

2D Displacement Sensor

**FASTUS**

# LS Series

LS-100C□

Instruction manual

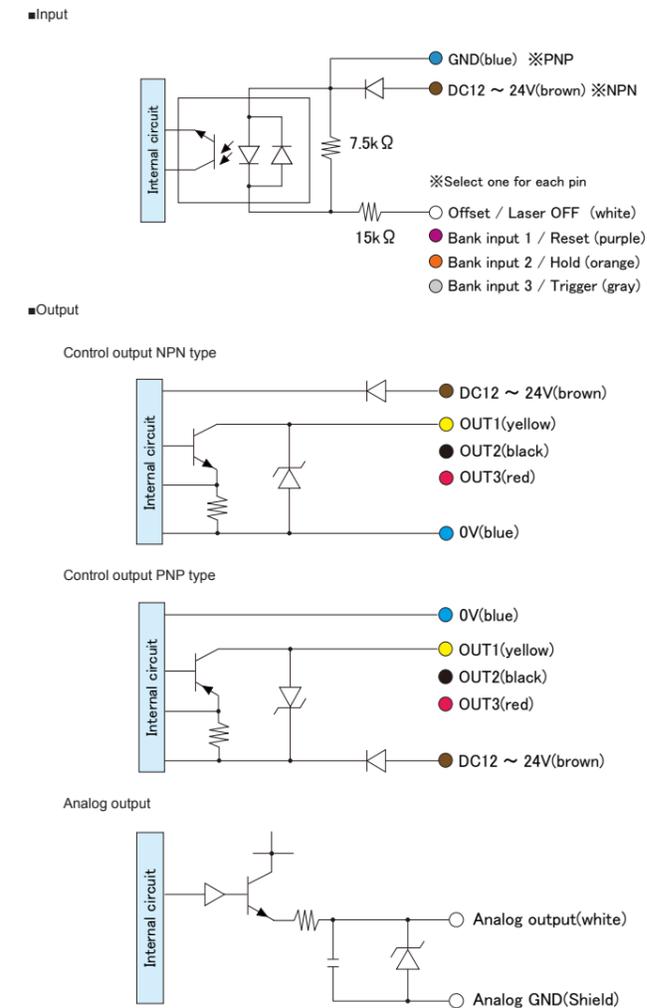
- Thank you for purchasing LS series. We hope you are satisfied with its performance.  
- Please read this manual carefully and keep it for future reference.

### Included accessories

Please confirm following accessories are included in the box.

- LS-100C□
- This instruction manual
- Mounting screws M4 \* 50 2 pieces
- CD ROM including setup software "LS\_Navigator" and users manual

### Connection diagram



### Option cables

Prepare the following option cables as necessary.

Main cable	Communication cable (USB)	Communication cable (RS-485)
For providing power supply, input and output.	For communication through USB.	For communication through RS-485.
2m cable: DOL-0H12-G02M 5m cable: DOL-0H12-G05M 10m cable: DOL-0H12-G10M	1.8m cable: DSL-DH06-G1M8	2m cable: DOL-SH06-G02M

### Specifications

Model	LS-100CN	LS-100CP
Measurement range	100±25mm	
Width of view (at measuring distance)	17mm at 75mm ~ 27mm at 125mm	
Light source	Red laser (wavelength: 655nm) / Max. output: 1mW	
Laser class	Class2	
	CLASS II	
Spot size <sup>※1</sup>	0.3×32mm	
Linearity	Z axis ±50μm (±0.1% of F.S.)	
Repeatability <sup>※2</sup>	Z axis 2μm	
Resolution <sup>※3</sup>	X axis 25μm	
Sampling period	0.5ms ~ 5ms	
Display	Dot matrix display	
Indicator	Power indicator: (Green) / Laser indicator: (Green)	
Input	Offset / Laser OFF, Bank 1 / Reset, Bank 2 / Hold, Bank 3 / Trigger	
Control output	3 outputs NPN open collector, Max. 100mA/DC30V (Residual voltage 1.8V)	3 outputs PNP open collector, Max. 100mA/DC30V (Residual voltage 1.8V)
Analog output	4 ~ 20mA / out of range: 24mA (Max. load: 300Ω)	
Communication I/F	RS-485 half-duplex (9.6k ~ 4.0Mbps)	
Temperature drift (typical value)	0.05% of F.S./°C	
Power supply	DC12 ~ 24V (+10%, -5%)	
Current consumption <sup>※4</sup>	Max. 180mA	
Protection category	IP67	
Operating Temp. / Humid.	-10 ~ +40°C / 35% ~ 85%RH without freezing or condensation	
Storage Temp. / Humid.	-20 ~ +60°C / 35% ~ 85%RH without freezing or condensation	
Ambient illuminance	Sunlight: 10000lx Max. / Incandescent lamp: 3000lx Max.	
Vibration resistance	10 ~ 55Hz, Double amplitude 1.5mm, X,Y,Z for 2 hours	
Shock resistance	500m/s <sup>2</sup> (approx. 50G) X,Y,Z 3 times each	
Material	Housing: Zinc diecast and PC, Cover of laser emitter and receiver: Glass	
Weight	Approx. 300g	

The specifications are based on the condition unless otherwise designated: Ambient temperature: 23°C, Supply voltage: 24VDC, Sampling period: 500μs, Averaging: 64, Measuring distance: Center of the range, Testing object: White ceramic

※1 Defined with center strength 1/e<sup>2</sup>(13.5%) at the center of measurement range. There may be leak light other than the specified spot size. The sensor may be affected when there is a highly reflective object close to the detection area.

※2 Object: Aluminum block painted white, Measurement function: Average height, Smoothing: 8 times, Averaging: 32 times

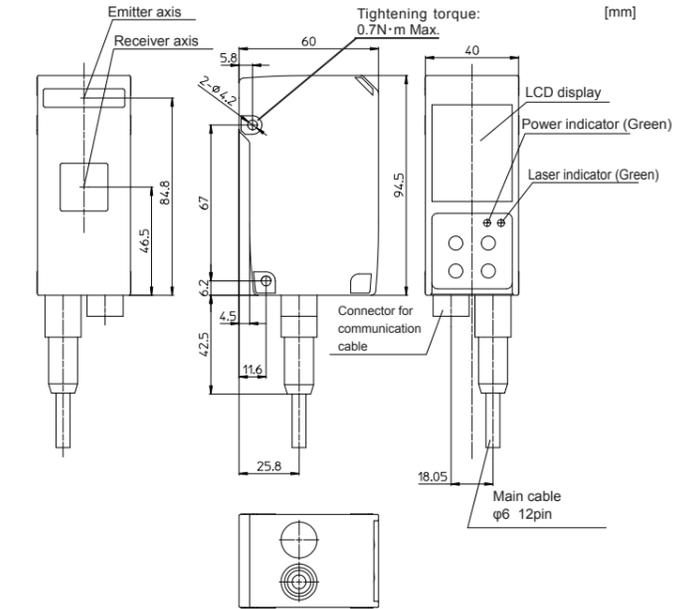
※3 Measurement distance: 75mm

※4 Power supply: 24VDC, including analog output current, not including control output current

### Functions of components

No.	Item	Function
①	LCD display	Shows measurement result and setup menu
②	Mounting holes	Holes to mount the sensor (Diameter: 4.2mm)
③	Connector for communication cable	Hook up communication cable
④	Connector for main cable	Hook up main cable for providing power supply, input and output
⑤	Window for laser emitting	Laser will be emitted from this window
⑥	Window for laser receiving	Laser will be received through this window
⑦	Power indicator	ON (Green) when the power supply is ON
⑧	Laser indicator	ON (Green) when the laser is ON
⑨	Cursor Key	Cursor key button for setup
⑩	EXIT key	You can cancel changing parameter. You can change the mode to "Main" menu by pressing for more than 1 second.
⑪	SET key	Press this key when you confirm changing parameter.

### Dimensions



### Setup

● Changing mode

LS series has following menu. You can go to "Main" menu from any setup display by Pressing **EXIT** key for more than 1 second.

**Main**

**Common operation**

- Go to main (Press more than 1 sec. EXIT)
- Select Tab (While select tab)

**In/Trig setting**

**Other setting**

**Camera/Area Setting**

- Camera setting
- Profile setting
- Area setting (1~4)

**Graph/Calc Setting**

- Area graph
- Calc graph/setting

**Output Setting**

- Output setting

### Precautions for using laser

- Laser label
- This product is classified as Class 2 (II) Laser Product by JIS C6802/IEC/FDA Laser Safety Standard.
- 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.

• LS-100C□

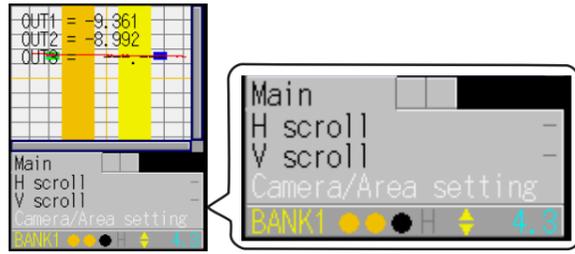
## Quick setup

Following shows quick setup just to see how LS sensor works simply.

## Change to setting menu

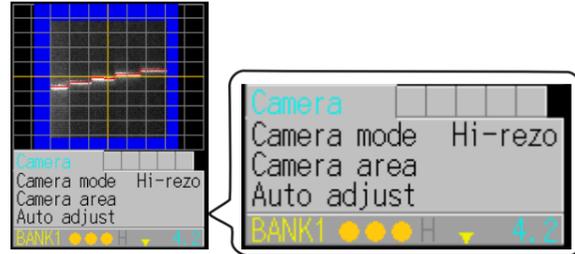
Select "setting" menu and press **SET** key from "Main" menu.

Then, it asks to confirm so press **SET** key again. Then, it goes to "setting" mode.



## Adjust shutter speed

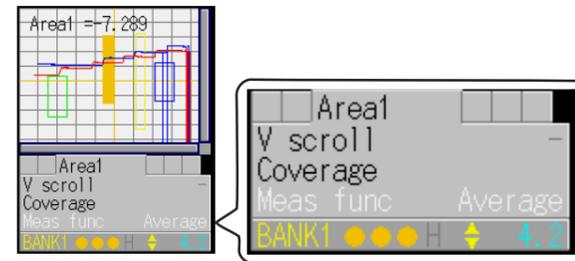
Set the target object to measure and select "Auto adjust". Then, press **SET** key. The laser light blinks and shutter speed will be adjusted at optimized parameter automatically.



## Set "Area" and "Measurement function"

Move up the cursor to "Camera" tab and press **SET** key. Then, move the cursor to "Area1~4" tab by pressing **SET** key. At "Area1~4" tab, move down the cursor to "Coverage" to adjust measurement area and also to "Meas func (Measurement function)" to set measurement function.

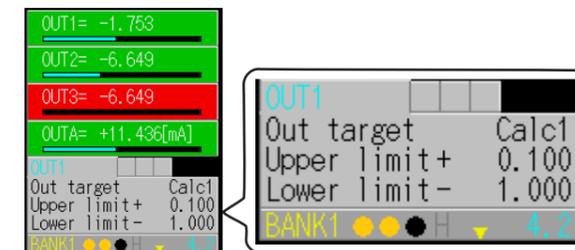
If you want to measure average height, please choose "Average" for example. You have to press **SET** key at the parameter, change the parameter and confirm by **SET** key.



## Setting output target

Change the display to "Main" menu by pressing **EXIT** key for more than 1 second.

Choose "Output" from "Main" menu and press **SET** key. Then, it goes to output setup menu. LS series has 3 control outputs and you can set output target for each output. Then, you can setup "Upper limit+" and "Lower limit-" for each output.



## Parameter table

Following shows parameters of LS series and default setting for each parameter. "Y" at "Bank" column means that the parameter can be set for each "Bank". "N" means the parameter is common for every "Bank".

### "Input/Trigger" setting

Parameter	Bank	Choices / Setting range	Default	Note
IN1	N	Bank1 / Reset	Bank1	
IN2	N	Bank2 / Hold	Bank2	
IN3	N	Bank3 / Trigger	Bank3	
IN4	N	Offset / LaserOFF	Offset	
Reset	-	Erase following data - Current measured data - Hold value	-	
Inner Hold	-	OFF / ON	OFF	
Inner Trig	-	OFF / ON	ON	
Input polar	N	N.O. / N.C.	N.O.	
Trig action	Y	Continuous / Oneshot / Pulse count	Continuous	
Trig count	Y	1 ~ 4095 [times]	1	
Input filter	N	5 ~ 1275 [μs]	5	
Trig delay	Y	5 ~ 20475 [μs]	5	
Offset target	N	Individual / All / OUT1 / OUT2 / OUT3	Individual	

### "Other" setting

Parameter	Bank	Choices / Setting range	Default	Note
Bank switch	N	In/Para / Comm	In/Para	
Bank	N	1 / 2 / 3 / 4 / 5 / 6 / 7 / 8	1	
Baud rate	N	9.6K / 19.2K / 38.4K / 57.6K / 115K / 230K / 460K / 921K / 2.0M / 4.0M	2.0M	
Axis dir	N	Near+ / Far+	Far+	
Lang/ 言語	N	JPN/ 日 / ENG/ 英	JPN/ 日	
Brightness	N	0 ~ 15	15	
Initialize	-	All / Bank	-	
Ver.	-	Version (only showing)	-	

### "Camera" setting

Parameter	Bank	Choices / Setting range	Default	Note
Camera mode	Y	Hi-reso / Hi-spd / HDR / NR	Hi-reso	
Camera area	Y	(set the area)	(whole area)	
Auto adjust	-	-	-	
Gain	Y	1.00 ~ 8.00	1.00	
Shutter	Y	5 ~ 10235	500	
HDR shutter	Y	5 ~ 10235	1000	
Threshold	Y	0 ~ 255	32	You don't have to change normally
Reject level	Y	0 ~ 127	16	

### "Profile" setting

Parameter	Bank	Choices / Setting range	Default	note
Scaling	Y	*1 / *2 / *4 / *8 / *16 / *32	*1	
H scroll	Y	(move the profile horizontally)	-	
V scroll	Y	(move the profile vertically)	-	
Target	Y	Normal / Gap / Semi-trans	Normal	
Alarm limit	Y	0 ~ 14 / Hold [point]	6	
Smoothing	Y	1 / 2 / 4 / 8 / 16 / 32 / 64 / 128	8	
Correct method	Y	- / → / ← / ↑ / ↓	-	
H correct	Y	-28000 ~ +28000	+0	
V correct	Y	-15000 ~ +14998	-6500	
Tilt correct	Y	OFF / ON	OFF	
Tilt cor pos	Y	-14998 ~ +15000	+6500	
Save master	-	(save the captured image as Bank master image)	-	

### "Area" setting

Following parameters are set for each "Area", "Area1~4".

Parameter	Bank	Choices / Setting range	Default	Note
Scaling	Y	*1 / *2 / *4 / *8 / *16 / *32	*1	
H scroll	Y	(move the profile horizontally)	-	
V scroll	Y	(move the profile vertically)	-	
Coverage	Y	(set Area position)	-	
Meas func (Measurement function)	Y	Average / P height / B height / Width / P pos / B pos / Edge pos / Edge count / Tilt / Size / Length / Diameter (P: Position, B: Bottom, pos: position)	Average	Default value varies by "Area"
Edge dir H	Y	← / →	←	
Direction	Y	↑ / ↓	↑	
Correction	Y	OFF/ON	OFF	

### "Graph"

You can define how to show the graph of each "Area" by following parameters.

Parameter	Bank	Choices / Setting range	Default	Note
Graph scale	Y	1 ~ 6	1	
Graph range	Y	0 ~ 6	0	
Span	Y	0.001 ~ 1.999	1.000	
Average	Y	1 ~ 1023	32	
Hold	Y	None / Sample / Peak / Bottom	None	

### "Calc" (Calculation)

You can calculate sum or difference with measurement results of two "Area". Two calculations are available.

Parameter	Bank	Choices / Setting range	Default	Note
Graph scale	Y	1 ~ 6	1	
Graph range	Y	0 ~ 6	0	
Span	Y	0.001 ~ 1.999	1.000	
Hold	Y	None / Sample / Peak / Bottom	None	
Calc target1	Y	Area1 / Area2 / Area3 / Area4	Area1	
Operator	Y	+ / -	+	
Calc target2	Y	Area1 / Area2 / Area3 / Area4	Area2	

### Control output (OUT1 ~ OUT3)

You can set parameters for control output by following parameters.

Parameter	Bank	Choices / Setting range	Default	Note
Out target	Y	Area1 / Area2 / Area3 / Area4 / Calc1 / Calc2	Area1	Default value varies by "OUT"
Upper limit	Y	-32.766 ~ +32.767	+25.000	
Lower limit	Y	-32.767 ~ +32.766	-25.000	
Out action	Y	Normal / 1 shot / On Delay / Ready / Strobe	Normal	
Out polar	Y	N.O. / N.C.	N.C.	
Output time	Y	0.1 ~ 204.7	0.1	
Offset value	Y	-327.67 ~ +327.67	0.00	
Hysteresis	Y	0 ~ 60	0	
Offset	Y	OFF / ON	OFF	

### Analog output (OUTA)

You can set parameter for analog output by following parameters.

Parameter	Bank	Choices / Setting range	Default	Note
Out target	Y	Area1 / Area2 / Area3 / Area4 / Calc1 / Calc2	Area1	
20mA	Y	-31.767 ~ +32.767	+25.000	
4mA	Y	-32.767 ~ +31.767	-25.000	

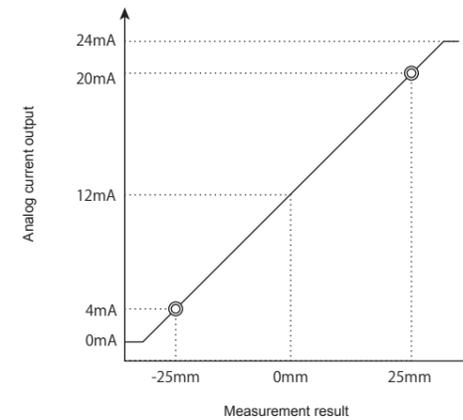
## Analog output

Analog output of LS series can be set by two points depends on how the measurement result is.

Setting parameters is done at "Analog output (OUTA)".

Following graph shows default setting.

You can change setting by defining the value of two **⊙** marks.

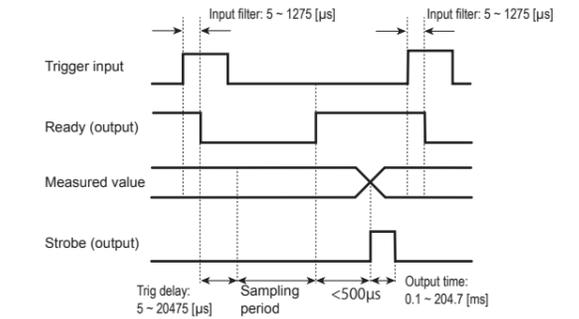


## Function of Input

You can set various function for external input as follows. Function of some of them varies by timing of the input.

### Trigger

Following timing chart shows how "Ready", Measured value and "Strobe" react from "Trigger".



### Offset

Function of "Offset" input varies by "Offset target" in "Input / Trigger" setting. The action of the "Offset" input will be done just after "Offset" input turns off.

#### "Offset target" = "Individual"

ON time	Function
~ 230ms	Set offset of "OUT1"
~ 430ms	Set offset of "OUT2"
~ 630ms	Set offset of "OUT3"
~ 830ms	Release offset of "OUT1"
~ 1030ms	Release offset of "OUT2"
~ 1230ms	Release offset of "OUT3"
1230ms ~	Release offset of "OUT1~3"

#### "Offset target" = "All"

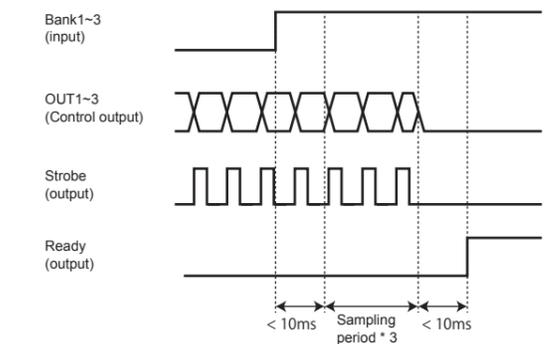
ON time	Function
~ 330ms	Set offset of "OUT1~3"
330ms ~	Release offset of "OUT1~3"

#### "Offset target" = "OUT1" ~ "OUT3"

ON time	Function
~ 330ms	Set offset of the offset target
330ms ~	Release offset of offset target

### Reset/Switching Bank

Following timing chart shows an example of changing "Bank" from a "Bank" with "Trig action" is "Continuous" to another "Bank" with "Trig action" is "Oneshot". How "Strobe" and "Ready" react depends on "Trig action".



Please refer "Users manual" in the CD-ROM included with sensor for detailed instruction. The CD-ROM contains setup software "LS-Navigator" for easier setup from the PC.

- 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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