



SGI Series Laser Displacement Sensor

——Quick User Guide

Please read the User Guide before use.

This guide aims to provide instructions for users to quickly use the SGI Series Laser Displacement Sensors.

For detailed user guide, please download the user manual from the official website of SSZN, website: <http://www.cnsszn.com>.

Please read the user guide comprehensively to have a complete understanding of the SGI Series Laser Displacement Sensors.

- Do not tear off the label or it will void the warranty.
- Do not disassemble the sensor head, otherwise it may lead to damage of the sensor head, and the error of the factory calibration data. In that case, it has to be returned to the factory for repair.
- Please read this guide carefully, as incorrect operation may result in camera damage.

1 Installation Environment

- Keep away from strong electromagnetic interference environment and high-power electrical appliances.
- Avoid sharing the power supply with high-power electrical appliances.
- Avoid laying the sensor head cable parallel to the power supply line with high current or frequent voltage switching.

2 Preparation

Before installation, please prepare the following items:

- Ethernet cable (above Category 6);
- Multimeter;
- Wire stripper;
- Crimping plier;
- Nipper pliers;
- M4 screw with washer × 2;
- A set of slot type screwdrivers;
- A set of Phillips screwdrivers;
- A set of internal hexagonal wrench;
- A set of wrenches.

3 Description of sensor head components

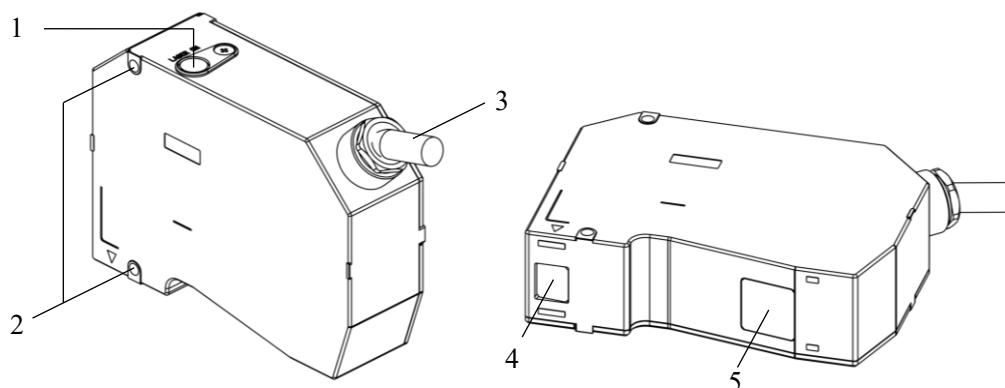


Figure 3-1 Schematic diagram of sensor head components

Table 3-1 Description of sensor head components

No.	Name	Function description	
1	Laser emission LED	Solid green light	The object is near the center of the measurement range ($\pm 5\%$ range)
		Solid yellow light	The object is within the measurement range
		Blinking yellow light	The object is outside the measurement range
		Yellow or green light is on	The laser device is working
		The light is off	No power or power supply anomaly
		Red light is on	Sensor head failure alarm
2	Mounting hole	Install the sensor head with the supplied hex eye bolt. Please refer to " 4 Precautions for sensor head installation ".	
3	Cable with high flexibility	Network and IO connection cables.	
4	Sensor head laser emission window	Laser used for emission measurement. Protected by a glass cover.	
5	Sensor head photosensitive window	Laser used for receiving measurement. Protected by a glass cover.	

4 Precautions for sensor head installation

Target distance measurement

Please choose to use the sensor head closest to the reference distance, thereby ensuring the most stable inspection.

Target shape

The sensor head is recommended to be installed in the direction indicated by the circle in the figure below.

The laser light reflected on walls, etc. will become stray light, so please confirm whether it will affect the measurement before use.

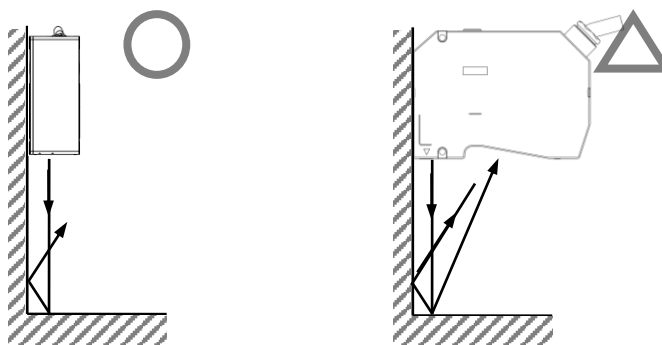


Figure 4-1 Schematic diagram of the correct installation for measuring close to the wall surface

Please avoid blocking the laser beam irradiating the target object and the light path reflected from the target object to the photosensitive window.

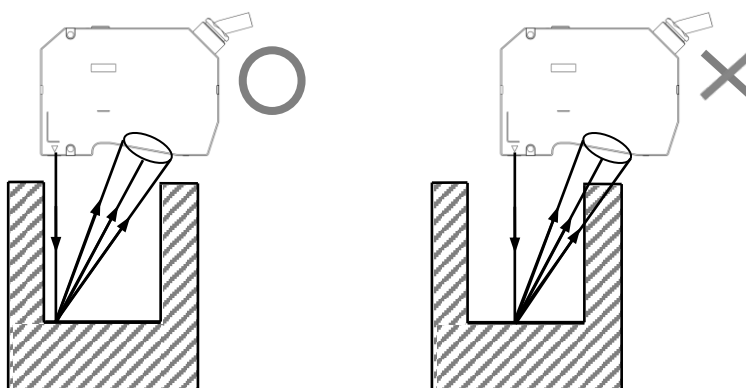
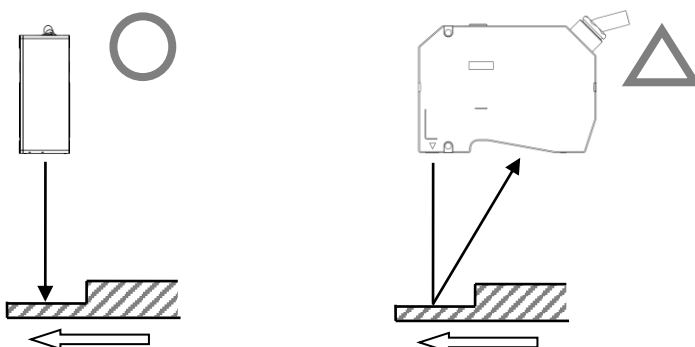


Figure 4-2 Schematic diagram of correct installation for displacement measurement in the hole

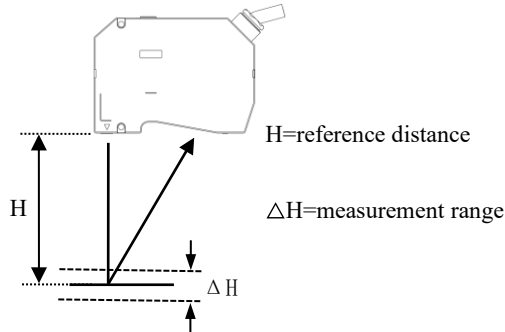
For height difference measurement, please confirm whether the object under test will block the light path during travel.



4-3 Schematic diagram of correct installation for height difference measurement

Installation method

Diffuse reflection installation method



Mirror reflection installation method

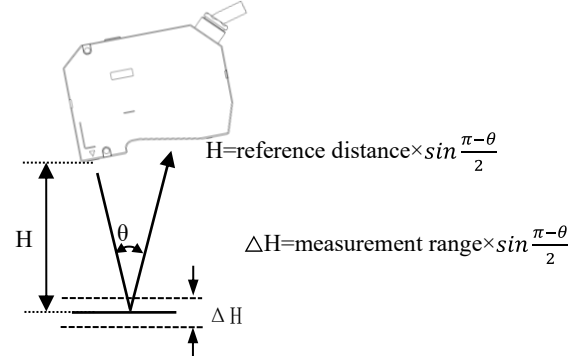


Figure 4-4 Schematic diagram of diffuse reflection and mirror reflection

Adjust the distance between the sensor head and the target object, and fix it with screws.
Please refer to "[8 Dimensional diagram](#)" for installation dimensions.
The tightening torque for the installation screws should be within the following range.
M4 screw:1.2 to 1.8N m

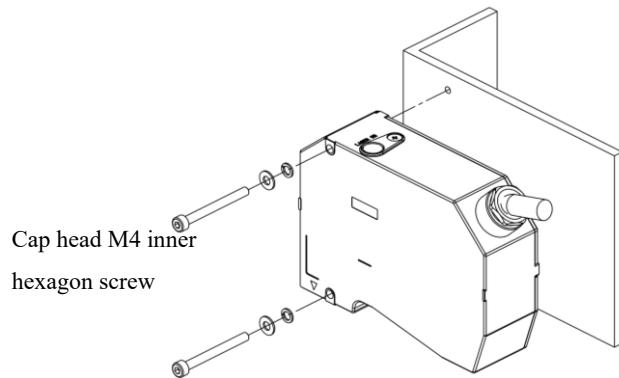
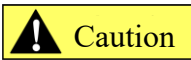


Figure 4-5 Schematic diagram of sensor head installation



- If the sensor head is mounted on a flat plate with poor heat dissipation, such as resin, the surface of the sensor head will heat up, which may cause burns.
- **To facilitate the heat dissipation of the sensor head, please install the sensor head on a metal plate.**

5 Hardware connection

5.1 Basic system configuration

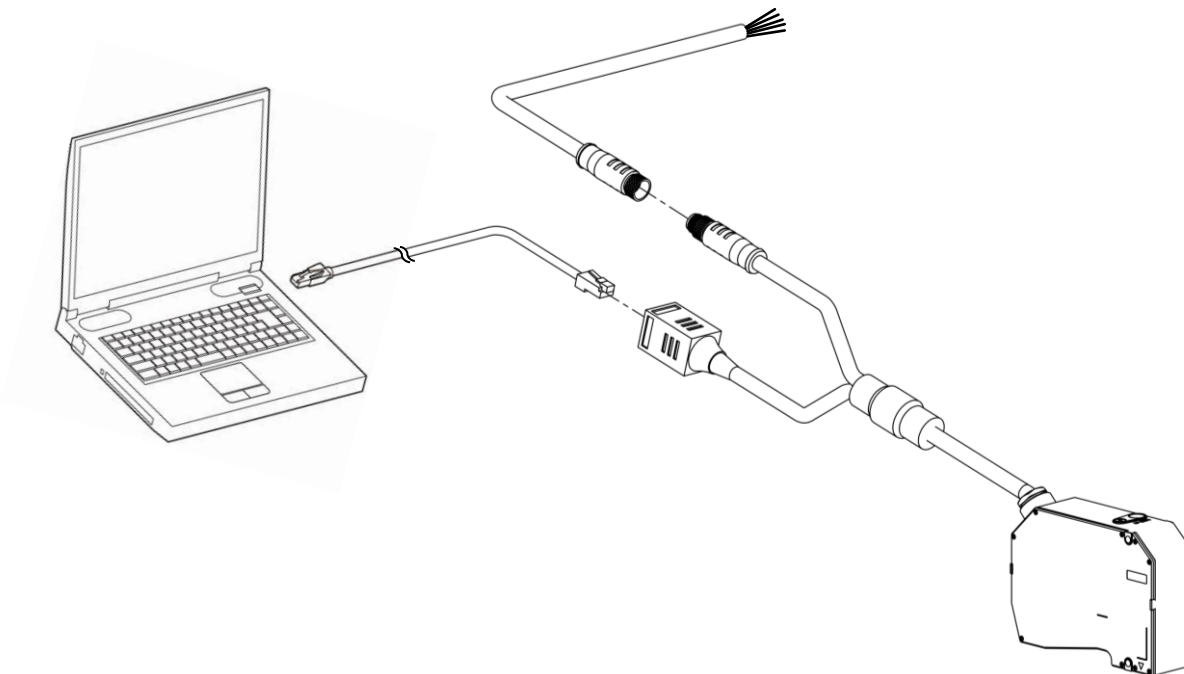


Figure 5-1 System composition diagram

▶ Important

- **Be sure to connect and remove cables after turning off the power to the controller. Connecting and removing with the power turned on will result in a malfunction.**
- **Please confirm the orientation of the connector before connecting. If the connection is not correct, the pins of the connector may be bent, resulting in a malfunction.**

5.2 System wiring

5.2.1 Cable definition

Category	Core wire color		Signal definition	Remark
Power	Brown		DC12~24V	
	Blue		0V	
Analog quantity	Single core shielded wire	Yellow	Analog output	Support analog voltage from 0~10V or analog current from 4~20mA.
		Shielding layer	Analog reference ground	
RS-485	Black		RS-485 DATA+(A)	
	White		RS-485 DATA-(B)	
Digital input	Gray-brown		External input 1	It is used for timing/clearing signal input or encoder signal input.
	Gray-red		External input 2	
Digital output	Green-brown		HIGH output	Output when the measured value is higher than the set tolerance upper limit.
	Green-red		GO output	Output when the measured value is within the set tolerance range.
	Green-blue		LOW output	Output when the measured value is lower than the set tolerance lower limit.
	Green-purple		STORE output	Output when the measured value is updated.

Special note:

- 1) For analog output, analog voltage output or analog current output can be selected. Among them, the maximum output range of analog voltage is 0~10V; and that of analog current is 4~20mA. Please configure it on the SG-Imaging software. For the setting method, please refer to the help document of SG-Imaging;
- 2) External input 1 and external input 2 are multi-function ports, which can be used in one of the following two modes:

Mode	Port		
Timing/clearing	External input 1	Timing	Timing signal for measured value retention or as data storage;
	External input 2	Clear	It is used to set the current Z position as the measurement zero plane;
Encoder	External input 1	Encoder Phase A	Only support single-ended encoder input
	External input 2	Encoder Phase B	

Note:

- a) To change the mode and other related settings, please configure on the SG-Imaging software. For the setting method, please refer to the help document of SG-Imaging;
- b) When the "Timing/Clear" mode is selected, the frequency of the input signal must be less than 4kHz.

5.2.2 Cable connection

Precautions

- The power supply supports DC 12~24V, and the power must be greater than or equal to 10W.
- The digital input and output ports support two types of NPN and PNP, which needs to be set on the SG-Imaging software. The set items will be applied to the input and output ports at the same time. For example, if the setting is the NPN type, then the input port only supports NPN type input, and the output port supports NPN type output.

Please set the corresponding type on SG-Imaging according to the actual external electrical characteristics, and refer to the corresponding method in Figure 5-2 External circuit connection type to connect external devices.

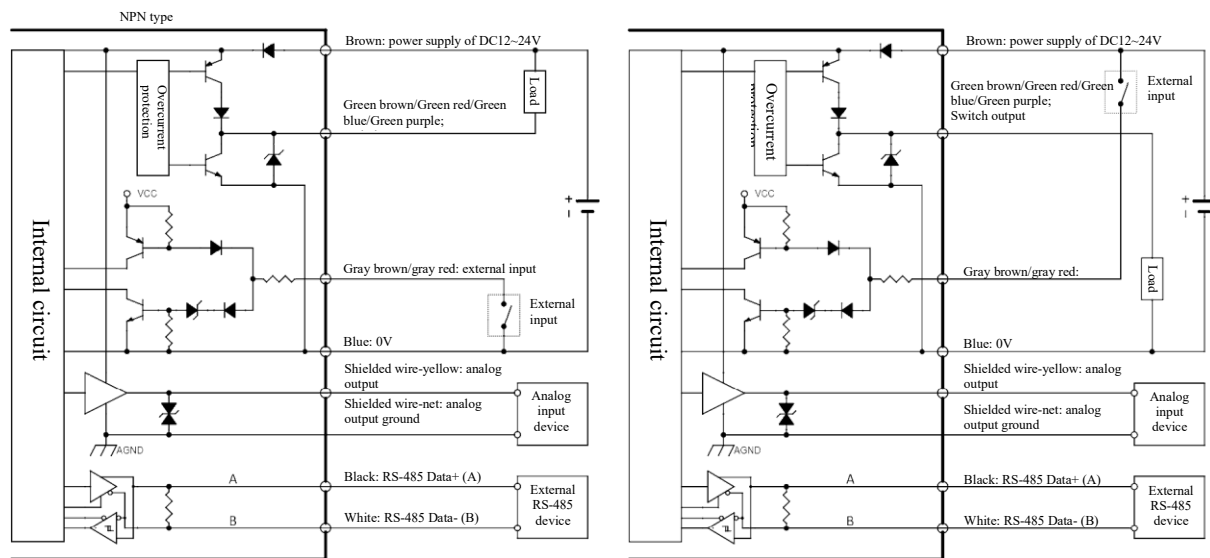


Figure 5-2 External circuit connection type

6 Software connection

6.1 Install SG-Imaging

1. Obtain the installation package of SG-Imaging software;
2. Enter the Windows system, double-click the installation package of the SG-Imaging software;
3. Set up the installation step by step according to the installation wizard (e.g. Image 6-1),

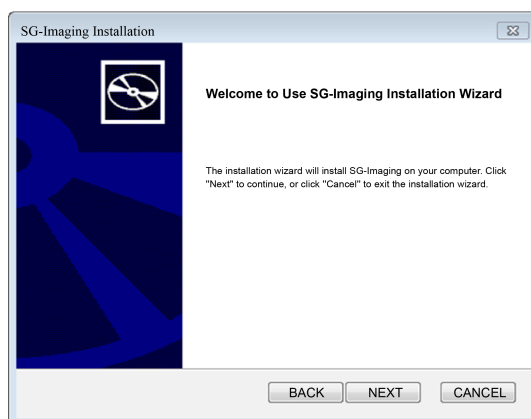


Image 6-1

4. After the installation, the installation wizard will display as Image 6-2, click [Finish] to exit. So far, the installation of SG-Imaging software is completed.

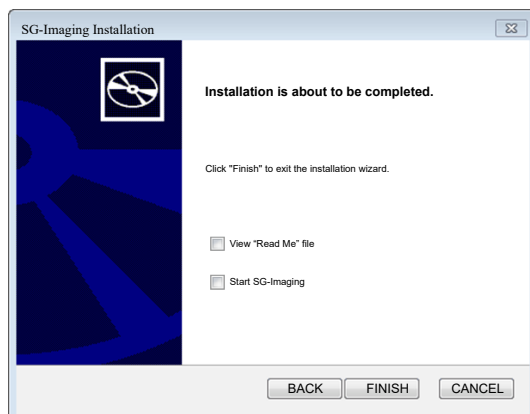


Image 6-2

6.2 Connect controller

1. Connect the computer and the controller with a network cable.
2. Enter the Windows system, and set a fixed IP address (such as Image 6-3) for the network card used to connect to the controller.

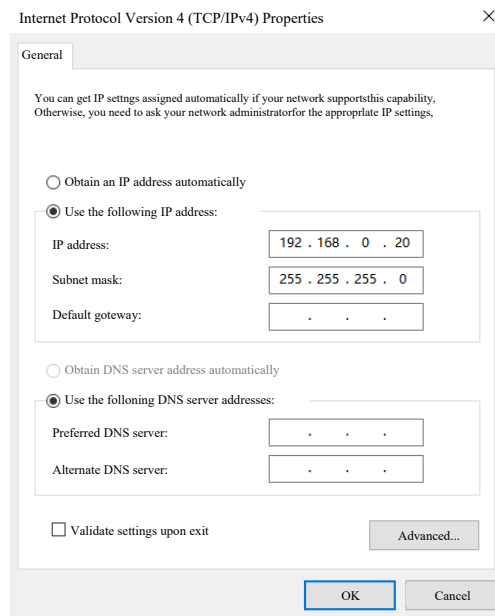


Image 6-3

3. Open the SG-Imaging software, and select "PC Communication Settings" in the pop-up prompt window (e.g. Image 6-4) of connection failure, and click [OK].



Image 6-4

4. The "PC Communication Settings" window (e.g. Image 6-5) pops up.

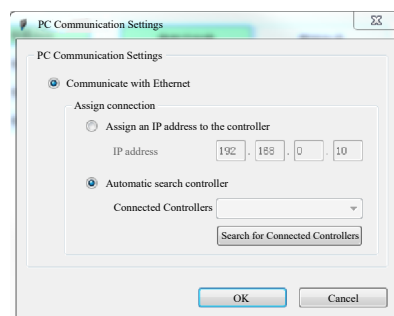


Image 6-5

5. Any of the following two ways can be selected to connect to the controller:
 - a) Select "Specify an IP address for the controller", and enter the IP address of the controller in the IP address input box below (the factory default IP address of the controller is 192.168.0.10);

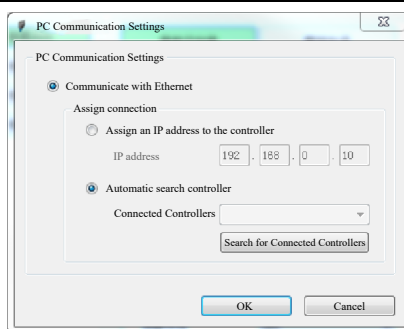


Image 6-6

- b) Select "Automatically search for controllers", and click [Search for connected controllers]. The IP address of the controller found will be displayed in the drop-down box above (e.g. Image 6-7). Select the corresponding IP address in the drop-down box (the factory default IP address of the controller is 192.168.0.10);

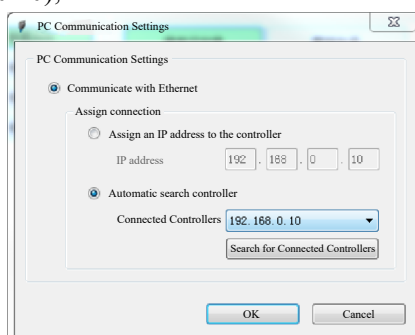


Image 6-7

6. After setting the IP address of the controller, click [OK]. After the connection is successful, a prompt (e.g. Image 6-8) "Do you want to read the set value of the controller" will pop up, and click [Yes] to read the set value.

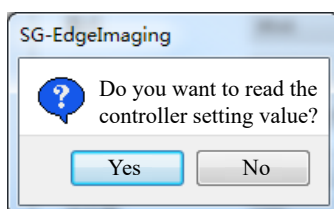


Image 6-8

7. At the completion of reading the set value, return to the home screen, and perform software operations. The connection status of the current controller and the IP address of the controller (e.g. Image 6-9) will be displayed in the lower left corner of the home screen.

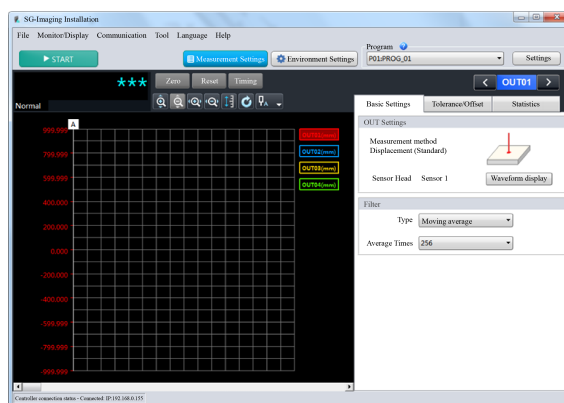


Image 6-9

7 Specifications

Table 7-1 SGI series parameters

Parameters		SGI Series Laser Displacement Sensor					
Model		SGI030/035	SGI050/055	SGI080/085	SGI150/155	SGI400/405	SGI500/505
Reference distance		30mm	50mm	80mm	150mm	400mm	500mm
Measuring distance		25~35mm	42~59mm	64~99mm	115~197mm	300~500mm	250~1150mm
Repeatability ^{Note 2}		0.05μm	0.1μm	0.2μm	0.5μm	2μm	2μm
Linearity		±0.05% F.S. (F.S.= 10mm)	±0.05% F.S. (F.S.=17mm)	±0.05% F.S. (F.S.=35mm)	±0.05% F.S. (F.S.=82mm)	±0.05% F.S. (F.S.=200mm)	250~450mm: ±0.02% F.S.; 250~750mm: ±0.05% F.S.; 250~1150mm: ±0.1% F.S; (F.S.=900mm)
Temperature characteristics		±0.01% F.S./°C (F.S.= 10mm)	±0.01% F.S./°C (F.S.=17mm)	±0.01% F.S./°C (F.S.=35mm)	±0.01% F.S./°C (F.S.=82mm)	±0.01% F.S./°C (F.S.=200mm)	±0.01% F.S./°C (F.S.=900mm)
Sampling frequency		88/50/20/10/5/2/1KHz (7 levels are optional)					
Light source	Emitter	Red semiconductor laser					
	Wavelength	655nm					
	Laser class	Class 2 (IEC60825-1:2014), Class IIIa (FDA CDRH Part 1040.10)					
	Output power	5mW					
Digital output		4 (support NPN/PNP)					
Digital input		2 (support NPN/PNP)					
Analog output port		1 (current type/voltage type multiplexing)					
Analog output	Electric current	Output 4~20mA, allowable load resistance below 300Ω					
	Voltage	Output 0~10V, output impedance 100Ω					
RS485		Baud rate: 9,600 to 115,200 bps, Data length: 8 bits, Stop length: 1 bit, Parity: None/even/odd					
Ethernet interface		1000Base-TX/100Base-T					
Power		12VDC±10% or 24VDC±10% (power less than or equal to 10W)					
Ambient brightness		Incandescent or fluorescent lamp: 10,000 lux Max.					
Operating temperature		0~50°C					
Storage temperature		-20~70°C					
Operating humidity		35%-85% no condensation					
ESD protection		Contact discharge 4kV, air discharge 8kV, in line with IEC 61000-4-2					
EFT protection		Power port 2kV/5 or 100kHz, signal port 1kV/5 or 100kHz, in line with IEC 61000-4-4					
Bumps		15Gs/6ms per axis, in line with IEC 68-2-27 Ea					
Vibrations		10 ~ 100Hz total amplitude of 1.5mm, each direction, namely X, Y, Z for 2 hours, in line with IEC 68-2-6 Fc					
Enclosure protection level		IP67, in line with IEC 60529					
Case material		Aluminum alloy					
Dimensions (mm)		90x76x41	88x77x48	88x77x48	88x79x50	119x85x35	119x85x35
Weight (g)		324	323	376	370	380	380
IO cable model		SCB-GICAM-HA1-3m					

Note 1: SGIxx0 laser spot is narrow spot type, which is recommended to be used for fine object measurement, while SGIxx5 laser spot is wide spot type, which is recommended to be used for rough object measurement.

Note 2: At the reference distance, take the average of 4096 measurements.

8 Dimensional diagram

8.1 SGI400/5 sensor head dimensional diagram

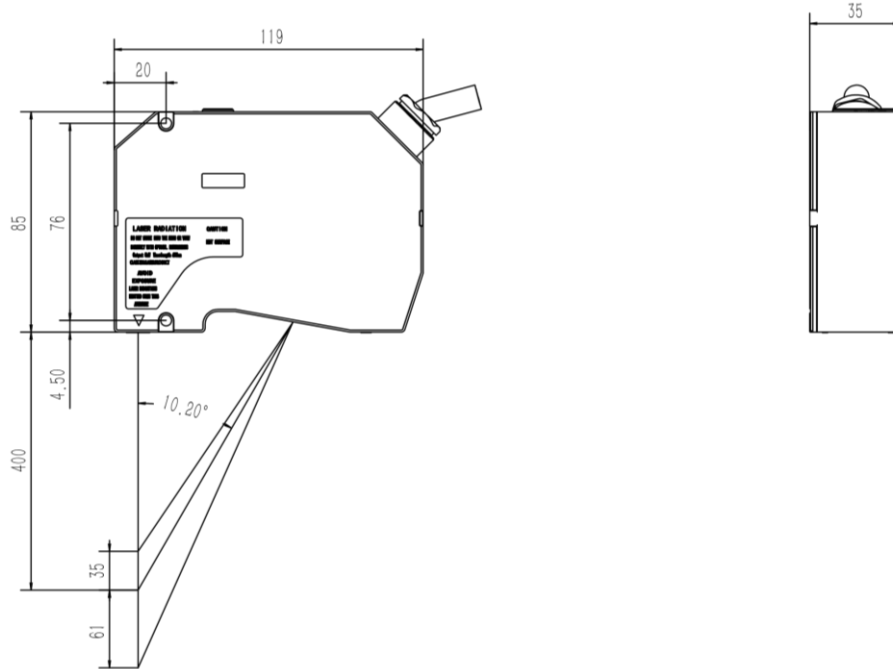


Figure 8-1 SGI030/5 Sensor Head dimensional diagram Unit (mm)