



Laser Autocollimator

Smart LAC H420 Series

The User's Manual

Thank you for choosing our products.

Before using the Products, read this manual, thoroughly.

After reading this manual, please keep it close for your immediate future reference.

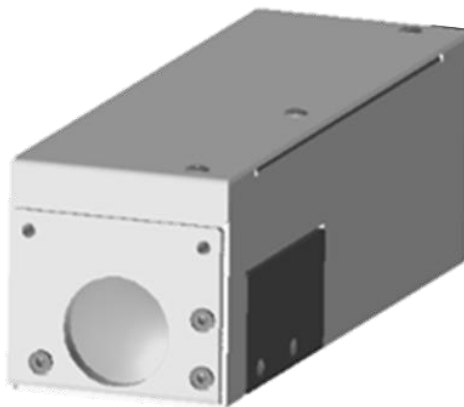


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Introduction

This document is the "User's Manual" for the H420 series - Laser Autocollimator (hereafter, referred to as "the products" or "the sensor head").

This "User's Manual" (hereafter referred to as "this manual") provides information and basic operating instructions for the products.

To use the Products effectively and safely, please read this Manual carefully and fully understand its contents before using the Products.

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H420 Series User's Manual

Issue Date	2026, June
Manual Version	008E

Revision History

Date	Revision	Details
2024 January	001E	1 st version
2024 March	002E	The Suruga OptGauge Ver.1.1.0 supported
2025 January	003E	Repair Notice Added
2025 February	004E	The Suruga OptGauge Ver. 1.1.3 supporter • In “Measurement Option Setting Details - Log File -> Image” - “Full Color/Gray Scale and PNG/BMP/TIFF” are added. • In “Controlling from External Devices, • Read & Write Commands, “MLT/ASC/RFP/IOE/RAE/IOC/IOF” added • In Execute Commands, “AR, MSN/RO” are added
2025 July	005E	• Separation and independent documentation of software (the Suruga OptGauge) content from this manual • Recommended operating environment for the installation PC • Title amended to the Installation Operating Environment. • Changed to [Recommended Operating Environment] and [Minimum Operating Environment]. • Correction of typographical errors and omissions
2025 July	006E	• Installation PC System Requirements - Remove Pro - Add Windows 11 version - Add note stating it may not function correctly depending on version • Symptoms and Solutions - Add details of issues where it may not function correctly depending on Windows version and their countermeasures
2025 July	007E	• Added 1/e² beam diameter calculation function • Added rotation angle calculation function
2026. June	008E	Suruga OptGauge Ver.1.3.7 Support Operating Environment • Compatible with .NET 10

		Software Startup • Added Quick Start instructions Measurement Method • For usage instructions, refer to the "Suruga OptGauge User's Manual" Sensor Head Specifications • Frame rate changed to 60 Hz
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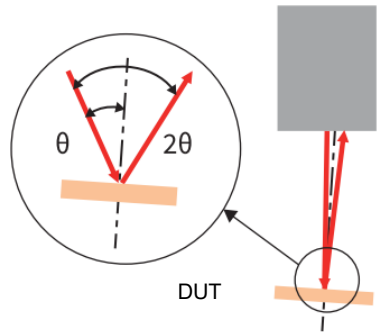
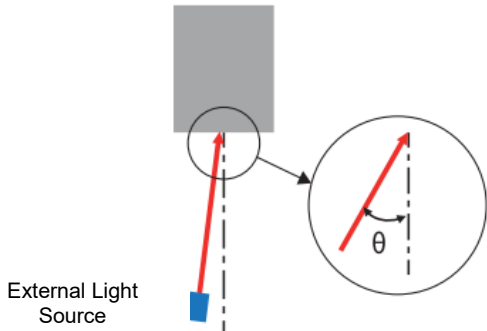
NOTICE

The information contained in this Manual is deemed correct at the time of publication.

SURUGA SEIKI CORPORATION reserves the right to change specifications without notice to the user of the Product offered.

The latest version of this Manual can be downloaded from our WEB site
(<http://jpn.surugaseiki.com/>).

0. Definitions (terms and abbreviations)

Terms and Abbreviations	Definitions
Reflection Angle Measurement	 Fig. 1 A measurement method that uses an internal light source to measure the angle of reflected light from an object. The 2θ is measured, and the θ is calculated from this measurement result, as shown in Fig. 1.
External Light Angle Measurement	 Fig.2 A measurement method that directly utilizes laser or LED light beams to determine angles. As shown in Fig. 2, the angle θ of the externally incident light is taken as the measurement result.
The Products	The Smart LAC H420 serie
The Software	The Suruga OptGauge software
This Manual	The user's manual for the Smart LAC H420 serie
Reference Plane	Mounting reference surface on the front of the Products.
Sensor Camera	Internal sensor camera embedded in the Products.

1. For your Safety – Precautions of Use

1.1 Warning labels addressed in this Manual

 Warning	May result in severe injury, damage to equipment, or other severe damage.
 Careful	May result in minor physical injury or equipment damage.
Attention	Instructions for safe handling are provided for the product.

1.2 Managing this Product

- This product uses a laser diode for its internal light source. We recommend that this product is in an environment where appropriate safety measures are taken for the laser before any use.
- Suruga Seiki shall not guarantee the functions and performance of this product if used in a manner other than that specified in this manual, or if modified.
- When other equipment combines this product, the functions and Suruga Seiki shall not guarantee the performance of this product, depending on your design, operating conditions, and environment.
- Do not subject each device, including peripherals, to sudden temperature changes, which may cause condensation and equipment failure.
- Do not wipe this product with a wet rag, benzene, thinner, or the alike, which may cause discoloration or deformation of this product. If this product is heavily soiled, wring out a cloth with diluted pH-neutral detergent and wipe off the stain, then dry this product with a soft cloth.
- If you suspect this product being malfunctioning, please contact our local sales office.

1.3 Precautions

1.3.1 Ambient Temperature and Illuminance

- Changes in ambient temperature can cause measurement errors. Please be advised to keep the ambient temperature always at a constant level.
- Avoid using the Products near lighting equipment that repeatedly turns on and off at high frequencies. If this is not possible, use a light shield or similar device to avoid being affected.

1.3.2 Power Supply



- Use the correct power supply voltage. Otherwise, fire, electric shock, or malfunction may occur.
- Be sure to turn off the power to and devices connected to the Product when connecting or disconnecting various connecting wires. Otherwise, this product may be damaged.
- Do not turn off the power while setting items. Sudden power cut-off while setting data, part or all configuration data may be lost.

1.3.3 Disassembly/Modification



Do not disassemble or modify any unit of this product. Disassembly or modification may cause fire or electric shock. The warranty is void if this product is disassembled or modified by anyone other than our employees or our certified third party.

1.3.4 Effects of dust and dirt

The following cases may cause measurement errors due to the influence of dust, dirt, water, oil, etc.

- Dust and dirt on the cover glass: Use dry-clean air to blow off any dirt on the cover glass. If the cover glass is heavily soiled, wipe it off with a soft cloth soaked in thin alcohol.
- Adhesion on the surface of the object to be measured: Blow it off with clean air or wipe off the dirt.
- Intrusion into the optical axis area by floating or by splashing: Take measures such as installing a protective cover or air purging.

1.3.5 Influence of Vibration

Vibration transmitted either to this product or to a measurement target (or both) may cause measured values unstable. In such cases, please be advised that, in order to obtain stable results, you may take extra efforts such as suppressing the vibration or averaging out result values upon increasing the number of measurements.

1.3.6 Disturbance by the air fluctuation

The influence of slow air fluctuation may cause the measured value to vary. In such cases, covering the measuring section with an airproof cover is advised.

1.3.7 Waterproof and Explosionproof



- This product is not intended for use in areas where explosion protection is required. Do not use this product in locations where flammable gases or other explosive atmospheres exist.
- This product is not waterproof. Do not use this product in locations where liquids may splash or flow into the Products.

1.3.8 Actions in case of abnormality



In the following cases, immediately turn off the power and disconnect the USB cable. Continuing to use the device in an abnormal state may cause damage.

- When abnormal sounds, strange smells, or smoke is detected.
- If the power cord is damaged.
- If water or other liquid is spilled on the Product.

1.3.9 Repair

For repair, please contact our local sales office,

- When water or foreign matter gets inside the main unit,
- When this product is damaged due to being dropped or external impact, and
- When there is a strange odor due to smoke emission.

1.3.10 Disposal of this Product

When disposing of this product, treat it as industrial waste. Please follow in accordance with laws and regulations or by any other appropriate methods. Suruga Seiki shall not collect this product for purpose.

Please dispose of all materials used to package this product in accordance with the law or by other appropriate methods. Suruga Seiki shall not collect these materials for the purpose.

1.3.11 Residual Risks

Attention

This document does not disclose all risks associated with this product. For residual or unexpected risks, or any other risks involved, please implement the safety design of machinery in accordance with ISO 12100 or your appropriate industrial safety standards.

1.4 Use of Laser Products for Your Safety

1.4.1. Corresponding Laser Classes for Autocollimator H420 series



The following describes the hazards of the laser classes in the H420 series.

For specific safety precautions for the laser class, please follow your occupational safety regulations.



Table for Laser Class, Precautions, and the Corresponding Products

Laser Class	Precautions
Class 1	Safe under reasonably foreseeable conditions A Laser product which is safe for use with observation optics such as a loupe and binoculars Applicable products: All models with a built-in laser at the wavelength of 405 nm
Class 2	Normally, your eyes are protected and safe due to aversion reactions such as blinking. Laser products that may cause temporary visual impairment or risk of secondary injury due to aversive reactions if the user intentionally stares at the laser beam. Applicable products: All models with a built-in laser at the wavelength of 660 nm

Ref : IEC 60825:2014 (JIS C 6802 : 2014) *Safety of Laser Products*

1.4.2. Laser Class Identification Labels

The contents and affixing position of the laser class identification label on this unit are shown below. The label contents differ depending on the product model. Please verify the applicable product model.



The descriptions of the laser class identifications and the content of the warning label are as below.

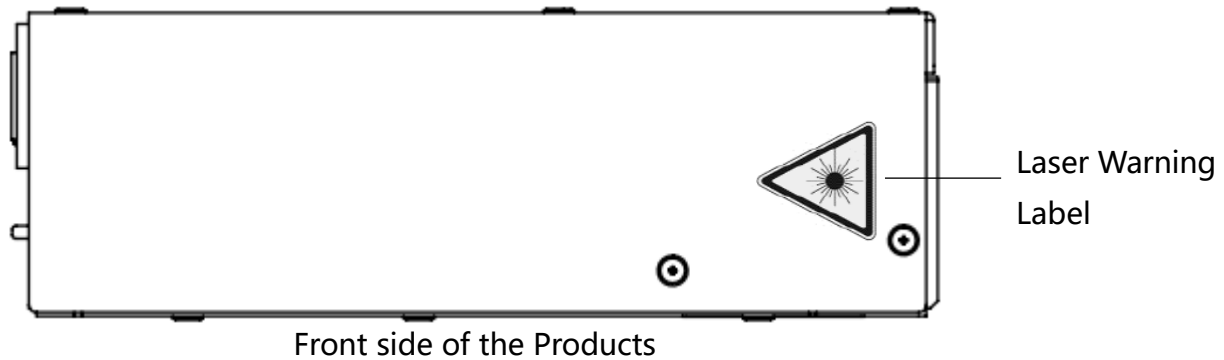
Laser Class Identification Labels	
Laser Class 1	Laser Class 2
 Background Color: Yellow Text Color: Black	 Background Color: Yellow Text Color: Black

Warning Label
 Background Color: Yellow Text Color: Black

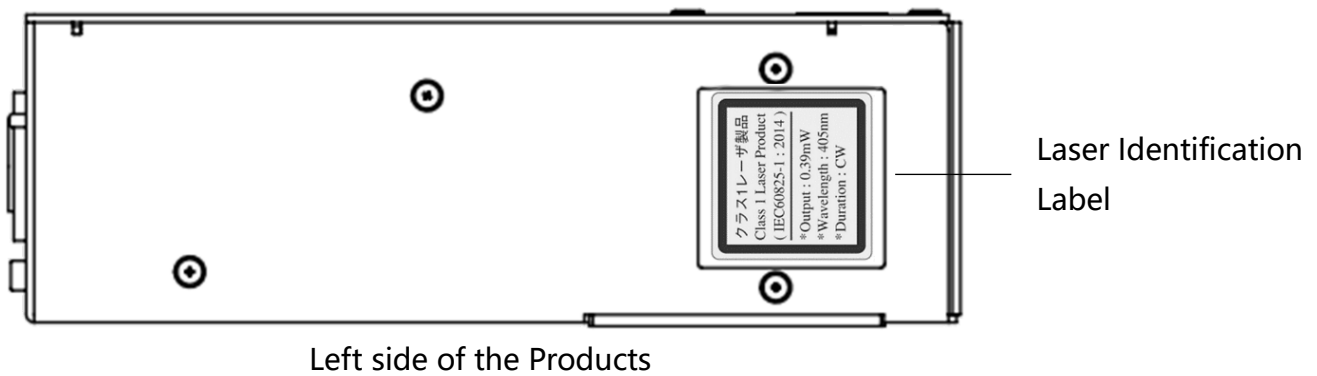
Labeling method and contents conform to IEC60825-1:2014 (JIS C 6802:2014)

Common locations for the laser labels to all models

The laser warning label is attached to the top of the Products.



The laser identification label for the specific laser class is attached to the left side of the Products on the laser emission port side.



2. Preparations

2.1 Functions and Features

The Products are autocollimator which derives oblique of a target object from the incident light to the sensor. The following are its notable features.

■ Angle measurements

- Measurement range: $\pm 1.35^\circ$ (circular Area)
- Linearity: $\pm 0.25\%$ of F.S. (F.S. = 2.7 degrees, Working Distance at 100 mm)
- Repeatability: 1 sec .(within 6σ of the averaging times = 256 measurements)

*See "[Specifications of the Products and Accessories](#)" for more details.

■ Divergence measurement is feasible

- Measurement range: ≤ 20 mrad
- Linearity: 5 % of F.S. (F.S. = 20 mrad)

■ The software installed in the PC with connecting this product is capable of the measurements.

* See "[System Configuration Example](#)" the Preparations.

■ Measurement of multiple luminous points is feasible.

■ The reflection angle measurement and the external light angle measurement are available.

- For reflection angle measurement, use the internal light source to measure the angle of its reflected light.
- For external light angle measurement, the angle of the beam of laser or LED can be measured directly.

For details on functions and usage, please refer to the separate software manual "SurugaOptGauge_User's Manual".

2.2 Contents of the Package

In addition to the product itself, the package delivered to the customer contains an adjusting screwdriver for the internal light source and a USB memory stick.

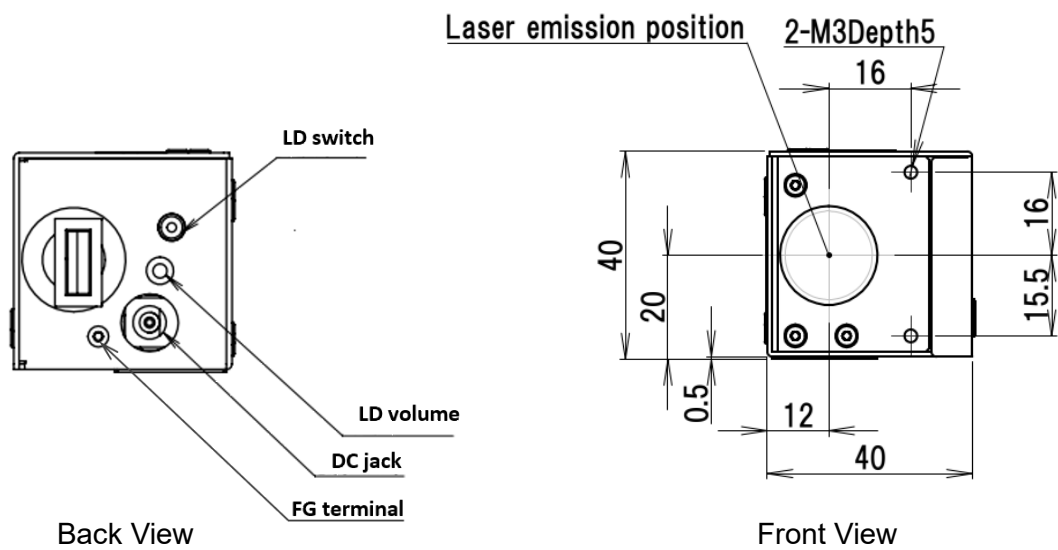
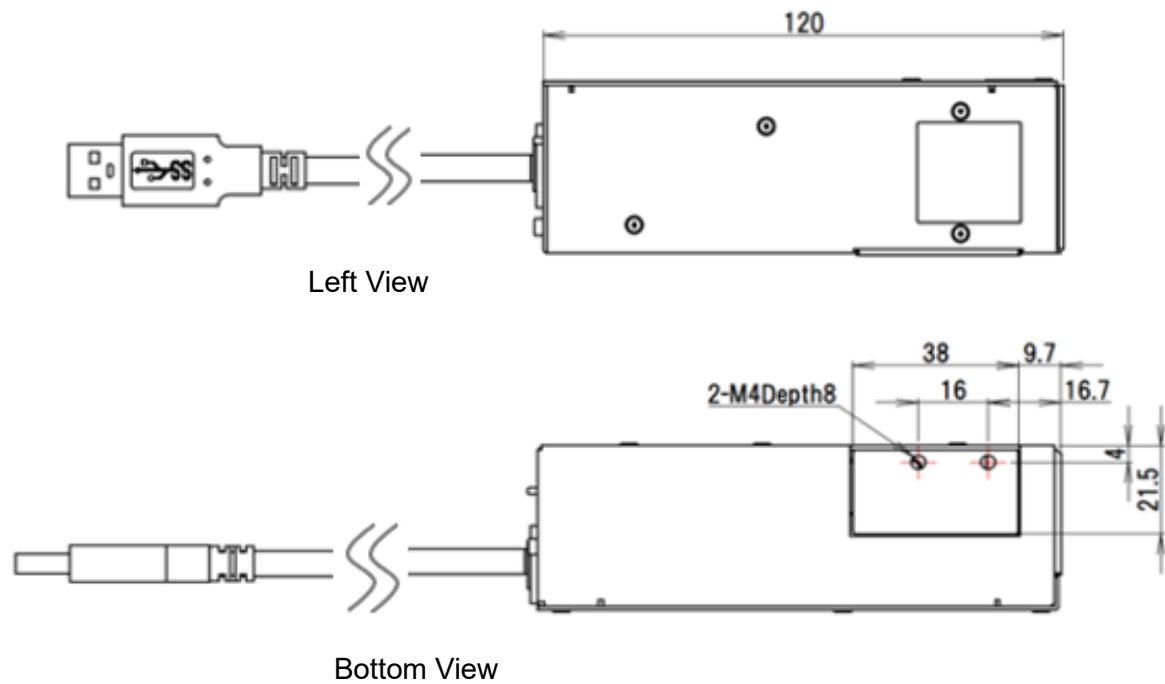
1.  The Products
2.  A screwdriver for the light intensity adjustment
3.  A USB memory stick contents:
the Suruga OptGauge (the Software), camera driver, device authentication file and this Manual).
*The latest version can be downloaded from the Suruga Seiki website (<http://jpn.surugaseiki.com/>).
4. The AC/DC power supply for the Internal light source

2.3 Overview Specifications of this Product

Specifications Table of this product

External dimensions	120 mm x 40 mm x 40 mm
Product weight	400 g
Main power source	12 VDC
Power consumption	5 W or below
Laser class	Class 1 or Class 2 (differs with model)
Protective functions	Short-circuit protection, polarity reversed connection protection
Communication functions	USB3.0 standard
Operating temperature and humidity	5 to 40 °C, 35% to 85% RH (no condensation)
Storage Temperature and humidity	-10 to 65 °C and 10% to 85% RH (no condensation)
Atmosphere	Avoid direct sunlight, corrosive or inflammable gases, liquids, powders/dust, and other toxic substances
Housing Material	Aluminum

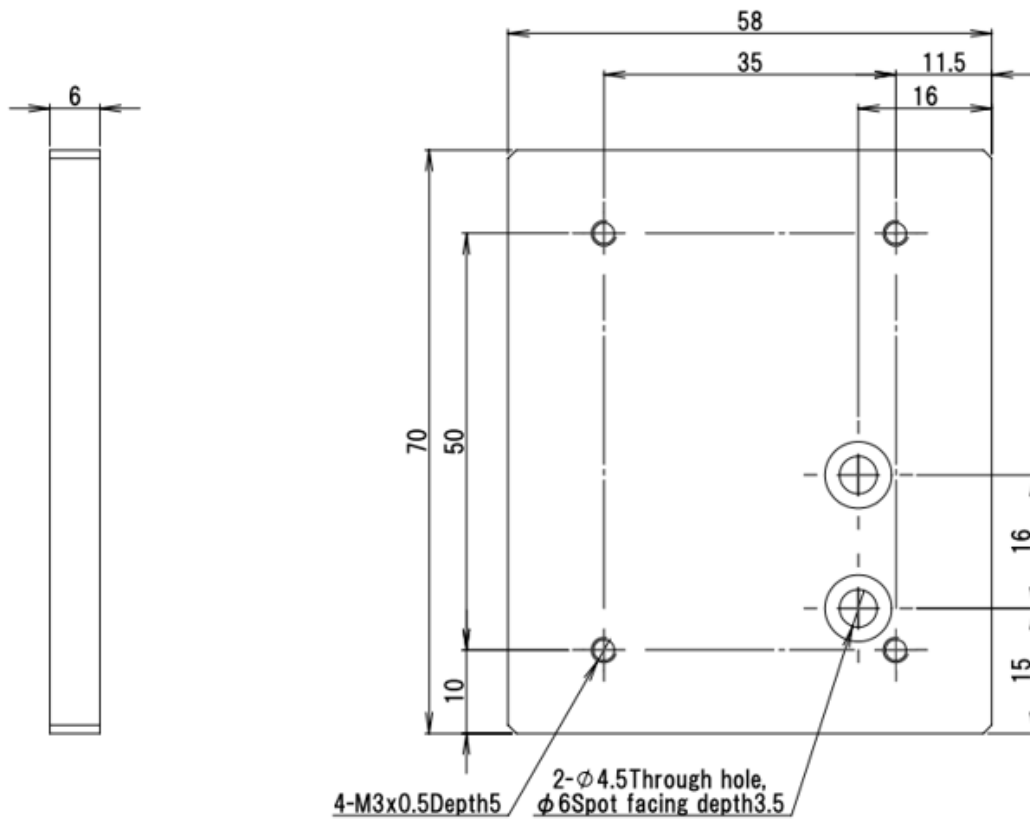
2.4 External Dimensions of the Products



HB10 Mounting Adapter Plate (Model: H420-AP) (sold separately)

*For installation methods using the HB10 Mounting Adapter Plate, refer to [Installation Method \(Example\)](#).

H420-AP Adapter Plate Dimensions



2.5 Names for the Sensor Head Parts and their functions

- ① Internal light source ON/OFF switch
When turned ON, the switch lights up orange as the internal light source is powered.

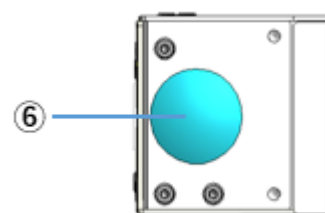
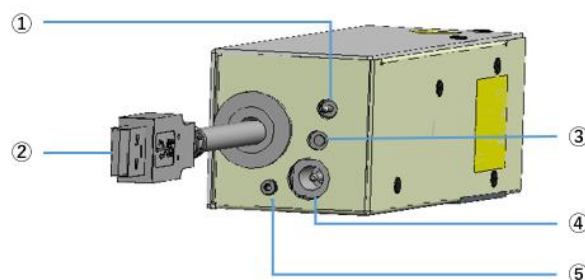
- ② USB connector
Connect your PC to the Products.

- ③ The internal light source brightness adjustment knob
Adjust the brightness of the internal light source. Turning clockwise increases brightness, while turning anticlockwise decreases it.

- ④ Power inlet for internal light source
The AC/DC adapter terminal for the internal light source.

- ⑤ FG Terminal
The frame ground to reduce electrical noise and to prevent malfunction.

- ⑥ Laser emission port
The laser irradiates when the internal light source is ON.



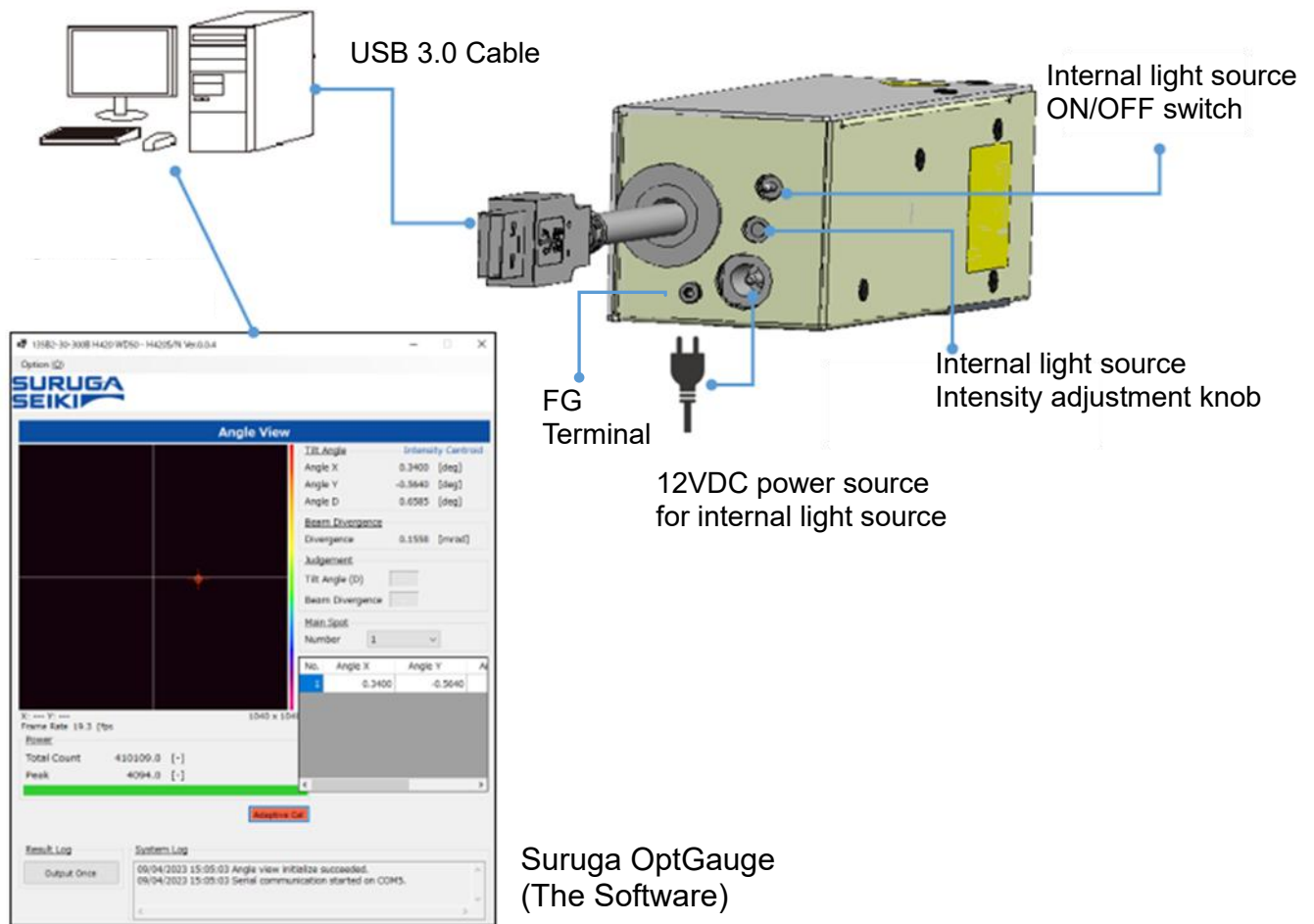
Laser emission
surface (front)



Careful

Do NOT irradiate the human body, eyes, skin, or any other object before safety is yet confirmed.

2.6 System Configuration Example



2.7 Required Parts for Configuration

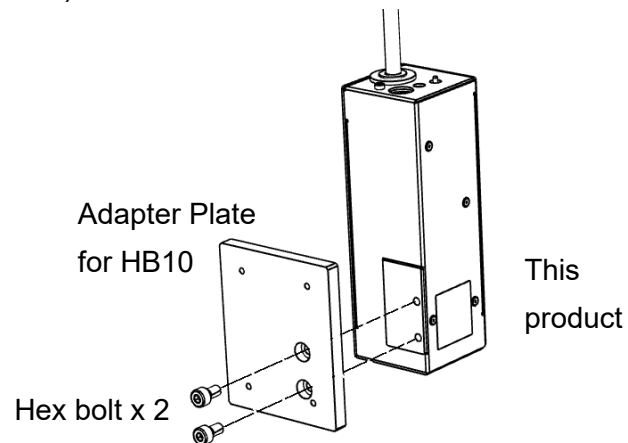
- Main unit
- Dedicated power supply for internal light source (supplied AC/DC adapter)
- PC, PC monitor, PC keyboard for connecting to the main unit
- The Suruga OptGauge (Measurement software)

2.8 Installation Method (Example)

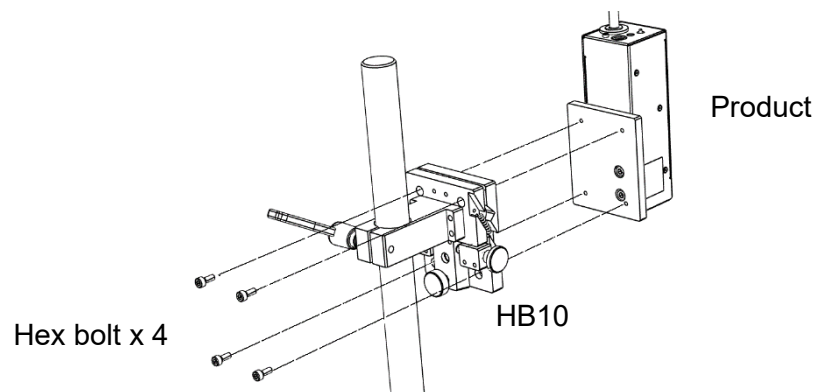
This section illustrates mounting methods for the products.

Secure the main unit and the 2-axis compact tilt stage (Model: HB10), an optical sensor sharing accessory sold by our company, to the stand (Model: HA14).

1. Mount the Product to the HB10 adapter plate (sold separately) with the hex socket head cap bolts (model: CBM4 x 8).



2. Mount the HB10 and HB10 mounting adapter plate at four points using square bolts.



3. Fasten the HB10.

Fasten with the lever

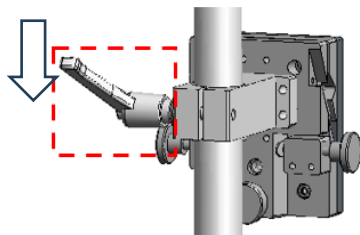


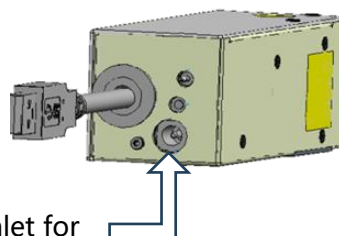
Image of the assembled devices



2.9 Connecting Power to the Internal Light Source

Please use only the proper AC/DC adapter.

Insert the DC plug of the AC/DC adapter into the designated socket before inserting the AC side into an outlet. Note: you should ground the FG terminal.



Attention

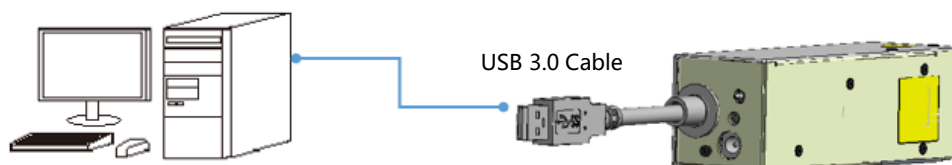
Do NOT CONNECT the AC/DC adapter power until the installation of the Suruga OptGauge is complete.

Please be advised to ground the FG terminal to prevent malfunction caused by noise.]

2.10 Connection to a Computer

Connect the USB3.0 cable to a USB port compatible with USB3.0.

Please ensure that you use a USB 3.0-compatible port on the PC.



Attention

Do not disconnect the USB cable while the Software is running. Normal operation will be disrupted. If the cable disconnects, close the application, reinsert the USB cable, and restart the application.

2.11 The Software - Installation of the Suruga OptGauge



If downgrading of the Software, setting information added to a newer version may not be correctly loaded

If downgrading to an earlier version of the Software, it would not read correctly the settings only available

to the newer versions so that the software would not even start up.

Therefore, please be advised to back up the folder with your option files being stored, to delete the original option file folder and then to re-installing an earlier version.

[Folder Path]

C:/Users/[UserName]/Documents/Suruga/OptGauge/[Product Serial No.]

2.11.1 Software License

To use the Suruga OptGauge (hereafter as "the Software"), the customer must consent to the following software license agreement (hereafter as "this agreement").

When installing or copying all or part of the Software on a computer, or using the Software after installation, it is considered that the customer has consented to all terms of this agreement, and the agreement is bilaterally concluded.

Article 1 (Permissions)

The Software is free of charge.

The copyright for the Software, its manual, and other documents concerning the Software belong to SURUGA SEIKI Co., Ltd. (hereafter as "the SURUGA").

The SURUGA grants all users for non-proprietary rights to the use of the Software.

Article 2 (Usage Restrictions)

The SURUGA permits the use of the Software only for the purposes of operating the Products and collecting data.

The SURUGA prohibits the use of the Software for any other purposes than that the SURUGA's intended.

Article 3 (Reproduction and Modification)

The Software can be copied only to the computers using the Products. The SURUGA prohibits modification, redistribution, and reverse engineering.

Article 4 (Disclaimers)

Users make the use of the Software on their own responsibility.

The SURUGA bears no responsibility and is not liable for any direct, indirect, incidental, special, supervenient, or punitive damage including but not limited to; data loss, business interruptions, and loss of profit, incurred arising out of or failure to use the Software.

In addition, The SURUGA bears no responsibility and is not liable for any damage incurred arising out of software bugs, errors, viruses, malfunctions due to illicit third-party access, or security issues with the Software.

The SURUGA holds no responsibility and is not liable to damages incurred upon modification of the Software.

Article 5 (Support)

The SURUGA provides technical support for the Software. However, there is no guarantee that our technical support will achieve the customer's purpose.

Article 6 (Termination of Agreement)

The right to use the Software will be, immediately, terminated upon violation of the conditions of this agreement.

2.11.2 Installation PC System Requirements

[Recommended System Requirements] *1

Hardware requirements	Supported OS	Windows 11 64-bit, Version 24H2 or later*4
	CPU	Intel Core i5 - 1345U CPU 1.6 GHz or higher 10-core 12-thread
	RAM	16GB or higher
	Storage capacity	1GB or higher
	Display resolution	1920 x 1080
	USB	USB3.0 (type A) port: 1 or more
Software requirements	Framework	.NET10.0*3

[Minimum System Requirements] *2

Hardware requirements	Supported OS	Windows 10 Pro 64bit, Windows 11 64-bit, Version 24H2 or later*4
	CPU	Intel Core i5 - 8265U CPU 1.6GHz 4-core 8-thread
	RAM	8GB or higher
	Storage capacity	1GB or higher
	Display resolution	1920 x 1080
	USB	USB3.0 (type A) port: 1 or more
Software requirements	Framework	.NET10.0*3

*1 “Recommended System Requirements” refers to a level where waiting times are minimal and operation is comfortable.

*2 “Minimum System Requirements” refers to a level where the software can start and perform basic functions.

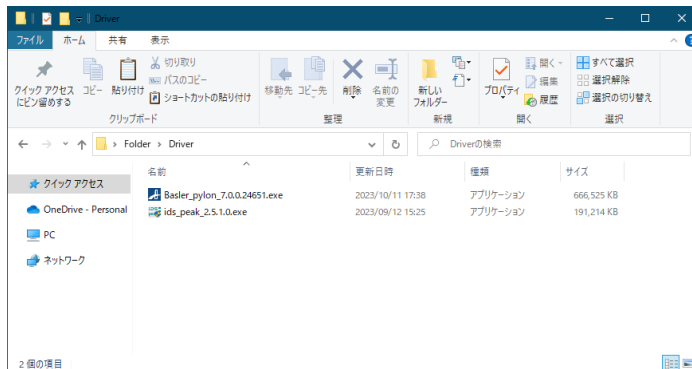
*3 If .NET10.0 is not installed on your computer, install “.NET Desktop Runtime 10.x.x.” from the Microsoft website

*4 It has been confirmed that the Software may not operate properly on Windows 11 Version 23H2 due to differences in certain system components and operating specifications. Please update to the Windows version (24H2 or later).

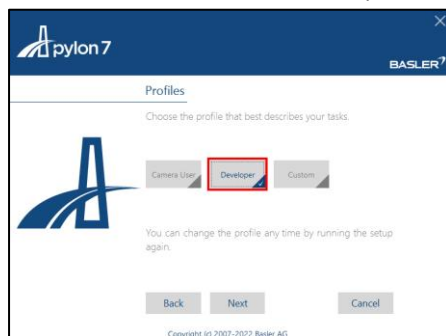
2.11.3 Installation of the Software

2.11.3.1 Installation of the USB device driver

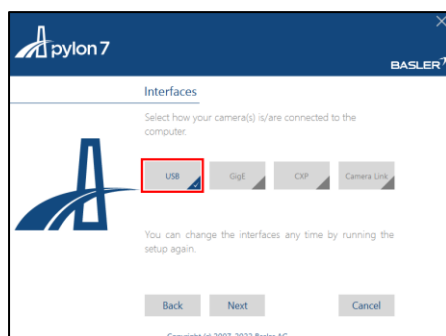
1. Double-click the "... ¥Driver" "Basler_pylon_7.0.0.24651.exe" to begin installation.



2. Consent to your installation on the confirmation screen.
3. Set the installation method (Profiles) to "Developer".



4. Set the sensor camera connection method (Interfaces) to "USB." Thereafter, use the default settings to complete the installation.



2.11.3.2 Download

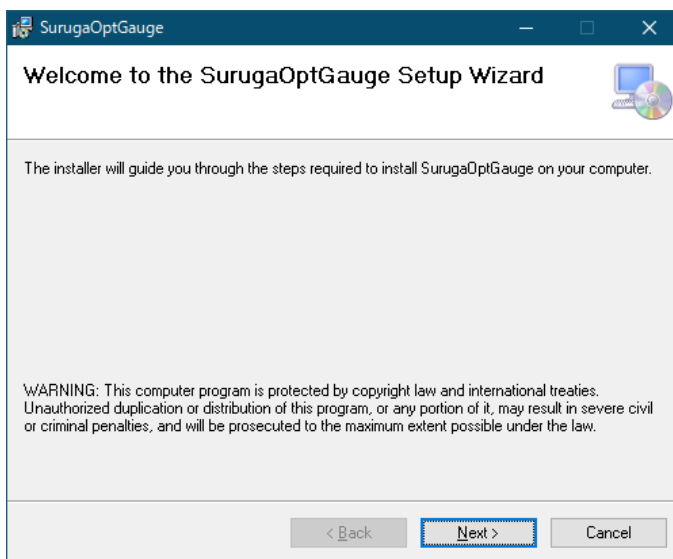
The latest version can be downloaded from our website (<http://jpn.surugaseiki.com/>).

2.11.3.3 Installation of the Software

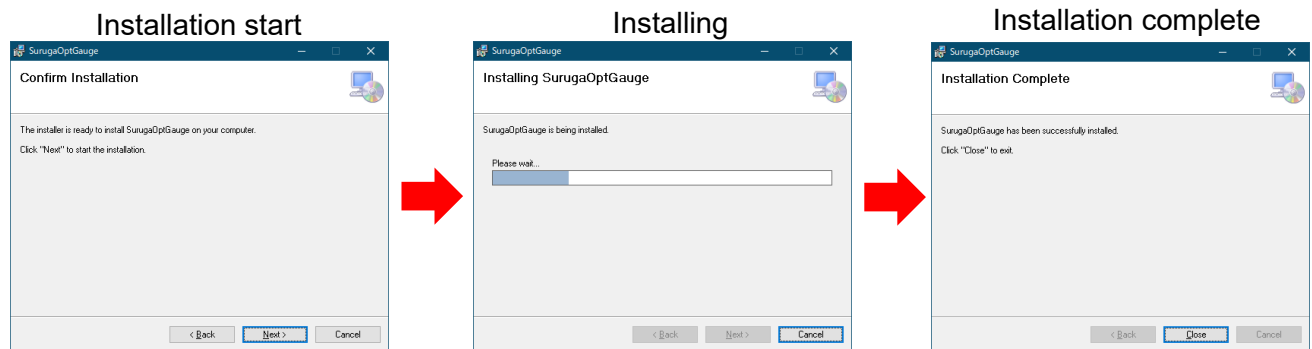
1. Double-click "SurugaOptGaugeSetup_x.x.xx.msi" in the directory "... ¥Application".

Name	Date Modified	Type	Size
 SurugaOptGaugeSetup_x.x.x.msi		Windows インストー...	61,590 KB

2. Click "Next>".



3. Click "Next>" to begin installation.
When installation is complete, click "Close".



4. OptGauge will be created on the desktop.



The installation procedures are complete.

2.11.3.4 Copying the Device Authentication File

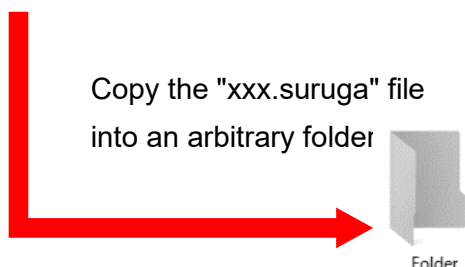
Attention

Authentication file

For this product, calibration values are set for each device. Therefore, the Software requires reading of a "device authentication file (.suruga)" in which the unique individual device information is stored.

To load the device authentication file into the Software, copy the file "xxx.suruga" in the ".../Authentication File" to an arbitrary file location.

名前	更新日時	種類	サイズ
xxx.suruga		SURUGA ファイル	6 KB



Note

If your security policy does not allow the device authentication file to be copied to your PC, you can read the file directly from the USB memory device provided with the product. In this case, this procedure is not required.

2.11.3.5 Starting Up and Shutting Down the Suruga OptGauge

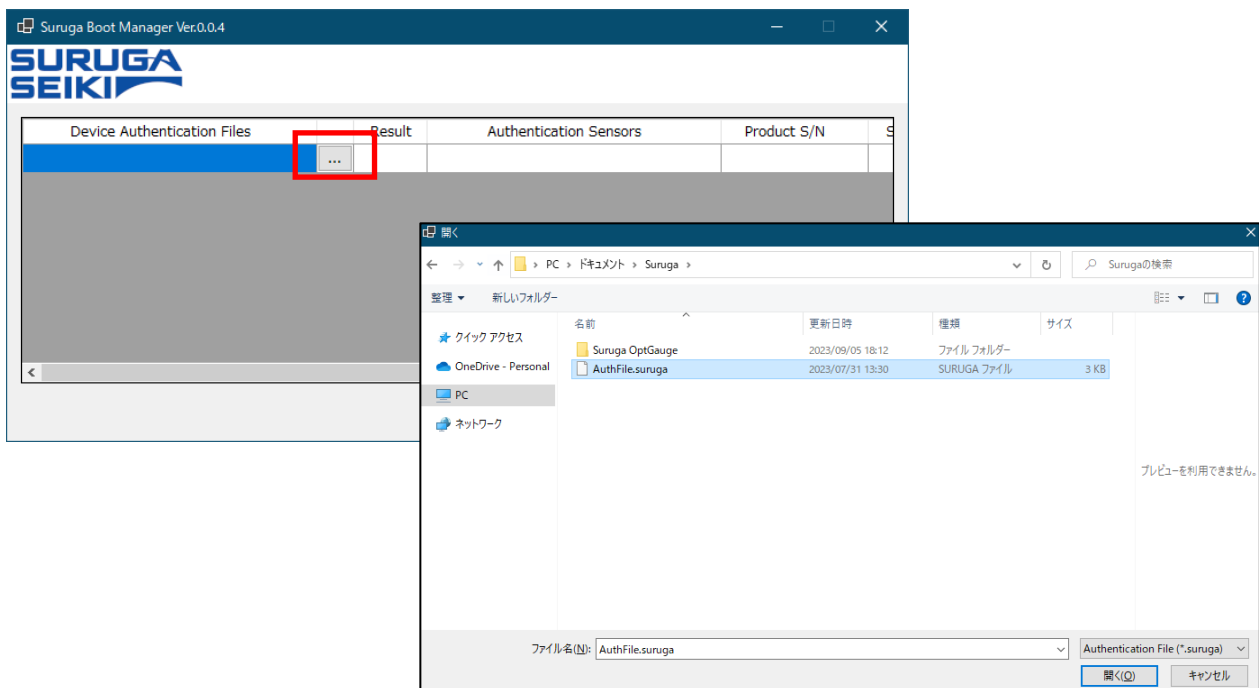
OptGauge startup

1. Double-click "SurugaOptGauge" in the "...¥Desktop".

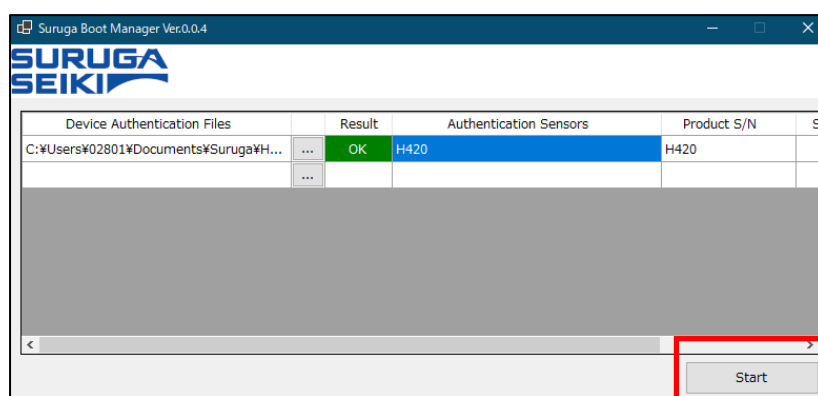


2. Select and open the file with the extension; ".suruga", within the folder copied using the 'Copy Device Authentication File' option in the 'Device Authentication File' section.

Note: If you are unable to copy the device authentication file to your PC, please select it directly from the USB memory stick.



3. Confirm that the "Result" is "OK" and click "Start."

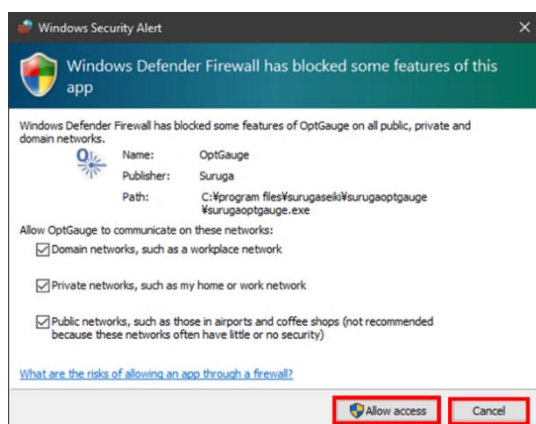


Attention

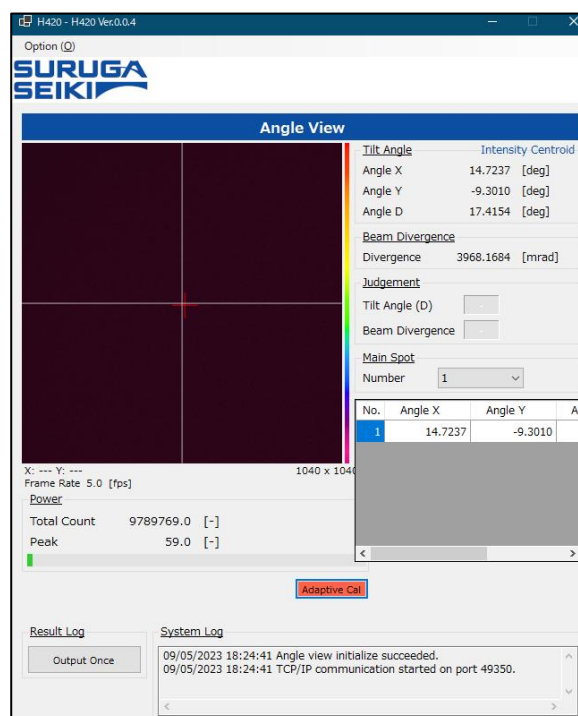
The Software incorporates TCP/IP communication control. Consequently, upon initial launch, the following warning may appear depending on your PC's security settings.

If your PC or network environment permits TCP/IP communication, please tick all boxes and click "Allow access". If you cannot permit it, please click "Cancel".

(Changes can be made after the fact in "Control Panel / All Control Panel Items / Windows Defender Firewall / Allowed Apps".)

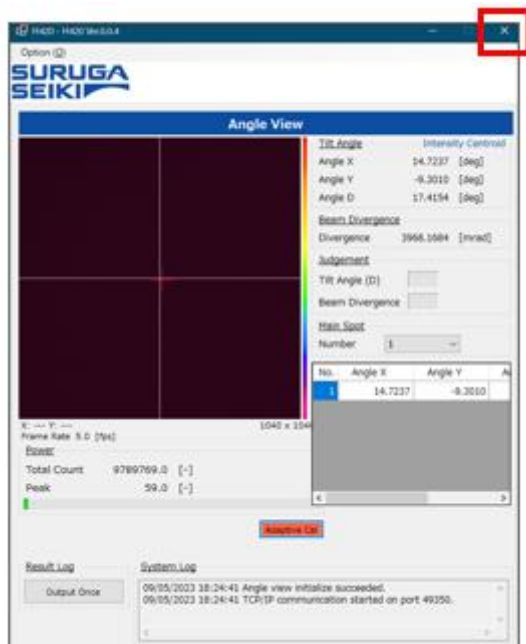


4. The application will start up.



Shutting Down the Suruga OptGauge.

1. Click the "x" button to shut down the Software.

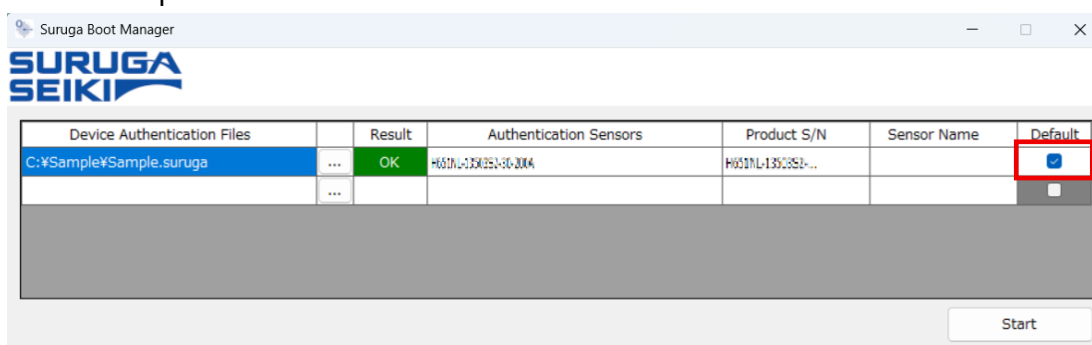


2.11.4 Quick Start

Quick Start is a feature that allows you to pre-select the authentication file used at software startup with the Boot Manager.

By configuring Quick Start, you can skip selecting the authentication file in the Boot Manager and pressing [Start] at the next startup.

When you enable Default for the relevant authentication file, Quick Start will be applied from the next startup.



Disabling Quick Start

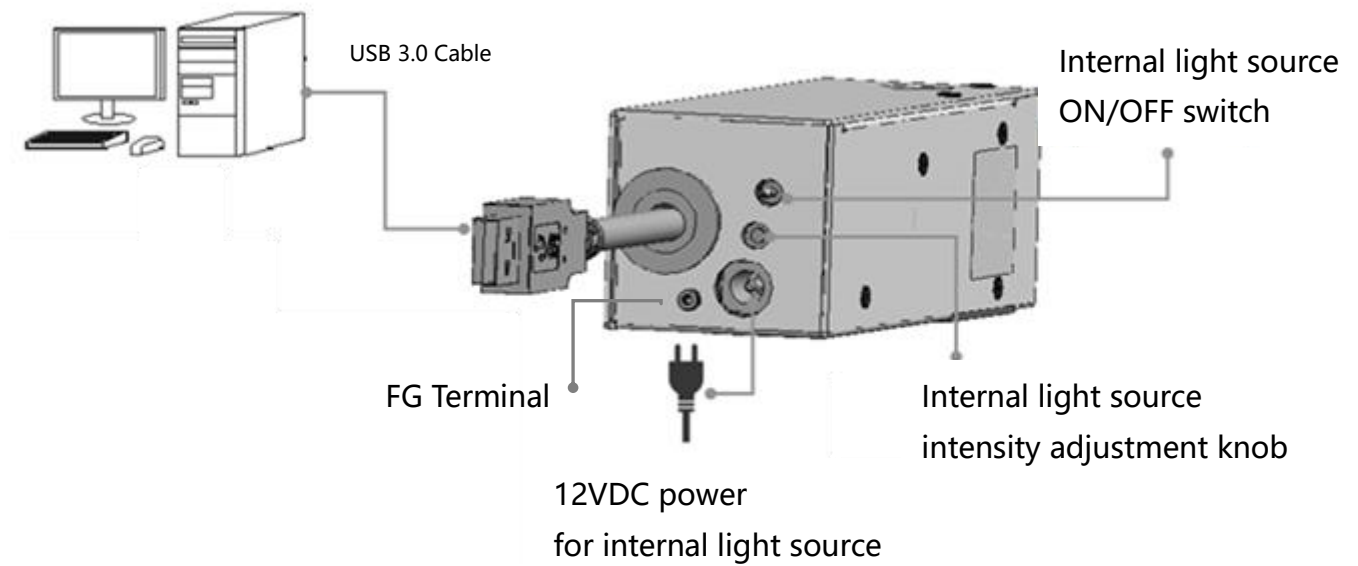
Even if Quick Start is enabled, you can still open the Boot Manager **by starting the software while holding down the Shift key** (hold down the Shift key until the Boot Manager screen appears). By using this method, you can temporarily disable Quick Start and select the authentication file in the Boot Manager before starting the software.

2.12 Turning the Power On



Do not turn on the sensor head power until the Products and the Software installation on your PC are completed and a supervisor has confirmed work safety.

To turn on the internal light source, connect the DC12V power adapter for internal light source to an outlet and set the internal light source ON/OFF switch to ON.



3. Settings

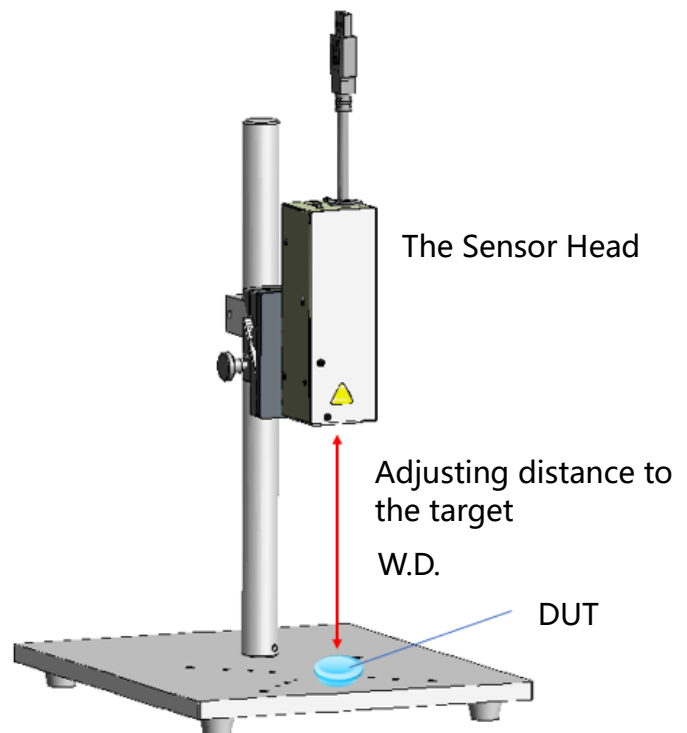
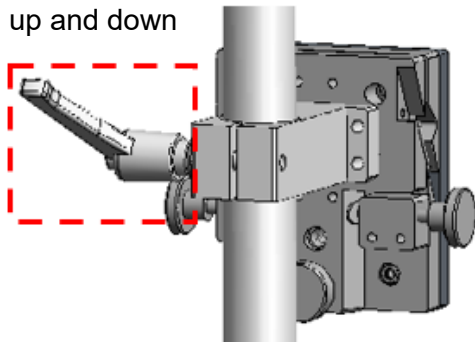
This section describes the setting method for the Products, using the Software.

3.1 Usage Precautions and Setting (Installation) by Model

3.1.1. Mounting (with HB10)

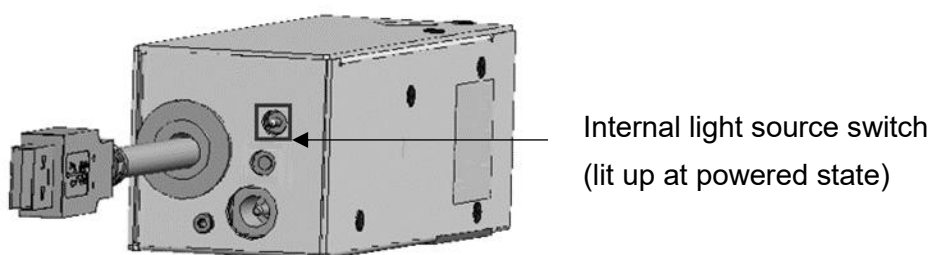
After connecting the USB cable to the PC, switch off the internal light source of the Product and adjust the working distance (W.D.) between the Product and the target being measured by raising and lowering the HB10 (the Tilt Stage).

Loosen the lever and move the Product up and down

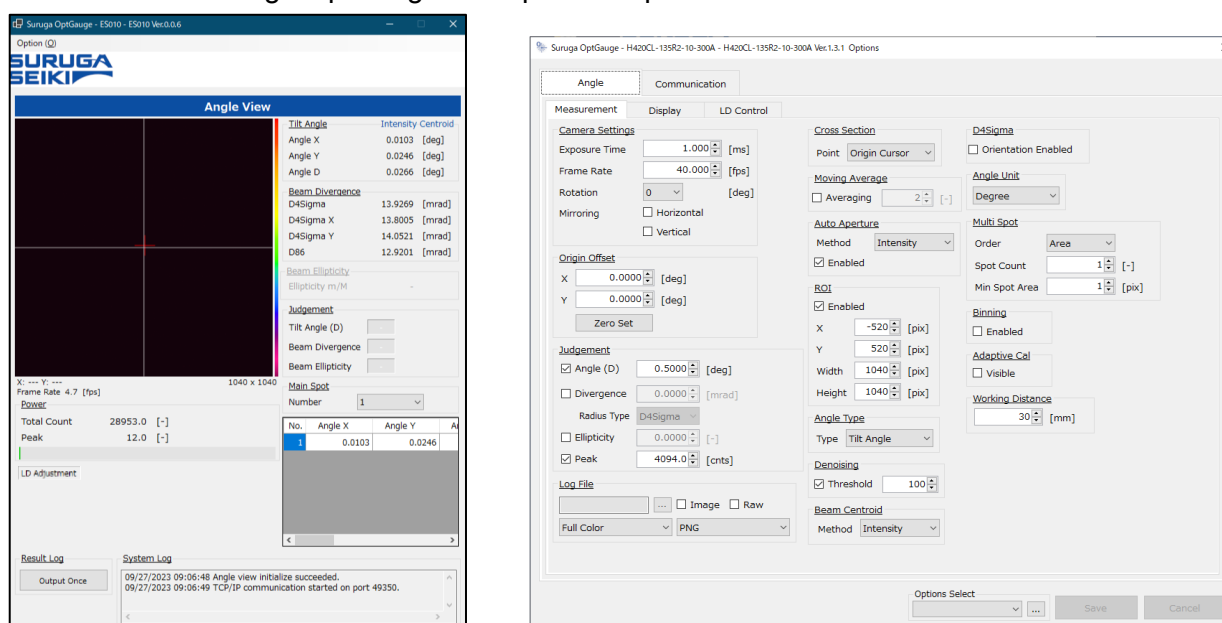


3.1.2. For Reflection Angle Measurement

1. After installation is complete, turn the internal light source switch ON.



2. Launch the Suruga OptGauge and open the option screen.

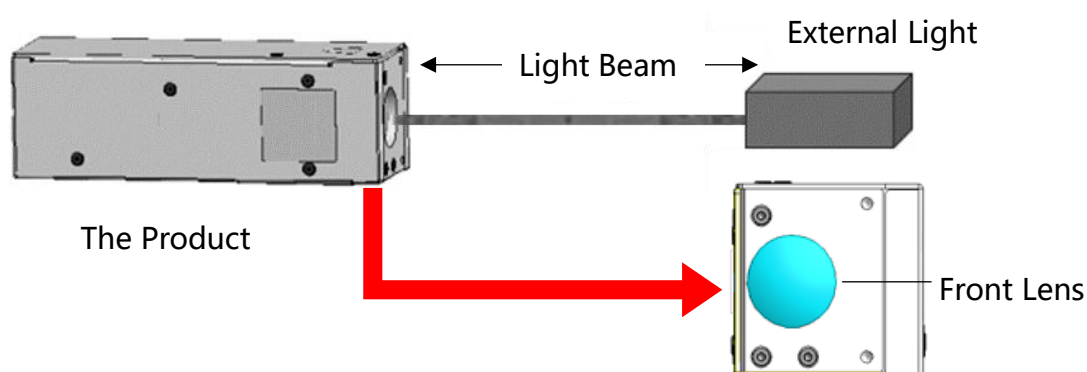


3. Input the working distance (W.D.) between the sensor head and the target into "Working Distance*1" in the option screen.
4. Set the Angle Type to "Tilt Angle" in the Option screen.
5. elect the LD Control subcategory tab within the Angle tab on the Option screen.
6. To adjust the light intensity of the internal light source, click the Tune button*1 in the LD Adjustment window, and set it to "3500-3800" (optimal value) while observing the Peak*1 on the measurement screen.

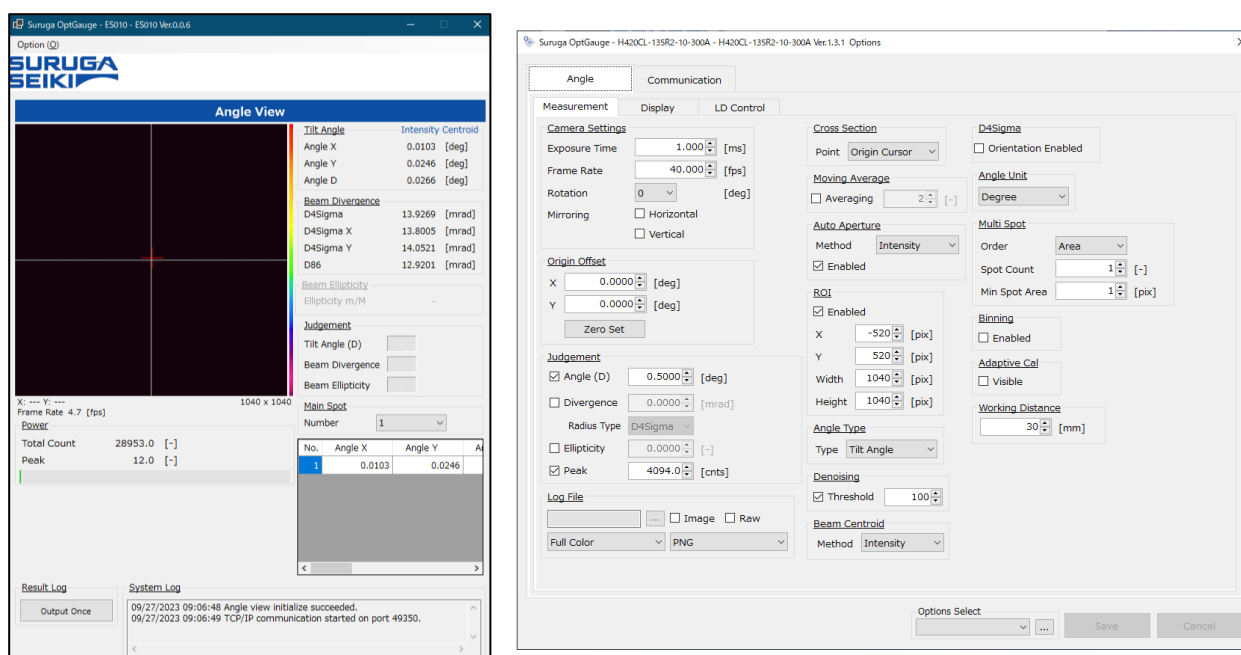
*1 see the separate software manual, "The Suruga OptGauge User's Manual", in details.

3.1.3. For External Light Angle Measurement

1. Turn OFF internal light source of this product and irradiate a beam from an external light source to the front lens of the Products.



2. Launch the Suruga OptGauge and open the Option screen.



3. Adjust the focal point of the beam light to align with the lens of the Product, then input the distance between the external light source and the Product into the Working Distance*1 field in the Option screen.
4. Set the Angle Type in the Option screen to the “Beam Angle”.

5. Select the LD Control subcategory tab in the Angle tab on the Option screen.
6. Adjust the intensity of the external light source, then click the Tune button*1 within the LD Adjustment group box. While observing the Peak*1 value on the measurement screen, set it to '3500–3800' (the optimum value).

*1 see the separate software manual; "The Suruga OptGauge User's Manual", for details.

3.2 Measurement Method

For instructions on using each measurement-related function, please refer to the separate software manual "SurugaOptGauge_User's Manual".

4. Specifications of the Products and Accessories

4.1. Sensor Head Specifications

Item		Specifications	
Light Source	Wavelength	405 nm or 660 nm	
	Emitted light	405 nm	660 nm
	Intensity	< 0.39 mW	< 1 mW
	Emission Position	12 mm (distance from the side surface reference) 20 mm (distance from the bottom surface reference) (see " External Dimensions of the Products ")	
Angle Measurement	Range	+/- 1.35°: Measurement distance < W.D. = 0 to 150 (mm) +/- 1.00°: Measurement distance < W.D. = 150 to 200 (mm) +/- 0.75°: Measurement distance < W.D. = 200 to 250 (mm) +/- 0.50°: Measurement distance < W.D. = 250 to 300 (mm) At measuring reflection angles	
	Repeatability	1sec (6σ)* ¹	
	Linearity (Ave.)	+/- 0.25% of F.S. (F.S. = 2.7°) * ²	
Divergence	Range	≤ 20 mrad	
	Linearity	5% of F.S. (F.S. = 20 mrad)	
Beam Diameter		Collimated light specification (Model: H-420-CL)	
		0.5 mm (only 405 mm), 1.0 mm and 3.0 mm * ³	
Frame Rate		60 Hz (with the recommended computer specifications)	
Environmental Conditions	Operating Environment * ⁴	0 to +40 °C and 35 to 85% RH	
	Storing Environment	-10 to +60 °C	
	Vibration Resistance	Frequency range: 10 Hz to 500 Hz Maximum acceleration: 2 G in X,Y,Z three directions (10 sweeps)	
Weight		0.4 kg	

*1 Averaging times of 256 measurements

*2 When measuring at W.D. of 100 mm

*3 When measuring at W.D. of 300 mm

*4 Inspection Environment for shipping: 22 to 24°C and 35 to 85% RH

4.2.AC/DC Converter Electrical Specifications

AC/DC adapter Specifications Overview	
Rated Input (AC)	100 V to 240 V
Rated Output (DC)	12 V / 3.0 A
Acquired Industrial Standards	PSE, BSMI, cUL, FCC, KC, CE, GS, RCM and CCC
Protective Functions	Short-circuit protection, overcurrent protection and overvoltage protection
RoHS	RoHS10
AC Side Plug Shape	Type-A
Product Dimensions (mm)	99 x 50 x 33
DC Cable Length	1.5 m +/- 30 mm
DC Plug Polarity	Center Positive

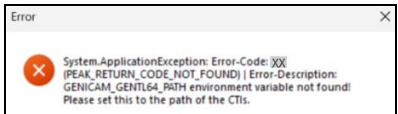
4.3. Cable Electrical Specifications for the Products

Cable Specifications Overview	
Rated input (power consumption)	12 VDC / 3 A (5 W or below)
Cable Type	USB cable compliant with USB3.0 (5Gbps) standard
Connector	USB3.0 Type A
Cable Length	3.0 m

5. Failures? Frequently Asked Questions

5.1 Symptoms and Countermeasures

Useful information for troubleshooting is listed below. Please be advised if the table below shows your trouble.

Symptom	Cause	Countermeasure
Internal light source power is NOT turned on.	AC/DC adapter or power cable is not correctly connected.	DC12V is not supplied.
	DC12V is not supplied.	Correctly connect the DC12V power source.
Application does not start.	USB cable is not correctly connected.	Connect the USB cable to the USB3.0 port.
	Device authentication file is not being read.	Read the device authentication file (.suruga) corresponding to the purchased sensor head.
The following message appears when starting this software and it cannot be launched: 	The camera driver may not be installed.	Please install the camera driver. (Installation of the USB device driver) After installation, please restart your PC.
The software does not start correctly	The sensor camera may be malfunctioning (check the all cable connections)	Please contact our sales representative from the optical equipment division for further assistance.
Application stops during startup	With Windows 11 Version 23H2, due to differences in some system components and specifications, the Software may not function properly.	Please update to the latest Windows version (24H2 or later).
	USB cable disconnected.	Close the application, connect the USB cable correctly, and restart the application.
Beam is not displayed on screen	Exposure Time* ¹ is too short.	Adjust the Exposure Time* ¹ to the optimal speed.

	Large tilt on the target.	Adjust the tilt angle of the target so that the reflected light beam enters within a viewing range of +/- 1.35°.
Measurement target centroid is unstable	Noise is causing serious effects	Enable the Threshold in the Denoising settings and adjust the threshold.
RS232C communication is not working	RS232C cable is not correctly connected	Correctly connect RS232C cable.
	Computer communication conditions are not set correctly.	Set the communication settings correctly on the PC.
TCP/IP communication is not working	Ethernet cable is not correctly connected.	Correctly connect the Ethernet cable.
	Computer communication conditions are not met correctly.	Set the communication settings correctly on the PC.

*1 see the separate software manual, "SurugaOptGauge User's Manual" for details.

6 Warranty - After-Sales Service

6.1 Warranty Terms, Conditions and Coverage

- Before contacting us, please confirm the serial number of the individual product.
- The warranty period is one year after delivery.
- However, the following cases are not covered by the warranty and will be repaired for a fee.
 - Failure or damage caused by misuse, modification or repair by someone other than the company's designated persons from us.
 - Failure or damage caused by improper handling, such as dropping the Products during transportation or moving.
 - Failure or damage caused by fire, salt damage, gas damage, abnormal voltage, earthquake, lightning, wind, flood, or other natural disasters
 - In the event of a malfunction or damage caused by improper handling contrary to the methods and precautions described in the instruction manual.

We reserve the right to revise, modify, or amend these Warranty Terms and Conditions (hereinafter referred to as "Revisions, etc."), and in the event of such revisions, etc., we shall promptly post the revised Warranty Terms and Conditions in this catalog or on our website (<http://jpn.surugaseiki.com/>). If you place an order for the Products after such revision, you shall be deemed to have accepted the revision.

6.2 After-Sales Service

Before requesting repair, please check the items in "[Failures? Frequently Asked Questions](#)". If you have any questions, please contact our Optical Instruments Division Sales Department.

<During the Warranty Period>

When damage occurs under a normal use state following the cautions/warnings/notes written in this Manual, Suruga conducts a repair service for free. For any damages out of warranty period mentioned above, Suruga charges a fee for any repair service.

<After the Warranty Period>

A repair service is available with a fee to maintain the functionalities of the Products up on your requests.

< If Repair is Required >

For repair and calibration inquiries, please contact to the following address.

info@suruga-g.co.jp

Misumi Group

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