



Suruga OptGauge User's Manual

Smart LAC H420 Version

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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1 Introduction

This document is the user's manual for the companion software, "Suruga OptGauge", with the measuring instruments by Suruga Seiki Co., Ltd.

This "User's Manual" (thereafter, "this Manual") provides the information and basic operation methods for the "Suruga OptGauge."

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

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Suruga OptGauge User's manual

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Revision History

Date	Revision	Details
2025. June	V.1.0.0	1 st edition
2025. July	V.1.0.1	<ul style="list-style-type: none">· Installation PC System Requirements- Removed “Pro”- Added Windows 11 version- Added note that the potential dysfunctionalities depend on version· Symptoms and Solutions- Added details on dysfunctionalities depending on Windows version and countermeasures
2025. September	V.1.1.0	Added $1/e^2$ beam divergence calculation function and the rotation angle calculation function



NOTICE

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

The SURUGA SEIKI Co. Ltd. (thereafter, “the SURUGA”) reserves the right to change specifications without notice the users of the Product.

For the latest version of this Manual and the Software, you can obtain by downloading them from our website (<http://jpn.surugaseiki.com/>) or (<https://eng.surugaseiki.com/>).

1.1 Warning Labels Addressed in this Manual

 Warning	Serious damage, data loss, or unsafe conditions may occur.
 Careful	Unstable or unexpected results, but not fatal, may occur in the software operations.
Attention	Points users may overlook and important notes about specification limitations. Information that won't cause danger or trouble but knowing it will make operation smoother.

1.2 Overview of the Suruga OptGauge

The Suruga OptGauge is the application software that you can configure parameters and monitor measurement results with the measuring instruments. You can configure parameters and monitor measurement results from the supported measuring instrument connected to a computer.

■ Functions and Features

This section describes the notable features of the Suruga OptGauge.

- Monitoring functions for measurement results

You can acquire measurement results from the supported instrument. Measurement results can be obtained in a .csv file or others.

Ex.: For the H420 Series, they are angle and divergence measurements

- Monitoring functions for the waveform of a received light.

The sensor camera detects and monitors the waveform of a light beam.

- Parameter settings

You may configure operational settings for the sensor cameras to fully detect a light beam and/or configure criteria for a pass/fail test. Multiple sets of parameter settings can be saved. You may select one for a measuring target and another, and restore it again.

Ex. : exposure time, noise threshold value and averaging out of a light beam

- Acquiring measurement results with external devices and setting parameters for them.

You can acquire measurement results or configure parameters with the commands from two computers

via the RS232C and/or TCP/IP communications

- Other convenient functions

You may utilize the functions such as the "Origin Offset" parameter that specifies the reference positions of a monitoring waveform or the "Automatic Brightness" control that enables automatic brightness according to your specified range of luminance of a detected light beam or the save function that you can store the image of an acquired waveform.

1.3 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.]

1.3.1 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.

1.3.2 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 or more
	USB	USB3.0 (type A) port: 2 or more
Software requirements	Framework	.NET8.0* 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 or higher 4-core 8-thread
	RAM	8GB or higher
	Storage capacity	1GB or higher
	Display resolution	1920 x 1080 or more
	USB	USB3.0 (type A) port: 2 or more
Software requirements	Framework	.NET8.0* 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 .NET8.0 is not installed on your computer, install “.NET Desktop Runtime 8.x.x.” from the Microsoft website

*4 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 latest Windows version (24H2 or later).

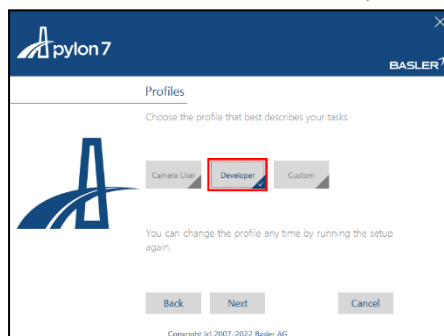
1.3.3 Installation of the USB device driver

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

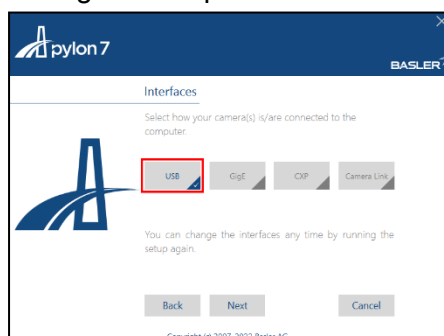


2. Consent to your installation on the confirmation screen.

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.



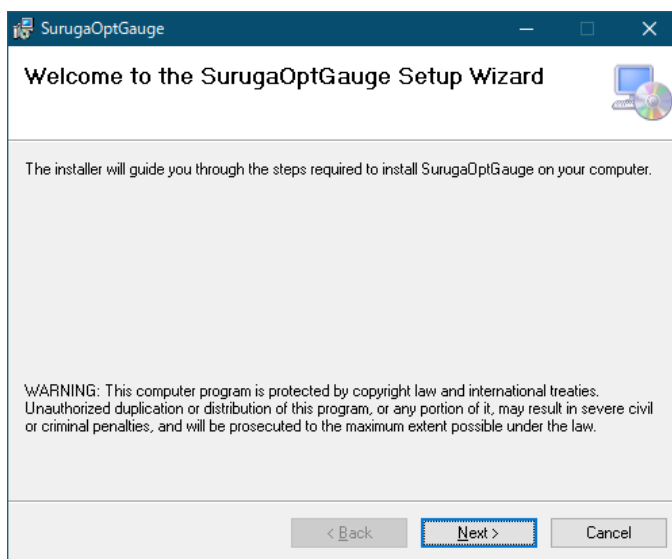
1.3.4 Installation of the Suruga OptGauge.

Install the Software, the Suruga OptGauge.

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

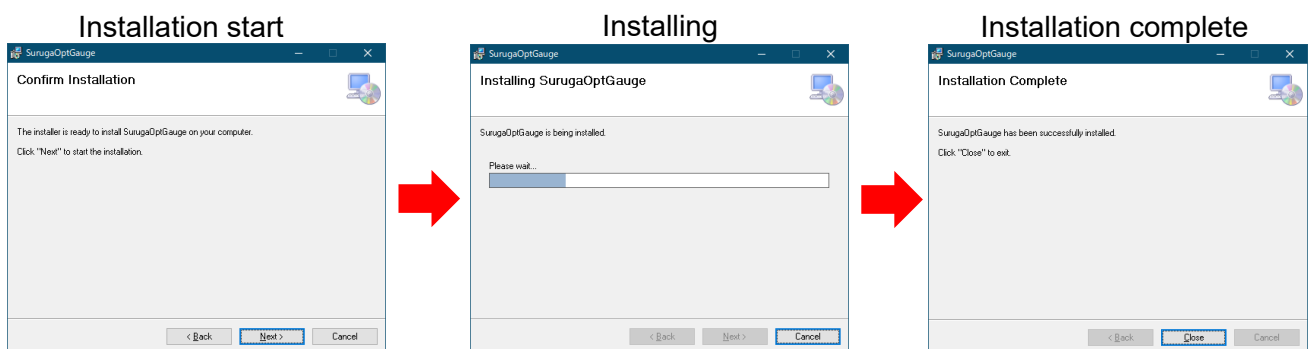
名前	更新日時	種類	サイズ
 SurugaOptGaugeSetup_x.x.xx.msi	2023/11/28 19:12	Windows インストー...	61,590 KB

2. Click "Next>".



Click "Next>" to begin installation.

When installation is complete, click "Close".



3. Suruga OptGauge will be created on the desktop. The installation procedures are complete.



1.3.5 Copying the Device Authentication File

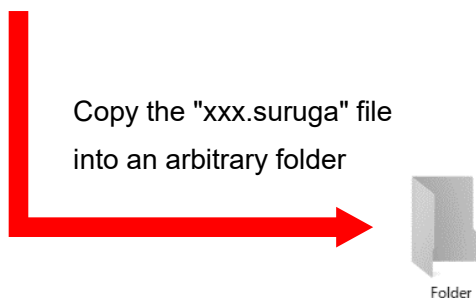
Attention

Authentication File

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

To load the device authentication file into the installed the Suruga OptGauge, copy the file "xxx.suruga" in the "... /AuthenticationFile" to an arbitrary file location.

名前	更新日時	種類	サイズ
xxx.suruga	2023/09/28 10:55	SURUGA ファイル	6 KB



Note

If your security does not allow you to copy the device authentication file into your PC, this procedure is not necessary because the file can be read directly from the USB memory stick provided included in the Products.

1.3.6 Starting up and Closing Down the Suruga OptGauge

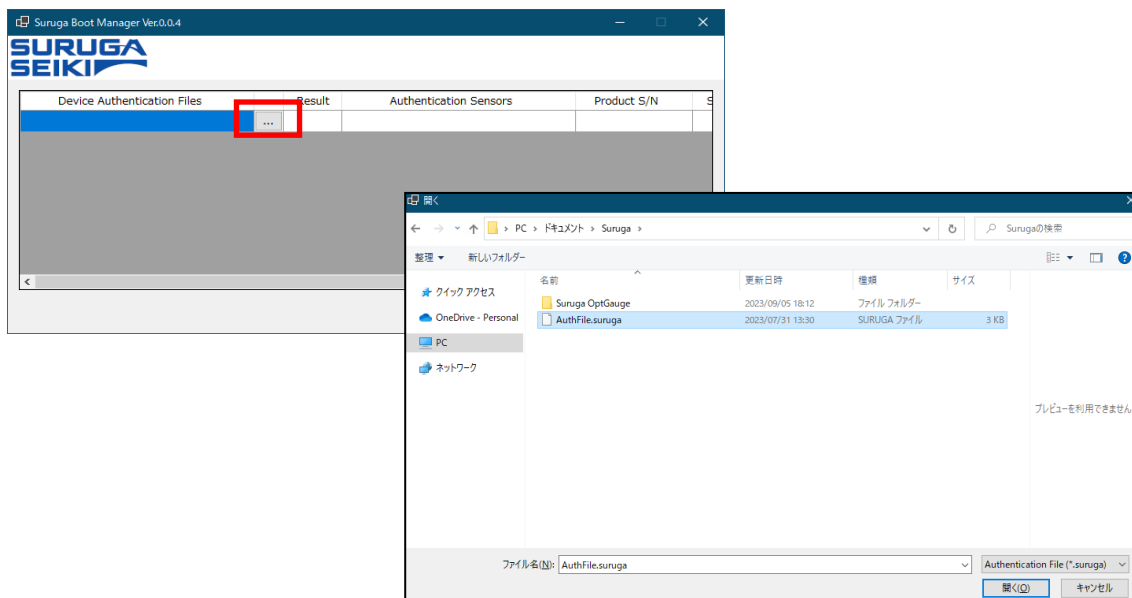
Starting up the Suruga OptGauge

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

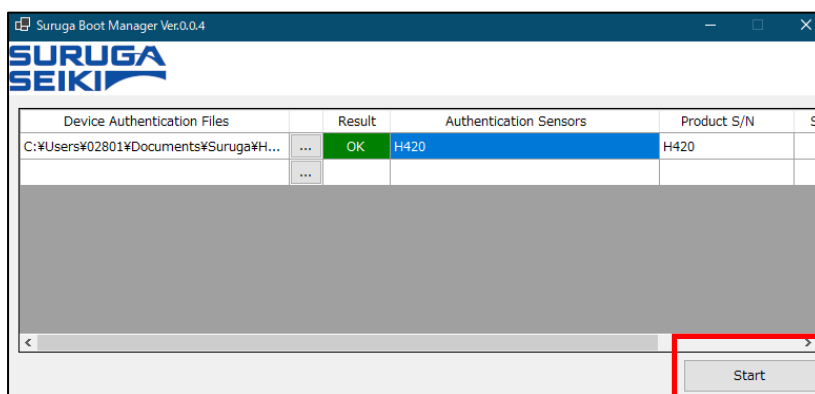


2. Click on "..." in the item "Device Authentication File" and select the extension ".suruga" in the folder in which the unique "Device Authentication File" was copied.

If not able to copy the device authentication file to your computer, select it directly from the USB memory stick.



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

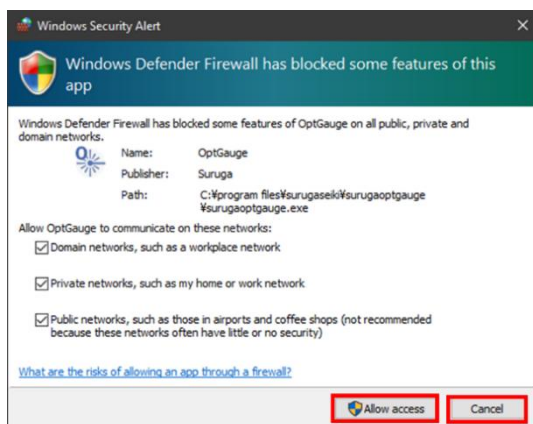


Attention

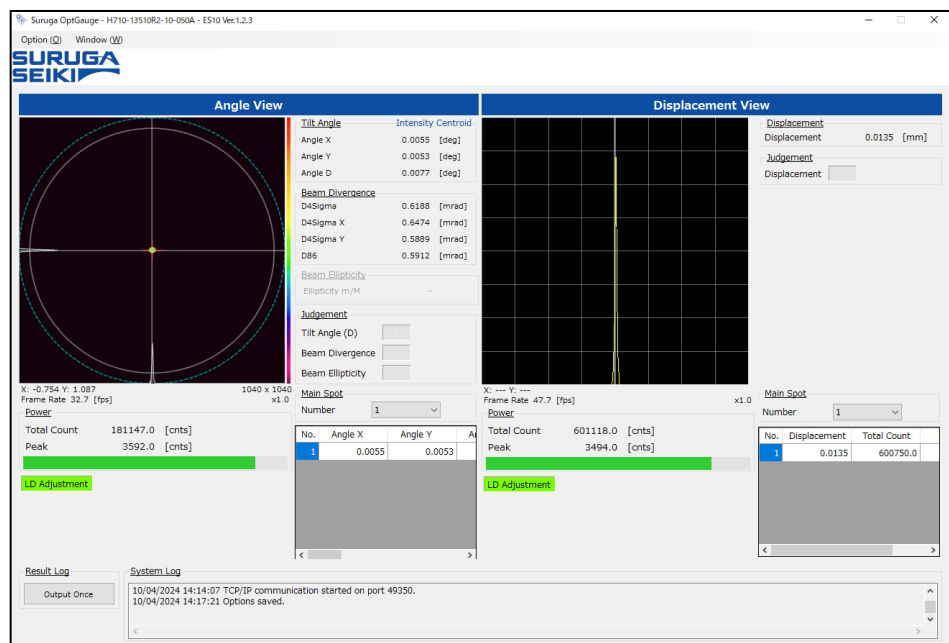
The Software incorporates TCP/IP communication control. Therefore, depending on your PC's security settings, the following warning may appear upon initial startup.

If your computer and network environment allow the TCP/IP communication permission, check all, and click "Allow access". If not, click "Cancel".

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

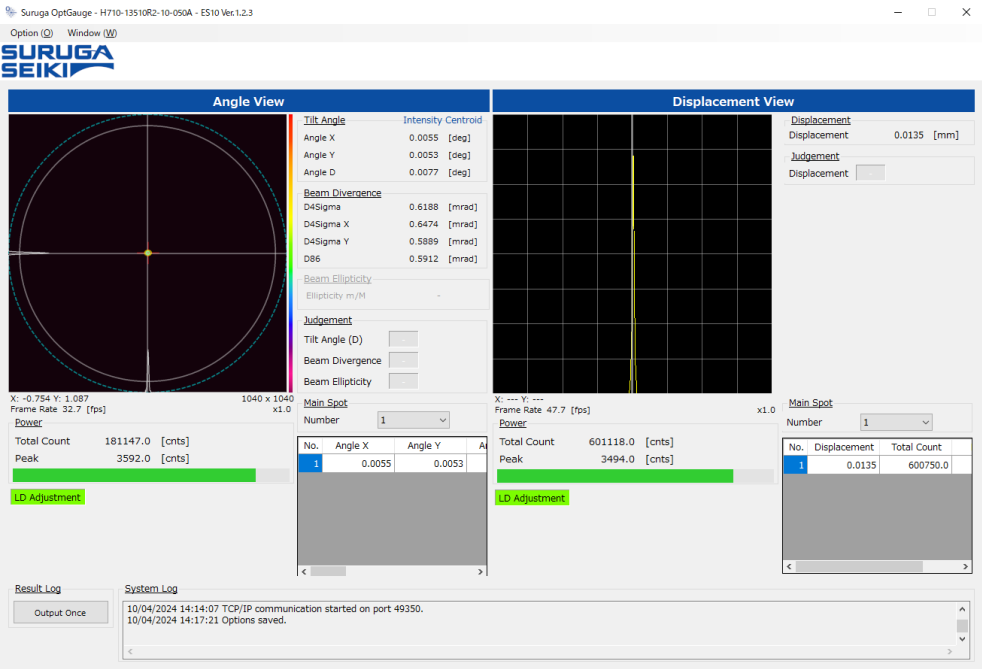


4. The Software will start up.



Closing the Suruga OptGauge

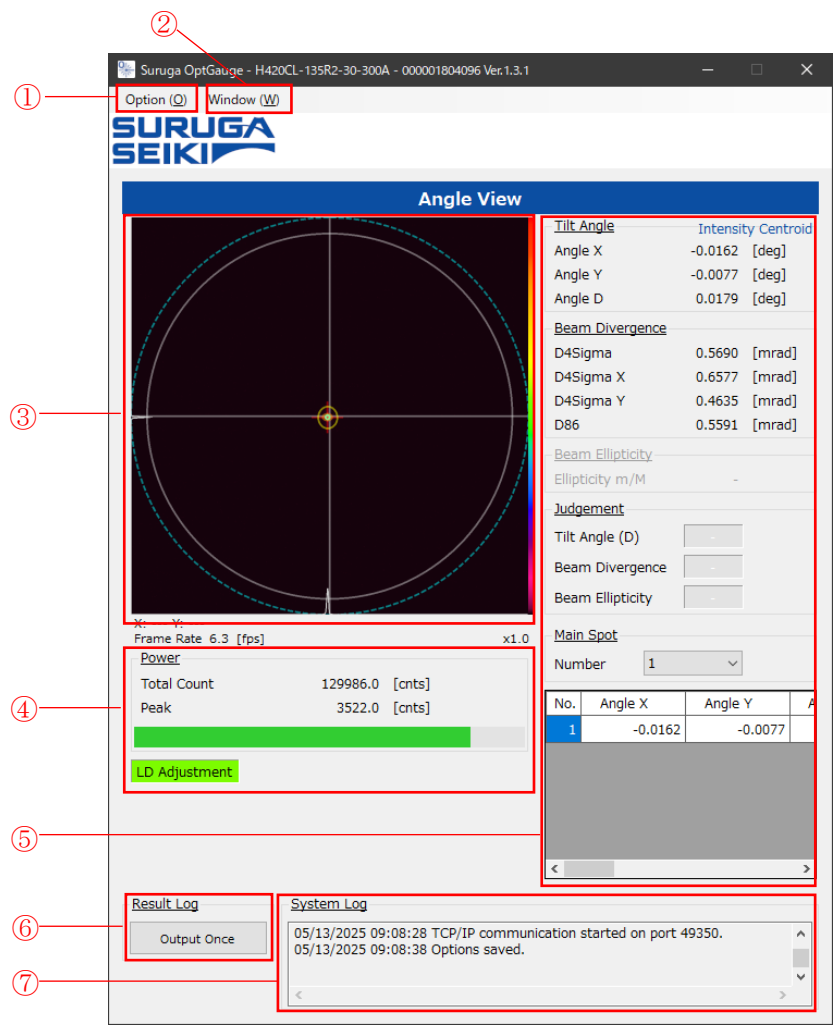
1. Click the "x" button to shut down the Suruga OptGauge.



2. Settings

2.1 Names and Functions in the Suruga OptGauge Main Screen

Suruga OptGauge Main Screen

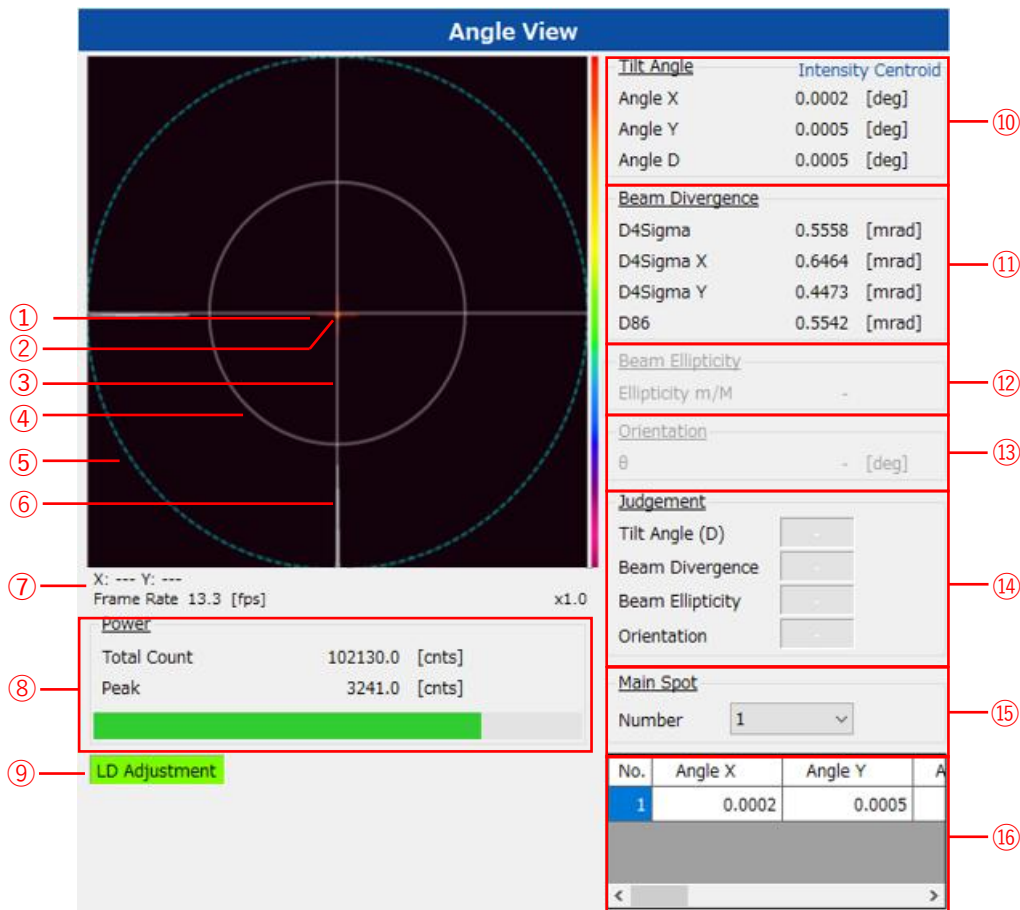








① Option	Opens the option dialog box
② Window	Opens the device authentication dialog box
③ Angle View	Display area for an image taken by the angle sensor camera
④ Angle Power	Display area for beam strength measured by the angle sensor camera
⑤ Angle Measurement Results Display	Angle measurement results display area
⑥ Result Log	Outputs measurement results and measurement images to the designated folder on the computer

⑦ System Log	Display area for the Suruga OptGauge operation log
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2.1.1 The Suruga OptGauge Main Screen Details

2.1.1.1 Angle View



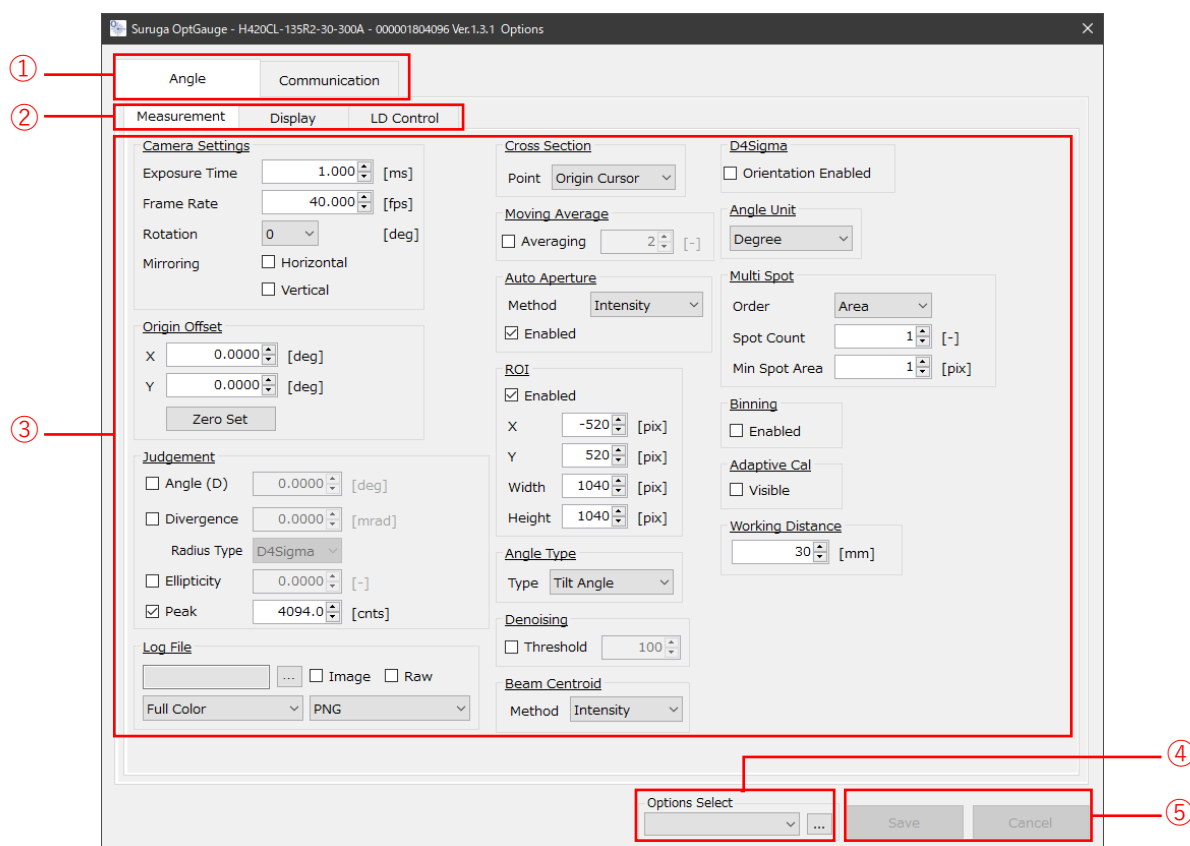
① Cross (red)		Displays the position of the light beam centroid.
② Auto Aperture (orange)		Displays the aperture if the Auto Aperture settings are enabled
③ Cross (white)		Displays the center position of the coordinate
④ Aperture (white)		Displays the range of angle measurement
⑤ ROI (blue)		Displays the aperture if the ROI settings are enabled
⑥ Profile		Displays the strength distribution of the light beam

⑦ XY Coordinates	Displays the coordinates where the mouse cursor points at	
Frame Rate	Displays the image refresh rate per second from image data acquisition to completion of measurement data calculation	
⑧ Power	Total Count	Displays the beam total count by the value from 0 to 4,429,152,000.
	Peak	Displays the maximum light beam luminance by the value from 0 to 4095. If the value is below the Peak value set in the “ Judgement Settings ”, the indicator turns green (OK), otherwise, it turns red (NG).
⑨ LD Adjustment	Displays the status of the dimming function (Green = Pass, Yellow = Under adjusting and Red = Fail)	

⑩ Tilt (Beam)Angle	Angle X	Displays the angle X from the X-axis component of the cross (white)
	Angle Y	Displays the angle Y from the Y-axis component of the cross (white)
	Angle D	Displays the angle from the center of the cross (white)
⑪ Beam Divergence	The " Orientation " in the Option Settings is enabled, it alters the measurement mode	
	If the "D4Sigma" is selected at the beam divergence " Type " configuration in the Option Settings, it displays following.	
	D4Sigma	Displays the beam divergence by $D4\sigma$ of half angle
	D4Sigma X(M)	Displays the beam divergence by $D4\sigma$ X(M) of half angle
	D4Sigma Y(m)	Displays the beam divergence by $D4\sigma$ Y(m) of half angle
	If the "1/e^2" is selected at the beam divergence " Type " configuration in the Option Settings, it displays following.	
	1/e^2	Displays the beam divergence by $1/e^2$ of half angle
	1/e^2 X (M)	Displays the beam divergence by $1/e^2$ X(M) of half angle
	1/e^2 Y (m)	Displays the beam divergence by $1/e^2$ Y(m) of half angle
⑫ Beam Ellipticity	Operates while the " Orientation " in the Option Settings is enabled	
	Ellipticity m/M	Displays the light beam width by $D4\sigma$ or $1/e^2$
⑬ Orientation	Operates if the " Orientation " in the Option Settings is enabled	
	θ	Displays the rotation angle of the light beam
⑭ Judgement	Operates while the measurement data to evaluate, at the " Judgement Settings " in the Option Settings, are checked, <input checked="" type="checkbox"/> , thereafter, you specify evaluation criteria for <input type="text" value="0.0000"/> .	
	Tilt Angle (D)	Displays "OK" if the configured evaluation criteria are satisfied or "NG" if not satisfied.
	Beam Divergence	
	Beam Ellipticity	
	Orientation	
⑮ Main Spot	Number	Specify the beam spots to display measurement

		results while measuring multiple beams.
⑩	Multi Spot Measurement Display	When multiple beams are detected, the measurement results for each beam spot are automatically listed and displayed

2.2 Names and Functions in the Suruga OptGauge Main Screens

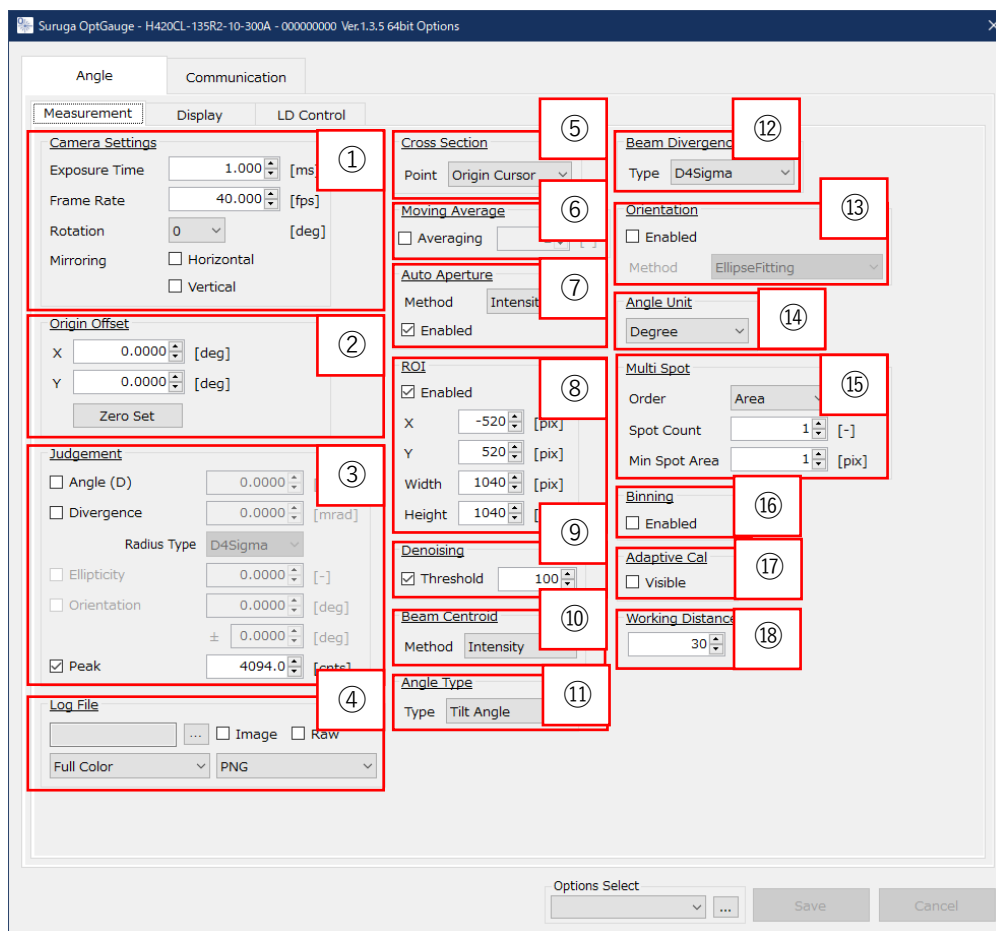


The Suruga OptGauge Option Screen

①	Option Tab	Select the tab to display options.
②	Subcategory Tab(s)	Displays options subdivided into the measurement, the display, and the LD control for the Angle options
③	Settings	Measurement conditions can be changed
④	Option Select	By creating an options list in advance, you can switch between the various setting in ③ (see “Options List”)
⑤	Save/Cancel	Changing the option settings (③ and ④) will activate the button. After changing the option settings, clicking the “Save” button will save the changes To cancel the changes, click the “Cancel” button


2.2.1 Measurement Option Setting Details

2.2.1.1 Angle Measurement



① Camera Settings		
Exposure Time	Sets the sensor camera exposure time. (def. = 1.0) Setting range: 0.027 to 2000.000	
Frame Rate	Sets the sensor camera frame rate. (def.=40.000) Setting range: 0.1 to 100.000	
Rotation	Sets the display rotation of the image	
	0 (def.)	No Rotation.
	90	Rotate the image clockwise by 90 degrees
	180	Rotate the image clockwise by 180 degrees
	270	Rotate the image clockwise by 270 degrees

Mirroring	Horizontal	Vertical	Sets mirroring
	Disabled (def.)	Disabled (def.)	No mirroring
	Enabled	Disabled	Horizontal mirroring
	Disabled	Enabled	Vertical mirroring
	Enabled	Enabled	Vertical and horizontal mirroring
② Origin Offset	Offsets coordinate center position (white cross).		
	X	Sets the center of the sensor camera as “0.0000 (def.)” and adjusts (Offset) the position of the crosshair (white) in the X direction. Setting range: -10.0000 to 10.0000	
	Y	Sets the center of the sensor camera as “0.0000 (def.)” and adjusts (Offset) the position of the crosshair (white) in the Y direction. Setting range: -10.0000 to 10.0000	
	Zero Set	Offsets to the current measurement coordinates	
③ Judgement Settings			
Angle	Sets OK / NG evaluation for the angle (def. = 0.0000). Setting range: 0.0000 to 10.0000		
	Enabled	Enables the judgement.	
	Disabled (def.)	Disables the judgement.	
Divergence	Sets OK / NG evaluation for the D4Sigma, 1/e ² , or D86 Setting range: 0.0000 to 1000.0000 (def. 0.0000)		
	Enabled	Enables the Judgement.	
	Disabled (def.)	Disables the Judgement.	
Radius Type	D4 Sigma (def.)	Sets the D4Sigma to evaluate "Divergence".	
	1/e ²	Sets the 1/e ² to evaluate "Divergence".	
	D86	Sets the D86 to evaluate "Divergence".	
Ellipticity	Sets the "OK/NG" evaluation for the "Beam Ellipticity". Setting range: 0.0000 to 1.0000 (def. 0.0000)		
	Enabled	Enables the judgement.	
	Disabled (def.)	Disables the judgement.	

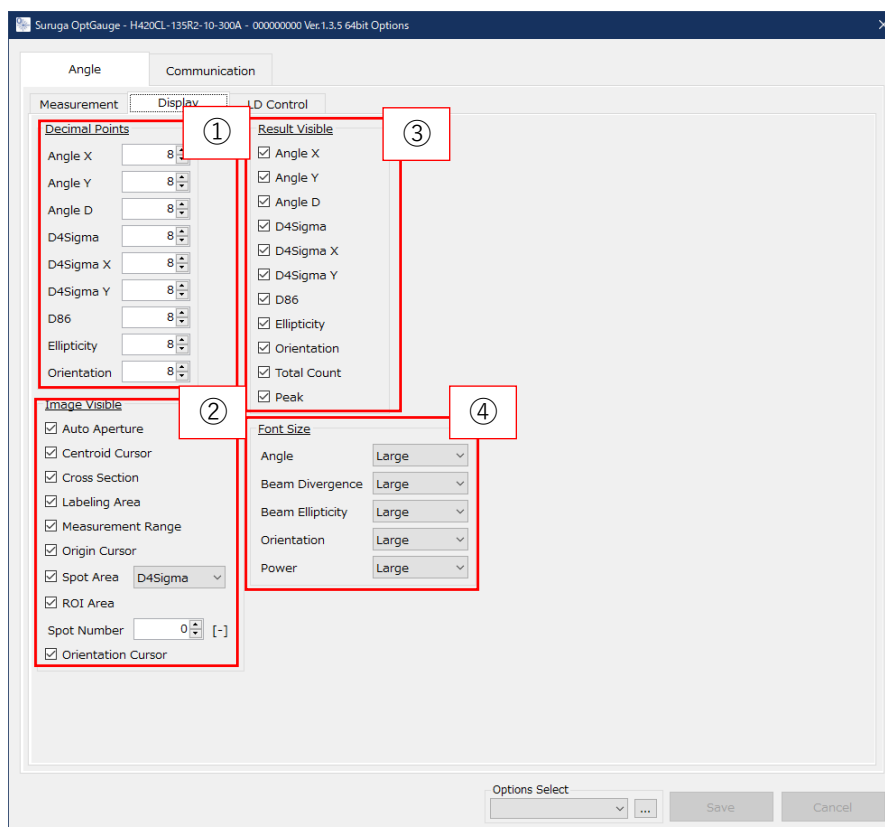
Orientation	Set the OK/NG evaluation for the Orientation The evaluation is made by combining the set angle and Range (\pm) Setting range: - 90.0000 to + 90.0000 (def. 0.0000)	
	Range [\pm]	Setting range: - 90.0000 to + 90.0000 (def. 0.0000)
	Enabled	Enables the judgement.
	Disabled (def.)	Disables the judgement.
Peak	Sets the "OK/NG" evaluation for the "Peak". Setting range: 0.0 to 4095.0	
	Enabled	Enables the judgement.
	Disabled (def.)	Disables the judgement.
④ Log File		
	To specify outputs where to save the measurement results (CSV).	
Image	Enabled	Outputs image data at the Angle View along with the measurement results
	Disabled (def.)	Does not output the Angle View image data
	Full Color (def.)	Outputs the image data in 24-bit full color
	Gray Scale	Outputs the image data in 8-bit grayscale
	PNG(def.)	Outputs the image data in PNG format
	BMP	Outputs the image data in BMP format
	TIFF	Outputs the image data in TIFF format
RAW	Enabled	Outputs Angle View luminance value data (CSV)* along with measurement results (CSV). Outputs luminance values as text data in CSV format, not as binary data.
	Disabled (def.)	Does not output the Angle View raw image data (CSV)
⑤ Cross Section	Sets the display location for the beam intensity distribution	
	Origin Cursor (def.)	Displays the coordinate center position for the beam strength distribution.
	Beam Cursor	Display the beam intensity distribution at the beam centroid
⑥ Moving Average	Sets averaging process (moving average) for measurement values. Setting range: 2 to 262144 (def. = 2)	
	Enabled	Enables the averaging process
	Disabled (def.)	Disables the averaging process
⑦ Auto Aperture	Sets the Auto Aperture	

	Enabled (def.)	Enables the Auto Aperture setting
	Disabled	Disables the Auto Aperture setting
	Area	Set the Auto Aperture based on the center position calculated using the area centroid processing
	Intensity(def.)	Sets Auto Aperture from centroid position calculated with intensity weighed process
⑧ ROI	Sets "ROI." If enabled, it evaluates a light beam by these range settings	
	Enabled (def.)	Enables ROI setting
	Disabled	Disables ROI setting
	X	Sets the ROI X direction setting position. Range: -3000 to 3000 (def.=520)
	Y	Sets the ROI Y direction setting position. Range: -3000 to 3000 (def.=520)
	Width	Sets the ROI horizontal width. Setting range: 0 to 3000 (def.=1040)
	Height	Sets the ROI vertical width. Setting range: 0 to 3000 (def.=1040)
⑨ Denoising	Sets the threshold. If enabled, it derives the measurement values using the pixels of the pixel values higher than the set value. Setting range: 1 to 4095 (def. = 100)	
	Enabled (def.)	Enables the denoising settings
	Disabled	Disables the denoising settings
⑩ Beam Centroid	Sets the calculation method for the Centroid position of a light beam	
	Area	Calculates the centroid position with the Area of Centroid process
	Intensity (def.)	Calculates the centroid position with the intensity weighing process

⑪ Angle Type	Sets targets for the angle measurement	
	Tilt Angle (def.)	Sets for the reflection angle measurement. Sets 1/2 of an incident beam as the measured target angle
	Beam Angle	Sets for the external light incidence angle measurement. Sets the incident beam angle to the angle of a measurement target.
⑫ Beam Divergence		
Type	Sets the type of the beam divergence	
	D4Sigma (def.)	Displaying the beam divergence by $D4\sigma$
	$1/e^2$	Displaying the beam divergence by $1/e^2$
⑬ Orientation		
Enabled	Toggle either “Beam Ellipticity,” or “Orientation” for the measurement of the beam divergence	
	Enables	Display the beam divergence in M (Major) and m (Minor) Enable Beam Ellipticity Enable Orientation
	Disables (def.)	Display Beam Divergence in X and Y Disable Beam Ellipticity Disable Orientation
Method	Sets the non-ISO compliant rotation angle measurement method *Only effective if the “ Type ” is set to the $1/e^2$ in the Beam Divergence	
	Ellipse Fitting(def.)	Takes the measurements by using the elliptical fitting method
	MaxDistanceSearch	Takes the measurement using the search method of the maximum distance between two points
⑭ Angle Unit	Sets the angle unit for measurement values	
	Degree(def.)	Sets for decimal degree unit
	DegMinSec	Sets for degrees-minutes-seconds unit
	Milliradian	Sets for milli radian unit
⑮ Multi Spot		
Order	Sets the sorting type of the measurement result list to be displayed when detecting multiple beams	
	Area(def.)	Sorts by beam area from the largest size

	Angle	Sorts by the beam angles from the smallest
Spot Count	Sets the number to display on the measurement results screen when detecting multiple beams. Setting range: 1 to 100 (def. = 1)	
Min Spot Area	Sets the threshold value for the beam size (pixels) conditions of the beam is detected (def. = 1). Setting range: 1 to 1023	
⑩ Binning	Sets the Binning function (2x2) of the sensor camera. Enabling the Binning combines adjacent pixels to reduce camera noise and improve sensitivity. Additionally, the image size is reduced to 1/4, lowering data volume and improving frame rate	
	Enabled	Enables the binning function
	Disabled (def.)	Disables the binning function
⑪ Adaptive Cal	Sets "Adaptive Cal" button show/hide. <div>Attention</div> Please be advised to disable the " Denoising " for your operation.	
	Enabled	Shows the "Adaptive Cal" button
	Disabled (def.)	Hides the "Adaptive Cal" button
⑫ Working Distance	Specifies the measurement distance to the target object. By specifying this, you can obtain a measurement result with guaranteed linearity. Setting range: 30 to 300 (default = 30).	

2.2.1.2 Angle Display



① Decimal Points

Specify the number of decimal places for the outputting measurement results*

Setting range: 0 to 8 (default=8)

*Note: Outputting measurement results refers to results output via the [Output Once] button (CSV) and output via communication for control by external devices.

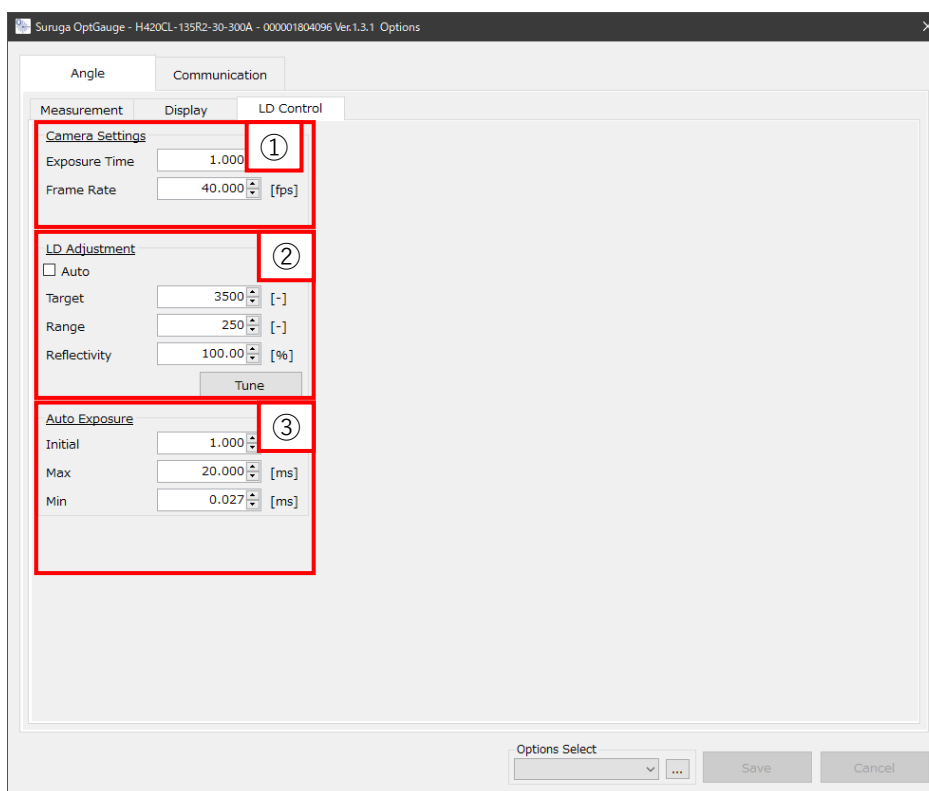
Angle X	Sets the number of decimal places for the Angle X measurement results
Angle Y	Sets the number of decimal places for the Angle Y measurement results
Angle D	Sets the number of decimal places for the Angle D measurement results
D4Sigma	Sets the number of decimal places for the D4Sigma measurement results
D4Sigma X(M)	Sets the number of decimal places for the D4SigmaX(M) measurement results
1/e ² X(M)	Sets the number of decimal places for the 1/e ² X(M) measurement results
D4Sigma Y(m)	Sets the number of decimal places for the D4SigmaY(m) measurement output
1/e ² Y(m)	Sets the number of decimal places for the 1/e ² Y(m) measurement output
D86	Sets the number of decimal places for the D86 measurement results
Ellipticity	Sets the number of decimal places for the Ellipticity measurement results
Orientation	Sets the number of decimal places for the Orientation measurement results

② Image Visible		
Auto Aperture	Sets the Auto Aperture to display or hide	
	Enabled (def.)	Displays the Auto Aperture
	Disabled	Hides the Auto Aperture
Centroid Cursor	Sets the Centroid Cursor to display or hide	
	Enabled (def.)	Displays the Centroid Cursor
	Disabled	Hides the Centroid Cursor
Cross Section	Sets the Cross Section to display or hide	
	Enabled (def.)	Displays the Cross Section
	Disabled	Hides the Cross Section
Labeling Area	Sets the Labeling Area to display or hide	
	Enabled (def.)	Displays the Labeling Area to display or hide
	Disabled	Hides the Labeling Area
Measurement Range	Sets the Measurement Range to display or hide	
	Enabled (def.)	Displays the Measurement Range
	Disabled	Hides the Measurement Range
Origin Cursor	Sets the display / hide of the Origin Cursor to display or hide	
	Enabled (def.)	Displays the Origin Cursor
	Disabled	Hides the Origin Cursor
Spot Area	Sets the Spot Area to display or hide	
	D4Sigma (def.)	Sets the beam diameter calculation method for the Spot Area display to D4Sigma
	1/e ²	Sets the beam diameter calculation method for the Spot Area display to 1/e ²
	D86	Sets the beam diameter calculation method for the Spot Area display to D86
	Enabled (def.)	Displays the Spot Area
	Disabled	Hides the Spot Area
ROI Area	Sets the ROI Area to display or hide	
	Enabled (def.)	Displays the ROI Area
	Disabled	Hides the ROI Area
Spot Number	Sets the number of serial number labels to display if light beams are measured (def. = 0). The setting range : 0 to 100	

Orientation Cursor	Set the Orientation Cursor to display or hide	
	Enabled (def.)	Displays the Orientation Cursor
	Disabled	Hides the Orientation Cursor
③ Result Visible		
Sets the display / hide of the measurement result.		
Angle X	Enabled (def.)	Displays the Angle X of measurement result
	Disabled	Hides the Angle X of measurement result
Angle Y	Enabled (def.)	Displays the Angle measurement result
	Disabled	Hides the Angle Y measurement result
Angle D	Enabled (def.)	Displays the Angle D measurement result
	Disabled	Hides the Angle D measurement result
D4Sigma	Enabled (def.)	Displays the D4Sigma measurement result
	Disabled	Hides the D4Sigma measurement result
1/e ²	Enabled (def.)	Displays the 1/e ² measurement result
	Disabled	Hides the 1/e ² measurement result
D4Sigma X	Enabled (def.)	Displays the D4Sigma X measurement result
	Disabled	Hides the D4Sigma X measurement result
1/e ² X(M)	Enabled (def.)	Displays the 1/e ² X(M) measurement result
	Disabled	Hides the 1/e ² X(M) measurement result
D4Sigma Y(m)	Enabled (def.)	Displays the D4Sigma Y(m) measurement result
	Disabled	Hides the D4Sigma Y(m) measurement result
1/e ² Y(m)	Enabled (def.)	Displays the 1/e ² Y(m) measurement result
	Disabled	Hides the 1/e ² Y(m) measurement result
D86	Enabled (def.)	Displays the D86 measurement result
	Disabled	Hides the D86 measurement result
Ellipticity	Enabled (def.)	Displays the Ellipticity measurement result
	Disabled	Hides the Ellipticity measurement result
Orientation	Enabled (def.)	Displays the Orientation measurement result
	Disabled	Hides the Orientation measurement result
Total Count	Enabled (def.)	Displays the Total Count measurement result
	Disabled	Hides the Total Count measurement result
Peak	Enabled (def.)	Displays the Peak measurement result
	Disabled	Hides the Peak measurement result

④ Font Size		
Angle	Sets the display font size for the angle measurement results	
	Small	Sets the Small for the display font size for the measurement results
	Medium	Sets the Medium for the display font size for the measurement results
	Large(def.)	Sets the Large for the display font size for the measurement results
Beam Divergence	Sets the display font size for the Beam Divergence measurement results	
	Small	Sets the Small for the display font size for the measurement results
	Medium	Sets the Medium for the display font size for the measurement results
	Large(def.)	Sets the Large for the display font size for the measurement results
Beam Ellipticity	Sets the display font size for the Beam Ellipticity measurement results	
	Small	Sets the Small for the display font size for the measurement results
	Medium	Sets the Medium for the display font size for the measurement results
	Large(def.)	Sets the Large for the display font size for the measurement results
Orientation	Sets the display font size for the Orientation measurement results	
	Small	Sets the Small for the display font size for the measurement results
	Medium	Sets the Medium for the display font size for the measurement results
	Large(def.)	Sets the Large for the display font size for the measurement results
Power	Sets the display font size for the Power measurement results	
	Small	Sets the Small for the display font size for the measurement results
	Medium	Sets the Medium for the display font size for the measurement results
	Large(def.)	Sets the Large for the display font size for the measurement results

2.2.1.3 Angle LD Control



① Camera Settings		
Exposure Time	Sets the sensor camera exposure time. (def. = 1. 000) Setting range: 0.027 to 2000.000	
Frame Rate	Sets the sensor camera frame rate. (def. = 40. 000) Setting range: 0.1 to 100. 000	
② LD Adjustment		
Auto	It always enables / disables the Automatic Brightness control	
	Enabled	Keeps the Automatic Brightness control enabled
	Disabled (def.)	Keeps the Automatic Brightness control disabled
Target Value	Sets the upper limit of peak luminance (def. = 3500) The setting range: 1000 to 3500	
Range	Sets the range of the dimming adjustment complete (def. = 250) It adjusts [light beams] within the target dimming range. The setting range: 100 to 1000	
Reflectivity	Sets the reflectance of the measuring target (def. = 100). Sets the reflectance of the measuring object optimizes the time required for light adjustment. The setting range: 0.05 to 100	

Tune	If the Auto feature is not enabled, clicking the Tune button will activate auto-brightness each time.
③ Auto Exposure Time	
Initial	Sets the initial exposure time applied in the auto-brightness control for the first time (default = 1.000). Setting range: 0.027 to 20.000
Max	Sets the maximum value for the exposure time adjusted at the automatic brightness (def. = 20.000). Its setting range: 0.027 to 20.000
Min	Sets the minimum value for the exposure time adjusted at the automatic brightness (def. = 0.027). Its setting range: 0.027 to 20.000

2.3 The Option List

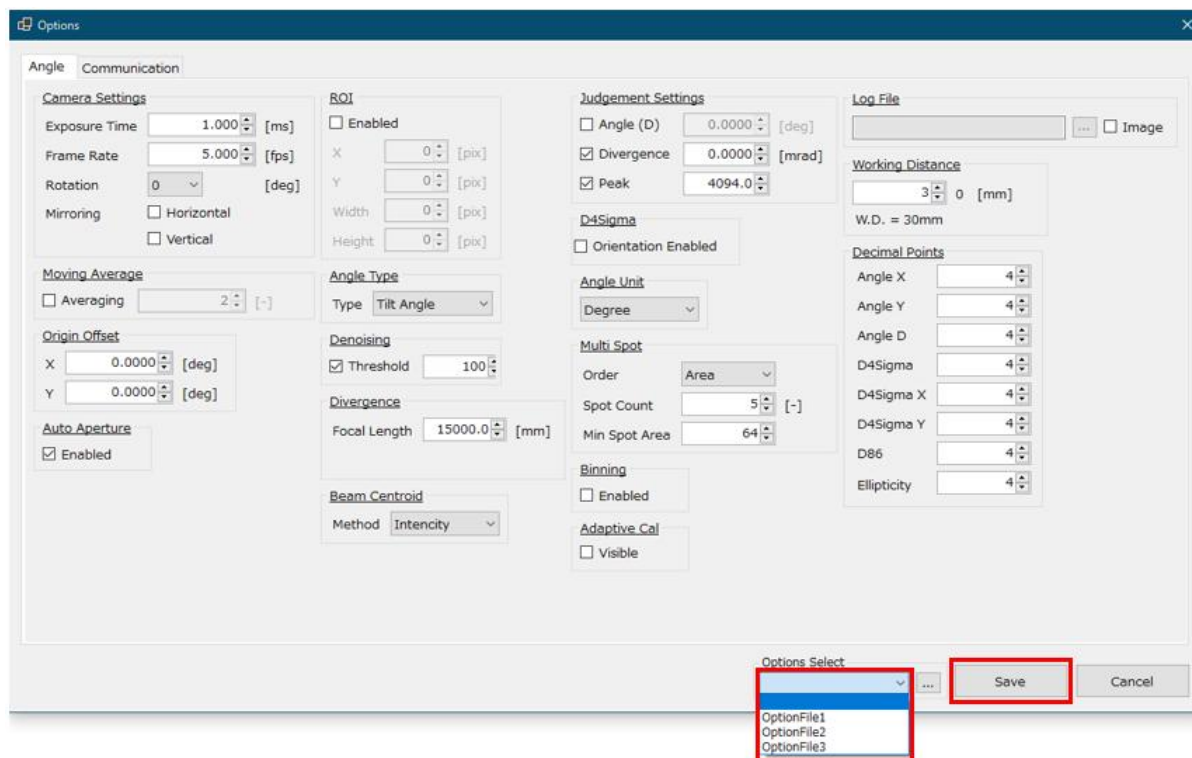
Multiple option lists can be available to the Suruga OptGauge and you can switch between them. When you may apply different option settings based on the measurement target or wavelength by switching to another option list while the Suruga OptGauge is running.

This chapter describes how to switch between multiple option lists, register it, or delete it.

2.3.1 Switching the Option Lists

This section describes how to switch option lists.

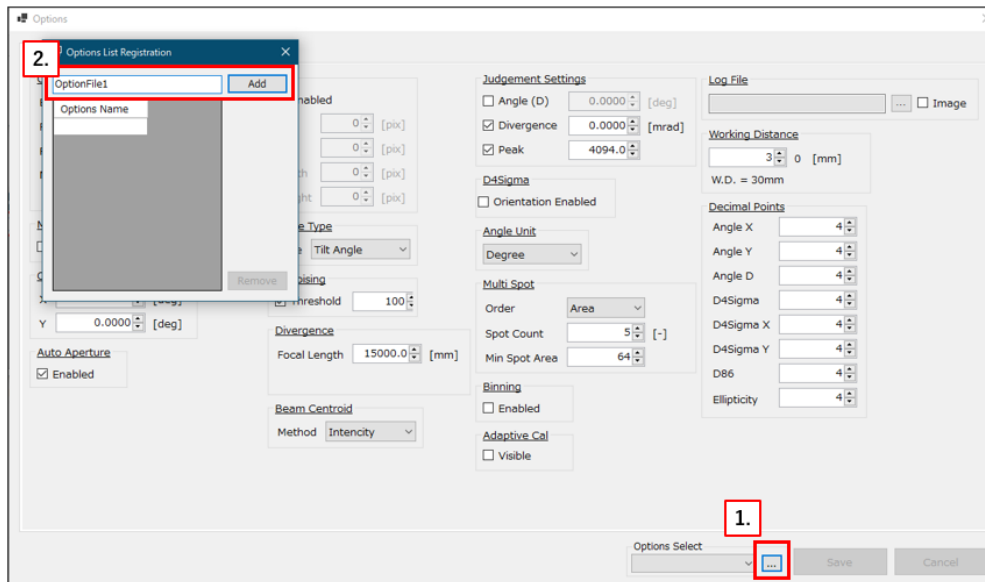
1. From the "Options Select" pulldown menu, select the desired option list name.
2. Click the "Save" button.



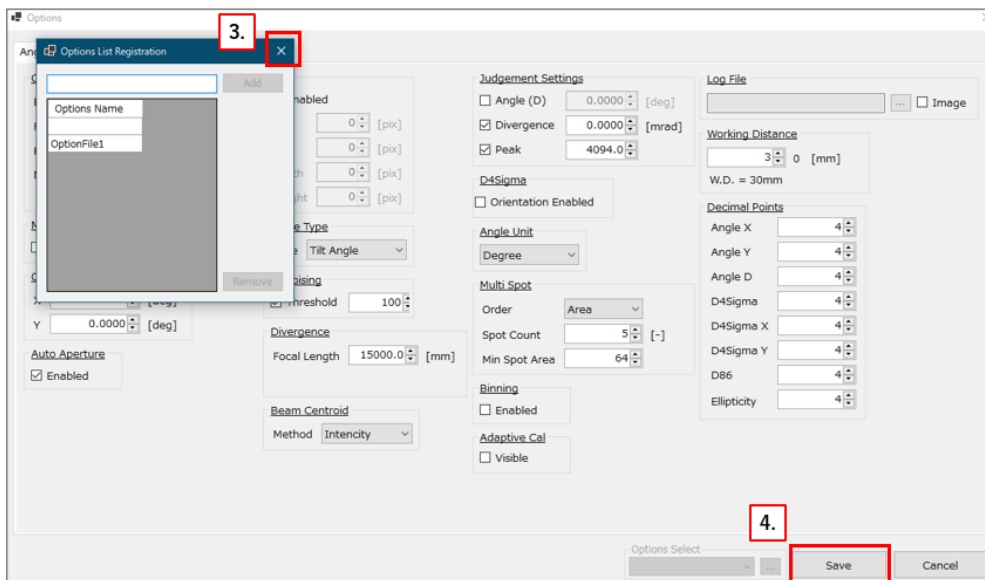
2.3.2 Registering an Option List

This section describes how to register an option list. It holds up to 31 option lists to be registered.

1. Click the [...] button.
2. Enter an arbitrary option name and click the [Add] button.



3. Click the [X] button.
4. Click the [Save] button.

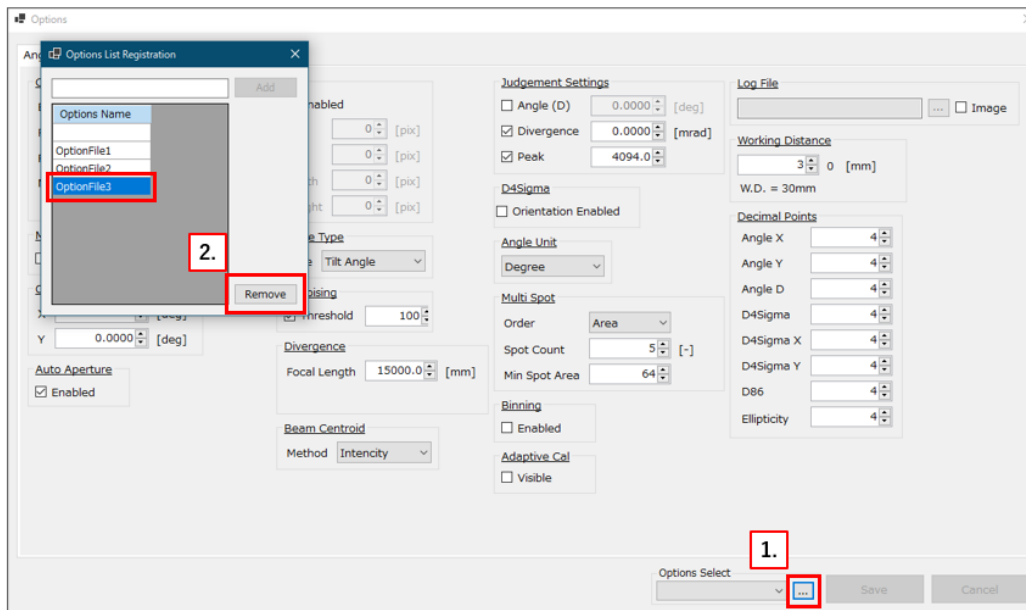


5. The list is now registered in "Options Select" to choose (*See "[Switching Option Lists](#)").

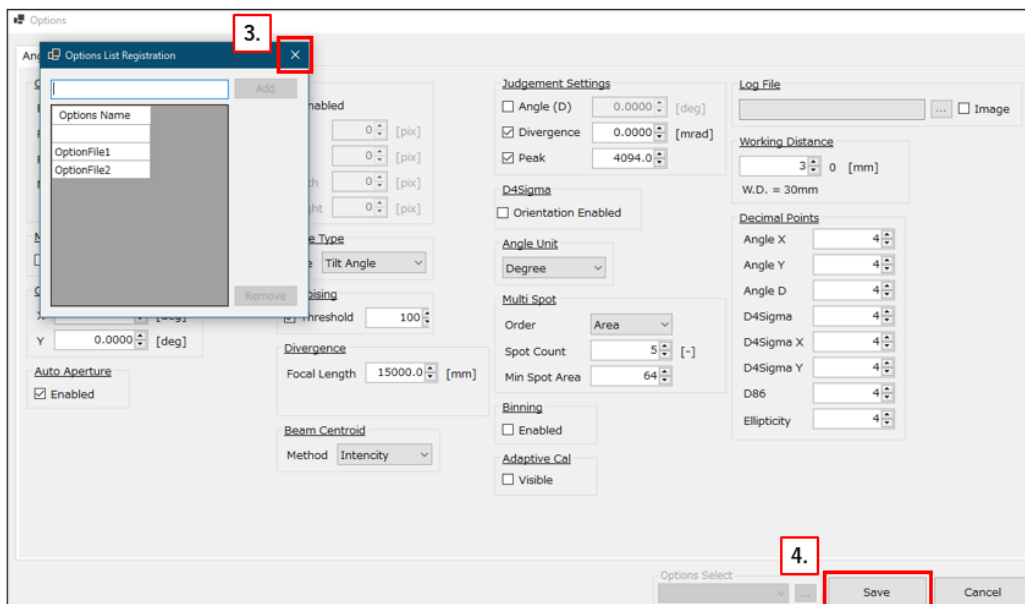
2.3.3 Deleting an Option List

This section describes how to delete an option list.

1. Click the [...] button while selecting an option other than the one you wish to delete.
2. Select the option name you want to remove and click the [Remove] button.



3. Click the [X] button.
4. Click the [Save] button.



3. Controlling from External Devices

3.1 RS232C

The RS232C connections can be broadly categorized into two patterns. After connecting, use terminal software* to send and receive data via serial communication with the Suruga OptGauge.

*Note: Terminal software must be provided by the customer.

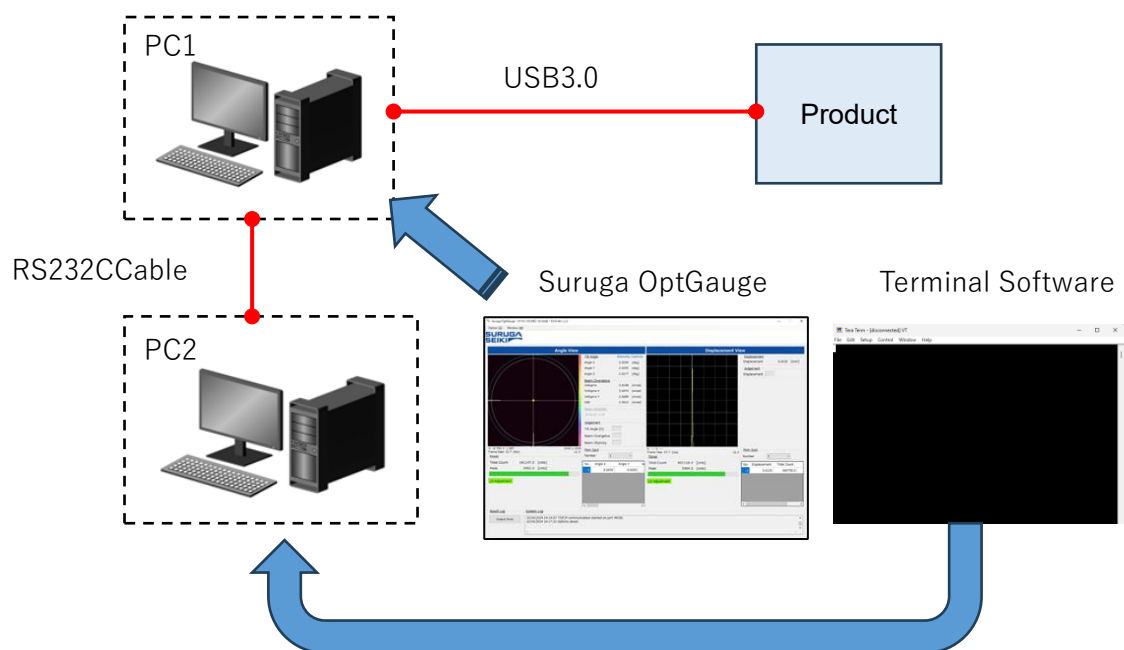
3.1.1 Communication Specifications

Item	Content
Synchronization method	Asynchronous
Transmission code	UTF-8
Data type	8 bits
Stop bit	1 bit
Parity	None
Flow control	None
Baud rate (bps)	9600 / 19200 / 38400 / 57600 / 115200

3.1.2 Example: Connections via the RS232C Communication

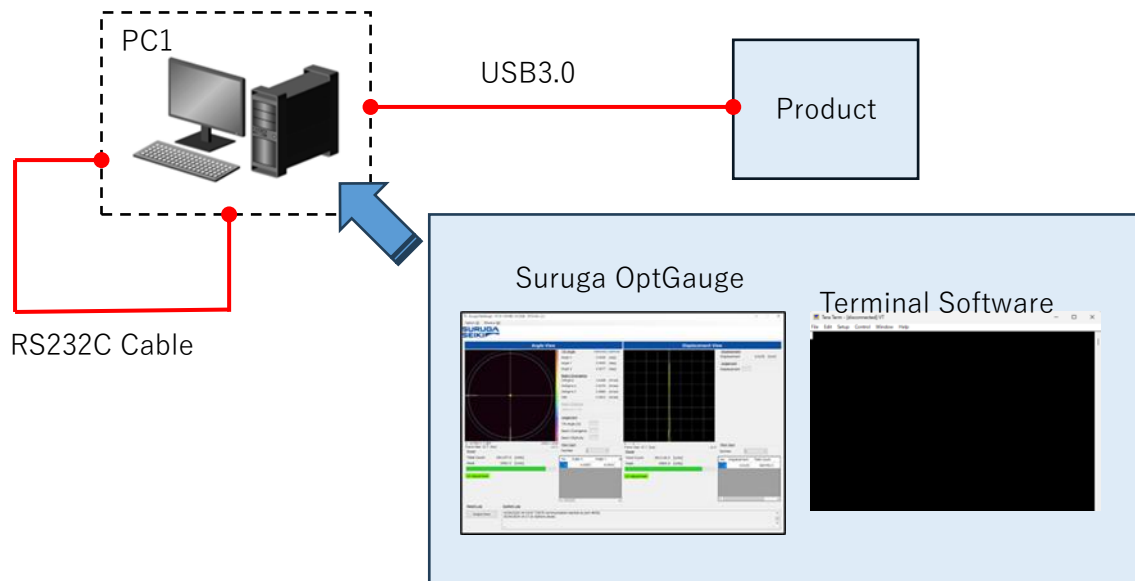
■ Using external PCs for communication

1. Set up two computers and connect with an RS232C cable.
2. Connect this product to one of the computers, launch the Suruga OptGauge, and start measurements.
3. Prepare terminal software on the other computer.
4. Configure the command communication settings and initiate communication.



■ Using the same computer for communication

1. Connect the sensor head to one computer and then connect the RS232C cable to your computer.
2. Launch the Suruga OptGauge and start measurement.
3. Prepare terminal software on the computer.
4. Configure the communication settings to command and begin communication.



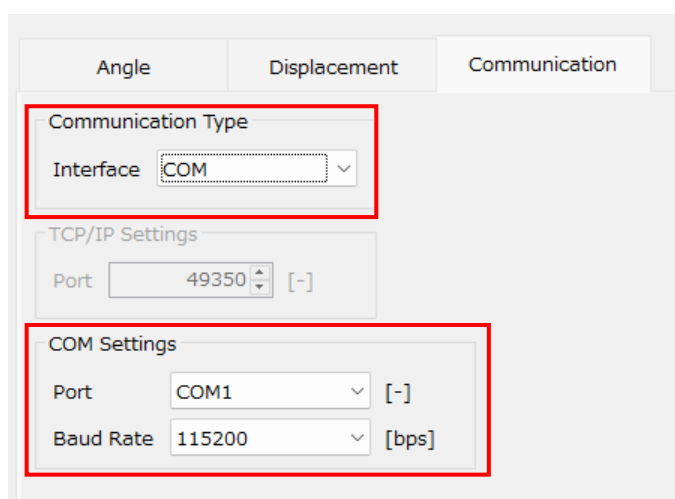
3.1.3 Command Communication Setting Method

This section describes how to configure the Suruga OptGauge and terminal software to command communication.

■ The Suruga OptGauge

1. Select the [Communication] tab in option settings.
2. Set the "Interface" to "COM" at the Communication Type.
3. Set "Port" and "Baud Rate" (arbitrary) in the COM settings.

*"Port" automatically displays the connected port candidates when RS232C is connected.



The screenshot shows the 'Communication' tab of the Suruga OptGauge settings window. It features three main sections: 'Communication Type', 'TCP/IP Settings', and 'COM Settings'. The 'Communication Type' section has an 'Interface' dropdown menu set to 'COM'. The 'TCP/IP Settings' section has a 'Port' field set to '49350'. The 'COM Settings' section has a 'Port' dropdown menu set to 'COM1' and a 'Baud Rate' dropdown menu set to '115200'. Red boxes highlight the 'Communication Type' and 'COM Settings' sections.

■ Terminal Software

The terminal software, to be provided by the customer, is to be set as below.

1. Set the COM port which matches the "Port" setting in the Suruga OptGauge.
2. Set the same baud rate as the "Baud Rate" setting in the Suruga OptGauge.
3. For settings other than the above, see the "[Communication Specifications](#)".

3.2 TCP/IP

TCP/IP supports three main connection patterns. After establishing a connection, data transmission is performed using terminal software[※] to exchange commands with the Suruga OptGauge via TCP/IP communication.

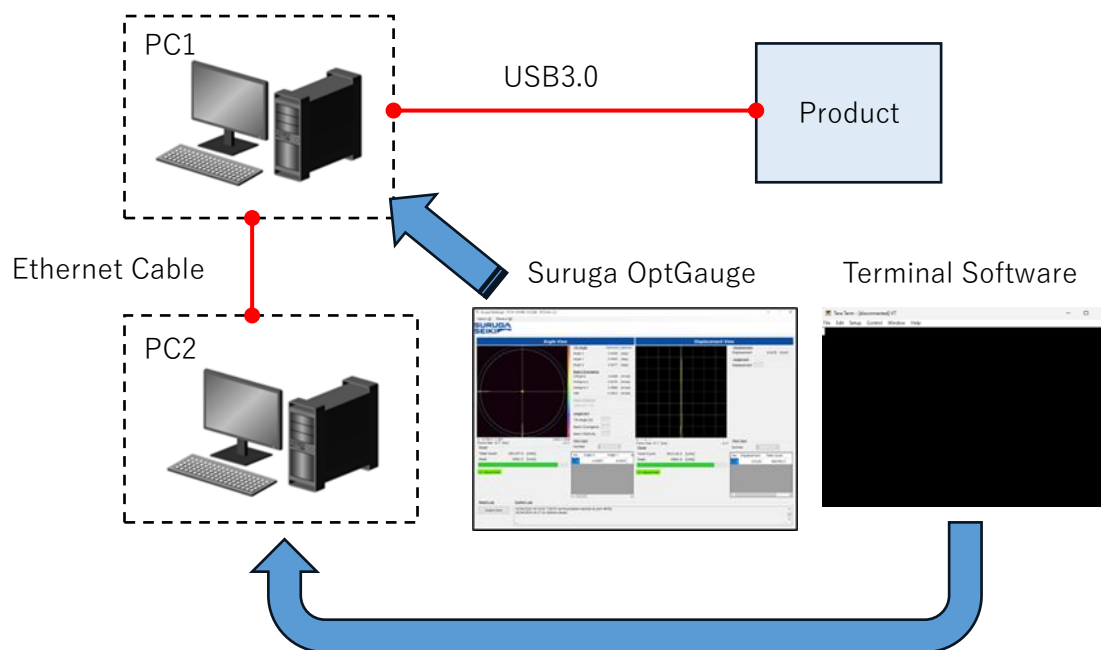
*Note: Terminal software must be provided by the customer.

3.2.1 Communication Specifications

Item	Details
Protocol	TCP
IPv4 Address	See " Command Communication Setting Method "
Subnet Mask	
Default Gateway	
DNS Server Address	
Port Number	Private Port of (49152-65535) Range

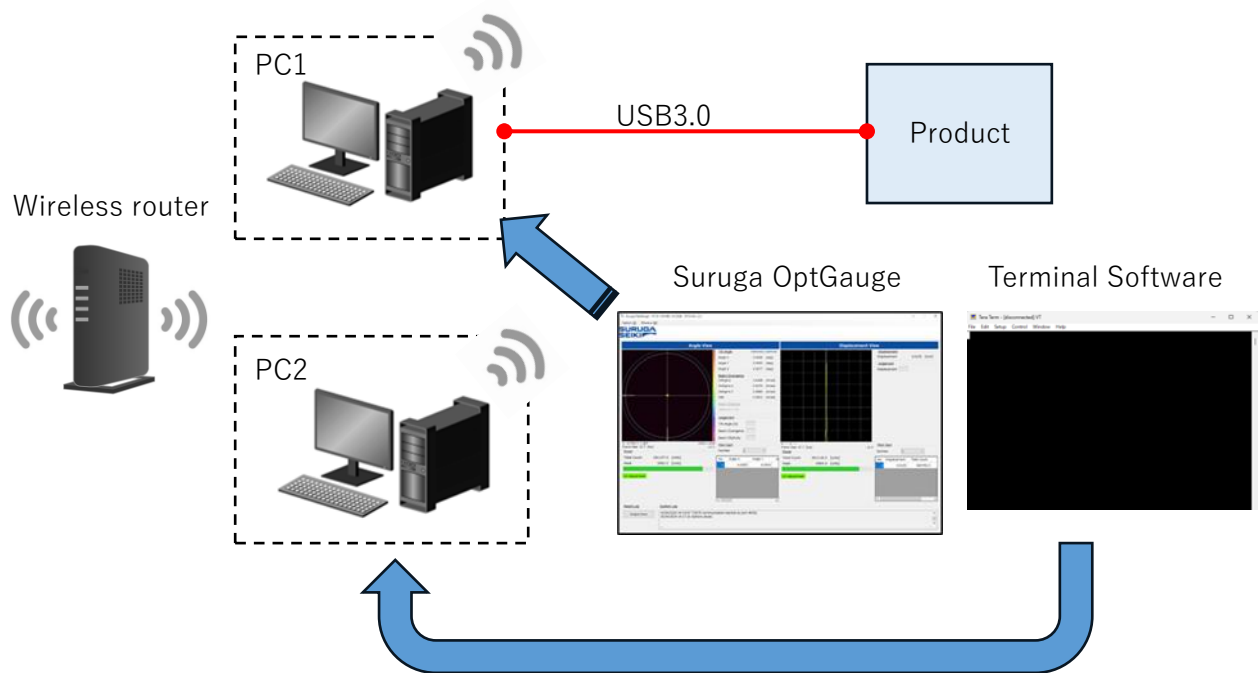
3.2.2 Example: Connections via the TCP/IP communication

- Using external devices for communication via Ethernet cable.
- 1. Set up two computers and connect them with an Ethernet cable.
- 2. Connect this product to one of the computers, launch the Suruga OptGauge, and start measurements.
- 3. Prepare terminal software on the other computer.
- 4. Configure the communication settings to command and start communication.



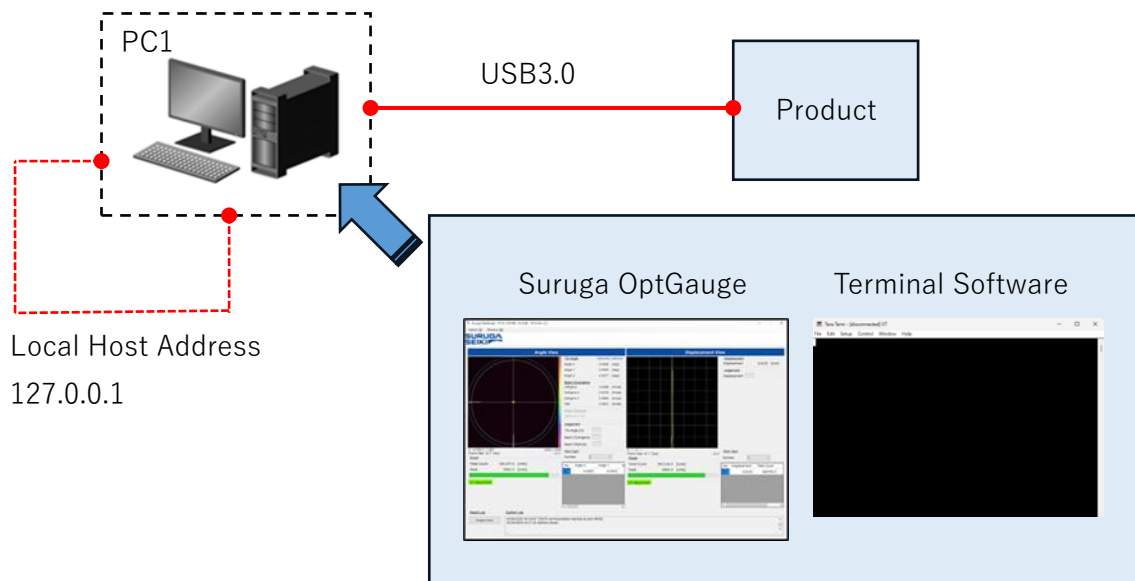
■ Using external devices for communication: Wireless router

1. Set up two computers and connect them via a wireless router.
2. Connect the Product to one of the computers, launch Suruga OptGauge, and start measurements.
3. Prepare terminal software on the other computer.
4. Configure the communication settings for the command and start communication.



■ Using the Same Computer for Communication

1. Connect the Product to one computer.
(There is nothing to connect, as the local host address is used).
2. Launch the Suruga OptGauge and start measurement.
3. Prepare terminal software on the computer.
4. Configure the communication settings to command and start communication.

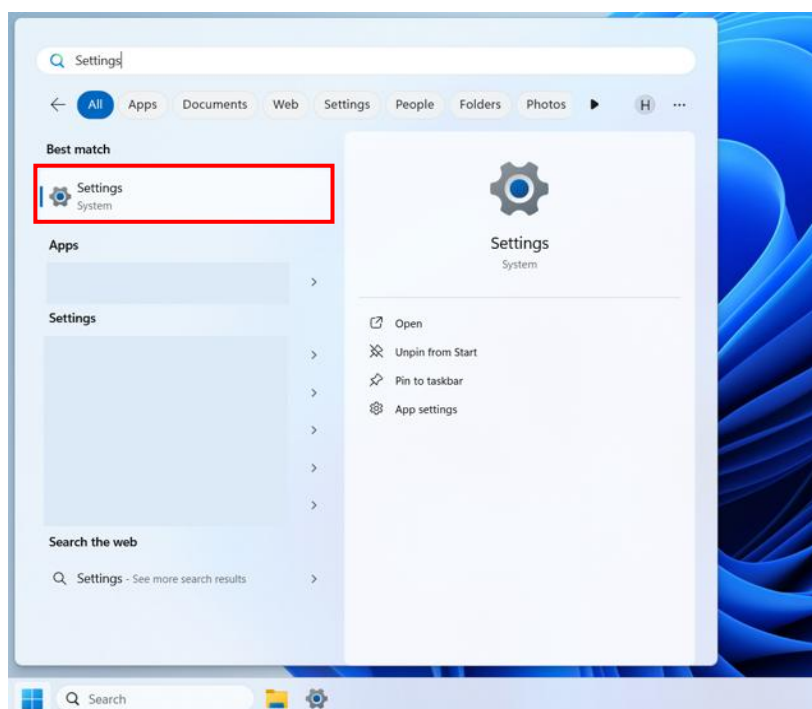


3.2.3 Command Communication Setting Method

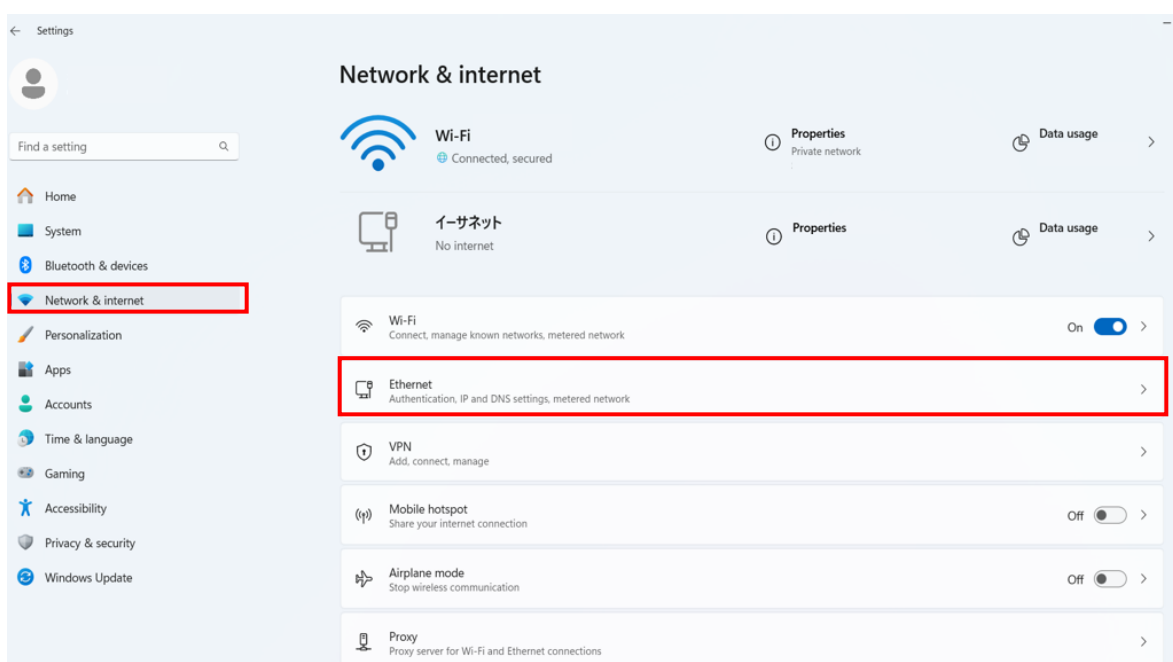
This section describes how to configure the PC, the Suruga OptGauge, and terminal software to command communication.

PC Settings

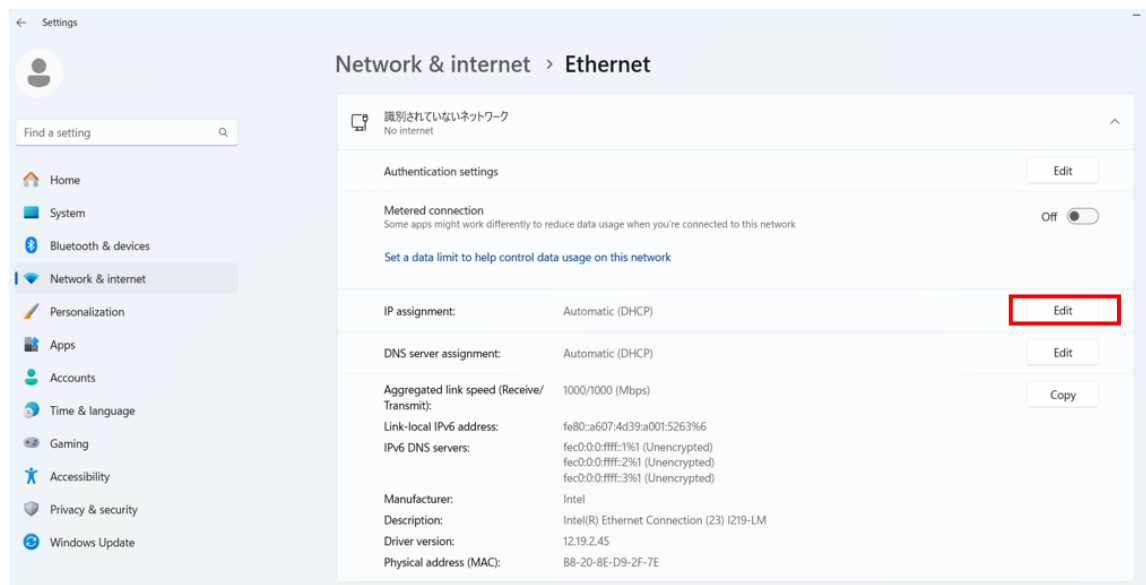
1. Click the [Start] button and select [Settings].



2. Select [Network & Internet], and then select [Ethernet]. If you are using a wireless LAN router, select [Wi-Fi] → [Hardware Properties].



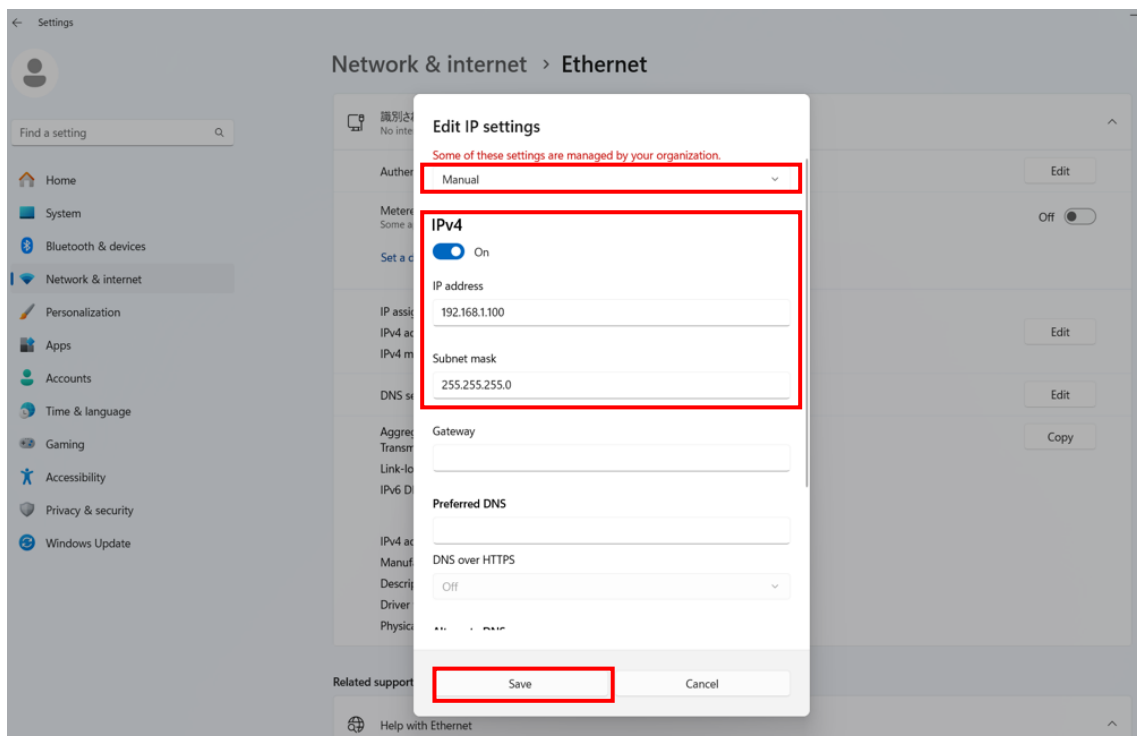
3. Click [Edit] under [IP Assignment].



4. Select [Manual] and enter the [IP address] and [Subnet mask] under [IPv4].
Example)

IP address: 192.168.1.100

Subnet mask: 255.255.255.0



5. Click [Save].

The settings for the PC to which the product is connected are complete.

6. Perform steps 1 through 5 on the other PC as well.

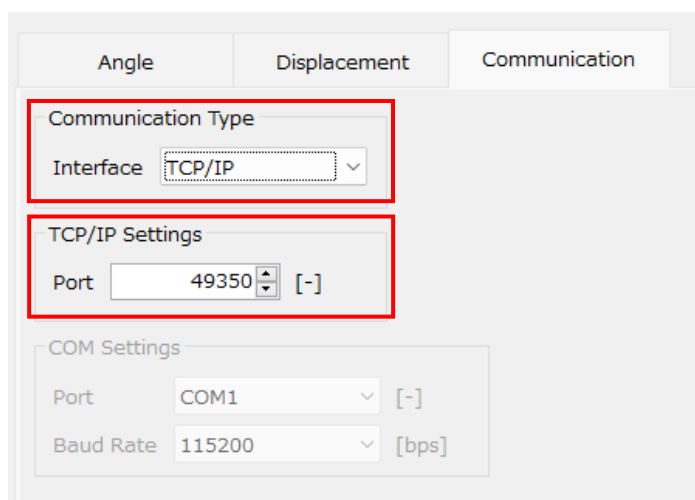
However, when configuring the IP address in step 5, ensure it does not duplicate the following:

EX. IP address: 192.168.1.**101** (*change only the last number)

Subnet mask: 255.255.255.0

Setting the Suruga OptGauge

1. Select the [Communication] tab in option settings.
2. Set "Communication Type - Interface" to "TCP/IP".
3. Set "Port" (arbitrary) in TCP/IP settings.



The screenshot shows the 'Communication' tab of the Suruga OptGauge settings window. It features three sub-sections: 'Communication Type', 'TCP/IP Settings', and 'COM Settings'. The 'Communication Type' section has a dropdown menu for 'Interface' set to 'TCP/IP'. The 'TCP/IP Settings' section has a 'Port' field set to '49350'. The 'COM Settings' section has a 'Port' dropdown set to 'COM1' and a 'Baud Rate' dropdown set to '115200'. Red boxes highlight the 'Interface' dropdown and the 'Port' field in the 'TCP/IP Settings' section.

Angle	Displacement	Communication
Communication Type		
Interface: TCP/IP		
TCP/IP Settings		
Port: 49350 [-]		
COM Settings		
Port: COM1 [-]		
Baud Rate: 115200 [bps]		

Terminal Software

For the terminal software you provide yourself, please configure the following settings:

- Specify the IP address set on the PC to which this product is connected, as configured in 'PC Settings ~ When Communicating Using External Devices ~', as the destination address.
- Configure the same TCP port as the 'Port' set on the Suruga OptGauge.

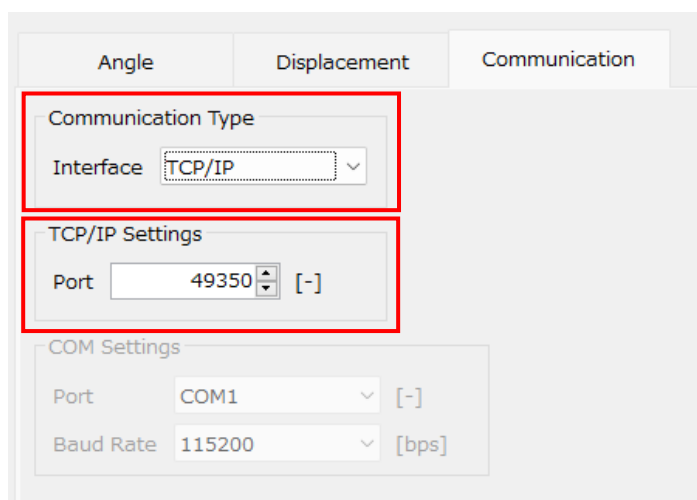
Note: This constitutes the minimum configuration required for command communication using the TCP/IP. As this involves network communication.

Please be advised to consider security and other settings appropriate to your specific application.

3.2.3.1 Using the same computer for communication

Setting the Suruga OptGauge

1. Select the [Communication] tab in option settings.
2. Set "Communication Type - Interface" to "TCP/IP".
3. Set "Port" (arbitrary) in TCP/IP settings.



Terminal Software

The terminal software, to be provided by the customer, is to be set as below.

- Local host address: Set **127.0.0.1**
- Set the TCP port which matches the "Port" setting in Suruga OptGauge.

3.3 List of Commands

3.3.1 List of Read Commands

3.3.1.1 Common Commands

[Read Commands]

Command Type	Command Parameter 0	Command Parameter 1	Command Description
RD	VS		Reads version information
	OL		Reads option list information

3.3.1.2 Angle

[Read Commands]

Command Type	Command Parameter 0	Command Parameter 1	Command Description
RD	AR		Reads measurement results
		MLT	Reads the Angle Multi Spot measurement results
		ASC	Reads the multi Angle Spot Count
	AS	LAS	Reas status information from the automatic brightness
	AD	EXT	Reads the sensor camera exposure time
		FRA	Reads the sensor camera frame rate
		ROT	Reads the Rotation configuration
		MHE	Reads the Mirroring horizontal configuration
		MVE	Reads the Mirroring vertical configuration
		MAV	Reads the number of Averaging times configuration
		MAE	Reads the Averaging processing Enabling configuration
		CSP	Reads the Cross Section Point configuration
		OOX	Reads the Origin Offset X value configuration
		OOY	Reads the Origin Offset Y value configuration
		AAM	Reads the Auto Aperture Method configuration
		AAE	Reads the Auto Aperture Enabling configuration
		ROE	Reads the ROI enabled configuration
		RAX	Reads the ROI X value configuration
		RAY	Reads the ROI Y value configuration
		RAW	Reads the ROI Width configuration
		RAH	Reads the ROI Height configuration
		ANT	Reads the Angle Type configuration
		AJE	Reads the Judgement Angle Enabling configuration
		AJV	Reads the Angle Judgement Value configuration
		DJE	Reads the Judgement Divergence enabling configuration

Command Type	Command Parameter 0	Command Parameter 1	Command Description
RD	AR	DJV	Reads the Divergence Judgement Value configuration
		BRT	Reads the Judgement Radius Type configuration
		EJE	Reads the Judgement Ellipticity enabled configuration
		EJV	Reads the Ellipticity Judgement value configuration
		PJE	Reads the Peak Judgement Enabling configuration
		OJE	Reads the Rotation Angle Judgement Enabling configuration
		OJV	Reads the Rotation Angle Judgement criteria Value configuration
		OJR	Read: Rotation Angle Judgement Range configuration
		PJV	Reads Peak Judgement Value configuration
		RFP	Reads the log File output Path configuration
		IOE	Reads the image file output enabling configuration
		RAE	Reads the raw data output enabling configuration
		IOC	Reads the Image file Output Color configuration
		IOF	Reads the Image file Output Format configuration
		CNM	Reads the beam Centroid configuration
		ANU	Reads the Angle Unit configuration
		DNE	Reads the Denoising Enabled configuration
		DNT	Reads the Denoising Threshold value configuration
		DAX	Reads the number of Decimal places for the Angle X configuration
		DAY	Reads the number of Decimal places for the Angle Y Configuration
		DAD	Reads the number of Decimal places for the Angle D configuration
		DDS	(Beam Divergence) Reads the number of Decimal places for the D4Sigma or the 1/e ² configuration
		DDX	(Beam divergence) Reads the number of Decimal places for the D4Sigma or the 1/e ² X(M) configuration
		DDY	(Beam divergence) Reads the number of Decimal places for the D4Sigma or the 1/e ² Y(m) configuration
		DD8	(Beam divergence) Reads the number of Decimal places for the D86 configuration
		DEL	Reads the number of Decimal places for the Ellipticity configuration
		DOR	Reads the number of Decimal places for the Rotation Angle configuration
		MSO	(Multi Spot) Reads the Order configuration

Command Type	Command Parameter 0	Command Parameter 1	Command Description
RD	AR	MSC	(Multi Spot) Reads the Spot Count configuration
		MSM	(Multi Spot) Reads the minimum Spot Area configuration
		ACE	Reads the Adaptive Cal execution button display enabled configuration
		BDT	Reads the Beam Diameter Type configuration
		DOE	Reads the Orientation Enabled configuration
		OCM	Reads the Rotation Angle Measurement method configuration
		BIE	Reads the Binning enabled configuration
		WDS	Reads the Working Distance configuration
		VAA	Reads the Auto Aperture display configuration
		VCC	Reads the Centroid Cursor display configuration
		VCS	Reads the Cross Section display configuration
		VLA	Reads the Labeling Area display configuration
		VMR	Reads the Measurement Range display configuration
		VOC	Reads the Origin Cursor display configuration
		VSA	Reads the Spot Area display configuration
		IST	Reads the Spot Area Type display configuration
		VRA	Reads the ROI Area display configuration
		VOU	Readd the Rotation Angle cursor display configuration
		DSN	Reads the Spot Number display configuration
		VAX	Reads the Angle X result display configuration
		VAY	Reads the Angle Y result display configuration
		VAD	Reads the Angle D result display configuration
		VDS	(Beam Divergence) Reads the D4Sigma or the $1/e^2$ result display configuration
		VDX	(Beam Divergence) Reads the D4Sigma or the $1/e^2$ X(M) result display configuration
		VDY	(Beam Divergence) Reads the D4Sigma or the $1/e^2$ Y(m)result display configuration
		VD8	Reads the D86 result display configuration
		VEL	Reads the Ellipticity result display configuration
		VTC	Reads the Total Count result display configuration
		VOR	Reads the Rotation Angle display configuration
		VPE	Reads the Peak result display configuration
		FAN	Reads the Font size for the Angle configuration
		FBD	Reads the Font size for the Beam Divergence Confdig.

Command Type	Command Parameter 0	Command Parameter 1	Command Description
RD	AR	FBE	Reads the Font size for the Beam Ellipticity configuration
		FOR	Reads the Font size for the Rotation Angle configuration
		FPO	Reads the Font size for the Power configuration
		LAE	Reads the automatic brightness execution Enabled configuration
		LAV	Reads the Automatic brightness peak target value configuration
		LAR	Reads the Automatic brightness peak target Range configuration
		LRV	Reads the Reflectance of the target configuration
		LEI	Reads the Initial Exposure time value applied in the automatic brightness configuration
		LEX	Reads the maximum Exposure time value applied in the Automatic brightness configuration
		LEN	Reads the configuration for the minimum exposure time value used for the automatic brightness

3.3.2 List of Write Commands

3.3.2.1 Common Commands

[Write Commands]

Command Type	Command Parameter 0	Command Parameter 1	Command Description
WR	OL		Writes the Option List configuration

3.3.2.2 Angle

[Write Commands]

Command Type	Command Parameter 0	Command Parameter 1	Command Description
WR	AO	EXT	Writes the sensor camera Exposure Time
		FRA	Writes the sensor camera Frame Rate
		ROT	Writes the Rotation configuration
		MHE	Writes the Mirroring Horizontal configuration
		MVE	Writes the Mirroring Vertical configuration
		MAV	Writes the number of Averaging times configuration
		MAE	Writes the Averaging processing Enabled configuration
		CSP	Writes the Cross Section Point configuration
		OOX	Writes the Origin Offset X value configuration
		OOY	Writes the Origin Offset Y value configuration
		AAM	Writes the Auto Aperture Method configuration
		AAE	Writes the Auto Aperture enabled configuration
		ROE	Writes the ROI Enabled configuration
		RAX	Writes the ROI X value configuration
		RAY	Writes the ROI Y value configuration
		RAW	Writes the ROI Width configuration
		RAH	Writes the ROI Height configuration
		ANT	Writes the Angle Type configuration
		AJE	Writes the Angle Judgement Enabled configuration
		AJV	Writes the Angle Judgement Value configuration
		DJE	Writes the Divergence Judgement Enabled configuration
		DJV	Writes the Divergence Judgement Value configuration
		BRT	Writes the Radius Type Judgement configuration

Command Type	Command Parameter 0	Command Parameter 1	Command Description
WR	AO	EJE	Writes the Ellipticity Judgment Enabled configuration
		EJV	Writes the Ellipticity Judgement Value configuration
		OJE	Writes the Rotation Angle Judgement Enabled configuration
		OJV	Writes the Rotation Angle Judgement criteria Value configuration
		OJR	Writes the Rotation Angle Judgement Range configuration
		PJE	Writes the Peak Judgment Enabled configuration
		PJV	Writes the Peak Judgement Value configuration
		RFP	Writes the Log File out Path configuration
		IOE	Writes the Image file Output Enabled configuration
		RAE	Writes the Raw data output Enabled configuration
		IOC	Writes the Image file Output Color configuration
		IOF	Writes the Image file Output Format configuration
		CNM	Writes the Beam Centroid configuration
		ANU	Writes the Angle Unit configuration
		DNE	Writes the Denoising Enabled configuration
		DNT	Writes the Denoising Threshold configuration
		DAX	Writes the Decimal places in the Angle X configuration
		DAY	Writes the Decimal places in the Angle Y configuration
		DAD	Writes Decimal places in the Angle D configuration
		DDS	(Beam Divergence) Writes the Decimal places in the D4Sigma or the $1/e^2$ configuration
		DDX	(Beam Divergence) Writes the Decimal places in the D4Sigma or the $1/e^2$ X(M) configuration
		DDY	(Beam Divergence) Writes the Decimal places in the D4Sigma or the $1/e^2$ Y(m) decimal place configuration
		DD8	(Beam Divergence) Writes the Decimal places in the D86 configuration
		DEL	Writes the Decimal places in the Ellipticity configuration
		DOR	Writes the Decimal places in the Rotation Angle

Command Type	Command Parameter 0	Command Parameter 1	Command Description
			configuration
		MSO	(Multi Spot) Writes the Order configuration
		MSC	(Multi Spot) Writes the Spot Count configuration
		MSM	(Multi Spot) Writes the Minimum Spot area configuration
		ACE	Writes the Adaptive Cal execution button display enabled configuration
		BDT	Writes the
		DOE	Writes the Orientation Enabled configuration
		OCM	Writes the Rotation Angle Measurement method
WR	AO	BIE	Writes Binning Enabled configuration
		WDS	Writes the Working Distance configuration
		VAA	Writes the Auto Aperture display configuration
		VCC	Writes the Centroid Cursor display configuration
		VCS	Writes the Cross Section display configuration
		VLA	Writes the Labeling Area display configuration
		VMR	Writes the Measurement Range display configuration
		VOC	Writes the Origin Cursor display configuration
		VSA	Writes the Spot Area display configuration
		IST	Writes the Spot area Type display configuration
		VRA	Writes the ROI Area display configuration
		DSN	Writes the Display Spot Number configuration
		VOU	Writes the Rotation Angle Cursor display configuration
		VAX	Writes the Angle X result display enabled configuration
		VAY	Writes the Angle Y result display enabled configuration
		VAD	Writes the Angle D result display enabled configuration
		VDS	(Beam Divergence) Writes the D4Sigma or the $1/e^2$ result display enabled configuration
		VDX	(Beam Divergence) Writes the D4Sigma or the $1/e^2$ X(M) result display enabled configuration
		VDY	(Beam Divergence)

Command Type	Command Parameter 0	Command Parameter 1	Command Description
			Writes the D4Sigma or the $1/e^2$ Y(m) result display enabled configuration
		VD8	(Beam Divergence) Writes the D86 result display enabled configuration
		VEL	Writes the Ellipticity result display enabled configuration
		VOR	Writes the Rotation Angle result display configuration
		VTC	Writes the Total Count result display enabled configuration
		VPE	Writes the peak result display Enabled configuration
		FAN	Writes the Font size for the Angle configuration
		FBD	Writes the Font size for the beam spread configuration
		FBE	Writes the Font size for the beam ellipticity configuration
		FOR	Writes the Font size for the Rotation angle configuration
		FPO	Writes the Font size for the Power configuration
		LAE	Writes the Automatic brightness execution Enabled configuration
		LAV	Writes the Automatic brightness peak target Value configuration
		LAR	the Automatic brightness peak target value configuration
WR	AO	LRV	Writes the Reflectance of the target configuration
		LEI	Writes the Exposure time Initial value applied in the automatic brightness configuration
		LEX	Writes the maximum Exposure time applied in the automatic brightness configuration
		LEN	Writes the minimum Exposure time applied in the automatic brightness configuration

3.3.3 List of Execute Commands

[Execute Commands]

Command Type	Command Parameter 0	Command Parameter 1	Command Description
EX	SV		Executes the Option save
	AL		Executes the Automatic brightness for the angle

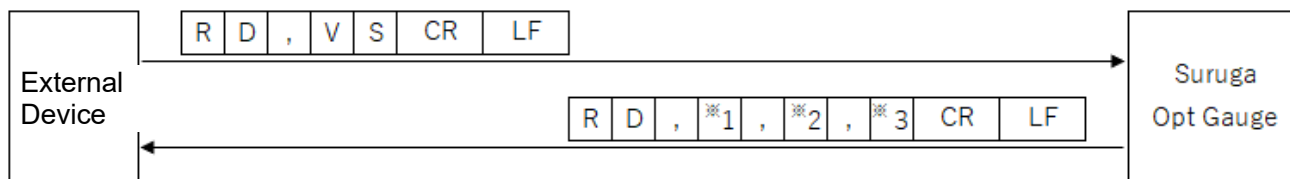
Command Type	Command Parameter 0	Command Parameter 1	Command Description
			measurement
	AR	MSN	Executes the Angle Main Spot Number switching
	RO		Executes the Log Output for measurement results
	AZ		Executes the Angle Zero set

3.4 Read Commands

3.4.1 Command Format

3.4.1.1 Common Commands

[Read: Version Information]

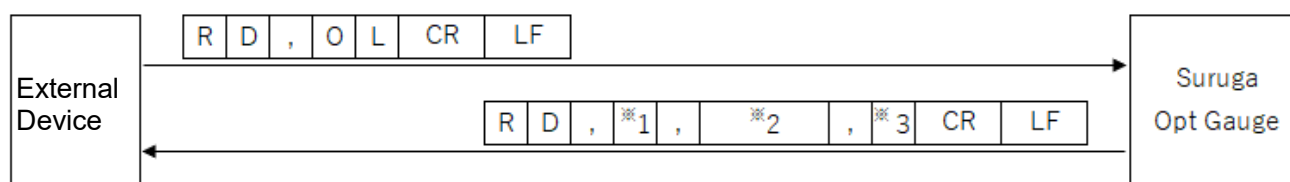


*1: Major number

*2: Minor number

*3: Build number

[Read: Option List Information]



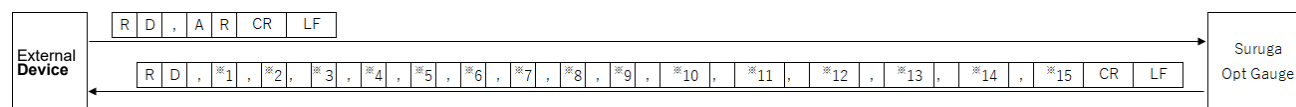
*1: Number of option lists

*2: Option name (includes many option names as there are option lists, separated with commas)

*3: Index indicating selected options

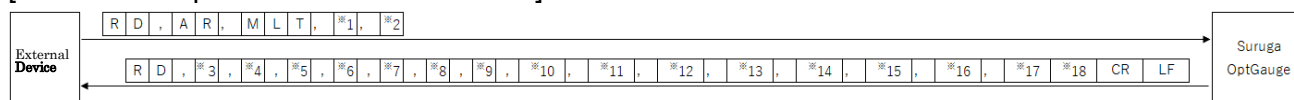
3.4.1.2 Angle

[Read: Measurement Results]



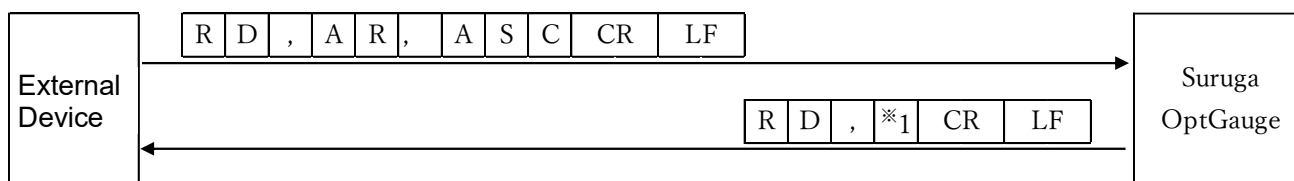
- *1: Tilt Angle/Beam Angle: Angle X measurement value
- *2: Tilt Angle/Beam Angle: Angle Y measurement value
- *3: Tilt Angle/Beam Angle: Angle D measurement value
- *4: Beam Divergence: D4Sigma or 1/e2 measurement value
- *5: Beam Divergence: D4Sigma X(M) or 1/e2 X(M) measurement value
- *6: Beam Divergence: D4Sigma Y (m) r 1/e2 Y(m) measurement value
- *7: Beam Divergence: D86 measurement value
- *8: Beam Ellipticity measurement value
- *9: Beam: Total count value
- *10: Beam: Peak value
- *11: Judgement: Tilt angle (D) judgement result (OK / NG)
- *12: Judgement: Beam divergence judgement result (OK / NG)
- *13: Judgement: Ellipticity judgement result (OK / NG)
- *14: Judgement: Peak judgement result (OK / NG)
- *15: Angle Unit (degree / DegMinSec / milli-radian)
- *16: Orientation Measurement value
- *17: Orientation Judgement result (OK / NG)

[Read Multi Spot Measurement Results]



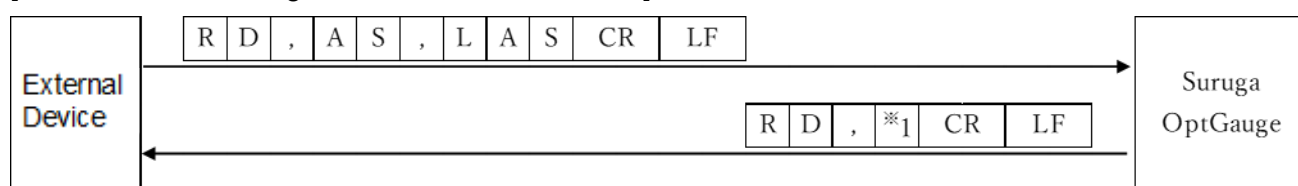
- ※1: Acquisition Start Spot Number (1 to 100)
- ※2: Consecutive Spot Count to Read from※1 (1 to 100)
- ※3: Tilt Angle / Beam Angle: Angle X measurement value
- ※4: Tilt Angle / Beam Angle: Angle Y measurement value
- ※5: Tilt Angle / Beam Angle: Angle D measurement value
- ※6: Beam Divergence: D4Sigma or 1/e2 measurement value
- ※7: Beam Divergence: D4Sigma X(M) or 1/e2 X(M) measurement value
- ※8: Beam Divergence: D4Sigma Y (m) or 1/e2 Y(m) measurement value
- ※9: Beam Divergence: D86 measurement value
- ※10: Beam Ellipticity measurement value
- ※11: Beam: Total Count value
- ※12: Beam: Peak value
- ※13: Judgement: Tilt Angle (D) judgement result (OK / NG)
- ※14: Judgement: Beam Divergence judgement result (OK / NG)
- ※15: Judgement: Ellipticity judgement result (OK / NG)
- ※16: Judgement: Peak judgement result (OK / NG)
- ※17: Angle Unit (degree / DegMinSec / milli-radian)
- ※18: Orientation measurement value
- ※19: Judgement : Orientation judgement result (OK / NG)
- ※20: Measurement Results of ※3 to ※19 specified in ※2 (The specified number of results will be included, separated by “,”)

[Read: Angle Multi Spot Count]



- ※1 : Number of measured Spot Count (0 to 100)

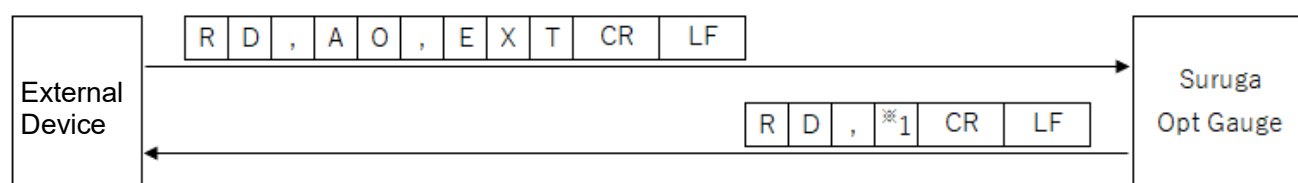
[Read: Automatic Brightness Status Information]



※1: Dimming status

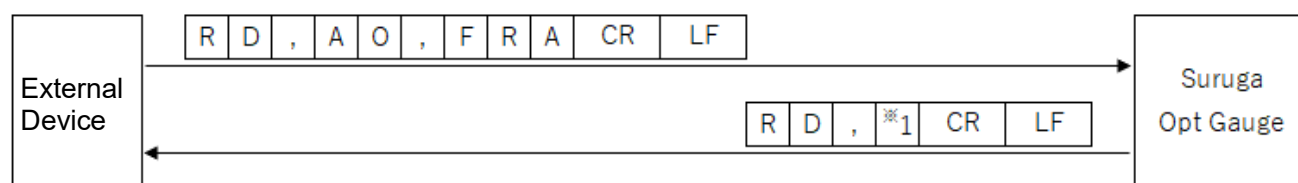
("0" = dimming complete, "1" = dimming in process, "2" = dimming failed, "3" = dimming not started)

[Read: Sensor Camera Exposure Time]



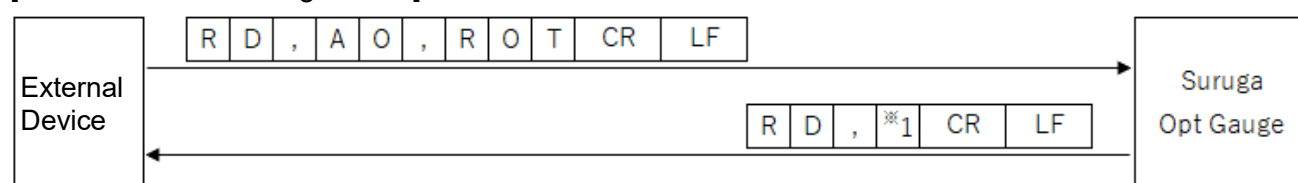
※1: Exposure time (0.027 to 2000)

[Read: Sensor Camera Frame Rate]



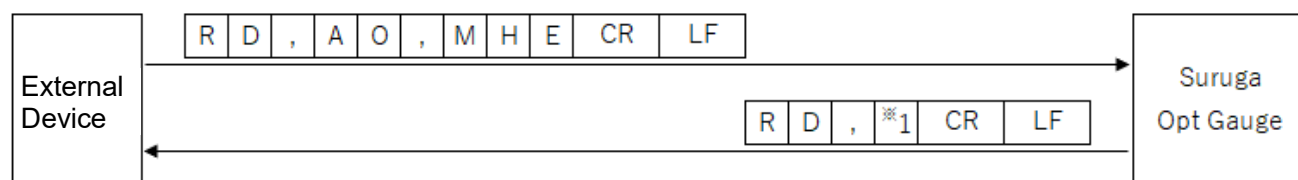
※1: Frame rate (0.1 to 100)

[Read: Rotation Configuration]



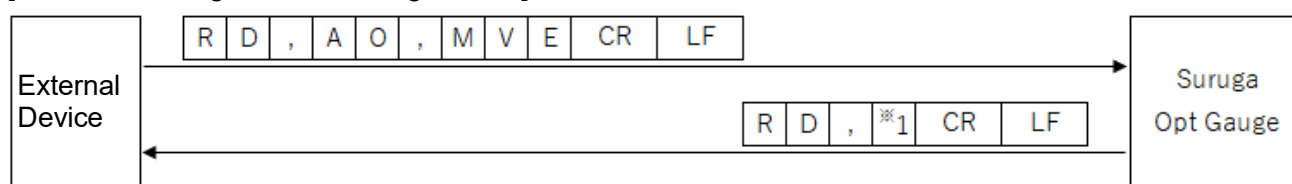
※1: Rotation ("0" = OFF, "1" = Rotation right 90°, "2" = Rotation right 180°, "3" = Rotation right 270°)

[Read: Mirroring Horizontal Configuration]



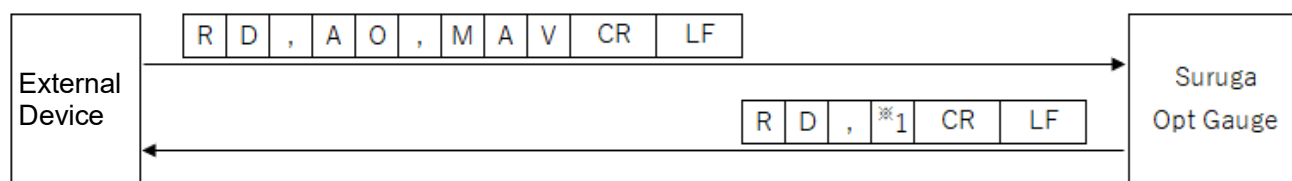
※1: Mirroring ("0" = OFF, "1" = Horizontal Mirroring display)

[Read: Mirroring Vertical Configuration]



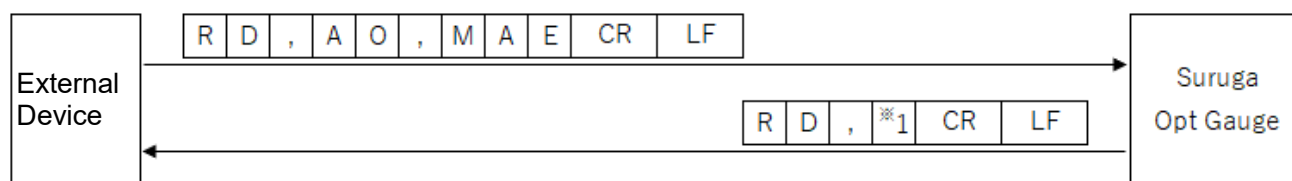
*1: Mirroring ("0" = OFF, "1" = Vertical Mirroring)

[Read: Number of Averaging Times Configuration]



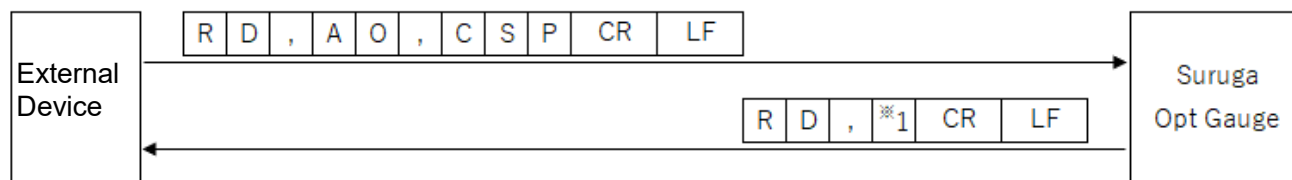
*1: Number of Averaging times (2 to 262144)

[Read: Averaging Processing Enabled Configuration]



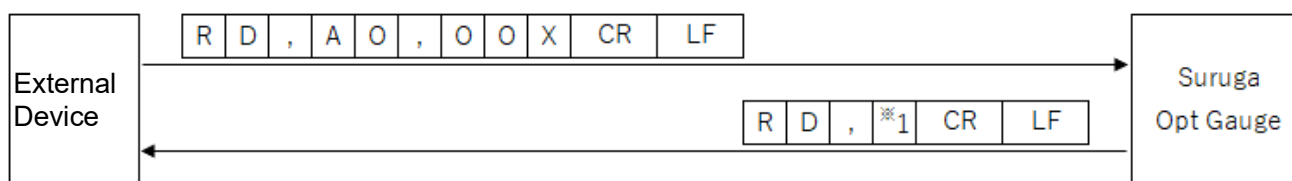
*1: Averaging Processing ("0" = disabled, "1" = enabled)

[Read: Cross Section Point configuration]



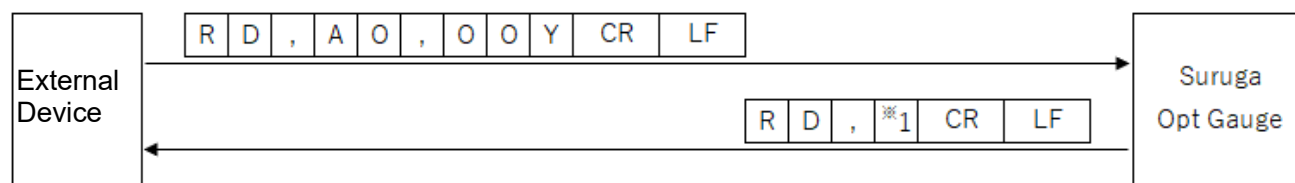
*1: Cross Section Point ("0" = Origin Cursor, "1" = Beam Cursor)

[Read: Origin Offset X Value Configuration]



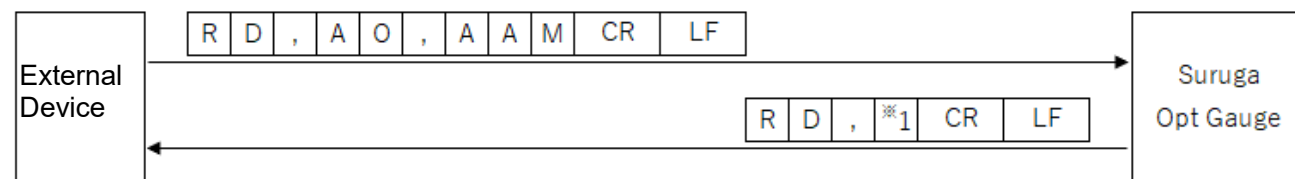
*1: Origin Offset X (-20 to 20)

[Read: Origin Offset Y Value Configuration]



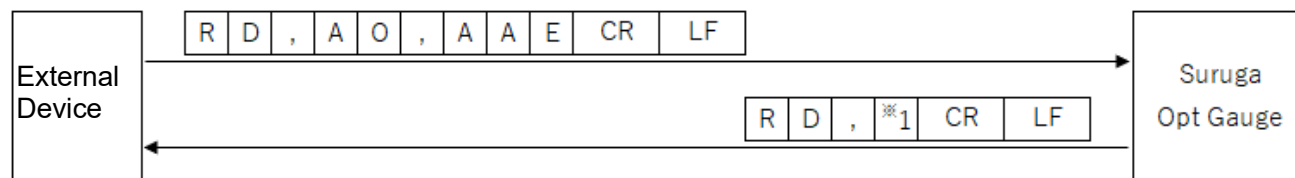
※1: Origin Offset Y (-20 to 20)

[Read: Auto Aperture Method Configuration]



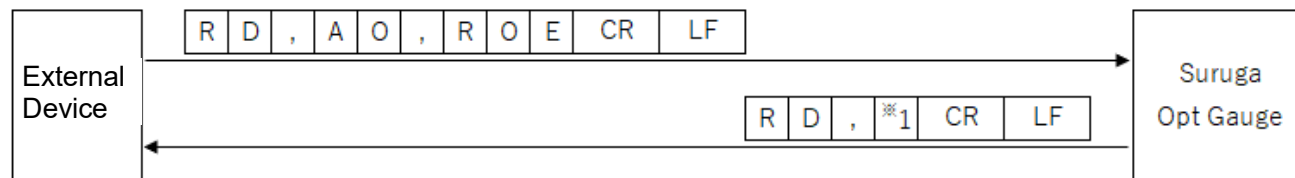
※1: Auto Aperture method ("0" = area, "1" = luminance)

[Read: Auto Aperture Enabled Configuration]



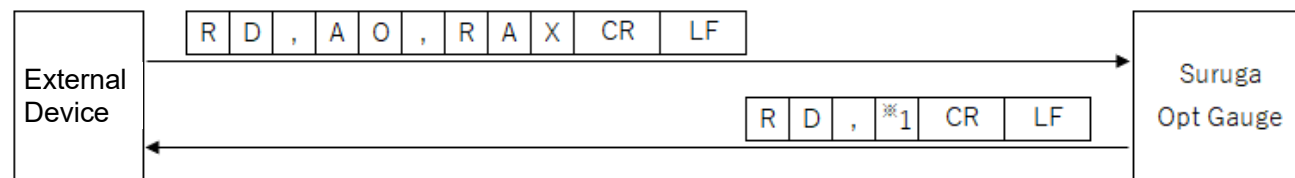
※1: Auto Aperture ("0" = disabled, "1" = enabled)

[Read: ROI Enabled Configuration]



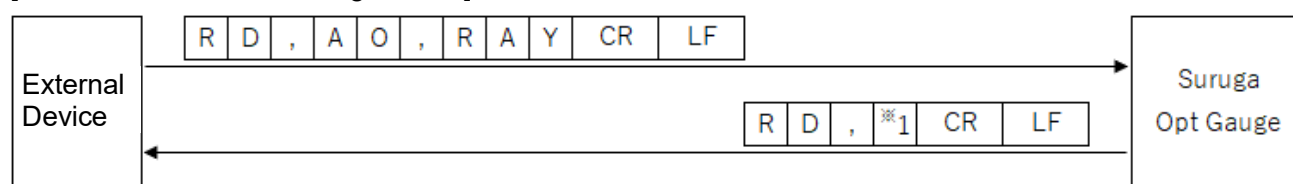
※1: ROI ("0" = disabled, "1" = enabled)

[Read: ROI X Value Configuration]



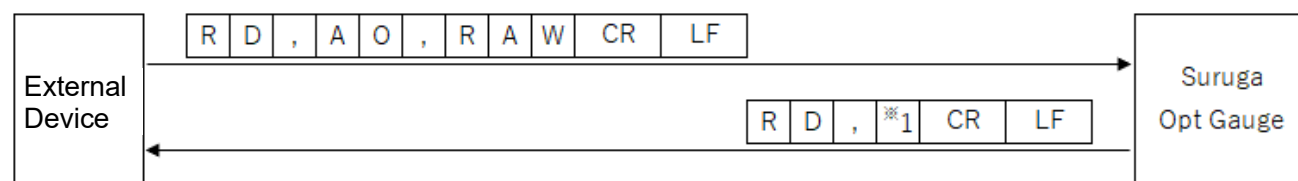
※1: ROI X value (- 3000 to 3000) or (- 1500 to 1500) if Binning is enabled

[Read: ROI Y Value Configuration]



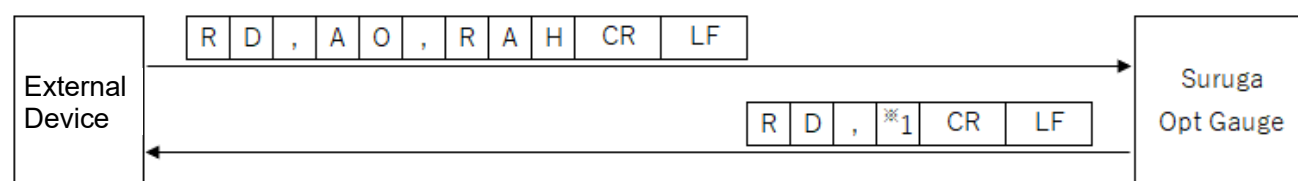
※1: ROI Y value (- 3000 to 3000) or (- 1500 to 1500) if Binning is enabled

[Read: ROI Width Configuration]



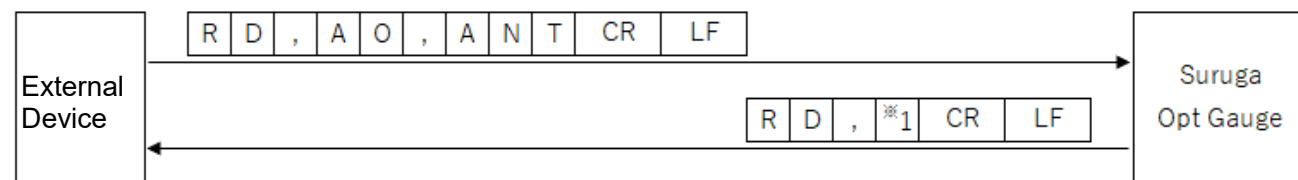
※1: ROI Width (0 to 3000) or (0 to 1500) if Binning is enabled

[Read: ROI Height Configuration]



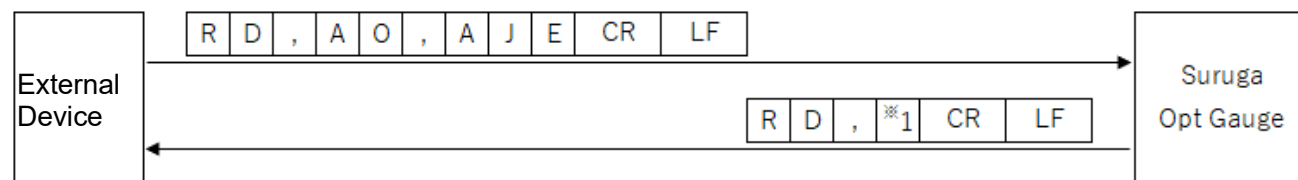
※1: ROI height (0 to 3000) or (0 to 1500) if Binning is enabled

[Read: Angle Type Configuration]



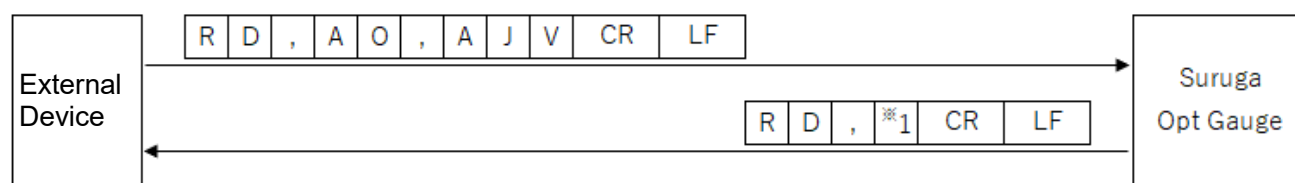
※1 : Angle Type (“0”= Tilt Angle、 “1”= Beam Angle)

[Read: Angle Judgement Enabled Configuration]



※1: Angle judgement (“0” = disabled, “1” = enabled)

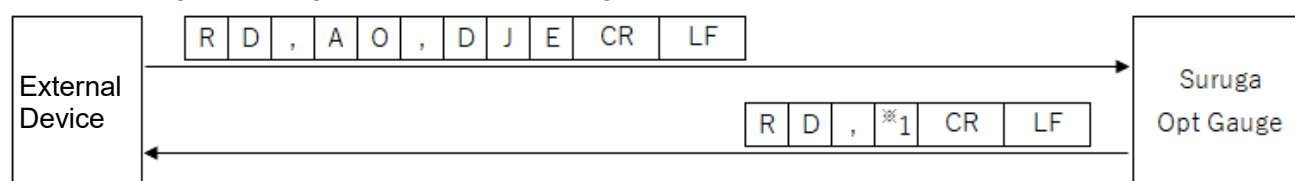
[Read: Angle Judgement Value Configuration]



※1: Angle judgement value:

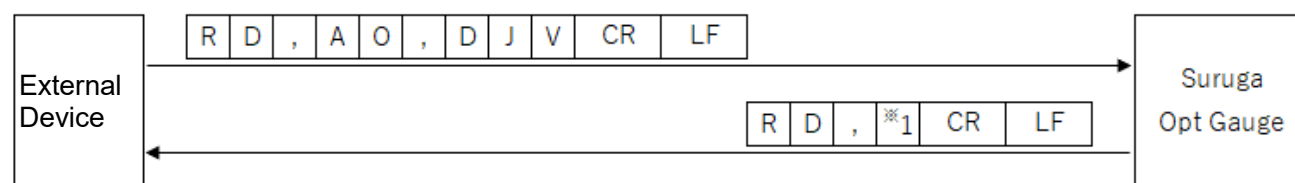
If the Angle Type is Tilt Angle, (0 to 10.0000). If the Angle Type is Beam Angle, (0 to 20.0000)

[Read: Divergence Judgement Enabled Configuration]



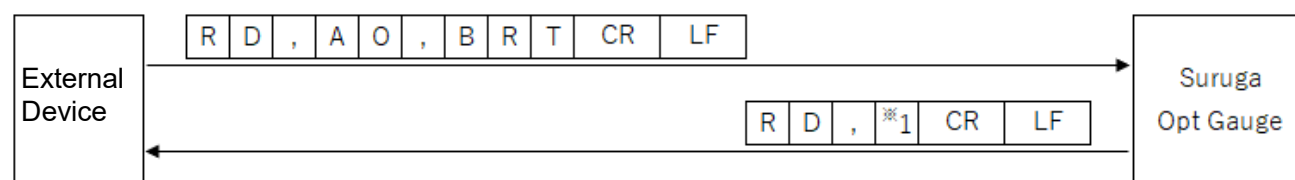
※1: Divergence judgement ("0" = disabled, "1" = enabled)

[Read: Divergence Judgement Value Configuration]



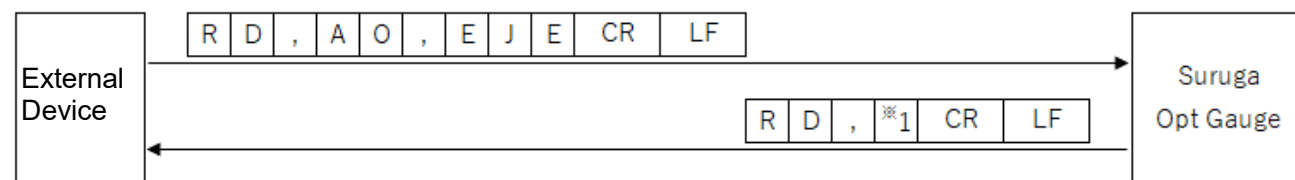
※1: Divergence judgement Value (0.0000 to 1000.0000)

[Read: Radius Type Judgement Configuration]



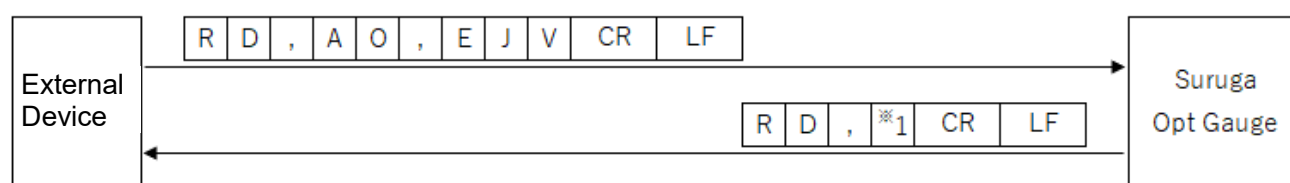
※1: Radius Type judgement ("0" = D4Sigma or 1/e², "1" = D86)

[Read: Ellipticity Judgement Enabled Configuration]



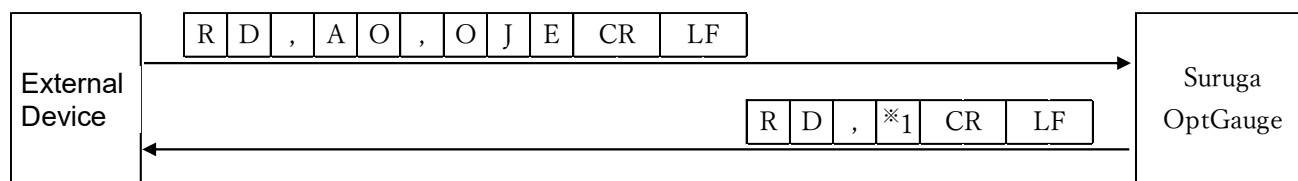
※1: Ellipticity judgement ("0" = disabled, "1" = enabled)

[Read: Ellipticity Judgement Value Configuration]



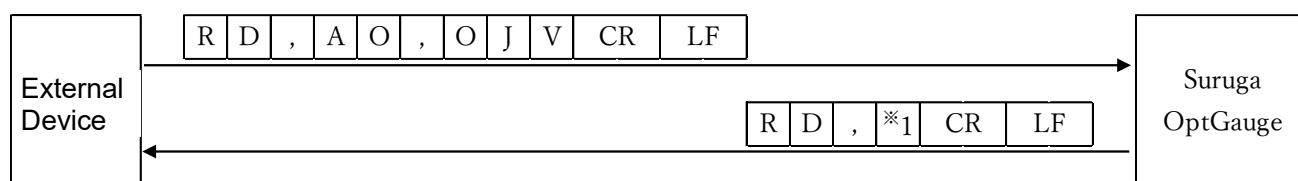
※1: Ellipticity judgement value (0.0000 to 1.0000)

[Read: Rotaion Angle Judgement Enabled Configuration]



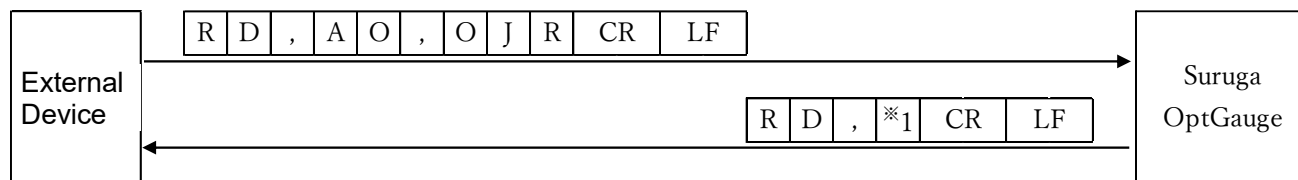
※1 : Rotaion angle judgement ("0" = disabled、"1" = enabled)

[Read: Rotaion Angle Judgement Criteria Value Configuration]



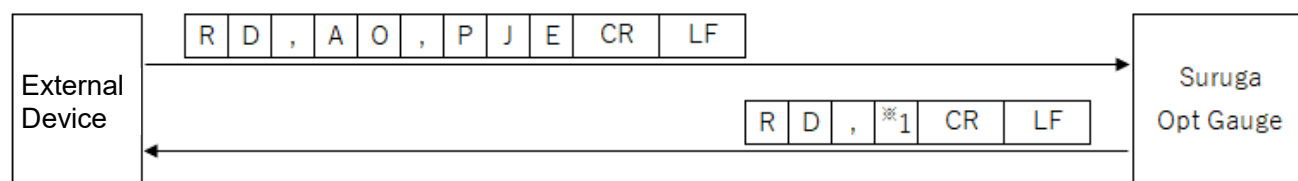
※1 : Rotaion angle judgement criteria value (-90.0000 to 90.0000)

[Read: Rotaion Angle Judgement Value Range Configuraion]



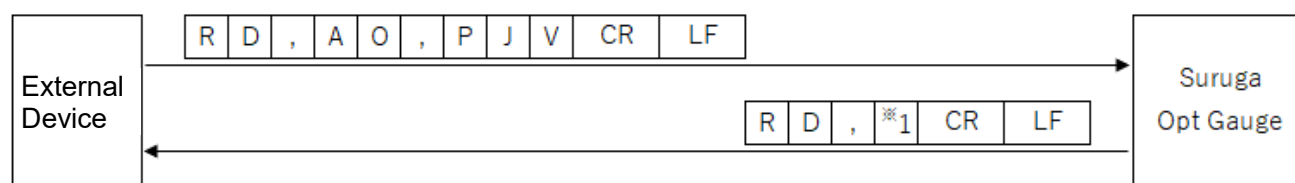
※1 Rotaion angle judgement value range (-90.0000 to 90.0000)

[Read: Peak Juedgement Enabled Configuration]



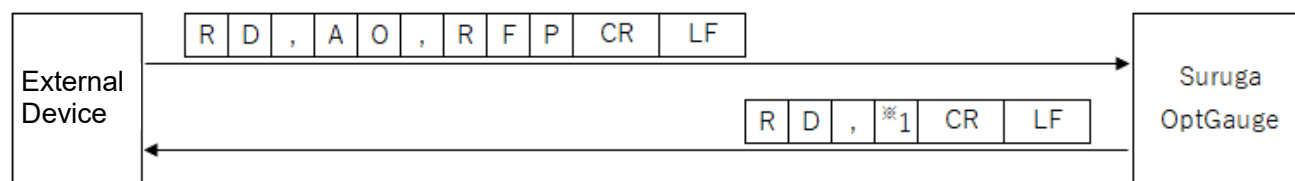
※1: Peak judgement ("0" = disabled, "1" = enabled)

[Read: Peak Judgement Value Configuration]



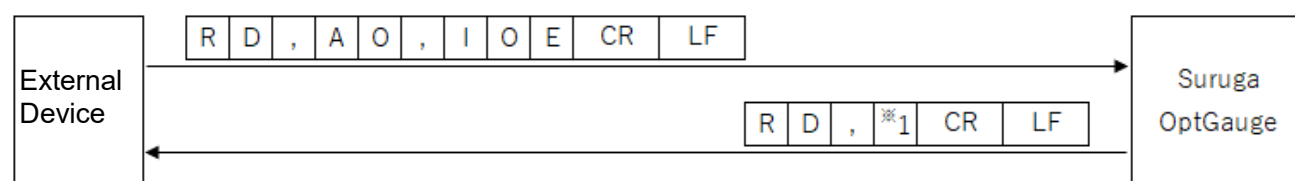
※1: Peak judgement value (0.0 to 4095.0)

[Read: Log File Output Path Configuration]



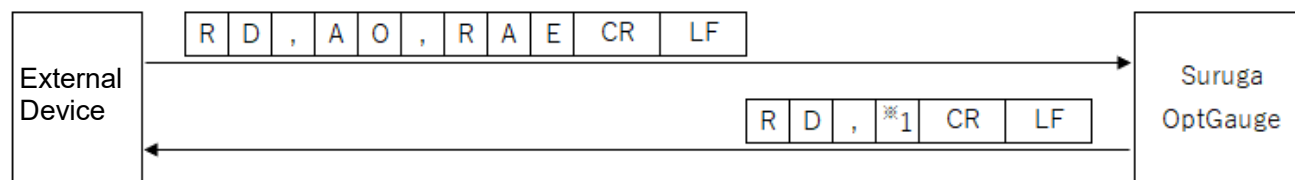
※1 : Log File Path Strings

[Read: Image File Output Enabled Configuration]



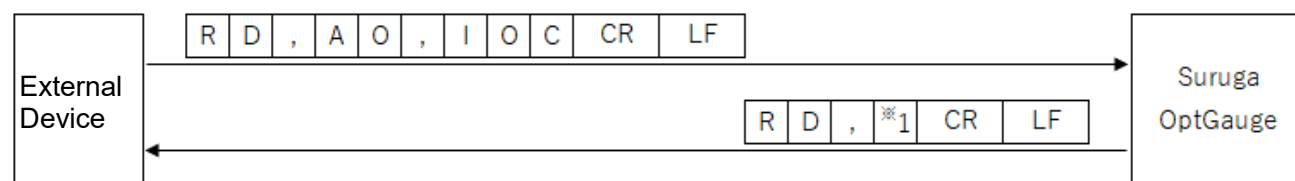
※1 : Image File Output ("0" = disabled, "1" = enabled)

[Read: RAW Data Output Enabled Configuration]



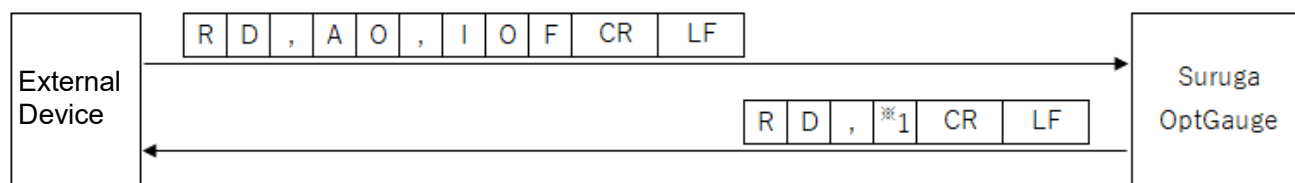
※1 : RAW Data Output ("0" = disabled, "1" = enabled)

[Read: Image File Output Color Configuration]



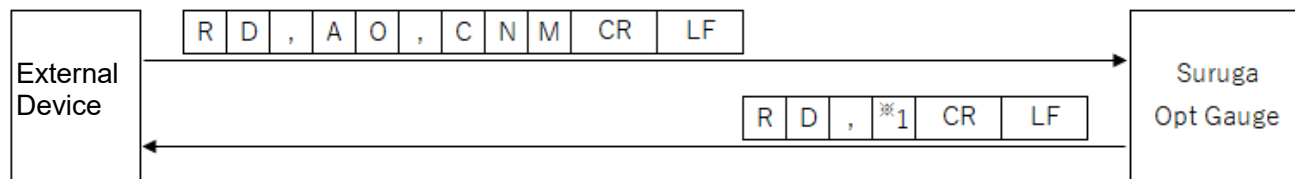
※1 : Image File Output Color ("0"= Full Color、 "1"= Grayscale)

[Read: Image File Output Format Configuration]



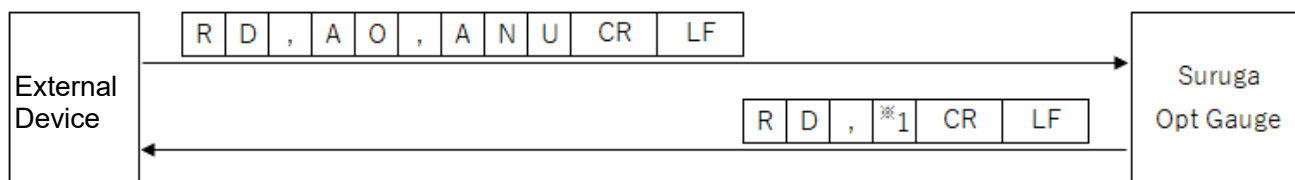
※1 : Image File Output Format ("0"= png、 "1"= bmp、 "2"= tiff)

[Read: Beam Centroid Configuration]



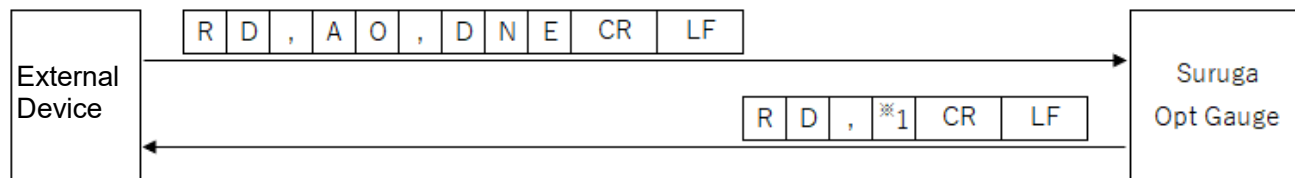
※1: Beam Centroid ("0" = Area, "1" = Intensity)

[Read: Angle Unit Configuration]



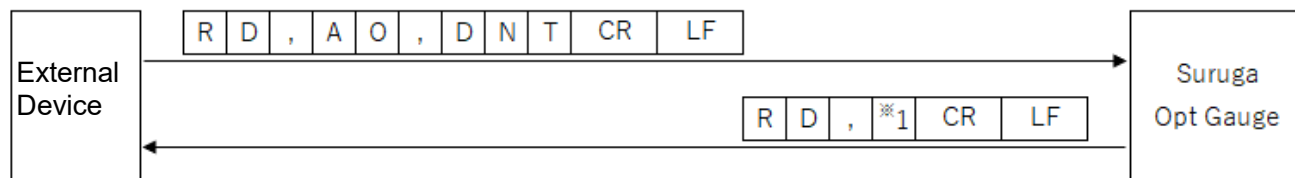
※1: Angle Unit ("0" = degree, "1" = DegMinSec, "2" = milliradian)

[Read: Denoising Enabled Configuration]



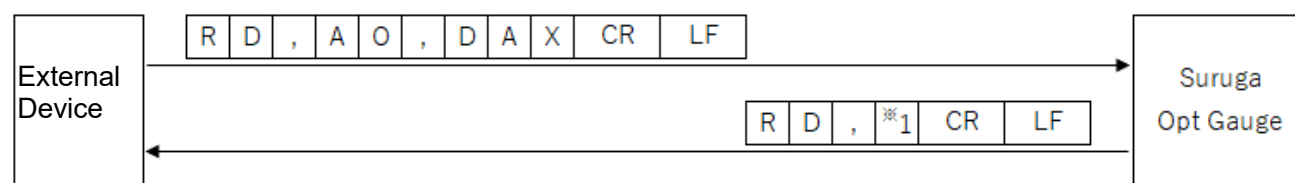
※1: Denoising function ("0" = disabled, "1" = enabled)

[Read: Denoising Threshold Value Configuration]



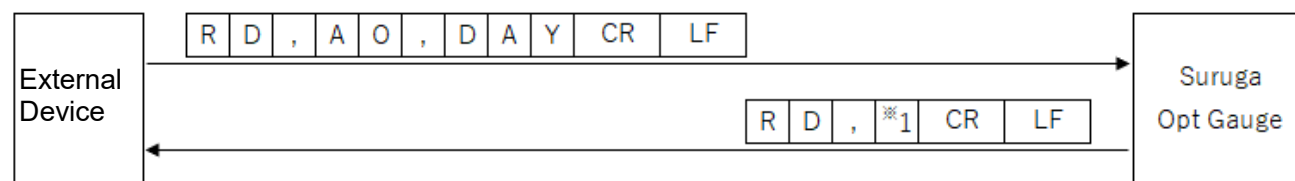
※1: Denoising threshold value (1 to 4095)

[Read: Number of Decimal Places for the Angle X Configuration]



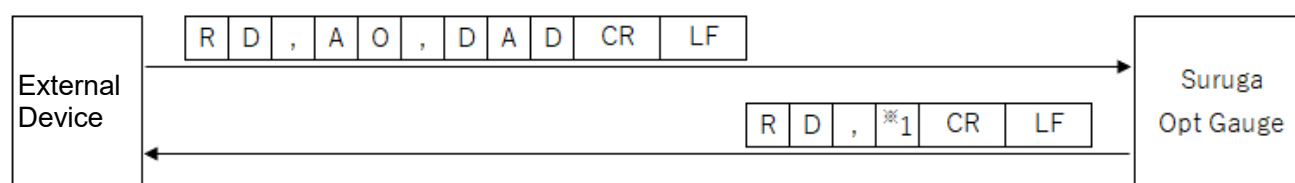
*1: Angle X decimal places (0 to 8)

[Read: Number of Decimal Places for the Angle Y Configuration]



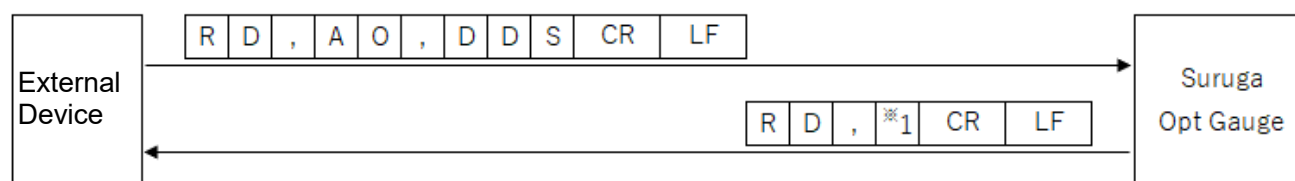
*1: Angle Y decimal places (0 to 8)

[Read: Number of Decimal Places for the Angle D Configuration]



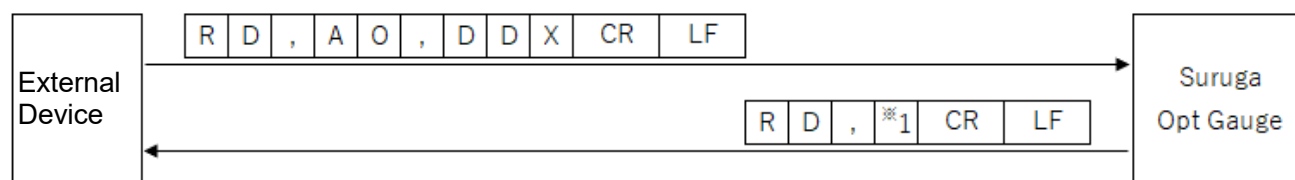
*1: Angle D decimal places (0 to 8)

[(Beam Divergence) Read: Number of Decimal Places for the D4Sigma $1/e^2$ Configuration]



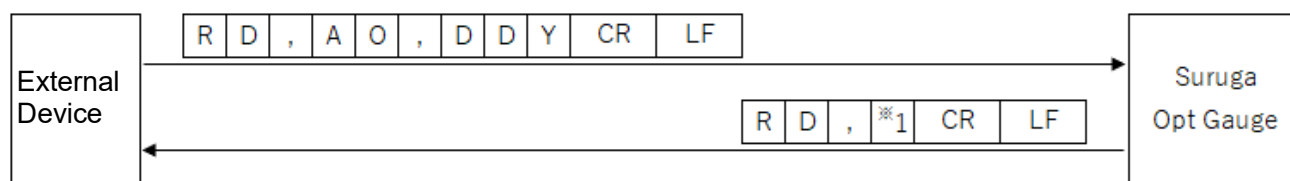
*1: D4Sigma decimal place (0 to 8)

[(Beam Divergence) Read: Number of Decimal Places for the D4Sigma X(M) or $1/e^2$ X(M) Configuration]



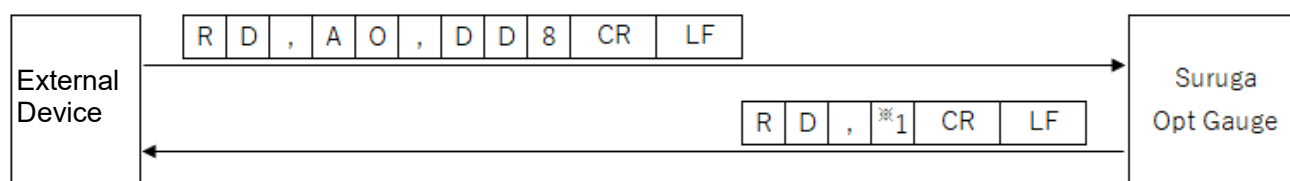
*1: D4Sigma X(M) decimal place (0 to 8)

[(Beam Divergence) Read: Number of Decimal Places for the D4Sigma Y(m) or $1/e^2$ Y(m) Configuration]



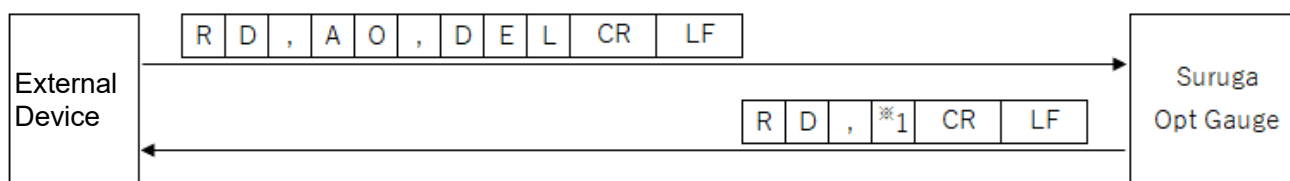
※1: D4Sigma Y(m) decimal places (0 to 8)

[(Beam Divergence) Read: Number of Decimal Places for D86 Configuration]



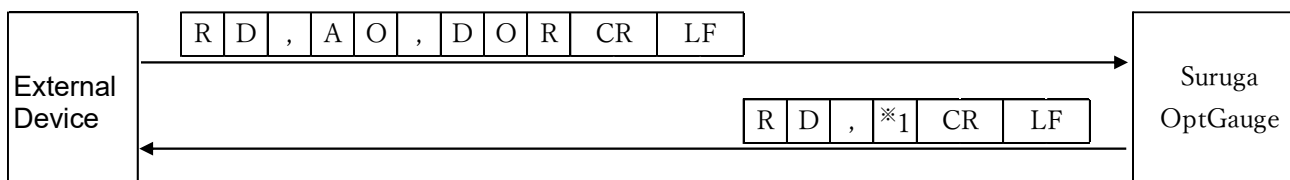
※1: D86 decimal places (0 to 8)

[Read: Number of Decimal Places for Ellipticity Configuration]



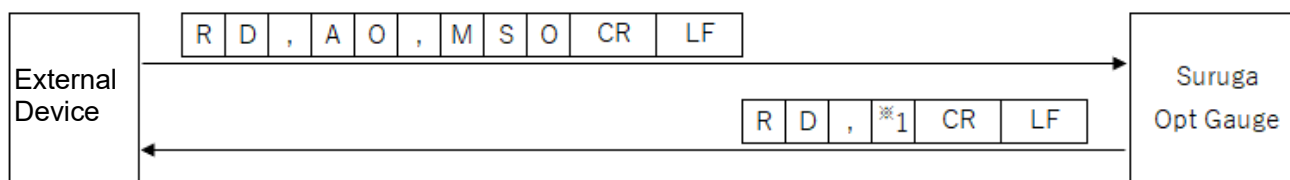
※1: Ellipticity decimal places (0 to 8)

[Read: Number of Decimal Places for the Rotation Angle Measurement Configuration]



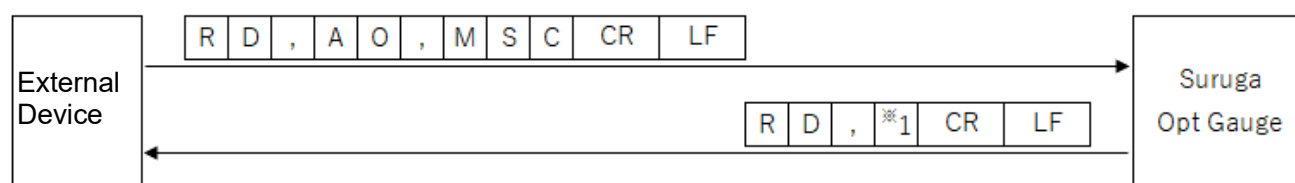
※1 : the number of decimal places (0~8)

[(Multi Spot) Read: Order Configuration]



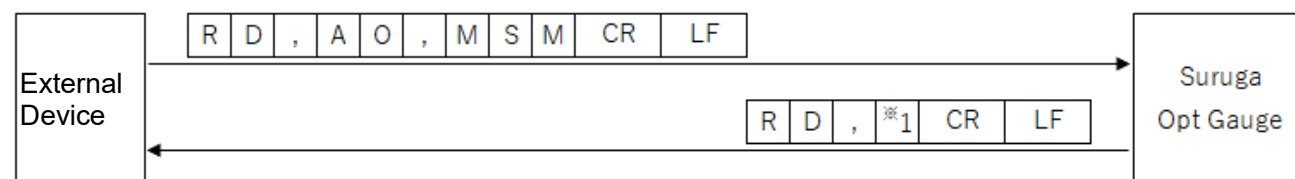
※1: (Multi Spot) List sort type ("0" = area, "1" = angle)

[(Multi Spot) Read: Spot Count Configuration]



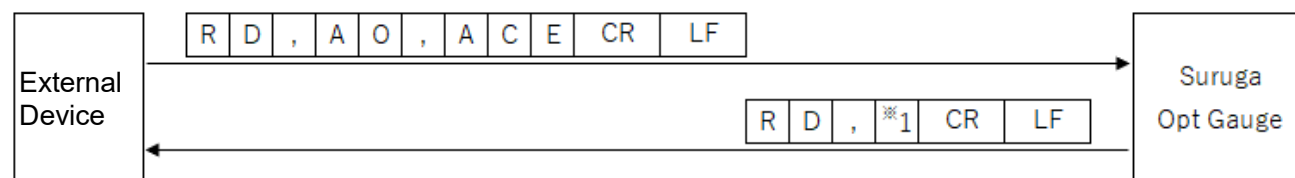
※1: (Multi Spot) Spot count (1 to 100)

[(Multi Spot) Read: Minimum Spot Area configuration]



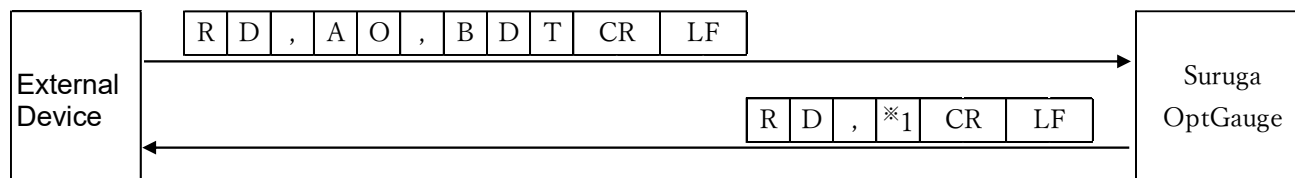
※1: Minimum spot area (1 to 1023)

[Read: Adaptive Cal Execution Button Display Enabled Configuration]



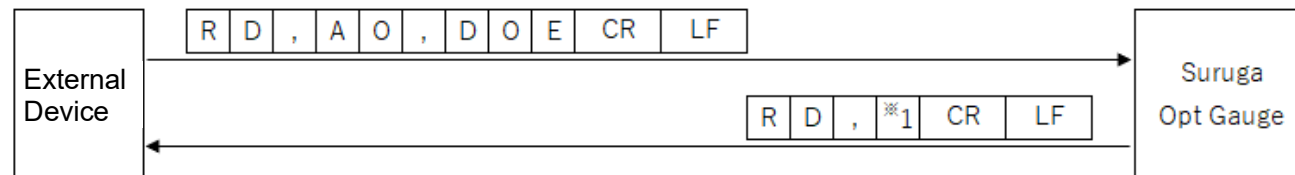
※1: Adaptive Cal execute button display ("0" = disabled, "1" = enabled)

[Read: Beam Diameter Type Configuration]



※1 : Beam Diameter Type ("0" = D4Sigma, "1" = 1/e²)

[Read: Orientation Enabled Configuration]



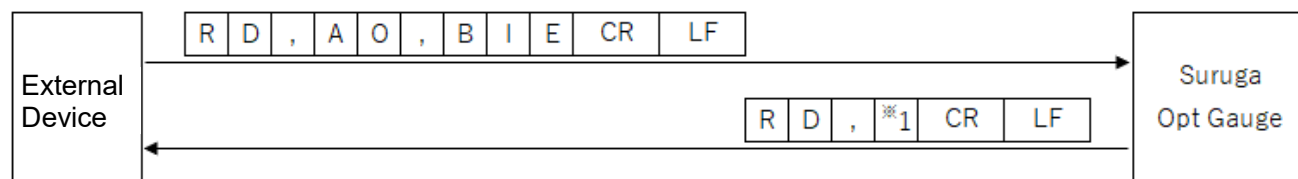
※1: Orientation Enabled ("0" = disabled, "1" = enabled)

[Read: Rotation Angel Measurement Method Configuration]



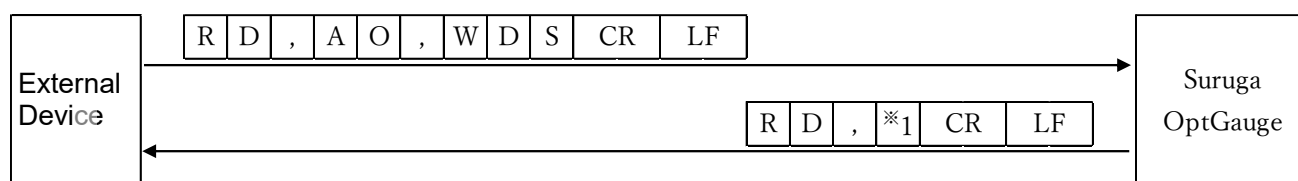
※1 : rotation angle measurement method (“0”= Ellipse Fitting、“1”= Max Distance Search)

[Read: Binning Enabled Configuration]



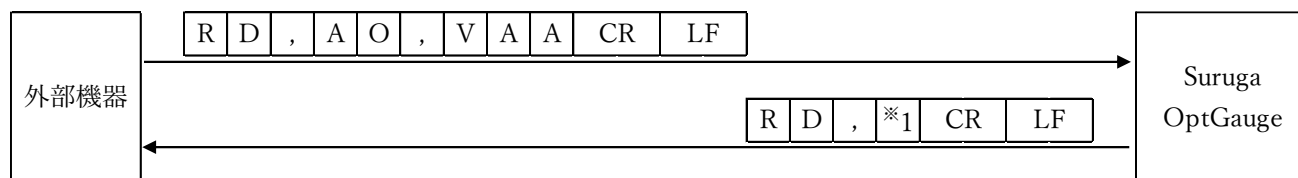
※1: Binning setting (“0” = disabled, “1” = enabled)

[Read : Working Distance]



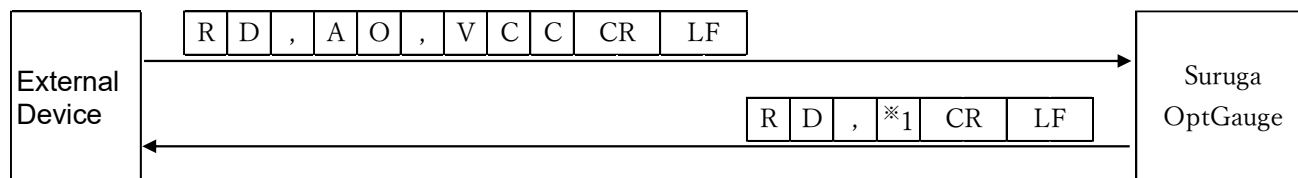
※1: Working distance (30 to 300)

[Read: Auto Aperture Display Cconfiguration]



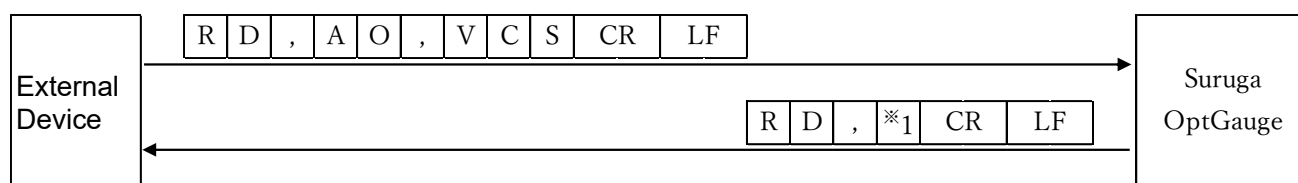
※1 : Auto aperture display (“0” = disabled, “1” = enabled)

[Read: Centroid Cursor Display Configuration]



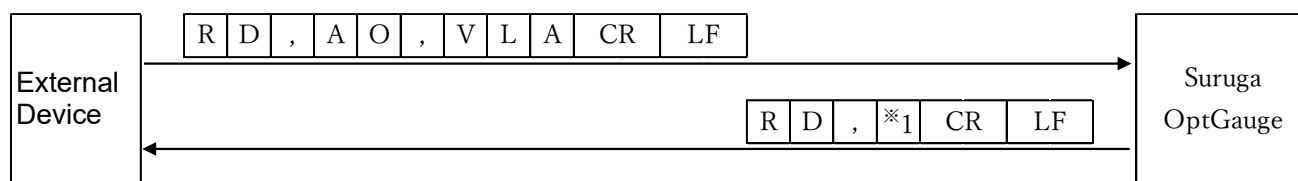
※1: Centroid Cursor display (“0” = disabled, “1” = enabled)

[Read: Cross Section Display Configuration]



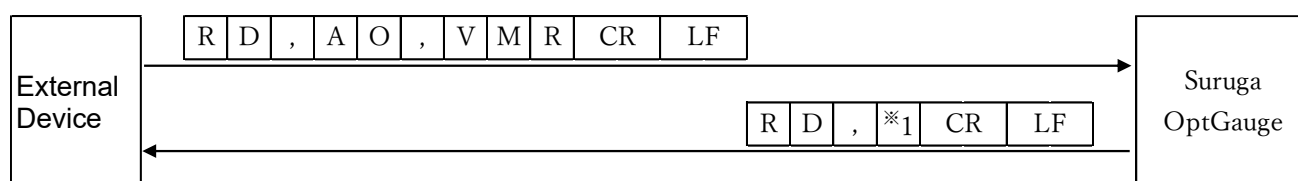
※1: Cross Section display ("0" = disabled, "1" = enabled)

[Read: Labeling Area Display Configuration]



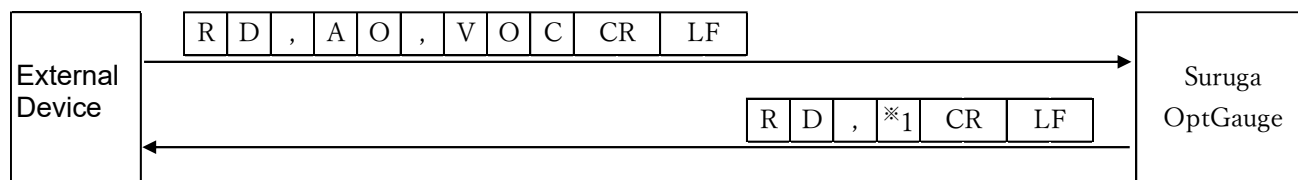
※1: Labeling Area display ("0" = disabled, "1" = enabled)

[Read: Measurement Range Display Configuration]



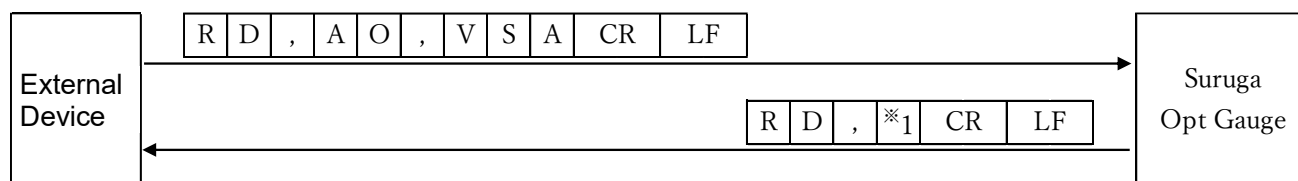
※1: Measurement range display ("0" = disabled, "1" = enabled)

[Read: Origin Cursor Display Configuration]



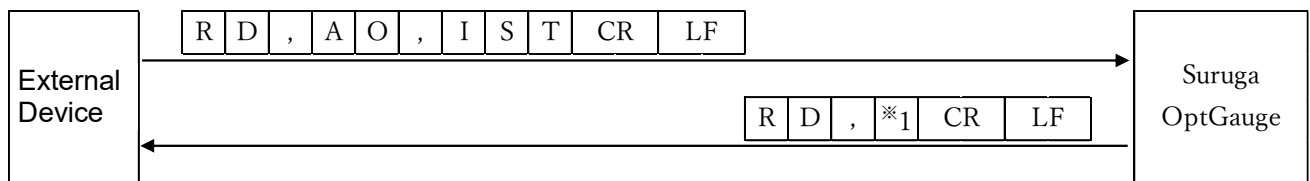
※1: Origin Cursor display ("0" = disabled, "1" = enabled)

[Read: Spot Area Display Configuration]



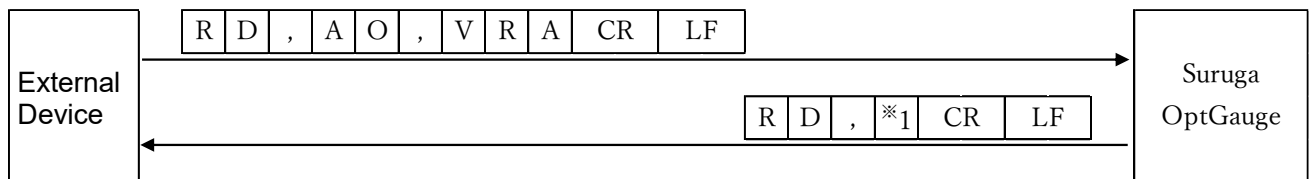
※1: Spot Area display ("0" = disabled, "1" = enabled)

[Read: Spot Area Display Type Configuration]



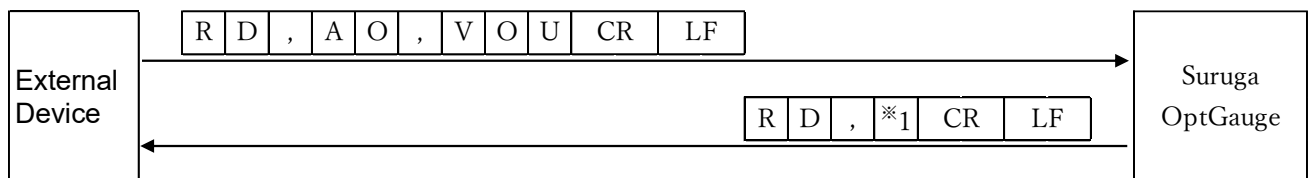
※1: Spot Area display type ("0" = D4Sigma, "1" = D86)

[Read: ROI Area Display Configuration]



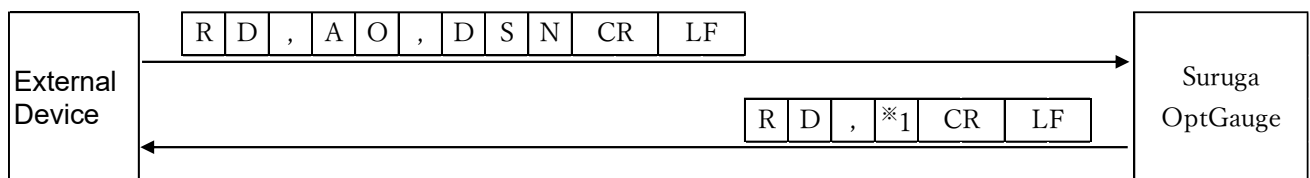
※1: ROI area display ("0" = disabled, "1" = enabled)

[Read: Rotaion Angle Cursor Display Enabled Configuration]



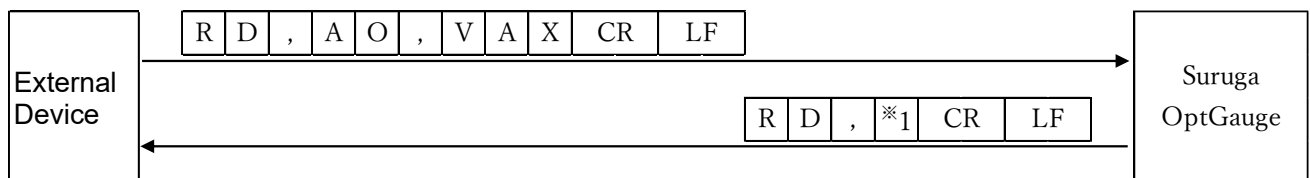
※1 : Rotation Angle Cursor display ("0" = disable、"1" = enable)

[Read: Display Spot Number Configuration]



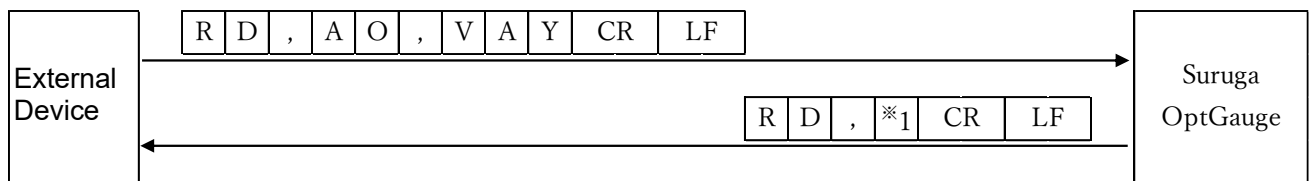
※1: Display spot number setting value (0 to 100)

[Read: Angle X Result Display Configuration]



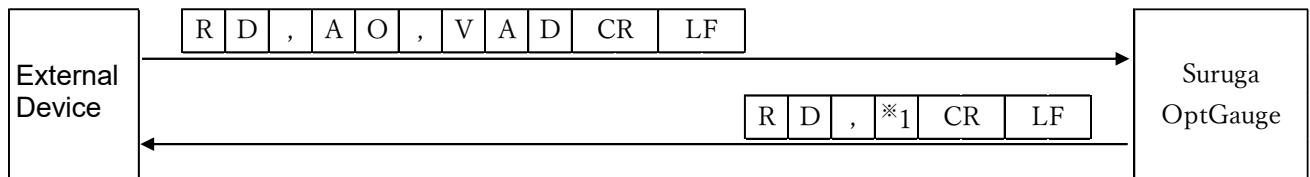
※1: Display Result ("0" = disabled, "1" = enabled)

[Read: Angle Y Result Display Configuration]



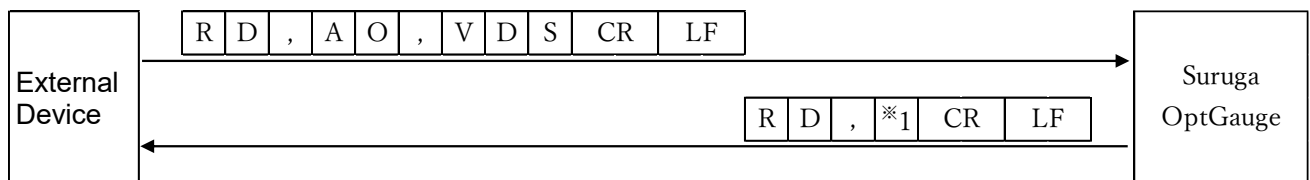
※1: Display Result ("0" = disabled, "1" = enabled)

[Read: Angle D Result Display Configuration]



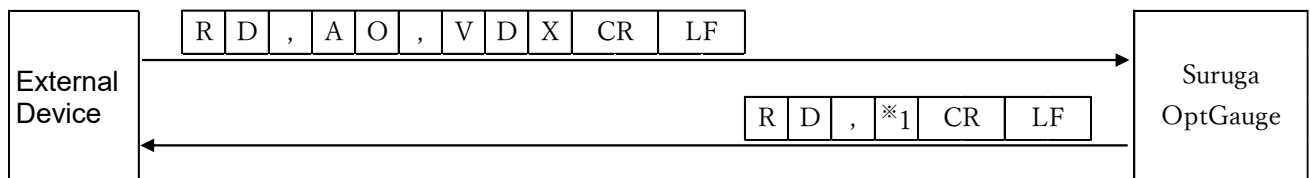
※1: Display Result ("0" = disabled, "1" = enabled)

[Read: D4Sigma or 1/e² Result Display Configuration]



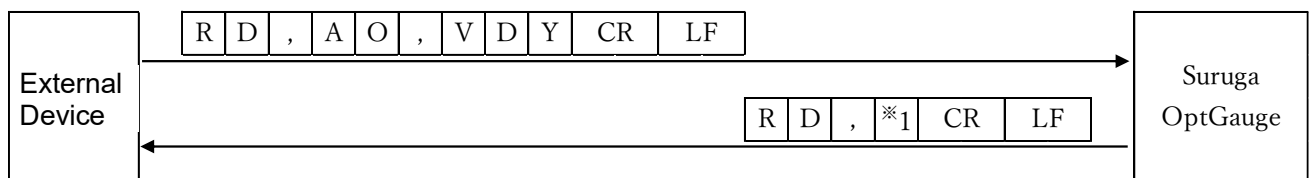
※1: Display Result ("0" = disabled, "1" = enabled)

[Read: D4Sigma X(M) or 1/e²X(M) Result Display Configuration]



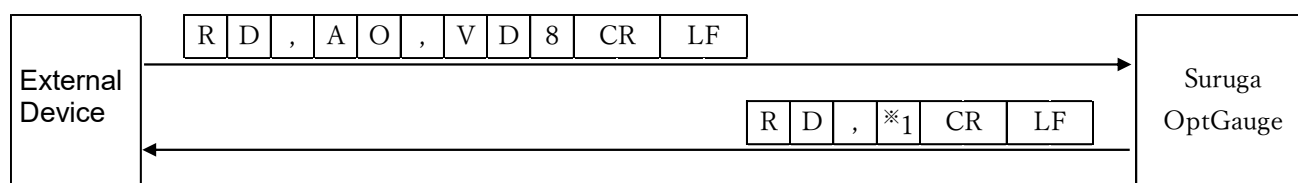
※1: Display result ("0" = disabled, "1" = enabled)

[Read: D4SigmaY(m) or 1/e²Y(m) Results display Configuration]



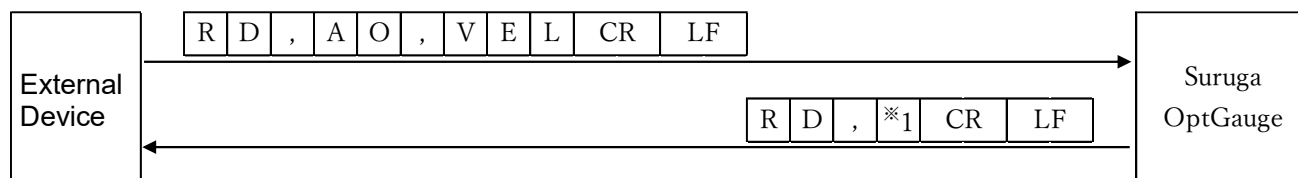
※1: Display Result ("0" = disabled, "1" = enabled)

[Read: D86 Results Display Configuration]



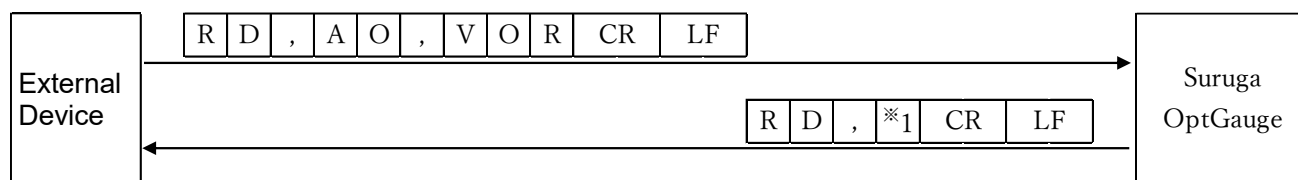
※1: Display Result ("0" = disabled, "1" = enabled)

[Read: Ellipticity Results Display Configuration]



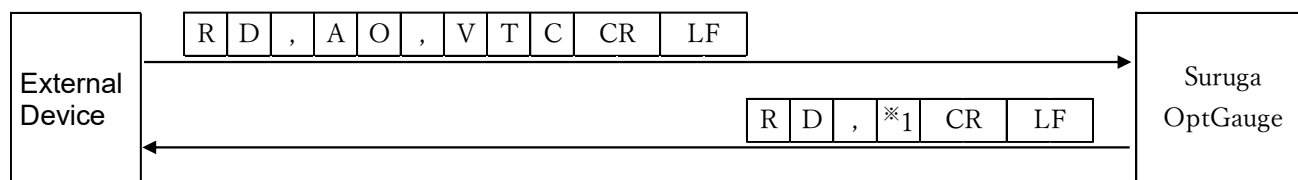
※1: Display Result ("0" = disabled, "1" = enabled)

[Read: Rotation Angle Result Display Configuraiton]



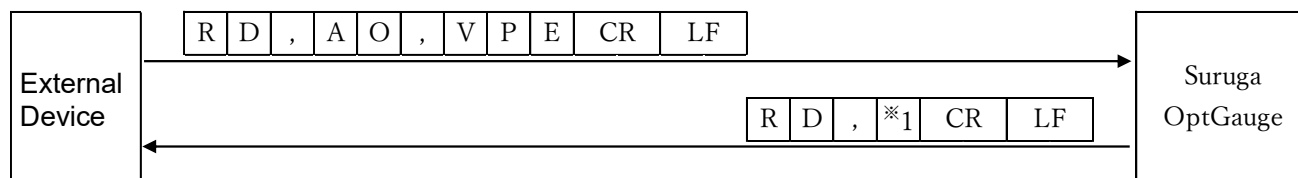
※1：結果表示 ("0" = disabled, "1" = enabled)

[Read Total Count Result Display Configuration]



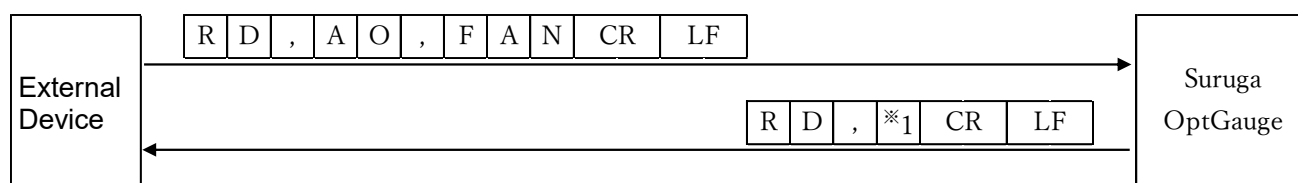
※1: Display Result ("0" = disabled, "1" = enabled)

[Read: Peak Result Display Configuration]



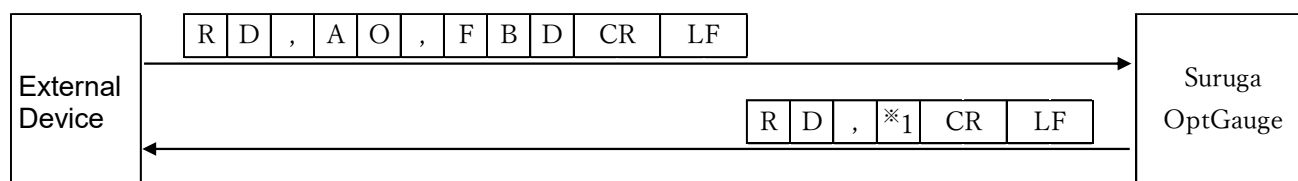
※1: Peak results display ("0" = disabled, "1" = enabled)

[Read: Font Size for the Angle Configuration]



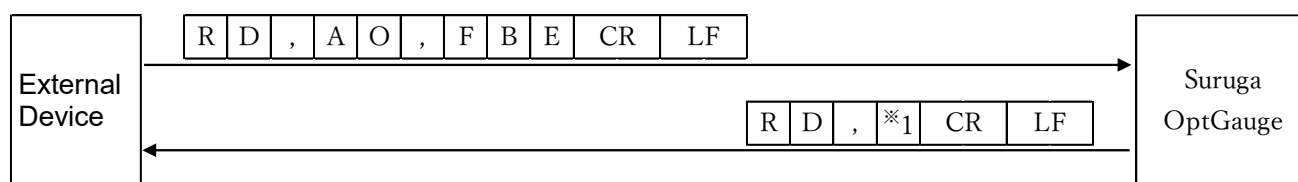
※1: Font size ("0" = small, "1" = medium, "2" = large)

[Read: Font Size for the Beam Divergence Configuration]



※1: Font size ("0" = small, "1" = medium, "2" = large)

[Read: Font size for the Beam Ellipticity Configuration]



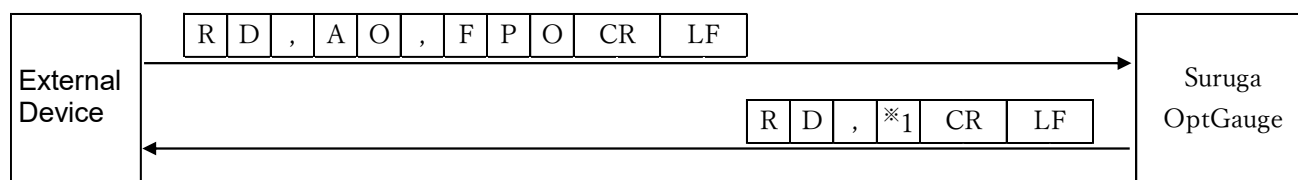
※1: Font size ("0" = small, "1" = medium, "2" = large)

[Read: Font Size for the Rtation Angle Configuration]



※1 : Font size ("0"= Small、 "1"= Medium、 "2"= Large)

[Read: Font Size for the Power Configuration]



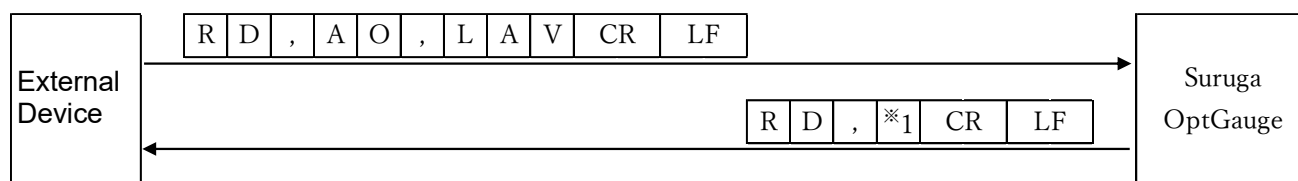
※1: Font size ("0" = small, "1" = medium, "2" = large)

[Read: Automatic Brightness Execution Enabled Configuration]



※ 1: Automatic brightness execution ("0" = disabled, "1" = enabled)

[Read: Peak Target Value for the Automatic Brightness Configuration]



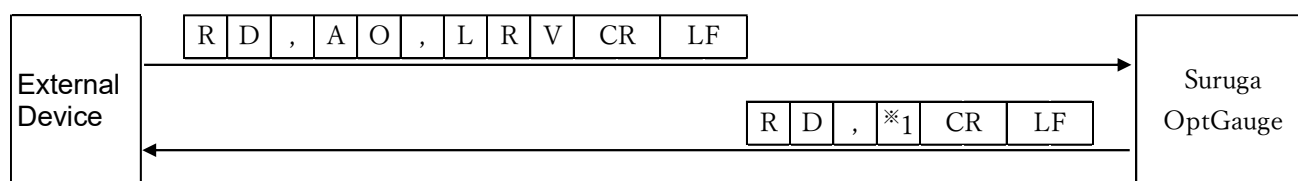
※1: Automatic brightness peak target value (1000 to 3500)

[Read: Peak Target Range Configuration for the Automatic Brightness Configuration]



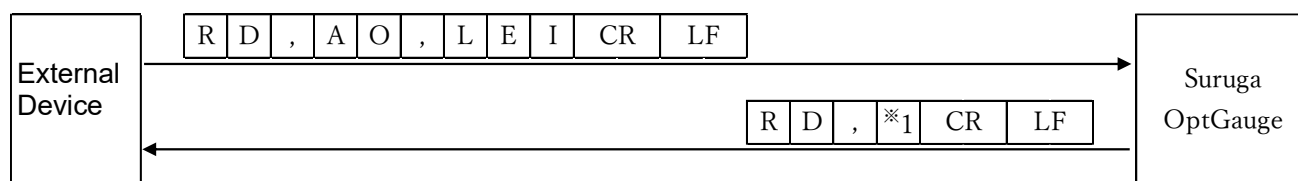
※1: Automatic brightness peak target range (100 to 1000)

[Read: Reflectance of the Target for the Automatic Brightness Configuration]



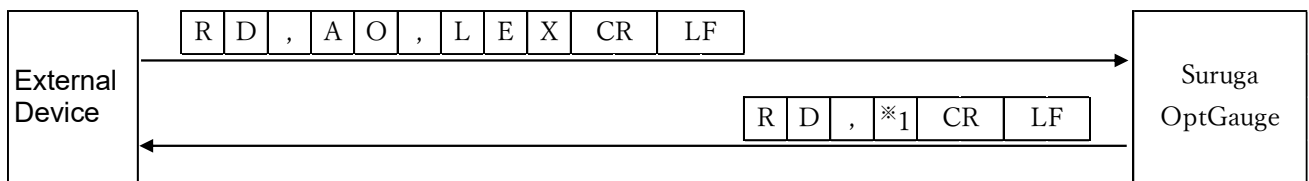
※1: Automatic brightness target reflectance (0.05 to 100)

[Read: Initial Exposure Time Value applied in the Automatic Brightness Configuration]



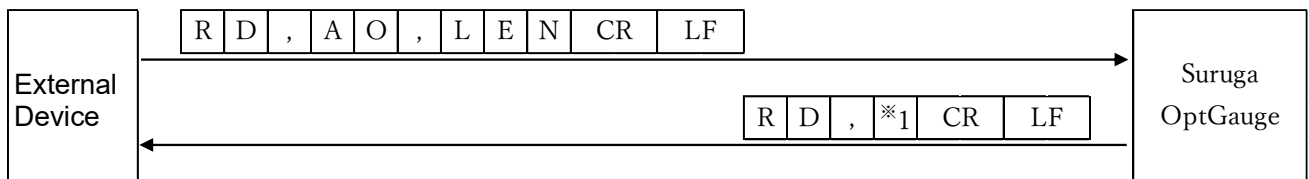
※1: Initial exposure time value applied in automatic brightness (0.027 to 20)

[Read: Maximum value of exposure time applied in automatic brightness Configuration]



※1: Maximum value of exposure time applied in automatic brightness (0.027 to 20)

[Read: Minimum Exposure Time Applied in the Automatic Brightness Configuration]



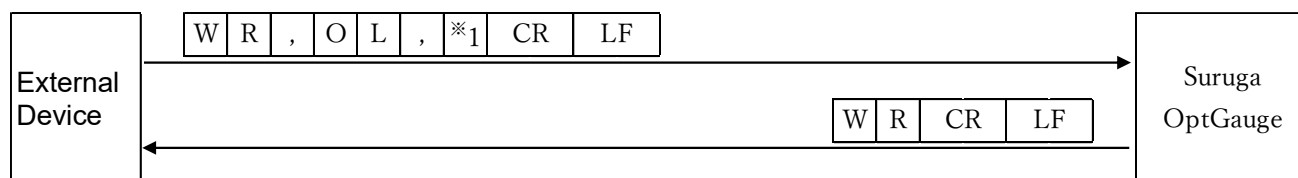
※1: Minimum exposure time applied in automatic brightness (0.027 to 20)

3.5 Write Commands

3.5.1 Command Format

3.5.1.1 Common Commands

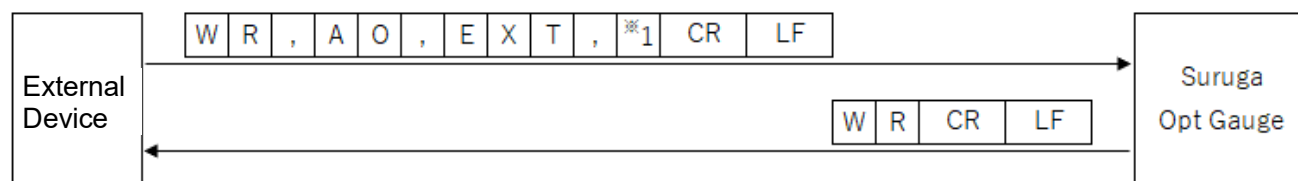
[Write: Option List Configuration]



*1: Option list index number

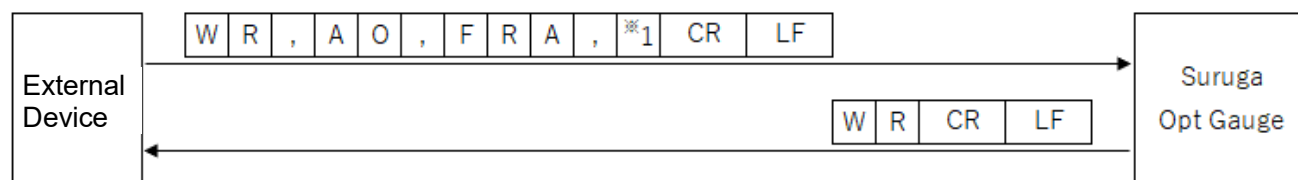
3.5.1.2 Angle

[Write: Sensor Camera Exposure Time]



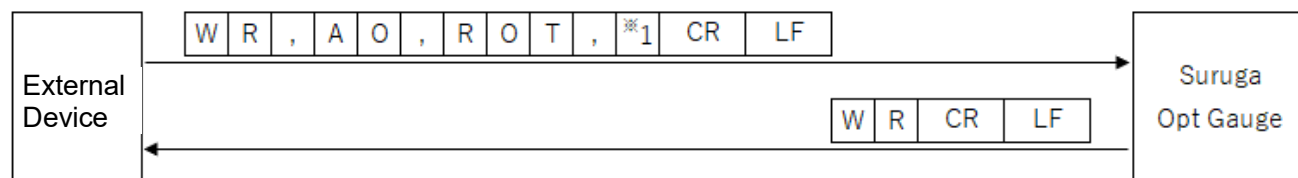
*1: Exposure time (0.027 to 2000)

[Write: Sensor Camera Frame Rate]



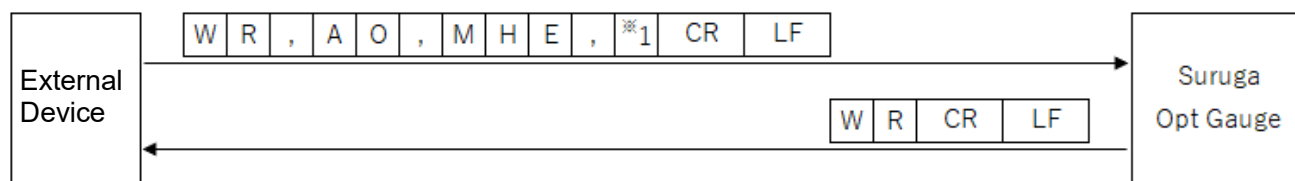
*1: Frame Rate (0.1 to 100)

[Write: Rotation Configuration]



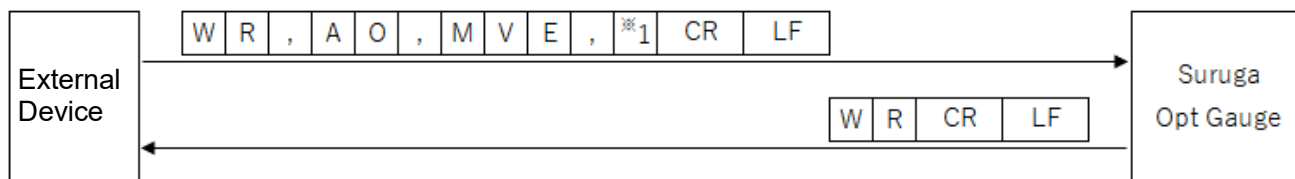
*1: Rotation ("0" = OFF, "1" = Rotation right 90°, "2" = Rotation right 180°, "3" = Rotation right 270°)

[Write: Mirroring Horizontal Configuration]



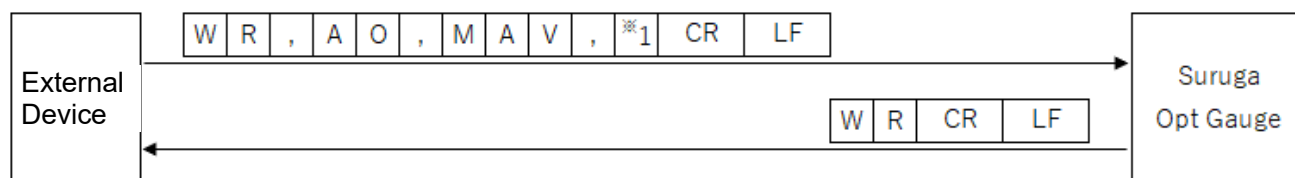
*1: Mirroring ("0" = OFF, "1" = horizontal mirroring)

[Write: Mirroring Vertical Configuration]



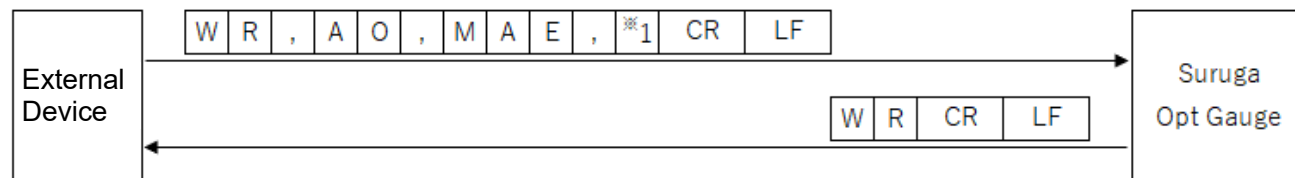
*1: Mirroring ("0" = OFF, "1" = vertical mirroring)

[Write: Number of Averaging Times Configuration]



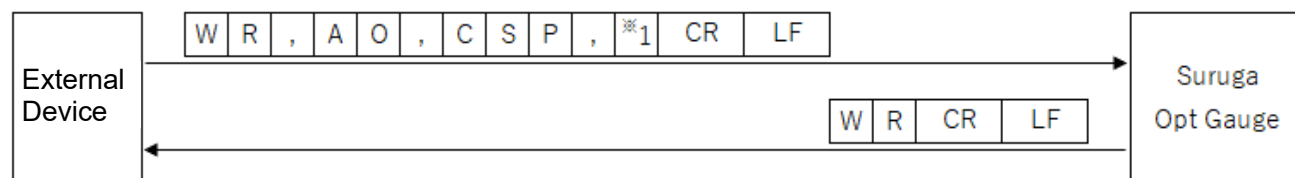
*1: Number of Averaging Times (2 to 262,144)

[Write: Averaging Processing Enabled Configuration]



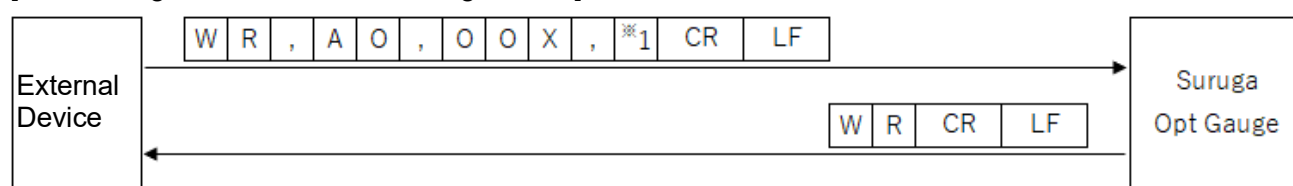
*1: Averaging Processing ("0" = disabled, "1" = enabled)

[Write: Cross Section Point Configuration]



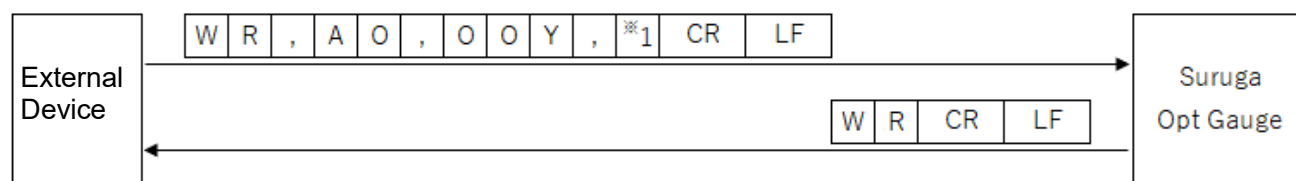
*1: Cross Section Point ("0" = Origin Cursor, "1" = Beam Cursor)

[Write: Origin Offset X Value Configuration]



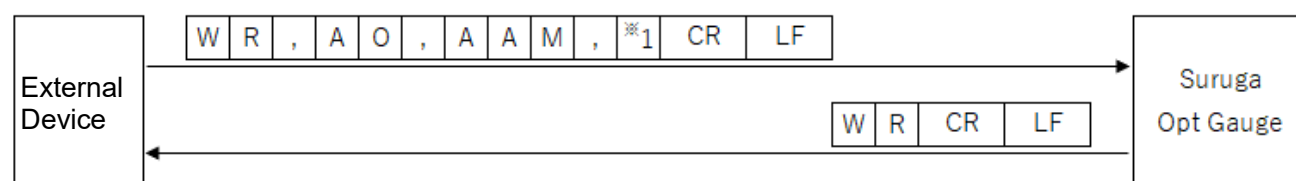
※1: Origin Offset X (-20 to 20)

[Write: Origin Offset Y Value Configuration]



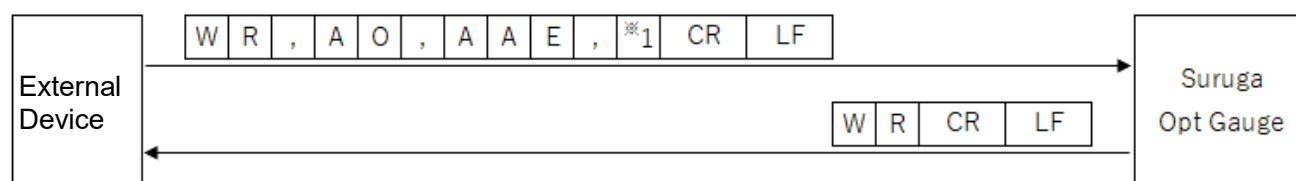
※1: Origin Offset Y (-20 to 20)

[Write: Auto Aperture Method Configuration]



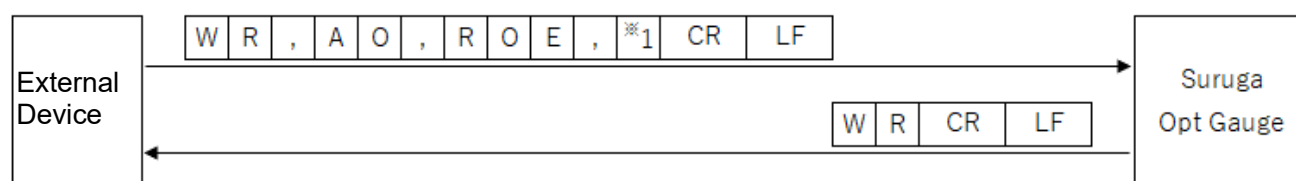
※1: Auto Aperture Method ("0" = area, "1" = luminance)

[Write: Auto Aperture Enabled Configuration]



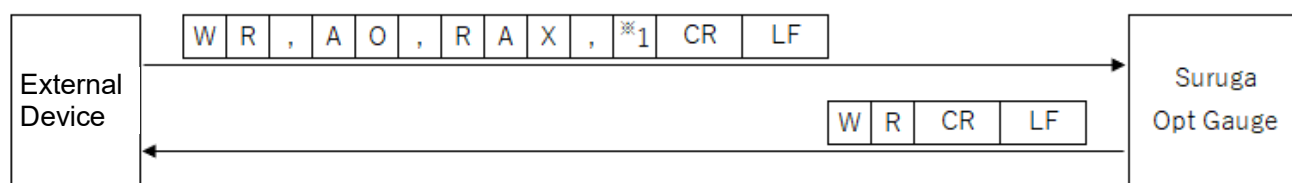
※1: Auto Aperture ("0" = disabled, "1" = enabled)

[Write: ROI Enabled Configuration]



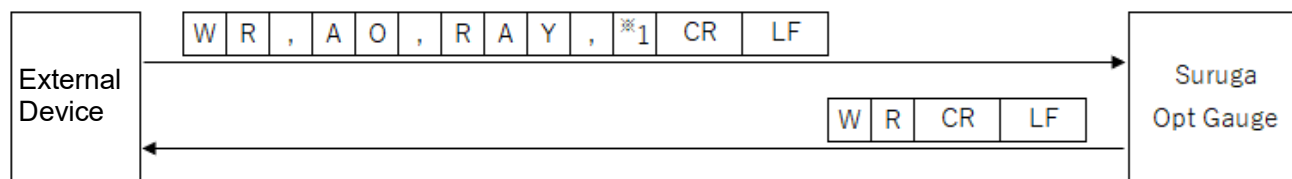
※1: ROI ("0" = disabled, "1" = enabled)

[Write: ROI X Value Configuration]



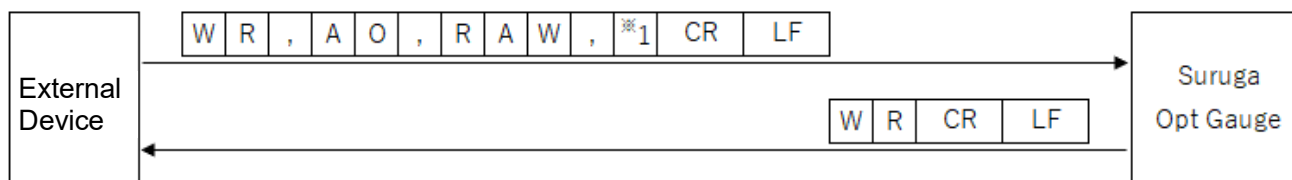
※1: ROI X value (-3000 to 3000) or (-1500 to 1500) if the Binning is enabled.

[Write: ROI Y Value Configuration]



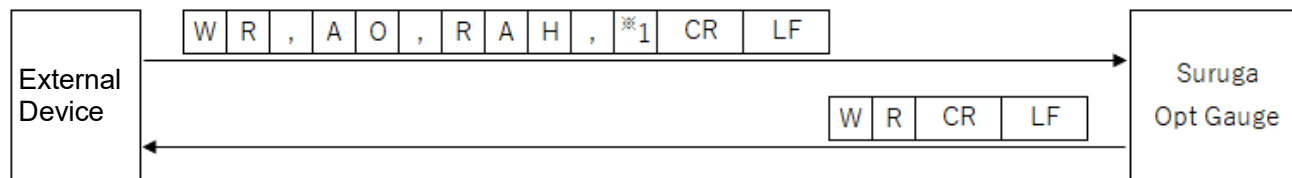
※1: ROI Y value (-3000 to 3000) or (-1500 to 1500) if the Binning is enabled:

[Write: ROI Width Configuration]



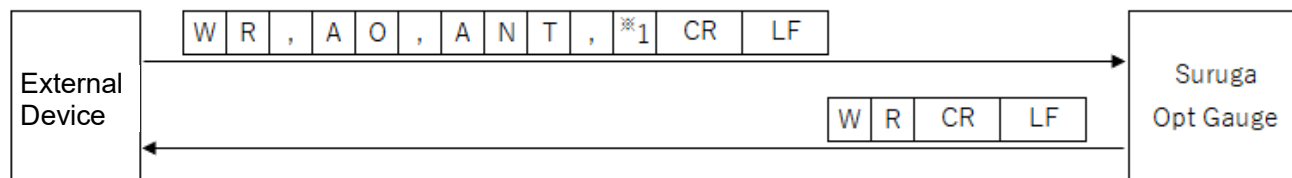
※1: ROI Width (0 to 3000) or (0 to 1500) if the Binning is enabled.

[Write: ROI Height Configuration]



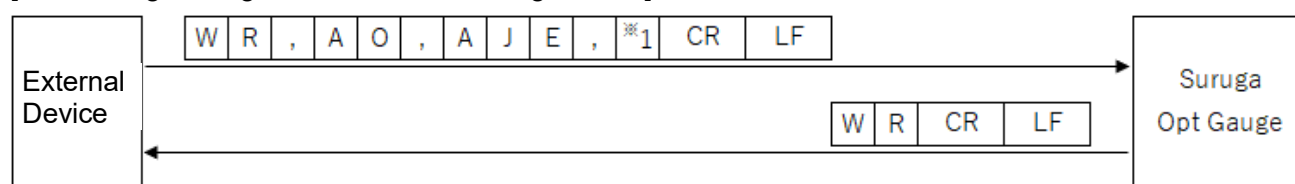
※1 : ROI Height (0~3000) or (0 to 1500) if the Binning is enabled.

[Write: Angle Type Configuration]



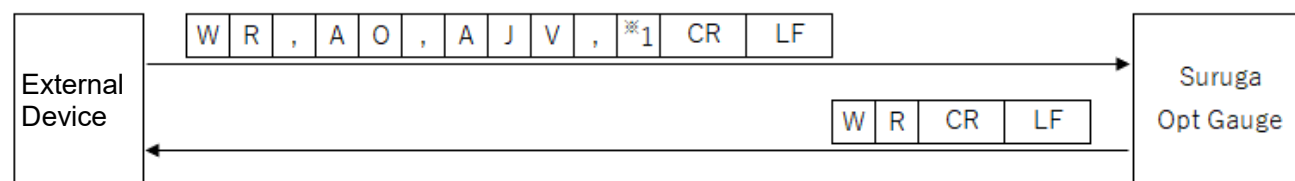
※1: Angle Type ("0"= Tilt Angle、"1"= Beam Angle)

[Write: Angle Judgement Enabled Configuration]



※1: Angle judgment ("0" = disabled, "1" = enabled)

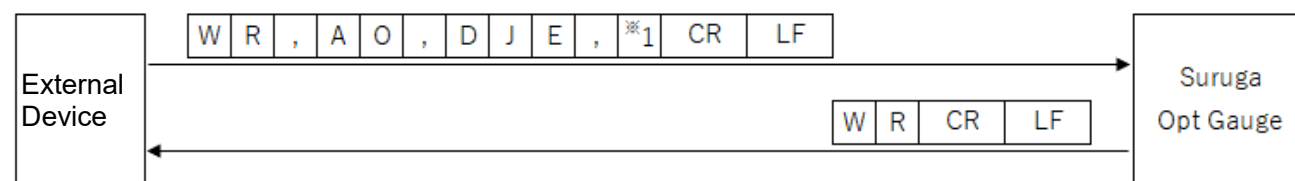
[Write: Angle Judgement Value Configuration]



※1: Angle judgement value

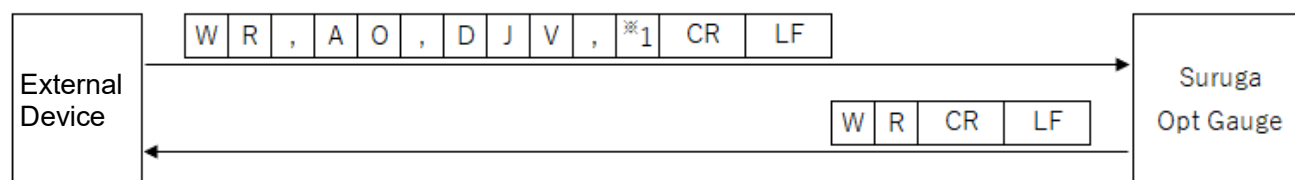
If Angle Type = Tilt Angle (0 to 10). Or, if Angle Type = Beam Angle (0 to 20).

[Write: Divergence Judgment Enabled Configuration]



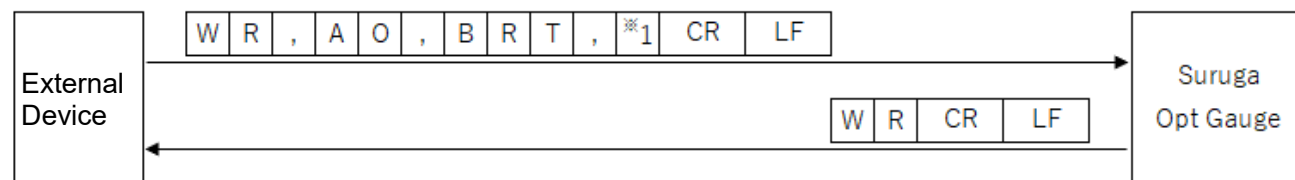
※1: Divergence judgement ("0" = disabled, "1" = enabled)

[Write: Divergence Judgment Value Configuration]



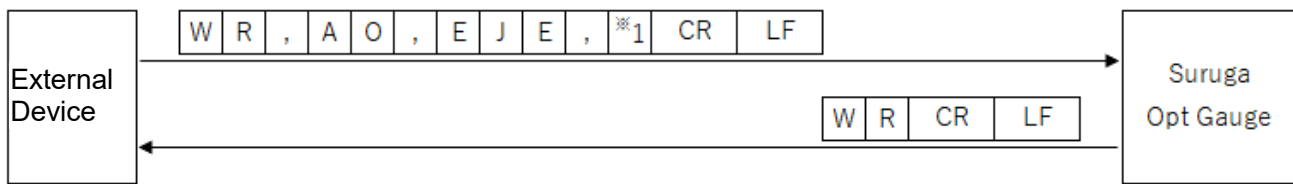
※1: Divergence judgement value (0.0000 to 1000.0000)

[Write: Judgement Radius Type Configuration]



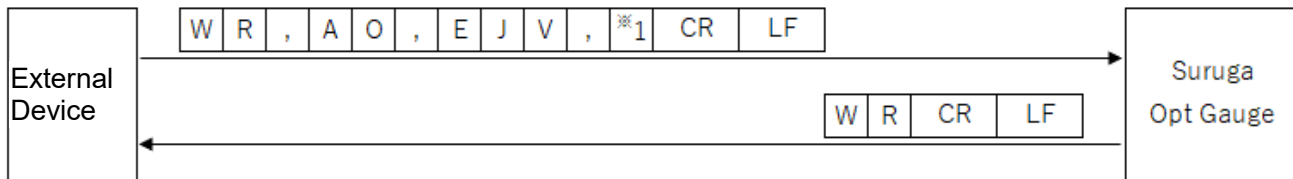
※1: Judgement RadiusType ("0" = D4Sigma or 1/e², "1" = D86)

[Write: Ellipticity Judgement Enabled Configuration]



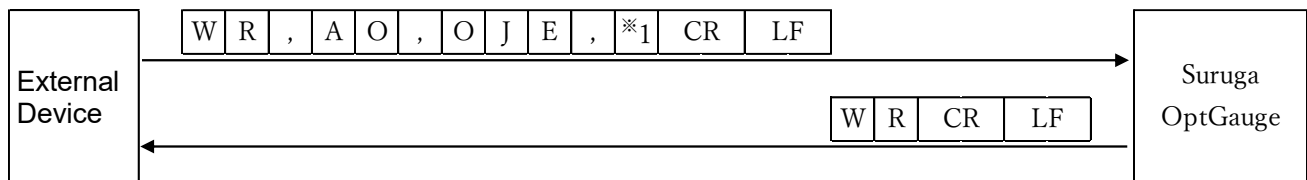
※1: Ellipticity judgement (“0” = disabled, “1” = enabled)

[Write: Ellipticity Judgement Value Configuration]



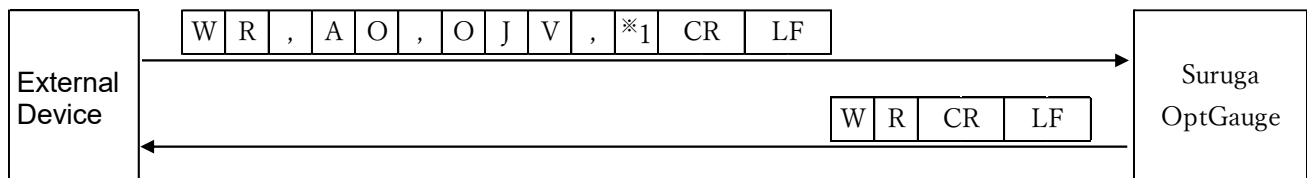
※1: Judgement Ellipticity judgement value (0.0000 to 1.0000)

[Write: Rotation Angle Judgement Enabled Configuration]



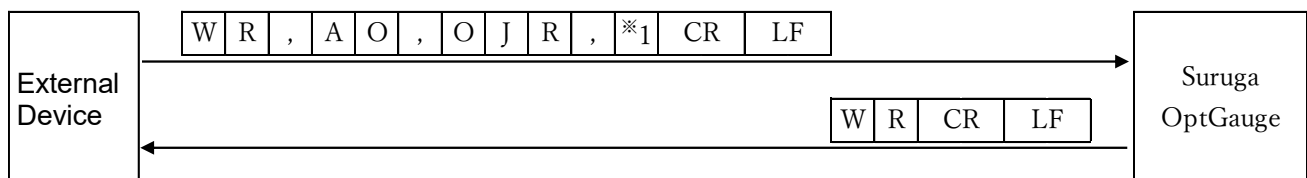
※1: Angle rotation judgement (“0” = disabled, “1” = enabled)

[Write: Rotation Angle Judgement Criteria Value Configuration]



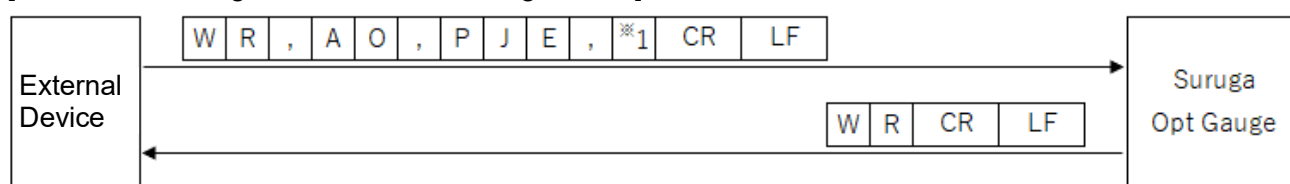
※1: Rotation angle judgement criteria Value (-90 to 90)

[Write: Rotation Angle Judgement Range Configuration]



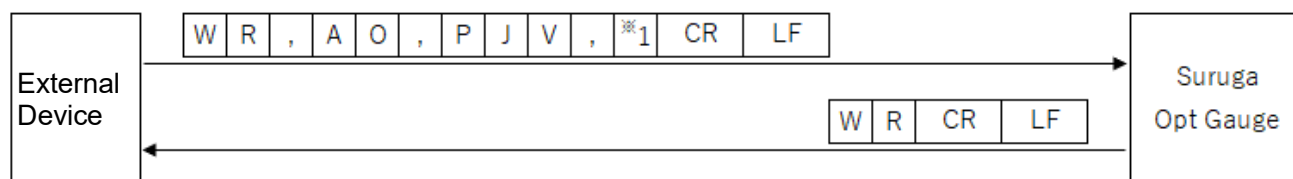
※1: Rotation angle judgment range (-90 to 90)

[Write: Peak Judgement Enabled Configuration]



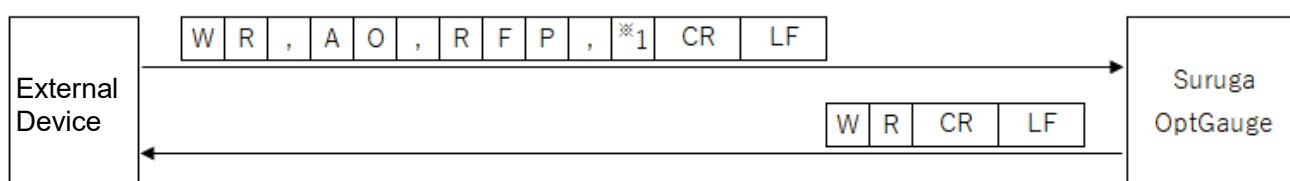
※1: Peak Judgement (“0” = disabled, “1” = enabled)

[Write: Peak Judgement Value Configuration]



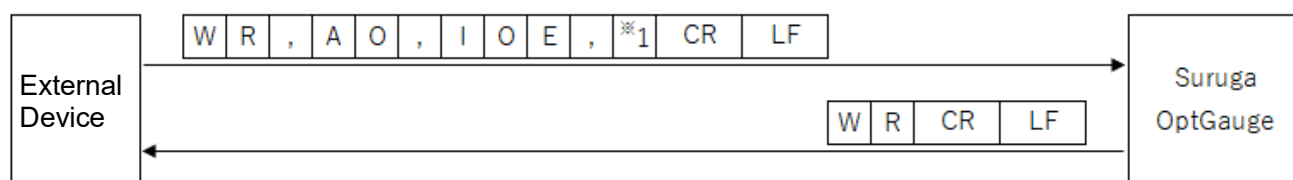
※1: Peak judgement value (0.0 to 4095.0)

[Write: Log File Output Path Configuration]



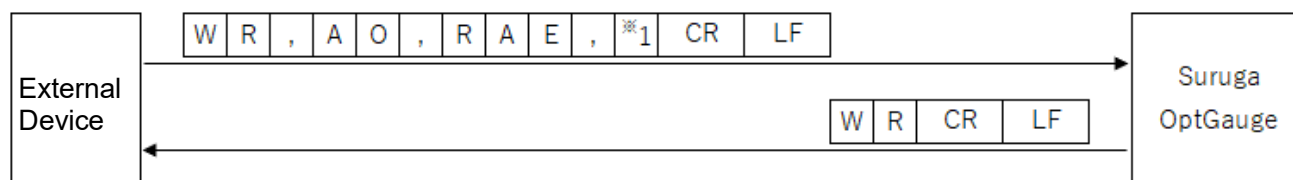
※1 : Log File Path String

[Write: Image File Output Enabled Configuration]



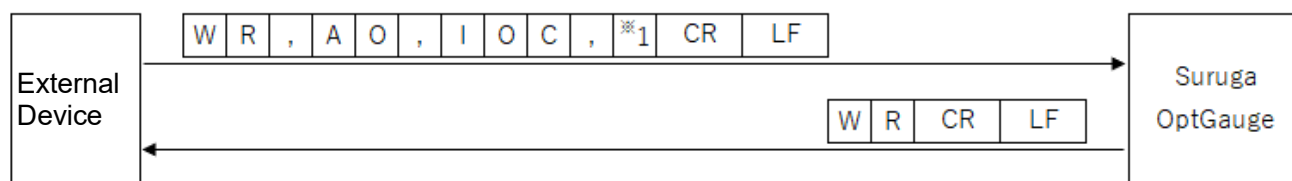
※1 : Image File Output (“0” = disabled, “1” = enabled)

[Write: RAW Data Output Enabled Configuration]



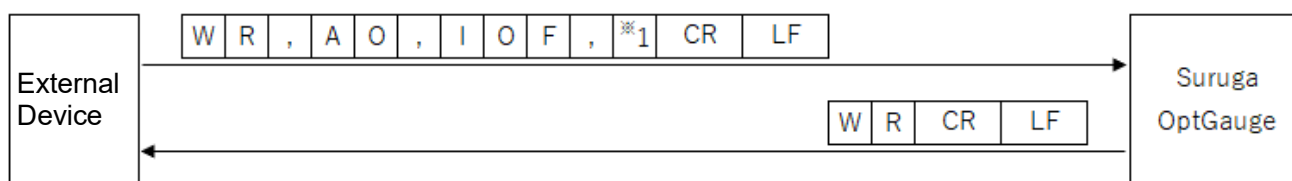
※1 : RAW Data Output (“0” = disabled, “1” = enabled)

[Write: Image File Output Color Configuration]



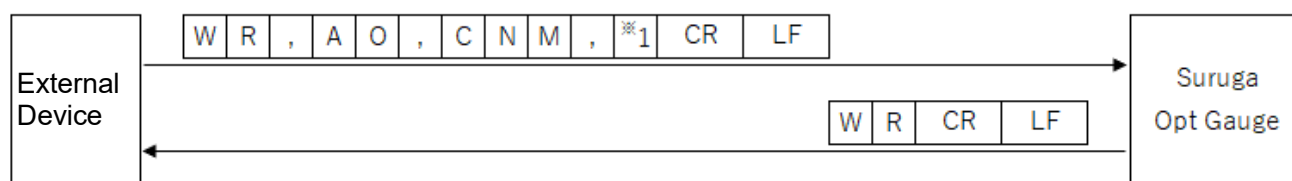
※1 : Image File Output Color (“0”= Full color、 “1”= Gray scale)

[Write: Image File Output Format Configuration]



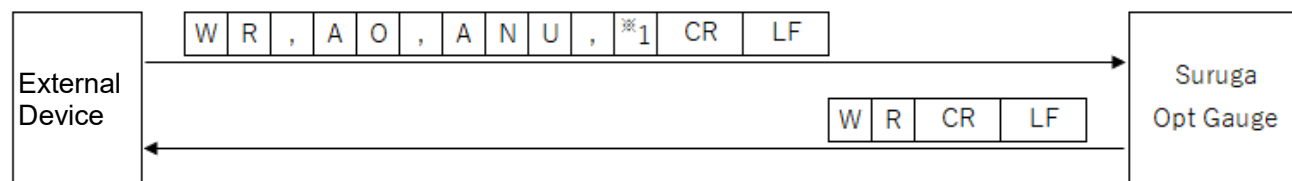
※1 : Image File Output Format (“0”= png、 “1”= bmp、 “2”= tiff)

[Write: Beam Centroid Configuration]



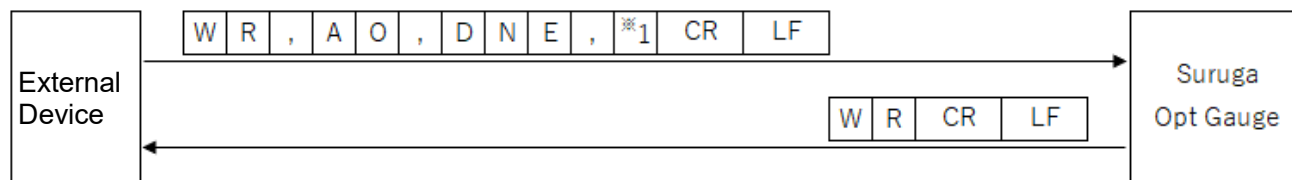
※1: Beam Centroid (“0” = area, “1” = Intensity)

[Write: Angle Unit Configuration]



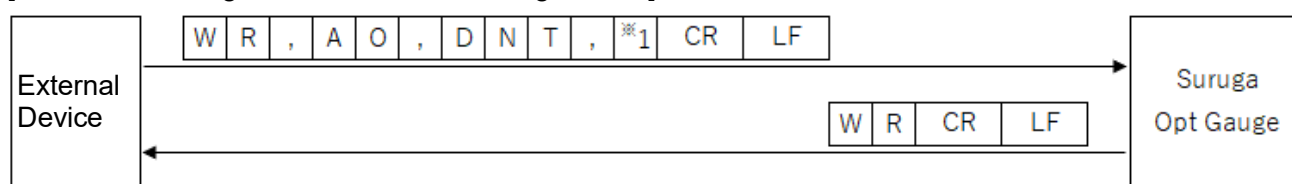
※1: Angle Unit (“0” = degree, “1” = DegMinSec, “2” = milliradian)

[Write: Denoising Enabled Configuration]



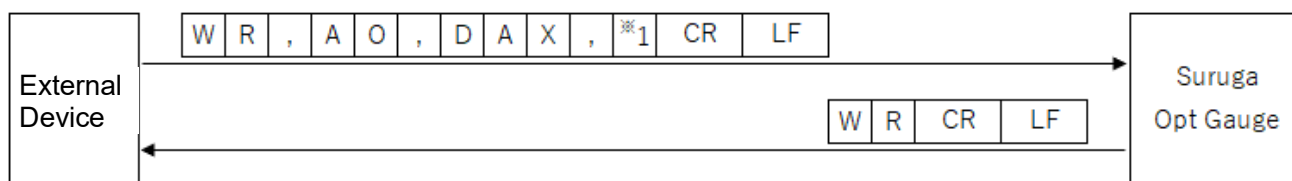
※1: Denoising function (“0” = disabled, “1” = enabled)

[Write: Denoising Threshold Value Configuration]



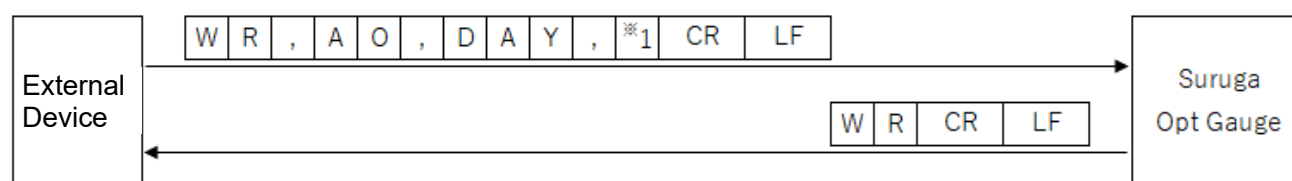
*1: Denoising threshold value (1 to 4095)

[Write: Number of Decimal Places for the Angle X Configuration]



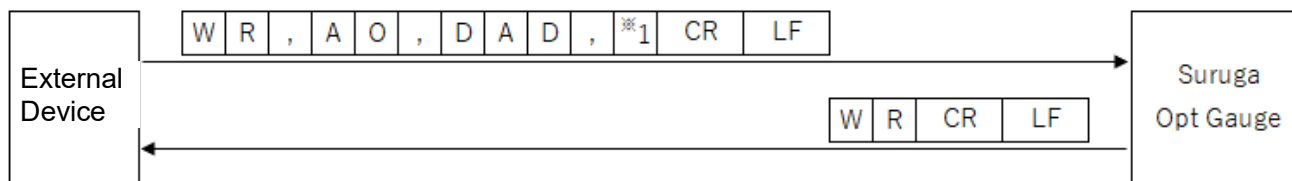
*1: Decimal places (0 to 8)

[Write: Number of Decimal Places for the Angle Y Configuration]



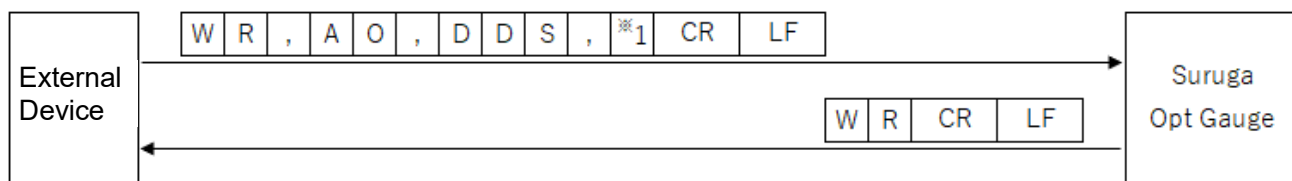
*1: Decimal places (0 to 8)

[Write: Number of Decimal Places for the Angle D Configuration]



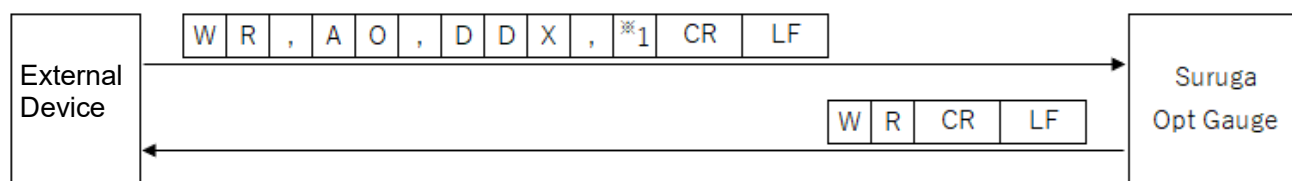
*1: Decimal places (0 to 8)

[(Beam divergence) Write: Number of Decimal Places for the D4Sigma or the 1/e² Configuration]



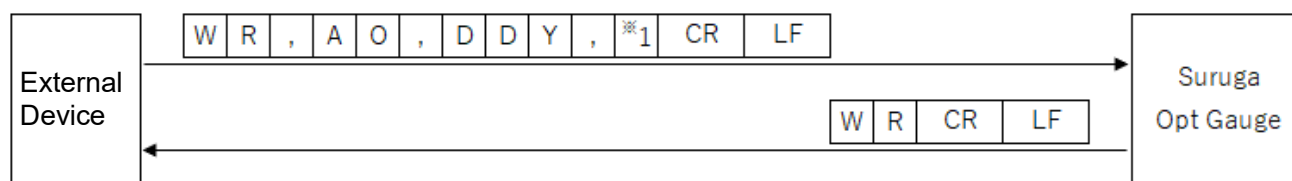
*1: Decimal places (0 to 8)

[(Beam divergence) Write: Number of Decimal Places for the D4Sigma X(M) or the $1/e^2$ X(M) Configuration]



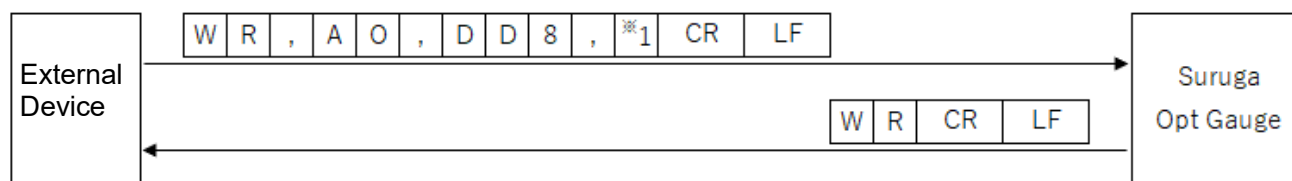
*1: Decimal places (0 to 8)

[(Beam divergence) Write: Number of Decimal Places for the D4Sigma Y(m) the $1/e^2$ Y(m) Configuration]



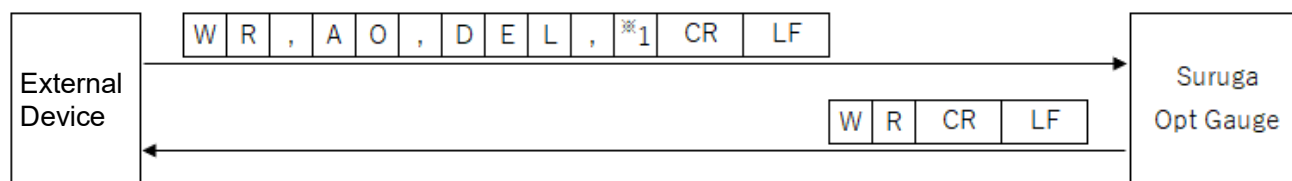
*1: Decimal places (0 to 8)

[(Beam divergence) Write: Number of Decimal Places for the D86 Configuration]



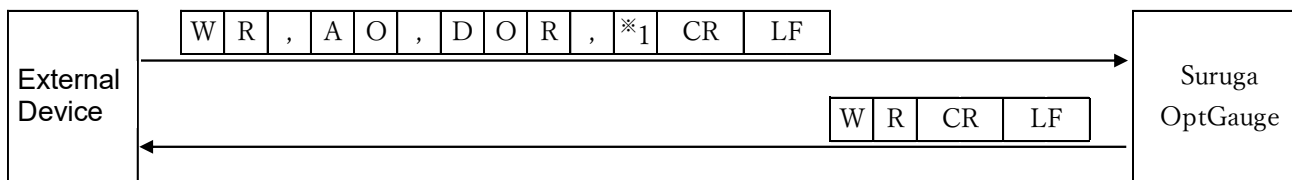
*1: Decimal places (0 to 8)

[Write: Number of Decimal Places for the Ellipticity Configuration]



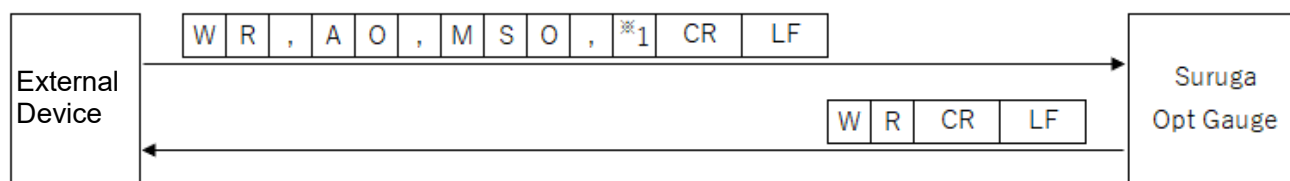
*1: Decimal places (0 to 8)

[Write: Number of Decimal Places for the Rotation Angle Configuration]



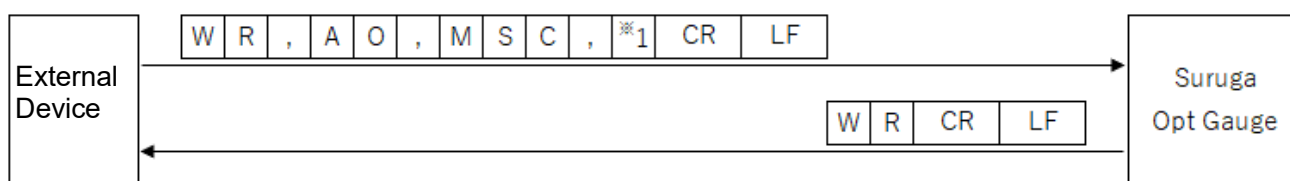
*1: Decimal places (0 to 8)

[(Multi Spot) Write: Order Configuration]



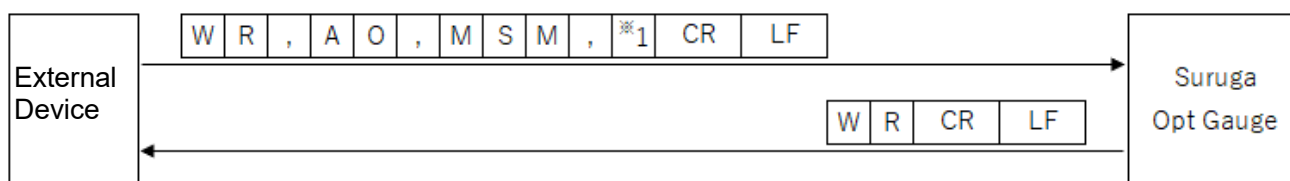
※1: (Multi Spot) Order (“0” = Area, “1” = Angle)

[(Multi Spot) Write: Spot Count Configuration]



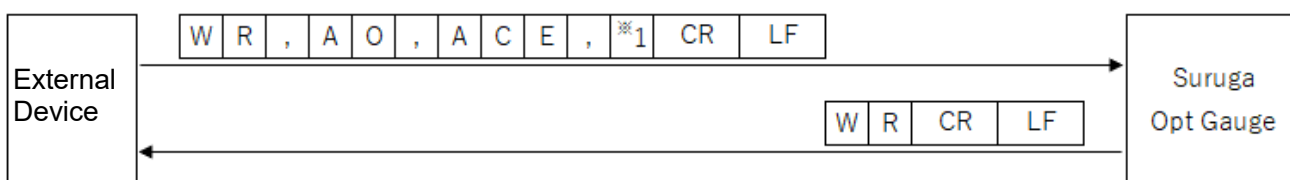
※1: Spot Count (1 to 100)

[(Multi Spot) Write: Minimum Spot Area Configuration]



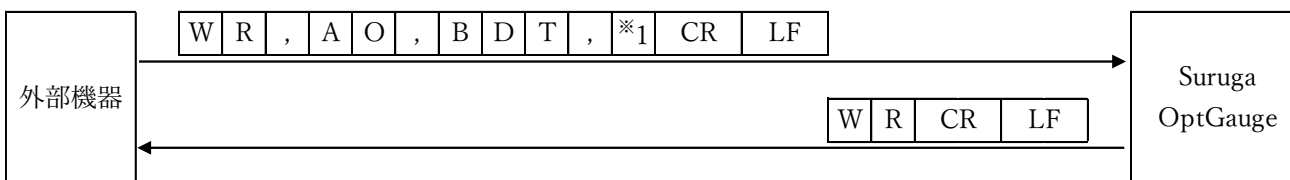
※1: Minimum Spot Area (1 to 1023)

[Write: Adaptive Cal Execution Button Display Enabled Configuration]



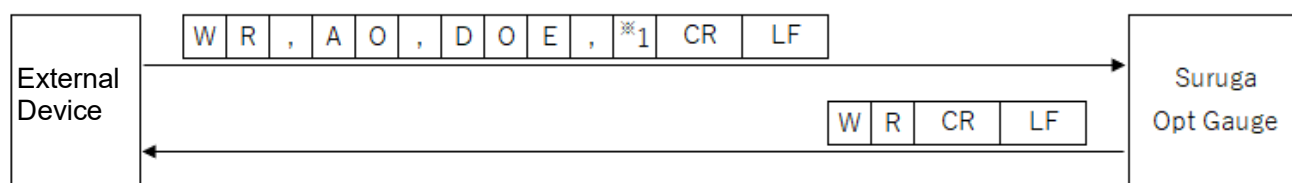
※1: Adaptive Cal execution button display (“0” = disabled, “1” = enabled)

[Write: Beam Diameter Type Configuration]



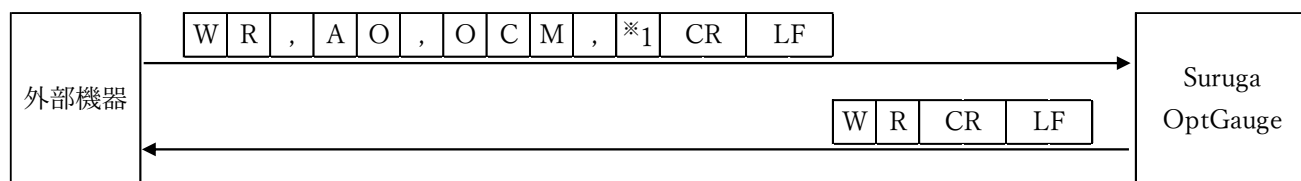
※1 : Beam diameter (“0”=D4Sigma、 “1”=1/e²)

[Write: Orientation Enabled Configuration]



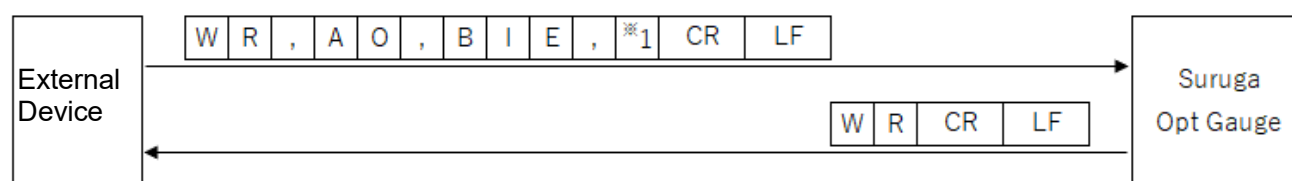
※1: Orientation Enabled (“0” = disabled, “1” = enabled)

[Write: Rotation Angle Measurement Method Configuration]



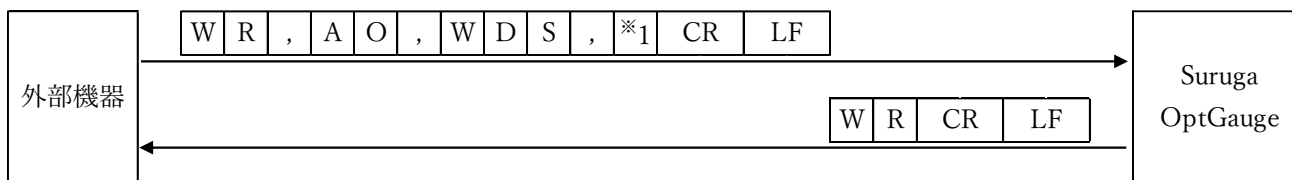
※1 : Rotation angle measurement method (“0”= Ellipse Fitting、 “1”= Max Distance Search)

[Write: Binning Enabled configuration]



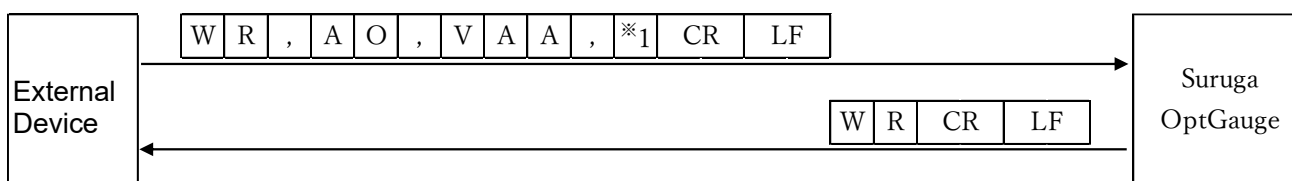
※1: Binning setting (“0” = disabled, “1” = enabled)

[Write: Working Distance Configuration]



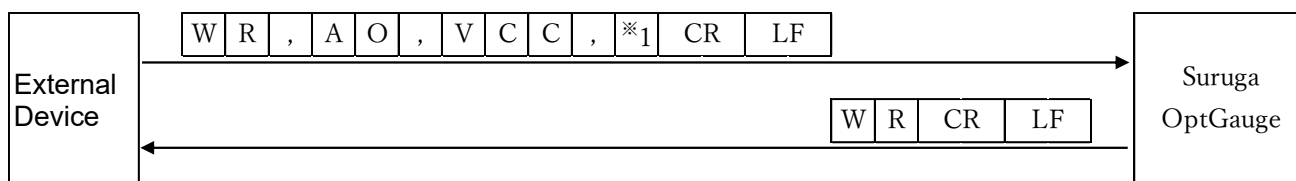
※1 : Working distance value (30～300)

[Write: Auto Aperture display configuration]



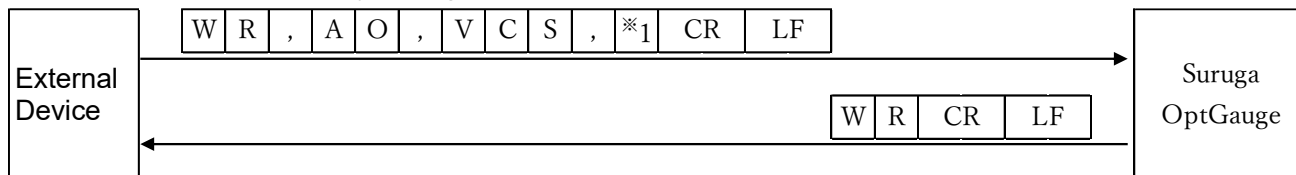
※1: Auto Aperture display ("0" = disabled, "1" = enabled)

[Write: Centroid Cursor display configuration]



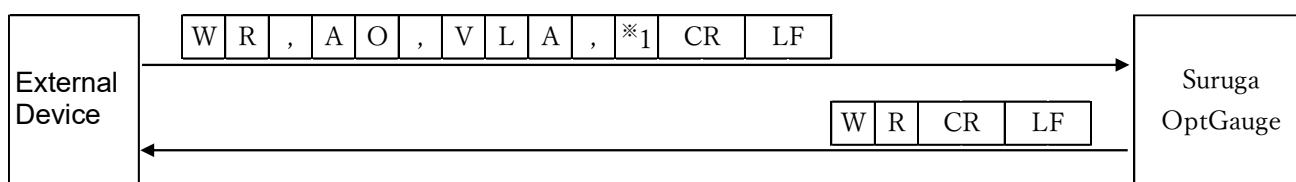
※1: Centroid Cursor display ("0" = disabled, "1" = enabled)

[Write: Cross Section Display Configuration]



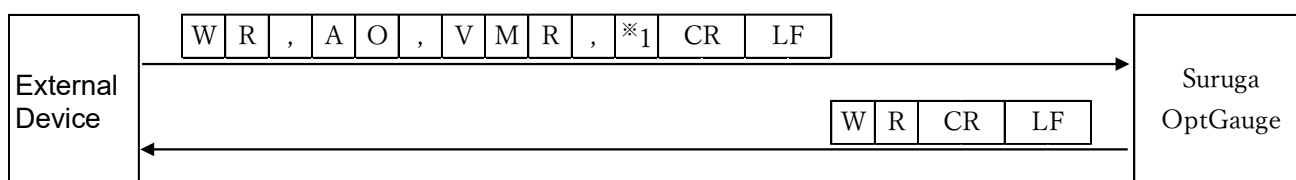
※1: Cross Section display ("0" = disabled, "1" = enabled)

[Write: Labeling Area Display Configuration]



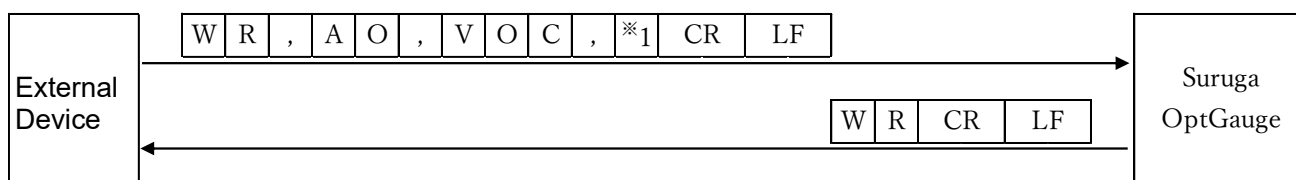
※1: Labeling Area display ("0" = disabled, "1" = enabled)

[Write: Measurement Range Display Configuration]



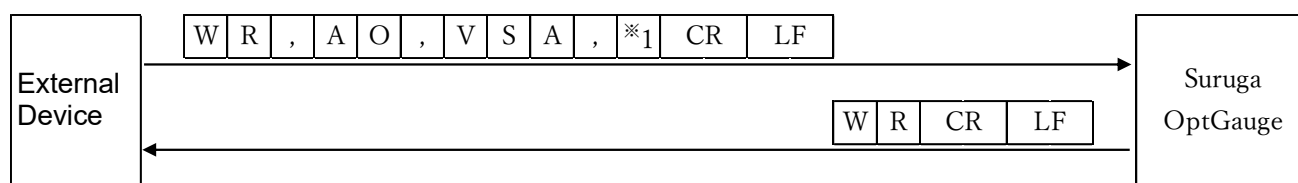
※1: Measurement range display ("0" = disabled, "1" = enabled)

[Write: Origin Cursor Display Configuration]



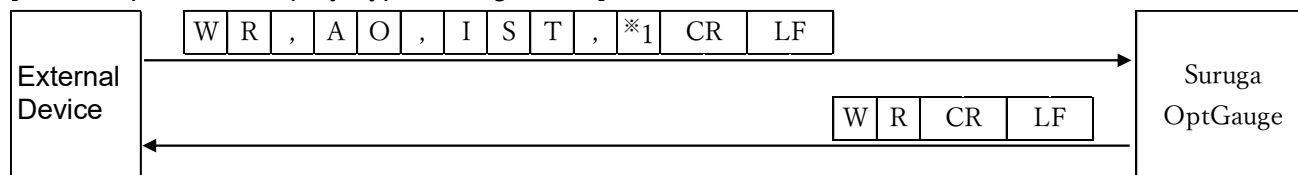
※1: Origin Cursor display ("0" = disabled, "1" = enabled)

[Write Spot Area Display Configuration]



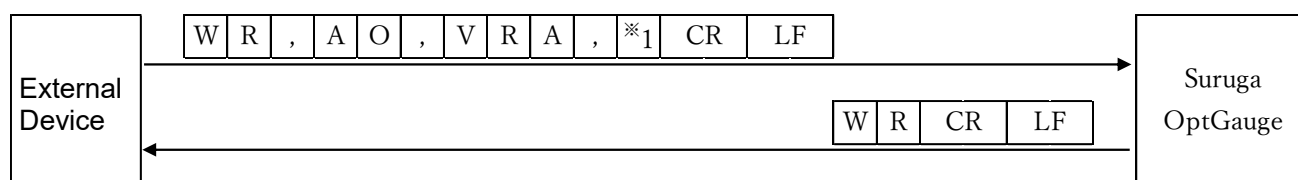
※1: Spot Area display ("0" = disabled, "1" = enabled)

[Write: Spot Area Display Type Configuration]



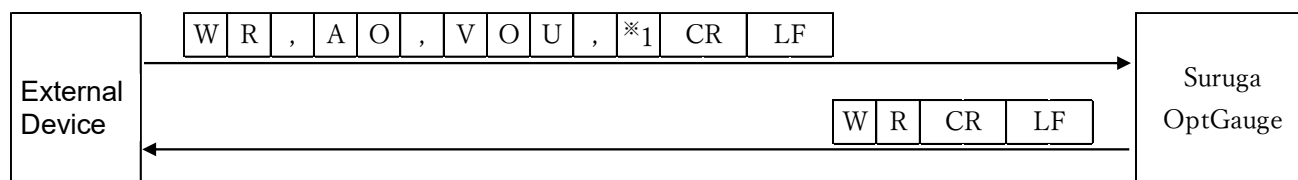
※1: Spot Area display type ("0" = D4Sigma or $1/e^2$, "1" = D86)

[Write: ROI Area Display Configuration]



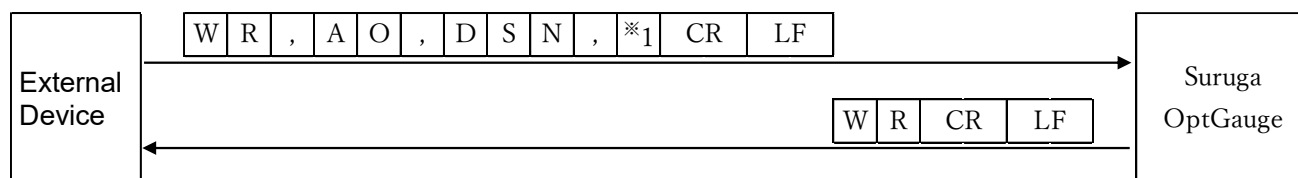
※1: ROI area display ("0" = disabled, "1" = enabled)

[Write: Rotation Angle Cursor Display Configuration]



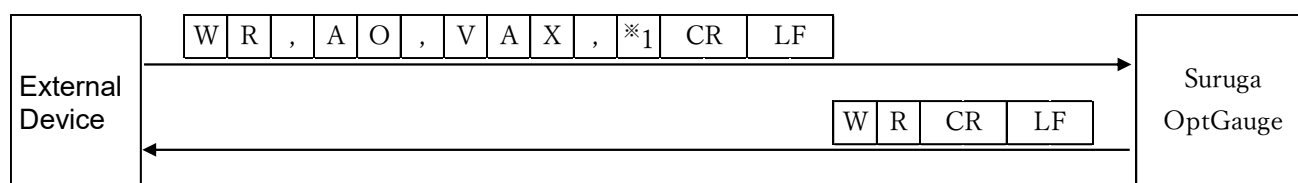
※1 : Rotation angle cursor display ("0" = disabled, "1" = enabled)

[Write: Display Spot Number Configuration]



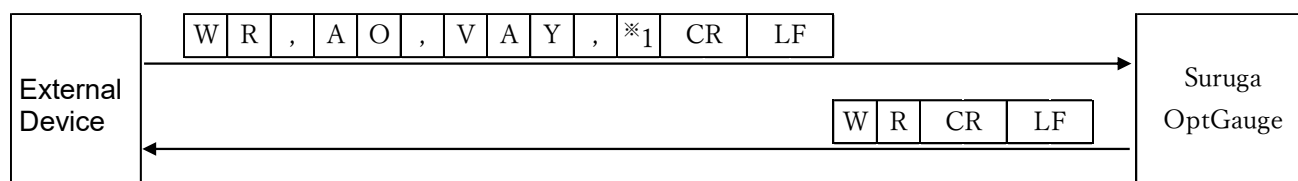
※1: Display spot number setting value (0 to 100)

[Write: Angle X Result Display Configuration]



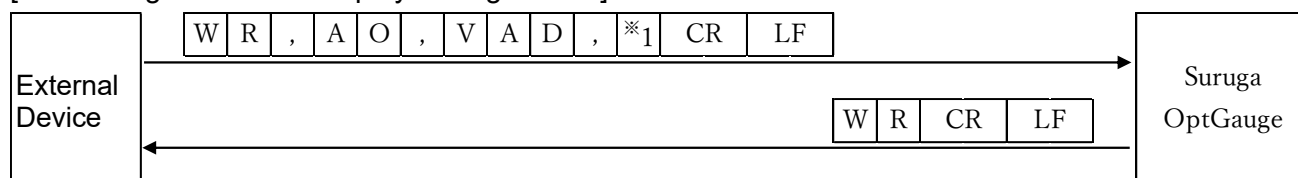
※1: Result display ("0" = disabled, "1" = enabled)

[Write Angle Y Result Display Configuration]



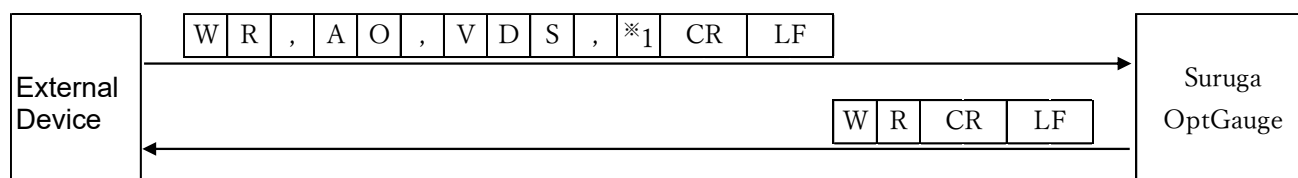
※1: Results display ("0" = disabled, "1" = enabled)

[Write: Angle D Result Display Configuration]



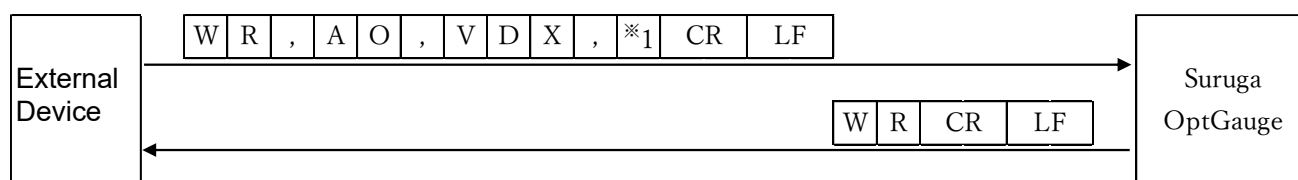
※1: Result display ("0" = disabled, "1" = enabled)

[Write: D4Sigma or 1/e² Result Display Configuration]



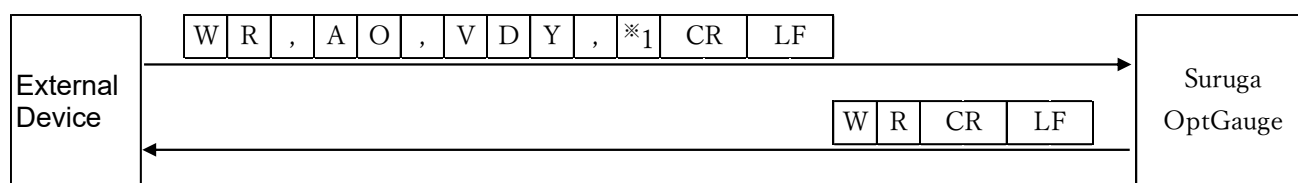
※1: Result Display ("0" = disabled, "1" = enabled)

[Write: D4Sigma X or 1/e² X(M) Result Display Configuration]



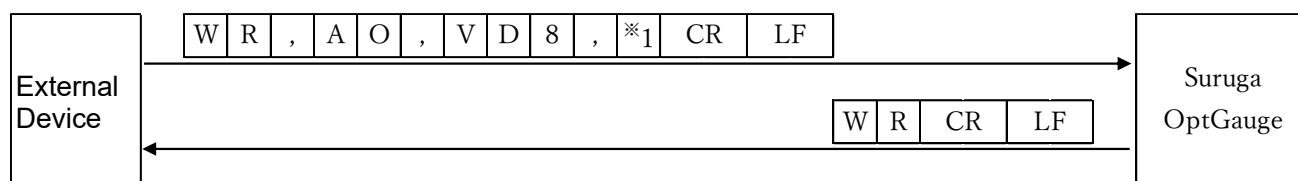
※1: Result display ("0" = disabled, "1" = enabled)

[Write: D4Sigma Y or $1/e^2$ Y(m) Result Display Configuration]



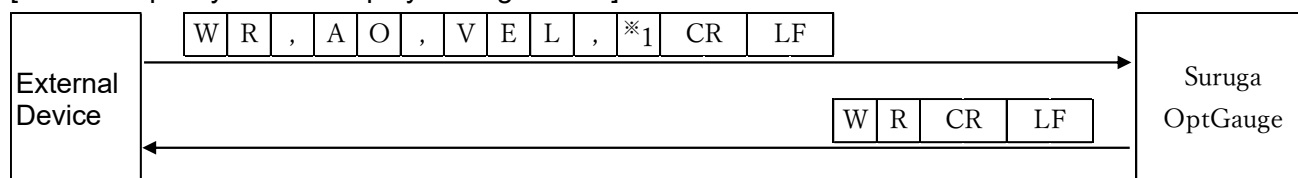
※1: Result display ("0" = disabled, "1" = enabled)

[Write: D86 Results Display Configuration]



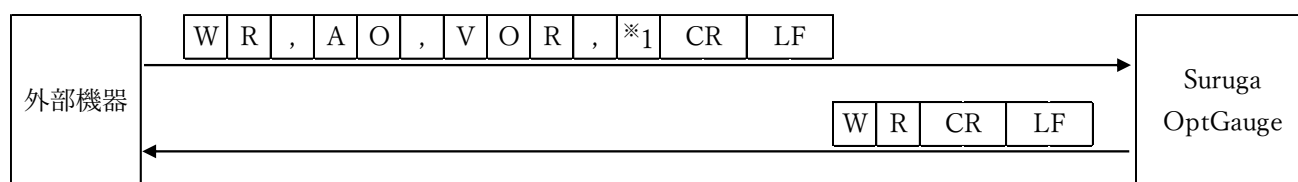
※1: Result display ("0" = disabled, "1" = enabled)

[Write: Ellipticity Result Display Configuration]



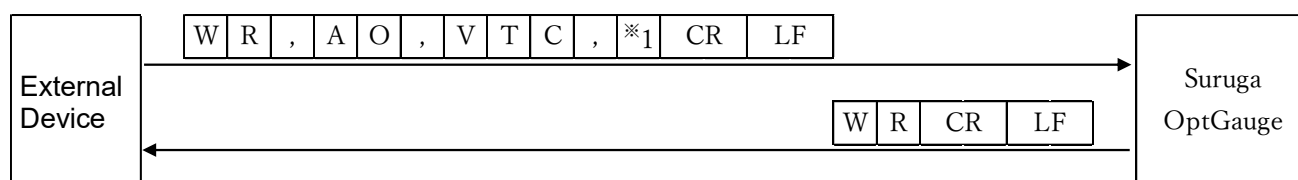
※1: Result display ("0" = disabled, "1" = enabled)

[Write: the Rotation Angle Result Display Configuration]



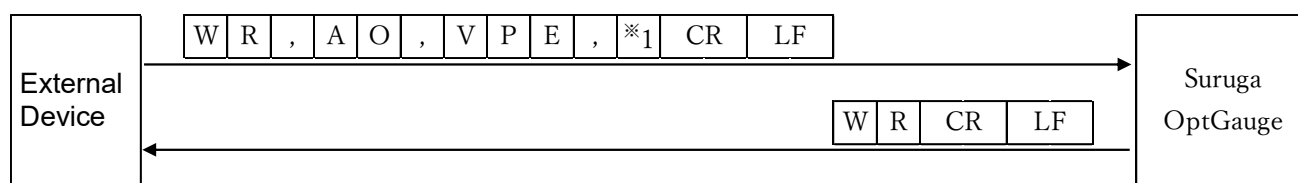
※1: Result display ("0" = disabled, "1" = enabled)

[Write: Total Count Resul Display Configuration]



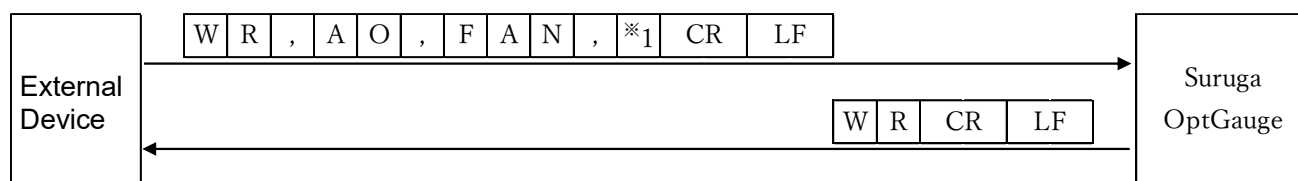
※1: Total Count result display ("0" = disabled, "1" = enabled)

[Write: Peak Result Display Configuration]



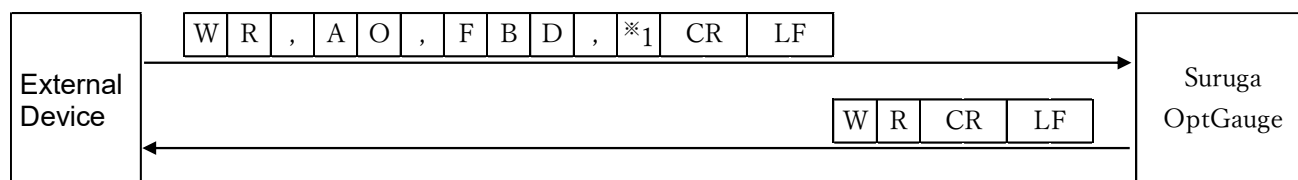
※1: Peak result display ("0" = disabled, "1" = enabled)

[Write: Font Size for the Angle Configuration]



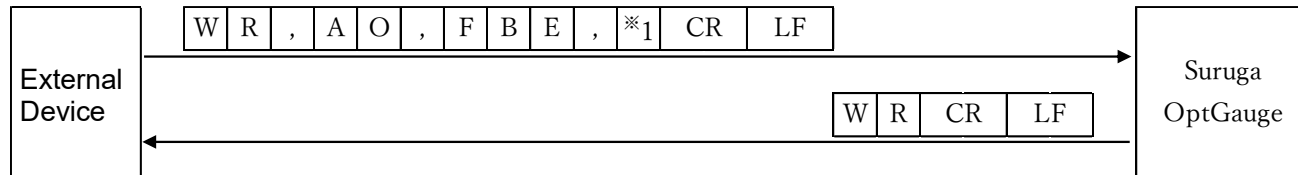
※1: Font seize ("0"= Small、"1"= Medium、"2"= Large)

[Write: Font Size for the Beam Divergence Configuration]



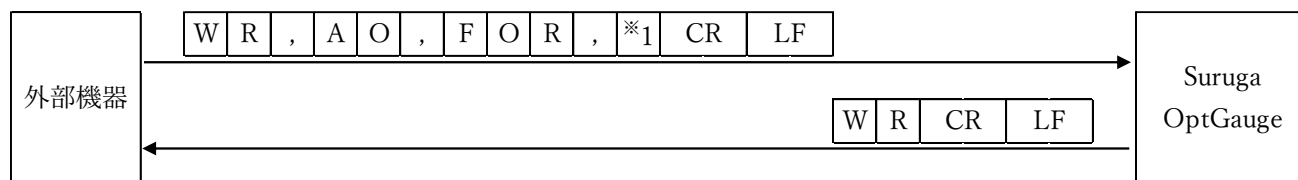
※1: Font seize ("0"= Small、"1"= Medium、"2"= Large)

[Write: Font Size for the Beam Ellipticity Configuration]



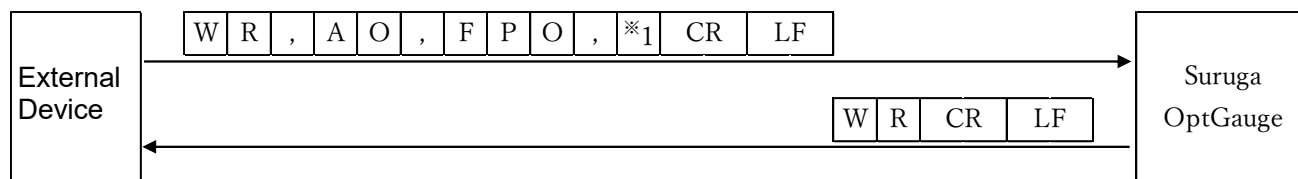
※1: Font seize ("0"= Small、"1"= Medium、"2"= Large)

[Write: Font Size for the Rotation Angle Configuration]



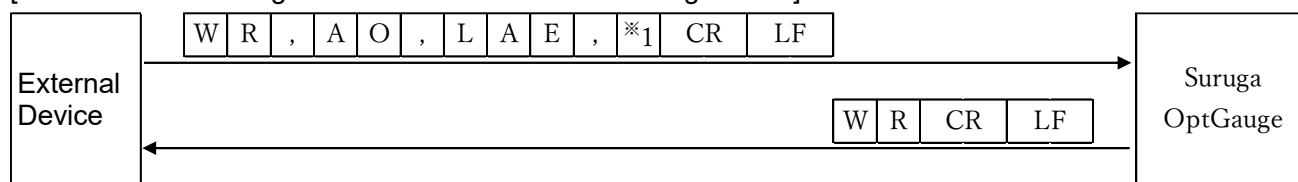
※1: Font seize ("0"= Small、"1"= Medium、"2"= Large)

[Write Font Size for the Power Configuration]



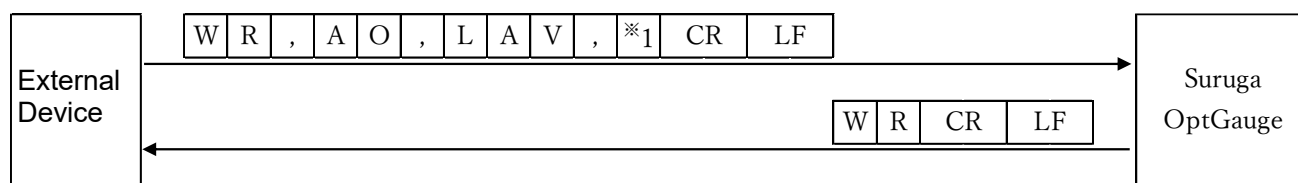
※1: Font size ("0"= Small、"1"= Medium、"2"= Large)

[Write: Automatic Brightness Execution Enabled Configuration]



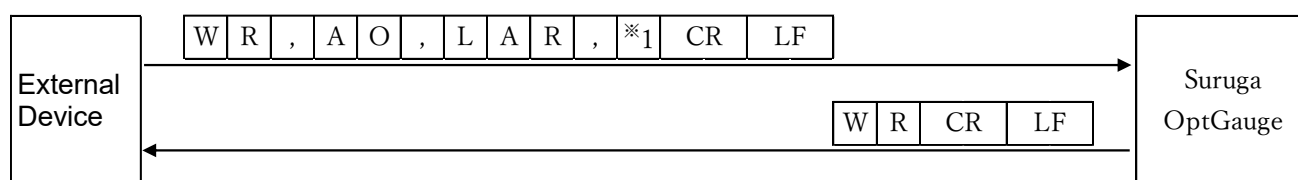
※1: Automatic brightness execution ("0" = disabled, "1" = enabled)

[Write: Peak Target Value for the Automatic Brightness Configuration]



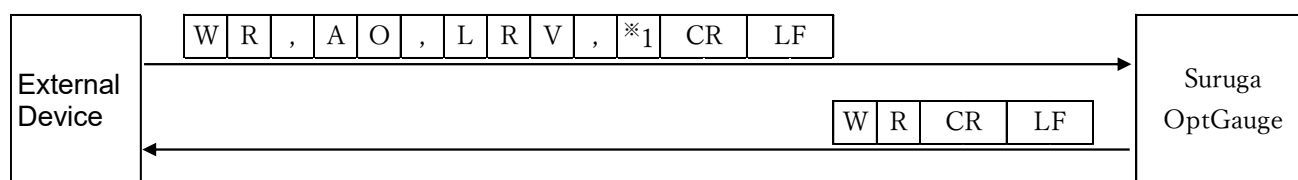
※1: Automatic brightness peak target value (1000 to 3500)

[Write: Peak Target Range for the Automatic Brightness Configuration]



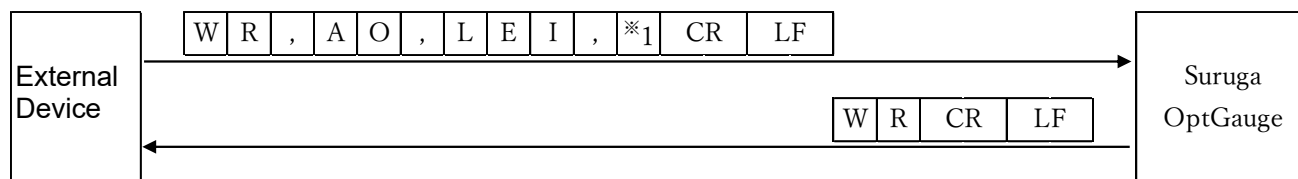
※1: Automatic brightness peak target range (100 to 1000)

[Write: Reflectance of the Target for the Automatic Brightness Configuration]



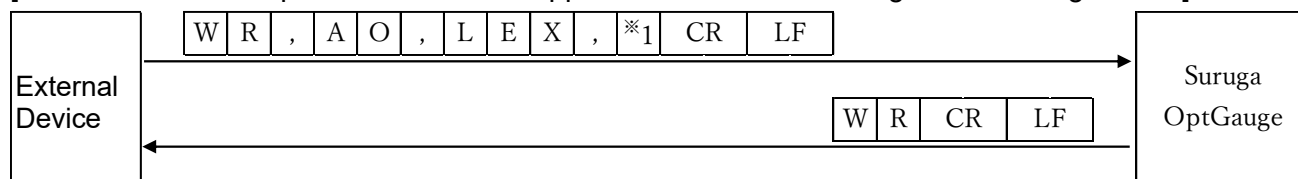
※1: Automatic brightness target reflectance (0.05 to 100)

[Write: Initial Exposure Time Value for the Automatic Brightness]



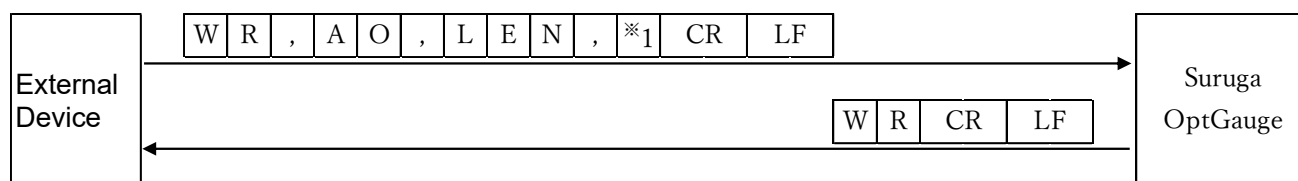
※1: Initial exposure time value applied in automatic brightness (0.027 to 20)

[Write: Maximum Exposure Time Value Applied in the Automatic Brightness Configuration]



※1: Maximum value of exposure time applied in automatic brightness (0.027 to 20)

[Write: Minimum Exposure Time value applied in the automatic brightness configuration]

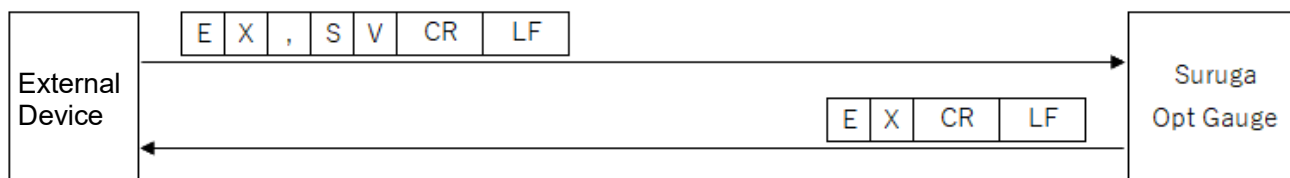


※1: Minimum value of exposure time applied in automatic brightness (0.027 to 20)

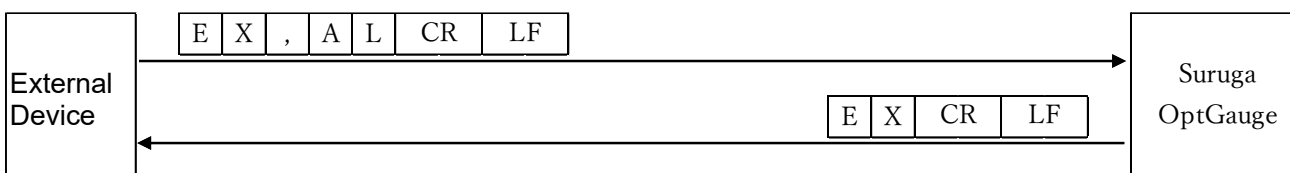
3.6 Execute Commands

3.6.1 Command Format

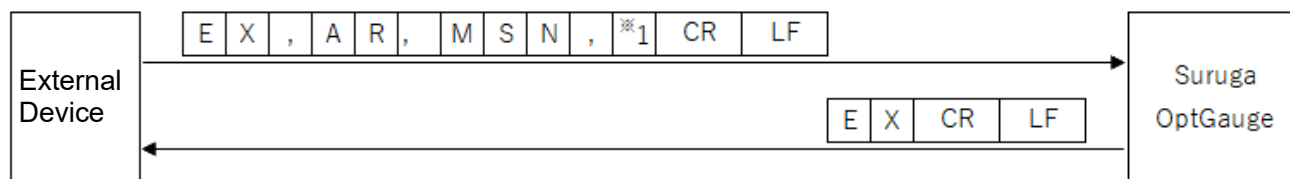
[Execute: Option Save]



[It executes the automatic brightness for angle measurement]



[Execute: Angle Main Spot Number Switching]

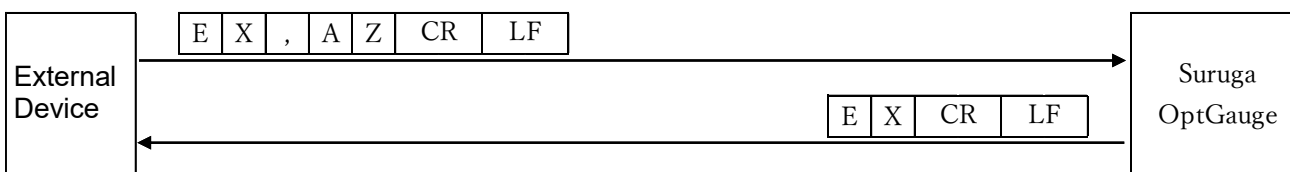


※1 : Main Spot Number(1 to 100)

[Execute: Measurement Result Log Output]

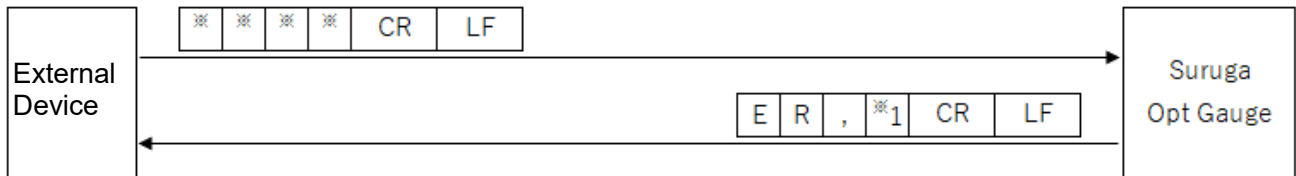


[Execute: Angle Zero Set]



3.7 Communication Error

Should a command fail to be received or executed correctly, this product will return error information in the following format:



The error codes appear in *1 as below.

"2": Setting Data Error

- Value outside setting range was set.

"3": Command Format Error

- Number of commas from header to [CRLF] does not match.
- Command not in command list, or non-alphanumeric characters.
- Text after header includes characters not in list above.

"5": Condition Error

- Value outside setting range was set.

4. System Log

4.1 System Log List

System Log	Content
Angle view initialize succeeded	Angle screen initialization was successful. Measurement starts normally.
Angle view initialize failed. Please check the connection with the Suruga OptGauge.	Angle screen initialization failed. Check the sensor head and computer connection.
Angle result output succeeded	By pressing the [Output Once] button icon, it executes the output of the Angle measurement results, successfully.
Angle result output failed	Measurement results output with [Output Once] button failed.
Adaptive Cal succeeded	Adaptive calibration with [Adaptive Cal] button was successful
Adaptive Cal failed	Adaptive Cal with [Adaptive Cal] button failed
It is necessary to block the light	Adaptive Cal failure: Block the light

4.2 Error Messages and Countermeasures

Error message	Cause	Countermeasure
Angle view initialize failed. Please check the connection with the Suruga OptGauge.	The Product and computer are not connected.	Check that the Product and computer are connected and restart the Suruga OptGauge. If this error is repeatedly generated, the Product interior camera may not be working properly. Contact the Suruga Seiki Optical Device Business Division Sales Section.
Angle result output failed.	Measurement results output file (.csv) is open.	Please close the measurement results output file (.csv) if opened and execute outputting measurement results.
Adaptive Cal failed. It is necessary to block the light.	Because the light is not blocked, the Adaptive Cal cannot be executed.	Check that the beam is not incoming to the Products. Also, make sure before measurement that there is no unwanted exterior light or other laser light source interfering with the sensor.

5. Failures? Frequently Asked Questions

5.1 Symptoms and Countermeasures

Useful information for troubleshooting is listed below. Check if the table below shows your trouble.

Symptom	Cause	Countermeasure
Internal light source power is NOT turned on.	AC 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: device authentication file (.suruga) corresponding to the Product purchased.
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 is too short.	Adjust the Exposure Time to the optimal speed.
	Large tilt on the target.	Adjust the tilt angle of the target so that the reflected light beam enters within the range.
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.

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, the SURUGA conducts a repair service for free. For any damages out of warranty period mentioned above, the 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

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