BGS Sensor with Digital Display Type

BGS-HL series : 1 output type
BGS-HDL series : 2 output type

High resolution BGS laser sensor

- Minimum detectable height difference = 0.08 mm (BGS-HL05/HDL05□□□)
- Built-in controller 4 Digit display
- Stable detection regardless object color

SUS housing for Foods and beverage industry

NEW BGS-HDL series 2 output type

Aluminum housing for general purpose

*FASTUS is a product brand of Optex FA.

OPTEX FA CO., LTD.
Super precision BGS sensor detects 0.08mm height difference

FASTUS BGS-HL/-HDL Series achieves precise height difference detection regardless of Object color and material. This is accomplished by utilizing original “TRI-CORE” Technology found in our high-end displacement sensors. This Technology enables the highest level of performance in the industry at an economical price.

**Features**

**High resolution electronic shutter**

Thanks to an automatic shutter speed adjustment function, the BGS-HL/-HDL series has the advantage of accurately detecting Black non-reflective surfaces as well as shiny reflective surfaces. The Automatic shutter speed adjustment function minimizes the error caused by differences in reflectivity of object color and material.

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**Material response is improved incredibly**

The error of BGS-HL25T2/BGS-HDL25T2 is improved to 1/13 (SUS object) and 1/58 (Black paper) compared with conventional BGS laser sensor.

* White ceramic base at 250mm.
Digital subpixel processing

Subpixel processing divides one pixel into sub pixels and enables accurate detection of peak.

<table>
<thead>
<tr>
<th></th>
<th>BGS-HL05</th>
<th>BGS-HDL05</th>
<th>BGS-HL25</th>
<th>BGS-HDL25</th>
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<tbody>
<tr>
<td>Minimum detectable height difference</td>
<td>0.08mm</td>
<td>0.8mm</td>
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</tbody>
</table>

Condition: Hysteresis setting: 0.02 (BGS-HL05=BGS-HDL05), 0.2 (BGS-HL25=BGS-HDL25)
Other condition to be referred notes on the specifications sheet

Automatic sampling function

In addition to standard feedback, received light to laser power, BGS-HL/-HDL has Automatic Sampling function which enables stable detection of metal surface and also black material by adjusting sampling speed.

Easy to see digital panel

- 4 Digit display in small case
- Easy setup by 4 buttons
- High-end functionality

Ideal for robot mounting

Ideal for mounting on robot cylinder thanks to compact dimensions and the light weight. IP67 water tightness is also secured.

The minimum detectable height difference of 0.08 mm (BGS-HL05/BGS-HDL05)

Perfect for applications that require sensing the height difference of very thin parts, inclination, and overlap (seam) detection.
Introducing the dual-output BGS-HDL - the newest addition to Optex FA's best-in-class lineup of height difference sensors

The newly added BGS-HDL model is equipped with two control outputs. With support for upper and lower limit output or two-step output, applications that call for two sensors can now be covered with just a single sensor.

Two selectable distance display patterns

The digital panel for displaying distance on the sensor can be set to either Background mode (bcGd) or Target mode (trGl). Select the display mode that makes seeing changes in distance easiest according to the application.

Switchable between Output 2 and Teach Input (BGS-HDL function)

For BGS-HDL, it is possible to choose from Output 2 or Teach Input by changing the setting and wiring connection (White wire). With this function, it enables dual input operations such as “Laser OFF” or “Sample & Hold”, in addition to Teaching at the same time.
### Lineup

<table>
<thead>
<tr>
<th>Type</th>
<th>Sensing distance</th>
<th>Repeatability</th>
<th>Laser class</th>
<th>Output</th>
<th>Line up</th>
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<tr>
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<td>IEC/JIS/FDA* Class1</td>
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<td>BGS-HL05T</td>
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<tr>
<td>Cable type</td>
<td>20 – 50mm</td>
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<td>BGS-HLM05T</td>
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<td>50 – 250mm</td>
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<tr>
<td>M8 Connector type</td>
<td>20 – 50mm</td>
<td>0.01mm</td>
<td>IEC/JIS/FDA* Class1</td>
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<td>BGS-HL05TC</td>
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<td></td>
<td>50 – 250mm</td>
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<td>BGS-HDL05TM12</td>
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<tr>
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<td>0.1mm</td>
<td>IEC/JIS/FDA* Class2</td>
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</tr>
</tbody>
</table>

*These products are classified as CLASS 1 or CLASS 2 by IEC 60825-1 according to Laser Notice No.50, FDA Guidance Document.*

### Application

1 output type (BGS-HL series)

- Detecting O-rings
- Checking face of black rubber parts
- Detecting wafers piling

2 output type (BGS-HDL series)

- Detecting blister pack stacks (Output 1: ON with 1 layer; Output 2: ON with 3 layers)
- Detecting amount remaining for component feeder (Output 1: Supply starts when amount remaining is small; Output 2: Supply stops when amount remaining is large)
- Detecting straws and float (Output 1: ON with no straw; Output 2: ON when floating)
Circuit diagram

BGS-HL series

NPN mode

Main circuit

Brown : DC 12~24V
Black : Control Output
Gray : External Input
Blue : 0V

PNP mode

Main circuit

Brown : DC 12~24V
Black : Control Output
Gray : External Input
Blue : 0V

BGS-HDL series

NPN mode

Main circuit

Brown : DC 12~24V
Black : Control Output 1
Gray : External Input
White : Control Output 2
Blue : 0V

PNP mode

Main circuit

Brown : DC 12~24V
Black : Control Output 1
Gray : External Input
White : Control Output 2
Blue : 0V

Connector pin configuration (sensor side)

M8 connector type
(BGS-HL series)

White
Black
Brown
Blue

M12 connector type
(BGS-HDL series)

White
Black
Brown
Blue
Gray
## Dimensions

**Cable type**  
(BGS-HL/HDL series)

**M8 connector type**  
(BGS-HL series)

**M12 connector type**  
(BGS-HDL series)

(unit: mm)

## Options

**Cable**

**M8 connector cable**
- JCN-S (2m)
- JCN-5S (5m)
- JCN-10S (10m)

**M12 connector cable**
- DOL-1205-G02M-R (2m)
- DOL-1205-G05M-R (5m)

**Bracket**

**BEF-OD1-A**  
(for M8 connector type)

**BEF-OD1-B**  
(for cable type, M12 connector type)

(unit: mm)
Specifications

<table>
<thead>
<tr>
<th>Output type</th>
<th>1 output type</th>
<th>2 output type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensing distance</td>
<td>20～50mm (display: 0.00～30.00&quot;&quot;)</td>
<td>30～250mm (display: 0.00～200.00&quot;&quot;)</td>
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<tr>
<td>Cable type</td>
<td>Aluminum</td>
<td>BGS-HL05T</td>
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<tr>
<td>M12 Connector type</td>
<td>Aluminum</td>
<td>BGS-HL05M12</td>
</tr>
</tbody>
</table>

| Repeatability | 0.01mm (display: 0.01) | 0.01mm (display: 0.01) | 0.01mm (display: 0.01) | 0.01mm (display: 0.01) |
| Temperature drift (typical value) | ±0.08% / °C F.S. | ±0.08% / °C F.S. | ±0.08% / °C F.S. | ±0.08% / °C F.S. |
| Light source | Red laser Diode (wave length 655nm) | | | |
| Spot size | φ0.8mm | φ1mm | φ0.8mm | φ1mm |
| Response time | 1.5ms Min. | | | |
| Hysteresis | 0～22.49mm Adjustable | 0～149.9mm Adjustable | 0～22.49mm Adjustable | 0～149.9mm Adjustable |

Adjusting sensing distance
- Teaching / Manual
  (Select from: 1 point / 2 point / Zones)

Indicator
- Laser indicator: Green / Output indicator: Orange / Mode indicator: Red
- Laser indicator: Green / Output 1, 2 indicator: Orange

Digital display
- 7 segment 4 digit LED display

External input
- Selectable from: Laser OFF, Teaching, Sample & Hold, One shot

Control output
- Open collector (NPN / PNP selectable), 100mA Max. / DC24V (Residual voltage 1.8 V Max.)

Operating mode
- Selectable from: ON, Dark ON

Timer
- Selectable from: OFF (ON delay / Off delay / One shot / 0～9999ms, 1ms step)

Power supply
- DC2～24V including 10% ripple (p-p)

Current consumption
- 40mA Max

Connection type
- Cable type: 2m, φ4.5mm
- M8 Connector type: 4pin

Applicable regulations
| EMC | 2014 / 30 / EU |
| RoHS | 2011 / 65 / EU/MIT Order No.32 |
| Safety | 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No.50 |
| Ambient Temp./Humid. | -10～+50°C / 35～85% RH (no condensation) |
| Ambient illuminance | Incandescent lamp: 5,000 lx max. |
| Vibration resistance | 30～55Hz, Double amplitude 1.5mm, X,Y,Z for 2 Hours |
| Shock resistance | 500m/s² (approx. 50G) X,Y,Z 3 times each |
| Protection class | Reverse connection protection, Over current protection |
| Protection category | IP67 |

Material
- Case: <Aluminum type> Aluminum / <SUS type> SUS, Front lens: PPSU, Display: PET, Cable: Oil resistant PVC

Weight
- Cable type: Approx. 90g
- M8 Connector type: Approx. 30g
- M12 Connector type: Approx. 100g

Options
- Mounting bracket: BEF-CD1-A (for cable type) / BEF-CD1-A (for connector type), M3 screw * 2 pieces

The specifications are based on the condition unless otherwise designated:
- Testing object: White ceramic

1. When "shift function" is ON, display shows 0 at the teaching position.
2. The number on the display can be as follows, 7.50～37.50 (BGS-HL50L50), 50.00～250.00 (BGS-HL25L50)
3. Sampling period: 1000μs
4. Hysteresis setting: 0.02mm (BGS-HL10L50), 0.2mm (BGS-HL25L50)
5. Defined with center strength 5%±(13%,5%) at the center. There may be leak tight other than the specified spot size. The sensor may be affected when there is a highly reflective object close to the detection area.
6. Default value: 1.5～7mm (BGS-HL10L50), 3～13mm (BGS-HL25L50)
7. Default value: 0.15mm (BGS-HL10L50), 1mm (BGS-HL25L50)

CLASS1 CLASS2
| BGS-HL05T | BGS-HL05T2 |
| BGS-HL05TC | BGS-HL05TC2 |
| BGS-HL25T | BGS-HL25TC2 |
| BGS-HL25T2 | BGS-HL25T22 |
| BGS-HL05ST | BGS-HL05ST2 |
| BGS-HL05ST2 | BGS-HL05ST22 |
| BGS-HL25ST | BGS-HL25ST2 |
| BGS-HL25ST2 | BGS-HL25ST2 |
| BGS-HL25ST3 | BGS-HL25ST3 |
| BGS-HL25ST32 | BGS-HL25ST32 |
| BGS-HL25ST4 | BGS-HL25ST4 |
| BGS-HL25ST42 | BGS-HL25ST42 |

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Specifications are subject to change without prior notice.
Specifications and technical information not mentioned here are written in Instruction Manual. Or visit our website for details.
All the warnings and cautions to prior use are given in Instruction Manual.

Attention: Not to be Used for Personnel Protection.
Never use these products as sensing devices for personnel protection. Doing so could lead to serious injury or death. These sensors do not include the self-checking redundant circuitry necessary to allow their use in personnel safety applications. A sensor failure or malfunction can cause either an energized or de-energized sensor output condition.

Optex FA CO., LTD
91 Chudoji-Awata-cho Shimogyo-ku Kyoto 606-8815 JAPAN
TEL. +81-75-325-1314 FAX. +81-75-325-2936
http://www.optex-fa.com

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WARNINGs
This product series is classified as CLASS 1 or CLASS 2 by IEC 60825-1 according to Laser Safety Standard. Every product is with following warning label attached.

BGS-HL25T2
BGS-HL25ST2

BGS-HL25T2