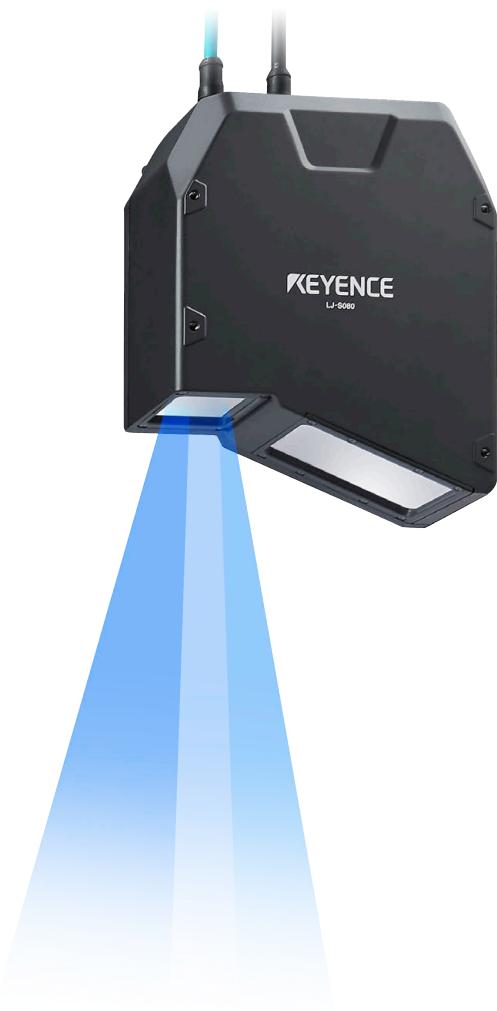


3D Laser Snapshot Sensor LJ-S8000 Series (PC Connection)

User's Manual

Please read this manual before using this device.

After reading the manual, please store it in a safe and easily accessible place for future use.



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| 1 | Before Use |
| 2 | Installation and Connection |
| 3 | Software |
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Introduction

This document describes how to install the 3D Laser Snapshot Sensor LJ-S8000 Series, the profile measurement procedure using software that is specifically designed for the product, and the product specifications.
Read this manual thoroughly in order to understand how this device works and to maximize its performance.
Always keep this manual in a safe place for future reference.
Please ensure that the manual is passed to the end user of the software.

Related manuals

When using LJ-S Navigator/LJ-S Observer, refer to the following manuals:

- LJ-S8000 Series Head Instruction Manual: This manual describes the specifications and precautions for the LJ-S8000 Series.
- LJ-S8000 Series (PC Connection) User's Manual (This Document)

Symbols

The following warning symbols are used to ensure safety and to prevent human injury and/or damage to property when using the system. Be sure to read these messages carefully.

 DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
 WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
 CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
 NOTICE	Indicates a situation which, if not avoided, could result in product damage as well as property injury.
 Important	Indicates cautions and limitations that must be followed during operation.
 Point	Indicates additional information on proper operation.
 Reference	Indicates items to enhance system understanding and other useful information.

Precautions

- (1) Unauthorized reproduction of this manual in whole or part is prohibited.
- (2) The contents of this manual may be changed for improvements without prior notice.
- (3) An utmost effort has been made to ensure the contents of this manual are as complete as possible. If there are any mistakes or questions, please contact a KEYENCE office listed in the back of the manual.
- (4) Regardless of item (3), KEYENCE will not be liable for any effect resulting from the use of this unit.
- (5) Any manuals with missing pages or other paging faults will be replaced.
- (6) The screenshots in this manual are examples for explanation only. Numerical values indicated in the images may differ from the actual situation.
- (7) This User's Manual is written in accordance with Windows 11.

Trademarks

Other company names and product names noted in this document are registered trademarks or trademarks of their respective companies. This manual does not use TM or ® mark for the trademarks or registered trademarks in the text.

Software

The relevant open-source software components are subject to the terms and conditions of the licenses stored in the folder in which the LJ-S series software is installed.

C:\Program Files\KEYENCE\LJ-S Navigator\License

Safety Information

General cautions

 DANGER	<ul style="list-style-type: none"> This product must not be used for the purpose of protecting the human body or a part of the human body. This product must not be used in an explosion-proof area. Do not use this product for applications (power plants, aviation, railways, ships, vehicles, medical devices, recreational equipment, etc.) which could cause great harm to people and/or property.
 WARNING	<ul style="list-style-type: none"> If this product is used in a manner not specified by this manual, the protection provided by the product may be impaired. You must perform a sufficient risk assessment for the machine where this product is to be installed prior to installing this product. Take appropriate protective measures to ensure that the devices functions safely even in case of a malfunction without the product.
 CAUTION	<ul style="list-style-type: none"> Before starting or operating the system, check to make sure all Keyence functions are working properly. In the unlikely case that this product fails, take all safety precautions to prevent damage.
 NOTICE	<ul style="list-style-type: none"> If the system is operated beyond its published specifications or if the system is modified, its functions and performance cannot be guaranteed. Please note that when Keyence is used in combination with other instruments, its functions and performance may be degraded. Do not subject the controller or connected devices to a sudden change in temperature. There is the risk of condensation occurring.

Precautions for use

 WARNING	<ul style="list-style-type: none"> Turn the main power supply off when performing cable connection or maintenance work etc. Failure to do so may cause electric shock. Pay attention to prevent foreign matter such as metal particles, dust, paper or wood chips from entering the inside of this unit. Failure to follow this may result in a fire, electric shock, malfunction or accidents. Use the specified voltage. Failure to do so may cause fire, electric shock or malfunction.
 CAUTION	<ul style="list-style-type: none"> Do not disassemble or modify the head. This may cause fire or electric shock. Mount the head on a metallic plate. The surface of the head may become very hot and cause burns.
 NOTICE	<ul style="list-style-type: none"> Do not apply any vibration or shock. Strong vibration or shock may cause a malfunction or the deterioration of the measurement accuracy. Before making any connections/disconnection, be sure to turn off the power of this unit and connected devices. Failure to do so may result in a malfunction of the controller or connected devices. Do not turn off this instrument when settings are being modified. Otherwise, all or part of the program settings may be lost. Due to mild fluctuations in the air, the measured value may fluctuate. In this case, take the following countermeasures. <ul style="list-style-type: none"> Enclose the measurement area with an appropriate enclosure. Agitate the air between the measurement point and the workpiece more strongly with a fan. Do not operate this device near lighting fixtures. If the unit must be used in such a location, install a light shielding board or similar device so that the light will not affect the measurement. Wait approximately 30 minutes after the power is turned on before using the LJ-S8000 Series. Otherwise, the measured value may gradually fluctuate as the circuit is not immediately stable after the power is turned on. A change in the ambient temperature may cause the measurement to fluctuate. Be sure to keep the temperature stabilized. When the ambient temperature changed by 10°C, it takes 60 minutes for the distribution of internal temperature to equalize.

Measures to be taken when an abnormality occurs

 CAUTION	<p>In the following cases, turn the power OFF immediately. Using the unit in an abnormal condition may cause fire, electric shock, or product malfunction. Contact your local KEYENCE office for repair.</p> <ul style="list-style-type: none"> If liquid, including water or chemicals, or debris enters the unit. If the product is dropped or the case or cover glass is damaged. If smoke or a burning smell emits from the product.
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Operating environment and conditions (precautions on installation)

 WARNING	<p>To use the unit properly and safely, avoid installing this unit in the following locations. Failure to do so may cause fire, electric shock or malfunction.</p> <ul style="list-style-type: none"> Locations that contain moisture or dust, or that are poorly ventilated. Locations where the unit is exposed to direct sunlight or temperature increases. Locations where there are flammable or corrosive gases. Locations where the unit may be directly subjected to vibration or impact. Locations where water, oil or chemicals may splash onto the unit Locations that are prone to static electricity
 NOTICE	<ul style="list-style-type: none"> Keep the machine and cables as far as possible from high voltage lines and power lines. Otherwise, noise may cause malfunction or accidents. When connecting the cables, make sure to bundle the protective material, such as a spiral tube from outside. If they are bundled directly, the load applied to the cables may be concentrated on the connector, which may cause a disconnection or short. The controller and optional devices are precision components. To maintain performance, do not subject them to vibration or shock. <p>In the following cases, foreign matter such as dust and debris or water and oil could cause differences in the measurement values.</p> <ul style="list-style-type: none"> Adhesion on the protective glass: Blow off the dirt on the cover glass with clean air. If dirt persists, wipe the glass surface gently using a soft cloth moistened with alcohol. Adhesion on the target object: Blow off the dirt with clean air, or wipe the surface gently using a cloth. Intrusion of floating or sprinkled dust or dirt into the light-axis range: In this case, take corrective action with a protective cover or air purge.

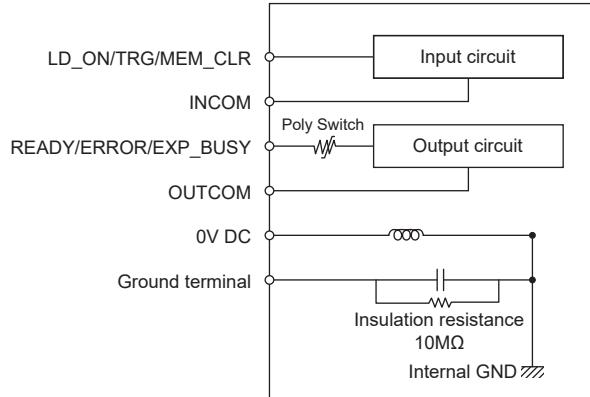
Maintenance

 NOTICE	<ul style="list-style-type: none"> Do not wipe the unit with a wet wipe, benzene, or thinner. If the unit has any dirt on it, wipe it off with a cloth moistened with a mild detergent, and then wipe with a soft dry cloth.
---	--

Caution on wiring

 WARNING	<p>Some of the I/O circuits of the controller are common internal terminals. Exercise caution to avoid a potential difference between the common internal terminals due to the wiring or potential difference between the external devices. There is a risk of fire occurring.</p>
--	--

Insulated condition between each I/O circuit



Precautions on Regulations and Standards

CE and UKCA markings

Keyence Corporation has confirmed that this product complies with the essential requirements of the applicable EU Directive(s) and UK regulations, based on the following specifications. Be sure to consider the following specifications when using this product in the Member States of the European Union and in the United Kingdom.

● EMC Directive (CE) and Electromagnetic Compatibility Regulations (UKCA)

- Applicable standard (BS) EN61326-1, Class A
- This product is designed for use in industrial environments.
- Use cables that are 30 m in length or shorter.
- All of the cables should not exceed 30 m.
- Be sure to connect the ground terminal to a grounding.

Remarks:

These specifications do not give any guarantee that the end product with this product incorporated complies with the essential requirements of EMC Directive and Electromagnetic Compatibility Regulations. The manufacturer of the end-product is solely responsible for the compliance on the end-product itself according to EMC Directive and Electromagnetic Compatibility Regulations.

CSA Certificate

This product complies with the following CSA and UL standards and has been certified by CSA.

- Applicable Standard CAN/CSA C22.2 No.61010-1
UL61010-1

Be sure to consider the following specifications when using this product as a product certified by CSA.

- Overvoltage category I
- Use this product under pollution degree 2.
- Use this product at the altitude of 2500 m or less.
- Indoor use only.
- Mount the head on a metallic plate.

FCC Regulations

This product complies with the following regulations specified by the FCC.

- Applicable regulation FCC Part 15 Subpart B Class A
- This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1)This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
- FCC CAUTION Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Best Management Practice for Perchlorate Materials - California only

This product uses components containing perchlorate material. When you ship this product or your end-product installing this product to California, you must label or mark the following statement on the exterior of all outer shipping packages and on consumer packages or you must include the following statement in an instruction manual or MSDS accompanied with the product.

"Perchlorate Material – special handling may apply.
See www.dtsc.ca.gov/hazardouswaste/perchlorate/."

KC mark (Republic of Korea)

Class A Device

This product has been conformity assessed for use in business environments.

In a residential environment this product may cause radio interference.

Precautions on Laser Products

The laser class of the heads that will be connected to this unit are classified as follows:

Model	Wavelength	IEC60825-1, FDA(CDRH) Part1040.10 ^{*1}	
		Output	Laser class
LJ-S015 / LJ-S025 / LJ-S040 / LJ-S080 / LJ-S160 / LJ-S320 / LJ-S640	405nm	10mW	Class 2M

*1 Classification performed based on IEC60825-1 in accordance with FDA (CDRH) Laser Notice No. 56.

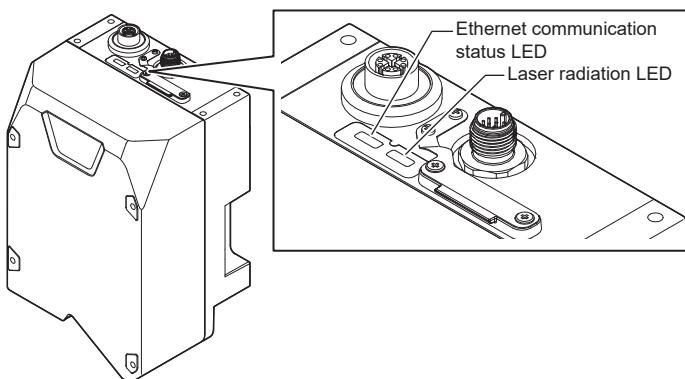
 Class 2M <ul style="list-style-type: none"> Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure. Follow the instructions mentioned in this manual. Otherwise, injury to the human body (eyes and skin) may result. 	<ul style="list-style-type: none"> Do not stare into the direct or specularly reflected beam. Do not direct the beam at other people or into areas where other people unconnected with the laser work might be present. Be cautious of the path of the laser beam. If there is a possibility that the operator may be exposed to the specular or diffuse reflections, block the beam by installing a protective enclosure. Install this product so that the path of the laser beam is not at the same height as that of human eye. Do not direct the beam into an area where telescopic optical instruments (for example, telescopes and binoculars) are likely to be used. Viewing the laser output with telescopic optical instruments may pose an eye hazard. Laser emission from this product is not automatically stopped when it is disassembled. Do not disassemble this product.

Equipment for safe use

This unit is equipped with the following laser safety features.

Ethernet communication status LED and laser radiation LED

Indicates the head EtherNet communication and laser radiation statuses with LEDs.



Warning labels

The position of the warning labels on the LJ-S Series head as well as the information written on them are displayed below.

The IEC (English) warning labels are attached to the unit when shipped from the factory. Warning labels other than IEC (English) are included.

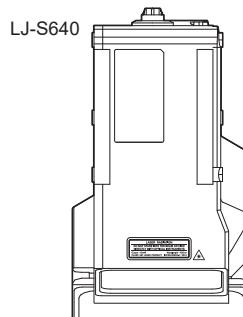
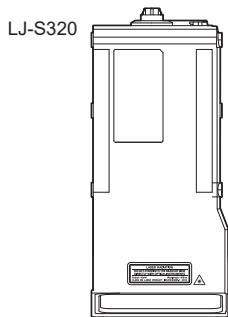
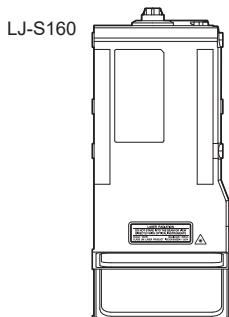
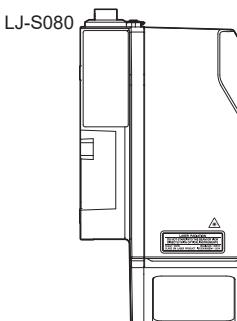
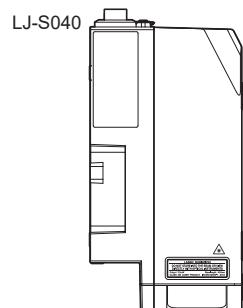
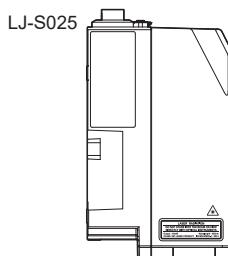
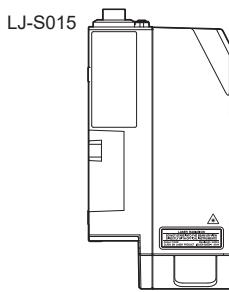
Use the warning label that is suitable for the destination and affix it to the specified position

Information displayed on warning labels

- LJ-S015 / LJ-S025 / LJ-S040 / LJ-S080 / LJ-S160 / LJ-S320 / LJ-S640



Warning label attachment positions



Software product license agreement

NOTICE TO USER: PLEASE READ THIS SOFTWARE LICENSE AGREEMENT ("THIS AGREEMENT") CAREFULLY. BY USING ALL OR ANY PORTION OF THE LJ-S Navigator AND LJ-S Observer ("THIS SOFTWARE"), YOU ARE AGREEING TO BE BOUND BY ALL THE TERMS AND CONDITIONS OF THIS AGREEMENT.

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- 7.2. If any part of this Agreement is found void and unenforceable, the rest of this Agreement will remain intact, valid and enforceable according to the associated terms and conditions.

Version update notes

Ver. 1.02.00 (December 2024)

- Supports sensor heads LJ-S160/LJ-S320/LJ-S640
- Supports translucent peak processing (Page 5-9)
- SLOPE added to [Control light intensity] (Page 5-8)

Ver. 1.01.00 (September 2024)

- Supports Chinese (traditional), Korean, German, and French
- Supports Actual value (Page 5-10)

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Appendix

Error Codes	A-2
Error Codes	A-2

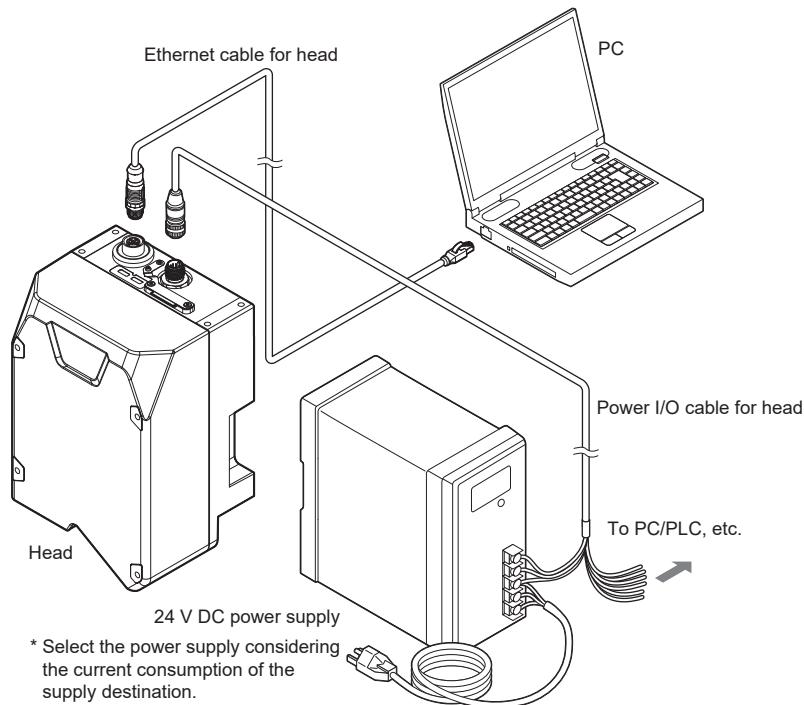
Chapter 1 Introduction

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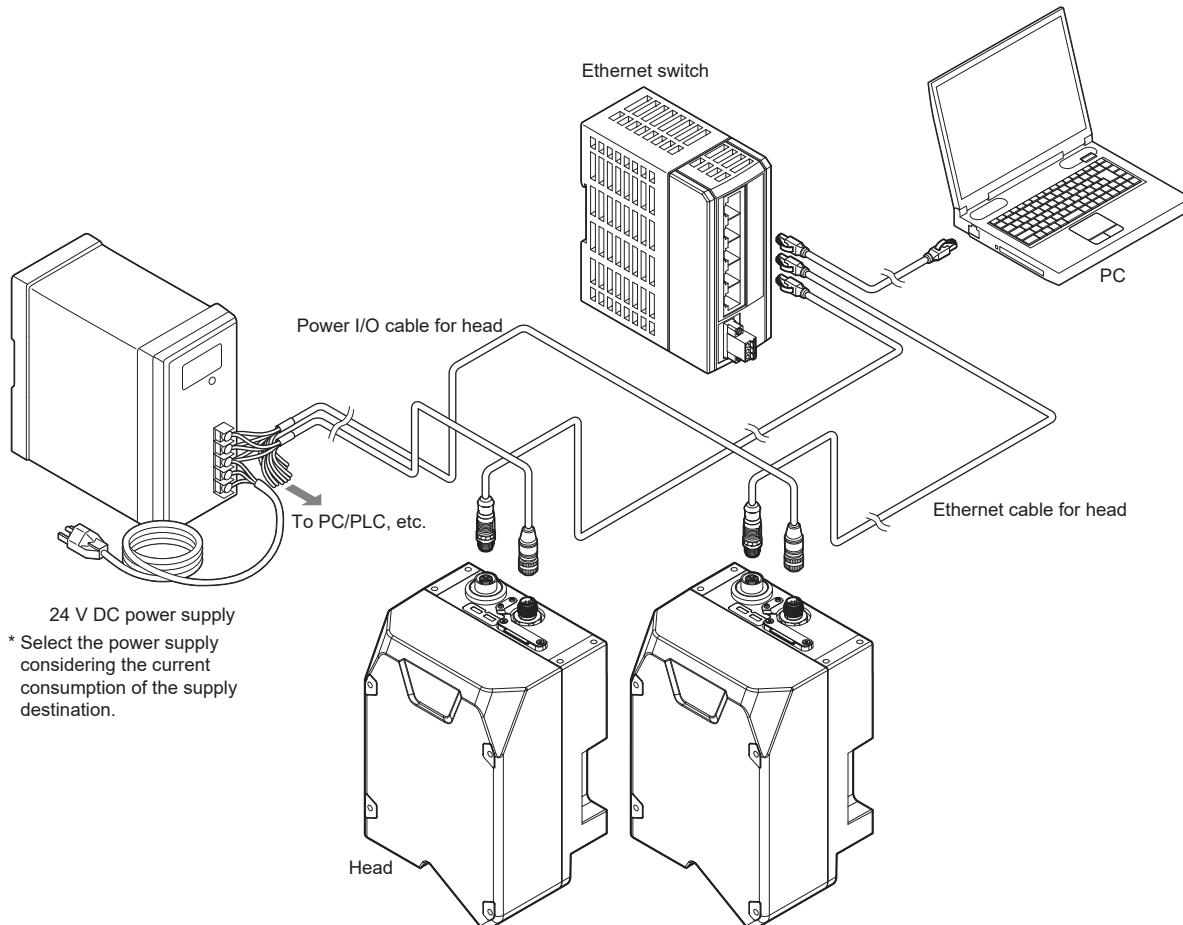
System Configuration

Basic System Configuration

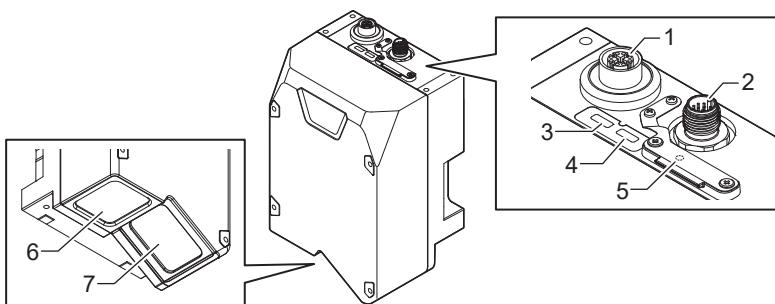
● Connecting one head



● Connecting two heads



Part Names and Functions



No.	Name	Function
1	Ethernet cable connector	Connects to an Ethernet cable.
2	Power I/O cable connector for head	Connects to a power supply cable.
3	Ethernet communication status LED	Lights or flashes according to the communication status of the device.
4	Laser radiation LED	Lights or flashes while the device is in operation.
5	IP reset button (under the cover)	The button to initialize IP Adress setting. ☞ "Resetting the Head's IP Address" (page 4-18)
6	Transmitter	Emits the laser beam for measurement. This part is protected with a glass cover.
7	Light receiver	Receives the laser beam for measurement. This part is protected with a glass cover.

■ Laser LED operation

LED status	Head status	Details
Orange (lit)	Starting	Lights up for a period of time before the trigger or command can be accepted.
Green (lit)	Operating normally	Lights when the device is operating normally.
Red (lit)	Error	Lights up when normal startup is not possible or when a system error occurs after startup.
Green (flashing)	Resetting IP address	Depending on how long the IP reset button is held down, it will blink with a 1-second cycle when ready to initialize to a fixed IP address and with a 0.5-second cycle when ready to initialize to BOOTP.

■ Communication LED operation

LED status	Ethernet communication status	Details
Green (lit)	1000Mbps Link – No Activity	The device is connected at 1,000 Mbps, but no data is being transmitted
Green (flashing)	1000Mbps Link – Activity	Data is being transmitted at 1,000 Mbps.
Red (lit)	100/10Mbps Link – No Activity	The device is connected at 100 Mbps or 10 Mbps, but no data is being transmitted.
Red (flashing)	100/10Mbps Link – Activity	Data is being transmitted at 100 Mbps or 10 Mbps.
Off	No Link	A connection is not established.

Chapter 2 Installation and Connection

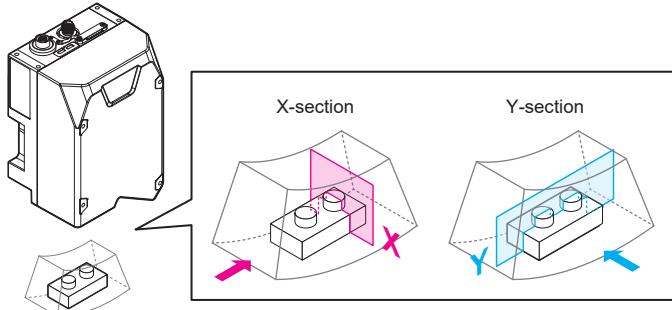
Mounting the Head	2-2
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Mounting the Head

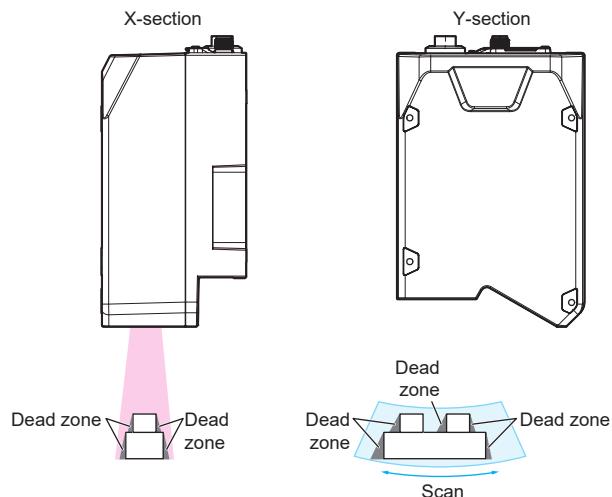
Be sure to read the installation cautions carefully and install the head correctly.

Installation cautions

The sensor head uses a fan-shaped laser beam and optical light receiver system, and the optical light system can scan rotationally to capture images. Dead zones are created if the laser beam irradiating the target object and the laser beam reflected from the target object is blocked from entering the receiver. Make sure that the dead zone does not affect the measurement result.



● X-section/Y-section dead zones



Mounting the Head

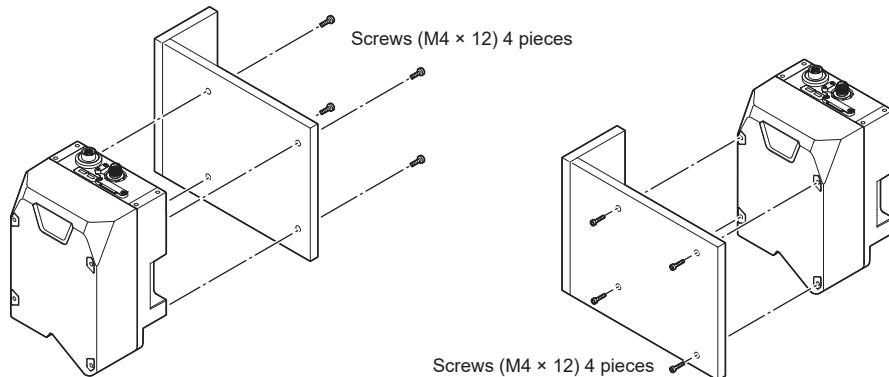
Align the head and the target object distance in reference to the LJ-S Series head measurement range and secure it to the metal plate via the screws provided with the head.

For details of the dedicated stand and OP jig, see below.
www.keyence.com/LJS8000ops



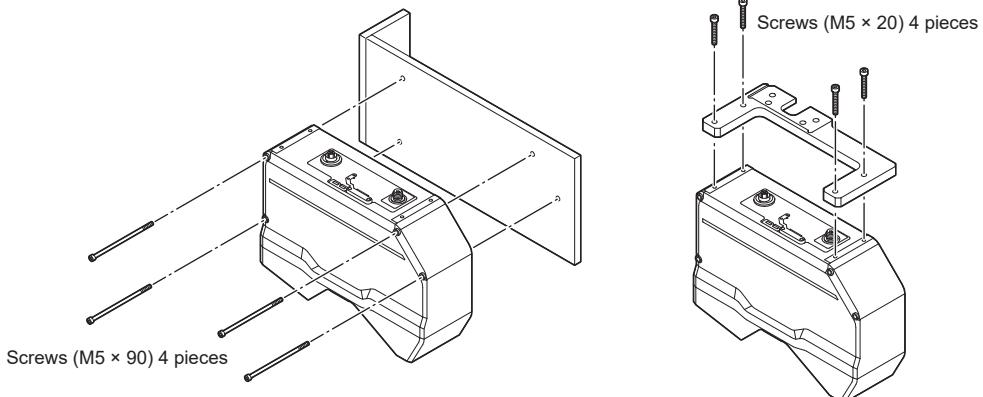
● LJ-S015, LJ-S025, LJ-S040, LJ-S080

Tightening torque: 0.8 to 1.2 Nm



● LJ-S160, LJ-S320, LJ-S640

Tightening torque: 1.5 to 2.0 Nm



Connecting the Cables

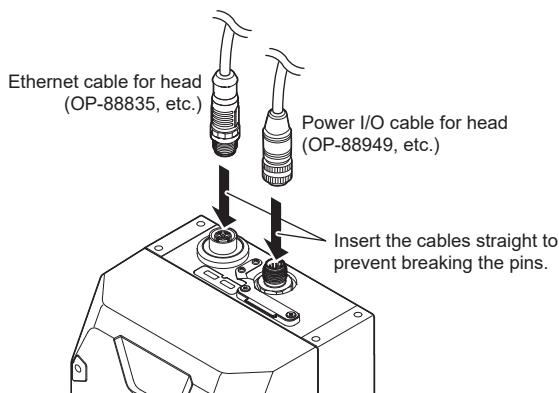
NOTICE
Notes when connecting cables

- Do not connect a cable that is not compatible with the LJ-S Series. Doing so may cause malfunction or damage to the head or connected equipment.
- Make sure that power is not being supplied to the head before connecting the cables. Connecting a cable while power is supplied may cause damage to the head or peripheral devices.
- Bundle the cables with protective material like a spiral tube. Direct bundling will concentrate the load on the bindings of the cable, which can result in cable damage or short circuit.
- In the absence of other specifications, the minimum cable bend radius (R) should be 4 times or more the external diameter (6 times or more is recommended). Additionally, repeated flexing and twisting should be avoided.

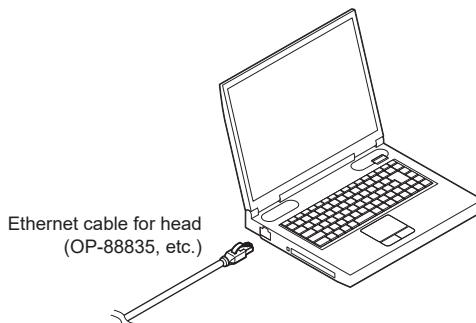
1 Adjust the orientation of the connector, then push it all the way in while slowly turning.

- Tightening torque: 1.2 to 1.5 Nm

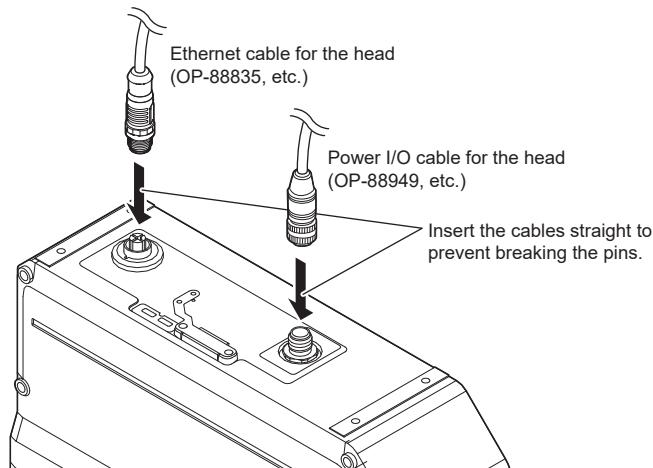
● LJ-S015, LJ-S025, LJ-S040, LJ-S080



2 Connect the Ethernet cable for head to the computer.



● LJ-S160, LJ-S320, LJ-S640



3 Connect the power I/O cable for head to the 24 VDC power supply.

NOTICE

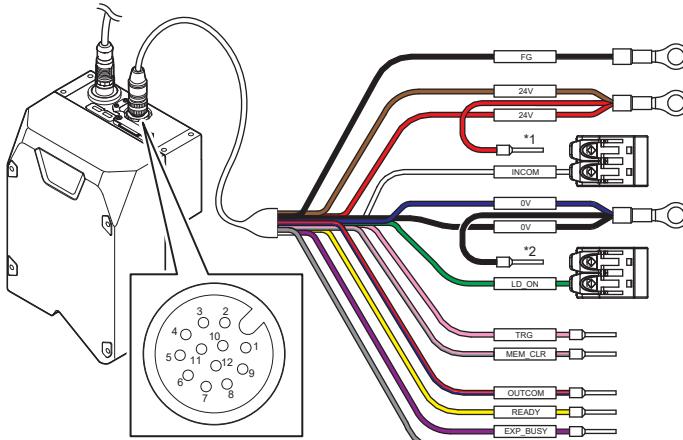
- Make sure to connect the frame ground terminal for the 24 VDC power source to a type D ground.
- Tighten the screws for the round terminal on the power supply with a torque of 0.5 to 0.75 [Nm].

(1) Connect 24 VDC and 0 V to the power supply terminals (24 V and 0 V round terminals) on the loose wire of the power I/O cable for head supply.

NOTICE

The power I/O cable for head supply has four power supply terminals: two 24 V and two 0 V. Connect all four to avoid malfunction.

(2) Connect the ground wire to the earth terminal (FG round terminal) on the loose wire of the power I/O cable for head supply.

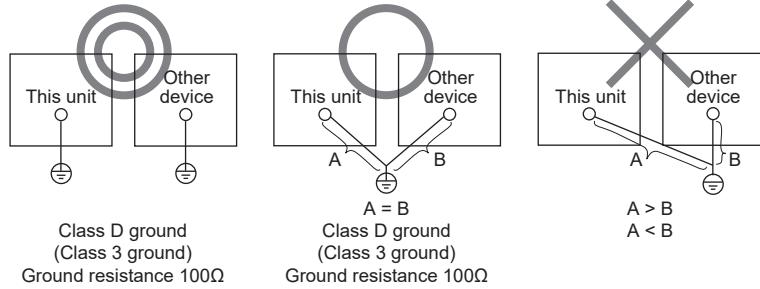


Label	Cable color	Connection
FG	Black	Connect the ground wire.
24V	Brown	Connect the 24V DC.
24V	Red	Connect the 24V DC.
INCOM	White	
0V	Blue	Connect the 0V DC.
0V	Black	Connect the 0V DC.
LD_ON	Green	
TRG	Pink	
MEM_CLR	Pink/Gray	
OUTCOM	Red/Blue	
READY	Yellow	
EXP_BUSY	Purple	
ERROR	Gray	

*1 Shipped short circuited to INCOM via a connector.

*2 Shipped short circuited to LD_ON via a connector.

- NOTICE**
- Ground each device separately.
 - Use a Class D ground.
 - Keep ground resistance to 100Ω or less.
 - Keep the ground wire as short as possible.
 - If it is not possible to ground each device separately, ground them together. However, make sure that the electrical cables are the same length.

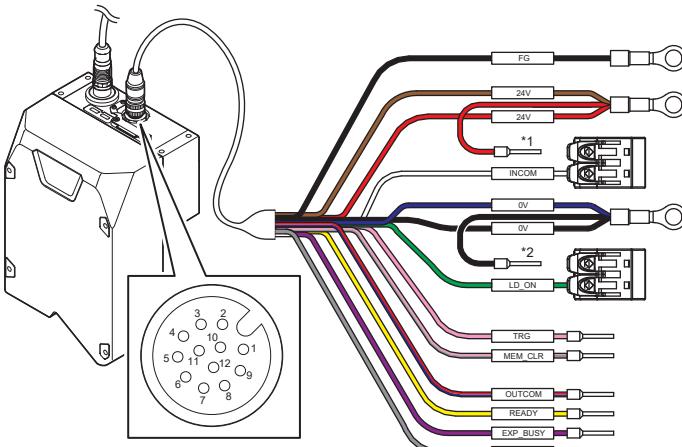


Wiring Input/Output

Overview

This chapter describes how to connect the wires required for basic I/O control using the LJ-S Series I/O connector interface for the head power supply.

I/O connector interface for head power supply



*1: Shipped short circuited to INCOM via a connector.

*2: Shipped short circuited to LD_ON via a connector.

No.	Label	Cable color	Connection
-	FG	Black	-
1	24V	Brown	24 VDC input
9	24V	Red	24 VDC input
3	INCOM	White	Common for input
2	0V	Blue	24 VDC input (GND)
7	0V	Black	24 VDC input (GND)
4	LD_ON	Green	Laser ON input
5	TRG	Pink	Trigger input
11	MEM_CLR	Pink/Gray	Memory clear input
12	OUTCOM	Red/Blue	Common for output
6	READY	Yellow	Trigger input permission output
10	EXP_BUSY	Purple	Capture-in-progress output
8	ERROR	Gray	Error output (N.C.)

[Reference] The color of the cables in the above figure are the colors of the power I/O cables for head.
OP-88949 (2 m) / OP-88950 (5 m) / OP-88951 (10 m)

Signal input to the LJ-S Series head

● Laser ON input

When this signal is input, the laser light is ready to be emitted.

● Trigger input

This is the signal to start scanning. This signal turns on from an external device at the timing to start scanning the measurement target. Ready signals can be used to confirm whether the trigger is accepted or not.

● Memory capacity clear input

Clears the memory of the area inside the head where the height and luminance images are kept.

Signal output from the LJ-S Series head

● Trigger input permission output

When this signal is ON, a trigger input to start scanning can be accepted.

● Capture-in-progress output

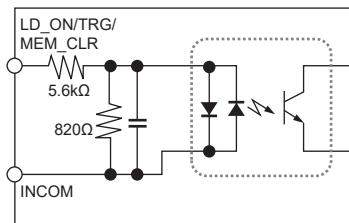
This signal outputs that an image is being captured. Do not move the measurement target while this signal is on.

● Error output (N.C.)

Normal close (N.C.) output when the power is turned on or a system error occurs (ON when normal, OFF when an error occurs).

Input circuit diagram

Circuit A1



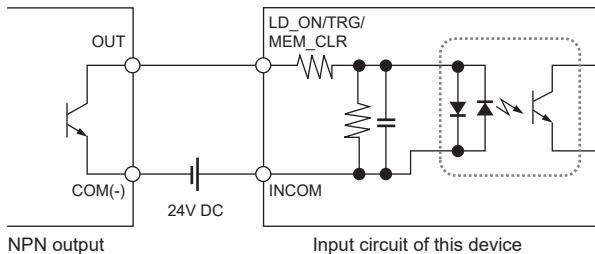
Item	Specifications	Remarks
Max. applied voltage	26.4V	
Minimum ON voltage	19V	Turn ON if either voltage or current condition is satisfied.
Min. ON current	3mA	
Maximum OFF current	5V	Turns off if the voltage condition or current condition is satisfied.
Maximum OFF current	1mA	

Point Power source 0V, INCOM, and OUTCOM are isolated.

Example of input connections

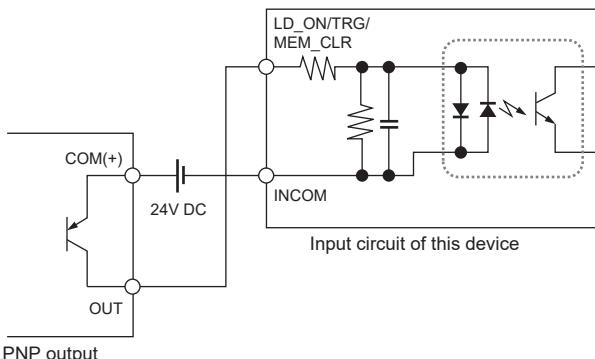
Example of NPN output connection

When connecting NPN output to the LJ-S Series head input



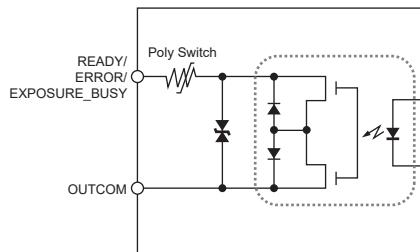
Example of PNP output connection

When connecting PNP output to the LJ-S Series head input



Output circuit diagram

Circuit B



Item	Specifications	Remarks
Max. applied voltage	30V	
Max. sink current	50mA	
Leakage current	0.1mA	When OFF / Maximum
	1.4V	When ON / Maximum (@ 50 mA)
Residual voltage	1.0V	When ON / Maximum (@ 20mA)

Point

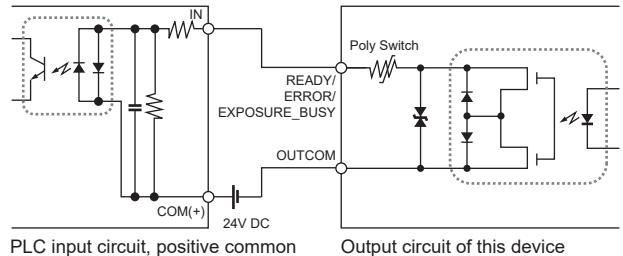
- Power source 0V, INCOM, and OUTCOM are isolated.
- Since this unit utilizes a photo MOSFET in the output elements, any one of the NPN inputs, or PNP inputs is Point connectable.

Example of output connections

If the input instrument is compatible with the NPN open collector outputs, then refer to this connection example.

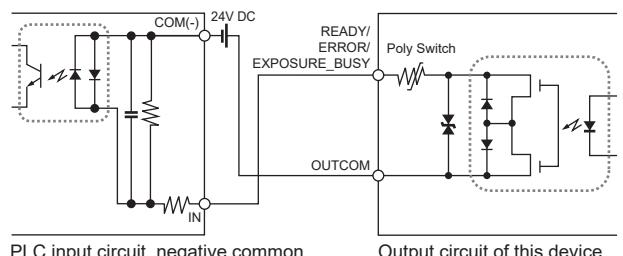
Example of PLC input connection 1

When inputting the output of the LJ-S Series head to PLC with a positive common



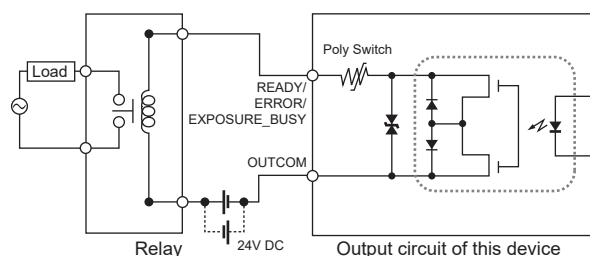
Example of PLC input connection 2

When inputting the output of the LJ-S Series head to PLC with a negative common



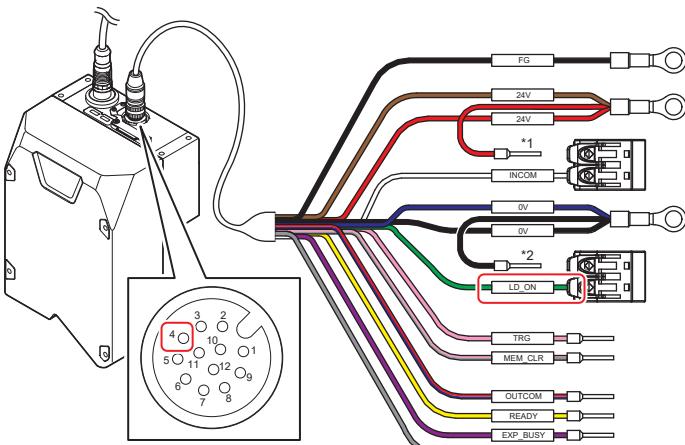
Example of relay input connection

When connecting the output from the LJ-S Series head to a relay



Laser ON input

The following is an example of wiring to enable the LJ-S Series head to emit laser light.



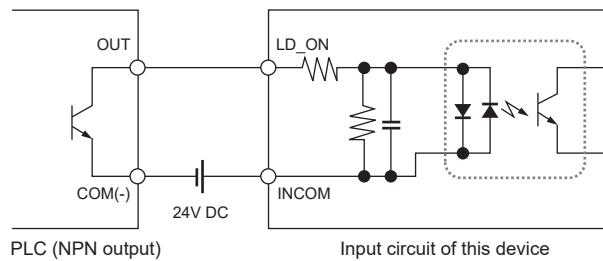
*1 Shipped short circuited to INCOM via a connector.

*2 Shipped short circuited to LP ON via a connector.

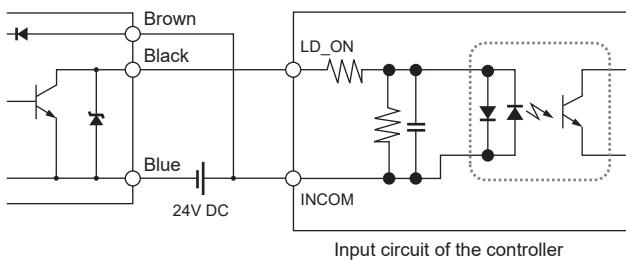
No.	Label	Cable color	Connection
-	FG	Black	-
1	24V	Brown	24 VDC input
9	24V	Red	24 VDC input
3	INCOM	White	Common for input
2	0V	Blue	24 VDC input (GND)
7	0V	Black	24 VDC input (GND)
4	LD_ON	Green	Laser ON input
5	TRG	Pink	Trigger input
11	MEM_CLR	Pink/Gray	Memory clear input
12	OUTCOM	Red/Blue	Common for output
6	READY	Yellow	Trigger input permission output
10	EXP_BUSY	Purple	Capture-in-progress output
8	ERROR	Gray	Error output (N.C.)

When the output instrument is compatible with the NPN open collector input

- Connect an NPN PLC output to the input for this unit

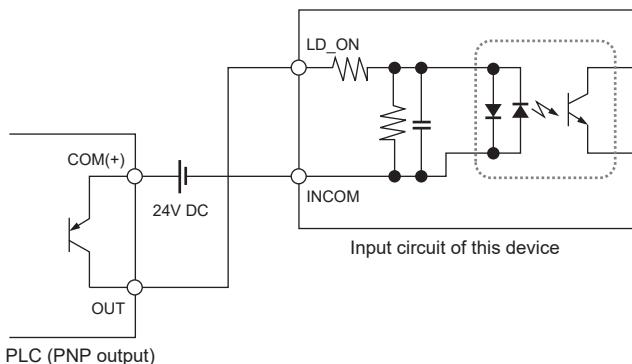


- Connect a sensor for synchronization with NPN output to the system input

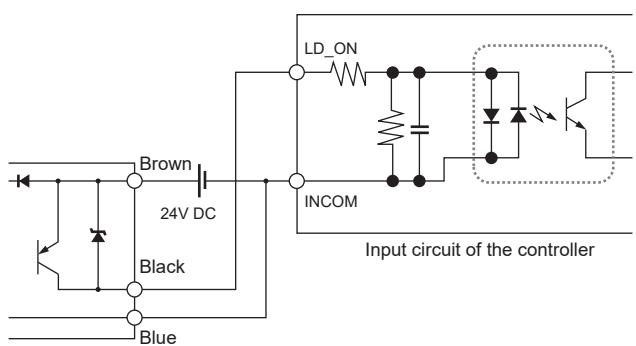


When the output instrument is compatible with the PNP open collector input

- Connect an PNP PLC output to the system input

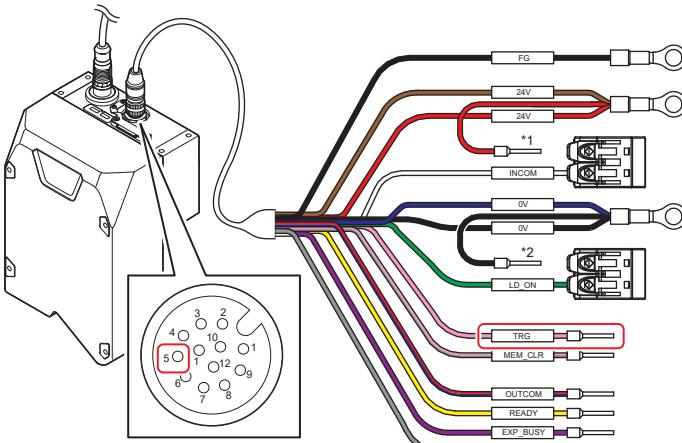


- Connect a sensor for synchronization with PNP output to the system input



Trigger input

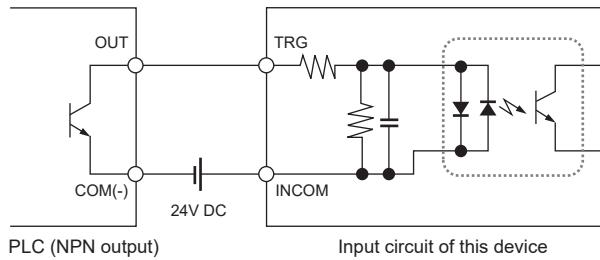
The following is an example of wiring terminals for inputting trigger signals from a PLC or a sensor for synchronization to the LJ-S Series head. Turn on terminal No. 5 "TRG" (trigger input) of the power I/O connector externally when you want to capture an image.



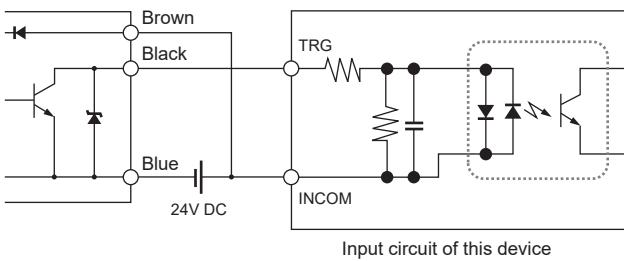
No.	Label	Cable color	Connection
-	FG	Black	-
1	24V	Brown	24 VDC input
9	24V	Red	24 VDC input
3	INCOM	White	Common for input
2	0V	Blue	24 VDC input (GND)
7	0V	Black	24 VDC input (GND)
4	LD ON	Green	Laser ON input
5	TRG	Pink	Trigger input
11	MEM_CLR	Pink/Gray	Memory clear input
12	OUTCOM	Red/Blue	Common for output
6	READY	Yellow	Trigger input permission output
10	EXP_BUSY	Purple	Capture-in-progress output
8	ERROR	Gray	Error output (N.C.)

When the output instrument is compatible with the NPN open collector input

● Connect an NPN PLC output to the input for this unit

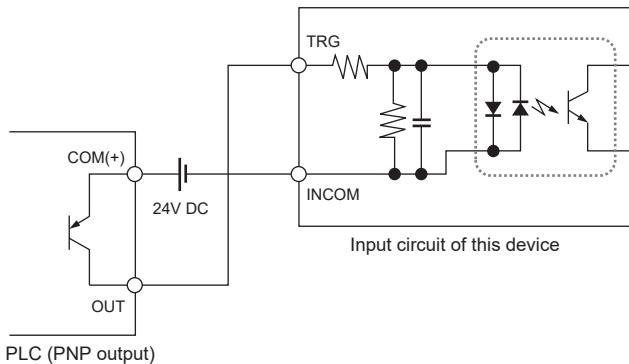


● Connect a sensor for NPN output synchronization to the input for this unit

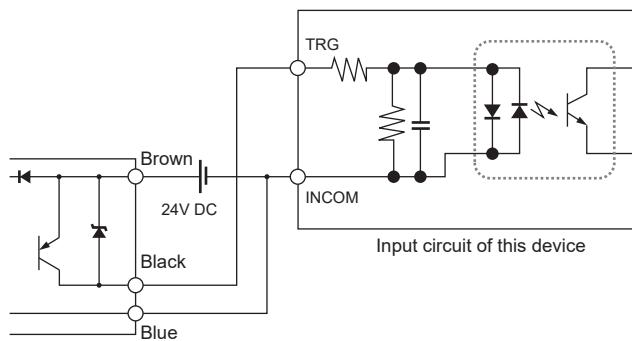


When the output instrument is compatible with the PNP open collector input

● Connect an PNP PLC output to the system input

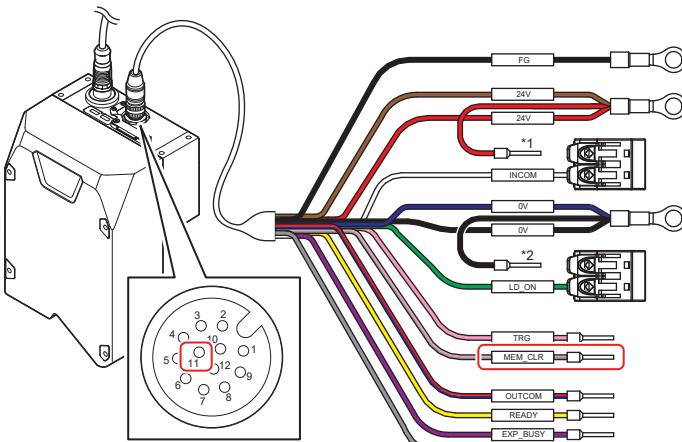


● Connect a sensor for PNP output synchronization to the input for this unit



Memory clear input

This is a wiring example of terminals for inputting a memory clear signal from a PLC or a sensor for synchronization to the LJ-S Series head. Clear the memory of the area inside the head that holds the height and luminance images.



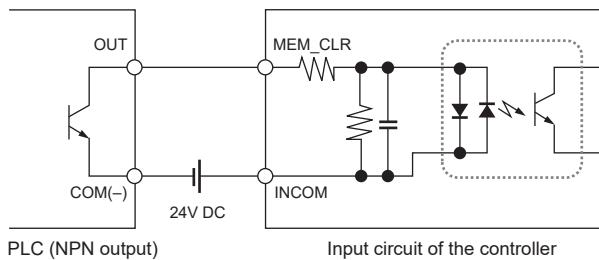
*1 Shipped short circuited to INCOM via a connector.

*2 Shipped short circuited to LD ON via a connector.

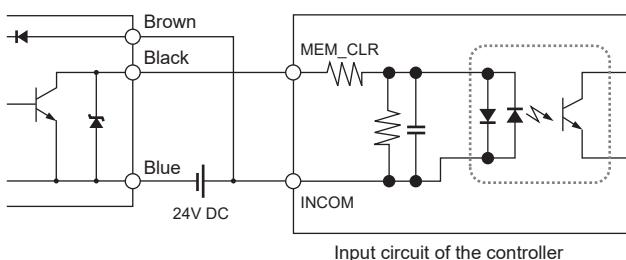
No.	Print	Cable color	Connection
-	FG	Black	-
1	24V	Brown	24 V DC input
9	24V	Red	24 V DC input
3	INCOM	White	Common for inputs
2	0V	Blue	24 V DC input (GND)
7	0V	Black	24 V DC input (GND)
4	LD_ON	Green	Laser ON input
5	TRG	Pink	Trigger input
11	MEM_CLR	Pink/Gray	Memory clear input
12	OUTCOM	Red/Blue	Common for output
6	READY	Yellow	Trigger input permission output
10	EXP_BUSY	Purple	Capture-in-progress output
8	ERROR	Gray	Error output (N.C.)

When the output instrument is compatible with the NPN open collector inputs

- Connect an NPN PLC output to the system input

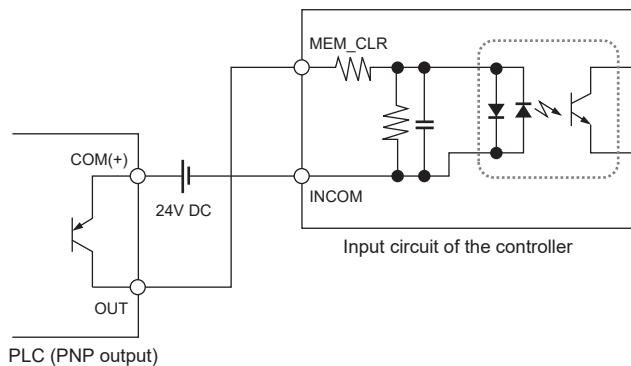


- Connect a sensor for synchronization with NPN output to the system input

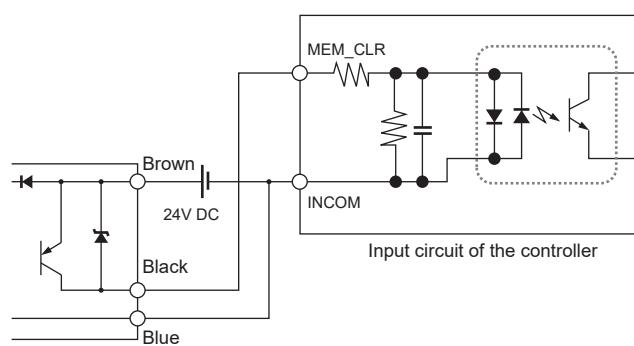


When the output instrument is compatible with the PNP open collector inputs

- Connect an PNP PLC output to the system input



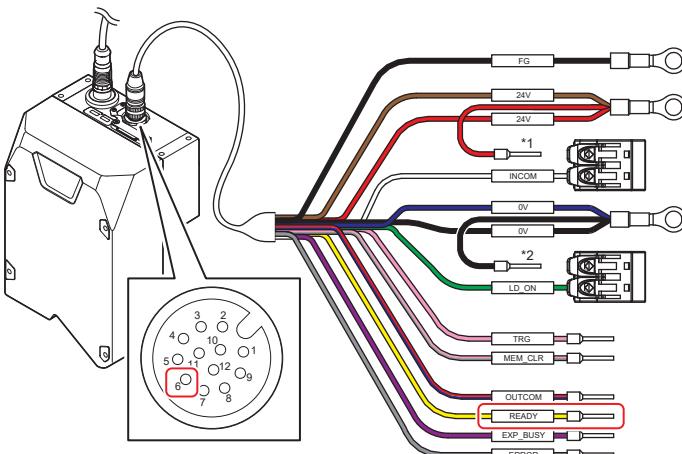
- Connect a sensor for synchronization with PNP output to the system input



Trigger input permission output

The following is an example of wiring for a terminal to check if a trigger can be input.

When input to the trigger is possible, the system turns on terminal No. 6 "READY" (trigger input permission output) of the power I/O connector for the head.



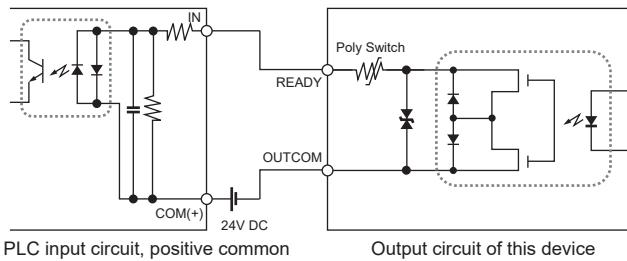
*1 Shipped short circuited to INCOM via a connector.

*2 Shipped short circuited to LD_ON via a connector.

No.	Label	Cable color	Connection
-	FG	Black	-
1	24V	Brown	24 VDC input
9	24V	Red	24 VDC input
3	INCOM	White	Common for input
2	0V	Blue	24 VDC input (GND)
7	0V	Black	24 VDC input (GND)
4	LD_ON	Green	Laser ON input
5	TRG	Pink	Trigger input
11	MEM_CLR	Pink/Gray	Memory clear input
12	OUTCOM	Red/Blue	Common for output
6	READY	Yellow	Trigger input permission output
10	EXP_BUSY	Purple	Capture-in-progress output
8	ERROR	Gray	Error output (N.C.)

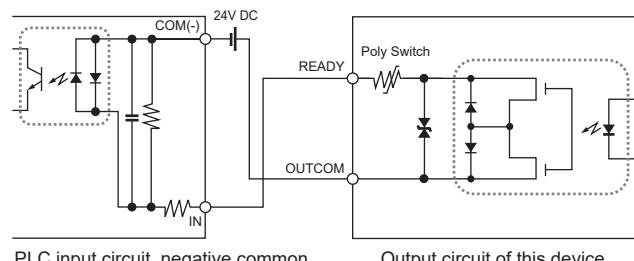
When the input instrument is compatible with the NPN open collector output

- Connect an output from this unit to a PLC with a positive common



When the input instrument is compatible with the PNP open collector output

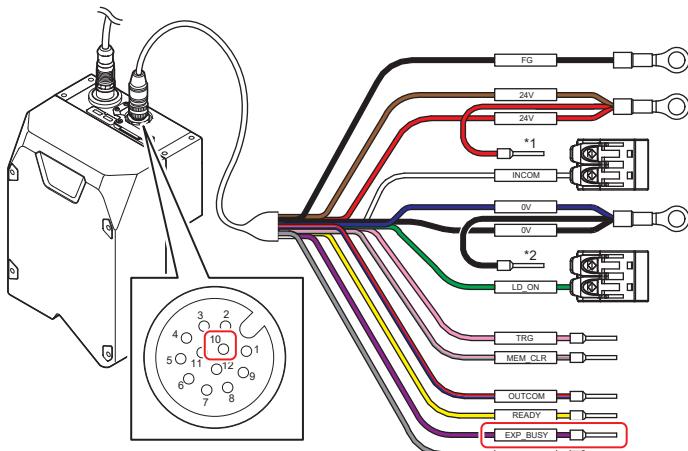
- Connect an output from this unit to a PLC with a negative common



Capture-in-progress output

This is an example of wiring for a terminal to confirm that capture is in progress.

Turn on terminal No. 10 "EXP_BUSY" (capture-in-progress output) of the power I/O connector for the head during capture. Do not move the measured object while this signal is on.



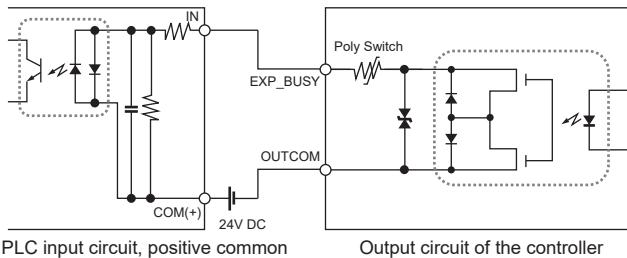
*1 Shipped short circuited to INCOM via a connector.

*2 Shipped short circuited to LD_ON via a connector.

No.	Print	Cable color	Connection
-	FG	Black	-
1	24V	Brown	24 V DC input
9	24V	Red	24 V DC input
3	INCOM	White	Common for inputs
2	0V	Blue	24 V DC input (GND)
7	0V	Black	24 V DC input (GND)
4	LD_ON	Green	Laser ON input
5	TRG	Pink	Trigger input
11	MEM_CLR	Pink/Gray	Memory clear input
12	OUTCOM	Red/Blue	Common for output
6	READY	Yellow	Trigger input permission output
10	EXP_BUSY	Purple	Capture-in-progress output
8	ERROR	Gray	Error output (N.C.)

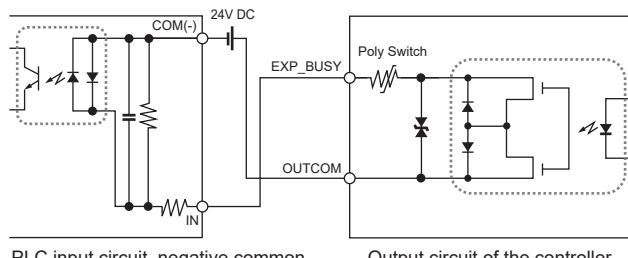
When the input instrument is compatible with the NPN open collector outputs

- Connect an output from the controller to a PLC with a positive common



When the input instrument is compatible with the PNP open collector outputs

- Connect an output from the controller to a PLC with a negative common

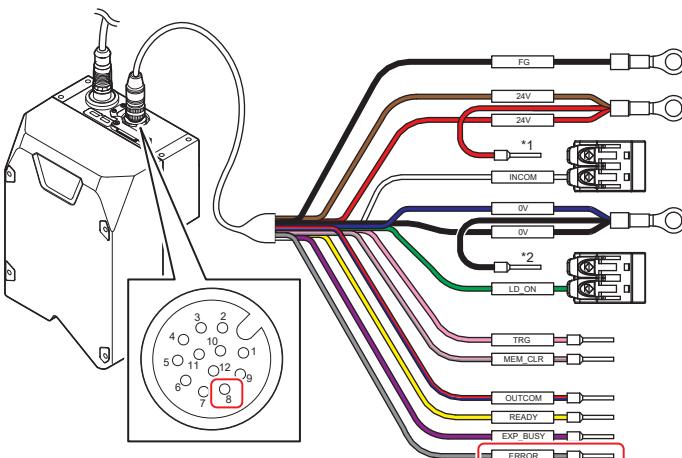


Error output

The following is an example of wiring for a terminal to check if an error occurred on this unit.

When a system error occurs, the system turns off terminal No. 8 "ERROR" (error output) of the power I/O connector for the head.

Point The error terminal is normally closed (N.C.). It is turned on during normal operation and turned off when a system error occurs.



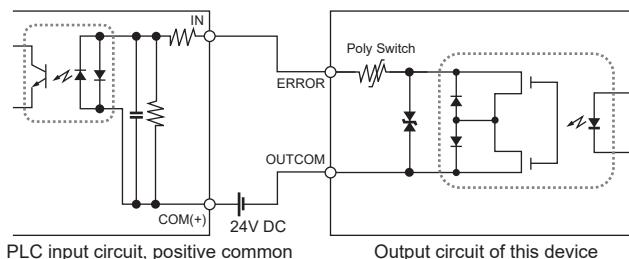
*1 Shipped short circuited to INCOM via a connector.

*2 Shipped short circuited to LD_ON via a connector.

No.	Label	Cable color	Connection
-	FG	Black	-
1	24V	Brown	24 VDC input
9	24V	Red	24 VDC input
3	INCOM	White	Common for input
2	0V	Blue	24 VDC input (GND)
7	0V	Black	24 VDC input (GND)
4	LD_ON	Green	Laser ON input
5	TRG	Pink	Trigger input
11	MEM_CLR	Pink/Gray	Memory clear input
12	OUTCOM	Red/Blue	Common for output
6	READY	Yellow	Trigger input permission output
10	EXP_BUSY	Purple	Capture-in-progress output
8	ERROR	Gray	Error output (N.C.)

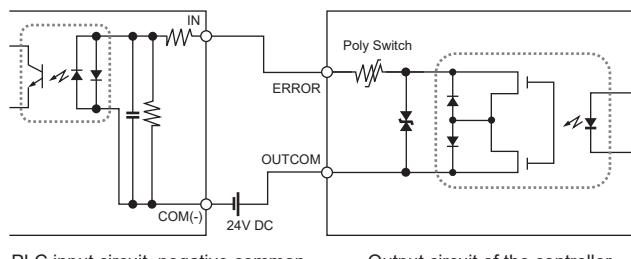
When the input instrument is compatible with the NPN open collector output

- Connect an output from this unit to a PLC with a positive common



When the input instrument is compatible with the PNP open collector output

- Connect an output from this unit to a PLC with a negative common



Chapter 3 Software

System Configuration Software	3-2
Software Operating Environment	3-3
Installing and Uninstalling the Software	3-4
Starting and Exiting the Software	3-5

System Configuration Software

There are two software packages that configure the LJ-S8000 Series: LJ-S Navigator and LJ-S Observer.

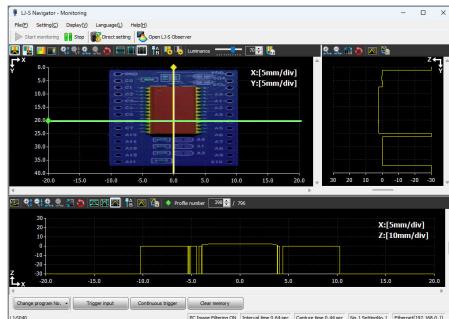
LJ-S Navigator is software to create the measurement settings for capturing 3D and luminance images (direct setting/local setting), or to check the imaging results by displaying it.

LJ-S Observer is software that can generate and display a LJ-S height image file (*.lhis) from data being displayed by LJ-S Navigator or snapshot file (*.psss), and perform an image processing and profile measurement.

LJ-S Navigator

Measurement result display

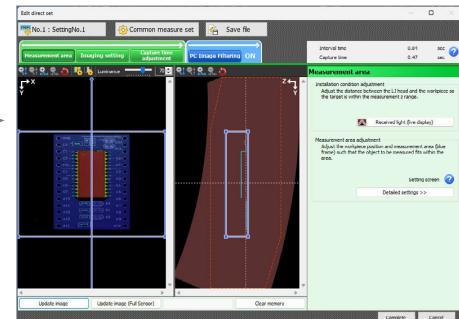
Profile display, Height/Luminance image display



Directly edit the measurement settings for the head

Measurement settings

Direct settings



Newly create or edit the measurement settings saved on the computer

Local settings

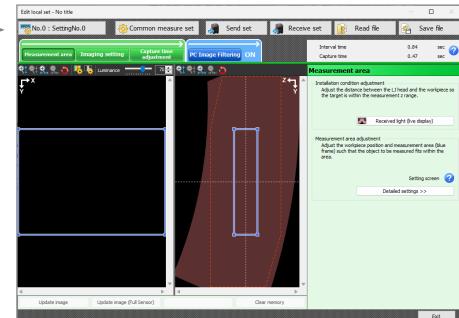
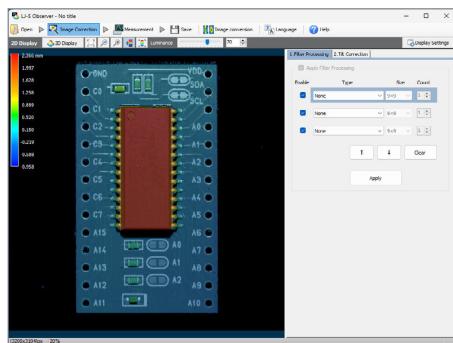


Image in display, or snapshot file (*.psss)

LJ-S Observer

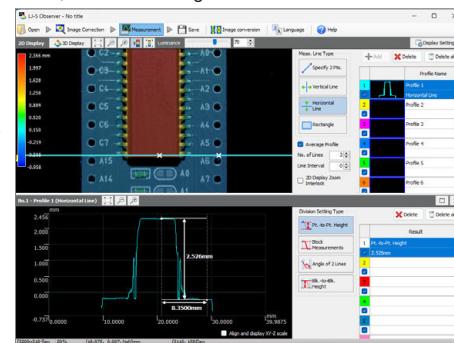
Image correction

Filter processing and tilt correction



Measurement

Pt.-to-Pt. Height, Block Measurements, Angle of 2 Lines, Blk.-to-Blk. Height



Save/Read



LJ-S height image file (*.lhis)

Software Operating Environment

LJ-S Navigator/Observer Operating System Environment

Supported OS	<ul style="list-style-type: none">Windows 11 (Pro)Windows 10 (Home/Pro/Enterprise) 64-bit version onlySupports OSes in Japanese, English, and Simplified Chinese.The other OSes which are not described cannot be used.
CPU	Intel® Core™ i3 processor or higher
Memory capacity	8GB or more
Free hard disk space	10 GB or more (separate area for storing image data and profile data is required)

Installing and Uninstalling the Software

Download and Installation

The following section describes the procedure to install LJ-S Navigator/LJ-S Observer onto your computer.

Perform installation by executing the file downloaded from the KEYENCE Website, following the instruction displayed on the screen.

Important

- Before starting the installation, terminate all other applications running on the personal computer.
- Sign in to the computer with an account that has Administrator privileges.

1 Download the latest installer from the user support page.

www.keyence.com/support_ljs8000_pc

Point

User registration and login are required to download the installer from the User Support page.

2 Unzip the compressed file which has been downloaded.

3 Run setup.exe in the Installer folder in the extracted and expanded folder.

Reference

This software doesn't use .NET Framework 3.5.
The installation of .NET Framework 3.5 can be skipped.

4 Clicking setup.exe will start [InstallShield Wizard].

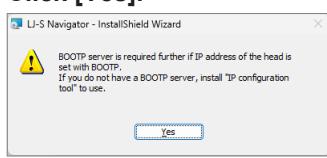
[InstallShield Wizard] will start.



5 Follow the on-screen instructions to install the software.

When the installment is complete, a confirmation message which relates the IP address settings will appear.

6 Click [Yes].



Point

The IP Setting Tool can be installed by running setup.exe in the "IP Setting Tool" folder.
Click [IP Setting Tool Installation], and follow the on-screen instructions to install the software.

7 Click [Complete].

Reference

The communication library (DLL) and sample program will be installed in the following location:
C:\Program Files\KEYENCE\LJ-S Navigator\lib

Uninstalling the Software

The following section describes the procedure to uninstall LJ-S Navigator from your computer.

Important

- Before starting the uninstallation, terminate all other applications running on the personal computer.
- Sign in to the computer with an account that has Administrator privileges.

1 From the Windows Start menu, select [Settings] > [Apps] > [Installed Apps].

2 Click [Uninstall] for [LJ-S Navigator].



3 Follow the on-screen instructions to uninstall the software.

Starting and Exiting the Software

LJ-S Navigator

Starting LJ-S Navigator

- 1 Check the wiring for errors and then turn on the power.**

Important Connections with a LAN through a router or converter are not guaranteed.

- 2 Double-click the LJ-S Navigator shortcut on the desktop.**



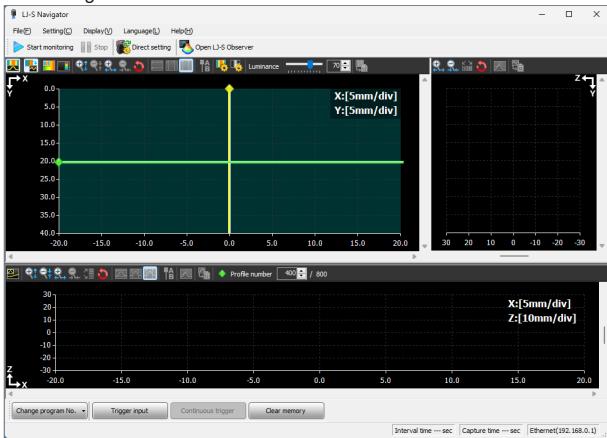
Reference You can also start the software by selecting [LJ-S Navigator] from the Start menu.

The start-up screen will appear.



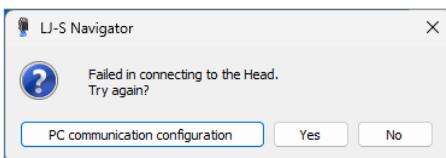
Communication with the head is successful

LJ-S Navigator starts.



Communication with the head failed

The dialog box below will appear.



Check that the head and computer are properly connected, and click the button.

Yes

The computer will try to connect with the head again.

No

The measurement screen will appear with the monitoring in stopped state. You can check and/or change the PC communication configuration and retry the connection by clicking the [Start monitoring] button.

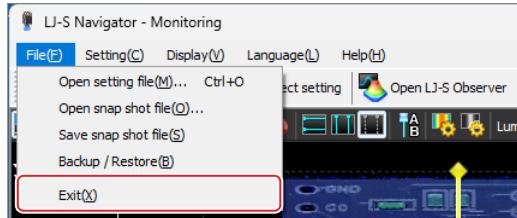
PC communication configuration

This brings up the [PC communication configuration] screen which allows you to change the communication settings such as the connection mode and IP address.

"PC communication configuration" (page 4-16)

Exiting LJ-S Navigator

- 1 Select [Exit] from the [File] menu.**



LJ-S Navigator will shut down.

- 2 Turn off the head.**

LJ-S Observer

Starting LJ-S Observer

You can start LJ-S Observer using one of the following methods:

- Desktop shortcut
- LJ-S Navigator tool bar
- LJ-S Navigator [Setting] menu

This section describes the procedure to start it up from the shortcut.

 To start the software from the LJ-S Navigator tool bar/[Setting] menu, see  "Displaying the Images from the Data being Displayed on the LJ-S Navigator" (page 6-3).

1 Double-click the LJ-S Observer shortcut on the desktop.

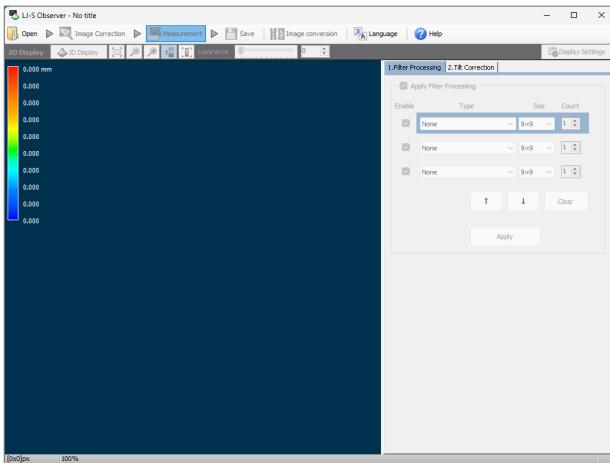


 You can also start the software by selecting [LJ-S Observer] from the Start menu.

The start-up screen will appear.



LJ-S Observer will start.

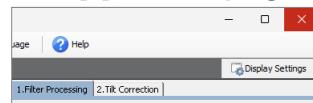


Exiting LJ-S Observer

There is no [Exit] menu in LJ-S Observer.

Exit by the [x] button at the top right corner of the screen.

1 Click [x] on the top right corner of the screen.



LJ-S Observer will shut down.

Chapter 4 LJ-S Navigator

Overview of LJ-S Navigator.....	4-2
Creating/Editing Measurement Settings	4-4
Checking the Measurement Results.....	4-8
Checking/Setting the System Settings.....	4-13

Overview of LJ-S Navigator

LJ-S Navigator Functions

Creating/Editing Measurement Settings

You can create and edit the measurement settings to acquire a profile by imaging with the head.

The measurement settings are configured by the following settings.

- **Measurement area**

Distance between head and measurement target, adjustment of measurement area
 "Measurement area" (Page 5-3)

- **Imaging setting**

Settings related to exposure time, blurred light filter, and detection mode
 "Capture Settings" (Page 5-6)

- **Capture time adjustment**

Adjusts capture time by setting the measurement area, skipping, and exposure time
 "Capture Time Adjustment" (Page 5-10)

- **PC Image Filtering**

Noise spike removal and invalid pixel suppression settings
 "PC Image Filtering" (Page 5-11)

- **Common measure set**

Settings that are common for measurement settings, such as head information, terminal settings, and memory settings
 "Common Measure Set" (Page 5-12)

There are two methods for creating and editing measurement settings: [Edit direct set] enables you to directly edit the measurement settings (for the currently active measurement) that are stored on the head; and [Edit local setting] enables you to create new settings and/or edit the settings that are stored on the computer.

"Creating/Editing Measurement Settings" (Page 4-4)

Displaying the Measurement Results

This function enables you to monitor directly the measurement results that have been captured based on the measurement settings in the profile display and height/luminance display.

"Checking the Measurement Results" (page 4-8)

- **[Height/Luminance Image Display] Screen**

Acquired profiles are displayed consecutively and time-sequentially.
 Measurement values of height or luminance are expressed as a gradient.

- **Display Y-Z axis profile screen**

The newest profile (Y-axis/Z-axis) that has been acquired is displayed.

- **Display X-Z axis profile screen**

The newest profile (X-axis/Z-axis) that has been acquired is displayed.

System Settings

- **Display device information**

The screen displays the device configuration of the head currently connected and the environmental configuration. The configurations can also be edited.

"Checking/Setting the Device Information" (page 4-13)

- **PC communication configuration**

Communication settings to connect the head to a computer can be checked and/or set.

"PC communication configuration" (page 4-16)

- **Switching the display language**

The display language of LJ-S Navigator can be changed.



Restarting LJ-S Navigator following the on-screen instructions to switch to the selected language.

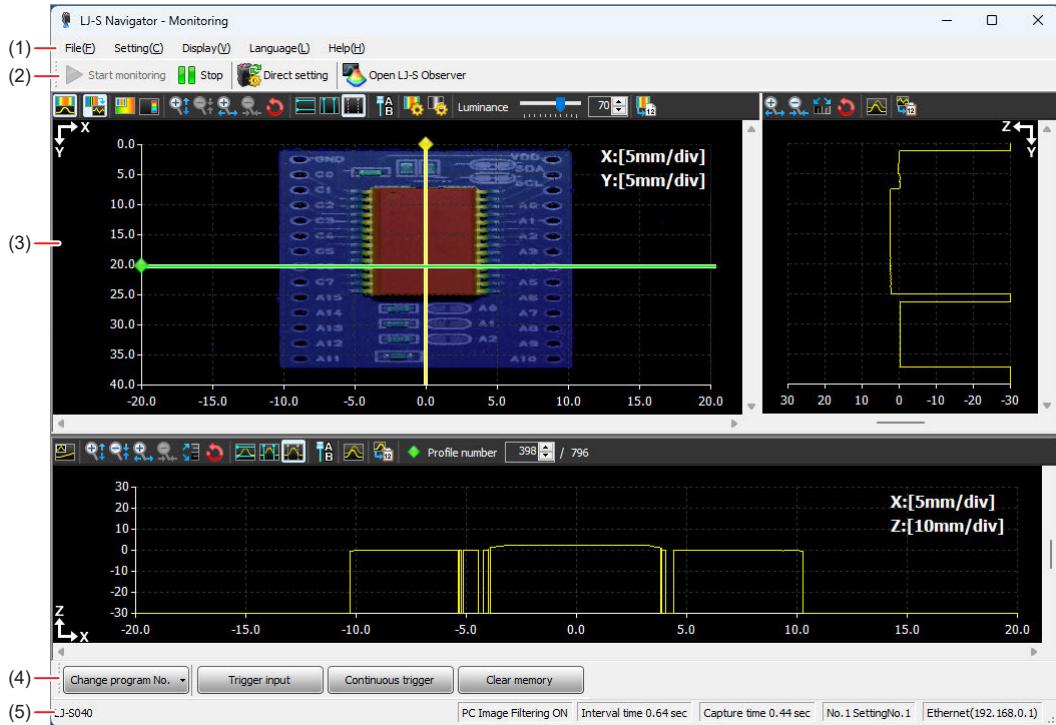
- **Version Information**

The version information for LJ-S Navigator can be checked.



Screen View

The main screen of LJ-S Navigator is configured as below.



(1) Menu

● File

The menu regarding the file operation, back up restoration, and application termination

● Setup

The settings related menu such as settings edit, device information and PC communication configuration, as well as start-up menu of LJ-S Observer

● Display

The menu regarding the display of measurement screen and operation panel, and status bar, as well as menu regarding the alignment of measurement screen

● Language

"Switching the display language" (Page 4-2)

● Help

"Version Information" (Page 4-2)

(2) Tool bar

Shortcut buttons for LJ-S Navigator are arranged.

● Start/Stop monitoring

Start/stop profile acquisition from the head.

"Start/Stop Monitoring" (Page 4-11)

● Direct settings

"Editing the direct setting" (Page 4-4)

● Open LJ-S Observer

Starts LJ-S Observer.

"Displaying the Images from the Data being Displayed on the LJ-S Navigator" (Page 6-3)

(3) Measurement screen area

The following screens are displayed:

- [Height/Luminance Image Display] Screen
 - Display Y-Z axis profile screen
 - Display X-Z axis profile screen
- "Checking the Measurement Results" (Page 4-8)

(4) Operation panel

The operation panel enables you to change the measurement settings to be executed (changing program No.) and execute several terminal input commands like trigger input to the head.

"Operating by the Operation Panel" (Page 4-11)

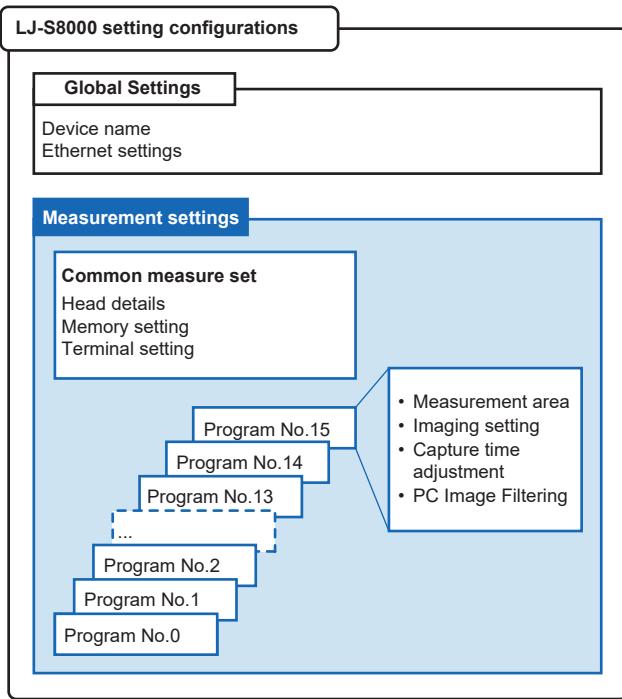
(5) Status bar

The connected head model, program number of the measurement settings in execution, and IP address of the connected head are displayed.

Creating/Editing Measurement Settings

Measurement Settings

The setting options explained in this chapter are outlined in the figure shown below.



You can edit the common measurement and program settings to obtain optimum measurement results.

Common measure set

Common measure set

The head details, memory setting, and terminal setting are settings that are in common for all measurements.

□ "Common Measure Set" (Page 5-12)

Program No. 0 to Program No. 15

A [Program] combines the sequence of settings from the measurement area, imaging setting, capture time adjustment, and PC image filtering to define the measurement operation.

LJ-S8000 can store up to 16 programs from which you can select the program you wish to use for the measurement.

You can also switch to another program while the measurement is in progress.

- "Measurement area" (Page 5-3)
- "Capture Settings" (Page 5-6)
- "Capture Time Adjustment" (Page 5-10)
- "PC Image Filtering" (Page 5-11)

Reference For the environment settings, see □ "Checking/Setting the System Settings" (page 4-13).

Direct and Local Setting Editing

Setting editing methods available for LJ-S Navigator are as follows:

- Edit direct set
- Edit local set

Features of the direct setting editing

- You can directly edit the measurement settings for the head.
- Since the setting changes are reflected to the head directly, you can change the settings as you check the profile and the changes in the height/luminance image display, etc.
- You cannot create a new measurement program.

Features of the local setting editing

- You can create a new measurement program.
- You can edit measurement programs that are stored on the computer.
- You can load and edit measurement programs that are stored on the head.
- The measurement programs that you created/edited can be sent to the head or saved to the computer.
- The entire content of the measurement program (Common measurement setting + Program x 16) will be sent to the head.
- If multiple heads are connected, you can send a measurement program (Common measurement setting + Program x 16) to each head.

Editing the direct setting

This section explains the procedure for directly editing (direct editing) the measurement program that is currently active on the head.

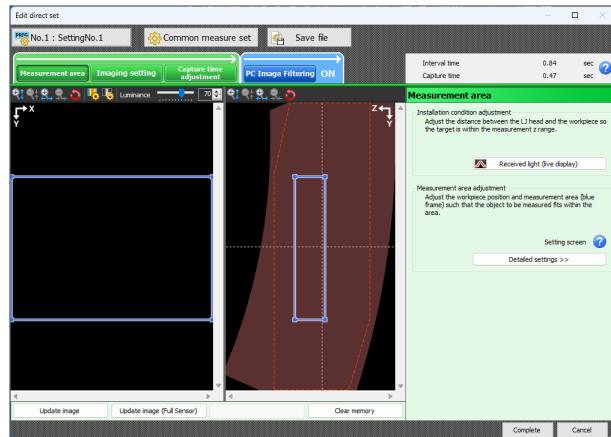
1 Click [Direct setting] on the tool bar.



The monitor will be stopped, and the [Edit direct set] screen where the measurement settings that are currently active on the head are read will appear.

Reference The [Edit direct set] screen can also be displayed by selecting [Direct set] from the [Setting] menu.

2 Select the configuration tab to be edited, and edit the measurement settings.



□ "Chapter 5 Measurement Settings" (page 5-1)

3 After the setup is completed, click [Complete].

You will return to the measurement screen.

Editing the local setting

The local setting edit can edit the measurement settings by following methods.

- "Receive from Head" (Page 4-5)
- "Open setting file" (Page 4-6)
- "Create new file" (Page 4-7)

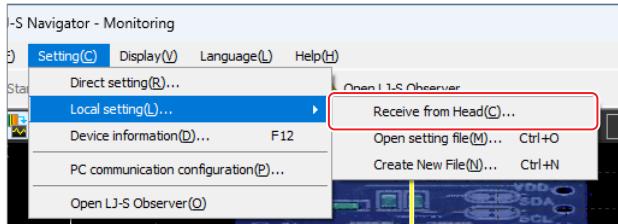
All local setting edits will be performed from the [Setting] menu.

Receive from Head

Receive the measurement settings that are currently active on the head, and edit it.

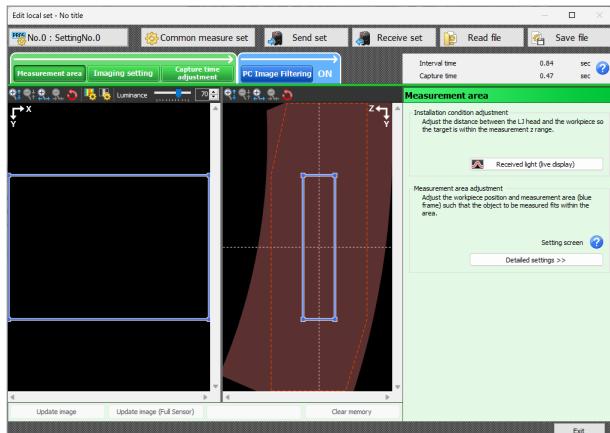
Point The setting edits will be performed after receiving the measurement settings that are currently active from the head, however, different from the direct setting editing, the settings will not be reflected directly. To reflect the settings to the head, the settings must be sent to the head.

1 Click the [Setting] menu > [Local setting] > [Receive from head].



The monitor will be stopped, and the [Edit local set] screen where the measurement settings that are currently active on the head are read will appear.

2 Select the configuration tab to be edited, and edit the measurement settings.



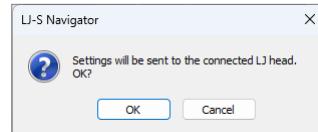
"Chapter 5 Measurement Settings" (page 5-1)

3 Once you have set the necessary program, click [Send set].



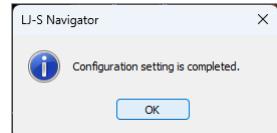
A confirmation dialog box for sending programs to the head will appear.

4 Click [OK].



The measurement program (Common measurement setting + Program x 16) will be sent to the head. When the transmission is complete, a confirmation dialog will appear.

5 Click [OK].



You will return to the [Edit local set] screen.

6 Click [Exit].



A dialog for confirming whether to save the edited measurement program to a file will appear.

7 Click [Yes] if you wish to save the measurement program to a file; click [No] if not.

[Yes]

The [Save As] screen will appear. Select a desired folder and click [Save]. The measurement program will be saved; and you will be taken back to the measurement screen.

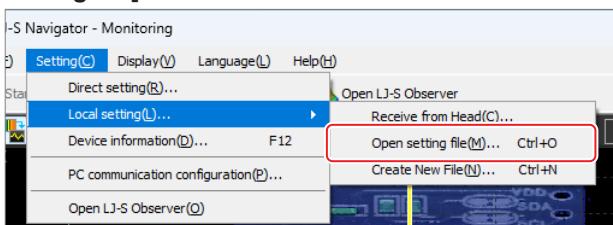
[No]

The system will return to the measurement screen without saving.

Open setting file

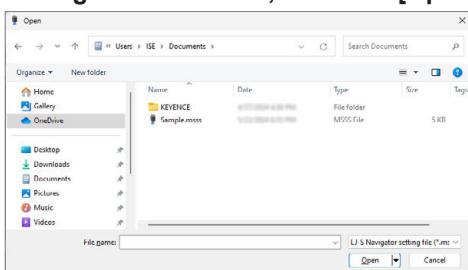
Perform editing by opening the measurement settings file saved in the PC.

1 Click the [Setting] menu > [Local setting] > [Open setting file].



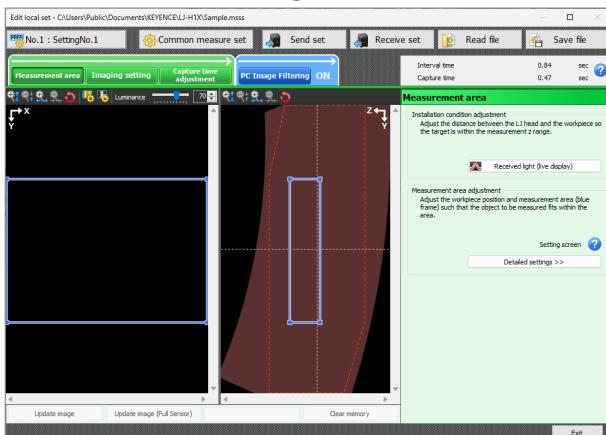
The monitor will be stopped, and the [Open] dialog will appear.

2 Select the measurement settings file where the settings will be edited, and click [Open].



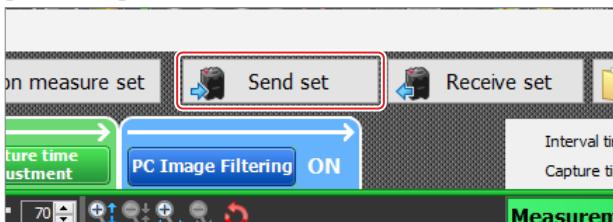
The [Edit local set] screen where the selected file has been read will appear.

3 Select the configuration tab to be edited, and edit the measurement settings.



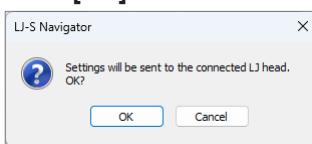
□ "Chapter 5 Measurement Settings" (page 5-1)

4 Once you have set the necessary program, click [Send set].



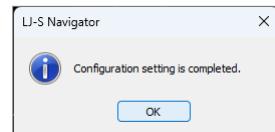
A confirmation dialog box for sending programs to the head will appear.

5 Click [OK].



The measurement program (Common measurement setting + Program x 16) will be sent to the head. When the transmission is complete, a confirmation dialog will appear.

6 Click [OK].



You will return to the [Edit local set] screen.

7 Click [Exit].



A dialog for confirming whether to save the edited measurement program to a file will appear.

8 Click [Yes] if you wish to save the measurement program to a file; click [No] if not.

[Yes]

The [Save As] screen will appear. Select a desired folder and click [Save]. The measurement program will be saved; and you will be taken back to the measurement screen.

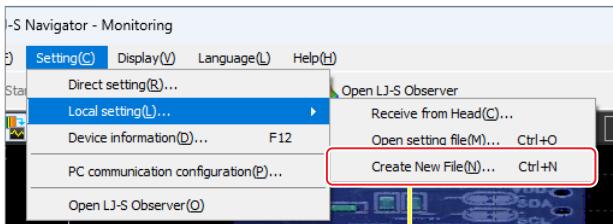
[No]

The system will return to the measurement screen without saving.

Create new file

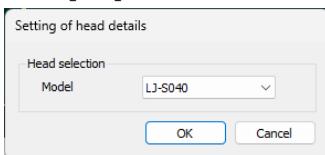
Newly create the measurement settings.

1 Click the [Setting] menu > [Local setting] > [Create New File].



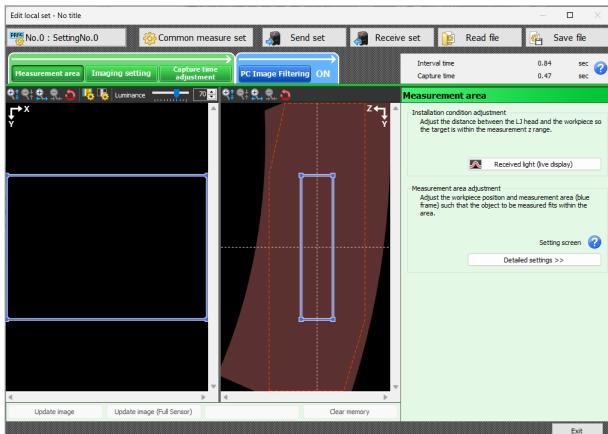
The monitor will be stopped, and the [Setting of head details] screen will appear.

2 Select the head model to be used in [Model], and click [OK].



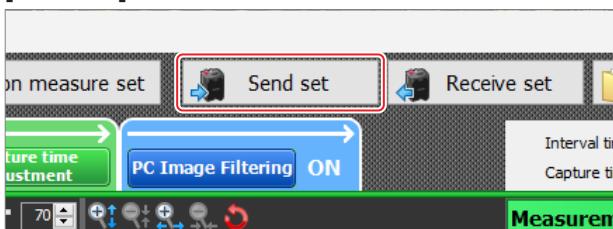
The [Edit local set] screen will appear.

3 Select the configuration tab to be edited, and edit the measurement settings.



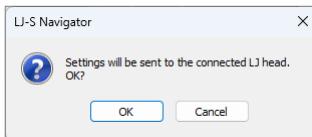
□ "Chapter 5 Measurement Settings" (page 5-1)

4 Once you have set the necessary program, click [Send set].



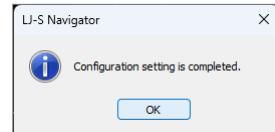
A confirmation dialog box for sending programs to the head will appear.

5 Click [OK].



The measurement program (Common measurement setting + Program x 16) will be sent to the head. When the transmission is complete, a confirmation dialog will appear.

6 Click [OK].



You will return to the [Edit local set] screen.

7 Click [Exit].



A dialog for confirming whether to save the created measurement program to a file will appear.

8 Click [Yes] if you wish to save the measurement program to a file; click [No] if not.

[Yes]

The [Save As] screen will appear. Select a desired folder and click [Save]. The measurement program will be saved; and you will be taken back to the measurement screen.

[No]

The system will return to the measurement screen without saving.

Checking the Measurement Results

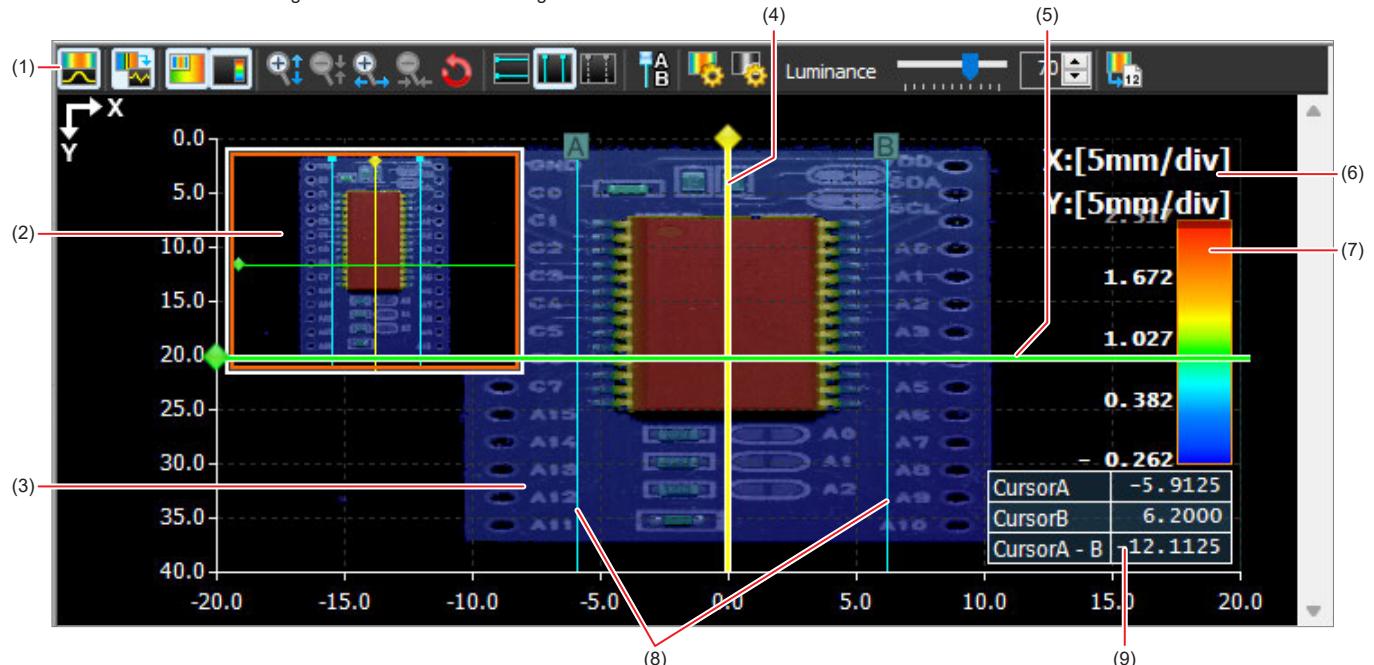
To check the measurement results acquired from the head, the following screens are available in LJ-S Navigator:

- "[Height / Luminance Image Display] screen" (page 4-8)
- "[Display Y-Z axis profile] screen" (page 4-10)
- "[Display X-Z axis profile] screen" (page 4-10)

[Height / Luminance Image Display] screen

The screen arranges the profiles in time series obtained from the head and displays them.

The measurement value of the height/Luminance is shown as a gradient.



(1) Operation menu



Shows or hides the [Display X-Z axis profile] screen.



Shows or hides the [Display Y-Z axis profile] screen.



Shows or hides [Display area guide].



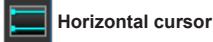
Shows or hides [Display height scale].



Each time one of these buttons is clicked enlarges or reduces the display size horizontally or vertically.



Resets the enlarged/reduced display size and the moved display position back to the default states.



Displays the horizontal cursor on the display area.



Displays the vertical cursor on the display area.



Hides the vertical/horizontal cursor on the display area.



Selects the vertical or horizontal cursor A and B at the same time, and moves them by dragging while keeping their positional relationship.

Display setting for height image

□ "Display setting for height image" (page 4-9)

Luminance image display settings

□ "Luminance image display settings" (page 4-9)

Luminance settings

Sets the luminance of the image with the slider or a number.

- If the luminance is set to 0, only the height image is displayed.
- If the luminance is set to 100, only the luminance image is displayed.

Save as CSV/TIFF/ASCII/PCD/PNG

Saves the height image and luminance image in the CSV/TIFF/ASCII/PCD/PNG format.

(2) Display area guide

The guide indicates the position being currently displayed by .

The range of the orange frame is displayed.

(3) Height/Luminance Image Display

The height/luminance appears as a gradient.

Display height image

The higher the image, the redder the color; and the lower the image, the bluer the color.

Luminance image display

The brighter (the more the light volume) the image, the whiter the color, and the darker (the less the light volume) the image, the blacker the color.

(4) Y-axis profile line

This profile line is displayed on the [Display Y-Z axis profile] screen. You can move it to any desired position.

(5) X-axis profile line

This profile line is displayed on the [Display X-Z axis profile] screen. You can move it to any desired position.

(6) Grid scale

Displays the dimension per division of the grid (dotted line).

(7) Display height scale

 The scale indicates the relationship between the height and gradient displayed by .

(8) Measurement cursor

The measurement cursor is used to check the value at any position displayed by  or .

(9) Measurement cursor information

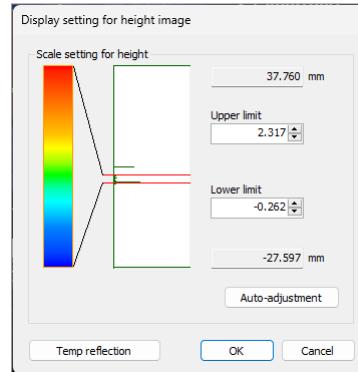
The measurement value at the measurement cursor.

Display setting for height image

Set the upper and lower limits of the height image scale.

1 Click  in the operation menu.

The [Display setting for height image] screen appears.

2 Set the upper/lower limit values of the display range, checking the histogram.

- Dragging the red line on the histogram can set the upper/lower limit.
- Clicking the [Auto-adjustment] automatically sets the upper/lower limits based on the histogram distribution.
- Clicking [Temp reflection] reflects the set upper/lower limit onto the height image of the [Height/luminance image display] screen. Since this is the temporary reflection, clicking [Cancel] returns to the original settings.

3 After the setup is completed, click [OK].

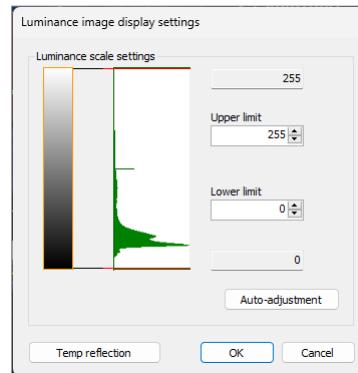
The scale for the height image is set.

Luminance image display settings

Set the upper and lower limits of the luminance image scale.

1 Click  in the operation menu.

The [Luminance image display settings] screen appears.

2 Set the upper/lower limit values of the display range, checking the histogram.

- Dragging the red line on the histogram can also set the upper/lower limit.
- Clicking the [Auto-adjustment] automatically sets the upper/lower limits based on the histogram distribution.
- Clicking [Temp reflection] reflects the set upper/lower limit onto the luminance image of the [Height/luminance image display] screen. Since this is the temporary reflection, clicking [Cancel] returns to the original settings.

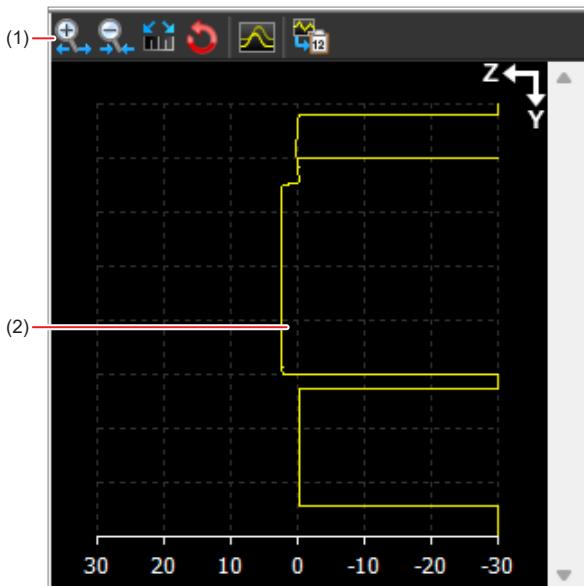
3 After the setup is completed, click [OK].

The scale for the luminance image is set.

[Display Y-Z axis profile] screen

The screen is to monitor the Y-axis profile.

The screen displays the newest profile obtained periodically from the head.



(1) Operation menu



Each click of these buttons enlarges/reduces the display size.



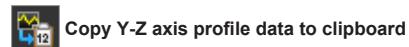
This button displays the maximum and minimum values of the currently displayed profile in the largest possible size that fits inside the display area.



Resets the enlarged/reduced display size and fit display back to the default state.



This button retains the profile display at the point when the icon was clicked and displays the current profile on top of it. The saved profile will disappear when you click the icon again.



This button copies the profile data to the clipboard in text format.

(2) Profile

The newest Y-axis profile obtained from the head.

[Display X-Z axis profile] screen

The screen is to monitor the X-axis profile.

The screen displays the newest profile obtained periodically from the head.



(1) Operation menu



Display area guide

Shows or hides the display position guide. When viewing the profile in enlarged size, this guide indicates the part of the screen that is currently being displayed.



Expand/Reduce

Each time one of these buttons is clicked enlarges or reduces the display size horizontally or vertically.



Fit display

This button displays the maximum and minimum values of the currently displayed profile in the largest possible size that fits inside the display area.



Return to default display

Resets the enlarged/reduced display size and fit display back to the default state.



Horizontal cursor

Displays the horizontal cursor on the display area.



Vertical cursor

Displays the vertical cursor on the display area.



Hide cursor

Hides the vertical/horizontal cursor on the display area.

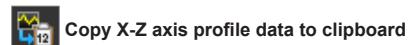


Select cursor A and B

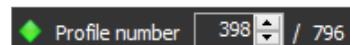
Selects the vertical or horizontal cursor A and B at the same time, and moves them by dragging while keeping their positional relationship.



This button retains the profile display at the point when the icon was clicked and displays the current profile on top of it. The saved profile will disappear when you click the icon again.



This button copies the profile data to the clipboard in text format.



398 / 796

This is the number of the displayed profile.

You can also specify a number to display a profile.

(2) Display area guide



The guide indicates the position being currently displayed by .

The range of the orange frame is displayed.

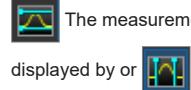
(3) Grid scale

Displays the dimension per division of the grid (dotted line).

(4) Profile

The newest X-axis profile obtained from the head.

(5) Measurement cursor



The measurement cursor is used to check the value at any position displayed by or .

(6) Measurement cursor information

The measurement value at the measurement cursor.

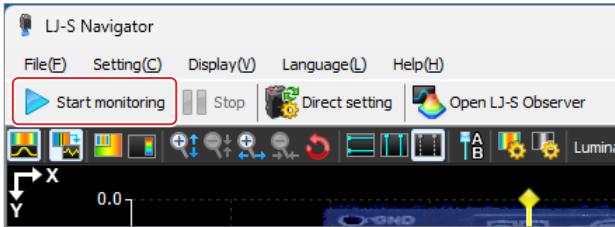
Start/Stop Monitoring

When LJ-S Navigator starts, a profile is acquired from the head. The profile acquisition can stop/start at any time. Starting the monitoring again after stopping will clear the measurement screen display and show it again with the newest profile.

Starting Monitoring

1 Click [Start monitoring] on the tool bar.

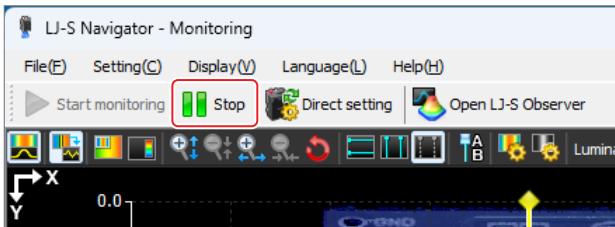
The profile acquisition from the head will start, and the measurement screen will be displayed again.



Stop Monitoring

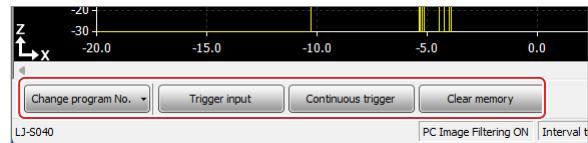
1 Click [Stop] on the tool bar.

The profile acquisition from the head will be stopped, and the measurement screen update will also stop.



Operating by the Operation Panel

The operation panel enables you to change the measurement settings to be executed (changing program number) and execute several terminal input commands like trigger input to the head.



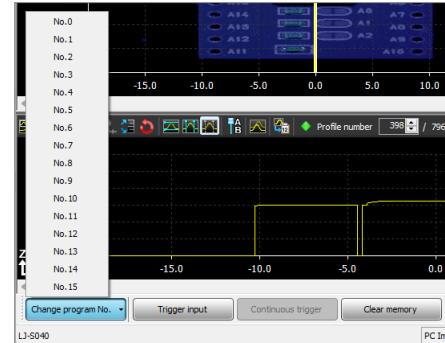
The contents that can be operated in the operation panel are as below.

- Change program No.
- Trigger input
- Continuous trigger
- Clear memory

Change program No.

When [Change program No.] is clicked, the list of measurement settings will appear.

Select the program No. of the measurement settings to be changed.



The program No. with the check box on is the measurement setting being executed.

Trigger input

When [Trigger input] is clicked, the trigger will be input once.

Continuous trigger input

When [Continuous trigger] is clicked, the trigger will be continuously input.

Clear memory

When [Clear memory] is clicked, the internal memory of the head will be cleared.

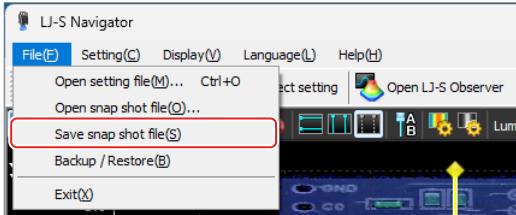
Backing Up/Restoring Monitor Data

Monitoring measurement results can be saved as a snapshot file (*.psss). Opening the snapshot file can restore the measurement results at saving.

Backing up monitor data

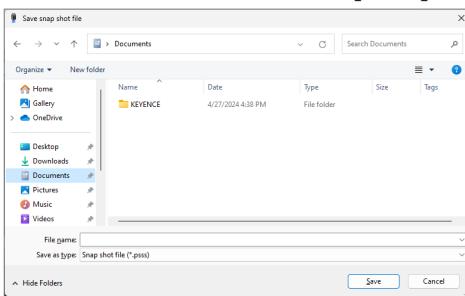
Profile data during monitoring and height/luminance image data are saved as a snapshot file.

1 Select the [File] menu > [Save snap shot file].



When using this save method, if there is no monitor data, the [There is no data to save.] message will appear and saving will stop.

2 Enter the file name and click [Save].

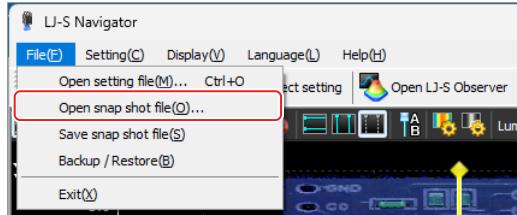


The newest profile data and height/luminance image data will be saved to the snap shot file.

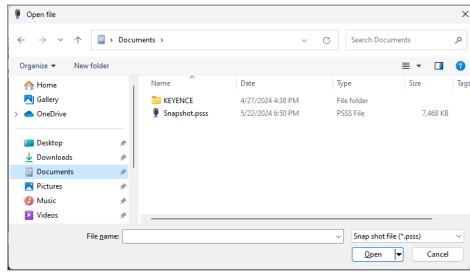
Restoring monitor data

Open the saved snapshot file, and restore the profile data and height/luminance image data at saving.

1 Select the [File] menu > [Open snap shot file].



2 Select and open the snapshot file (*.psss).



The profile data and height/luminance image data at saving will be restored.



You can open the file by double-clicking the snapshot file.

Checking/Setting the System Settings

Checking/Setting the Device Information

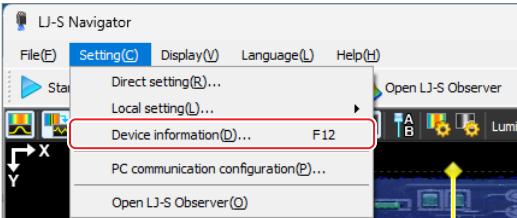
To check/set the device information, the [Display device information] screen is prepared for LJ-S Navigator.

In the [Display device information] screen, the head and head information that has been connected can be checked, as well as switching the destination head, setting the environment setting of the destination head, initializing the connection device, and backup/restore of all settings can be done.

Displaying Device Information

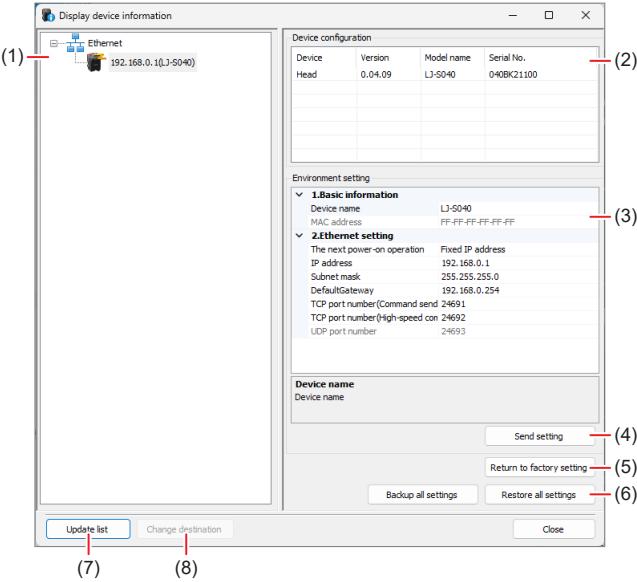
Information for the connected head can be checked.

1 Select the [Setting] menu > [Device information].



The [Display device information] screen will appear.

2 Check the information for the connected head.



(1) Head list

The list of the connected heads will appear.

The statuses of the heads are shown by the icons.

Icons	Statuses
	Indicates that the head is found at update and the device information has been obtained.
	Indicates that the device information has been obtained but the environmental configuration has not been obtained due to the system error of the head.
	Indicates that the head was not found at update. The device name is shown by [???] (gray). The IP address is shown according to "PC communication configuration" (Page 4-16).

When the head has been selected as a connection destination, is displayed on the icon.



(2) Device configuration

Displays the version, model name, and serial number of the head connected.

(3) Global Settings

The area shows the environmental configuration of the connection destination head. The item name and description appear at the lower part of the screen by selecting the item.

Clicking the columns of the settings (right row) allows editing of the settings.

"Setting the device name/communication specifications" (Page 4-14)

(4) Send setting

Use this button to send the setting to the head, when the setting are changed.

"Setting the device name/communication specifications" (Page 4-14)

(5) Return to default

Reset the settings of the connection destination head to the factory default values.

"Resetting the Instrument Settings to their Factory Default States" (Page 4-15)

(6) Backup all settings / Restore all settings

Use this button to back up/restore the following settings of the connection destination head.

- Measurement program
(Measurement common setting + program x 16)
 - Global Settings
- "Backup all settings / Restore all settings" (Page 4-15)

(7) Update list

Updates the head list by searching for heads that can be connected.

Pressing the [F5] key also updates the list.

(8) Change destination

Use this button to set the selected head as the connection destination.

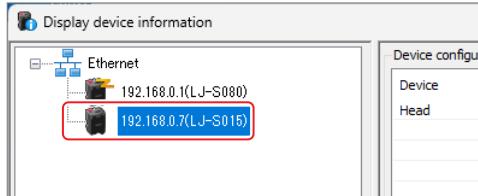
Switching the Head to Connect

When multiple heads are connected via a hub, the destination head to be displayed in LJ-S Navigator can be switched.

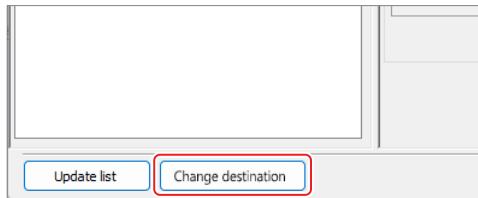
1 Show the [Display device information] screen.

□ "Displaying Device Information" (Page 4-13)

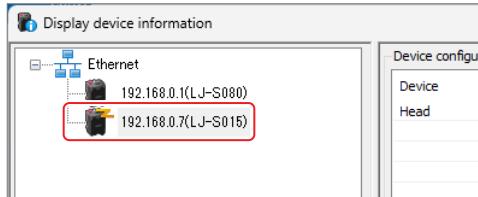
2 From the list, select the head you wish to connect.



3 Click [Change destination].



The connection will switch to the selected head.



If the environment setting is currently being edited, a dialog for confirming whether to discard the changes will appear. Clicking the [Yes] button will discard the changes and switch the head.



You can update the list by clicking the [Update list] or by pressing the [F5] key.

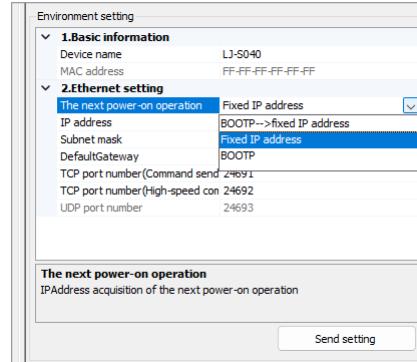
Setting the device name/communication specifications

Set the environment setting information, such as the destination head device name and communication specifications.

1 Show the [Display device information] screen.

□ "Displaying Device Information" (Page 4-13)

2 Click the setting value field in the environment setting (the row on the right side).



3 Edit the environment setting values.

[MAC address] and [UDP port number] cannot be edited.

● 1. Basic Information

○ Device name

You can enter your desired name for the head.

● 2. Ethernet setting

○ The next power-on operation

You can set how the head will acquire the IP address at the next power-on.

- **BOOTP-->fixed IP address**

Once you start the head using the IP address, subnet mask and gateway acquired from BOOTP, the acquired values will be stored as the network setting of the head.

At the next power-on, the mode will automatically switch to [Fixed IP address] and the unit will start using the stored network setting.

- **Fixed IP address**

The system will start using the set IP address, subnet mask, and gateway.

- **BOOTP**

The system will start by acquiring the setting of the IP address/Subnet mask/Gateway at every start-up by BOOTP.

○ IP address / Subnet mask / Gateway

Set the IP address/Subnet mask/Gateway of the head.

These are only valid when [The next power-on operation] is set to [Fixed IP address].



- **The following IP addresses are treated as invalid IP addresses:**

- 0.0.0.0
- 224.0.0.0 to 255.255.255.255

- **The following addresses are treated as invalid subnet masks:**

- 0.0.0.0
- 255.255.255.255

- There are no consecutive [1] bits from the beginning
(Example: 255.255.255.64 = 11111111.11111111.1111.01000000 is an error)

- **The following addresses are treated as invalid gateway:**

- 224.0.0.0 to 255.255.255.255

○ TCP port number (Command send and receive)

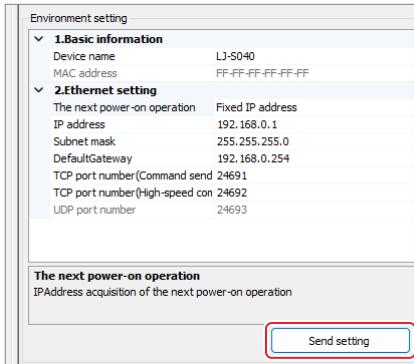
Set the port number to be used by the head for sending and receiving commands (1 to 65535).

○ TCP port number (High-speed communication)

Set the port number to be used by the head for the high-speed communication (1 to 65535).

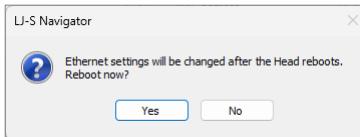
High-speed communication is a mode in which data is sent continuously from the head to the computer.

4 Click [Send setting].



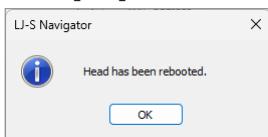
When editing [2.Ethernet setting], a reboot confirmation dialog will appear.

5 Click [Yes].



When the restart is complete, a confirmation dialog will appear.

6 Click [OK].



The environment setting will take effect and the [Display device information] screen will appear.

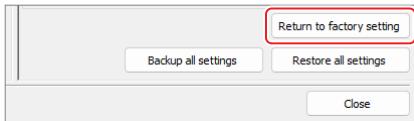
Resetting the Instrument Settings to their Factory Default States

Reset all settings of the connection destination head to the factory default values.

1 Show the [Display device information] screen.

"Displaying Device Information" (Page 4-13)

2 Click [Return to default].



A dialog for confirming whether you wish to restore the default will appear.

3 Click [Yes].

A restart confirmation dialog will appear.

4 If you want the Ethernet setting to take effect immediately, click [Yes].

When the restart is complete, a confirmation dialog will appear.

5 Click [OK].

Return to the [Display device information] screen, and click [Update list] and specify the connection destination.

Backup all settings / Restore all settings

■ Backup all settings

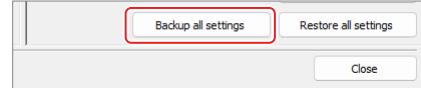
This function backs up the head settings (Common measurement setting + Program x 16, and environment settings) as a head backup file (*.cbks). You are advised to back up the settings to prevent data loss in the event of system trouble or failure.

1 Show the [Display device information] screen.

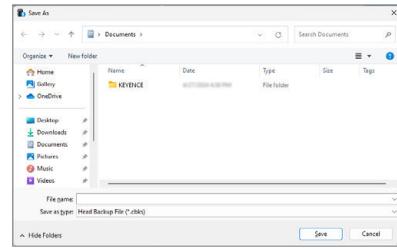
"Displaying Device Information" (Page 4-13)

The [Display device information] screen can also be displayed by clicking [Backup / Restore] from the [File] menu.

2 Click [Backup all settings].



3 Enter the file name and click [Save].



When the backup is complete, a confirmation dialog will appear.

4 Click [OK].

■ Restoring all settings

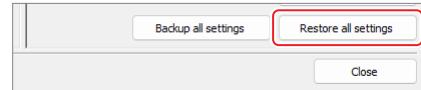
This function restores the head settings to the head by reading the head settings saved in the head backup file (*.cbks).

1 Show the [Display device information] screen.

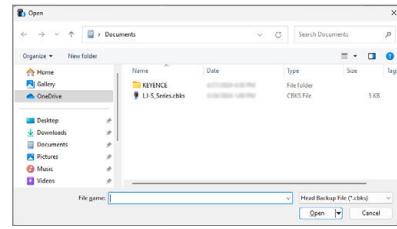
"Displaying Device Information" (Page 4-13)

The [Display device information] screen can also be displayed by clicking [Backup / Restore] from the [File] menu.

2 Click [Restore all settings].



3 Select a file (*.cbks) and click [Open].



The backup settings (Common measurement setting + 16 programs, and environment settings) will be loaded into and restored to the head.

If the model of the head for which you wish to restore the settings is different from the backup file, an error message will appear preventing you from restoring the settings.

When the restoration is complete, a restart confirmation dialog will appear.

4 If you want the Ethernet setting to take effect immediately, click [Yes].

When the restart is complete, a confirmation dialog will appear.

5 Click [OK].

Return to the [Display device information] screen, and click [Update list] and specify the connection destination.

PC communication configuration

The LJ-S Navigator communicates via the head and the Ethernet interface. The head's factory default IP address is 192.168.0.1. If the IP addresses for the computer which is going to be connected cannot be set to 192.168.0.2 – 192.168.0.255 due to restrictions such as the network environment, the head's IP address needs to be changed in advance in accordance with the computer which is going to be connected.

This section explains the procedures for setting the communication settings in accordance with the IP address for the computer which is going to be connected, and how to reset the head's IP address.

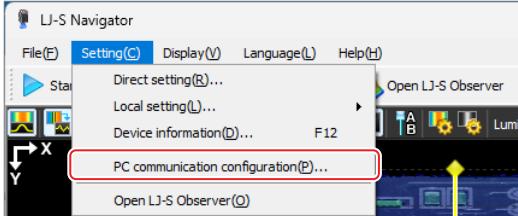
The PC IP Addresses 192.168.0.2 – 192.168.0.255 Are for the PC to Be Connected

If the IP addresses for the computer which is going to be connected are 192.168.0.2 – 192.168.0.255, and the head's IP address is the factory default IP address setting (192.168.0.1), then it can be automatically connected without having to set any additional communication settings.

This section describes the procedures for checking the communication settings via the LJ-S Navigator's [PC communication configuration] screen.

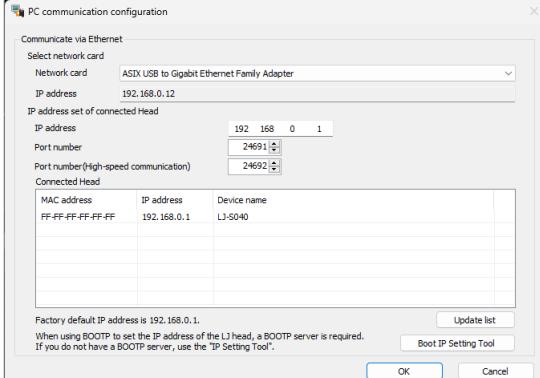
- Point** If the head's IP address is changed, it can be initialized to the factory default setting (192.168.0.1) via the [IP RESET] button.
“Resetting the Head's IP Address” (Page 4-18)

1 Click the [Setting] menu > [PC communication configuration].



The [PC communication settings] screen appears.

2 Confirm the current communication settings.



● Select network card

○ Network card

Displays the network cards which are installed in the computer. This can be changed if two or more network cards are installed in the computer.

○ IP address

The IP address which is set to the computer (network card).

● IP address set of connected controller

○ IP address / Port number / port number (High-speed communication)

The setting value for the head which is connected.

○ Connected Head

Detects the heads that are on the network and displays a list of them. Select the head to be connected from the list.

3 After confirming, then click [OK].

The [PC communication settings] screen closes.

The PC IP Addresses Other Than 192.168.0.2 – 192.168.0.255 Are for the PC to Be Connected

The head's IP address needs to be changed in advance in accordance with the IP address for the computer that is going to be connected.

After resetting the head's IP address, reset it in accordance with the IP address for the computer that is going to be connected via the IP Setting Tool, and then configure the communication settings.

This section describes the procedures for setting the IP addresses and the communication settings via the IP Setting Tool for heads that have not been set with IP addresses.

Reference

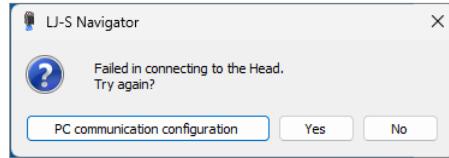
The IP Setting Tool can be installed from the HTML files for installing. Click [IP Setting Tool Installation], and follow the on-screen instructions to install the software.

1 Reset the head's IP address to “Not set”.

“Reset to “Not set”” (Page 4-18)

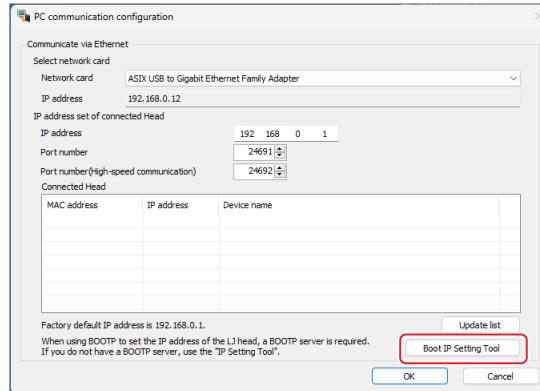
2 Start LJ-S Navigator.

Since the head cannot be communicated with, a message appears.



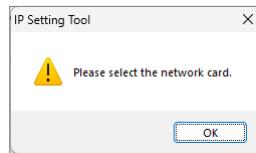
3 Click [PC communication configuration].

4 Click [Boot IP Setting Tool].



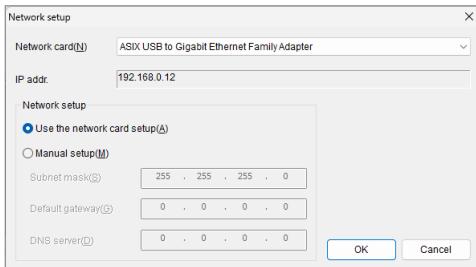
The IP Setting Tool starts up, and a confirmation message which gives a prompt to select the network card appears.

5 Click [OK].



The [Network setup] screen appears.

6 Select the network card which is going to be used, and click [OK].



The [IP Setting Tool] screen appears.

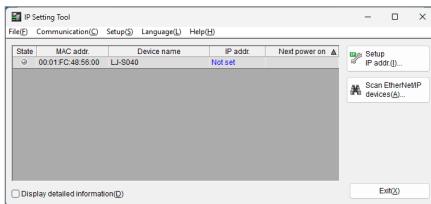
The Ethernet devices that are not assigned IP addresses are detected and displayed in a list.



If the head that is going to be connected does not appear, confirm the following items:

- Are the computer and head correctly connected to the network?
- Is the computer's firewall blocking the IP Setting Tool?
- Is the head's [The next power-on operation] setting set to [Fixed IP Address]?

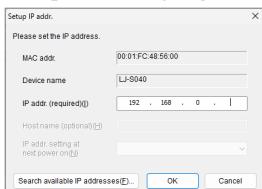
7 Select the head that is going to be connected from the list, and click [Setup IP addr.].



The [Setup IP addr.] screen appears.

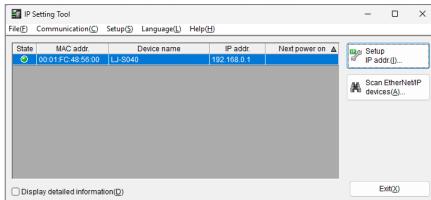
8 Click [Search available IP addresses], and search for available IP addresses.

9 When blank IP addresses are found, enter them in the [IP addr. (required)] field, and click [OK].



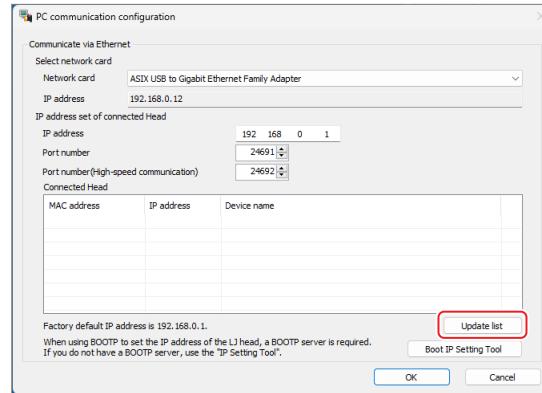
The head's IP address is set, and the [IP Setting Tool] screen is returned to.

10 Click [Exit].



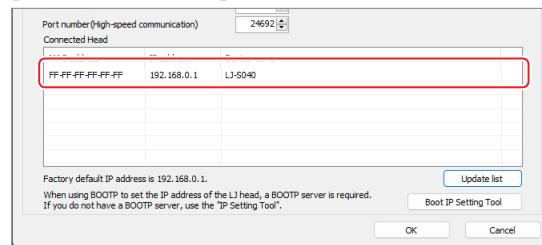
The [PC communication settings] screen is returned to.

11 Click [Update list].



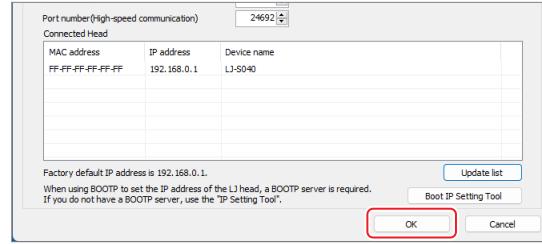
The heads whose IP addresses were set are detected, and displayed in a list.

12 Select the heads that are connected from the [Connected Head] field.



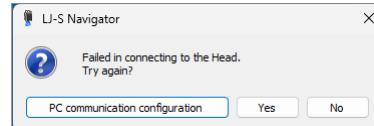
The IP address is set to [IP address set of connected Head].

13 Click the [OK].

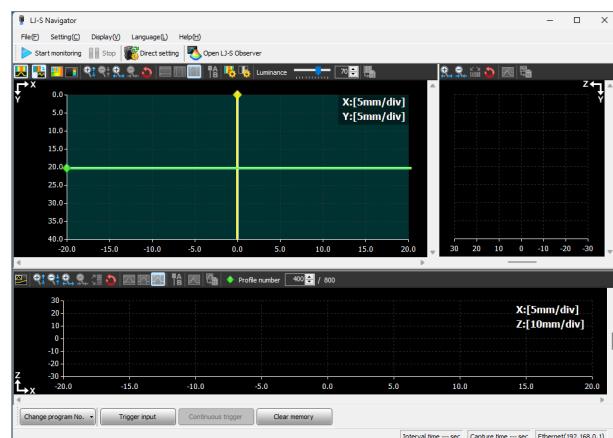


The PC communication settings are completed, and the [PC communication settings] screen closes. A reconnection confirmation message appears.

14 Click [Yes].



LJ-S Navigator starts.

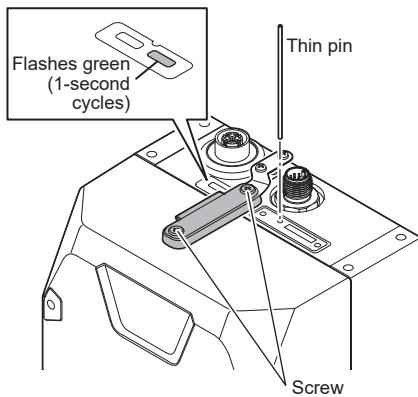


Resetting the Head's IP Address

The head's IP address can be reset via the [IP RESET] button under the head's top cover. The IP address can be reset to "Factory default setting" or "Not set" with the [IP RESET] button.

■ Reset to the factory default (192.168.0.1) setting

- 1 Remove the head's top cover (secured with screws in two places), insert a thin pin into the [IP RESET] button, and push it in until the laser radiation LED flashes green in 1-second cycles (approximately 3 to 7 seconds).

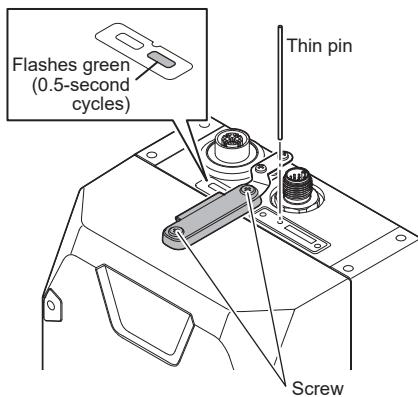


The head will automatically restart.
All of the Ethernet settings will be initialized, and the IP address will be reset to the factory default (192.168.0.1) setting.

■ Reset to "Not set"

The IP addresses can be set (BOOTP client functions) via the Ethernet by using the IP Setting Tool.

- 1 Remove the head's top cover (secured with screws in two places), insert a thin pin into the [IP RESET] button, and push it in until the laser radiation LED flashes green in 0.5-second cycles (approximately 8 seconds).



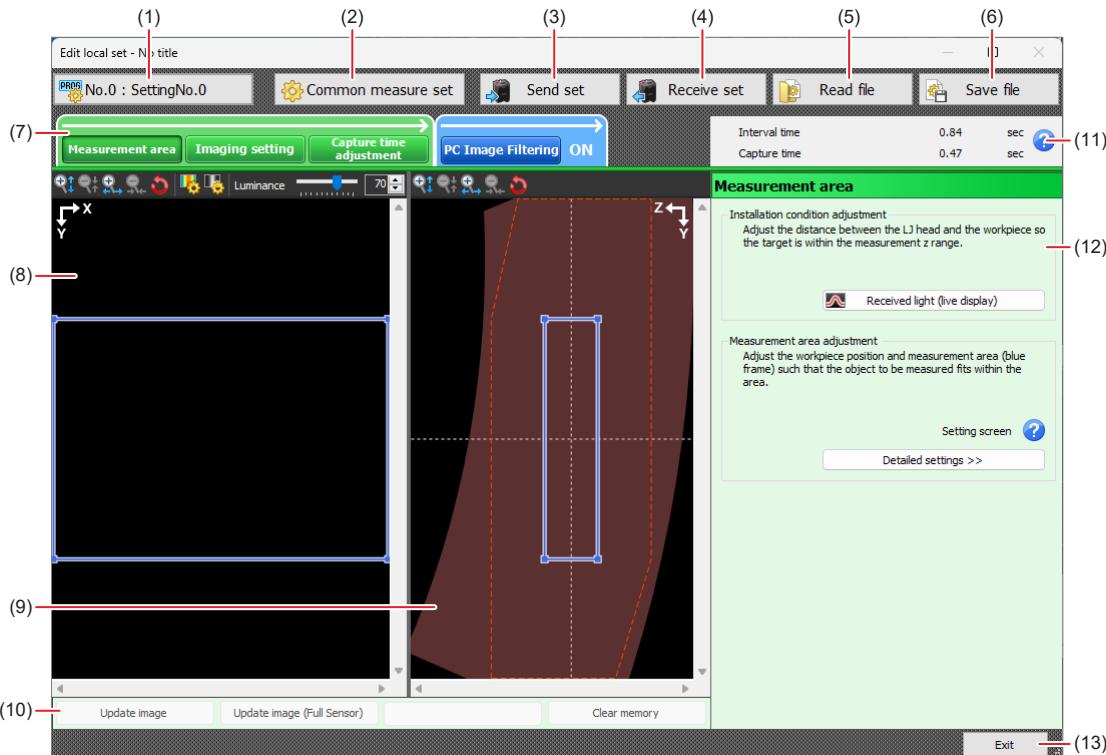
The head will automatically restart.
All of the Ethernet settings will be initialized, and the IP address will be reset to "Not set".

Chapter 5 Measurement Settings

Settings Screen Layout.....	5-2
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Settings Screen Layout

This section explains how to view the setting screen, using the [Edit local set] screen as an example.



- (1) Change prog. No. button
The program No. and name of the active program is displayed here. Clicking this button will bring up the [Change prog. No.] screen which allows you to change the program to edit.
□ "Operating Programs" (page 5-13)
- (2) Common measure set
Configure settings that are common for measurement settings, such as terminal settings and memory settings.
□ "Common Measure Set" (page 5-12)
- (3) Send set
The set measurement program (Common measurement setting + Program x 16) is sent to the head.
Reference This function is only available with local setting editing.
- (4) Receive set
Loads a measurement program from the head.
Reference This function is only available with local setting editing.
- (5) Read file
Loads the measurement program saved on the computer as a file.
Reference This function is only available with local setting editing.
- (6) Save file
Stores the set measurement program in a LJ-S Navigator dedicated format (*.msss) file.
- (7) Setting category switching tab
The setting item categories will appear. Clicking this tab will switch the setting item categories.
□ "Measurement area" (page 5-3)
□ "Capture Settings" (page 5-6)
□ "Capture Time Adjustment" (page 5-10)
□ "PC Image Filtering" (page 5-11)
- (8) Display height image
The height image appears. You can perform display setting operations like in the measurement screen, such as enlarging/reducing the display size and showing/hiding the cursor.
□ "[Height / Luminance Image Display] screen" (page 4-8)
- (9) Display profile
Displays a profile. You can perform display setting operations like in the measurement screen, such as enlarging/reducing the display size and showing/hiding the cursor.
□ "[Display X-Z axis profile] screen" (page 4-10)
- (10) Operation panel
This enables you to execute several terminal input commands like a trigger input and clearing internal memory to the head. The displayed buttons will vary depending on the setting category and the state of the profile display area. For details, see □ "Operating by the Operation Panel" (page 4-11).
- (11) Interval time/Capture time
Displays [Interval time] and [Capture time] based on the settings.
- (12) Setting edit area
Detailed setting items will appear according to the setting category.
□ "Measurement area" (page 5-3)
□ "Capture Settings" (page 5-6)
□ "Capture Time Adjustment" (page 5-10)
□ "PC Image Filtering" (page 5-11)
- (13) Settings screen control button
This button is used for switching the setting category and for terminating/cancelling the setting.
 Exit
[Complete] will appear for direct setting editing. The edited setting will be saved to the head; and the measurement screen will appear. In the case of local setting editing, a confirmation dialog will only appear if you have saved the edited settings or changed the settings. The measurement screen will appear when you save or discard the edited setting.
 Cancel
This button will only appear during direct setting editing. Clicking it will discard the edited settings and take you back to the measurement screen.

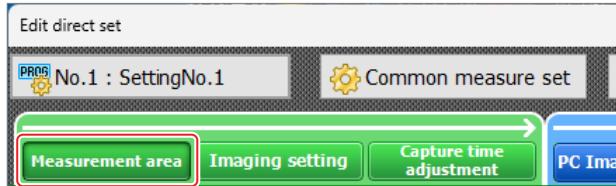
Measurement area

Setting the Measurement area

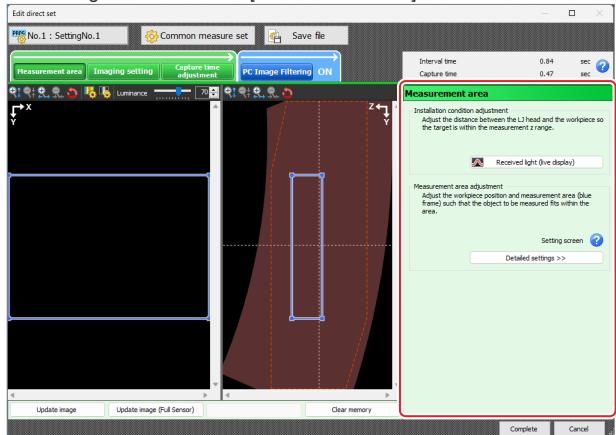
1 Display the [Edit direct set] screen.

□ "Editing the direct setting" (Page 4-4)

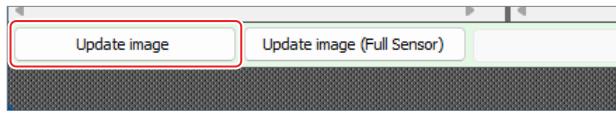
2 Click [Measurement area].



The setting edit area turns to [Measurement area].

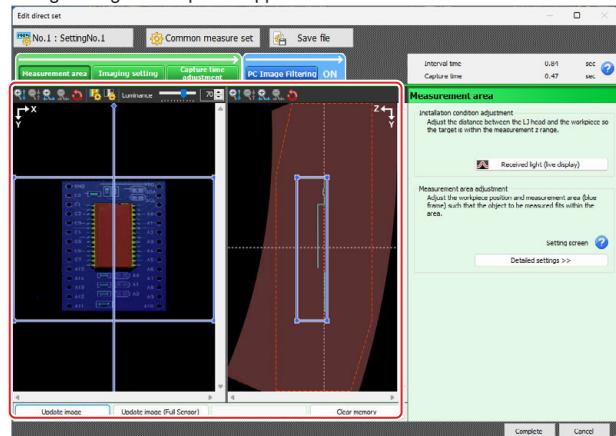


3 Click [Update image] to capture an image of the measurement target.



Reference Click [Update image (Full Sensor)] to capture the entire measurement range instead of the currently set measurement range.

A height image and a profile appear.



4 Configure the measurement area settings.

Measurement area

Installation condition adjustment
Adjust the distance between the LJ head and the workpiece so the target is within the measurement z range.



Measurement area adjustment
Adjust the workpiece position and measurement area (blue frame) such that the object to be measured fits within the area.

Setting screen ?

Detailed settings >>

□ "Installation condition adjustment" (Page 5-4)
□ "Measurement area adjustment" (Page 5-4)

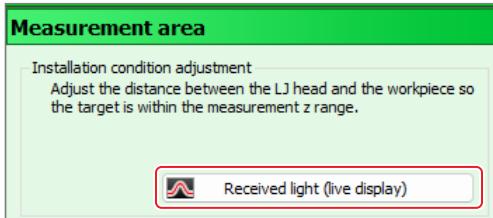
5 After completing the settings, proceed to [Imaging setting].

□ "Capture Settings" (Page 5-6)

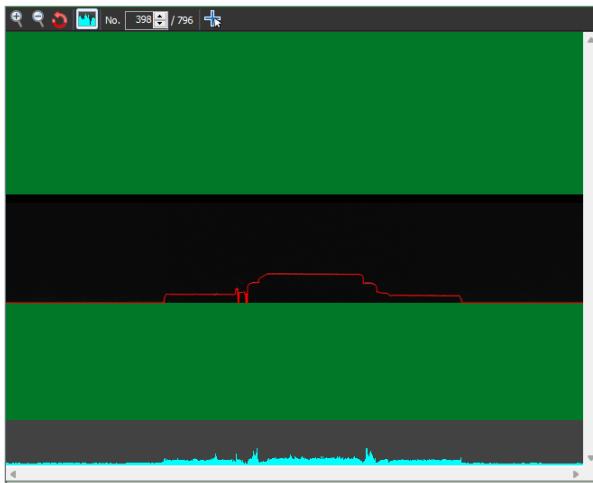
Installation condition adjustment

Adjust the distance between the head and the workpiece so the target is within the display image data screen.

1 Click [Received light (live display)].



2 Adjust the distance between the head and the workpiece while checking the screen.



Each click of these buttons enlarges/reduces the display area.



The enlarged/reduced display area is restored to its initial state.



Shows or hides the received light quantity on the bottom of the display area.

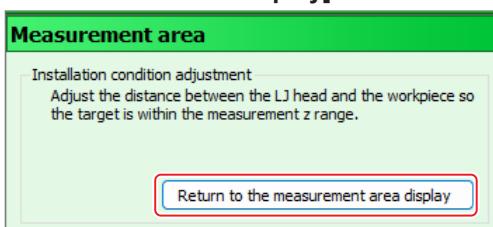


The number of the profile in the Y-axis direction displayed on the screen. You can also specify a numerical value as the Y-axis profile number.



Clicking this button displays the height image. This enables you to check the position of the Y-axis profile of the clicked position on the height image.

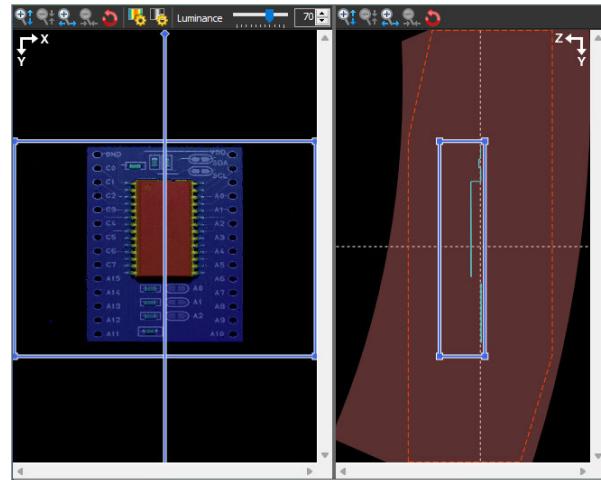
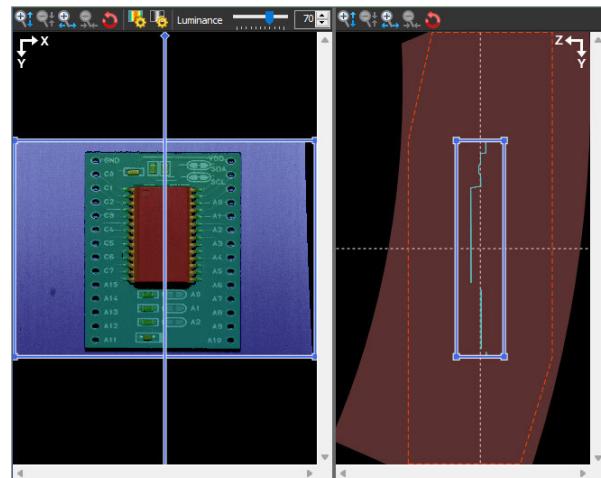
3 Once adjustment is complete, click [Return to the measurement area display].



Measurement area adjustment

Adjust the workpiece and measurement area (blue frame) such that the workpiece fits within the area.

1 Adjust the position of the blue frame according to the workpiece.



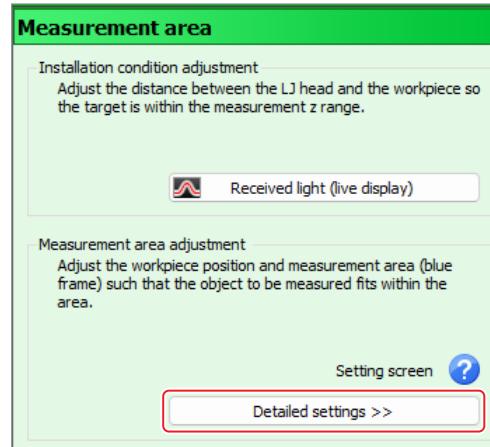
○ Changing the size

Drag and drop a side or an angle of the rectangle.

○ Moving the position

Drag and drop the inside of the rectangle.

2 Configure [Detailed settings] as required.



3 Configure the range settings.

Measurement area

Z range

Z range	4
Wide Imaging Mode	<input checked="" type="radio"/> OFF <input type="radio"/> ON
Z starting position (%)	41.3

Y range

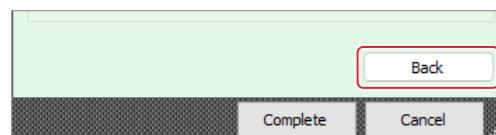
Y range	3183
Start position (Y line number)	1641
Y skipping	4
Y data pitch	0.05 mm
Y data points	796

X range

X skipping	OFF
X data pitch	0.0125 mm
X data points	3200

Back

4 After completing the setting, click the [Back] button.



● Z range

Z range

This can be set when wide imaging mode is turned off.
Select the Z range from [0 (wide)] to [11 (narrow)].

Wide Imaging Mode

Select OFF to specify a Z range.

Reference The LJ-S160 cannot turn on the [Wide Imaging Mode].

Z starting position

Specifies the starting position for the Z range with a number.

● Y range

Y range

Specifies the number of lines before Y skipping.

Start position (Y line number)

Specifies the starting position (line number) in the Y direction with a numerical value based on the number of lines before Y skipping.

Y skipping

Selects the skipping interval relative to the number of lines before Y skipping.

Y data pitch

Displays the Y data pitch based on the settings.

Y data points

Displays the Y data points based on the settings.

● X range

X skipping

Selects the X skipping interval.

X data pitch

Displays the X data pitch based on the settings.

X data points

Displays the X data points based on the settings.

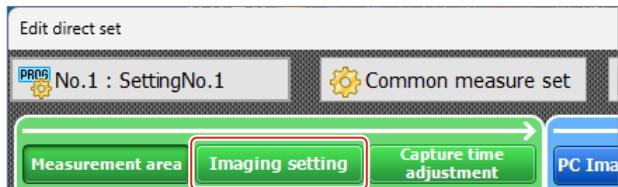
Capture Settings

Setting the Image Conditions

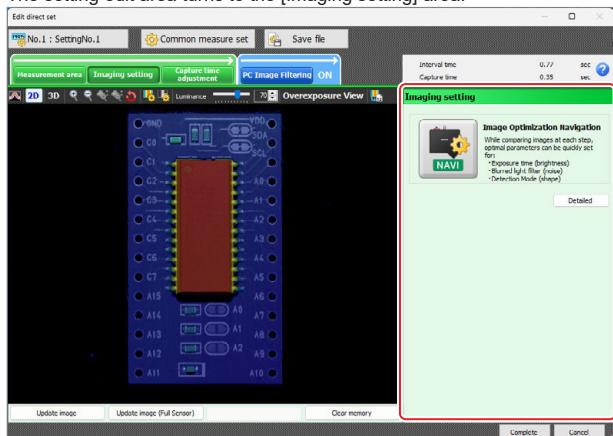
1 Display the [Edit direct set] screen.

"Editing the direct setting" (Page 4-4)

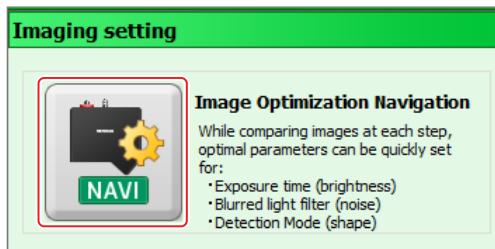
2 Click [Imaging setting].



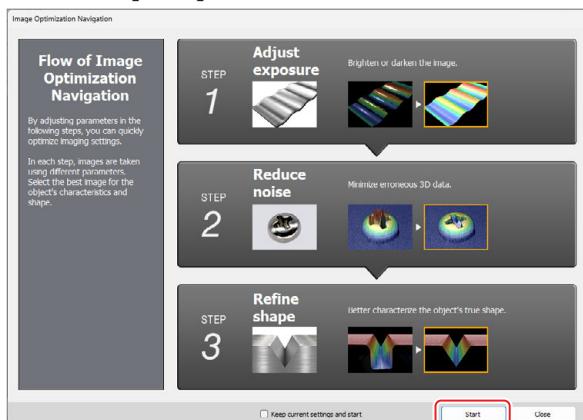
The setting edit area turns to the [Imaging setting] area.



3 Click [Image Optimization Navigation].



4 Check [Flow of Image Optimization Navigation] and then click [Start].



Point The following settings are initialized and started in [Image Optimization Navigation].

- Exposure time
- Blurred light filter =OFF
- Detection Mode

To start with the current settings retained, select the [Keep current settings and start] check box and click [Start].

5 Follow the on-screen instructions to configure the following settings:

- "Adjust exposure (Exposure time)" (Page 5-7)
- "Reduce noise (Blurred light filter)" (Page 5-7)
- "Refine shape (Detection mode)" (Page 5-7)

6 Configure [Advanced settings] as required.

"Detailed settings for Imaging setting" (Page 5-8)

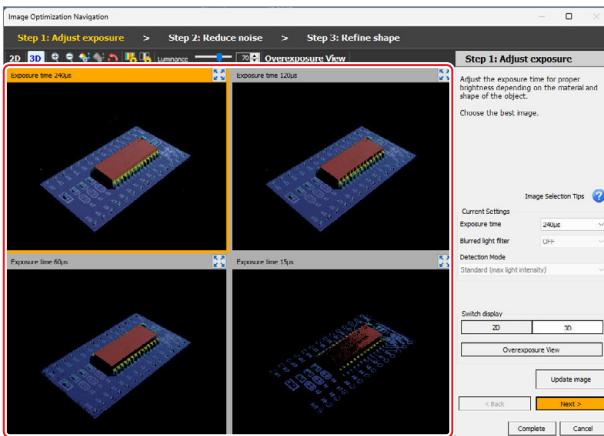
7 After completing the settings, proceed to [Capture time adjustment].

"Capture Time Adjustment" (Page 5-10)

Adjust exposure (Exposure time)

Adjust [Exposure time] to a suitable brightness according to the material and shape of the object.

1 From the four candidates, select the image closest to the shape of the actual object.



The exposure time according to the selected image appears.
When any exposure time is selected, the display is updated to the image with the selected exposure time.

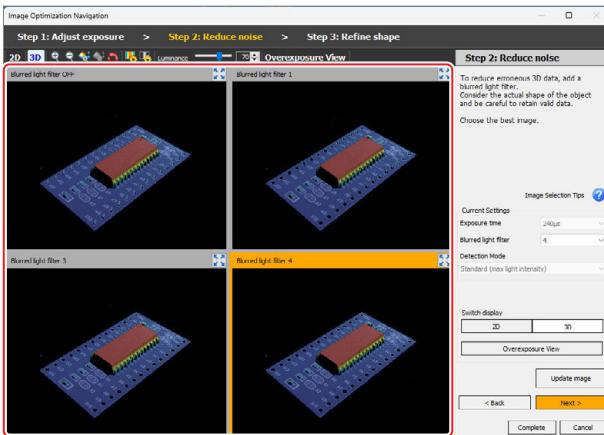
Current Settings	
Exposure time	240μs
Blurred light filter	OFF
Detection Mode	Standard (max light intensity)

2 After completing the setting, click [Next] and then proceed to [Reduce noise].

Reduce noise (Blurred light filter)

To reduce erroneous 3D data, add a blurred light filter.

1 From the four candidates, select the image closest to the shape of the actual object.



The blurred light filter strength (1-5) appears according to the selected image.
When any strength is selected, the display is updated to the image with the selected strength.

Current Settings	
Exposure time	240μs
Blurred light filter	4
Detection Mode	Standard (max light intensity)

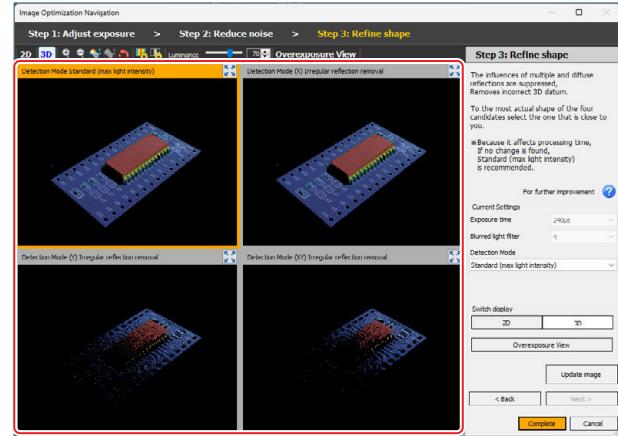
2 After completing the setting, click [Next] and then proceed to [Refine shape].

Refine shape (Detection mode)

Data close to the actual shape is obtained by suppressing the effects of multiple and diffuse reflections.

1 From the four candidates, select the image closest to the shape of the actual object.

- Point** Select [Standard (max light intensity)] (top left image) if it is not effective because it affects the processing time.



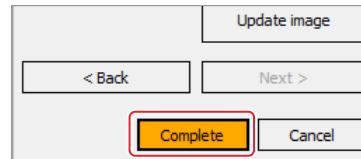
The peak type appears according to the selected image.

- Standard (max light intensity)
- NEAR
- FAR
- (X) Irregular reflection removal
- (Y) Irregular reflection removal
- (XY) Irregular reflection removal

When any item is selected, the display is updated to the image with the selected peak applied.

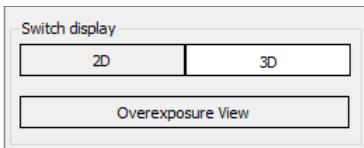
Current Settings	
Exposure time	240μs
Blurred light filter	4
Detection Mode	Standard (max light intensity)

2 After the setup is completed, click [Complete].

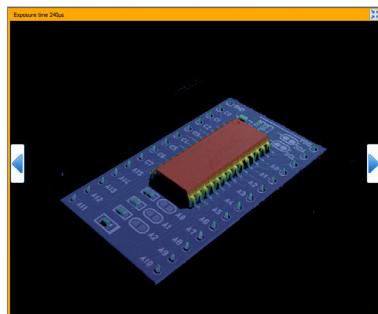
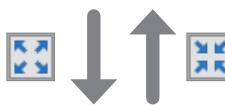
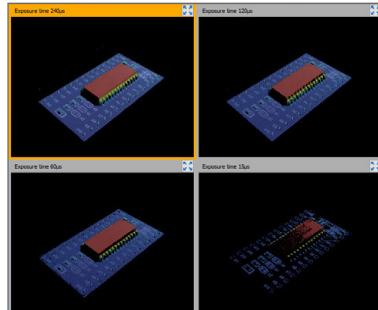


Reference If you want to review the settings, click [Back] and configure the appropriate settings.

Switch Display

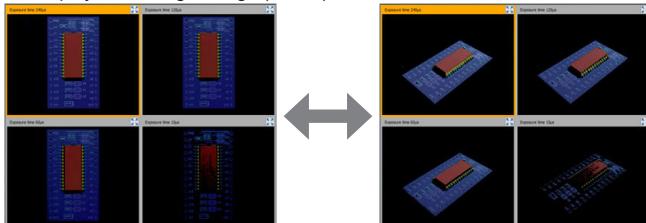


Reference Easy Navigation for Imaging Setting enables you to select the image that most closely resembles the actual shape of the object from among the four candidate images displayed, and configure the settings. Candidate images can be viewed by switching between split and single displays.



Switching between 2D and 3D display

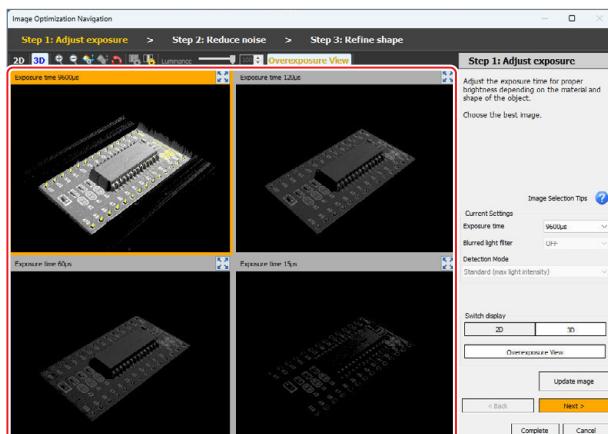
When configuring settings with Image Optimization Navigation, you can switch the display of the height image (2D/3D).



Overexposure View

Selecting [Overexposure View] switches to the luminance image, and the saturated points are displayed in yellow. Select [Overexposure View] again to return to the original display.

Reference In general, saturated areas tend not to yield correct data.



Detailed settings for Imaging setting

1 Click [Detailed].

Imaging setting

Image Optimization Navigation

While comparing images at each step, optimal parameters can be quickly set for:

- Exposure time (brightness)
- Blurred light filter (noise)
- Detection Mode (shape)

Detailed

2 Configure the detailed settings.

Received Light Adjustment

Light receiving property CMOS Dynamic Range 4

Light intensity setting

Exposure time 240μs

Control light intensity

Peak process

Detection Sensitivity 4

Translucent peak processing OFF ON

Multiple peak processing

Blurred light filter OFF ON 3

Detection Mode

Standard (max light intensity)

Dead zone interpolation

Vertical interpolation

Back

● Received Light Adjustment

○ Light receiving property

Set [CMOS Dynamic Range] to between 1 and 9. By setting a high level, the target with higher reflectance can be imaged.

○ Light intensity settings

• Exposure time

This setting sets the maximum exposure time of the imaging device. 15μs / 30μs / 60μs / 80μs / 120μs / 160μs / 210μs / 240μs / 320μs / 380μs / 480μs / 640μs / 960μs / 1170μs / 9600μs

• Control light intensity

Sets the control mode (MANUAL/AUTO/SLOPE) and the upper/lower limit values of the control range (1 to 99) as a control operation to control light intensity.

[SLOPE] adjusts the laser emission step by step between the upper limit and the lower limit within the control range. At the top of the display screen, the laser emission is weakened, and the lower side is enhanced, so that the light distribution of the entire screen is reached evenly.

Control operation

Control mode

Control range

Upper limit: 60

Lower limit: 60

● Peak process

○ Detection Sensitivity

This setting sets "Detectability" to detect the peak values of in each X-coordinate when converting the image data to the profile data. Sets [Detection Sensitivity] between 1 (low) and 5 (high).

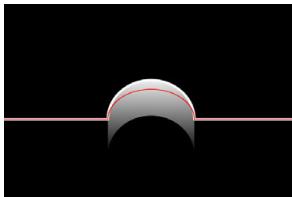
○ Translucent peak processing

Select OFF/ON to disable/enable translucent peak processing. If the object is translucent, light reflected from the surface of the object and light reflected from the inside of the object may both be received. In this case, the surface detected may be that of the inside of the target. Turning this function ON will help detect the reflection of the top surface.

<Specific examples>

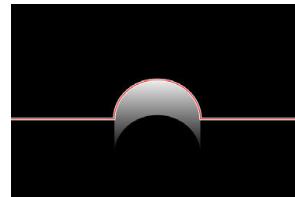
Translucent peak processing : OFF

The inner side (lower side) of the object surface is detected.



Translucent peak processing : ON

The object surface is detected.



● Multiple peak processing

○ Blurred light filter

Select on or off for blurred light filter.

If on is selected, set the strength of the blurred light filter to between 1 (weak) and 5 (strong).



When compared to the normal light reflected from the target, the peaks created by stray ambient light and multi-reflected light tend to be wider.

Using this phenomenon, the wider peaks are excluded as "False peak". This processing is called [Blurred Light Filter].

○ Detection Mode

[Detection mode] sets which peak is selected when multiple peaks exist on the same X-coordinate.

- **Standard (max light intensity)**

Measure the peak with the maximum amount of received light.

- **NEAR**

The peak which is closest to the head is measured.

- **FAR**

The peak which is furthest from the head is measured.

- **(X) Irregular reflection removal ([Detailed] settings also available)**

Preference is given to peaks with continuity in the X direction. Image compilation time is longer compared to Single capture/NEAR/FAR.

- **(Y) Irregular reflection removal ([Detailed] settings also available)**

Preference is given to peaks with continuity in the Y direction. Image compilation time is longer compared to Single capture/NEAR/FAR.

- **(XY) Irregular reflection removal ([Detailed] settings also available)**

Both (X) Irregular reflection removal and (Y) Irregular reflection removal are processed. Image compilation time is longer compared to other detection mode settings.

○ Detailed

Click [Detailed] to set [Irregular reflection removal].

Detection Mode	
(XY) Irregular reflection removal	
Timeout (seconds)	5.0
X Intensity filter	3(High)
Y Tilt filter	1(Low)
Y Size filter	2
Y Brightness filter	50
Y isolation threshold	2

• Timeout time

Set the upper limit for irregular reflection removal processing time. If irregular reflection removal processing time exceeds the set value due to the state of the measured value, processing times out, and all data is invalidated.

• (X) Irregular reflection removal : X intensity filter

You can adjust parameters related to continuity in the X-direction. The closer to 3 (strong), the more continuity is judged as being present even in distant peaks.

• (Y) Irregular reflection removal : Tilt filter

After separating peaks with continuity in the Y direction as a single clump, clumps with a significant tilt are judged as noise and removed. The larger the value, clumps with a gentle tilt will be removed.

• (Y) Irregular reflection removal : Cut size

After separating peaks with continuity in the Y direction as a single clump, small clumps are judged as noise and removed. The larger the value, the bigger clumps will be removed.

• (Y) Irregular reflection removal : Brightness filter

If multiple peaks are detected, their brightnesses are compared, and if they differ by more than a certain amount, the darker peaks are excluded from the candidates. The smaller the value, the darker the peaks will remain.

• (Y) Irregular reflection removal : Isolation threshold

Sets the distance threshold to judge clumps as separated when recognizing peaks with continuity in the Y direction as a single clump. The greater the value, the more continuity is judged as being present even in distant peaks.

● Dead zone interpolation

Selects the processing method for the place that has become invalid pixels because the dead zone was caused in the measurement range due to the shape of the target.

- **OFF**

- **Horizontal/Vertical interpolation (default)**

Interpolates a dead zone between valid data that exist before and after the dead zone by copying the value of the lower side of the valid data to the dead zone.

- **Linear interpolation**

Linearly interpolates a dead zone between valid data that exist before and after the dead zone.

3 After completing the setting, click the [Back] button.

Vertical interpolation	
Back	
Complete	Cancel

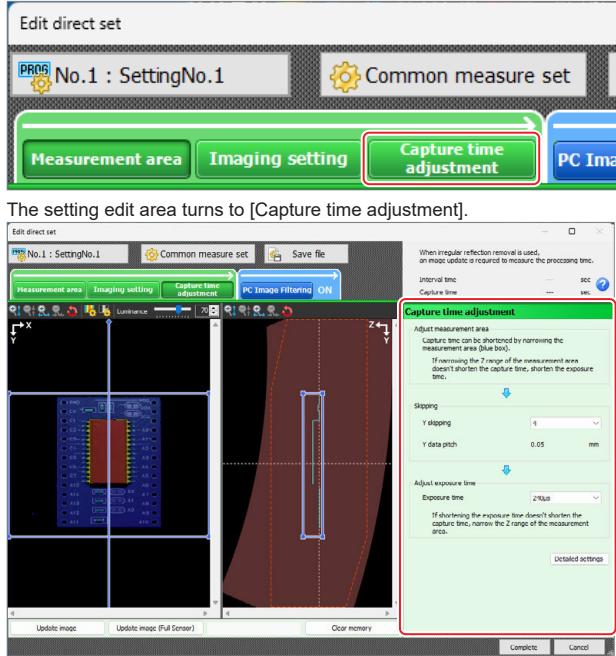
Capture Time Adjustment

Setting Capture Time Adjustment

1 Display the [Edit direct set] screen.

"Editing the direct setting" (Page 4-4)

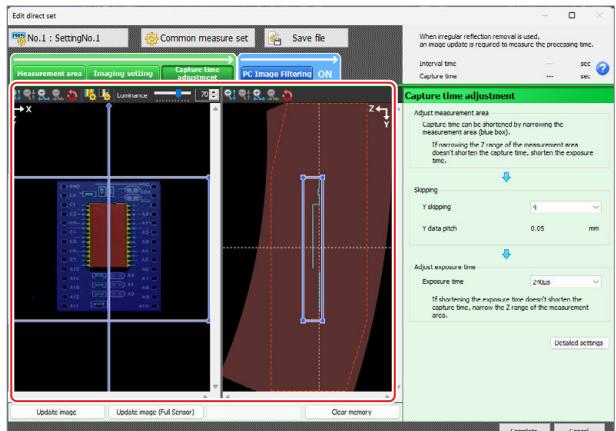
2 Click [Capture time adjustment].



3 Adjust the measurement area.

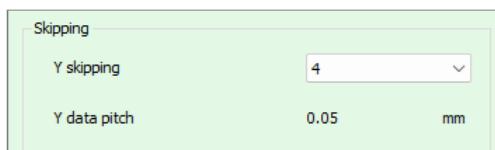
Capture time can be shortened by narrowing the measurement area (blue frame).

Reference For capture time adjustment, further adjust the measurement area set with "Measurement area adjustment" (Page 5-4).



4 Adjust skipping.

Reference For capture time adjustment, further adjust the settings set with "Measurement area adjustment" (Page 5-4).



○ Y skipping

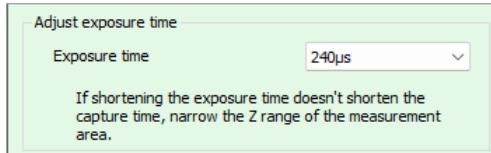
Selects the skipping interval relative to the number of lines before Y skipping.

○ Y data pitch

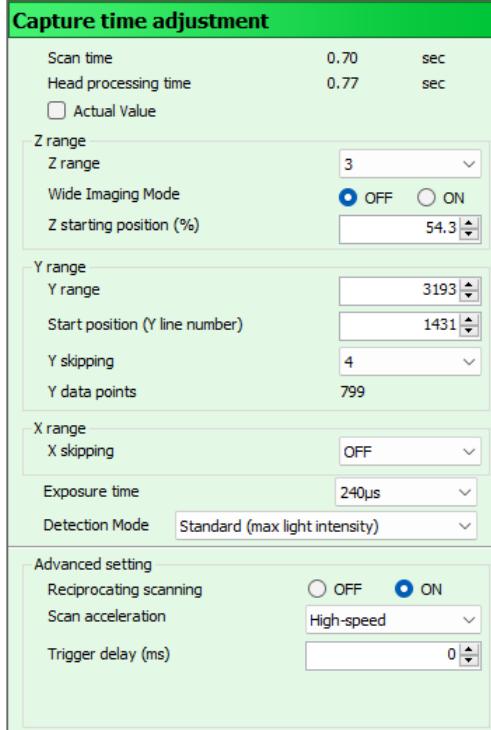
Displays the Y data pitch based on the settings.

5 Adjust the exposure time.

Reference For capture time adjustment, further adjust the measurement area set with "Adjust exposure (Exposure time)" (Page 5-7).



6 Configure [Detailed settings] as required.



● Actual Value

Selecting this check box measures and displays the actual time spent.

Reference The [Actual Value] is always displayed when [Detection Mode] of [Multiple peak processing] is [(X) Irregular reflection removal], [(Y) Irregular reflection removal], or [(XY) Irregular reflection removal].

● Z range / Y range / X range

"Measurement area adjustment" (Page 5-4)

● Exposure time/Detection mode

"Detailed settings for Imaging setting" (Page 5-8)

● Advanced settings

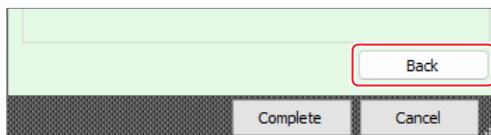
○ Reciprocating scanning

Select OFF or ON for reciprocating scanning.

○ Scan acceleration/Trigger delay (ms)

When [ON] is selected, set [Scan acceleration] and [Trigger delay].

7 After completing the setting, click the [Back] button.



PC Image Filtering

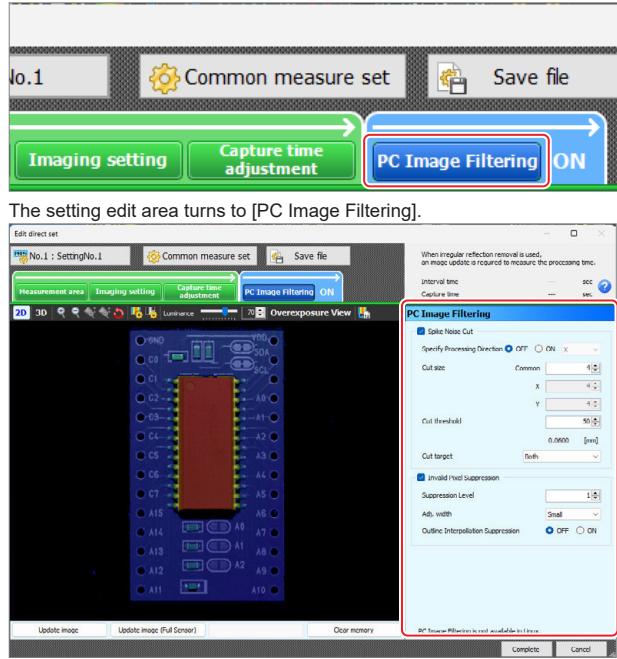
PC Image Filtering Setting

Point PC Image Filtering is not available in Linux.

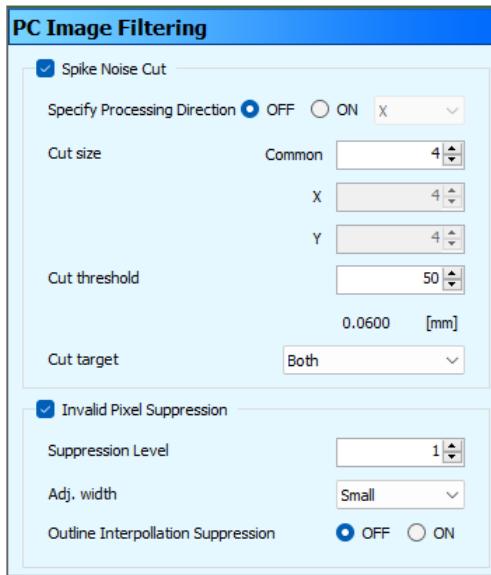
1 Display the [Edit direct set] screen.

□ "Editing the direct setting" (Page 4-4)

2 Click [PC Image Filtering].



3 Configure the settings.



● Spike Noise Cut

When this check box is selected, the pixels with prominent height due to noise, etc. can be removed. The removed protruding points become invalid pixels.

○ Specify Processing Direction

If the processing direction is specified, place a check and then configure the processing direction in the [Specify Processing Direction] field.

• X

Eliminates continuous vertical protruding noise in the image, leaving continuous horizontal and protruding dots.

• Y

Eliminates continuous horizontal protruding noise in the image, leaving continuous vertical and protruding dots.

• XY individual

You can adjust the deletion size individually for each direction.

○ Cut size

Removes protruding noise below the specified size width.

○ Cut threshold (mm)

Removes the protruding points farther from the specified height with respect to the periphery as noise.

○ Cut target

Set the type of protruding point to be removed.

• Upper Part

Removes only the protruding points that are high relative to the periphery.

• Lower Part

Removes only the protruding points that are low relative to the periphery.

• Both

Removes both high and low side protruding points with respect to the periphery.

● Invalid Pixel Suppression

Invalid pixels are replaced with height data estimated from surrounding valid pixel values.

Select this check box to use [Invalid Pixel Suppression].

○ Suppression Level

[Invalid Pixel Suppression] strength can be set from a range of 1 to 9.

○ Adj. width

Set the width adjustment (large or small) for [Invalid Pixel Suppression].

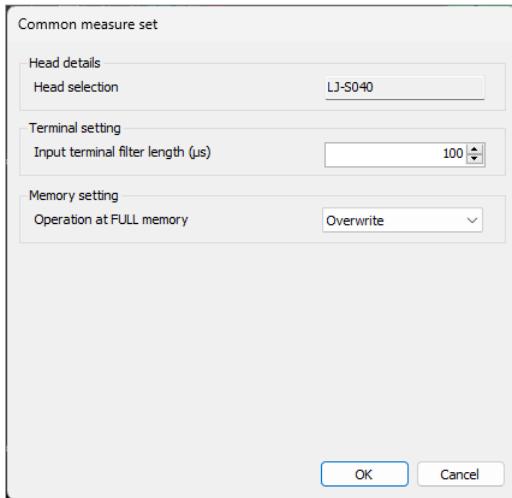
○ Outline Interpolation Suppression

Sets outline interpolation suppression for [Invalid Pixel Suppression] to on or off.

Common Measure Set

Setting the Measurement Common Setting

Configure common measure settings for all measurement programs.



Head details

This is the model of the head that is selected or connected. This cannot be changed.



The model of the head can be set only when newly creating the measurement settings.

"Create new file" (Page 4-7)

Terminal setting

● Input terminal filter length

Specifies the time range that is considered a noise signal to remove the noise signal on the input terminal (signal fluctuations in the specified time are ignored) to 100 to 65536 (µs) (default value: 100 µs).

Memory setting

Sets whether to overwrite the oldest data or not to overwrite but stop the buffering in the case that the free space of the internal memory has run out.



All the stored data is cleared in the following cases.

- When programs are switched.
- [Clear memory] is performed.
- Setting is changed.
- [Return to default] is performed.
- When the head is turned off.
- The system error occurred.

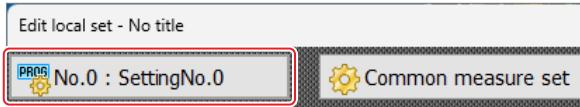


- After the measurement has started, the internal memory automatically buffers the generated height image.
- When the internal memory is full, it will turn to the MEM_FULL status. The MEM_FULL status can be checked using the communication command (LJS8IF_GetAttentionStatus).

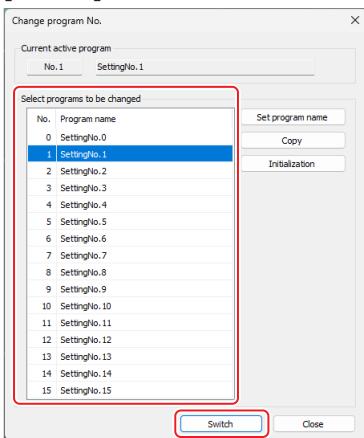
Operating Programs

Switching between programs

- 1 Click the change prog. No. button at the top of the setting screen.**



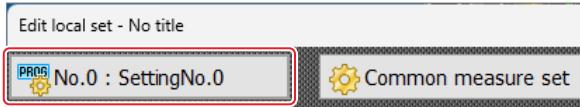
- 2 Select the program you want to switch from the list in [Select programs to be changed] and then click [Switch].**



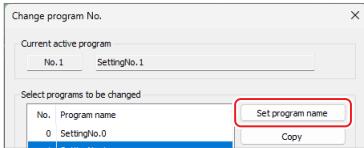
The settings screen for the switched program will appear.

Changing the program name

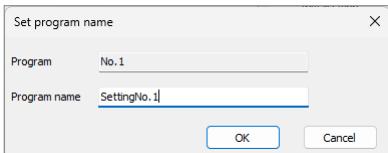
- 1 Click the change prog. No. button at the top of the setting screen.**



- 2 Click [Set program name].**



- 3 Enter the program name on the keyboard and click [OK].**



- 4 Click [Close].**

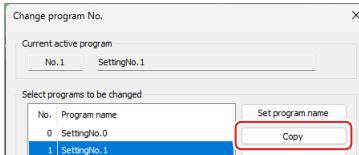
Copying programs

This section explains the procedure for copying the settings of any program number to another program number.

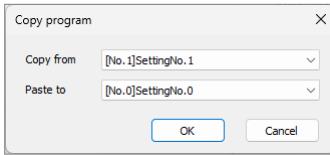
- 1 Click the change prog. No. button at the top of the setting screen.**



- 2 Click [Copy].**



- 3 Select the [Copy from] and [Paste to] programs, and click [OK].**



The program is copied, and the screen returns to [Change prog.No.]

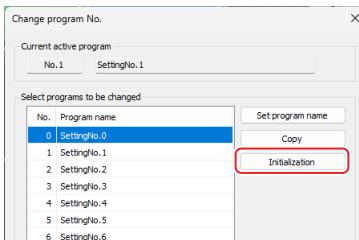
- 4 Click [Close].**

Initializing programs

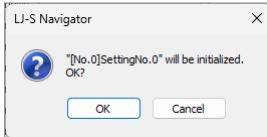
- 1 Click the change prog. No. button at the top of the setting screen.**



- 2 Select the program you wish to initialize from the list in [Select programs to be changed], and click [Initialization].**



- 3 Click [OK].**



The program is initialized, and the screen returns to [Change prog.No.]

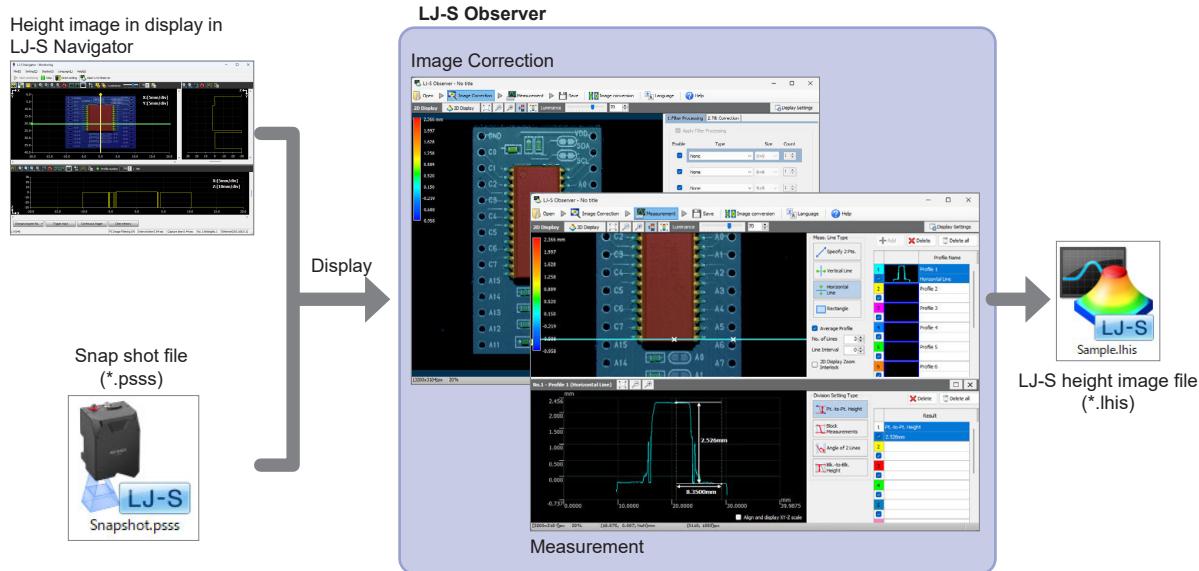
- 4 Click [Close].**

Chapter 6 LJ-S Observer

LJ-S Observer Functions.....	6-2
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LJ-S Observer Functions

The functions available for LJ-S Observer are shown below.



Height/Luminance Image Display

LJ-S Observer can display height/luminance images shown in LJ-S Navigator, snapshot files (*.psss), and LJ-S height image files (*.lhis) saved by LJ-S Observer.

It supports the height/luminance image 2D display and 3D display, and profile display.

□ “Adjusting Height/Luminance Image Display” (page 6-3)

Image Correction

Filter Settings

An Image can be filtered by filtering a height image (median, gaussian, and average) to acquire a profile appropriate for the measurement.

Tilt Correction

By specifying a virtual flat plane on the image, the reference plane tilt can be corrected so that the flat plane should become horizontal.

□ “Correcting Captured Image (Image Correction)” (page 6-7)

Measurement of Profile Height/Distance/Angle

By specifying a measurement line on the height image, measurement can be made for the point-to-point height (Height and distance between two points), block measurement (max., average, min. height and deviation within the block), angle of 2 lines, and block-to-block height to the section of the measurement line position (profile). In addition, by specifying a measurement area, measurement will be done for the max., average, min. height within its area.

□ “Measuring Height, Distance, and Angle” (page 6-10)

Saving an LJ-S Height Image File (*.lhis)

Save the displayed image as an LJ-S Observer-specific LJ-S height image file (*.lhis).

□ “Saving the LJ-S Height Image Files or Image Data” (page 6-14)

Reference The LJ-S height image file also saves the image correction setting, measurement setting, and image conversion setting.

Image conversion

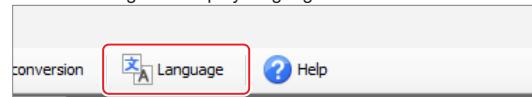
Equalizing the scales in the horizontal (X-axis) and the vertical (Y-axis) directions allows you to display the vertical-to-horizontal ratio of the image of the actual dimension and measure the actual dimension.

□ “Converting Images (Image Conversion)” (page 6-14)

System Settings

Switching the display language

You can change the display language for LJ-S Observer.



After restarting LJ-S Observer following the on-screen instructions, the selected language is used as the display language.

Point User-specified names such as profile name do not change.

Version Information

The version information for LJ-S Observer can be checked.



Adjusting Height/Luminance Image Display

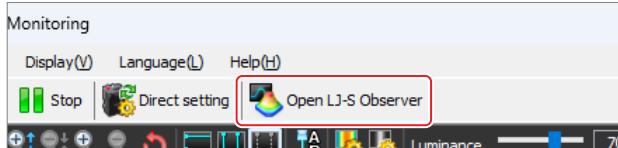
With the LJ-S Observer, follow the procedure below to display the height / luminance images.

- Displaying the Images From the Data being Displayed on the LJ-S Navigator
- Specifying and Displaying a File

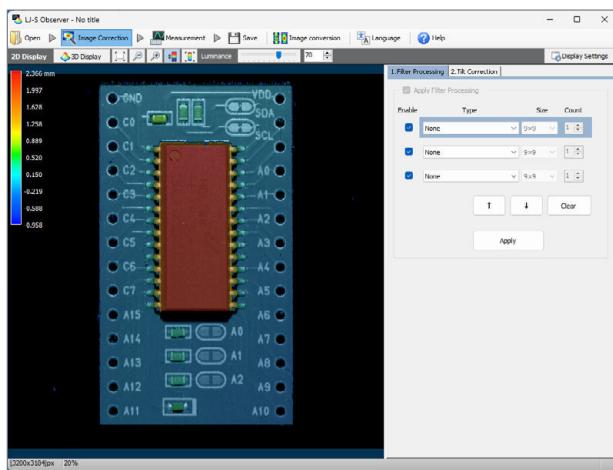
This section describes each displaying procedure and how to operate displayed images.

Displaying the Images from the Data being Displayed on the LJ-S Navigator

- 1 Click [Open LJ-S Observer] on the LJ-S Navigator tool bar.



LJ-S Observer starts, and the [Image Correction] screen appears.

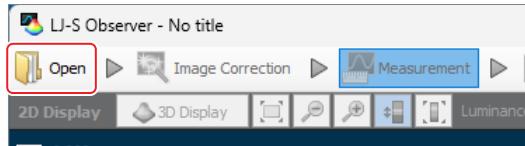


[Reference] Clicking [Open LJ-S Observer] in the [Setting] menu for LJ-S Navigator also displays the [Image Correction] screen for LJ-S Observer.

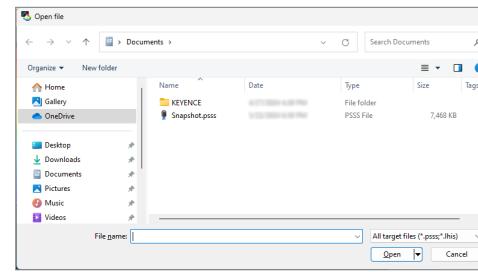
For the image correction, see □ "Correcting Captured Image (Image Correction)" (page 6-7).

Specifying and Displaying a File (Open)

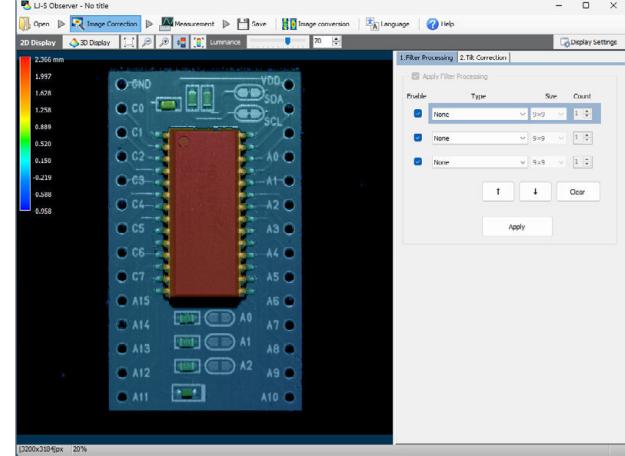
- 1 Click [Open] at the top of the screen of LJ-S Observer.



- 2 Select a file where the height image is to be displayed, and click [Open].



The file will be read, and the [Image Correction] screen will appear.



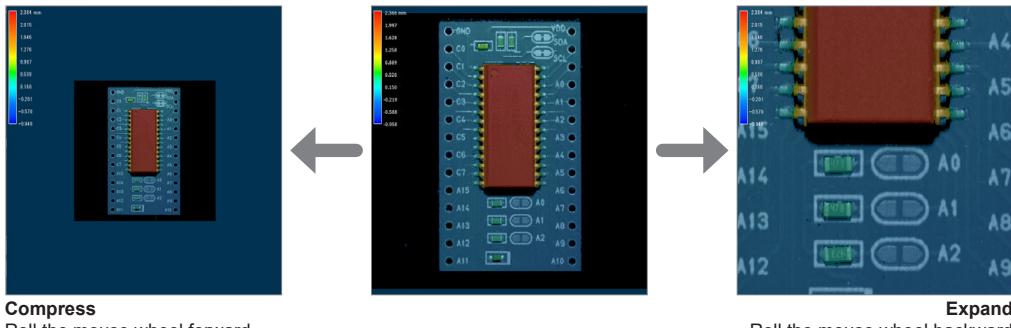
For the image correction, see □ "Correcting Captured Image (Image Correction)" (page 6-7).

Operating the Images

You can easily view the captured image by zooming in/out and moving using a mouse. You can also use the operation buttons on the display tool bar to do the same operations.

This section describes the height / luminance image operation with the mouse and the operation button on the display tool bar.

Image Zoom In/Out



Compress

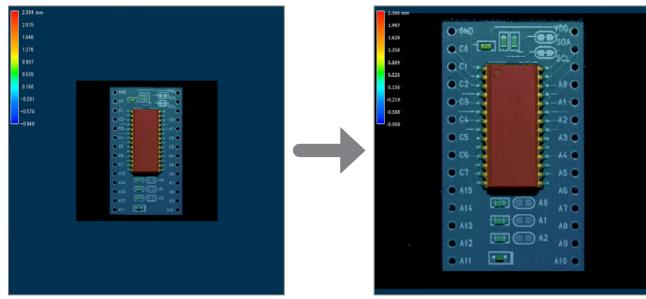
Roll the mouse wheel forward

Expand

Roll the mouse wheel backward

[Reference] You can also use on the display tool bar to zoom in/out the images.

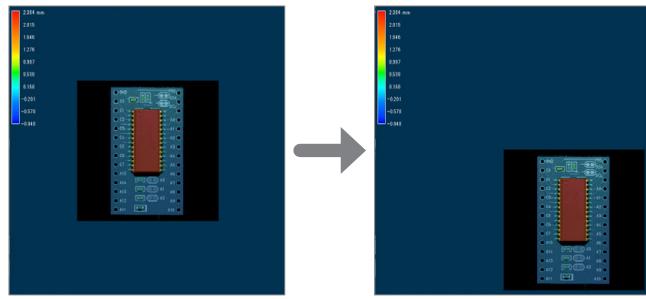
Entire Image Display (Fit Display)



Double-click the right button of the mouse

- [Reference]**
- In the case of [2D Display], double-clicking the mouse wheel can display the entire image (Fit display).
 - You can also use on the display tool bar to display the entire image (Fit display).

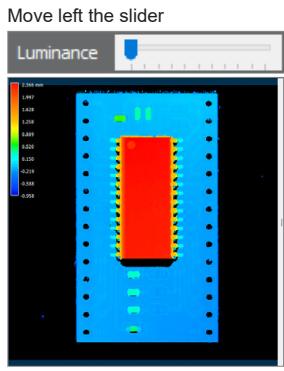
Move



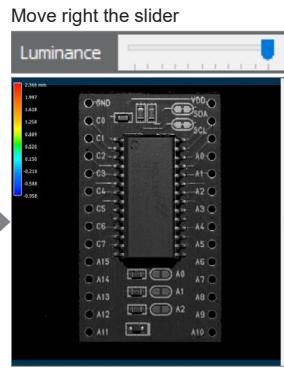
Drag with the right button or the mouse wheel.

- [Reference]** In the case of [3D Display], drag and drop with the right button moves the image in the XY direction and drag and drop of the mouse wheel translates to parallel movement in the Z direction.

Luminance Intensity Switching

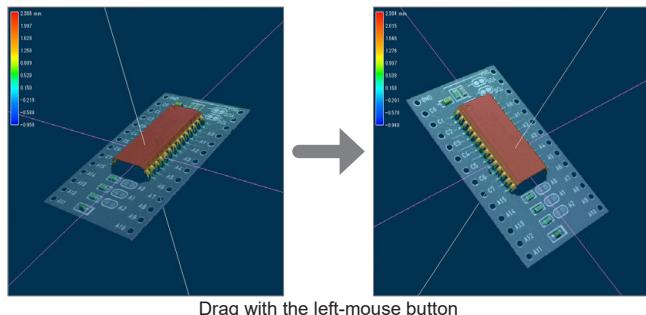


Height display



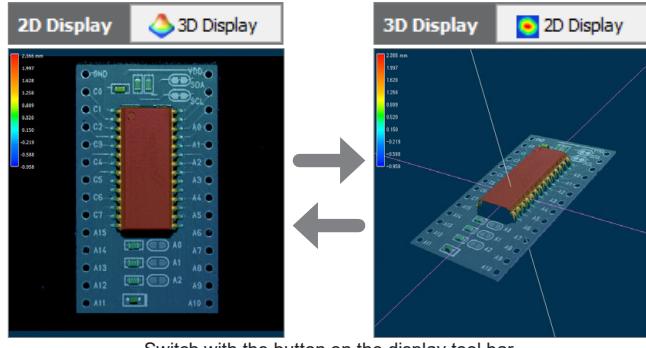
Luminance display

Rotation ([3D Display] only)



Drag with the left-mouse button

Switching [2D Display]/[3D Display]

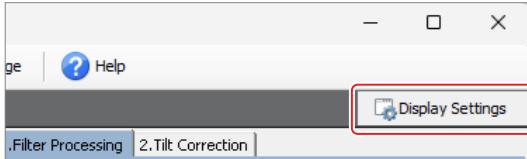


Switch with the button on the display tool bar

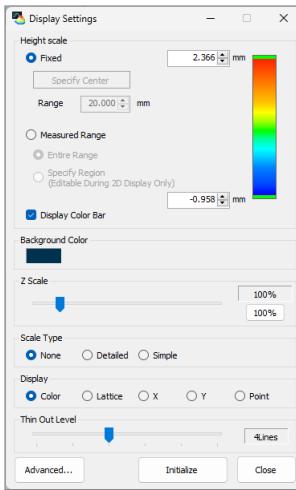
Setting Image Display Method (Display Settings)

This setting sets the display method of [2D Display] and [3D Display] and scaling.

1 Click the [Display Settings] button at the far right of the tool bar.



2 Set the display method.



The items with the mark of (*) in the following items explanation can be set only at the 3D display.

Height scale

○ Fixed

This option uses fixed values (mm) of the height to set the upper and lower limits of the height scale.

For [2D Display], the upper and lower limits are set centering around the height of the point clicked with the [Specify Center] button.

"Setting Height Scale by Specifying Center Position" (page 6-6)

○ Measured Range

For a region you specified, the maximum and minimum values of the height in the region are set to the upper and lower limits of the height scale.

"Setting Height Scale by Specifying Region" (page 6-6)

- For setting of [3D Display], you can select [Specify Region] but can not edit the region.
• You can also use ([Fix]) or ([Measured Range]) on the display tool bar to change the height scale settings.

○ Display Color Bar

When checked, the color bar appears on the image.

Background Color

The background color of the image is set.

When you click the color box, the [Color] dialog appears to allow you to set the color.

Clicking the [Initialize] button restores the background color to the default.

Z Scale (*)

The height display magnification is set in the range between 0 and 50,000%.

Clicking the [100%] button resets [Z Scale] to 100%.

Scale Type (*)

Select the scale for [3D Display].

- **None**

No scale appears.

- **Detailed**

Detailed scale with an auxiliary scale appears.

- **Simple**

Simple scale with no auxiliary scale appears.

Display (*)

Select the 3D display method from among the following.

- **Color**
A plane connecting XY coordinates is filled with a color.
- **Lattice**
A line connecting XY coordinates is shown with a color.
- **X**
A line connecting X coordinates is shown with a color.
- **Y**
A line connecting Y coordinates is shown with a color.
- **Point**
XY coordinate is shown with a color.

Thin Out Level (*)

Thin out level for the data to be used for the 3D display is set.

If video memory is low, [Thin Out Level] may not be lowered. If the [Thin Out Level] cannot be lowered, change the [Min. Thin Out Level] in [Advanced] or crop the image from the image converter to reduce the image size. For image conversion, see "Converting Images (Image Conversion)" (page 6-14).

Advanced (*)

Sets [Min. Thin Out Level].

Clicking this button displays the [Advanced] dialog box.

When you have set a value using the slider, click the [Close] button.

Specifying the height scale by setting the center position can be made only in the case of [2D display].

Initialize

Clicking the button resets the display settings to the default.

Setting Height Scale by Specifying Center Position

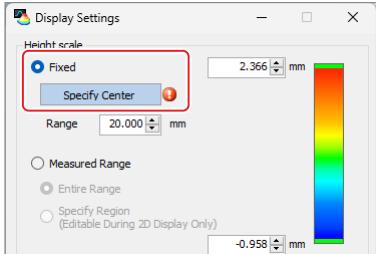
The upper and lower limits of the height scale are set based on the height at the center position.

Point Specifying the height scale by setting the center position can be made only in the case of [2D display].

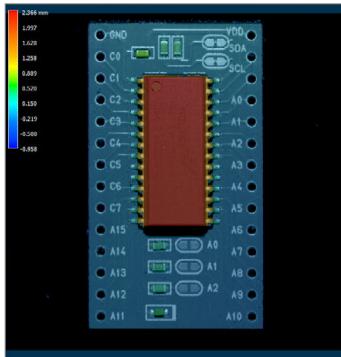
1 Open the [Display settings] screen.

□ "Setting Image Display Method (Display Settings)" (Page 6-5)

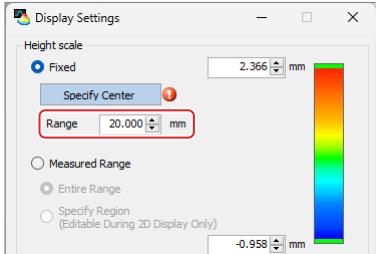
2 Select [Fixed] and click [Specify center].



3 Click a point to be the height of the height scale center on [2D Display].



4 Specify the range of the height scale with [Range].



±[Range]/2 of the height at the clicked point are set to the height scale of the upper and lower limits.

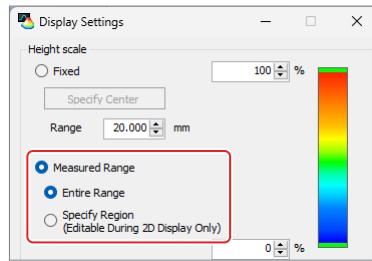
Setting Height Scale by Specifying Region

The maximum and minimum values of the height in the specified region are set to the upper and lower limits of the color range.

1 Open the [Display settings] screen.

□ "Setting Image Display Method (Display Settings)" (Page 6-5)

2 Specify [Measured Range] and then select how to specify the region.



● Entire Range

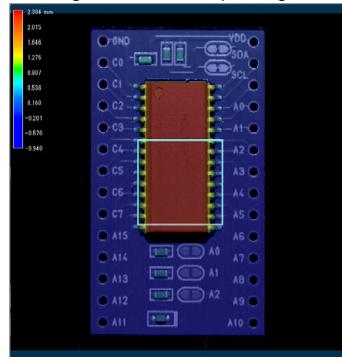
The maximum and minimum values of the heights in the entire region are set to the upper and lower limits of the color range.

● Specify Region

Specify a rectangle region on the image. The maximum and minimum values of the heights in the rectangle region are set to the upper and lower limits of the color range.

3 When [Specify Region] is selected, change the size and position of the rectangle region on the image.

The height scale is set depending on the change of the rectangle.



○ Changing the size

Drag and drop a side or an angle of the rectangle.

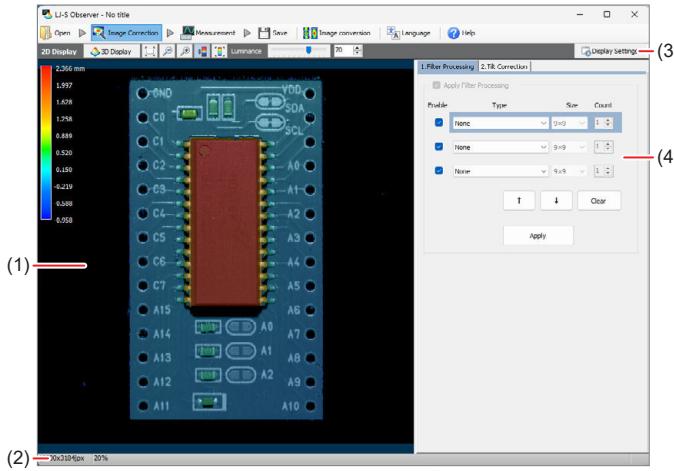
○ Moving the position

Drag and drop the inside of the rectangle.

Correcting Captured Image (Image Correction)

An Image can be filtered by filtering a height image (median, gaussian, and average) to acquire a profile appropriate for the measurement. Additionally, by specifying a virtual flat plane on the image, the reference plane tilt can be corrected so that the flat plane should become horizontal.

Screen Layout in Correcting the Images



(1) Image display ([2D Display]/[3D Display])

The height / luminance image appears.
You can set the filter processing and inclination while checking the condition of the corrected image.
For details on operating the display image, see □ "Operating the Images" (page 6-4).

(2) Status bar

The status bar shows the information below.

- Image size
- Magnification (when it is the 2D display)
- X, Y, and height coordinates in actual size of the mouse cursor position (when it is the 2D display)
- Pixel (px) coordinate of the mouse cursor position (when it is the 2D display)

(3) Display Settings

□ "Setting Image Display Method (Display Settings)" (page 6-5)

(4) Setting area

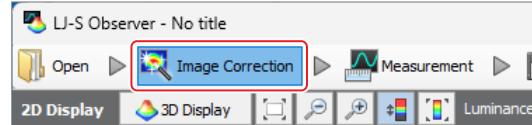
You can correct the images.

- "Filtered Images (Filter Processing)" (page 6-7)
- "Correcting Tilt of Images (Tilt Correction)" (page 6-8)

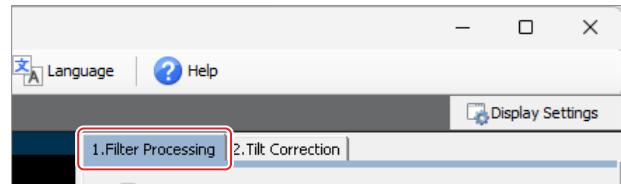
Filtered Images (Filter Processing)

Apply filter processing to the height/luminance image.
Three types of filters can be applied simultaneously.

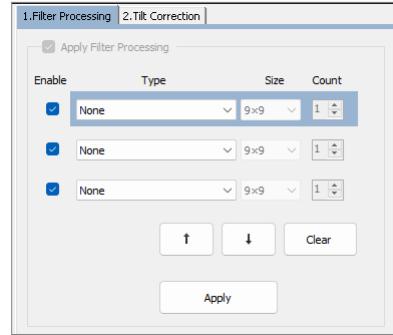
1 Click [Image Correction].



2 Select the [1. Filter Processing] tab.



3 Set the filter processing to be performed.



● Apply Filter Processing

A filter with its [Enable] checked is applied.

● Enable

The filter in the checked line is enabled.

● Type

This option selects a filter to be applied.

- None: No filter is applied.
- Median: The median filter is applied.
- Gaussian: The Gaussian filter is applied.
- Average: The moving average filter is applied.

● Size

Select the filter size.

● Count

Set the number of times to apply the filter.



The buttons switches the order of filtering between ascending and descending.

● Clear

The button clears the filter setting selected.

4 After the filter settings is completed, click [Apply].

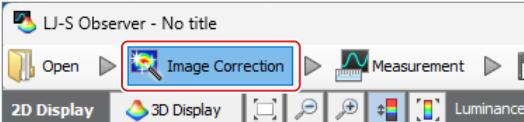
The filter processing is applied and the image is smoothed.
The [Apply] button turns to [Edit].

Correcting Tilt of Images (Tilt Correction)

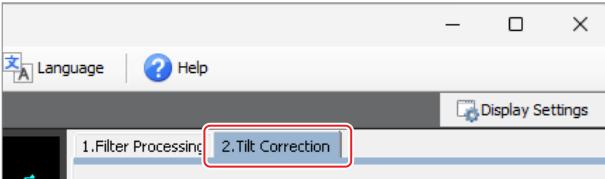
Specify a virtual plane and correct the tilt of the plane. The height data are corrected so that the specified plane becomes the reference plane.

- Reference
- This tilt correction corrects only the Z coordinate but not the X and Y coordinates. Therefore, when measuring distances or angles, etc., use the pretilt correction profile.
 - The reference plane is a plane 0 mm in height.

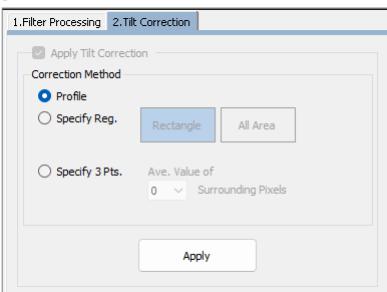
1 Click [Image Correction].



2 Select the [2. Tilt Correction] tab.



3 Select [Correction Method] and set the virtual plane.



Profile

Set the tilts of the horizontal and vertical profiles of the image to specify the virtual plane.

"Specifying Plane with Profile" (page 6-8)

Specify Region

Specify a region on the image. The virtual plane is specified with the height data of the region.

"Specifying Plane by Specifying Region" (page 6-9)

Specify 3 Pts.

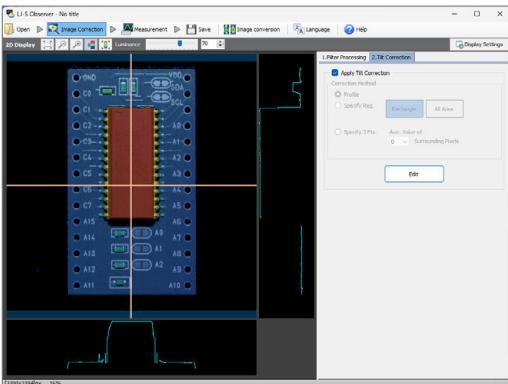
Specify three points on the image. The plane passing through the heights of the three points is specified as the virtual plane.

"Specifying Plane by Specifying Three Points" (page 6-9)

4 Click [Apply].

The tilt is corrected.

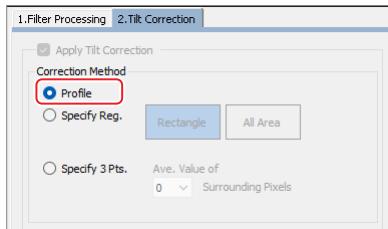
The [Apply] button turns to [Edit].



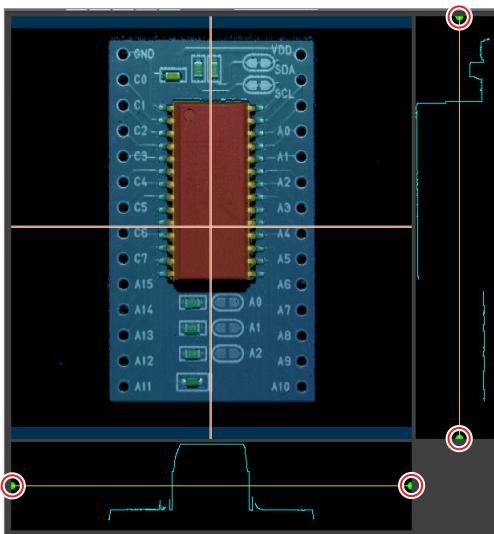
- Clicking the [Edit] button allows you to edit [Correction Method].
- Checking/Unchecking [Apply Tilt Correction] enables/disables the tilt correction.

Specifying Plane with Profile

1 Select [Profile] under [Correction Method].



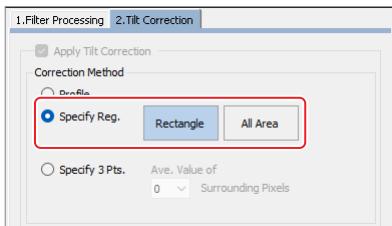
2 Move the green pointer on the profile display to specify the tilt.



The yellow line on the profile display shows the tilt of the virtual plane.

Specifying Plane by Specifying Region

- 1 Select [Specify Reg.] under [Correction Method].**
- 2 Select how to specify the region.**



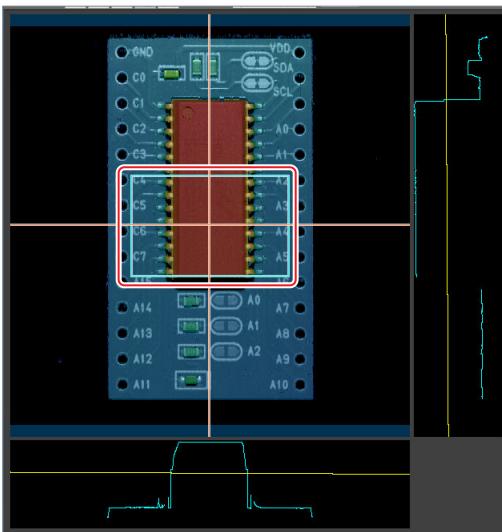
● Rectangle

Specify the virtual plane with a rectangle on the image.

● All Area

The entire region of the image is specified as the virtual plane.

- 3 When [Rectangle] is selected, change the size and position of the rectangle at the image center to specify the plane.**



○ Changing the size

Drag and drop a side or an angle of the rectangle.

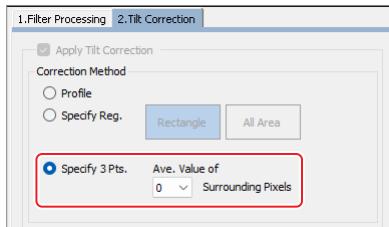
○ Moving the position

Drag and drop the inside of the rectangle.

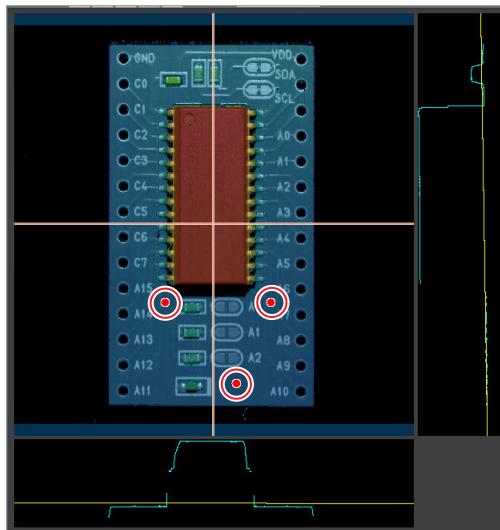
[Reference] The yellow line on the profile display shows the tilt of the virtual plane.

Specifying Plane by Specifying Three Points

- 1 Select [Specify 3 Pts.] under [Correction Method].**
- 2 Use the pull-down menu to specify the number of pixels for the height acquisition range at each point.**



- 3 Move the red pointer on the profile display to specify the three points.**

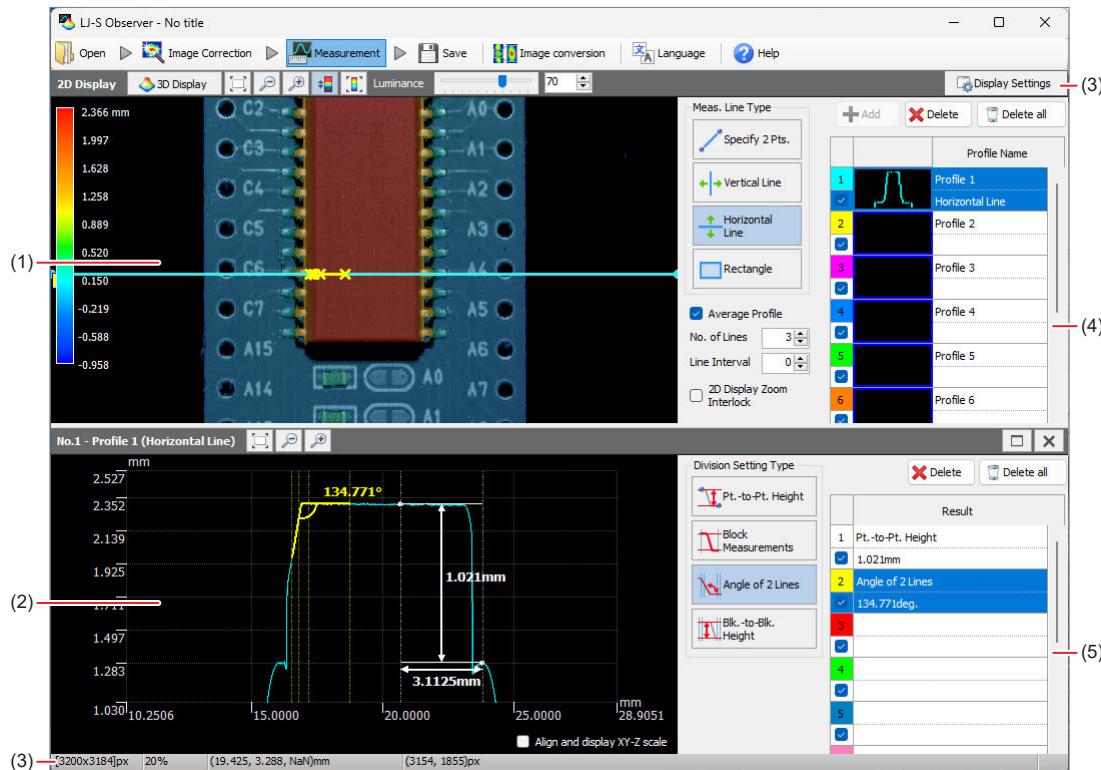


[Reference] The yellow line on the profile display shows the tilt of the virtual plane.

Measuring Height, Distance, and Angle

By specifying a measurement line on the height image, measurement can be made for the point-to-point height (Height and distance between two points), block measurement (max., average, min. height and deviation within the block), angle of 2 lines, and block-to-block height to the section of the measurement line position (profile). In addition, by specifying a measurement area, measurement will be done for the max., average, min. height within its area.

Screen Layout in Measuring



(1) Image display ([2D Display]/[3D Display])

The height / luminance image appears.

Set the measurement line and region for [2D display]/3D display].

"Specifying the Measurement Line/Region on the Image" (page 6-11)

(2) [Display profile]

The measurement line and region profile set in image display appears, on which you can perform measurement.

"Measuring on the Profile" (page 6-12)

(3) Status bar

The status bar shows the information below.

- Image size
- Display Magnification
- X, Y, and height coordinates in actual size of the mouse cursor position
- Pixel (px) coordinate of the mouse cursor position

Reference The display magnification and position of the mouse cursor will appear only at the 2D display.

(4) Display Settings

You can set the method to display images.

"Setting Image Display Method (Display Settings)" (page 6-5)

(5) Setting area: Measurement Line Setting

You can specify the measurement line/area onto the image.

"Specifying the Measurement Line/Region on the Image" (page 6-11)

(6) Setting area: Measurement Division Settings

You can do measurement on the profile display of the measurement line.

"Measuring on the Profile" (page 6-12)

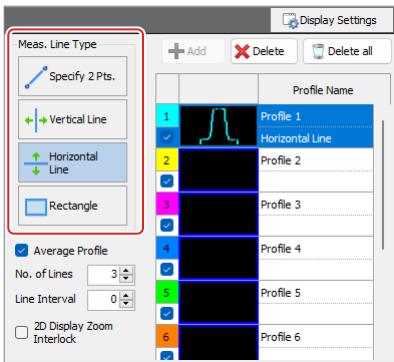
Specifying the Measurement Line/Region on the Image

By specifying the measurement line/measurement area on the height/luminance image, display the profile of the place of the measurement line/measurement area.

1 Click [Measurement].



2 Use [Meas. Line Type] to select a type of the measurement line/region to be specified.



Specify 2 Pts.

Specify two points of starting and ending on the image to draw the measurement line.

Vertical Line

A linear measurement line is drawn in the Y direction on the image.

Horizontal Line

A linear measurement line is drawn in the X direction on the image.

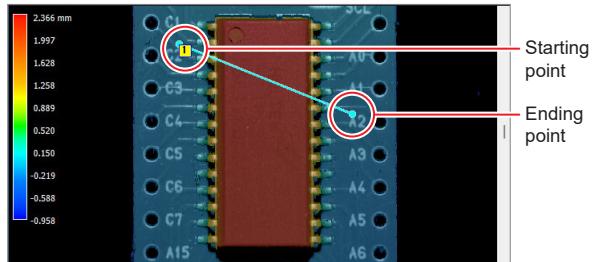
Rectangle

Specify a rectangle measurement region on the image.

3 According to the type of the specified measurement line/region, specify the measurement line/region on the image.

Specify 2 Pts.

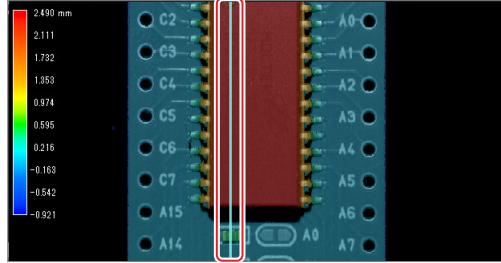
Specify the starting and ending points by clicking two points on the image.



Drag and drop of the starting (ending) point allows you to move their position.

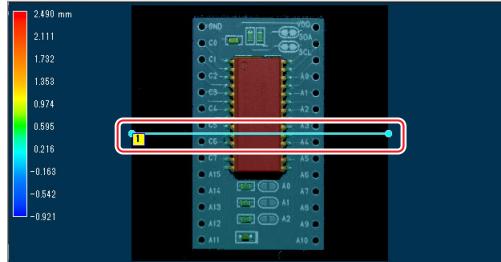
Vertical Line

Click the image to move the measurement line to the desired position.



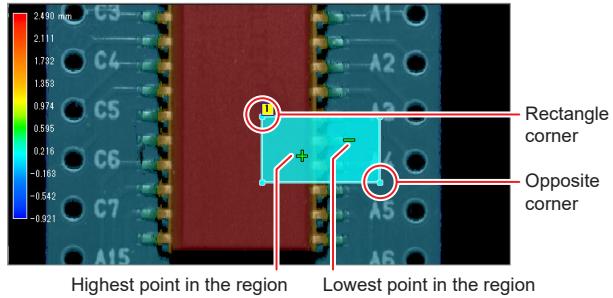
For [Horizontal Line]

Click the image to move the measurement line to the desired position.



For [Rectangle]

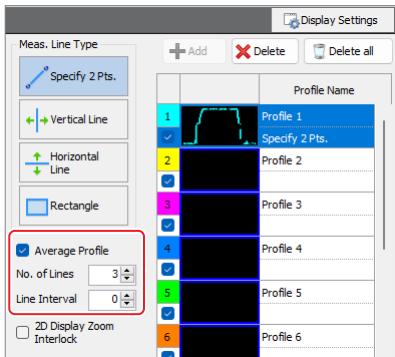
Click a point to be a corner of the rectangle and click a point to be the opposite corner.



-
- Selecting [Meas. Line Type] and clicking [Add] also allows you to add the measurement line/region.
 - Selecting a measurement line/region and clicking [Delete] allows you to delete the measurement line/region.
 - Clicking [Delete all] deletes all measurement lines/region.
 - Drag and drop of a line segment of the measurement line/region allows you to move the position of the measurement line/region.
 - When [Rectangle] is selected, profiles that can specify [Block measurement] by [Division setting type] will appear, and when [Specify 2 pts.], [Vertical line], and [Horizontal line] is selected, profiles that can specify all division setting types by [Division setting type] will appear.

4 To display the average profile, check [Average Profile] and set [No. of Lines] and [Line Interval].

Reference The average profile is created by averaging the profiles which include the specified measurement line and the drawn measurement lines at equal intervals on both sides of the specified measurement line.



● Number of lines

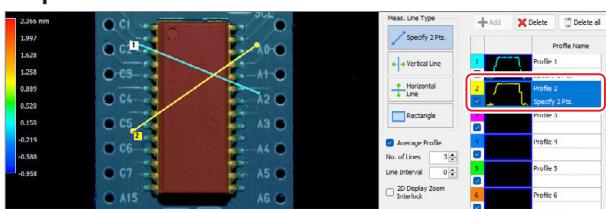
Specify the number of measurement lines to be drawn on one side of the drawn measurement line.

When one line is specified, the average profile is displayed with the three lines that appear in total including one original line and the two additional lines drawn on both sides.

● Line Interval

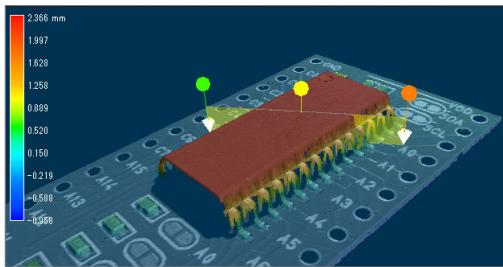
Specify the interval in pixels between the original and additional measurement lines.

5 To add the measurement line/measurement region, select an unset profile from the list and repeat the steps 2 to 4.



Reference When the camera image is [2D Display], and [2D Display Zoom Interlock] is previously checked, changing the measurement line/region on the list zooms the image such that the measurement line/region appears in the maximum size.

6 You can check the measurement line/region even if you switched the screen to [3D Display].

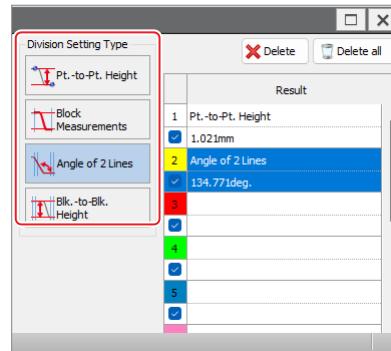


Reference In [3D Display], the measurement line/region selected from the list appears.

Measuring on the Profile

The height, distance, and angle on the profile are measured by specifying points and blocks (areas of measurement).

1 Select a division to be measured with [Division Setting Type].



● Point-to-point height

The height and distance between two points, the starting and ending points, are measured.

● Block Measurements

The maximum, minimum, average values, and deviation are measured regarding the heights between the starting and ending points.

Reference When [Rectangle] is selected with [Meas. Line Type], only [Block Measurement] can be measured. No other [Division Setting Type] can be measured.

● Angle of 2 Lines

Specify the starting and ending points for two blocks. The approximate line is calculated for each of the blocks and the angle between the lines are measured.

● Blk.-to-Blk. Height

Specify the starting and ending points for two blocks. The difference between the average height of each block is measured.

2 Specify the division to be measured on [Profile].

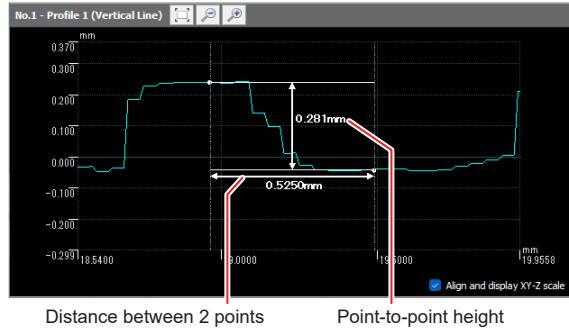
Reference

- When [Align display XY-Z Scale] is checked, the XY coordinate scale and the Z coordinate scale can be displayed with the same scale.
- After selecting a measurement result, clicking [Delete] deletes the selected measurement result.
- Clicking [Delete all] deletes all measurement results.

Point-to-point height

Click the starting and ending points on [Profile].

The height and distance between the two points appear on the profile.



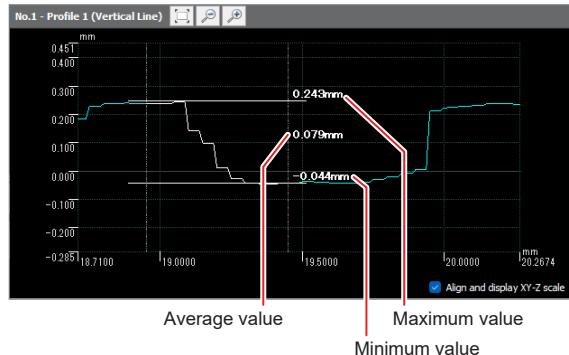
Reference

- If [Average Profile] has been checked when the measurement line is drawn, multiple profiles appear. The start point and end point are set to average values of the profiles being displayed.

Block Measurements

Click the starting and ending points on [Profile].

The maximum, minimum, and average values of the heights between the two points appear on the profile.



Reference

- If [Average Profile] has been checked when the measurement line is drawn, multiple profiles appear. The start point and end point are set to average values of the profiles being displayed.
- The deviation appears in the [Result] column of the list.

Angle of 2 Lines

Click the starting and ending points for the first line segment on [Profile]. The first approximate line appears.



Reference

- If [Average Profile] has been checked when the measurement line is drawn, multiple profiles appear. The start point and end point are set to average values of the profiles being displayed.

Likewise, click the starting and ending points for the second line segment. Another approximate line and the angle between the two approximate lines appear.



Blk.-to-Blk. Height

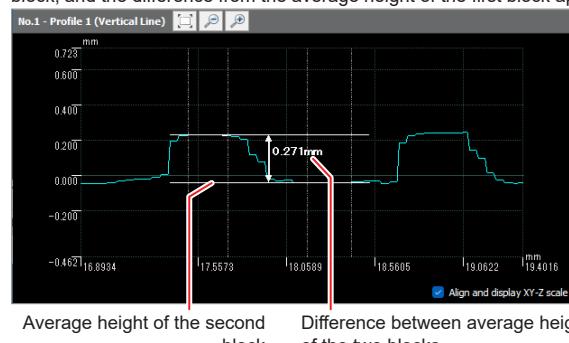
Click the starting and ending points for the first block on [Profile]. A line appears at the position which is the average of the heights between the two points.



Reference

- If [Average Profile] has been checked when the measurement line is drawn, multiple profiles appear. The start point and end point are set to average values of the profiles being displayed.

Likewise, click the starting and ending points for the second block. A line appears at the position which is the average height of the second block, and the difference from the average height of the first block appears.

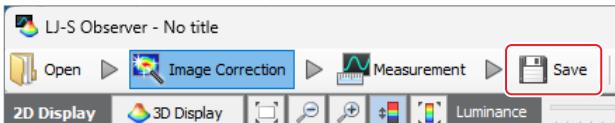


Saving the LJ-S Height Image Files or Image Data

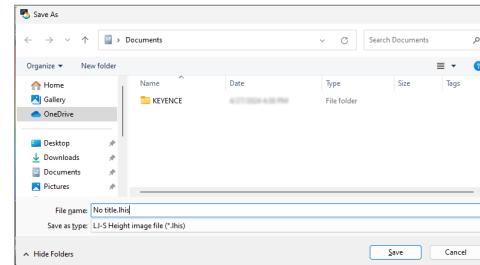
This section describes the procedure to save the image being displayed into the LJ-S height image file format (*.lhis). Or to save the height image data in the CSV/TIFF/ASCII/PCD format. Luminance image data is saved in the CSV/TIFF format. The image is saved with the size changed based in the [Image conversion] settings.

The LJ-S height image file also saves the image correction setting, measurement setting, and image conversion setting.

1 Click [Save] on the menu bar.



2 Specify the location, the file name to save, and the file type, and then click [Save].

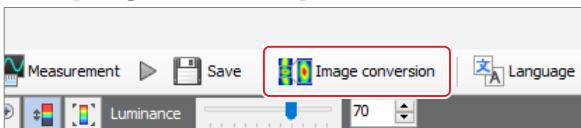


Converting Images (Image Conversion)

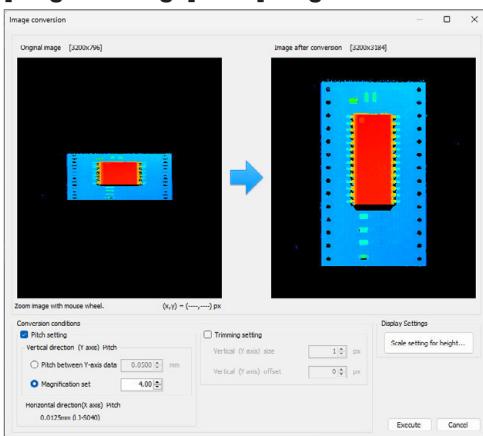
The image conversion function changes the scales in the X/Y directions of the image and the image size in the Y direction. Because the vertical direction of the height image captured by the LJ-S is the Y-axis, the ratio between the vertical and horizontal directions of the image may not 1:1. Equalizing the scales in the horizontal (X-axis) and the vertical (Y-axis) directions by using the image conversion function allows you to display the vertical-to-horizontal ratio of the image of the actual dimension and measure the actual dimension.

You can use the image conversion function to change the vertical-to-horizontal ratio, but for more precise measurement, it is recommended to capture the height image so that the ratio of the X-axis and Y-axis directions is 1:1.

1 Click [Image Conversion] on the menu bar.



2 Set [Conversion conditions] while checking [Original image] and [Image after conversion].



Trimming Setting

Selecting this check box allows you to trim the upper and lower ends of the image in the vertical direction (Y-axis).



- If you set the trimming settings, the image correction settings and measurement settings are canceled.
- The upper limit for the image's vertical direction (Y-axis) size is 60000 pixels. Do not exceed this limit for trimming.

Vertical (Y-axis) size

This option changes the lower end of the trimming position. The greater number raises the lower end of the trimming position.

Vertical (Y-axis) offset

This option changes the upper end of the trimming position. The greater number lowers the upper end of the trimming position.

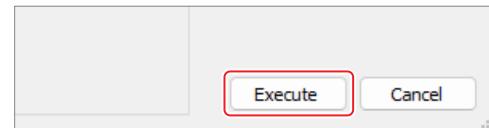


You can use mouse dragging to change the trimming position.

Display Settings

You can set the method to display the height scale of the original image and the converted image.

3 Click [Execute].



The image is converted depending on the settings.



Using the mouse wheel on the original image allows you to zoom the image.

Pitch setting

Selecting this check box allows you to set the scale for the vertical direction (Y-axis) of the image.



The scale in the horizontal direction (X-axis) is fixed. Change the scale in the vertical direction (Y-axis) such that the actual horizontal to vertical ratio is achieved.

Vertical direction (Y-axis) pitch

Select the method to set the scale in the vertical direction (Y-axis) from [Pitch between Triggers] and [Magnification set].

Pitch between Y-axis data

This option sets the pitch in the vertical direction between the profiles in mm.

Magnification set

This option sets the magnification to expand the vertical direction.

Chapter 7 Specifications

Specifications	7-2
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Communication Interface	7-25

Specifications

Head

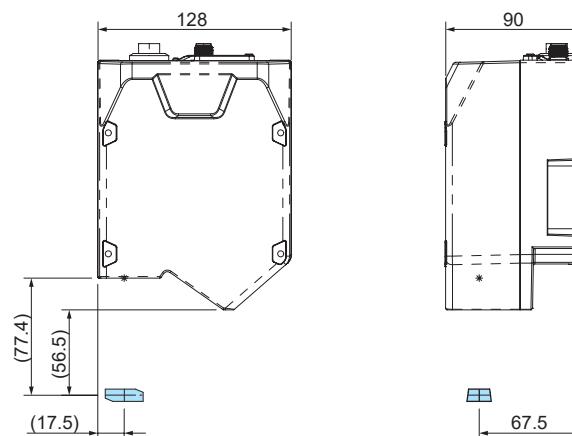
Model name	LJ-S015	LJ-S025	LJ-S040	LJ-S080	LJ-S160	LJ-S320	LJ-S640			
Reference distance ^{*1}	56.5mm	68.5mm	70mm	160mm	211mm	470.5mm	1116mm			
Measurement range (Z)	±4 mm (F.S. = 8 mm)	±9 mm (F.S. = 18 mm)	±18mm (F.S. = 36 mm)	±23mm (F.S. = 46 mm)	±50 mm (F.S. = 100 mm)	+100/-120mm (F.S. = 220mm)	+180/-250mm (F.S. = 430mm)			
Measurement range XY	X NEAR side	14mm	21mm	31mm	66mm	124mm	243mm			
	X Reference distance	15mm	23mm	35mm	72mm	143mm	295mm			
	X FAR side	16mm	25mm	39mm	78mm	160mm	320mm			
	Y Reference distance	25mm	51.2mm	80mm	160mm	160mm	640mm			
XY Data pitch	5µm	8µm	12.5µm	25µm	50µm	100µm	200µm			
XY Data points	3200 x 5000	3200 x 6400	3200 x 6400	3200 x 6400	3200 x 3200	3200 x 3200	3200 x 3200			
Repeatability	Z (height) ^{*2}	0.3µm	0.4µm	0.5µm	1µm	3µm	5µm			
	XY (distance) ^{*3}	0.5µm	0.7µm	1µm	3µm	5µm	10µm			
Linearity ^{*4}	Standard area	±0.035% of F.S.	±0.03% of F.S.	±0.02% of F.S.	±0.055% of F.S.	±0.02% of F.S.	±0.027% of F.S.			
	High-precision area	-	-	-	±0.03% of F.S.	-	-			
Capture time ^{*5}	Approx. 0.2 seconds at a maximum				Approx. 0.3 seconds at a maximum					
Optical source	Laser optical source	Blue semiconductor laser, wavelength: 405 nm (visible light)								
	Laser class	Class 2M laser product ^{*6} (IEC60825-1, FDA (CDRH) Part1040.10 ^{*7})								
	Output	10mW								
Rating	Power voltage	24 V +25%, -20%								
	Current consumption ^{*8} / Electric power	Max. 4.0 A (for 19.2 V), 3.2 A (for 24 V) / Typ 17 W			Max. 5.5 A (for 19.2 V), 4.4 A (for 24 V) / Typ 17 W					
I/F	Ethernet	1000BASE-T, 100BASE-TX								
	input ^{*9}	LASER_ON, TRG, MEM_CLEAR								
	output ^{*9}	READY, EXPOSURE_BUSY, ERROR								
Environmental resistance	Protective structure ^{*10}	IP65 (IEC60529)								
	Ambient luminance ^{*11}	White lamp: 10000 lx or less								
	Ambient temperature ^{*12}	0 to +45°C								
	Ambient humidity	85%RH or less (no condensation)								
	Vibration resistance	10 to 500 Hz, power spectrum density: 0.033 G2/Hz, X, Y, Z directions (IEC60068-2-64)								
	Shock resistance	15G (IEC60068-2-27)								
Material		Aluminum								
Weight		Approx. 2300 g	Approx. 2100 g	Approx. 2600 g	Approx. 2600 g	Approx. 3600 g	Approx. 3700 g	Approx. 4300 g		

- *1 The reference distance is the distance from the bottom edge of the head to the measurement center of the Z-axis (height). For the attachment reference plane, see "Dimensions" (Page 7-8).
- *2 Measured object is a standard object as determined by us. The value of σ, which is the average height of 200x200 points in the center of the visual field measured by the height tool with reciprocating scanning being turned off.
- *3 Measured object is a standard object as determined by us. The value of σ, which is the result of measuring the distance of two circles in a grayscale image by the circle-to-circle distance tool with reciprocating scanning being off, where the diameters of the circles are 500 points, the distance between the circles is 1000 points, and the circles are positioned in the center of the visual field.
- *4 Measured object is a standard object as determined by us. The average height of 200x200 points measured by the height tool with reciprocating scanning being turned off. About the high-precision area, see "Measurement range drawing" (Page 7-3).
- *5 With the YZ range being minimum, and Y-thinning being maximum.
- *6 Never look directly at a beam through an optical apparatus (magnifying glass, magnifier, microscope, telescope, binocular, etc.). Viewing laser output with an optical apparatus may damage the eyes.
- *7 The laser classification is implemented based on IEC60825-1 in accordance with the requirements of Laser Notice No. 56 of the FDA (CDRH).
- *8 The maximum value may be exceeded when an extreme acceleration is made.
- *9 The controller connection type is enabled only for laser ON input.
- *10 When an OP cable is connected.
- *11 Illuminance on a sensor head light-receiving surface when a light is shined on white paper during white-paper measurement.
- *12 The head must be mounted to a metal plate for use.

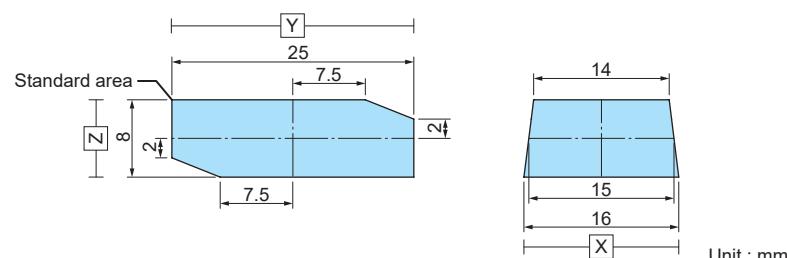
Measurement range drawing

Measurement ranges for the LJ-S Series are indicated below. Measures the shape of the object within the Z-axis measurement range and the trapezoidal area surrounded by the X-axis measurement range.

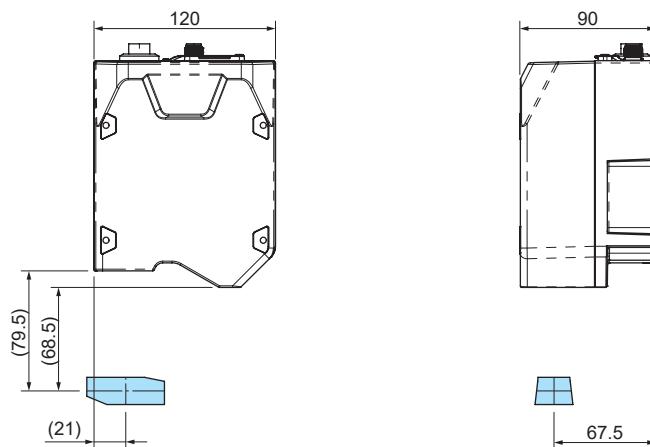
LJ-S015



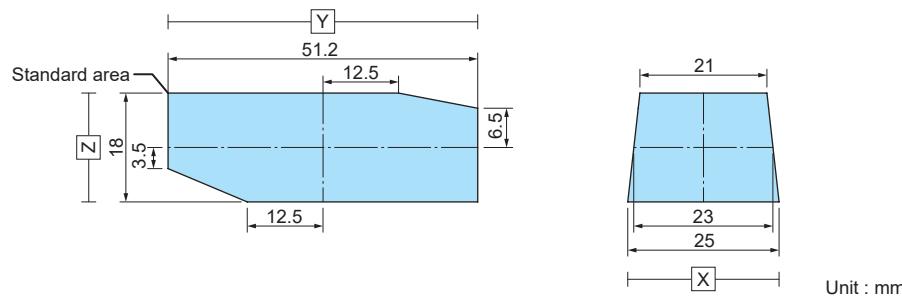
Measurement range details

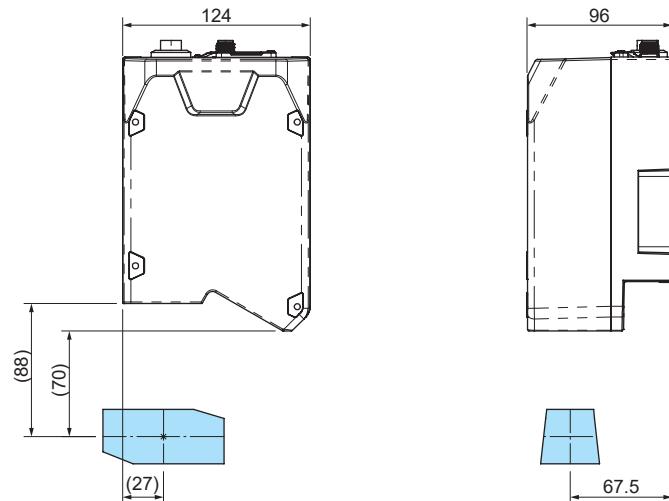
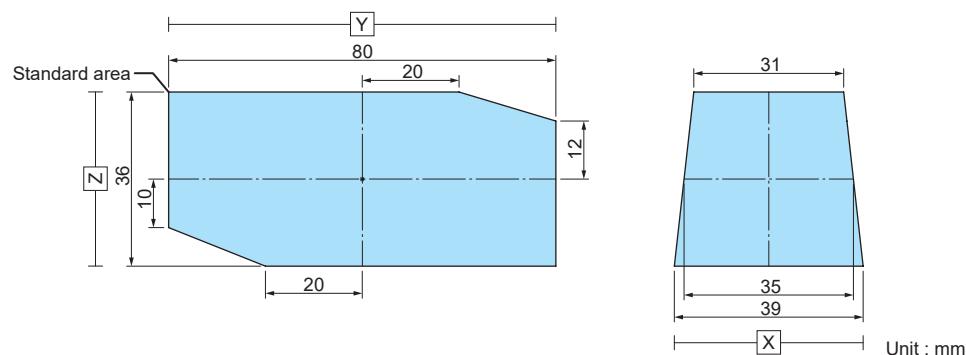
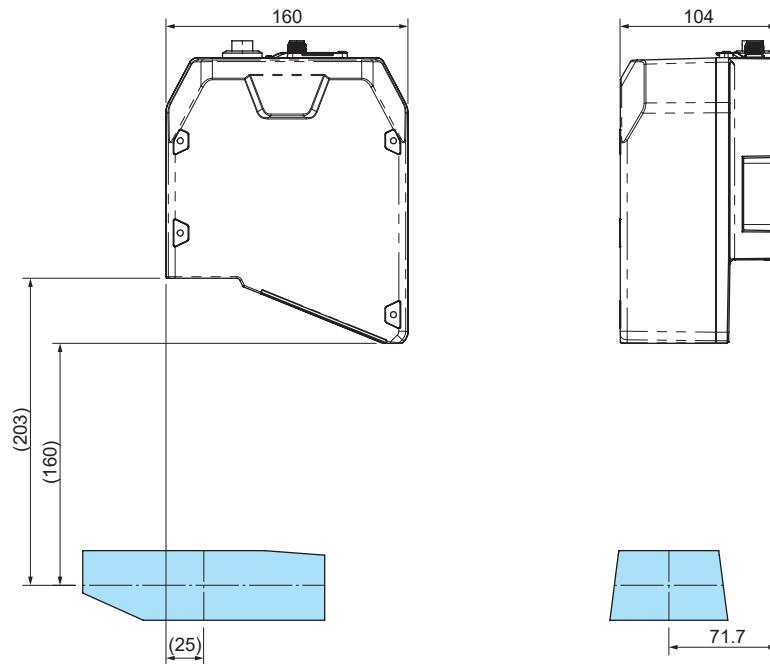
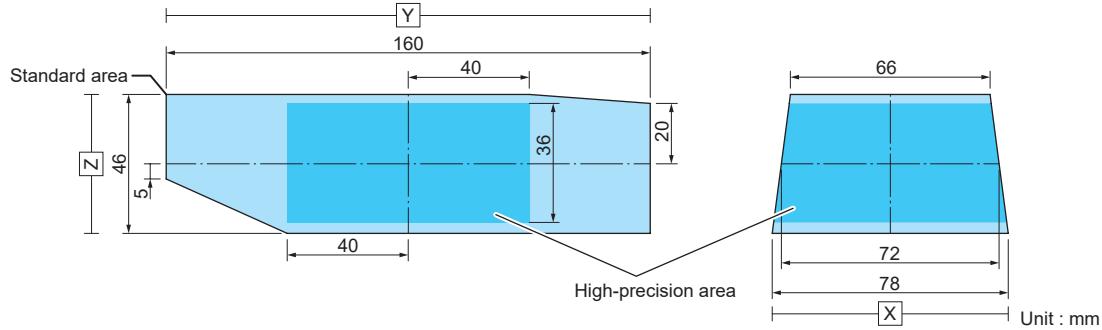


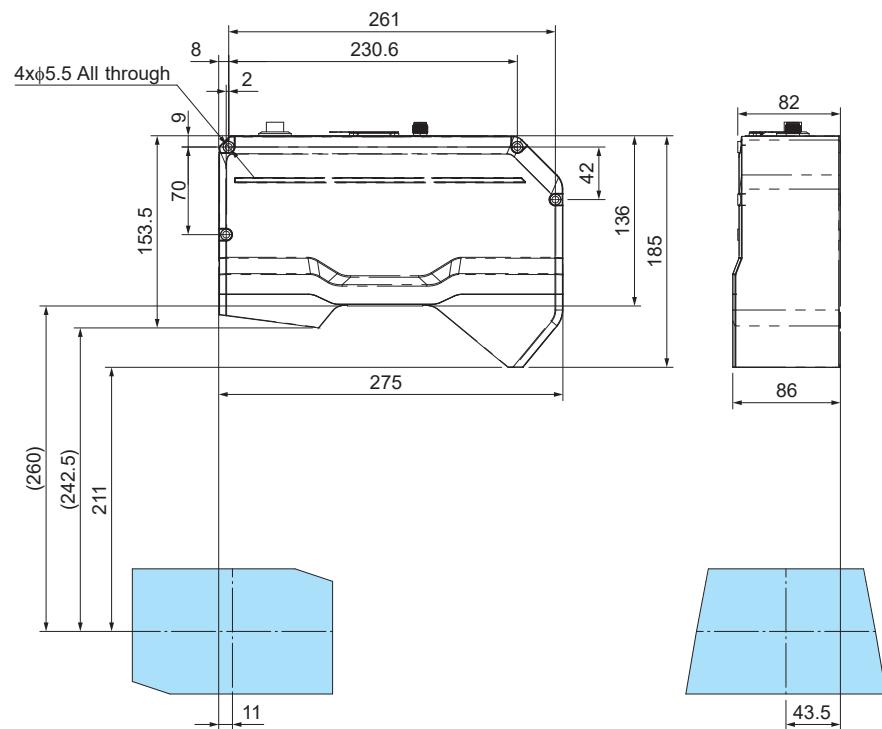
LJ-S025



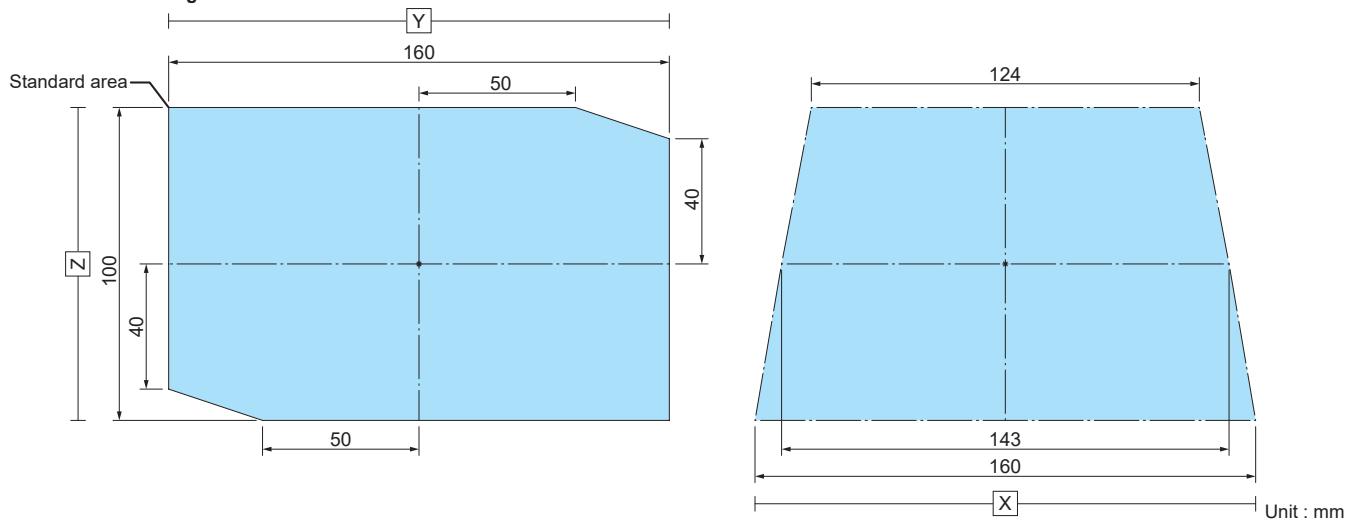
Measurement range details



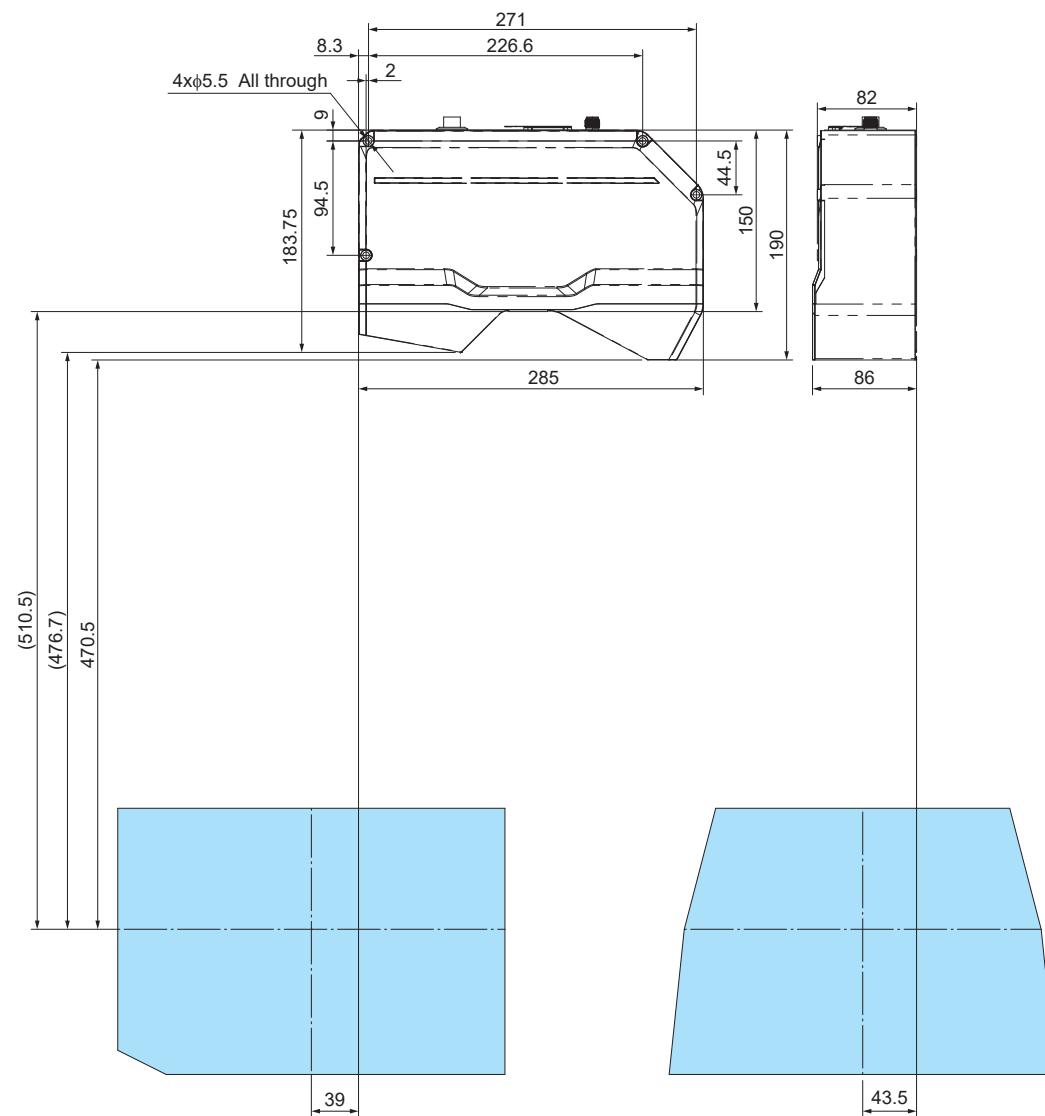
LJ-S040**Measurement range details****LJ-S080****Measurement range details**

LJ-S160

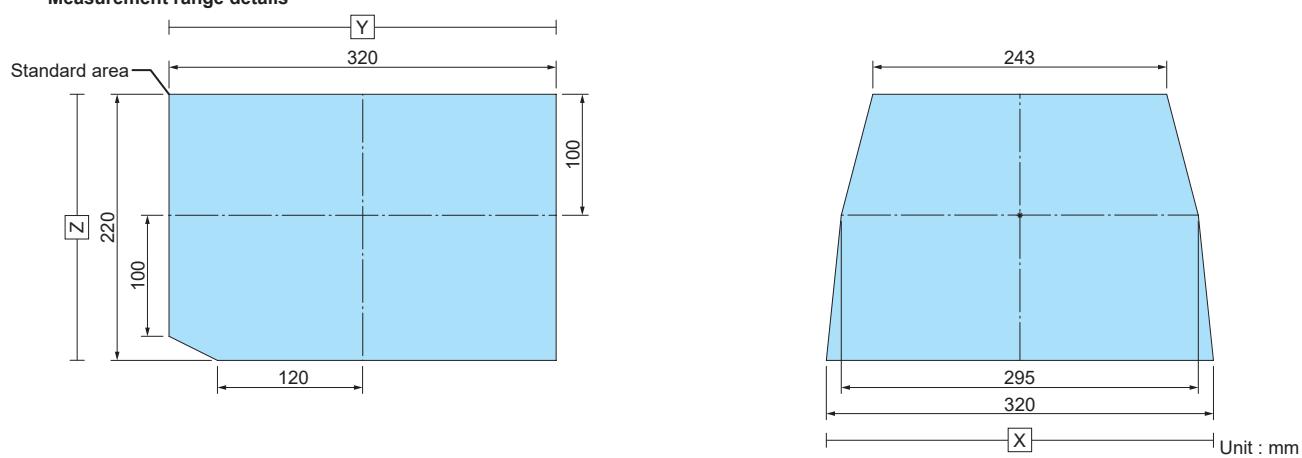
Measurement range details

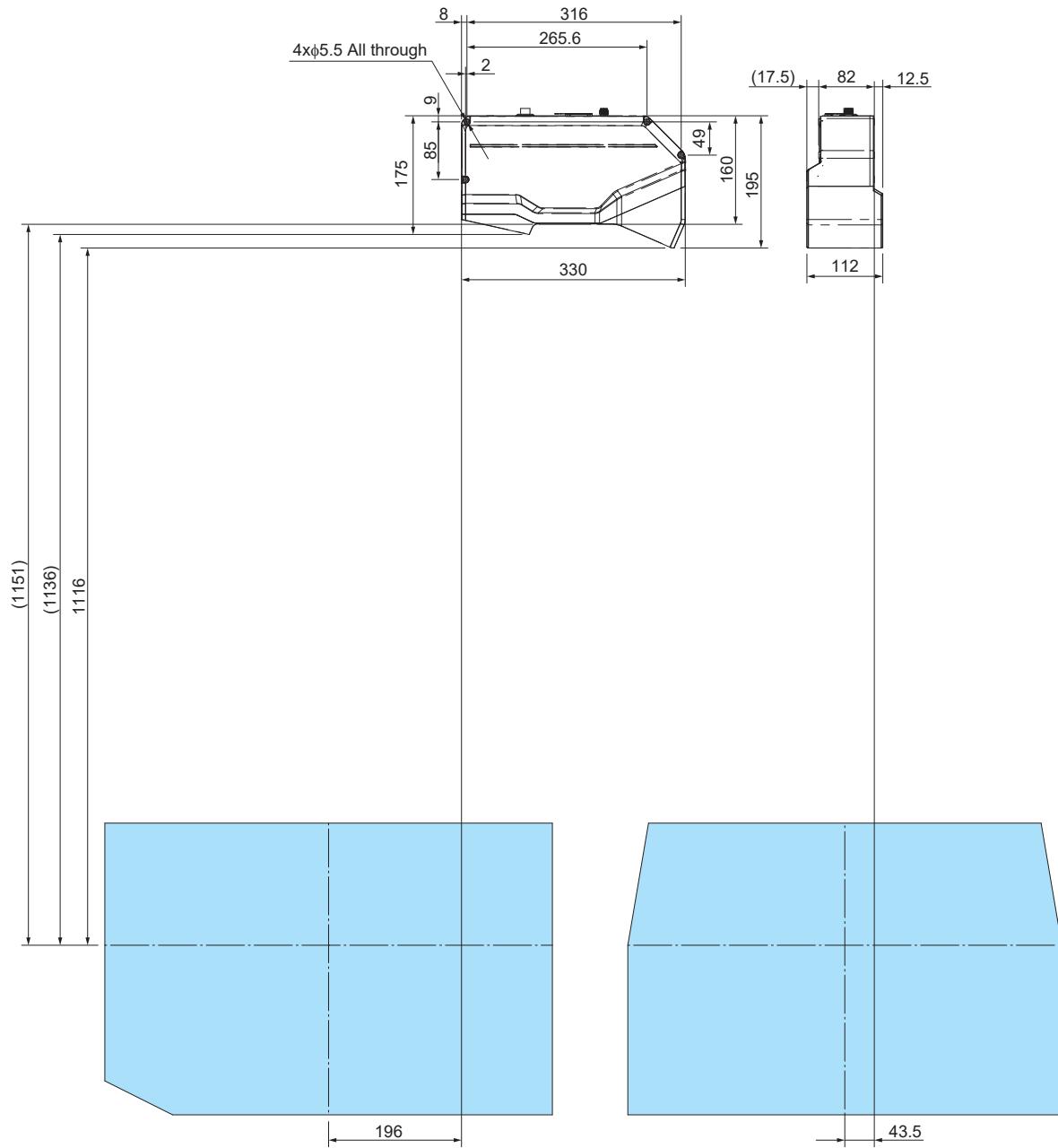
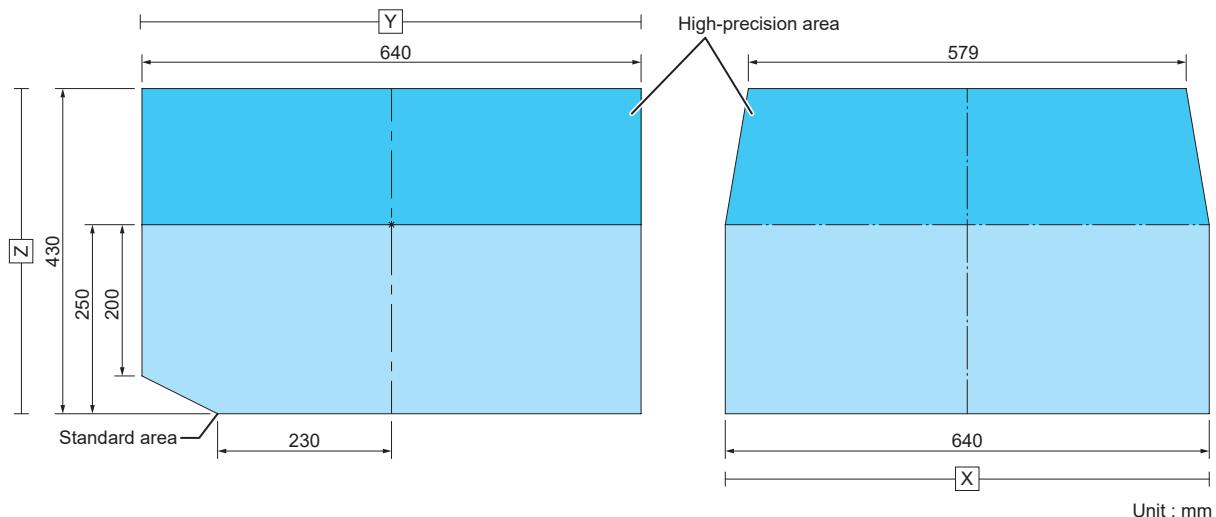


LJ-S320



Measurement range details

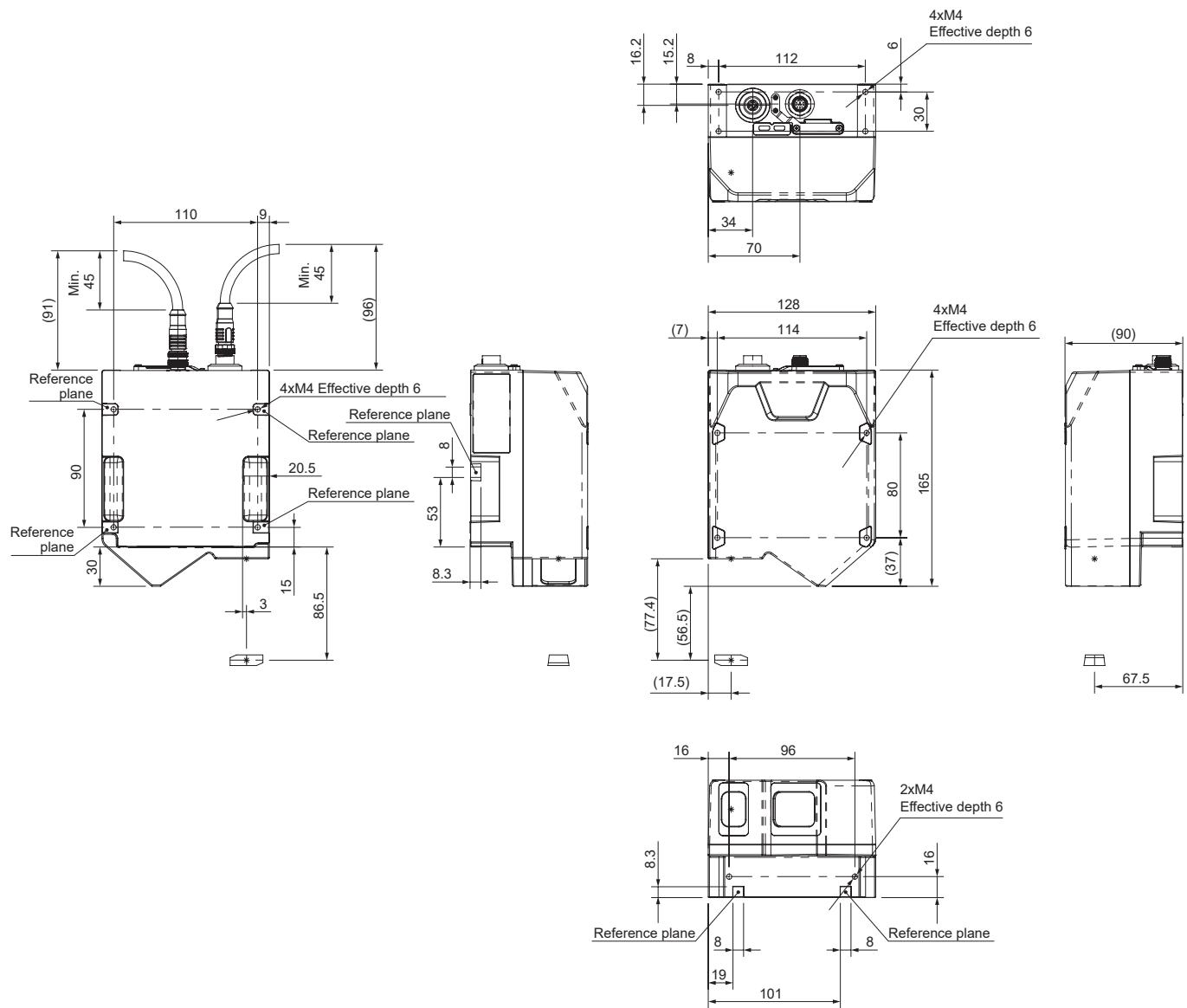


LJ-S640**Measurement range details**

Dimensions

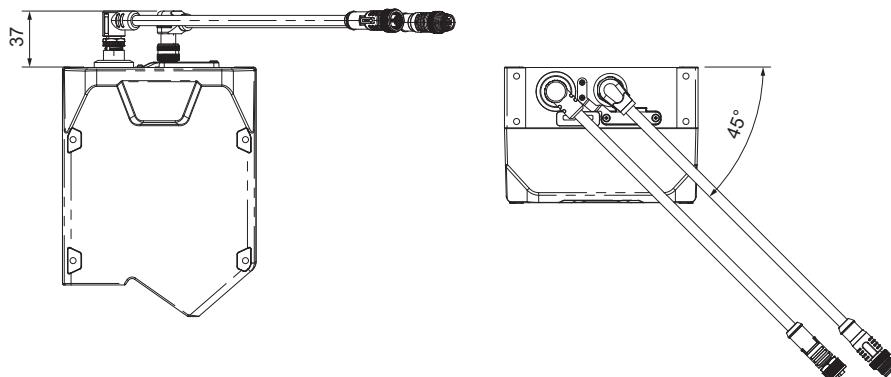
Head

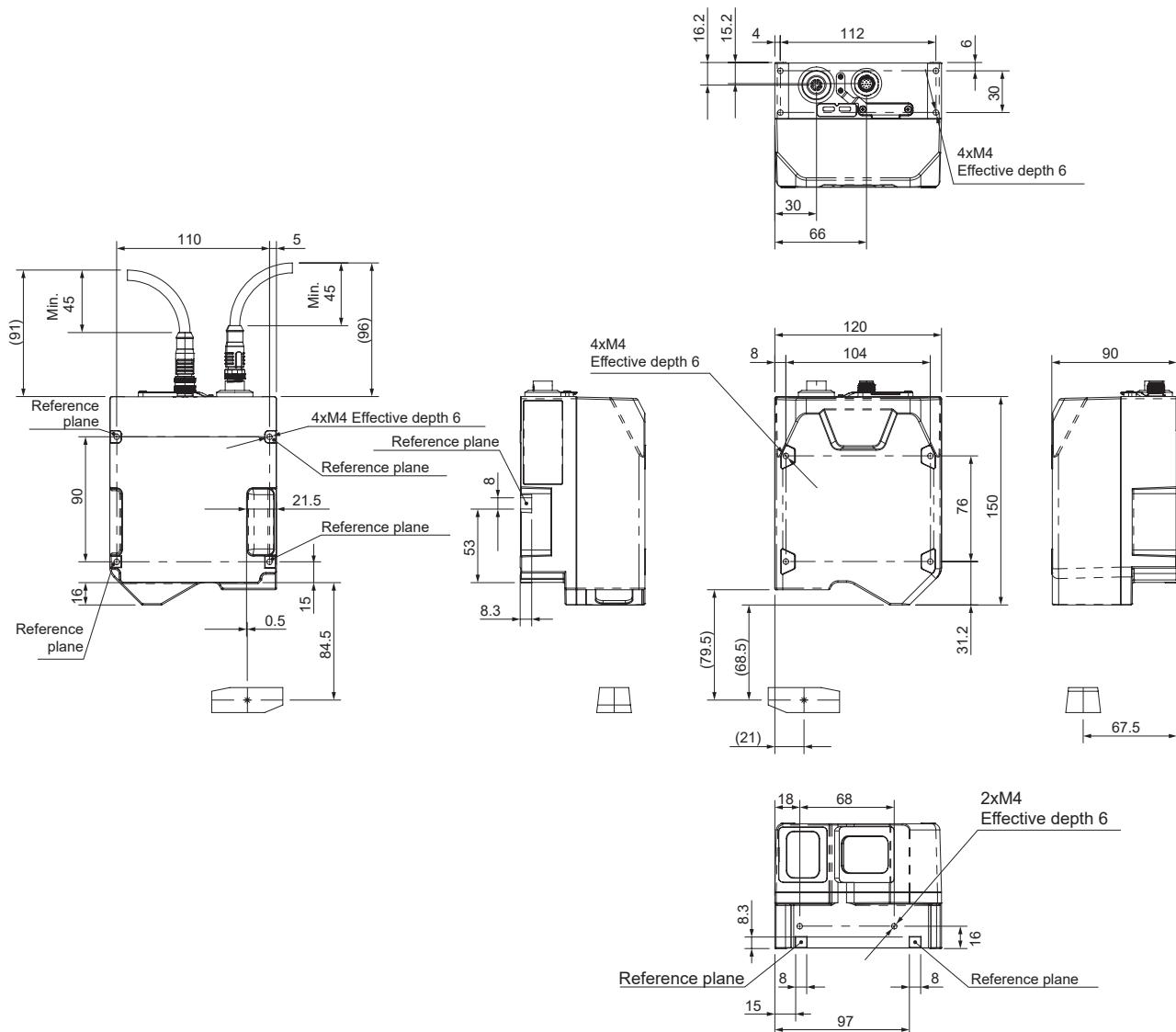
LJ-S015



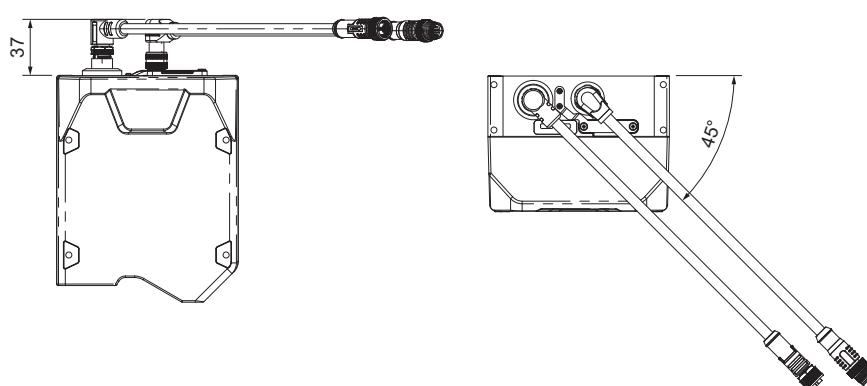
For the reference plane, see □ "Reference plane for the head" (Page 7-20).

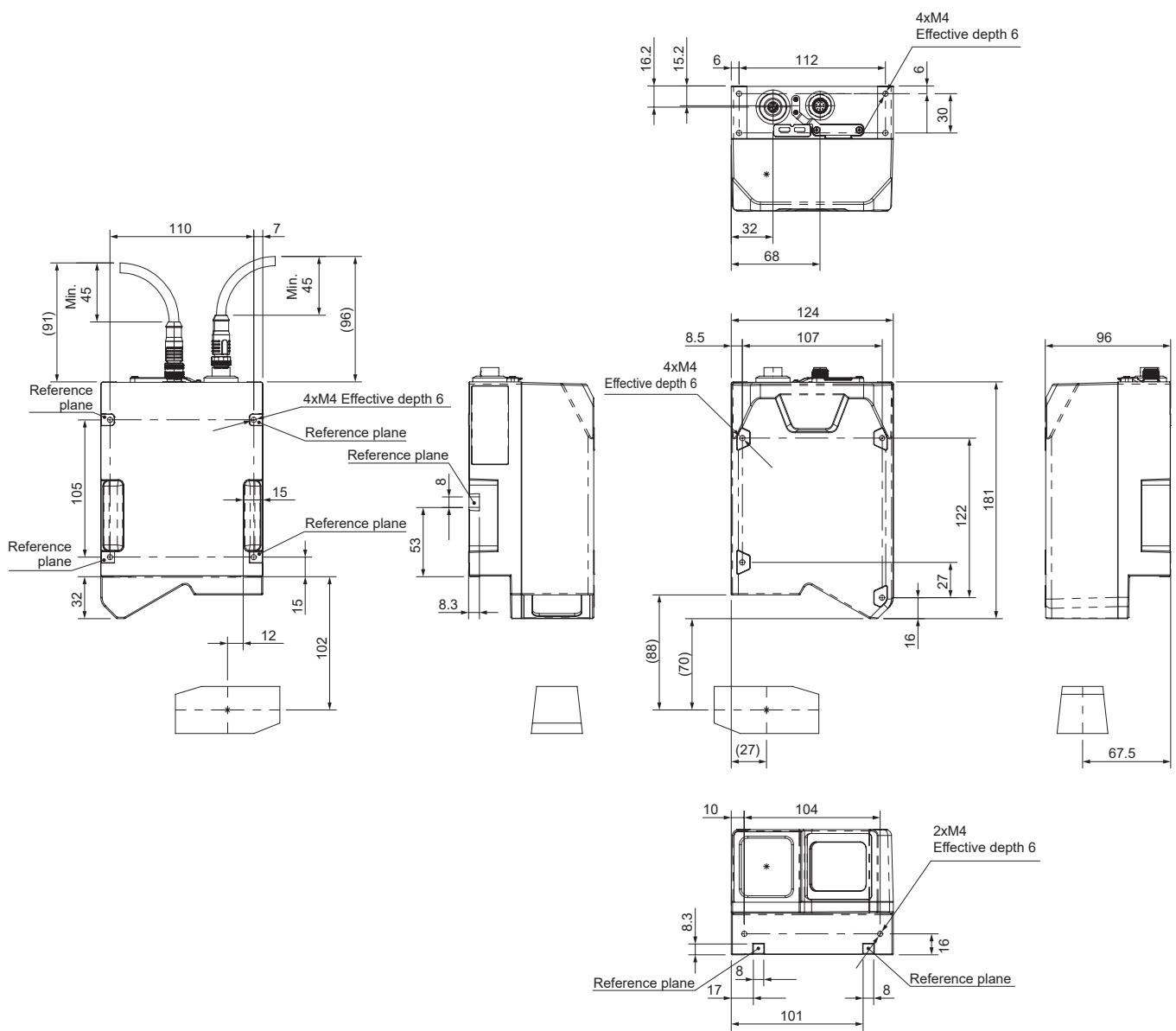
- When using L-shaped Ethernet Cable (OP-88825) and L-shaped Power I/O cable (OP-88826) with sensor head.



LJ-S025

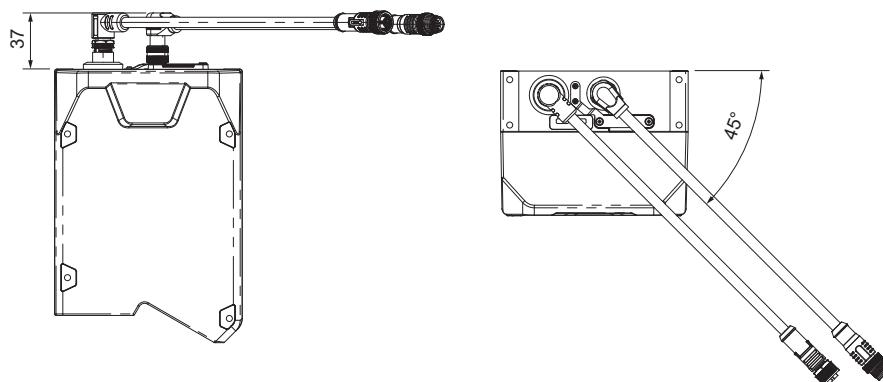
- When using L-shaped Ethernet Cable (OP-88825) and L-shaped Power I/O cable (OP-88826) with sensor head.

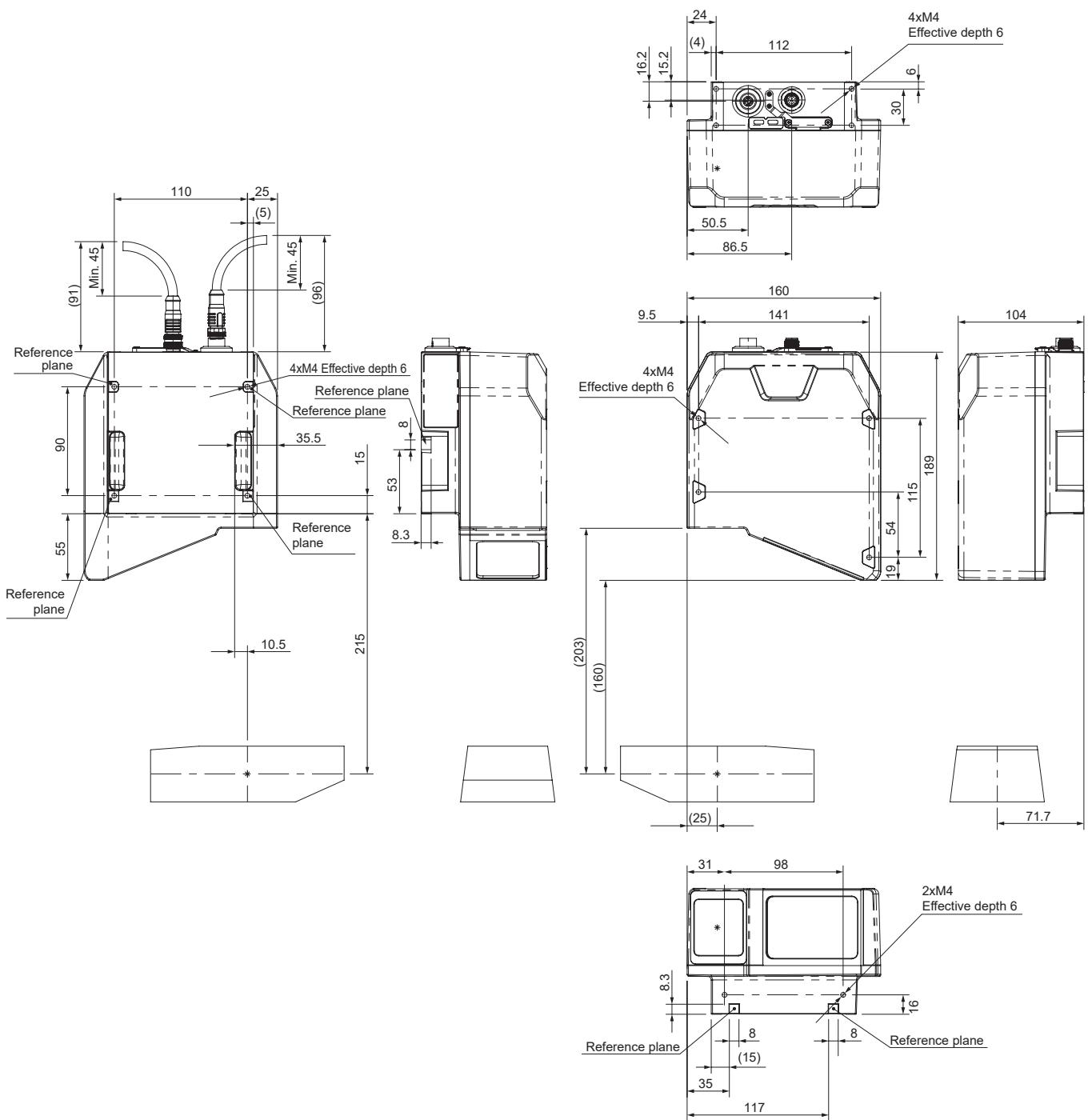


LJ-S040

For the reference plane, see □ "Reference plane for the head" (Page 7-20).

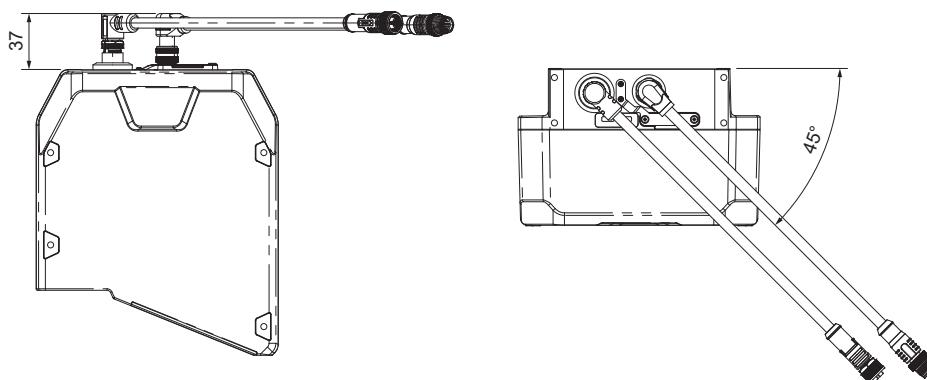
- When using L-shaped Ethernet Cable (OP-88825) and L-shaped Power I/O cable (OP-88826) with sensor head.

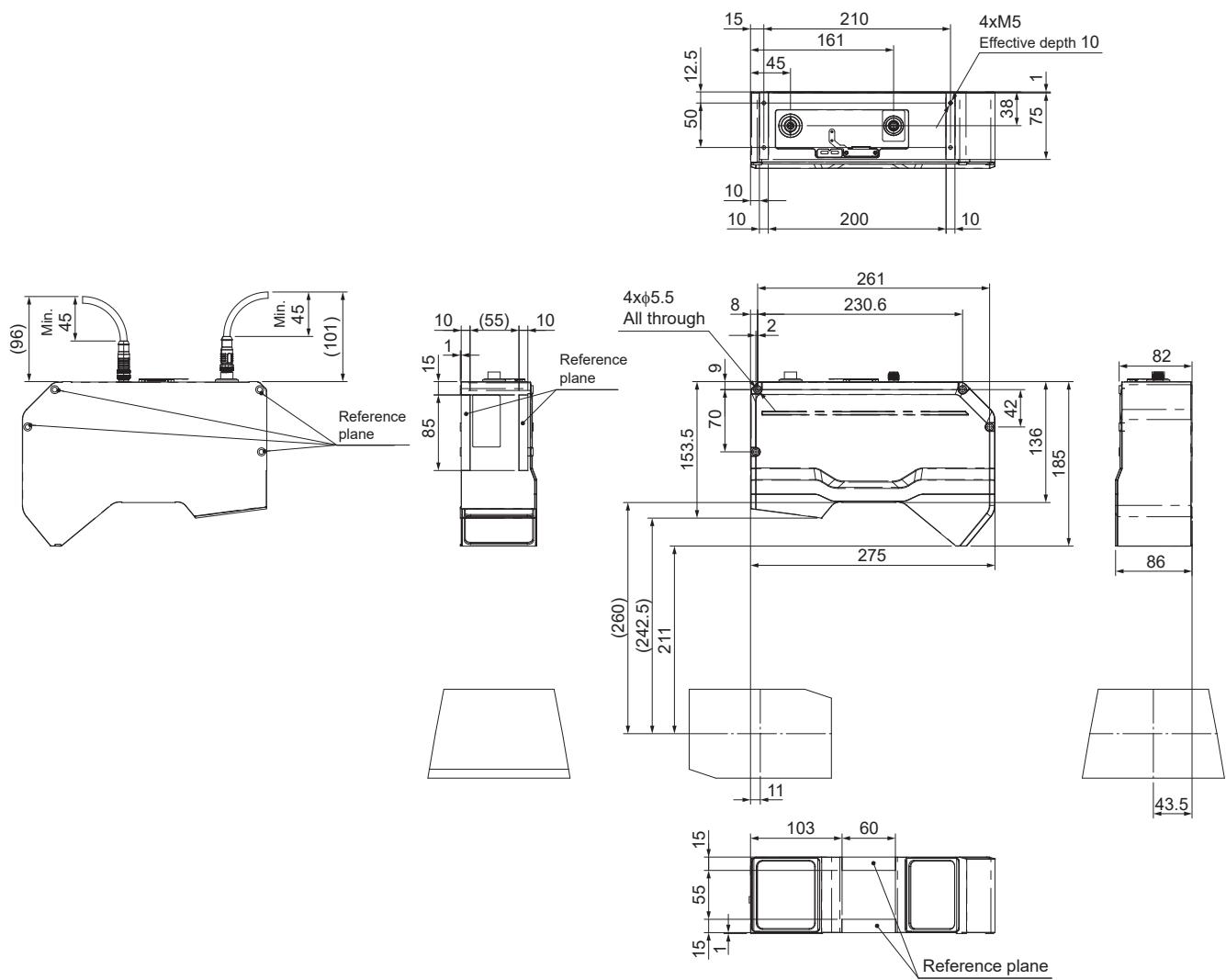


LJ-S800

For the reference plane, see □ "Reference plane for the head" (Page 7-20).

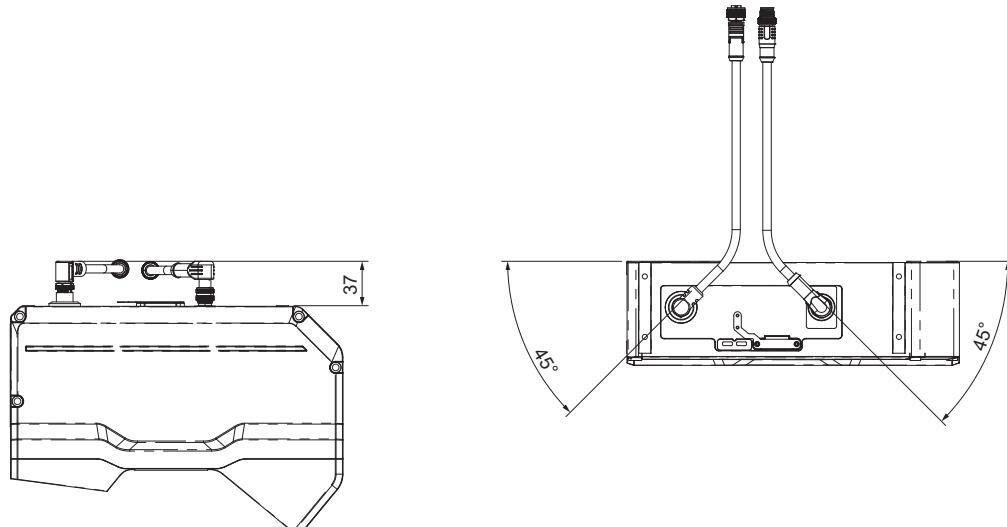
- When using L-shaped Ethernet Cable (OP-88825) and L-shaped Power I/O cable (OP-88826) with sensor head.

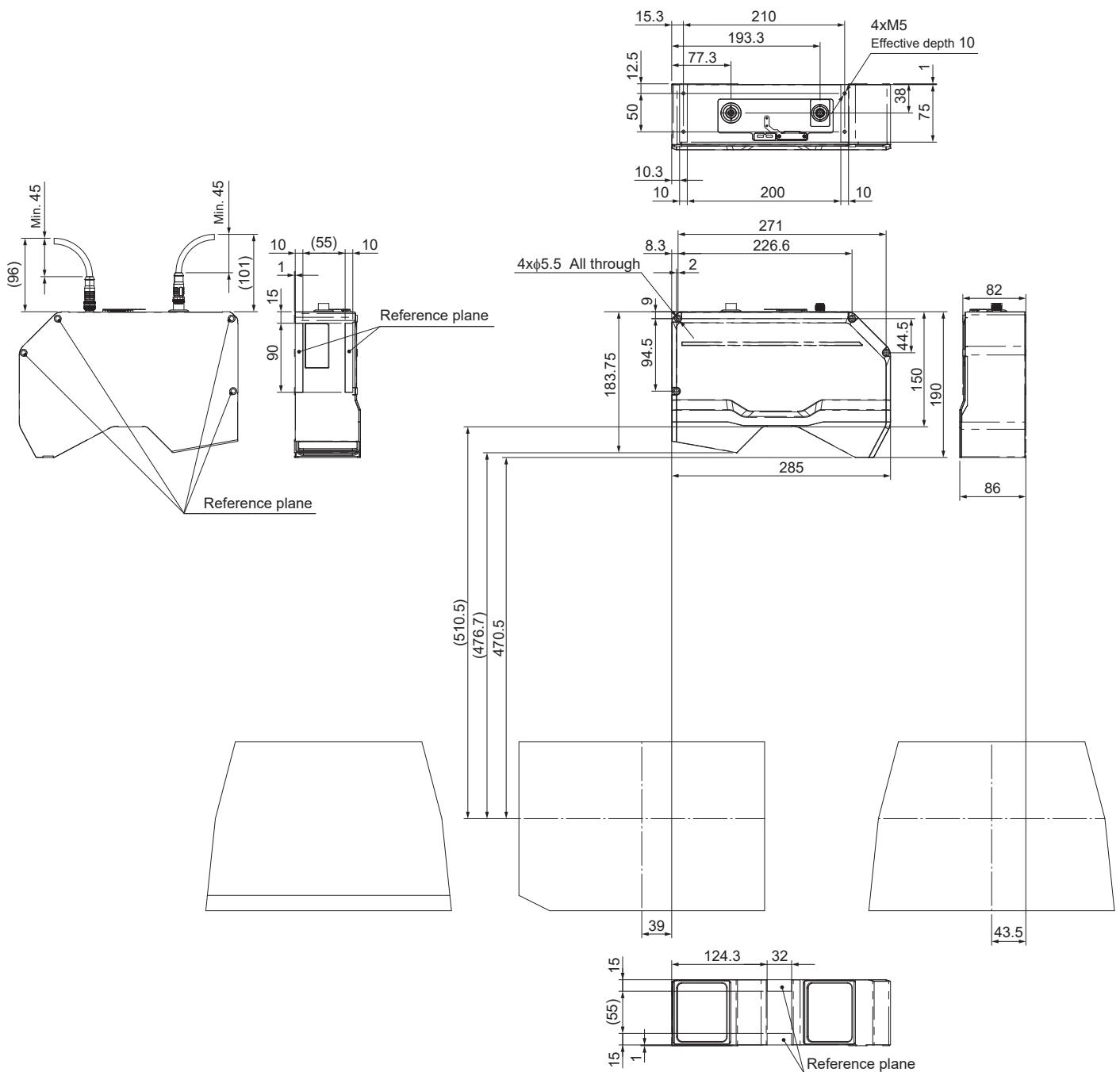


LJ-S160

For the reference plane, see □ "Reference plane for the head" (Page 7-20).

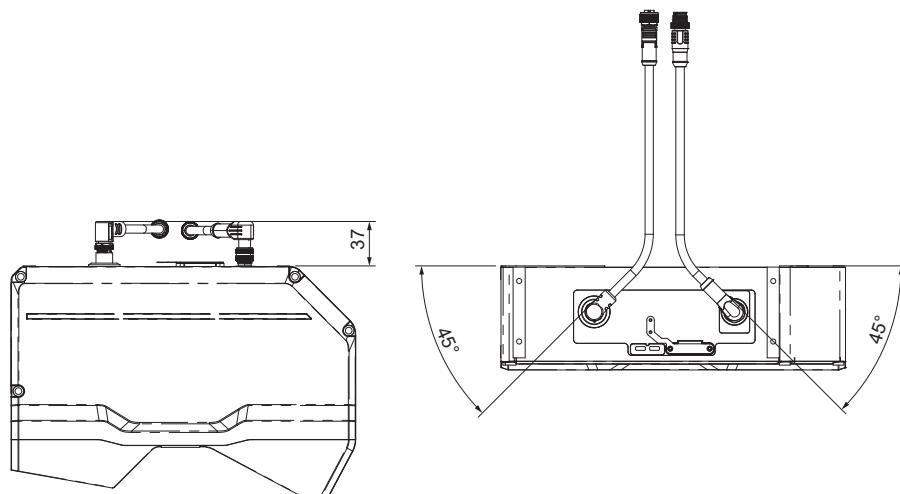
- When using L-shaped Ethernet Cable (OP-88825) and L-shaped Power I/O cable (OP-88826) with sensor head.



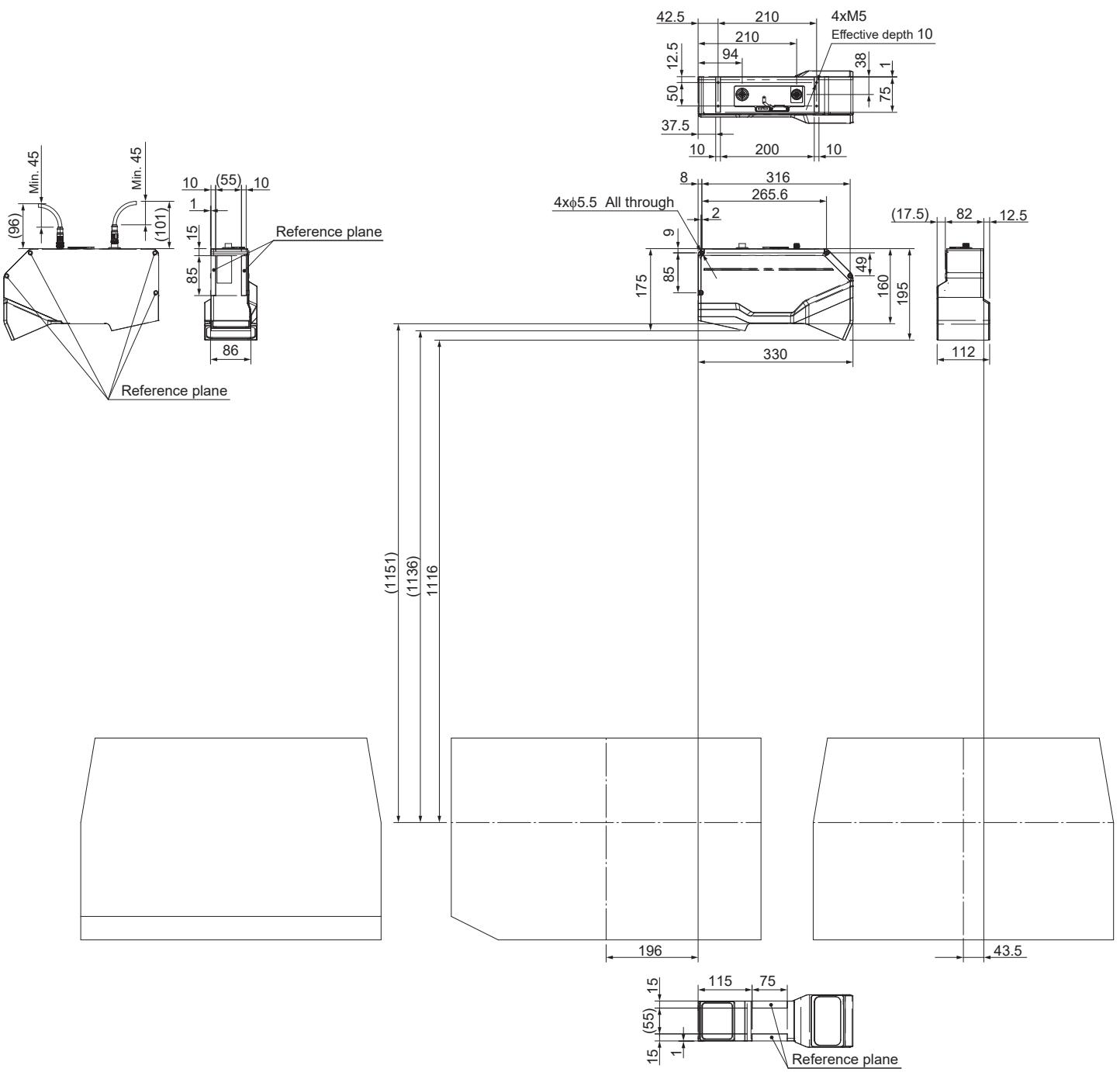
LJ-S320

For the reference plane, see □ "Reference plane for the head" (Page 7-20).

- When using L-shaped Ethernet Cable (OP-88825) and L-shaped Power I/O cable (OP-88826) with sensor head.

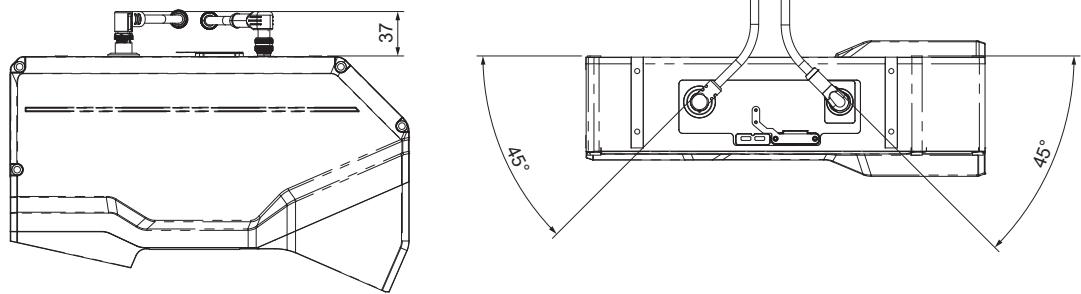


LJ-S640



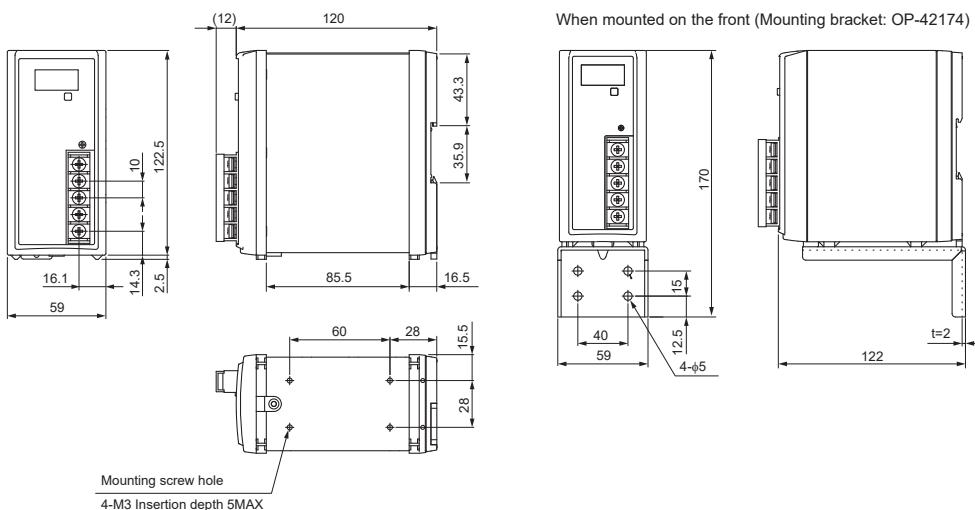
For the reference plane, see  “Reference plane for the head” (Page 7-20).

- When using L-shaped Ethernet Cable (OP-88825) and L-shaped Power I/O cable (OP-88826) with sensor head.

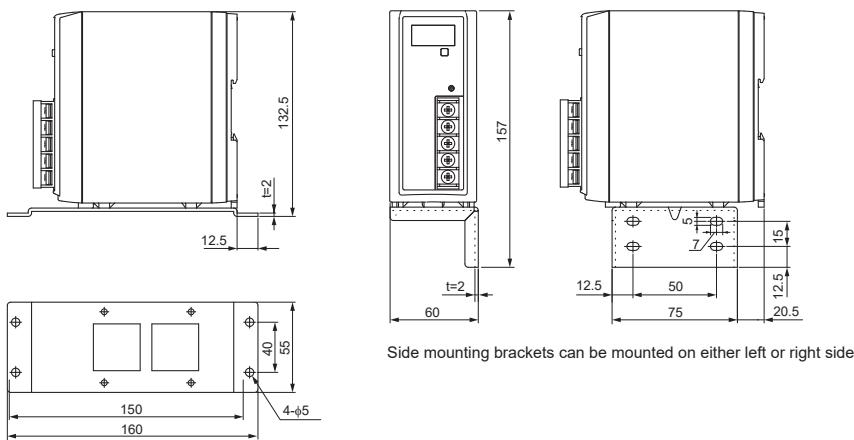


Power supply (CA-U4/U5)

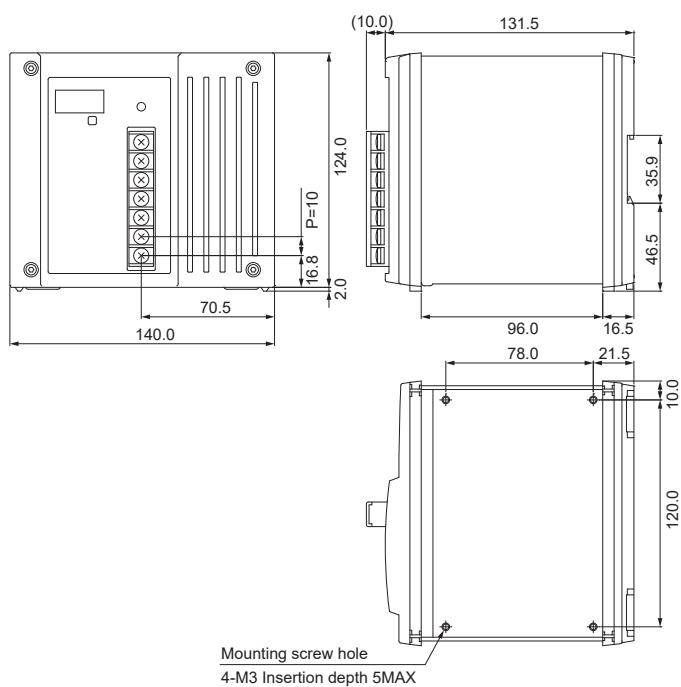
CA-U4



Bottom mounted (Mounting bracket: OP-42175) When installing on the side (Mounting bracket: OP-51629)



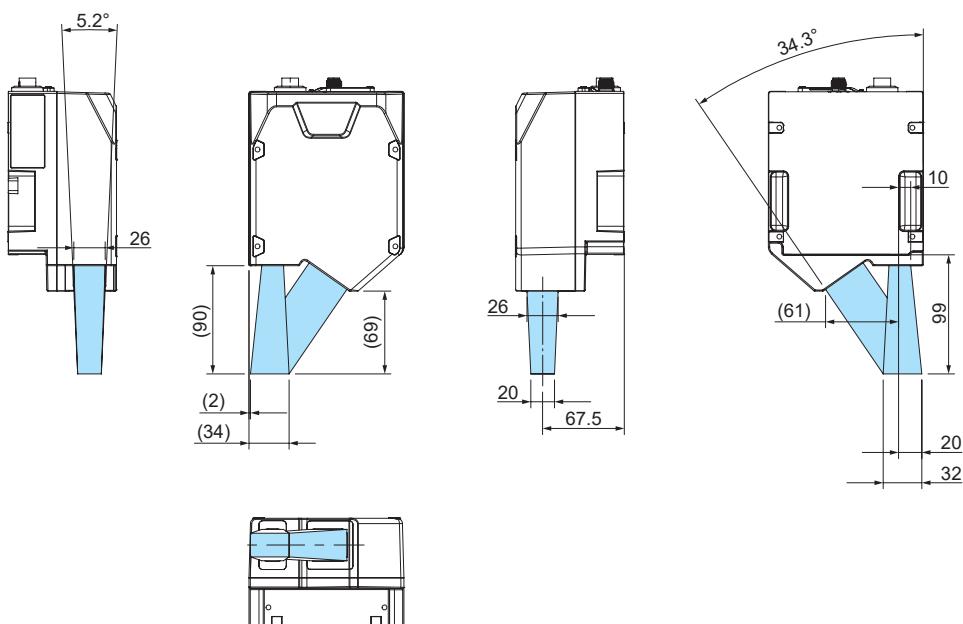
CA-U5



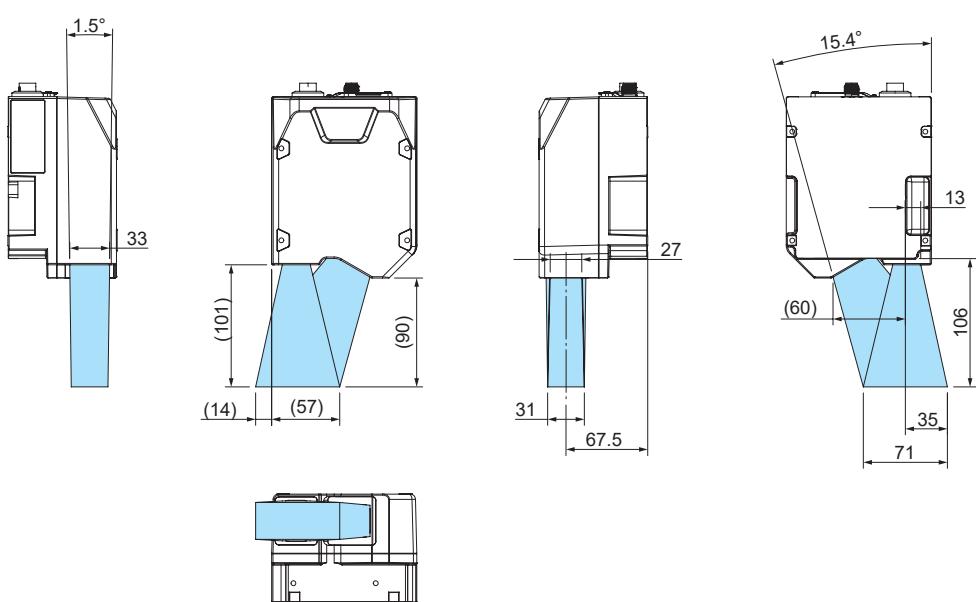
Light-axis range

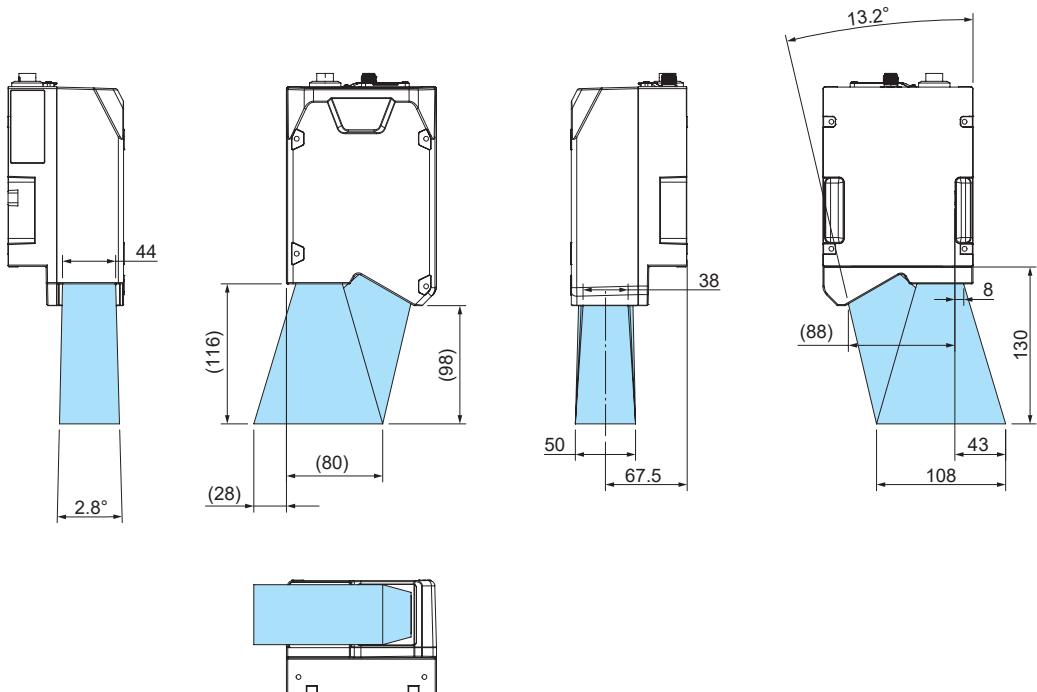
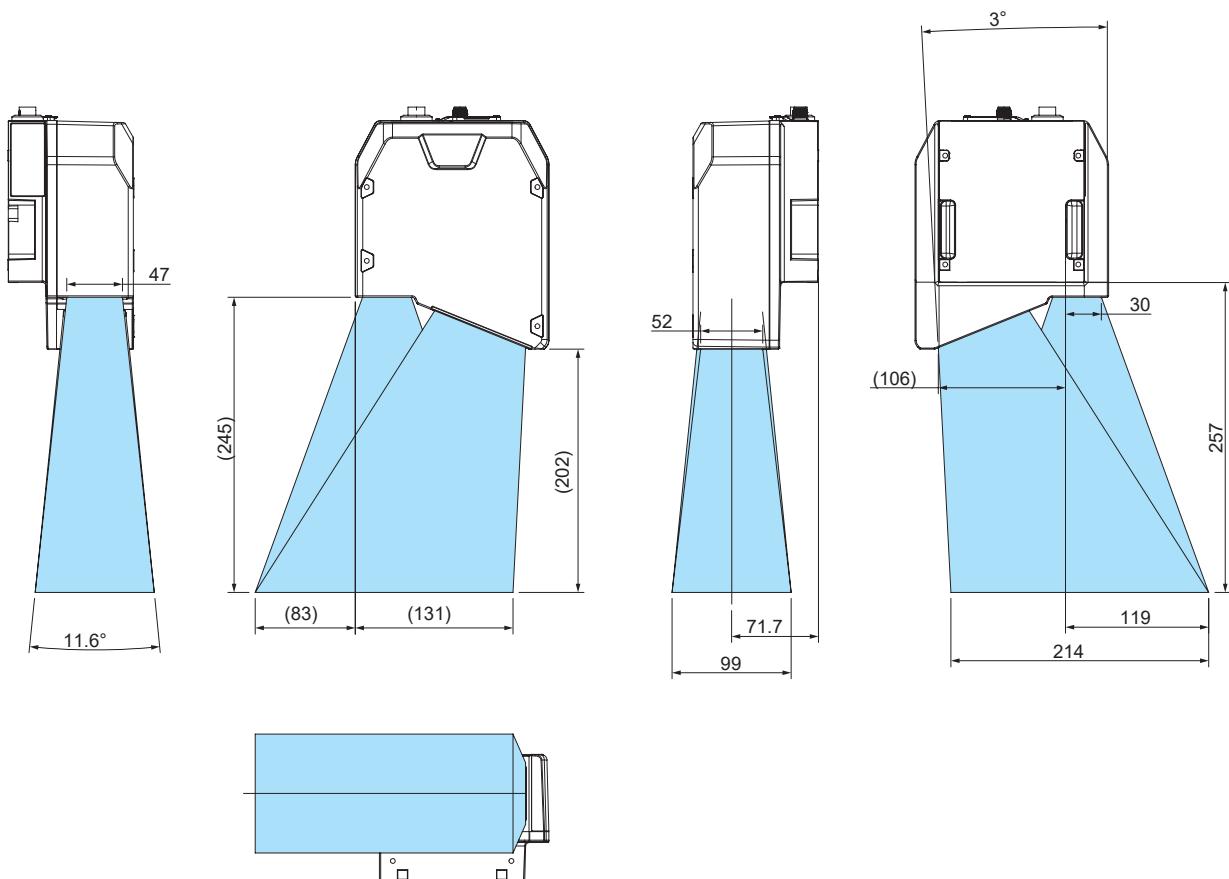
The light-axis range is the range in which measurement is affected by the blockage of the light path.

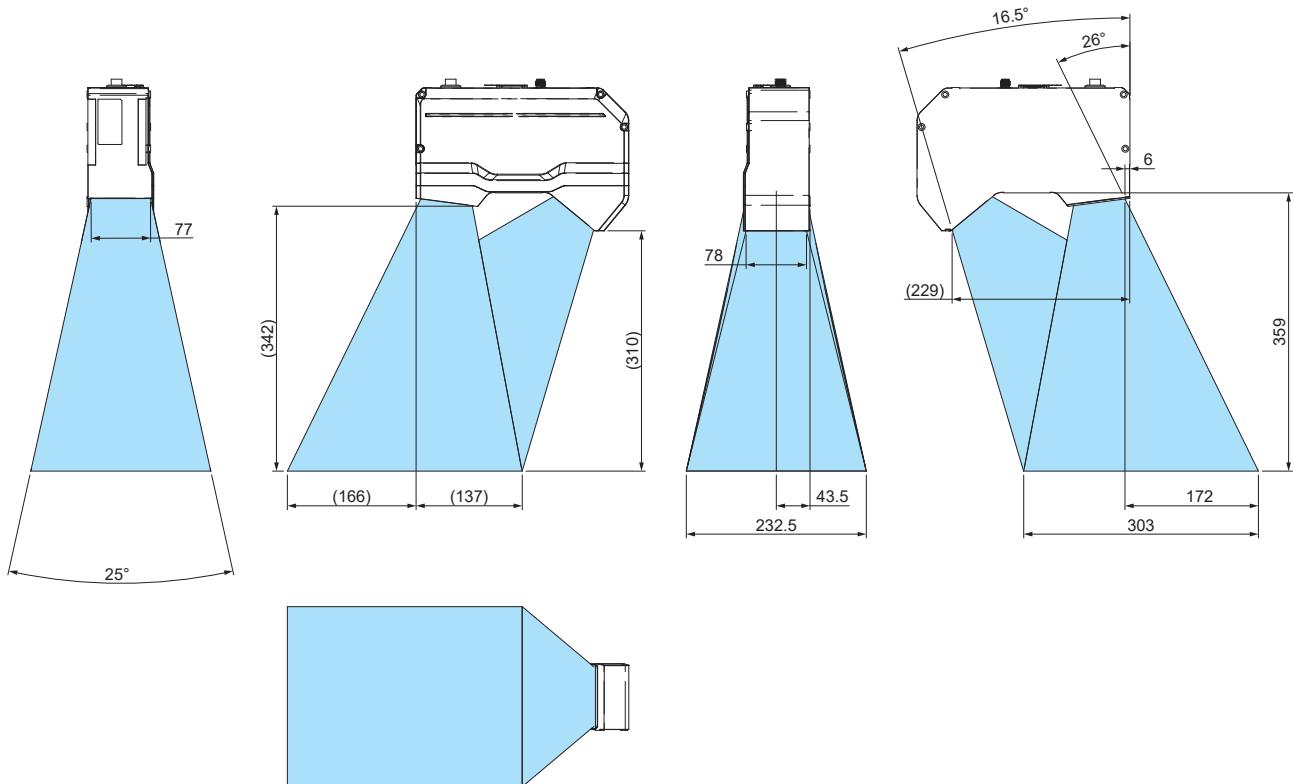
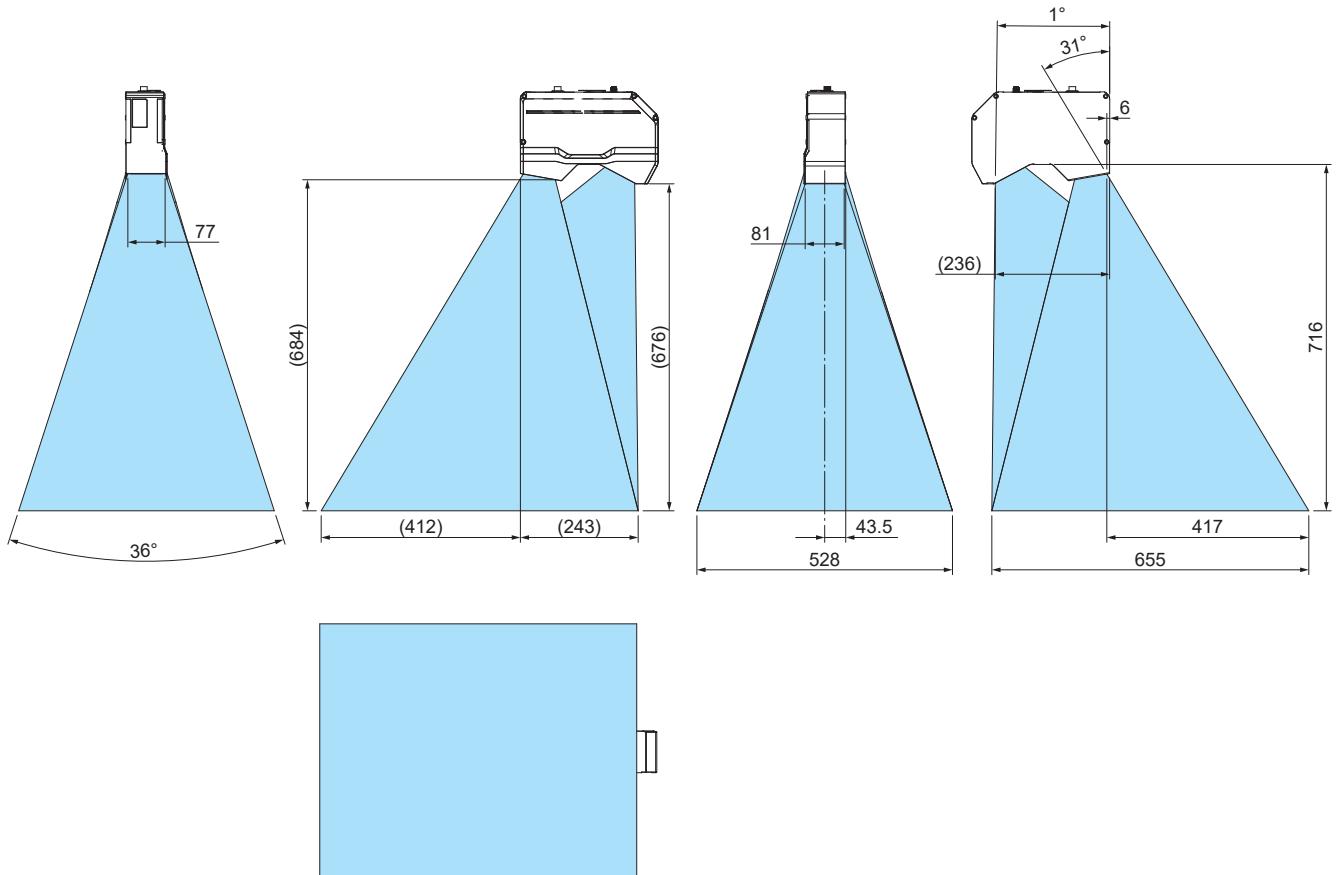
LJ-S015

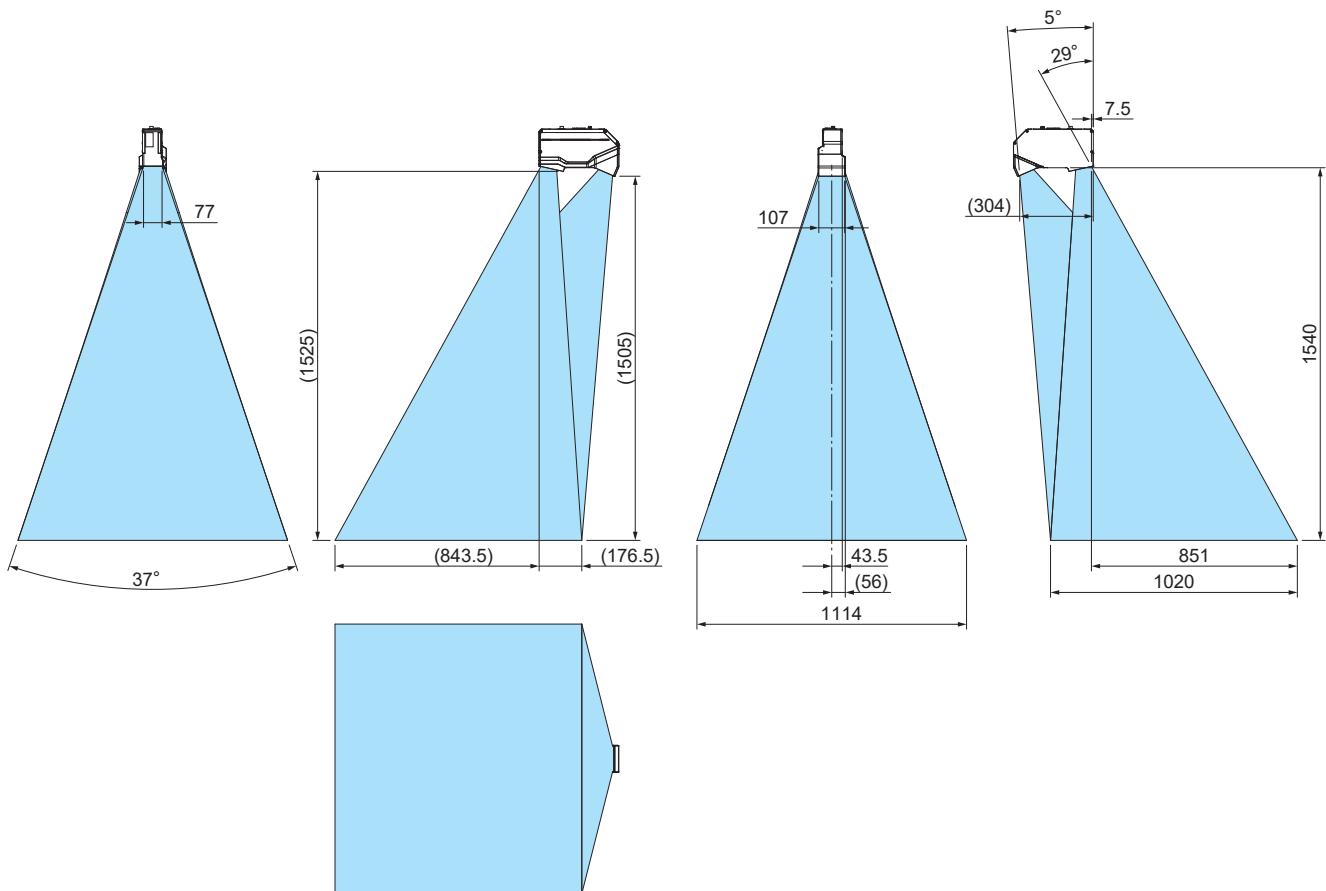


LJ-S025



LJ-S040**LJ-S080**

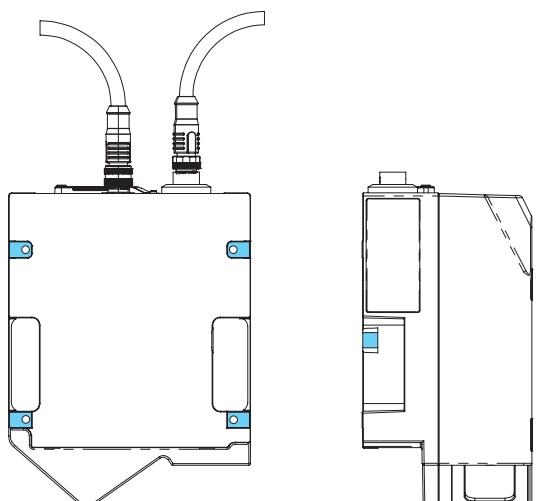
LJ-S160**LJ-S320**

LJ-S640

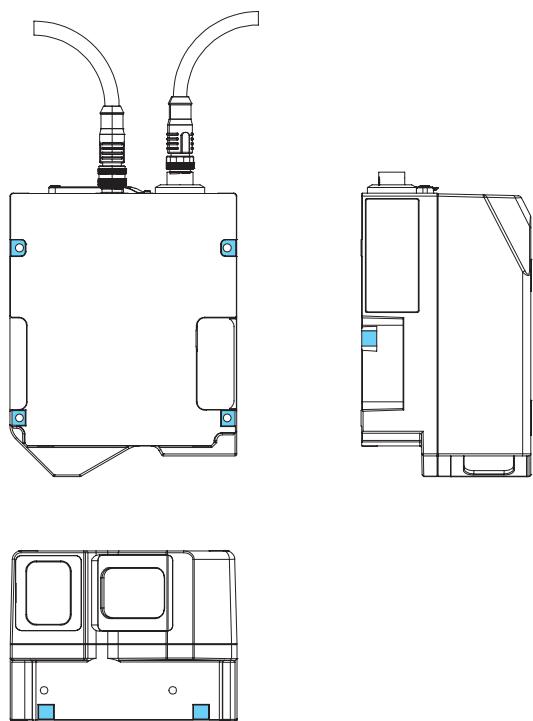
Reference plane for the head

Hatched areas (blue) are standard areas on each surface.

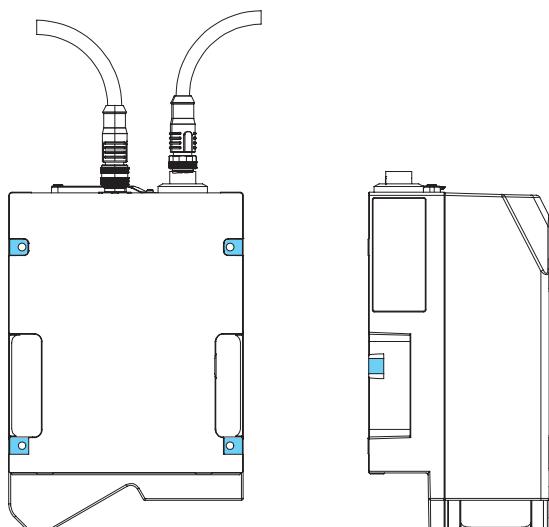
LJ-S015



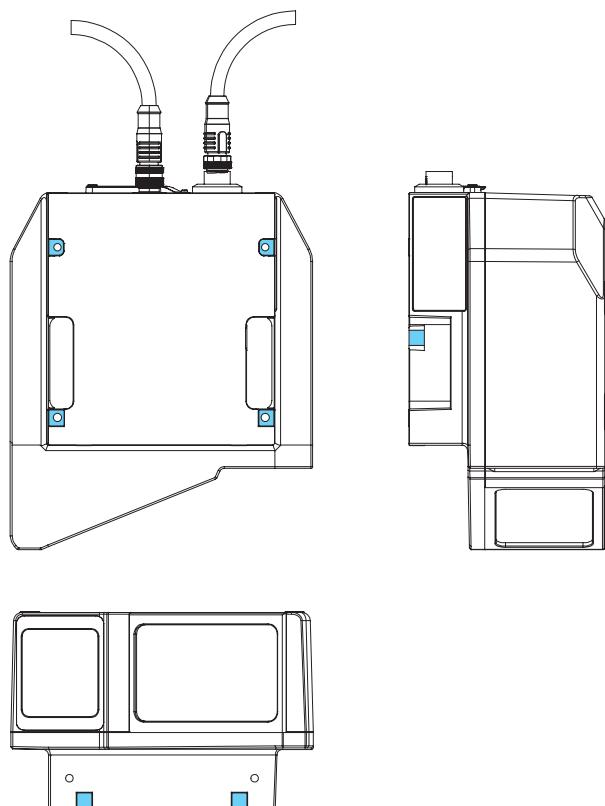
LJ-S025

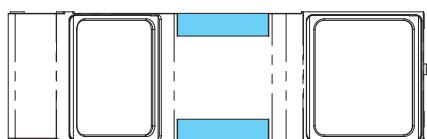
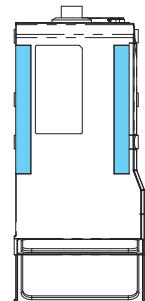
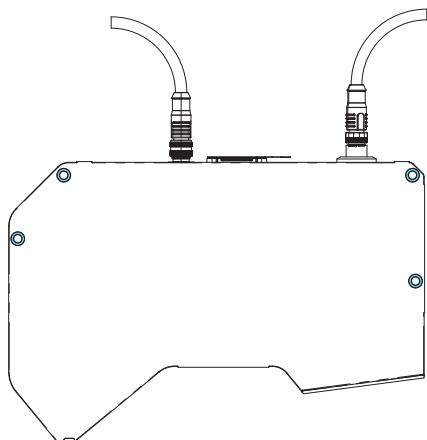
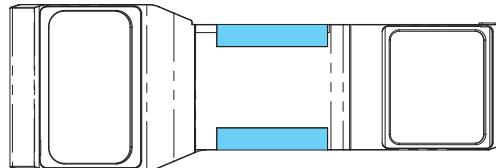
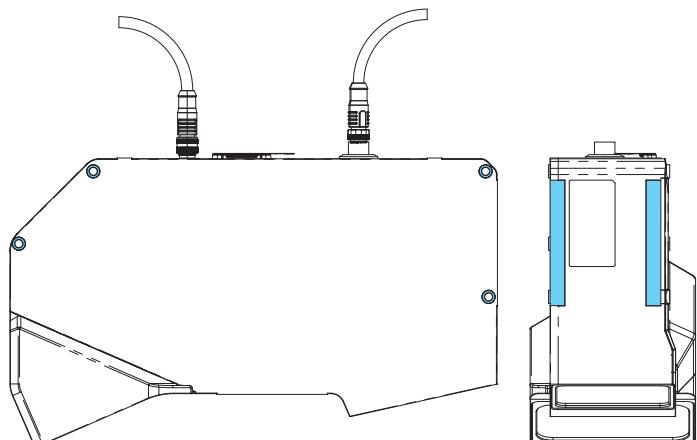
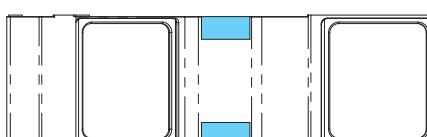
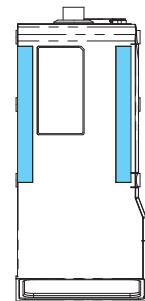
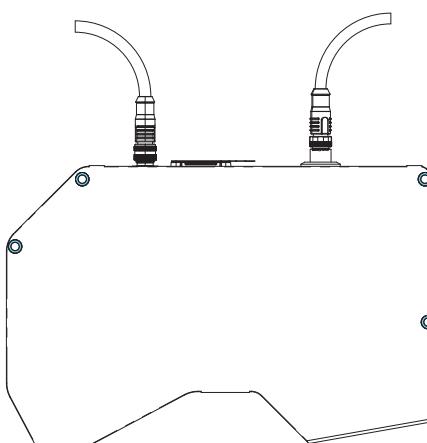


LJ-S040



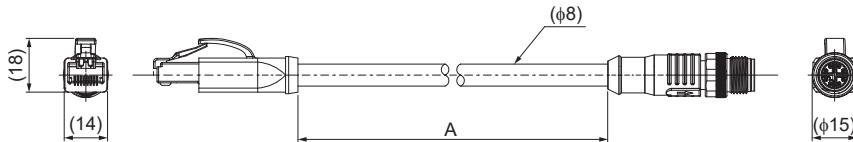
LJ-S080



LJ-S160**LJ-S640****LJ-S320**

Options

Ethernet cable for head (OP-88835/88836/88837)

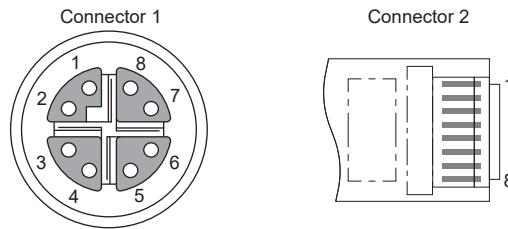


Type name	Cable length (A)	Weight
OP-88835	2m	180g
OP-88836	5m	370g
OP-88837	10m	700g

Cable Specifications

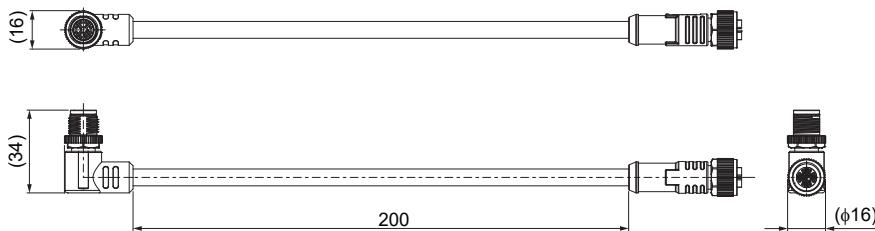
Type		OP-88835/88836/88837
Connector 1	Shape	M12X cord
	Polarity	Plug
	Number of pins	8
Connector 2	Shape	RJ45
	Polarity	Plug
	Number of pins	8
Rated voltage		DC60V
Rated current (average current)		0.6A
Protective structure (when joined)		IP67
Ambient temperature		-25°C to 75°C
Flame resistance		VW-1
AWG diameter		26
Category		Cat5e
Material	Sheath	PVC
	Mold	TPEE
	Connector 1	Brass
	Connector 2	PC
Cable color		Light blue

Pin layout

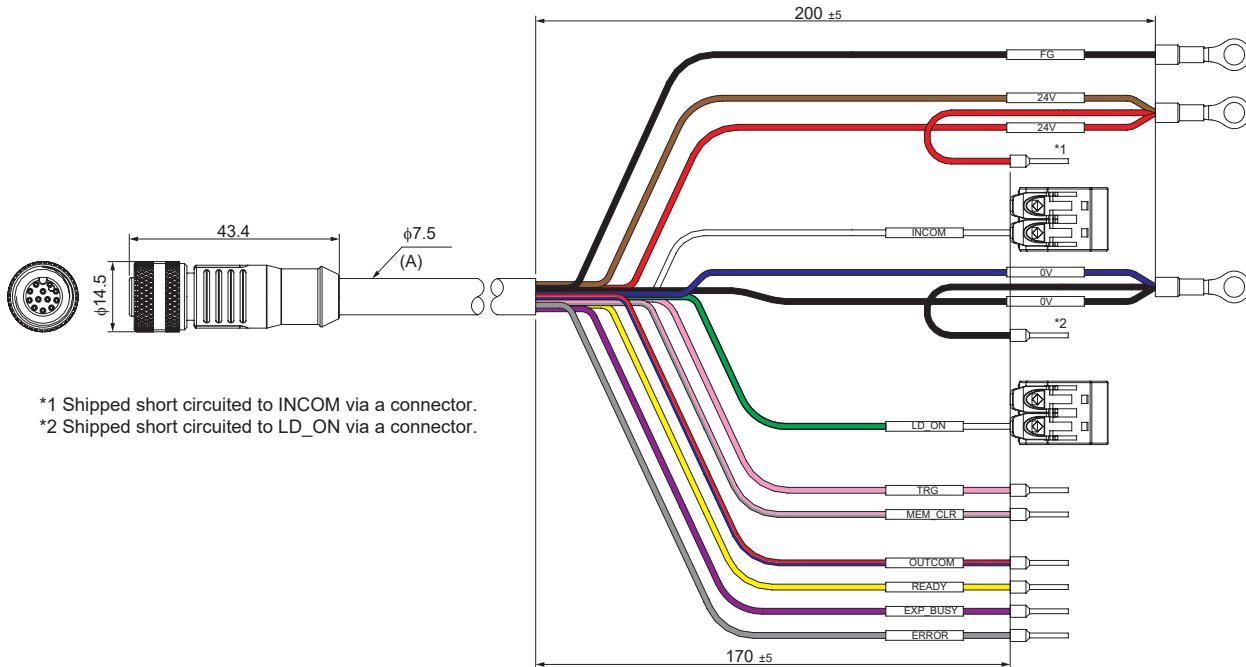


Pin no. of connector 1	AWG	Pin no. of connector 2
1	26	1
2	26	2
3	26	3
4	26	6
5	26	7
6	26	8
7	26	5
8	26	4

Ethernet cable for L-shaped head (OP-88825)



Power I/O cable for head (OP-88949/88950/88951)

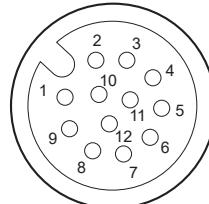


Type name	Cable length (A)	Weight
OP-88949	2m	Approx. 180g
OP-88950	5m	Approx. 430g
OP-88951	10m	Approx. 830g

Cable Specifications

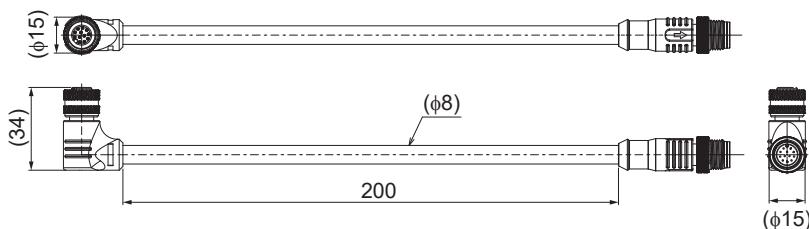
Type		OP-88949/88950/88951
Connector	Shape	M12A cord
	Polarity	Socket
	Number of pins	12
Rated voltage		DC30V
Rated current (average current)		3.2 A (AWG22) / 1.5 A (AWG26)
Protective structure (when joined)		IP67
Ambient temperature		-25°C to 75°C
Flame resistance		VW-1
AWG diameter		22/26
Material	Sheath	PVC
	Mold	TPEE
	Connector	Brass
Cable color		Black

Pin layout



Pin no. of connector 1	Color	AWG
1	Brown	22
2	Blue	22
3	White	26
4	Green	26
5	Pink	26
6	Yellow	26
7	Black	22
8	Gray	26
9	Red	22
10	Purple	26
11	Gray/Pink	26
12	Red/Blue	26

Power I/O cable for L-shaped head (OP-88826)



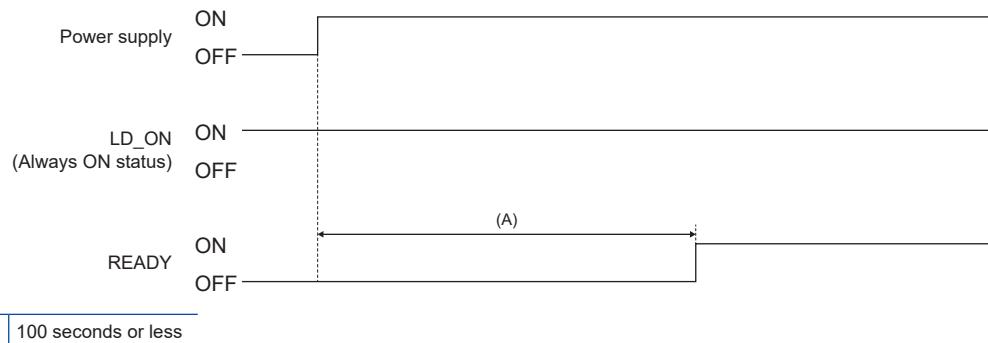
Others

Model name	Description
CA-U4	Ultra-compact switching power supply (6.5 A)
CA-U5	Ultra-compact switching power supply (12.5 A)
OP-88956	OP stand head adjuster
OP-88957	OP stand base panel
OP-88958	OP stand height adjustment block (1 piece)
OP-88959	OP stand height adjustment block (3 pieces)
OP-88960	Mounting Plate A
OP-88961	Mounting Plate B
OP-89041	Mounting Plate C
OP-89042	Mounting Plate D
OP-89040	Mounting rail set

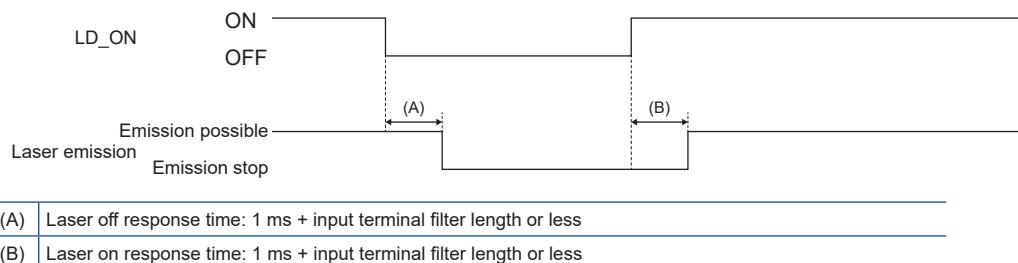
Communication Interface

Timing Chart

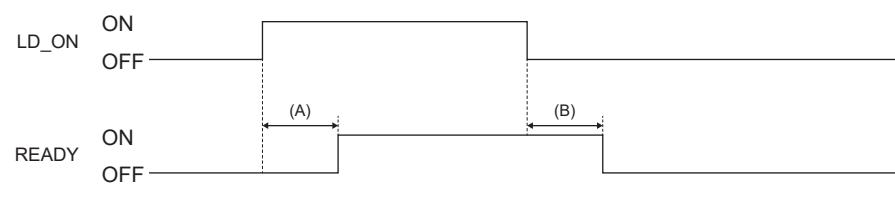
(1) Operations at startup



(2) LD ON terminal operation



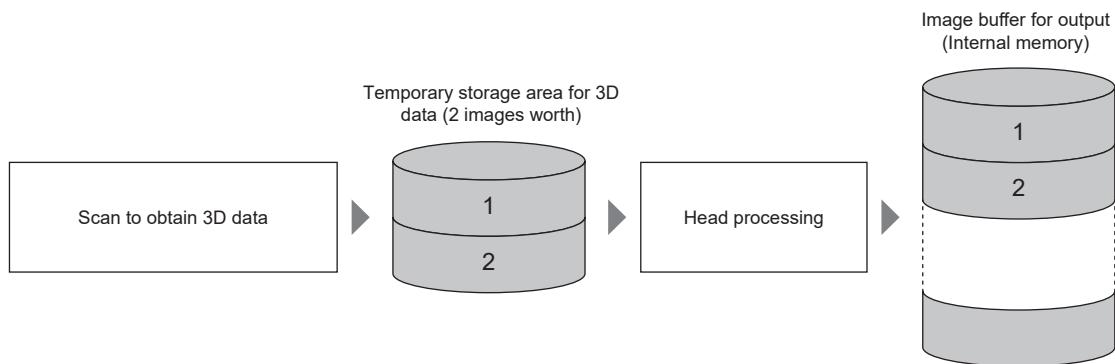
(3) Relationship between LD ON terminal and READY terminal



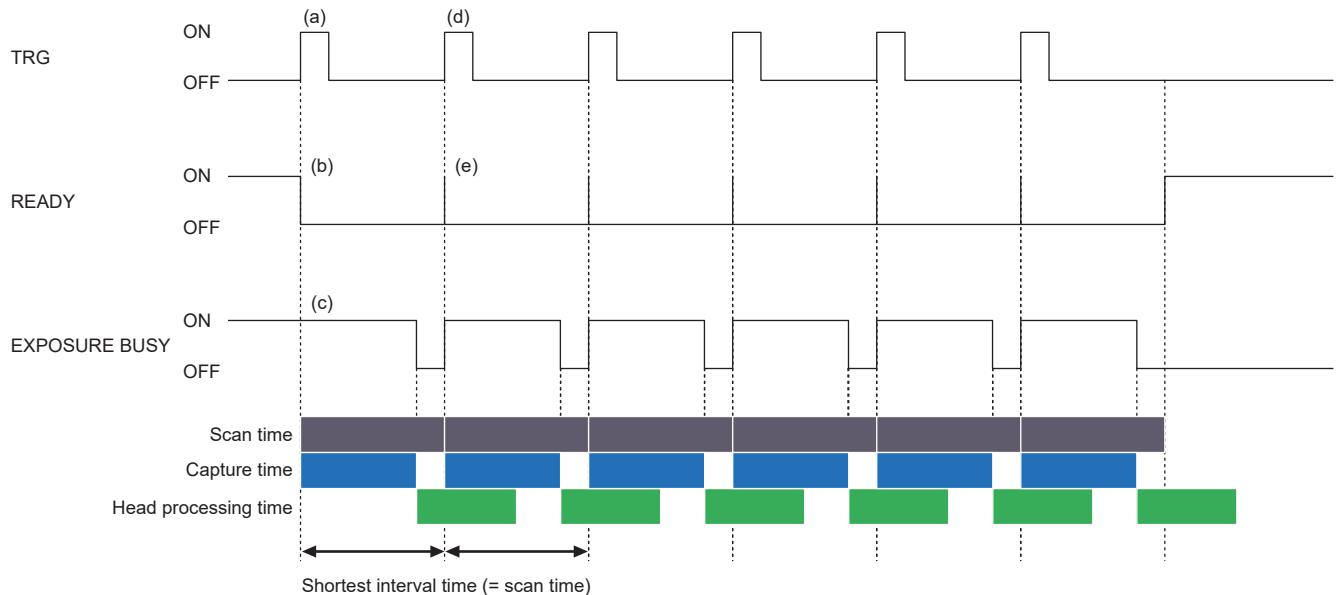
(4) Head internal processing process and chart

The internal optical system of the head scans (operates) with TRG input to continuously acquire (capture) the data that will form the basis of 3D. After the acquired 3D data is corrected inside the head (head processing), it is stored in the image buffer (internal memory) for output.

● Processing process overview

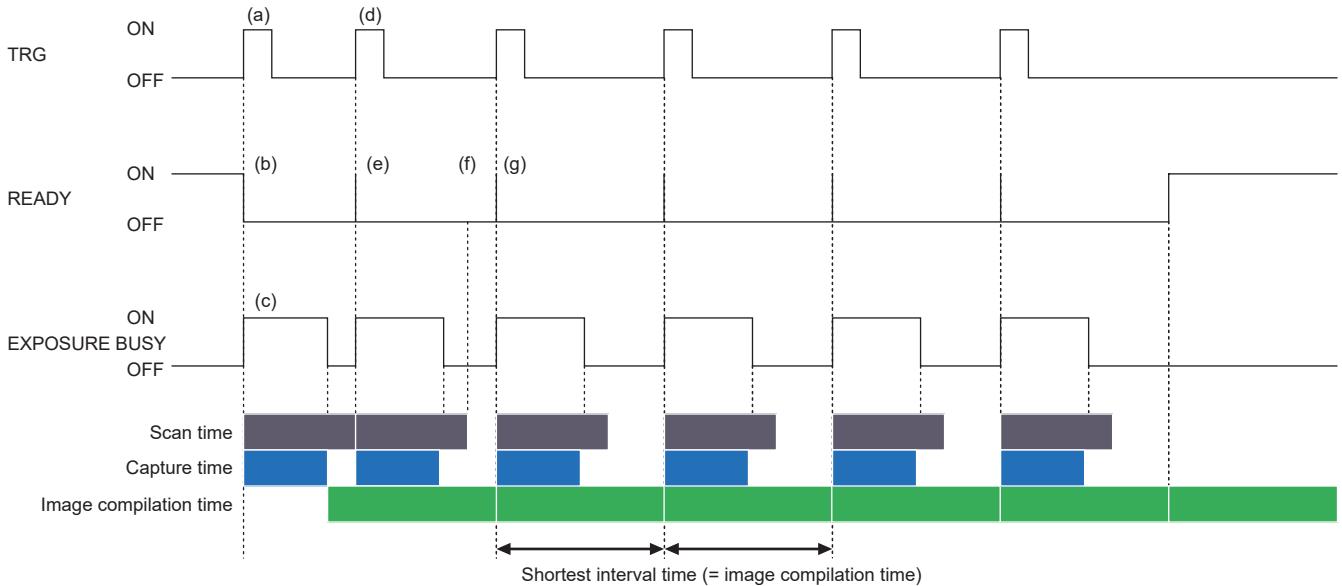


● Example of inputting TRG at the shortest interval with the setting of the scan time \geq image compilation time



(a)	TRG is input when READY is on.
(b)	Scanning starts inside the head and READY turns off. TRG input cannot be accepted when READY is off.
(c)	EXPOSURE_BUSY is kept on during capture. Do not move or vibrate the workpiece during this period.
(d)	During head processing, READY turns ON, the TRG input is accepted, and scanning begins.
(e)	When the trigger is turned on as soon as READY is turned on, capture can be performed at the shortest possible interval. READY is immediately turned OFF.

● Example of inputting TRG at the shortest interval with the setting of the scan time < image compilation time



- | | |
|-----|---|
| (a) | TRG is input when READY is on. |
| (b) | Scanning starts inside the head and READY turns off. TRG input cannot be accepted when READY is off. |
| (c) | EXPOSURE_BUSY is kept on during capture. Do not move or vibrate the workpiece during this period. |
| (d) | During image compilation, READY turns ON, the TRG input is accepted, and scanning begins. |
| (e) | When the trigger is turned on as soon as READY is turned on, capture can be performed at the shortest possible interval. READY is immediately turned OFF. |
| (f) | Scanning is completed, but READY remains off because there is no empty space in the storage area for the data that will be the basis of 3D. |
| (g) | READY turns on when image compilation is completed and there is space in the storage area for the data that will be the basis of 3D. |

Appendix

Error Codes..... A-2

Error Codes

Error Codes

Error Codes	Description	Cause	Remedy
0X0001 - 0x0052 0x0057 - 0x005D 0x00C1 - 0x00C8 0x00CA - 0x00CB 0x00CE - 0x00CF 0x00D1 - 0x00D2 0x00D4 - 0x00D5 0x00D7 - 0x00D8 0x00DB - 0x00DE 0x00E1 - 0x00E4 0x00E6 - 0x00EA	There is an abnormality in the internal device of head.	The internal device of the head may be malfunctioning.	If the device does not operate properly after the power is turned on again, contact your nearest KEYENCE office.
0x0053 - 0x0056	There is a head temperature abnormality.	The head ambient temperature may be high.	Please check the head ambient temperature.
		The internal device of the head may be malfunctioning.	If the device does not operate properly after the power is turned on again, contact your nearest KEYENCE office.
0x00C9 0x00D3	There was an update error.	The update has not been completed successfully due to power failure during the head firmware update process or the like.	Please update the head firmware again.
0x00CC	There is an error in the setting data.	<ul style="list-style-type: none"> • Data saved in the head internal memory could not be loaded. • The data saved on the µSD card, which is built into the head, could not be loaded. 	<ul style="list-style-type: none"> • It is possible to clear the error by following the message displayed in LJ-S Navigator. Once the error has been cleared, the unit will operate with the factory default settings. • When this error occurs, the head operates with the default IP address (192.168.0.1). • Check that the card has been correctly inserted. • When this error occurs, the head operates with the default IP address (192.168.0.1). • It is possible to clear the error by following the message displayed in LJ-S Navigator. • Once the error has been cleared, the unit will operate with the factory default settings.
0x00EB	Configuration data does not correspond to the current head version.	The head firmware update may have caused the configuration data to become unsupported.	<ul style="list-style-type: none"> • It is possible to clear the error by following the message displayed in LJ-S Navigator. • If this occurs after sending settings from LJ-S Navigator, update to the latest head firmware and LJ-S Navigator. • Once the error has been cleared, the unit will operate with the factory default settings with the exception of the IP address and other communication settings.

- When an error occurs, the error output (Normal close) will become ON.
- If an error code other than the above appears, contact your nearest KEYENCE office.

Revision history

Revision history	Edition number	Revision details
June 2024	Official release	
December 2024	Revised 1st edition	

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