

High resolution BGS sensor

FASTUS BGS-HDL Series

BGS-HDL05T □
BGS-HDL25T □ □

Instruction manual

- Thank you for purchasing BGS-HDL series. We hope you are satisfied with its performance.
- Please read this manual carefully and keep it for future reference.

Specifications

Part number legend

BGS-HDL

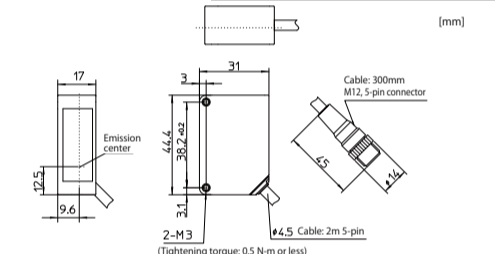
- Laser Class: (none) : Class 1, 2 : Class 2
- Connect type: (none) : Cable, M12 : M12 Connector*
- Max. working distance (cm) : *
- Make-to-Order

Type	2m cable	BGS-HDL05T	BGS-HDL25T
Connector type	BGS-HDL05TM12	BGS-HDL25TM122	
Detection range	20 ~ 50mm	50 ~ 250mm	
Repeat accuracy	0.01mm (Display: 0.01)	0.1mm (Display: 0.1) ¹⁾	
Min. detection step ²⁾	0.08mm	0.8mm	
Temperature Drift ³⁾	± 0.04%/°C of F.S.	± 0.08%/°C of F.S.	
Light source	Type (Wavelength)	Red laser diode (Wave length: 655nm)	
	Pulse duration	Variable within 8 μs - 4ms	
Repetition	Repetition	Variable within 250 Hz - 2kHz	
	Maximum output	390 μW	1mW
Laser class	CLASS 1 (IEC/JIS/FDA ³⁾)	CLASS 2 (IEC/JIS/FDA ³⁾)	
Spot size ⁴⁾	φ 0.8 mm	φ 1 mm	
Response time	Min: 1.5ms @ Default: 1.5-7ms	Min: 1.5ms @ Default: 3-14ms	
Hysteresis	0-22.49 (Default: 0.15)	0-0149.9 (Default: 1.0)	
Detection range adjustment	Selectable from two methods, Teaching type / Target mode and Background mode used with manual adjustment		
Indicator	Laser radiation emission indicator: Green Output1 Indicator, Output2 Indicator (Orange)		
Display	7-segment 4-digit LED display		
Control output	NPN/PNP Open Collector (Selectable Functions) 2 system × 50mA max./24VDC Residual voltage: 1.8V		
Output mode	Light ON / Dark ON / ZONE / FGS, Selectable by setting		
Timer function	OFF / On delay / Off delay / One shot, Selectable by setting (Unit: 1ms)		
Connection	Cable type: 2m cable, φ 4.5 Connector type: M12, 5-pin connector 300 mm		
External input mode	Input (Gray) Laser OFF (No. O, N/C)/ Teach / Sample hold / One shot, Selectable by setting		
External input mode (No.2 output/Teach input) ⁵⁾	Teach input selectable by setting Alternative with No.2 output.		
Rating	Supply voltage: 12-24 VDC including 10% ripple (p-p) Current consumption ⁶⁾ : 40mA max. / 24VDC excluding the current of Control Output		
Environment resistance	Protection circuit	Reverse connection protection, Overcurrent protection	
	Protection Degree	IP67	
Storage Temp./Humid.	Operating Temp./Humid.	-10-45°C / 35-85% RH (without freezing or condensation)	
	Ambient Illuminance	Incandescent lamp: 5000 lx or less	
Vibration resistance	Shock resistance	500m/s ² (Approx. 50G) 3 times in each X,Y,Z direction	
	Material	Case: Aluminum die - cast, Front cover: PPSU, Display: PET, Cable: Oil proof PVC	
Applicable regulations	EMC Directive (2014/30/EU)		
Environment	RoHS Directive (2011/65/EU), China RoHS (MIIT Order No. 32)		
Safety	(excluding differences specified in Laser Notice No.50)		
Applicable standards	EN 60947-5-2:2007 / A1:2012, IEC 60825-1:2007		
Mass	Approx. 90g (Cable type) / Approx. 30g (M12 Connector type)		

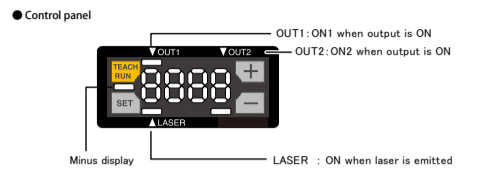
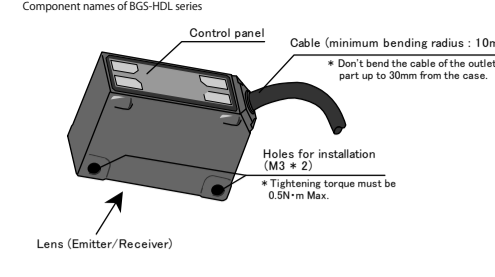
The specifications are based on the following conditions unless otherwise designated:
ambient temperature: 23°C (Normal temperature), Power voltage 24 VDC, Sampling interval: 500 μs, Averaging: 512 times, Measuring distance: Center of measurement range (BGS-HDL05T: 35mm, BGS-HDL25T: 150mm), Measuring object: Our standard work (white ceramic plate)

- Sampling period: 1000 μs
- Hysteresis setting: 0.02 (BGS-HDL05T), 0.2 (BGS-HDL25T)
- In accordance with the FDA provisions of Laser Notice No. 50, the laser is classified as Class 1 or Class 2 per the IEC 60825-1 standard.
- Defined by light strength within 1/e² (13.5%) of spot center. There may be leak light at outside of the specified spot size. The sensor may be affected when there is a highly reflective object at that light area.
- Input Filter (Fixed): 8ms
- No.1 output / No.2 output load current are not included.

Outside dimensions

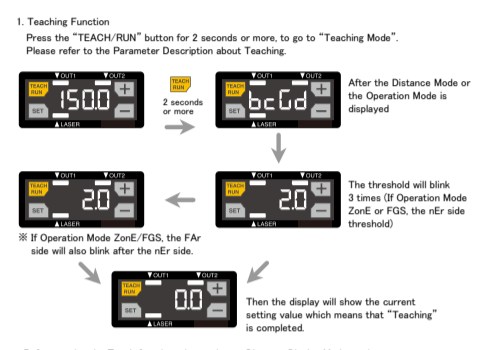


Functions of components



Basic operation

The following shows the basic operation and how to shift the screens of BGS-HDL series. Pressing the TEACH/RUN button less than 2 seconds will restore the Normal screen even in the Setup screen. Press the TEACH/RUN button less than 2 seconds even after setting is complete. When in Setup Mode or Threshold Adjustment Mode, if the button is not touched for 30 seconds the displayed/chosen parameter will be set, and the display will revert to Default Display.



Functions of components

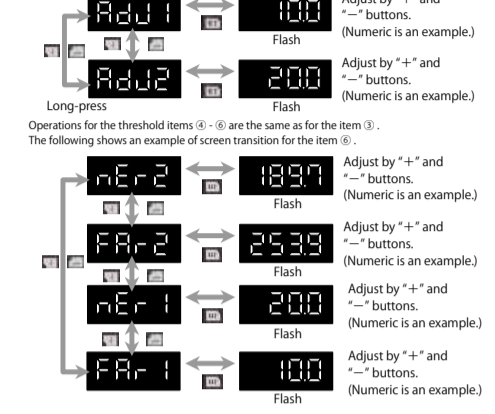
Component names of BGS-HDL series

1ch setting	2ch setting	1ch threshold name	1ch threshold name	2ch threshold name	2ch threshold name
① L/D on	tch	FAr	nEr	—	—
② Zone/FGS	tch	FAr	nEr	—	—
③ L/D on	L/D on	ADJ1	—	ADJ2	—
④ L/D on	Zone/FGS	ADJ1	—	FAr2	nEr2
⑤ Zone/FGS	L/D on	FAr1	nEr1	ADJ2	—
⑥ Zone/FGS	Zone/FGS	FAr1	nEr1	FAr2	nEr2

For ①, if "+" or "-" button is long-pressed, "Threshold name" will flash, and the value can be adjusted by pressing "+" or "-" button again. After adjusting the value, press the SET button. Then, the Threshold name is entered.

Long-press "+" or "-" button → Flash → Adjust with "+" and "-" button. (Value is just an example) → Enter by "SET" button.

For ③, if "+" or "-" button is long-pressed, "ch threshold name" will flash. When "+" or "-" button is pressed with the "ch threshold name" displayed, a different "ch threshold name" is displayed. By pressing the SET button when an intended "Threshold name" is displayed, the value of the threshold name flashes. By pressing "+" or "-" button when the threshold value of a threshold name is flashing, the value can be adjusted. After adjusting the value, press the SET button. Then, the Threshold value is entered and the display will return to the "Threshold name".



In any case, pressing the TEACH/RUN button after adjusting a threshold value will restore the Normal screen. Also, in all cases, if the TEACH/RUN button is pressed without pressing the SET button after the threshold value adjustment, the threshold value which is finally displayed is entered, and the screen returns to the normal screen.

Differences in display values depend on Distance Display Mode

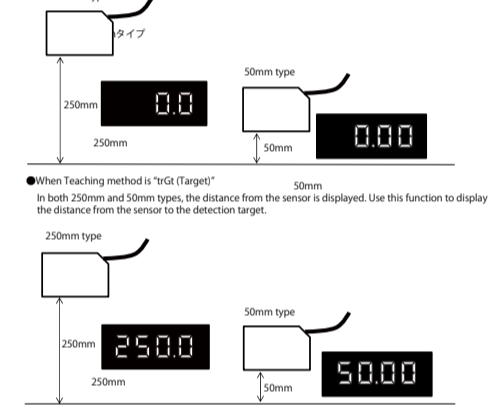
When Distance Display Mode is "bcGd (Background)"

The position 250 mm off the sensor is "0.0" for the 250mm type while the position 50 mm off the sensor is "0.0" for the 50 mm type.

(The distance will be 0.0 or 0.00 after Teaching)

The Numeric display will be in millimeters, up to one digit (two digits for 50 mm type). The value will become greater near the sensor.

This is a useful display for detecting workpieces on surfaces. (ex. on a conveyor belt)

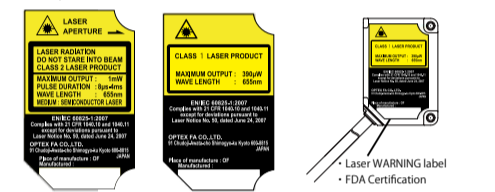


Precautions for using laser

This product emits visible light laser beam and is in the category of Class 1 or Class 2 in IEC 60825-1 Laser Safety standard. A label along the requirements of the standard is affixed or attached to the product.

Regulations in the USA

When exporting laser devices to the USA, the USA laser control, FDA (Food and Drug Administration) is applied. This product has been already reported to CDRH (Center for Devices and Radiological Health). For details, contact our customer service.

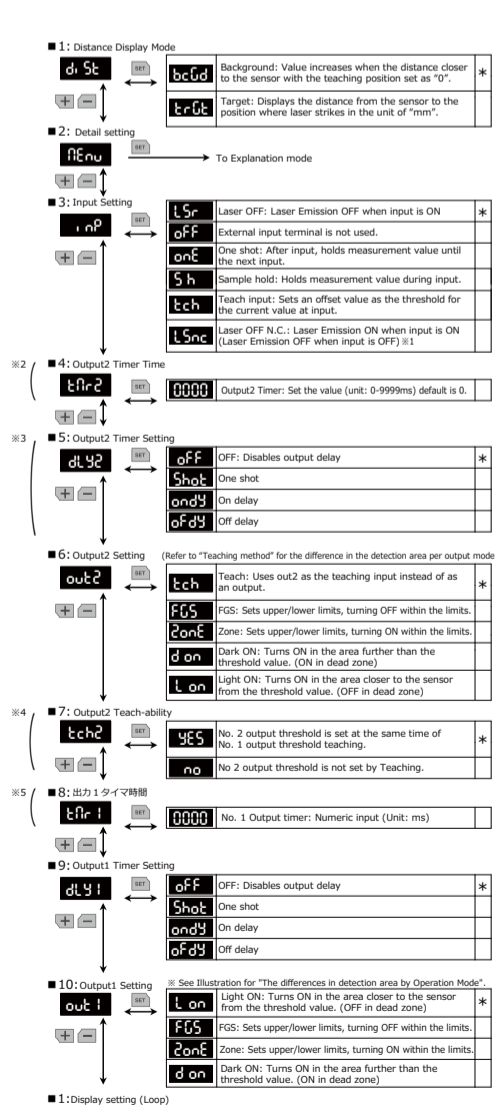


Included Items

- Please confirm following goods bundled in the box.
- BGS-HDL □ □
 - This instruction manual
 - Mounting screws M3 × 15-2pcs
 - Bracket
 - Laser WARNING label

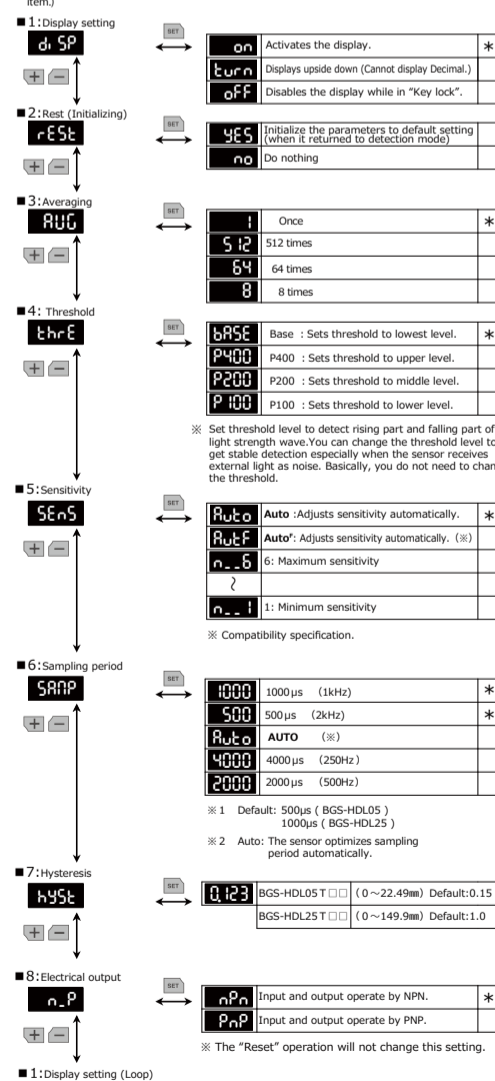
Setup Mode

The following shows the order to display the setting items when "+" button is pressed. The order will reverse when "-" button is pressed. (* shows the default of each setting item.)



Extension Mode

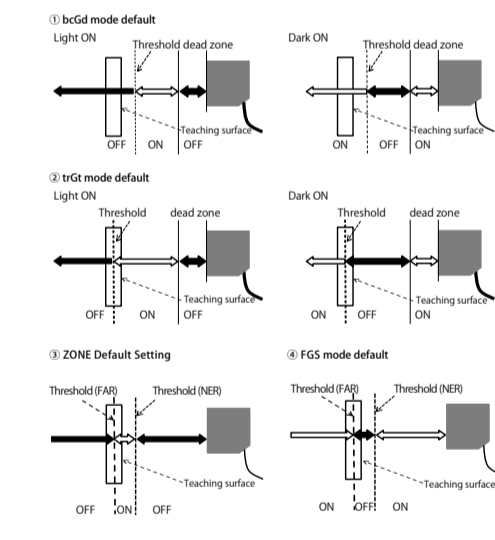
Select "Menu" in the Setup mode to enter the Explanation mode (* shows the default of each setting item.)



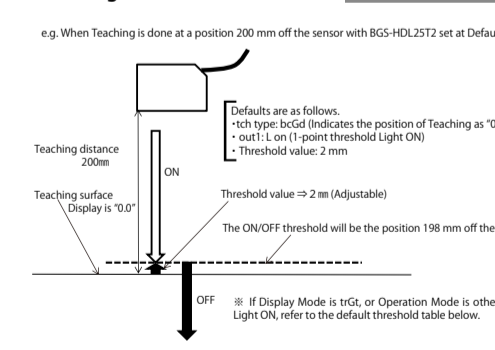
Other function

- The following other function is provided.
- Keylock function
 - Activating keylock: While it's RUN mode, press [Keylock] a time for 1 second or more. Then, [Keylock] will be shown.
 - While Key lock is activated, any access except "Release Key lock" will be neglected.
 - In the Setup mode, press [Keylock] to enter the Run mode.
 - Resetting keylock: While Key lock is activated, it will be released by pressing [Keylock] at a time for 3 seconds or more. Then, [Keylock] will be shown. After this process, keylock is released and every access will be accepted.

Operation Mode



Teaching distance and Default



Resetting threshold value

Output threshold (numeric) can be set freely. Teaching is done based on the threshold value set here. The following shows the defaults before changing. The values in paren. () show the defaults shown by the distance from the sensor.

BGS-HDL25 T □ □	Threshold default	Adj	FAr	nEr
bcGd mode	L on	2.0mm (248mm)	—	—
	tch	2.0mm (248mm)	—	—
	Zone	—	2.0mm (252mm)	2.0mm (248mm)
trGt mode	L on	252mm	—	—
	Zone	—	252mm	248mm
	FGS	—	252mm	248mm

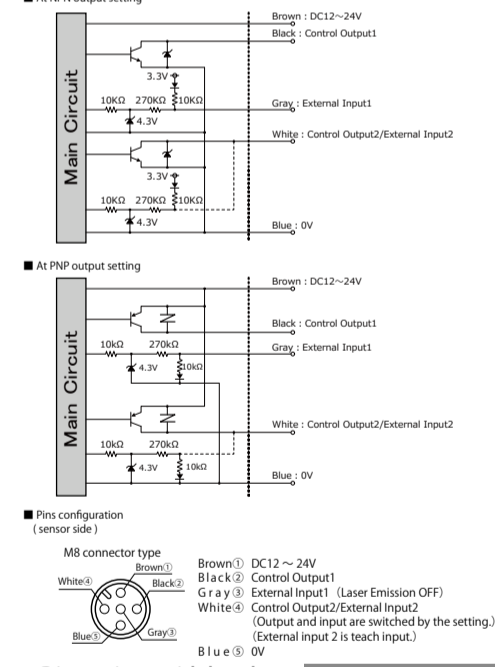
* In bcGd mode, the value (in brackets) is the distance from the sensor.

BGS-HDL05 T □ □	Threshold default	Adj	FAr	nEr
bcGd mode	L on	0.5mm (49.5mm)	—	—
	tch	0.5mm (49.5mm)	—	—
	Zone	—	0.5mm (50.5mm)	0.5mm (49.5mm)
trGt mode	L on	50.5mm	—	—
	Zone	—	50.5mm	49.5mm
	FGS	—	50.5mm	49.5mm

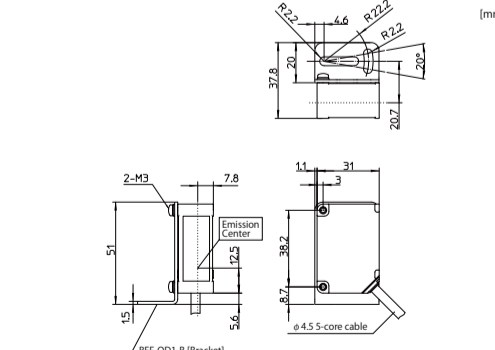
* In bcGd mode, the value (in brackets) is the distance from the sensor.

Connection diagram

Circuit diagram of signal lines is as follows. NPN/PNP output can be switched over by the setting of main body.



Dimensions with bracket



Specifications and equipment are subject to change without any obligations on the part of manufacture.

For more information, questions and comments regarding products, please contact us below.

Our correspondence to China RoHS

Please see website below for our correspondence to China RoHS (Management Methods for Controlling Pollution by Electronic Information Products).

http://www.optex-fa.com/rohs_cn/

Manufactured and sold by:

OPTEX FA CO.,LTD.

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 TEL : +81-(0)75-325-2920
 FAX : +81-(0)75-325-2921
 Website : http://www.optex-fa.com

High resolution BGS sensor

FASTUS BGS-HL Series

BGS-HL05T □
BGS-HL25T □□

Instruction manual

- Thank you for purchasing BGS-HL series. We hope you are satisfied with its performance.
- Please read this manual carefully and keep it for future reference.

Warning Indicates a possible hazard that may result in death, serious injury, WARNINGS or serious property damage if the product is used without observing the stated instructions.

Warning Mandatory Requirements

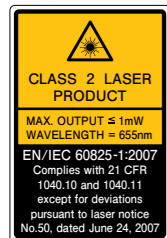
- The light source of this product applies the visible light semiconductor laser. Do not allow the laser beam to enter an eye, either directly or reflected from reflective object. If the laser beam enters an eye, it may cause blindness.
- This product is not an explosion proof construction. Do not use the product under flammable, explosive gas or liquid environment.
- Do not disassemble or modify the product since it is not designed to automatically stop the laser emission when open. Disassembling or modifying at customer's end it may cause personal injury, fire or electric shock.
- Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Warning Safety Precautions

- It is dangerous to wire or attach/remove the connector while the power is on. Make sure to turn off the power before operation.
- Installing in the following places may result in malfunction:
 - A dusty or steamy place
 - A place generating corrosive gas
 - A place directly receiving scattering water or oil.
 - A place suffered from heavy vibration or impact.
- The product is not designed for outdoor use.
- Do not use the sensor in a transient state at power on (Approx. 2sec. Warm up period)
- Do not wire with the high voltage cable or the power lines. Failure to do this will cause malfunction by induction or damage.
- Do not use the product in water.
- Operate within the rated range.
- Wipe off dirt on the emitting/receiving parts to maintain correct detection. Also, avoid direct impact on the product.

Precautions for using laser

● Regulations in the USA
When exporting laser devices to the USA, the USA laser control, FDA (Food and Drug Administration) is applied. This product has been already reported to CDRH (Center for Devices and Radiological Health). For details, contact our customer service.



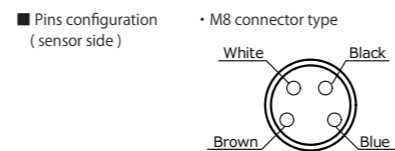
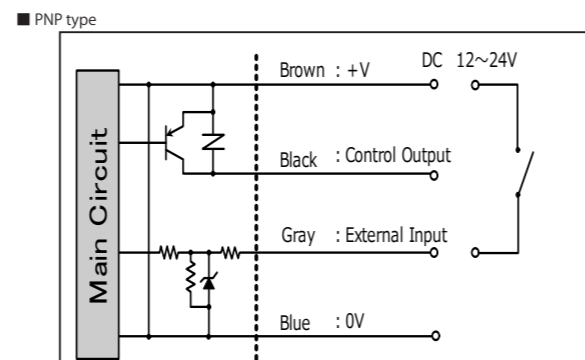
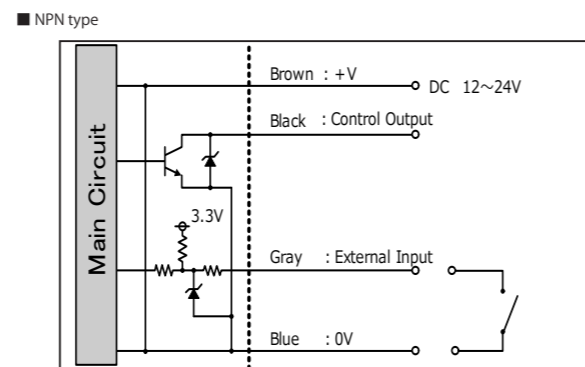
Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No.50, dated June 24, 2007
OPTEX FA CO.,LTD.
11 Futsucho (Choshi) Shirogahara Kybu 802-8811 JAPAN
Place of manufacture: OFROM CO.,LTD. Manufactured in

Bundled goods in the box

Please confirm following goods bundled in the box.

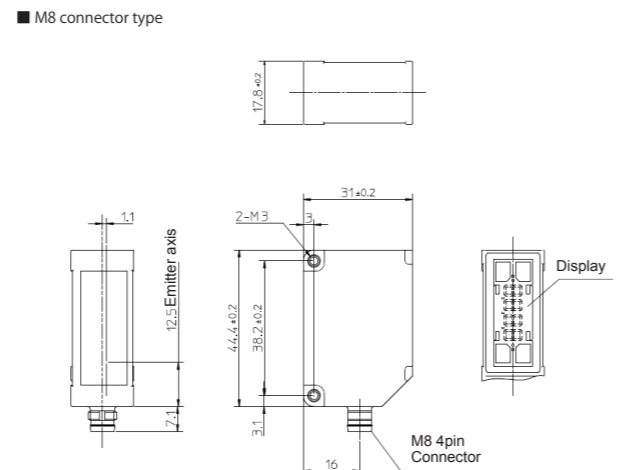
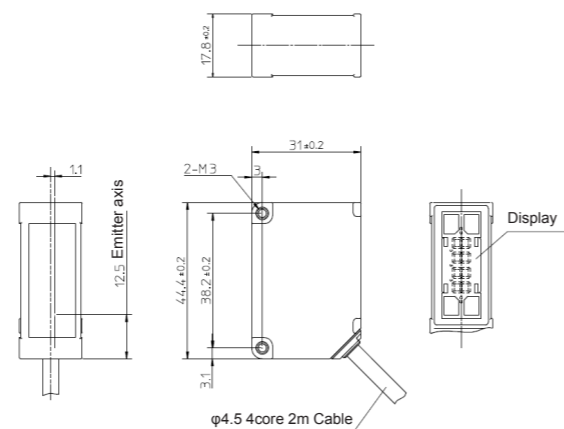
- BGS-HL□□□□
- This instruction manual
- Screws M3 × 15...2
- Bracket

Connection diagram



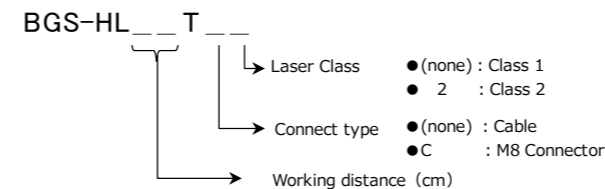
Dimensions

■ Cable type [mm]



Specifications

● Part number legend



● Specifications

Part number	Cable type	BGS-HL05T	BGS-HL25T2
Connector type		BGS-HL05TC	BGS-HL25TC2
Sensing range *1		20 ~ 50mm (Display: 0.00 ~ 30.00)	50 ~ 250mm (Display: 0.0 ~ 200.0)
Light source		Red laser Diode (wave length 655nm)	
Laser class	IEC/JIS	CLASS 1	CLASS 2
Spot size *2		φ 0.8 mm @ 50mm	φ 1 mm @ 250mm
Repeat accuracy		10μm	100μm *3
Sampling period		500μs / 1000μs / 2000μs / 4000μs / AUTO	
Response time		1.5ms max. (1.5~7ms/default)	1.5ms max. (3~14ms/default)
Hysteresis		0 ~ 22.49 (default: 0.15)	0 ~ 149.9 (default: 1.0)
Display		7-segment 4-digit LED display	
Indicator		Laser indicator: Green, Output indicator: Orange, Mode indicator: Red	
Control Output		NPN/PNP selectable 100mA max./DC24V (Residual voltage 1.8 V max.)	
External Input		Laser OFF, Teaching, Sample Hold, One shot hold	
Timer function		OFF/On delay/Off delay/One shot 1msec increment : 0 ~ 9999ms	
Supply voltage		12 ~ 24VDC including 10% ripple	
Current consumption		40mA max. / 24VDC excluding the current of Control Output	
Protection circuit		Reverse connection protection, Over current protection	
Protection category		IP67	
Operating Temp./Humid.		-10 ~ 50°C / 35 ~ 85% RH without freazing or condensation	
Storage Temp./Humid.		-20 ~ 60°C / 35 ~ 85%/RH	
Ambient illuminance		Incandescent lamp: 3,000 lx max.	
Vibration resistance		10 ~ 55Hz, Double amplitude 1.5mm, X,Y,Z for 2 hours	
Shock resistance		500m/s ² (approx. 50G) X,Y,Z 3 times each	
Material		Case: Aluminum, Front lens: PPSU, Display: PET	
Weight		Cable type : Approx. 90g (including cable) Connector type : Approx. 30g	

The specifications are based on the condition unless otherwise designated: Ambient temperature: 23°C, Supply voltage: 24VDC, Sampling period: 500μs, Averaging: 512, Measuring distance: Center of the range, Testing object: White ceramic

*1 When [Shift] in Extension mode is ON, the display shows 0000 at the Teaching point.

The range that the display can show is as follows.

BGS-HL05 -7.50 ~ 37.50

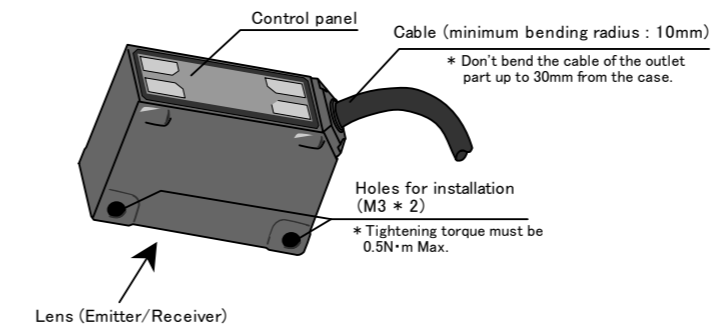
BGS-HL25 -50.0 ~ 250.5

*2 When the distance exceeds this range in Sensing range, the display shows FFFF. Although, the sensor works while the distance is in Sensing range. The display shows 9999 when the distance is out of range.

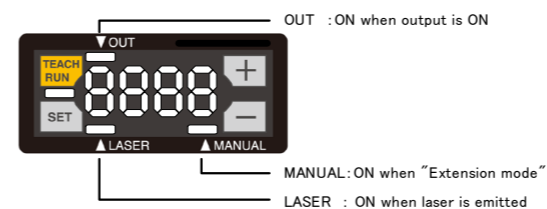
*3 Defined by light strength within 1/e²(13.5%) of spot center. There may be leak light at outside of the specified spot size. The sensor may be affected when there is a highly reflective object at that leak light area.

*3 Sampling period: 1000μs.

Functions of components



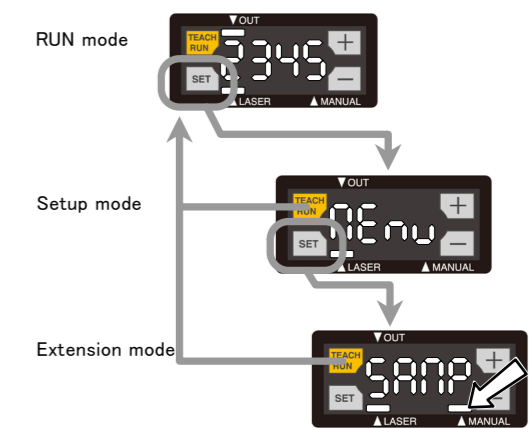
● Control panel



Setup

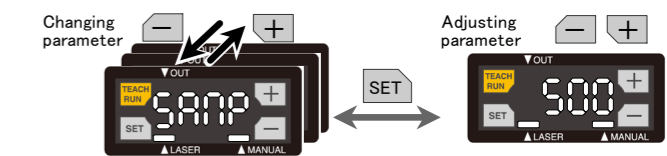
● Changing mode

While it's "Setup mode" or "Extension mode", you can change the mode to "RUN mode" by clicking "TEACH/RUN" button.
While it's "Extension mode", the LED "MANUAL" is lit.



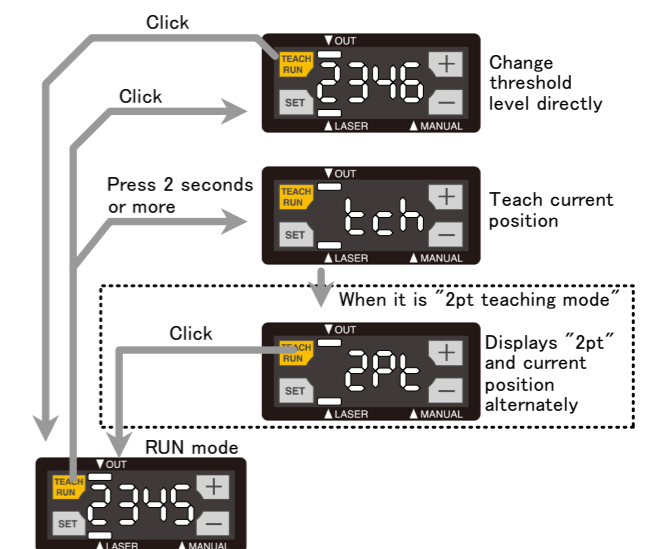
● Changing parameters

You can choose and adjust the parameters by clicking "+" and "-" buttons. The mode will be changed to "RUN mode" by clicking "TEACH/RUN" button.



Teach function

You can change threshold level directly by "+" and "-" buttons after clicking "TEACH/RUN" button from "RUN mode".
By pressing "TEACH/RUN" button for 2 seconds or more, it gets to "Teaching mode". It has 3 "Teaching mode" that you can choose one in "Setup mode". Please refer "Teaching mode" and "Setup mode" on next page.



Teaching mode

BGS-HL series has 3 Teaching mode.

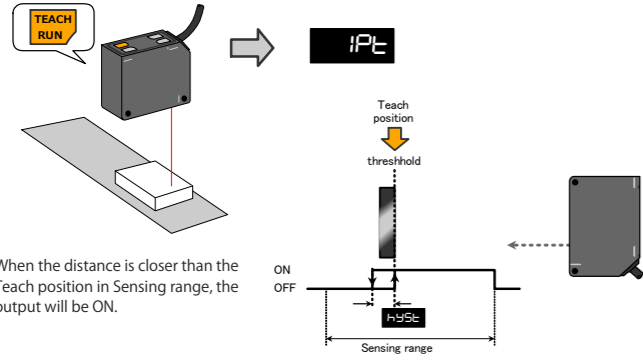
Please choose a Teaching mode at [Teach mode **tch**] in [Setup mode] before Teaching.

Output polarity can be reversed by [Light ON/Dark ON **Ldon**].
Following output shows its ON/OFF status as [Light ON **L on**].

1 point Teaching

Teaching is done at a position on the object to detect. When the distance is closer than that position, the output will be ON.

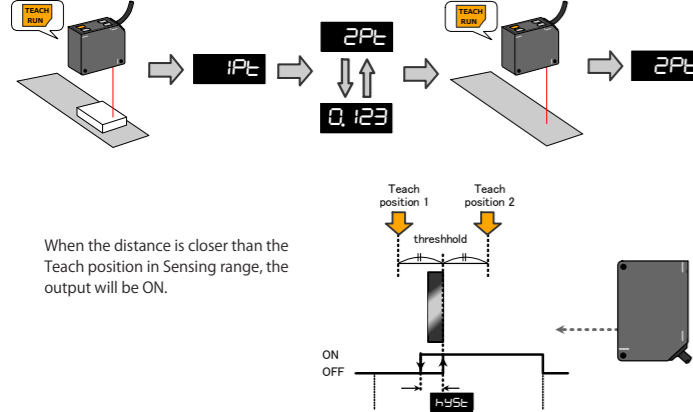
Press the [TEACH/RUN] button until the display shows "1pt".
Teaching is completed after releasing button.



2 point Teaching

Teaching is done at two different positions on the object to detect. Teach position will be set at center of these two positions. When the distance is closer than the Teach position, the output will be ON. When the distance between these two positions is too close, the display will show **Err** that means error. Then, please try again.

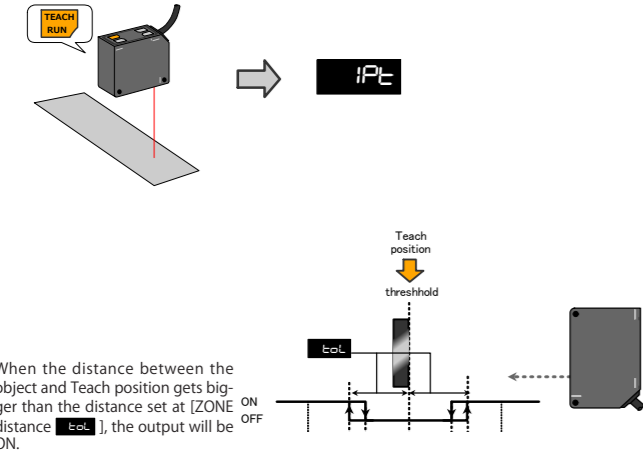
Press the [TEACH/RUN] button until the display shows "1pt". Then, the display shows "2pt" and the distance related number alternately. Click the [TEACH/RUN] button without object to detect. Then, the display shows "2pt" that means Teaching is completed.



ZONE Teaching

Teaching is done without object to detect. Teach position will be set at this position. When the distance between the object and Teach position gets bigger than the distance set at [ZONE distance **zcd**] in [Setup mode], the output will be ON.

Press the [TEACH/RUN] button until the display shows "1pt".
Teaching is completed after releasing button.



Setup mode

You can get to [Setup mode] by clicking "SET" button from [RUN mode]. (* means default value)

1: Teaching mode

tch	1Pt	1 point teaching	
	zonE	ZONE teaching	
	2Pt	2 point teaching	*

2: Extension mode

Menu		To Extension mode	
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3: External input

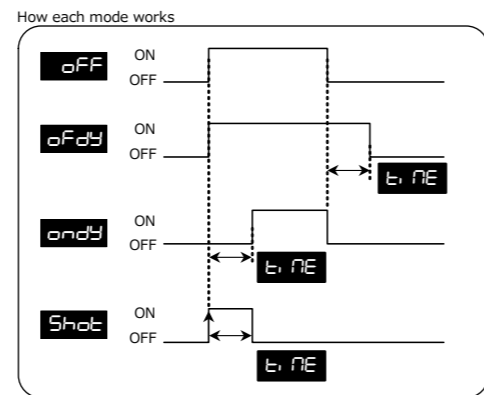
inp	off	OFF : Disable external input	*
	Lsr	Laser OFF : Kill laser power when input is ON	
	tch	Teaching : Set current value as threshold	
	sh	Sample hold : Keep the level when input is ON	
	one	One shot hold : Hold the value as input turns ON	

4: Delay time

tne	0000	Set the value (unit : ms)	
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5: Output delay

dely	off	OFF : Disable output delay	*
	ofdy	Off delay	
	ondy	On delay	
	shot	One shot	



6: ZONE distance

zcd	0.123	Set the value	Default: BGS-HL05□□ 03.00 BGS-HL25□□ 020.0
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7: Light ON/Dark ON selection

Ldon	L on	Light ON: When the distance is closer than Threshold, the output will be ON. (ZONE Teach mode: When the distance is outside of ZONE distance, the output will be ON.) While it's out of range, the output will be OFF.	*
	d on	Dark ON: When the distance is farther than Threshold, the output will be ON. (ZONE Teach mode: When the distance is inside of ZONE distance, the output will be ON.) While it's out of range, the output will be ON.	

1: Teaching mode (Loop)

Extension mode

You can get to [Extension mode] from [2:Extension mode] in [Setup mode]. (* means default value)

1: Display setting

d.SP	on	Activate the display	*
	off	Disable the display while "Key lock"	

2: Reset (Initializing)

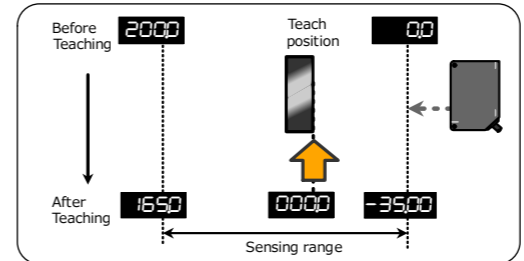
reset	YES	Initialize the parameters to default setting	
	no	Do nothing	

3: Shift function

sh.F	on	Activate (Set teach position as "0000")	*
	off	Not use	*

Set the display "0000" at the Teach position (threshold) when Teaching is done. When it's 2 point Teaching, set the display "0000" at near side position of 2 positions of Teaching.

Example of 1 point Teaching (BGS-HL25)



4: Averaging

AVC	1	Once	*
	8	8 times	
	64	64 times	
	512	512 times	

5: Threshold

thre	base	Base : Set threshold to lowest level	*
	P400	P400 : Set threshold to upper level	
	P200	P200 : Set threshold to middle level	
	P100	P100 : Set threshold to lower level	

Set threshold level to detect rising part and falling part of light strength wave. You can change the threshold level especially when the sensor receives external light as noise so to get stable detection. Basically, you don't have to change the threshold.

6: Sensitivity

SENS	Auto	Auto : Adjust sensitivity automatically	*
	n_6	6 : Maximum sensitivity	
	1	1 : Minimum sensitivity	

7: Sampling period

SAMP	500	500μs (2kHz)	*
	1000	1000μs (1kHz)	*
	2000	2000μs (500Hz)	
	4000	4000μs (250Hz)	
	Auto	AUTO	

Default: 500μs (BGS-HL05)
1000μs (BGS-HL25)
Auto: The sensor optimize sampling period automatically.

8: Hysteresis

hyst	0.123	Set the value	Default: BGS-HL05□□ 0.15 BGS-HL25□□ 1.0
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9: NPN/PNP selection

n_p	n_pn	Set input/output as NPN	*
	pnp	Set input/output as PNP	

This parameter won't be changed by [Reset]

1: Display setting (Loop)

Miscellaneous function

Key lock function

Activate Key lock

While it's RUN mode, press **[+]** **[-]** at a time for 1 second.
Then, **Loc** will be shown.

While Key lock is activated, any access except "Release Key lock" will be neglected.

Release Key lock

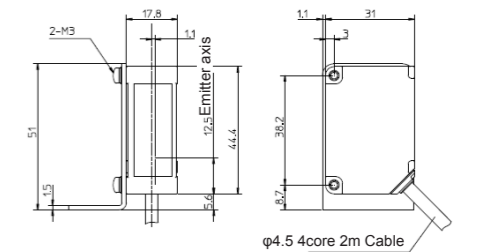
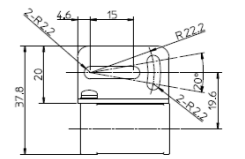
While Key lock is activated, it will be released by pressing **[+]** **[-]** at a time for 3 seconds. Then, **uLoc** will be shown.

After this process, every access will be accepted.

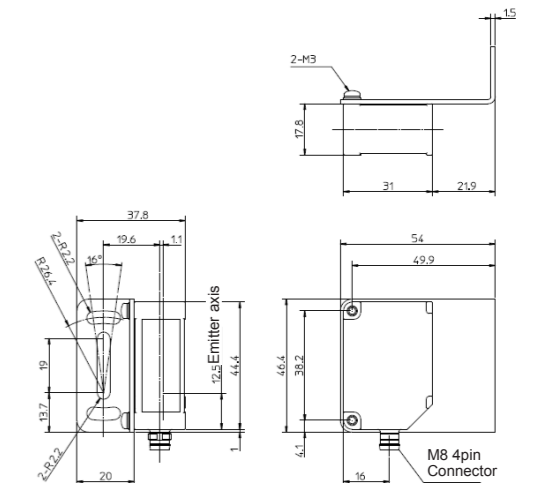
Dimensions with bracket

Cable type with standard bracket BGS-HL-B

[mm]



Connector type with standard bracket BGS-HL-A



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. Please consult our distributors about safety products which meet OSHA, ANSI and IEC standards for personnel protection.

- Specifications and equipment are subject to change without any obligations on the part of manufacture.
- For more information, questions and comments regarding products, please contact us below.

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