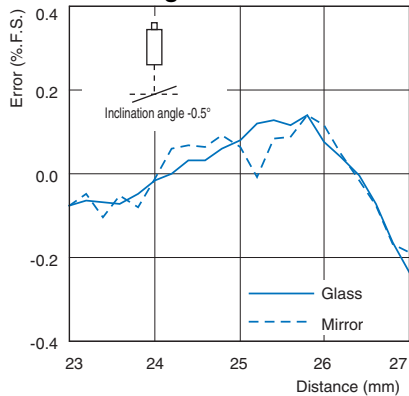
Inclination angle Horizontal +0.5°



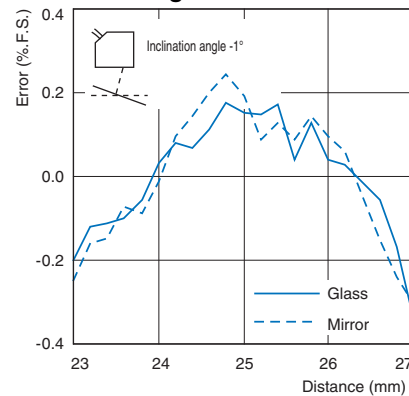
Inclination angle Horizontal +1°



Inclination angle Horizontal -0.5°



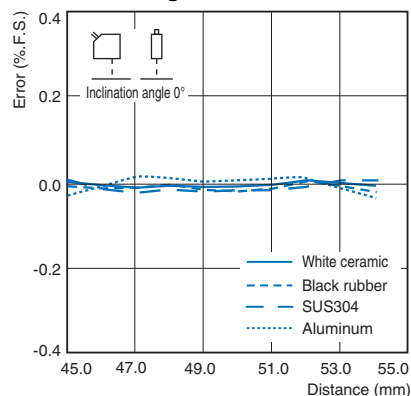
Inclination angle Horizontal -1°



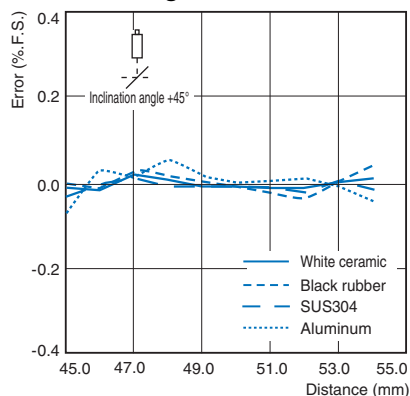
ZS-HLDS5T (mode: High-Resolution)

Diffuse reflection

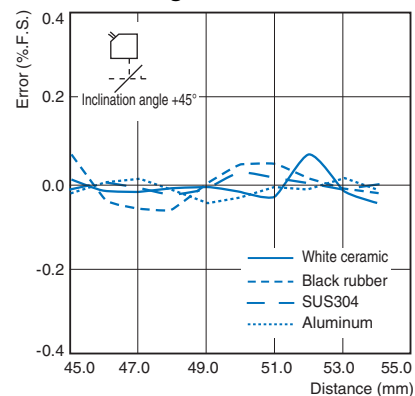
Inclination angle 0°



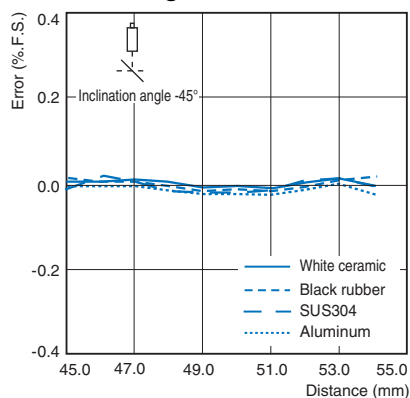
Inclination angle Vertical +45°



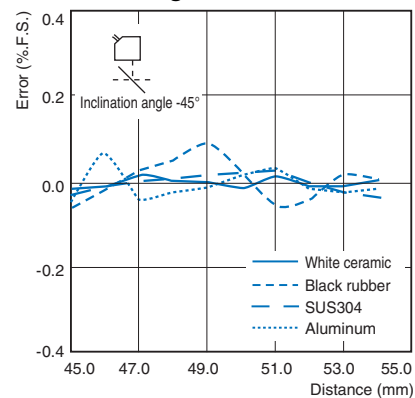
Inclination angle Horizontal +45°



Inclination angle Vertical -45°

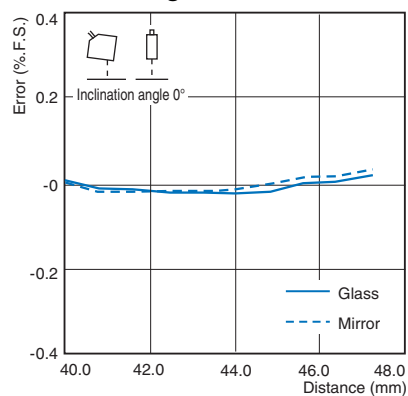


Inclination angle Horizontal -45°

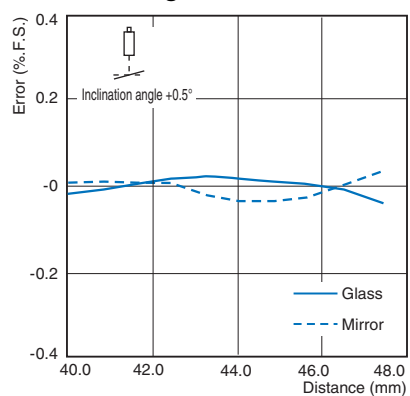


Regular reflection

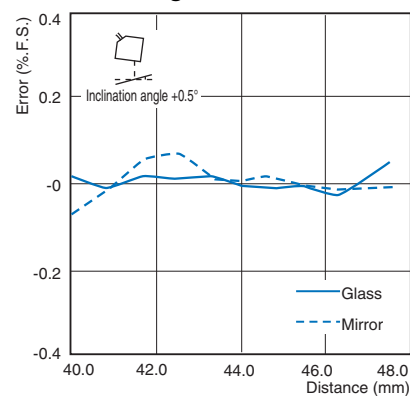
Inclination angle 0°



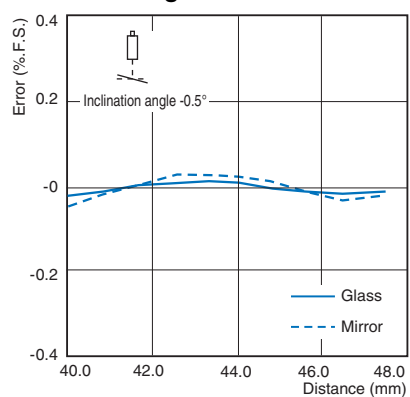
Inclination angle Vertical +0.5°



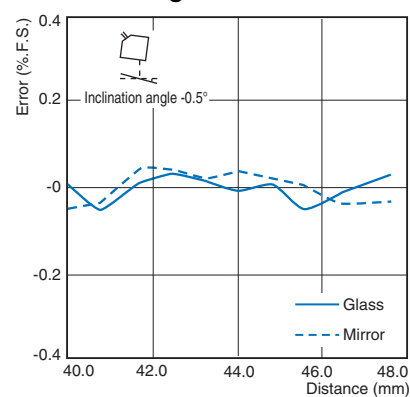
Inclination angle Horizontal +0.5°



Inclination angle Vertical -0.5°



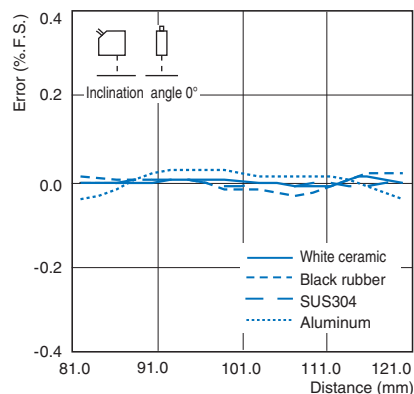
Inclination angle Horizontal -0.5°



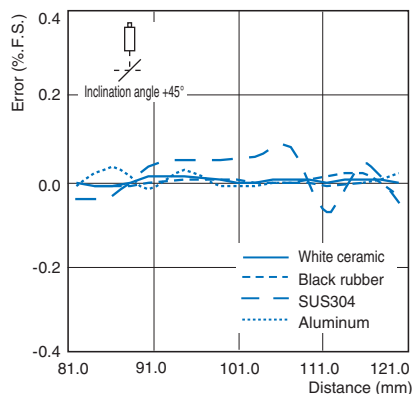
ZS-HLDS10 (mode: High-Resolution)

Diffuse reflection

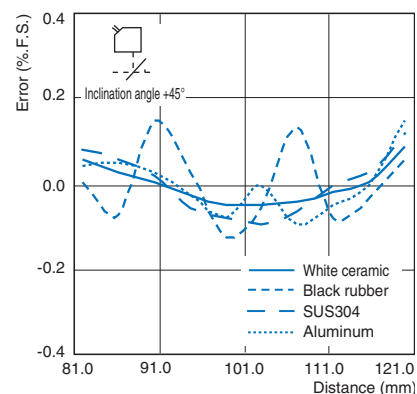
Inclination angle 0°



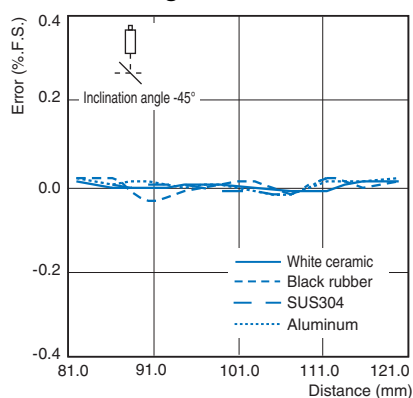
Inclination angle Vertical +45°



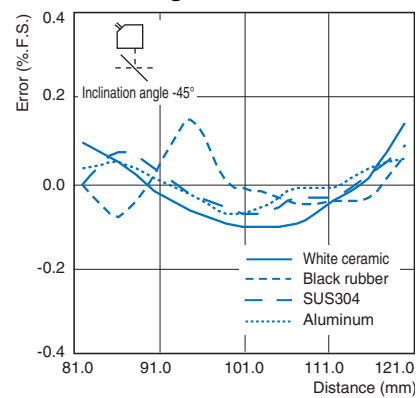
Inclination angle Horizontal +45°



Inclination angle Vertical -45°

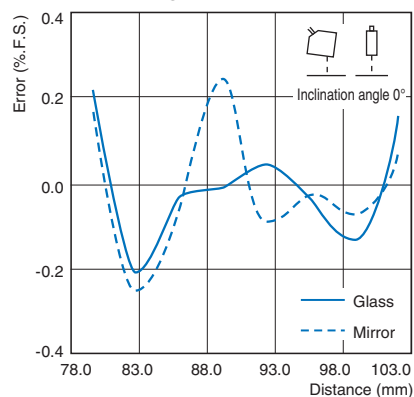


Inclination angle Horizontal -45°

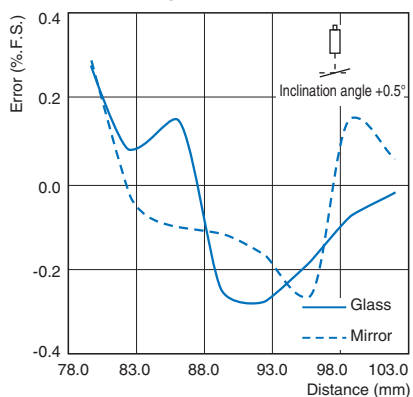


Regular reflection

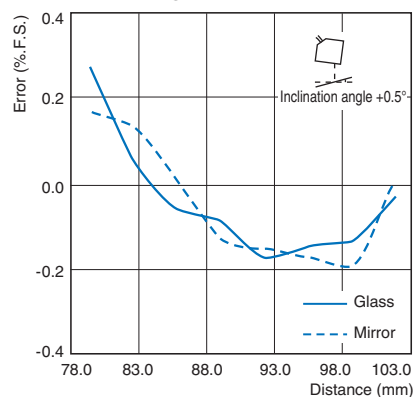
Inclination angle 0°



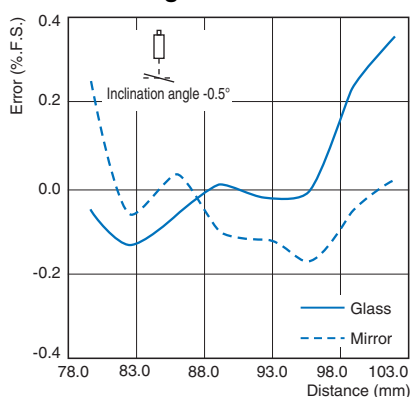
Inclination angle Vertical +0.5°



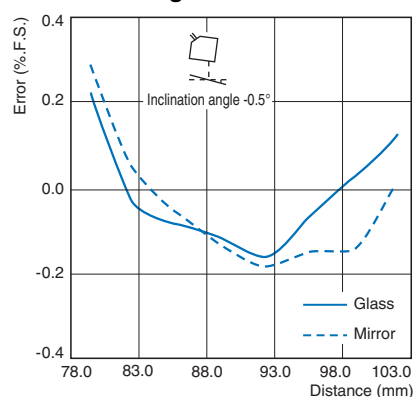
Inclination angle Horizontal +0.5°



Inclination angle Vertical -0.5°



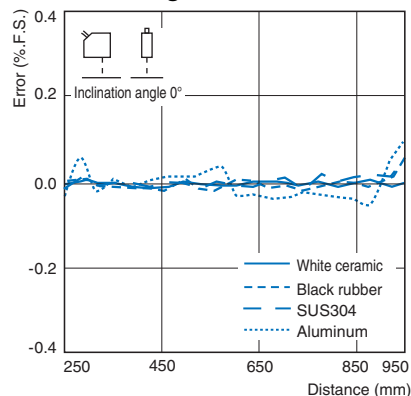
Inclination angle Horizontal -0.5°



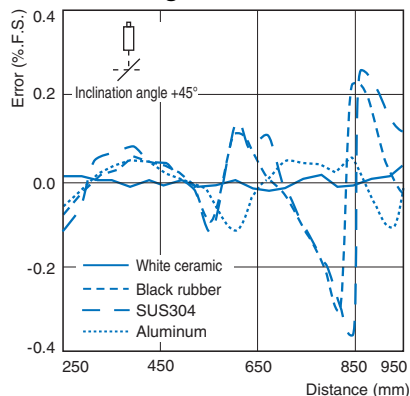
ZS-HLDS60 (mode: High-Resolution)

Diffuse reflection

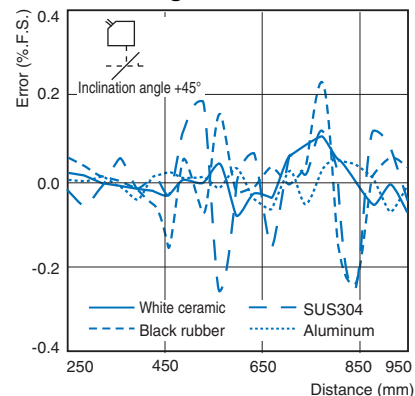
Inclination angle 0°



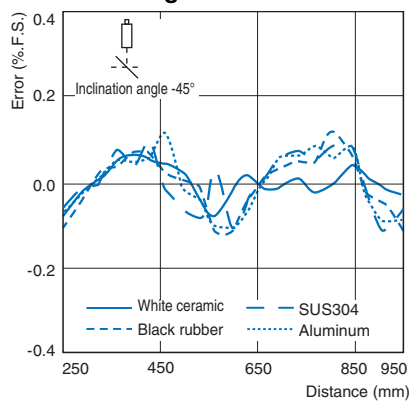
Inclination angle Vertical +45°



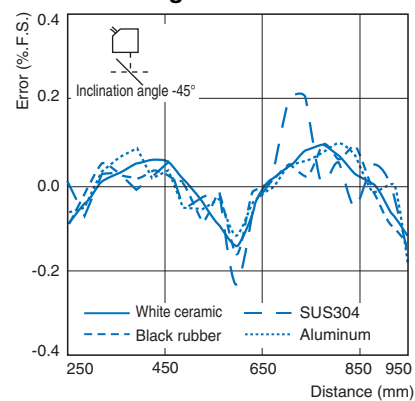
Inclination angle Horizontal +45°



Inclination angle Vertical -45°



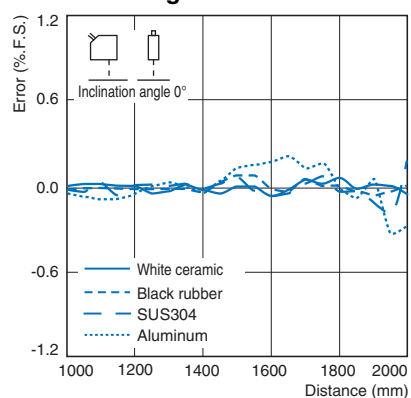
Inclination angle Horizontal -45°



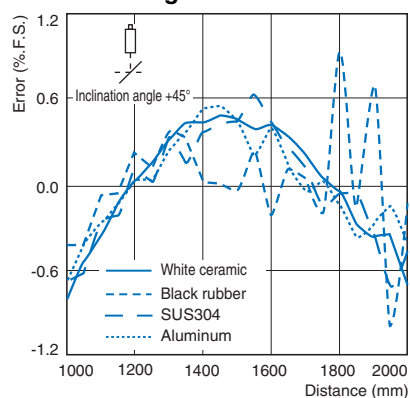
ZS-HLDS150 (mode: High-Resolution)

Diffuse reflection

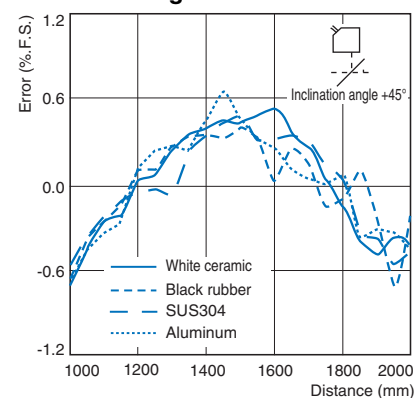
Inclination angle 0°



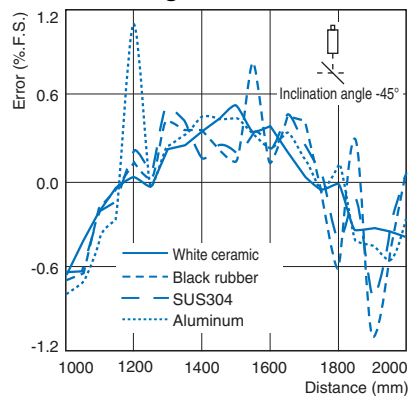
Inclination angle Vertical +45°



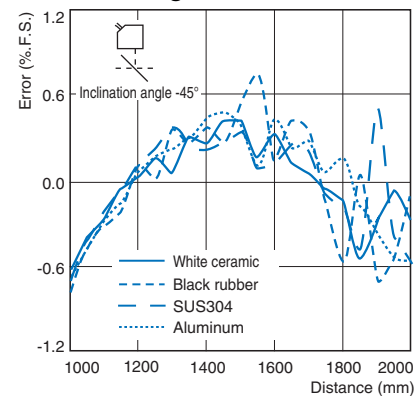
Inclination angle Horizontal +45°



Inclination angle Vertical -45°



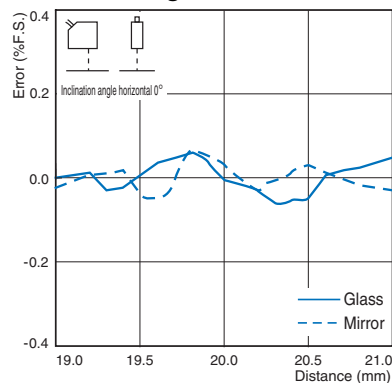
Inclination angle Horizontal -45°



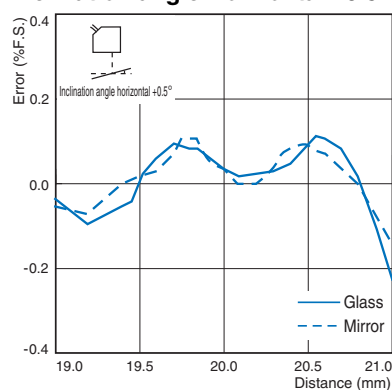
ZS-LD20T (mode: Standard)

Regular reflection

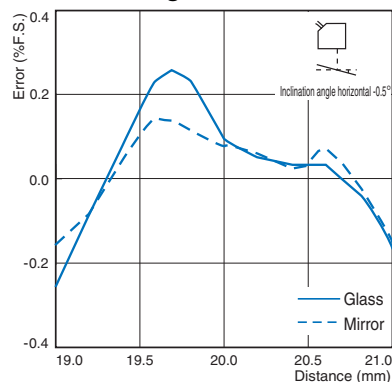
Inclination angle 0°



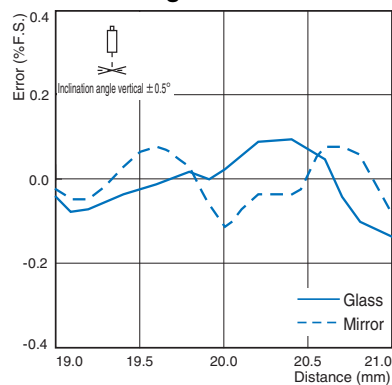
Inclination angle Horizontal +0.5°



Inclination angle Horizontal -0.5°

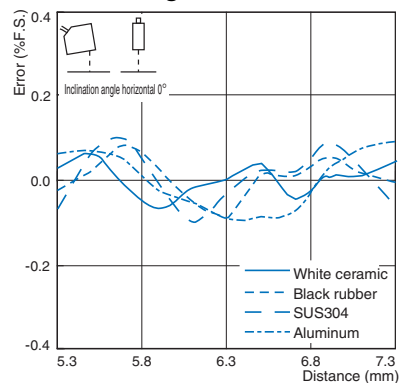


Inclination angle Vertical ±0.5°

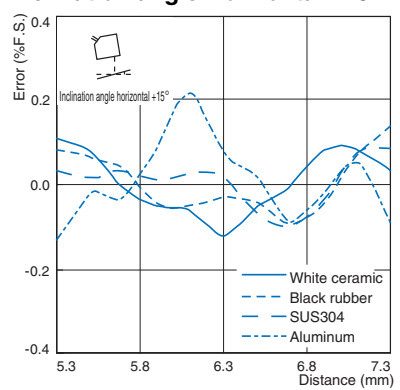


Diffuse reflection

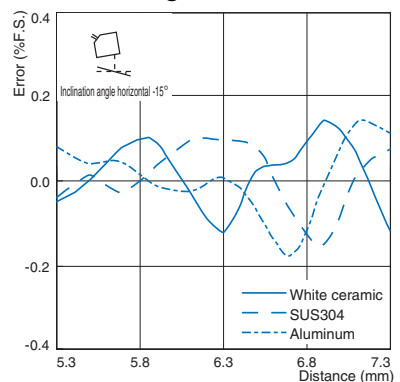
Inclination angle 0°



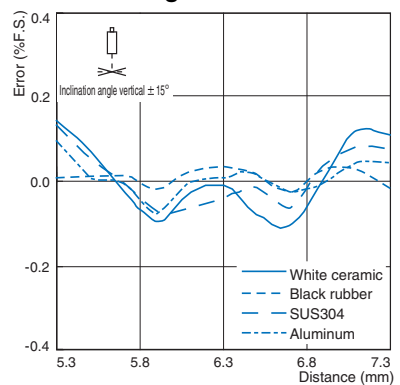
Inclination angle Horizontal +15°



Inclination angle Horizontal -15°



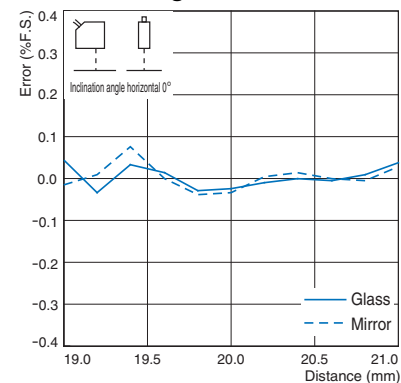
Inclination angle Vertical ±15°



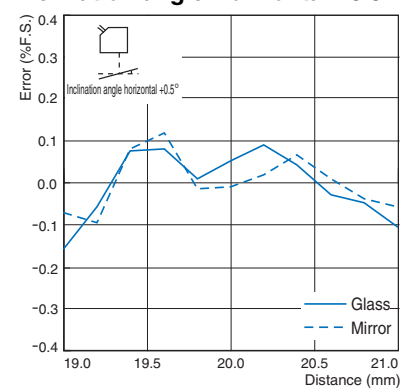
ZS-LD20ST (mode: Standard)

Regular reflection

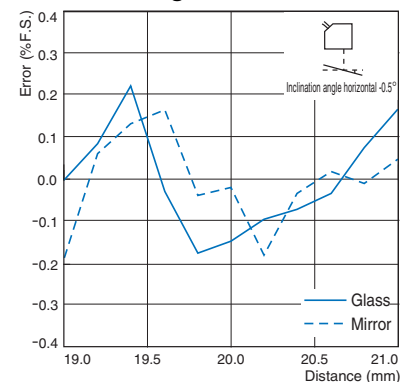
Inclination angle 0°



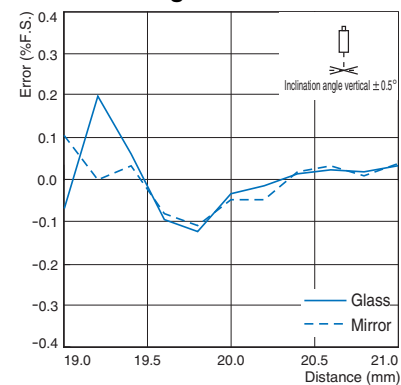
Inclination angle Horizontal +0.5°



Inclination angle Horizontal -0.5°



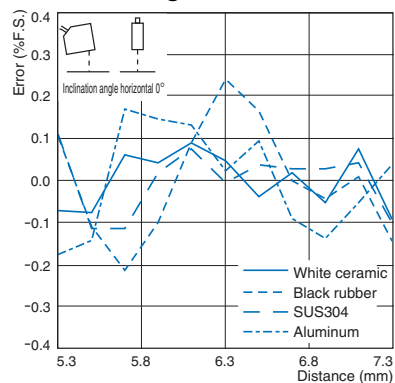
Inclination angle Vertical ±0.5°



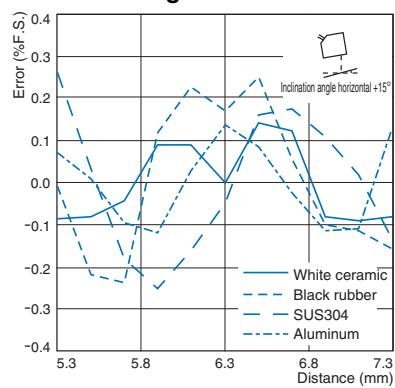
ZS-LD20ST (mode: Standard)

Diffuse reflection

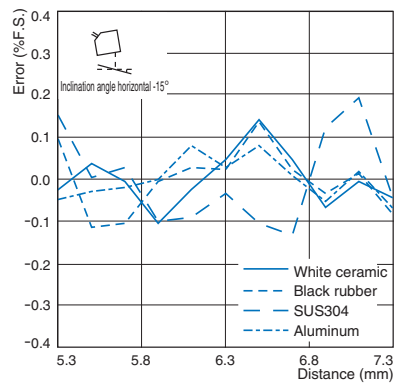
Inclination angle 0°



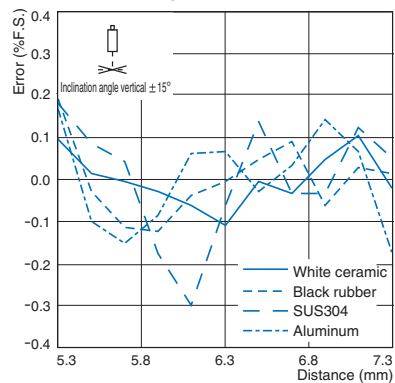
Inclination angle Horizontal +15°



Inclination angle Horizontal -15°



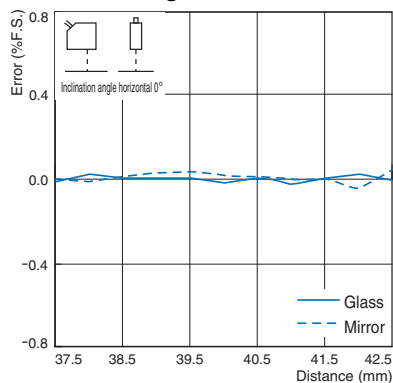
Inclination angle Vertical ±15°



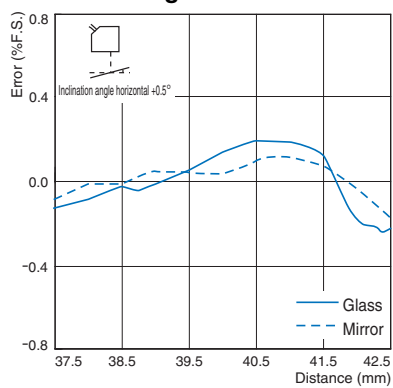
ZS-LD40T (mode: Standard)

Regular reflection

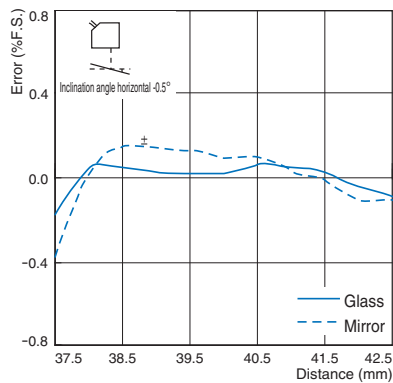
Inclination angle 0°



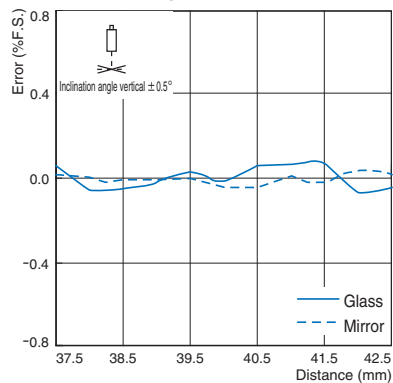
Inclination angle Horizontal +0.5°



Inclination angle Horizontal -0.5°

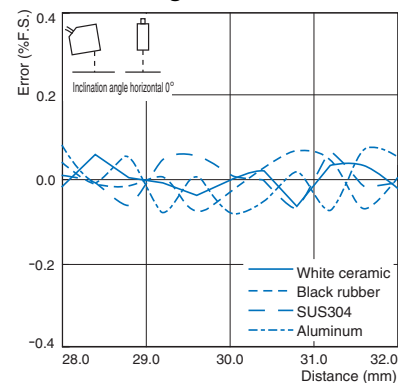


Inclination angle Vertical ±0.5°

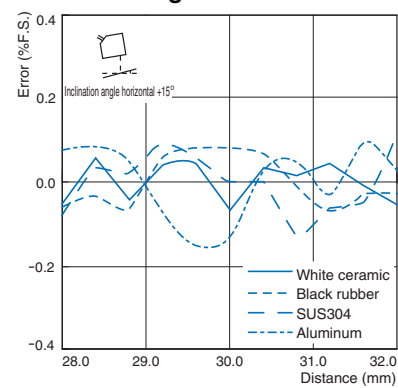


Diffuse reflection

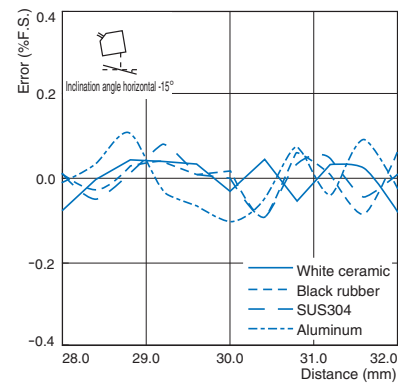
Inclination angle 0°



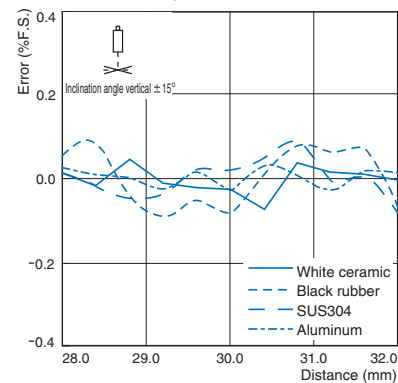
Inclination angle Horizontal +15°



Inclination angle Horizontal -15°



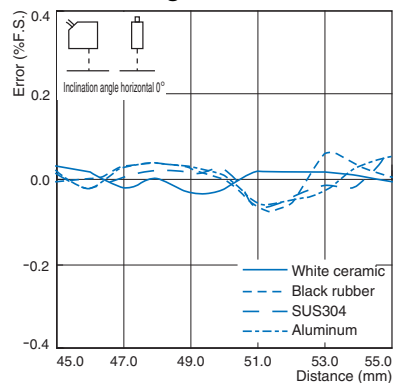
Inclination angle Vertical ±15°



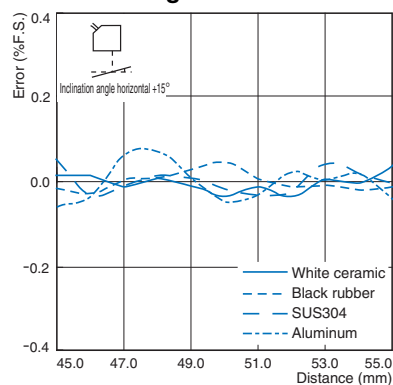
ZS-LD50 (mode: Standard)

Diffuse reflection

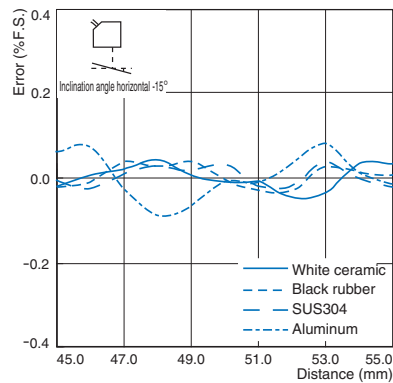
Inclination angle 0°



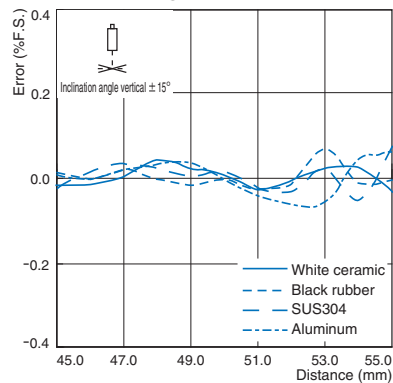
Inclination angle Horizontal +15°



Inclination angle Horizontal -15°

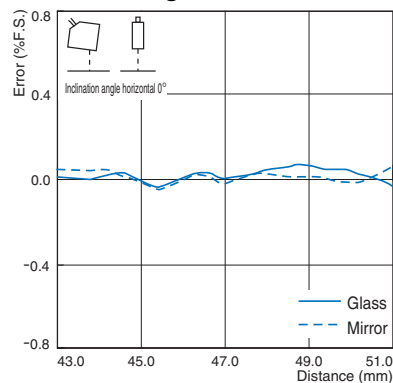


Inclination angle Vertical ±15°

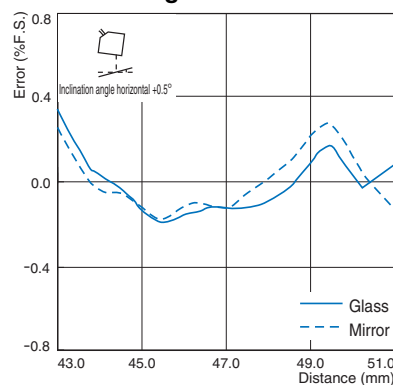


Regular reflection

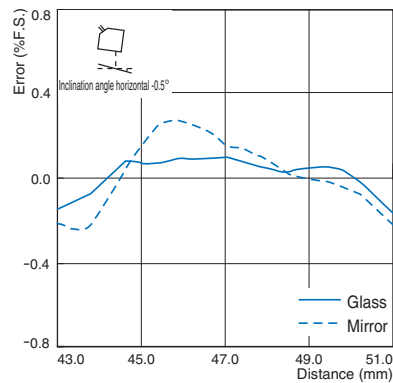
Inclination angle 0°



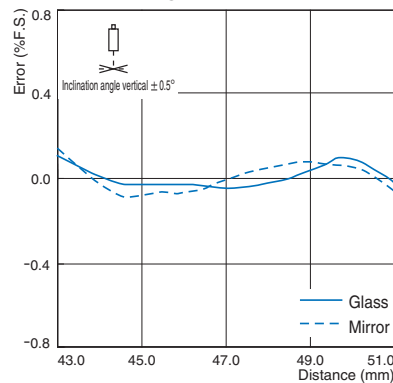
Inclination angle Horizontal +0.5°



Inclination angle Horizontal -0.5°



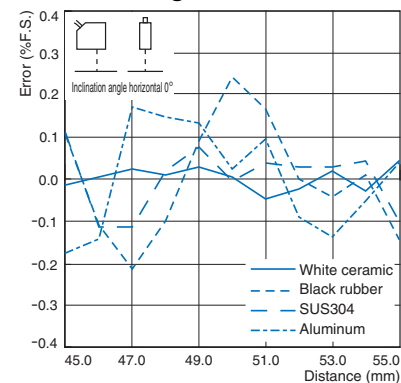
Inclination angle Vertical ±0.5°



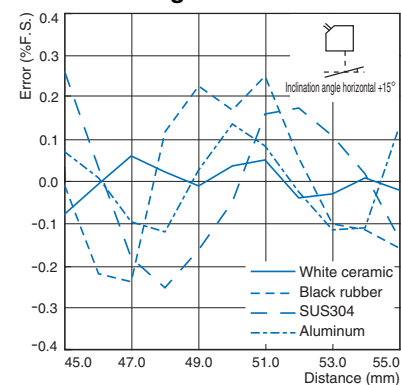
ZS-LD50S (mode: Standard)

Diffuse reflection

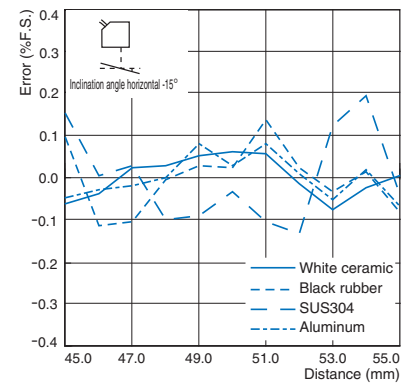
Inclination angle 0°



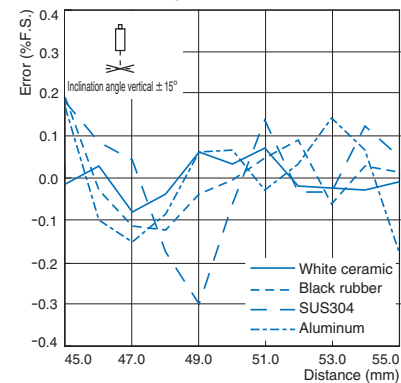
Inclination angle Horizontal +15°



Inclination angle Horizontal -15°



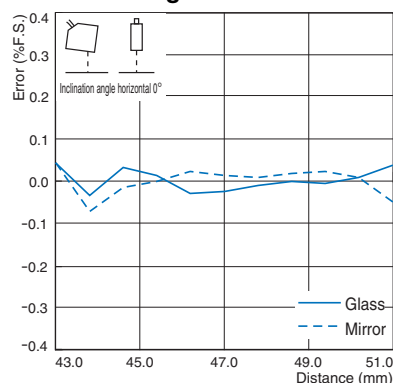
Inclination angle Vertical ±15°



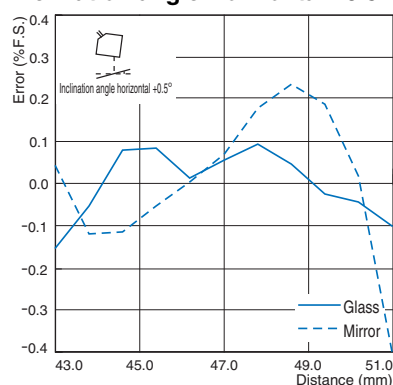
ZS-LD50S (mode: Standard)

Regular reflection

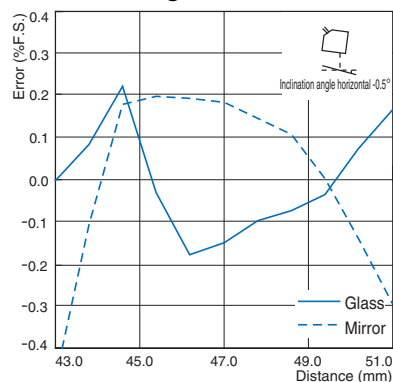
Inclination angle 0°



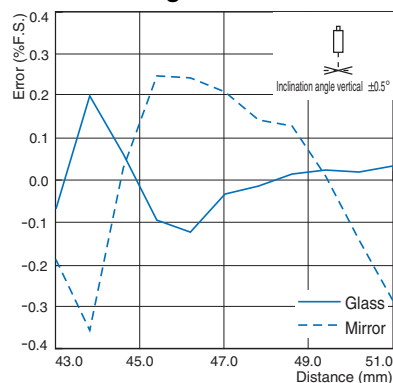
Inclination angle Horizontal +0.5°



Inclination angle Horizontal -0.5°



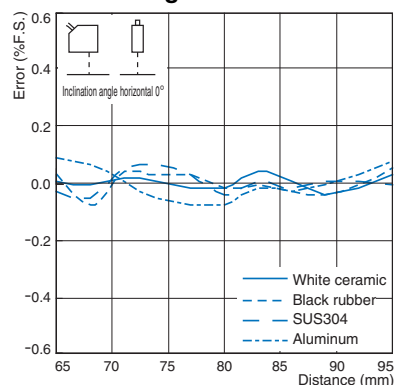
Inclination angle Vertical ±0.5°



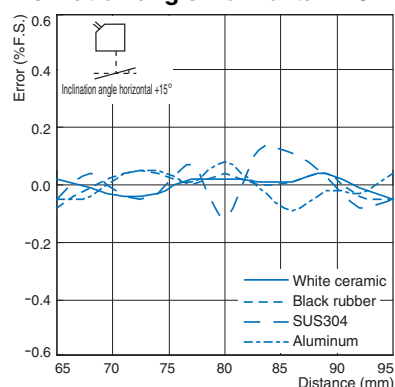
ZS-LD80 (mode: Standard)

Diffuse reflection

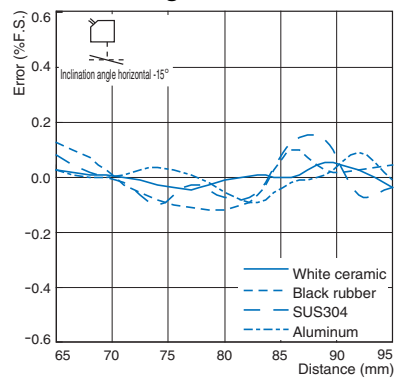
Inclination angle 0°



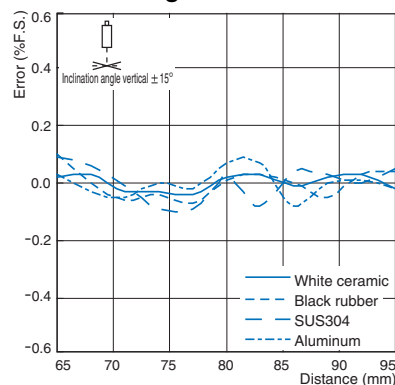
Inclination angle Horizontal +15°



Inclination angle Horizontal -15°

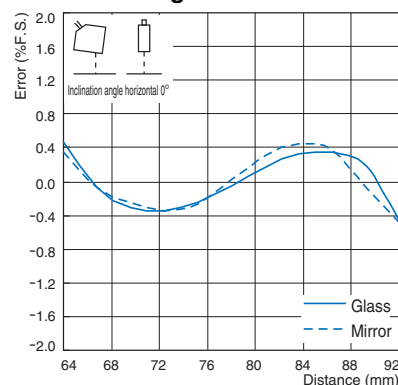


Inclination angle Vertical ±15°

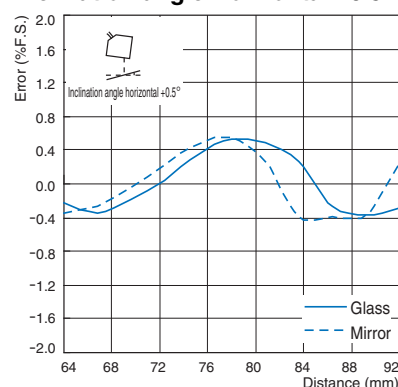


Regular reflection

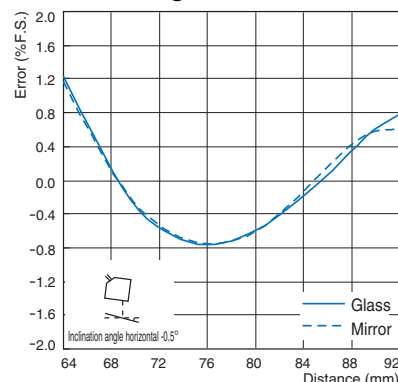
Inclination angle 0°



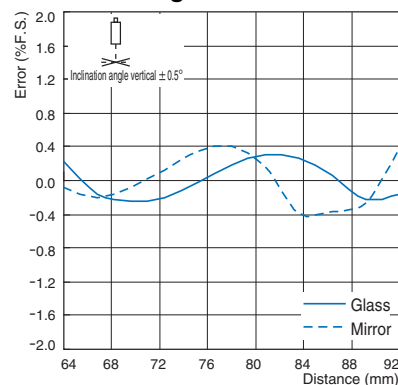
Inclination angle Horizontal +0.5°



Inclination angle Horizontal -0.5°



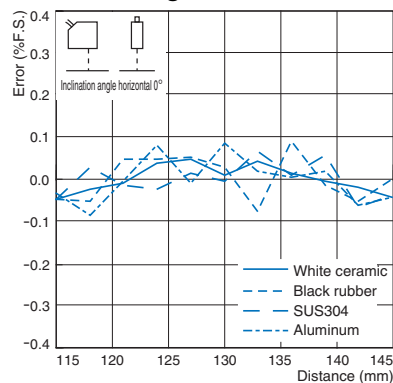
Inclination angle Vertical ±0.5°



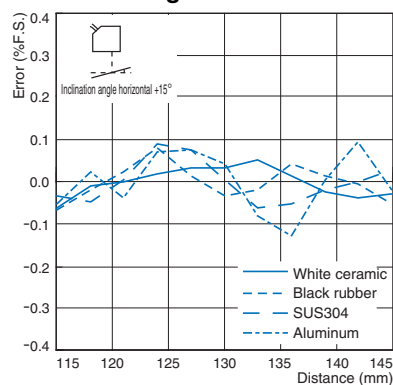
ZS-LD130 (mode: Standard)

Diffuse reflection

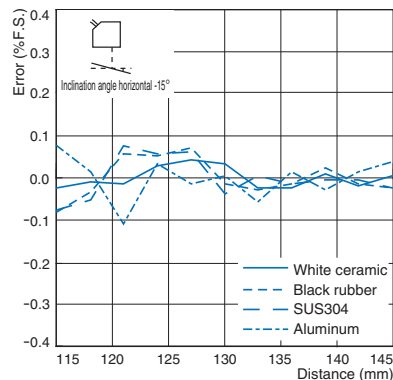
Inclination angle 0°



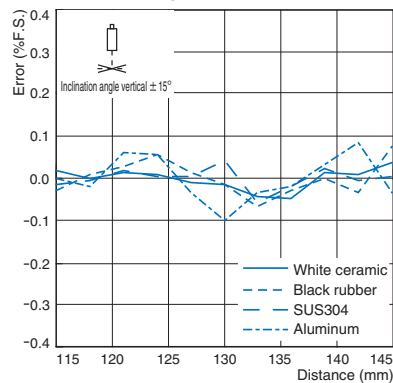
Inclination angle Horizontal +15°



Inclination angle Horizontal -15°

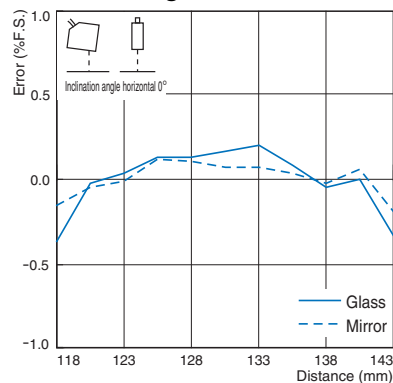


Inclination angle Vertical ±15°

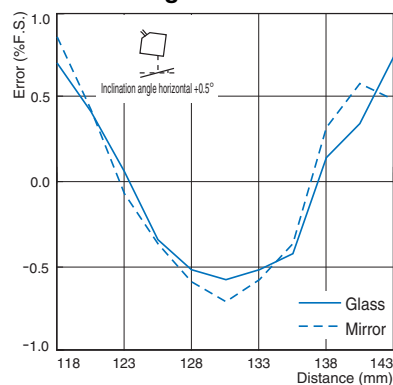


Regular reflection

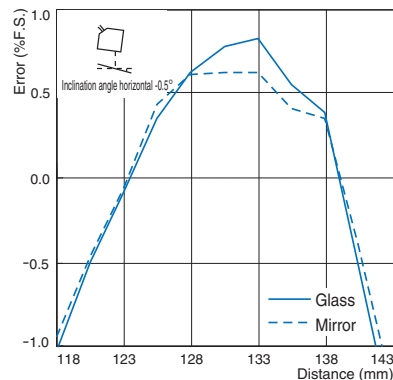
Inclination angle 0°



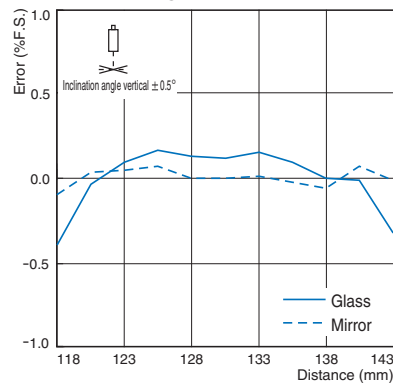
Inclination angle Horizontal +0.5°



Inclination angle Horizontal -0.5°



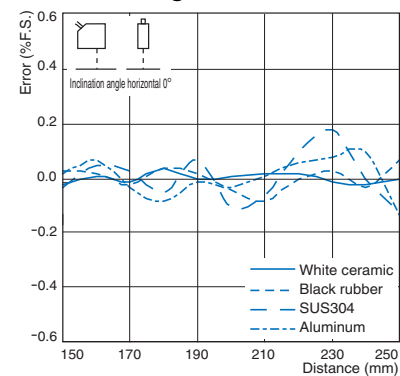
Inclination angle Vertical ±0.5°



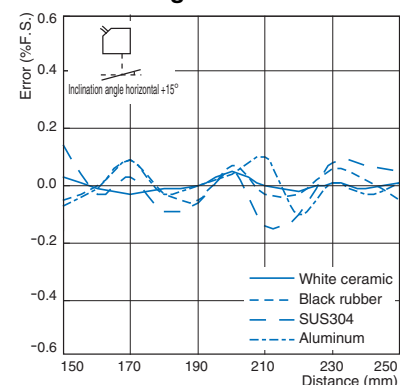
ZS-LD200 (mode: Standard)

Diffuse reflection

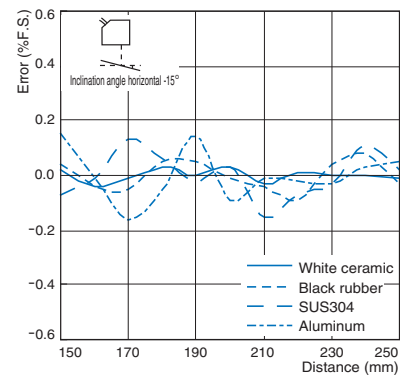
Inclination angle 0°



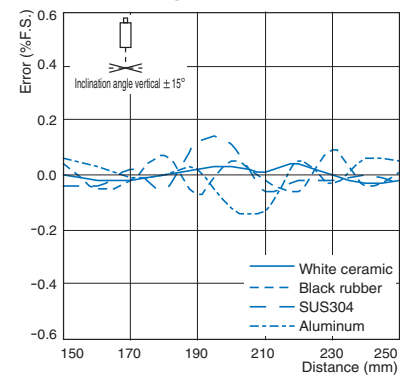
Inclination angle Horizontal +15°

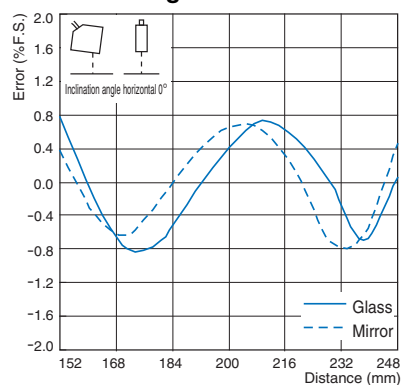
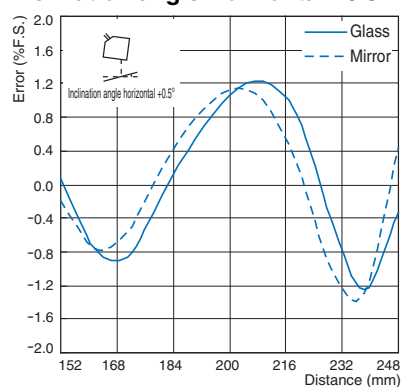
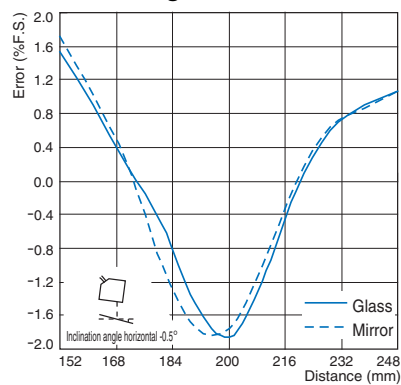
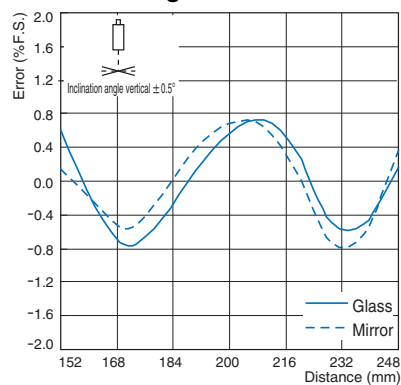
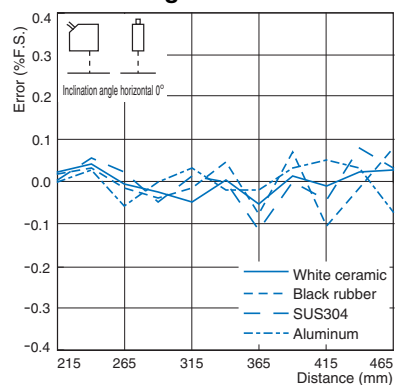
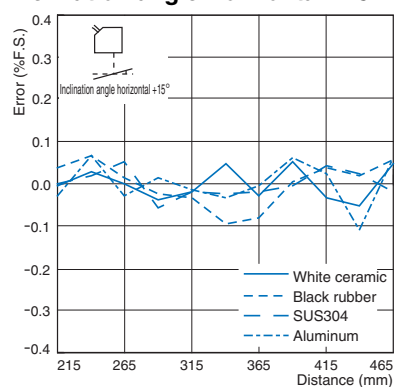
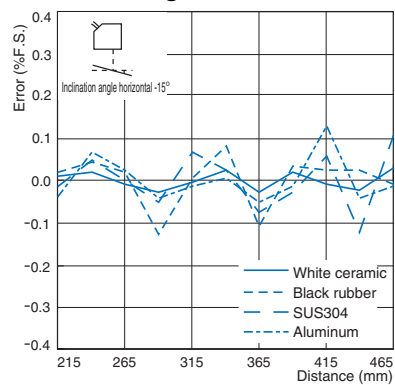
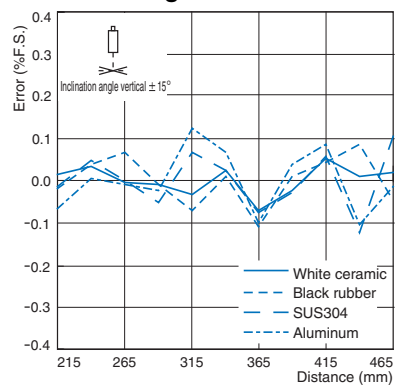


Inclination angle Horizontal -15°



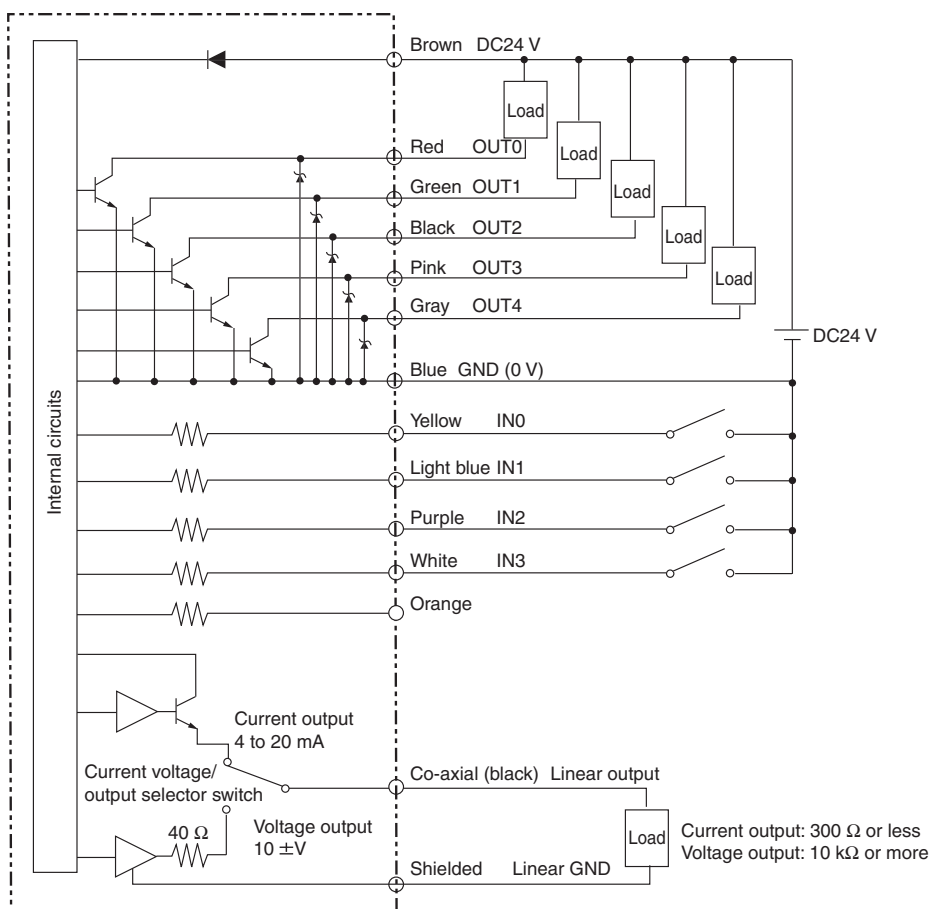
Inclination angle Vertical ±15°



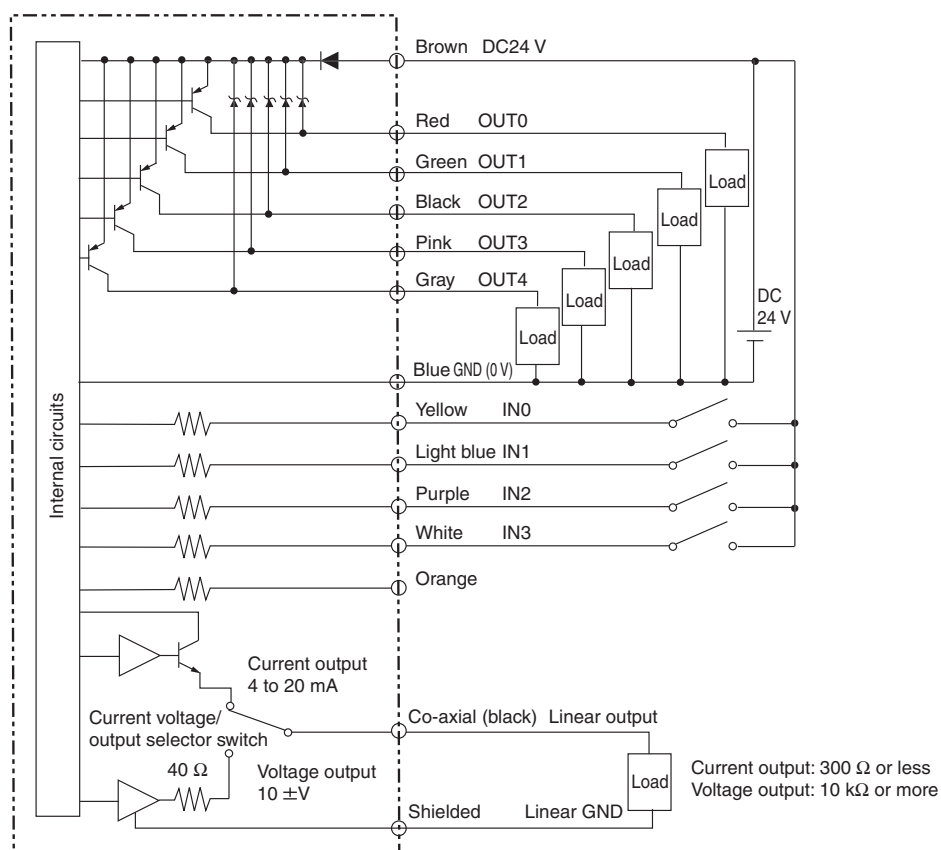
ZS-LD200 (mode: Standard)**Regular reflection****Inclination angle 0°****Inclination angle Horizontal +0.5°****Inclination angle Horizontal -0.5°****Inclination angle Vertical ±0.5°****ZS-LD350S (mode: Standard)****Diffuse reflection****Inclination angle 0°****Inclination angle Horizontal +15°****Inclination angle Horizontal -15°****Inclination angle Vertical ±15°**

I/O Circuit Diagrams

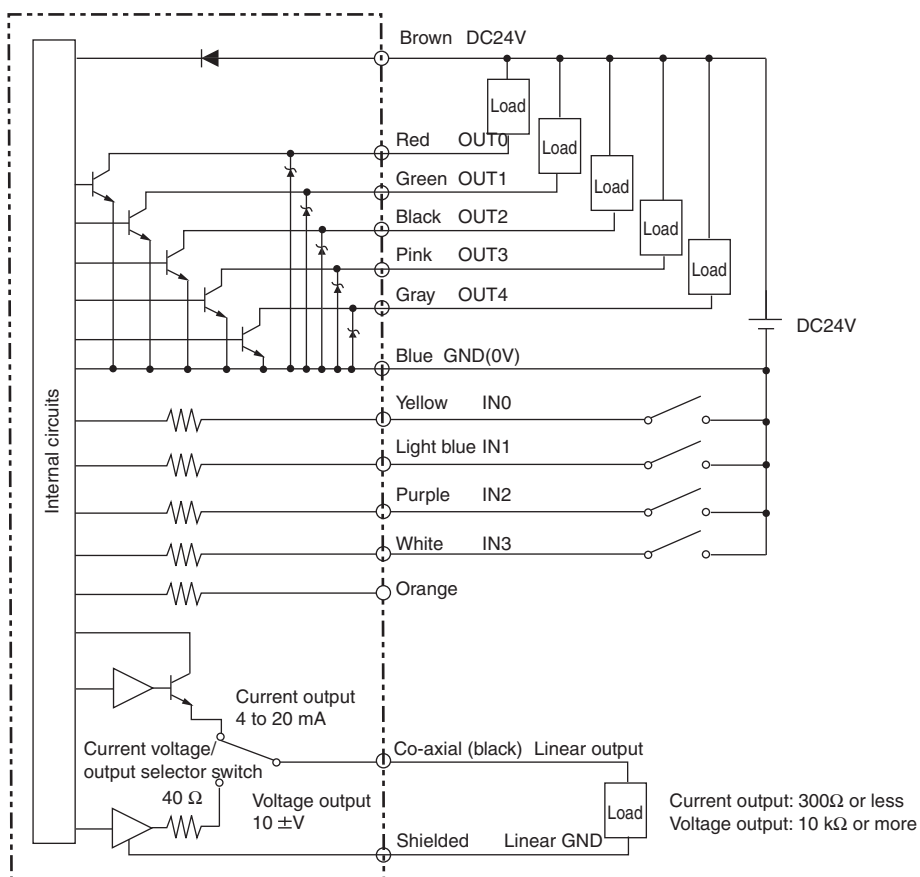
NPN type (ZS-HLDC11)



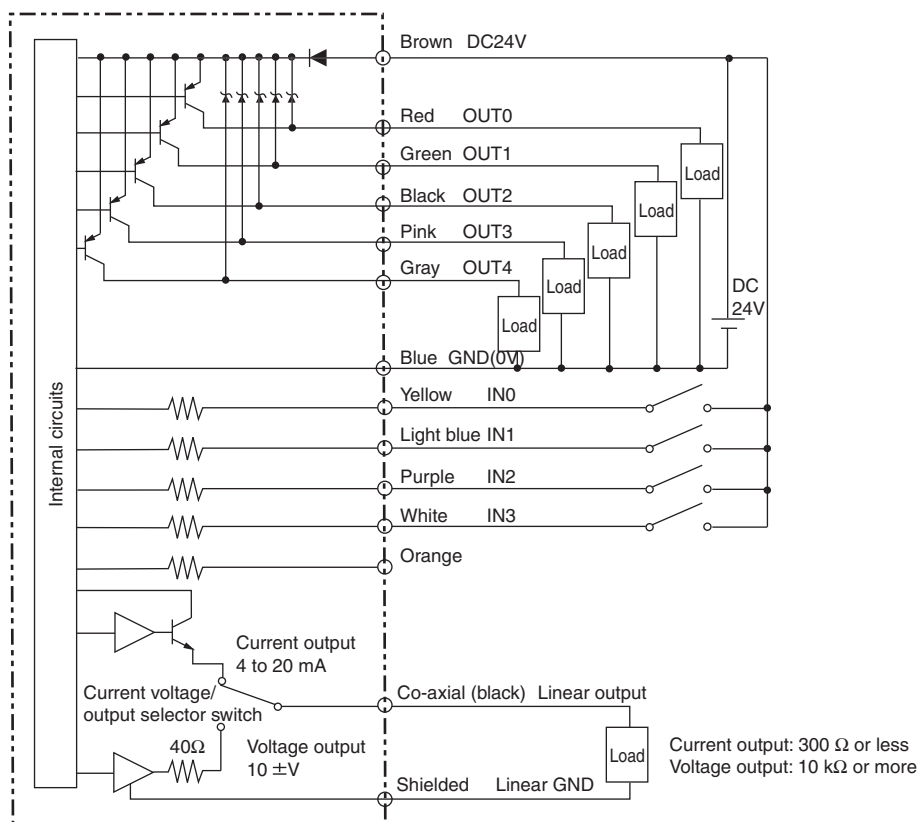
PNP type (ZS-HLDC41)



NPN type (ZS-LDC11)



PNP type (ZS-LDC41)



Safety Precautions

⚠ WARNING

This product is not designed or rated for ensuring safety of persons either directly or indirectly.

Do not use it for such purposes.



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.



Do not disassemble the product. Doing so may cause the laser beam to leak, resulting in the danger of visual impairment.



Laser Label Indications

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



For details, including precautions for correct use, refer to the "ZS-HL Smart Sensor User's manual" (Cat. No. Z236) and "ZS-L Smart Sensor User's manual" (Cat. No. Z208) on your OMRON website.

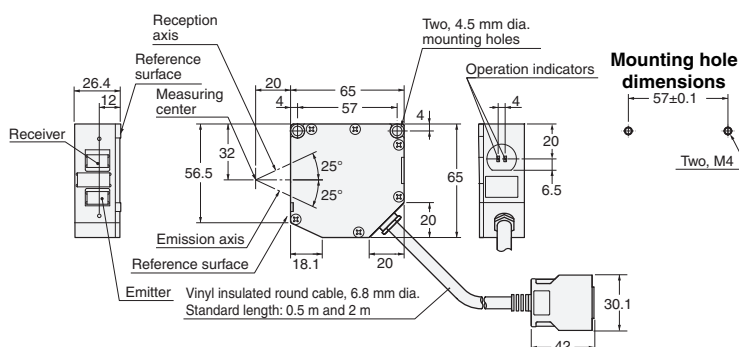
● For technical information and product FAQs, refer to the "Technical Guide" at your OMRON website.

Dimensions

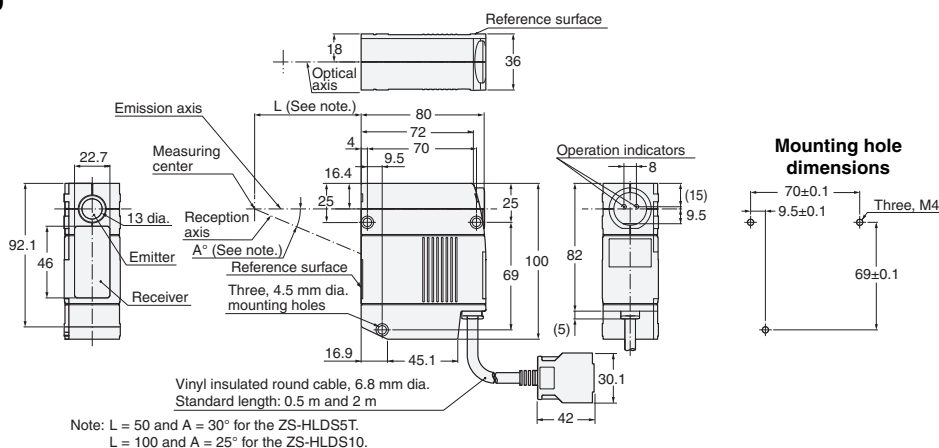
(Unit: mm)

Sensor Heads

ZS-HLDS2T

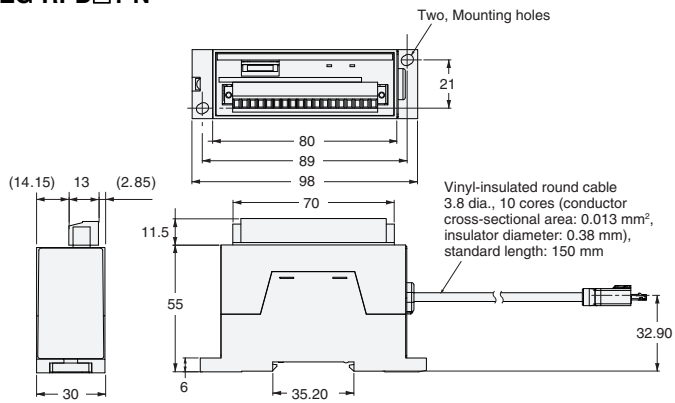


ZS-HLDS5T/HLDS10

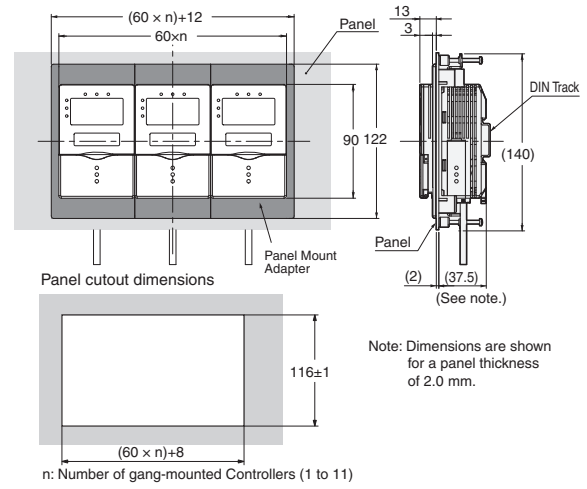




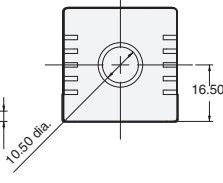
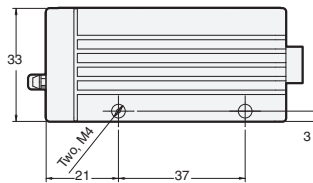
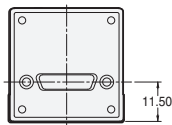
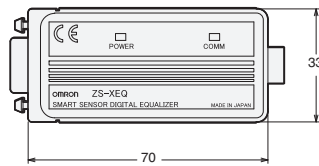
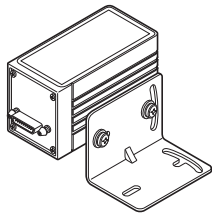
Realtime Parallel Output Unit ZG-RPD□1-N



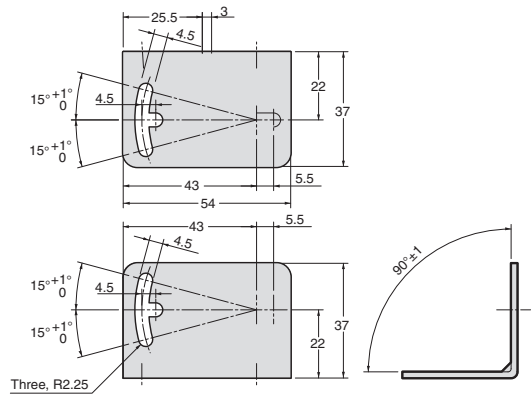
Panel Mount Adapter ZS-XPM1/XPM2 (Dimensions for Panel Mounting)



Digital Equalizer ZS-XEQ



Mounting bracket



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