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KEYENCE

MLJ04GB

Ultra-High Speed In-line Profilometer

LJ-V7000 Series

User's Manual

Read this manual before use.
After you read this manual, keep it in a safe place for future reference.



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Introduction

Be sure to read this user's manual before use.
After you read this manual, keep it in a safe place for future reference.

Symbols

In this manual, the following symbols alert you to important messages.
Be sure to read the messages.

DANGER	**It indicates a hazardous situation which, if not avoided, will result in death or serious injury.**
WARNING	**It indicates a hazardous situation which, if not avoided, could result in death or serious injury.**
CAUTION	**It indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.**
NOTICE	**It indicates a situation which, if not avoided, could result in product damage as well as property damage.**

Important **It indicates cautions and limitations that must be followed during operation.**

Point **It indicates additional information on proper operation.**

Reference It indicates tips for better understanding or useful information.

It indicates the reference pages and items in this manual.

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 question, 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.

Safety Information for LJ-V7000 Series

General Precautions

DANGER	• **Do not use this product for the purpose to protect a human body or part of a human body.** • **This product is not intended for use as an explosion-proof product. Do not use this product in a hazardous location and/or potentially explosive atmosphere.**

CAUTION	• **At startup and during operation, be sure to monitor the functions and performance of the LJ-V7000 Series.** • **We recommend that you take substantial safety measures to avoid any damage in the event of a problem occurring.** • **Do not allow the temperature to change sharply around the LJ-V7000 Series, including the accessories. Otherwise, condensation may lead to malfunction.**

NOTICE	• **Do not attempt to open or modify the LJ-V7000 Series or use it in any way other than as described in the specifications. If the LJ-V7000 Series is modified or used other than as described, the warranty will be voided.** • **When the LJ-V7000 Series is used in combination with other devices, functions and performance may be degraded, depending on the operating conditions and surrounding environment.**

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Important Instructions

Observe the following cautions to prevent malfunction of the LJ-V7000 series and to ensure that it is used properly.

Precautions for use

WARNING	• Use this instrument at the correct supply voltage. Failure to do so may cause fire, electric shock, or a product damage. • Do not disassemble or modify this instrument. Doing so may cause fire and electric shock.

CAUTION	Attach the head to a metal plate for use. The head surface temperature may increase, which may cause burn injuries.

NOTICE	• The power of this instrument and peripherals connected to this instrument must be turned off when the head cable is plugged or unplugged. Failure to do so may cause product damage.
	• Do not connect and disconnect the display unit and the controller while the power is on. Failure to do so may cause a product damage.
	• Do not turn off this instrument while this instrument is writing data to memory such as when settings are being modified. Failure to do so may cause loss of a part of or all of the setting data.
	• Do not block the vent holes on the instrument. Increase of internal temperature could cause failure.
	• The USB connector and a part of the input/output terminals are not insulated from the DC24V (-) terminal. Exercise caution not to produce a potential difference between the non-insulated terminals due to a positive grounding environment or a potential difference between the equipment. Otherwise, it may cause a malfunction in the LJ-V7000 Series or a malfunction in the connected computer or other external device.
	“Insulated condition between each I/O circuit” (Page 11-19)
	• We recommend backing up the settings with LJ-Navigator2 in case there are problems with the device.
	• A change in the ambient temperature may cause the measurement to fluctuate. Be sure to keep the temperature stabilized. When the ambient temperature changes by 10 °C, it takes 60 minutes for the distribution of internal temperature to equalize.
	• Wait approximately 30 minutes after the power is turned on before using the LJ-V7000 Series. Otherwise, the measured value may gradually fluctuate because the circuit is not immediately stable after the power is turned on.
	• 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.
	• When the target is vibrating, the measured value may fluctuate. In this case, increase the averaging of the profiles and the measurement averaging to achieve a more accurate value.
	• In this case, take the following countermeasures.
	  • Enclose the measurement area with an appropriate enclosure.
	  • Agitate the air between the measurement point and the workpiece more strongly with a fan.

Precautions in Emergency

CAUTION	**Turn the power off immediately in the following cases. Using the unit in an abnormal condition could cause fire, electric shock, or accident.** **Contact the KEYENCE office for repair.** **• If liquid, including water or chemicals, or debris enters the unit.** **• If the unit is dropped or the case is damaged.** **• If abnormal smoke or odor is present.**

Precautions on Installation

NOTICE	**• To use this instrument correctly and safely, avoid installing it in the following locations. Installation in such locations may cause malfunction.** **• Locations that are humid, dusty or poorly ventilated** **• Locations where the temperature is high such as those exposed to direct sunlight** **• Locations where there are flammable or corrosive gases** **• Locations where the unit may be subject to vibration or impact** **• Locations where water, oil, or chemicals may splash onto the instrument** **• Locations that are prone to static electricity** **• Installing the instrument in the vicinity of an electrical noise source such as a power source and high-voltage line could cause malfunction and instrument damage due to noise. Take preventive actions such as using noise filters, separating cables, and insulating the controller and the head. Use single-conductor shielded cable for the analog output cable.** **In the following cases, foreign matter such as dust and debris or water and oil could cause differences in the measurement values.** **• Adhesion on the protective glass: Blow the dirt off with clean air. If dirt persists, wipe the glass surface gently using a soft cloth moistened with alcohol.** **• Adhesion on the surface of the measuring target: Blow the dirt off with clean air or wipe it off.** **• 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.**

Precautions in storing

NOTICE	**Do not wipe the instrument with a wet wipe, benzine, or thinner. Doing so could change the color or shape of the instrument. If the instrument has a large amount of dirt on it, wipe it off with a cloth moistened with a mild detergent, then wipe with a soft dry cloth.**

Precautions on Regulations and Standards

CE Marking

Keyence Corporation has confirmed that this product complies with the essential requirements of the applicable EC Directive, based on the following specifications. Be sure to consider the following specifications when using this product in the Member States of European Union.

● **EMC Directive**

- Applicable standard EN61326-1, Class A
- All cables used for power, communication or other functions must be less than or equal to 30m.
- Use the Ethernet cable compatible with the category 7 or upper or those compatible with 10GBASE-T.
- For the head cable and extension cable, wind the cable around the following ferrite core (an accessory of the controller) once or more at the position 200mm or less from the head connector of the controller.
  Type: ZCAT2035-0930A-BK (TDK)

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

Safety precautions on laser product

The LJ-V7000 Series are classified as follows:

Models		LJ-V7020K	LJ-V7020	LJ-V7060K	LJ-V7060	LJ-V7080	LJ-V7200	LJ-V7300
Wavelength		405nm						
IEC60825-1, FDA (CDRH) Part 1040.10 *	Output	10mW	10mW	4.8mW	10mW	4.8mW	4.8mW	4.8mW
	Laser class	Class 2M	Class 2M	Class 2	Class 2M	Class 2	Class 2	Class 2

* The laser classification for FDA(CDRH) is implemented based on IEC60825-1 in accordance with the requirements of Laser Notice No. 50.

⚠ WARNING	• **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.** **Precautions on Class 2M Laser Product** • **Do not stare into the direct or specularly reflected beam.** • **Do not direct the beam at other people or into areas where other people might be present.** • **Be careful 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 as 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 the telescopic optical instruments may pose an eye hazard.** **Precautions on Class 2 Laser Product** • **Do not stare into the direct or specularly reflected beam.** • **Do not direct the beam at people or into areas where people might be present.** • **Be careful 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 as the same height as that of human eye.** • **Do not disassemble this product. Laser emission from this product is not automatically stopped when it is disassembled.**

Functions for safety use

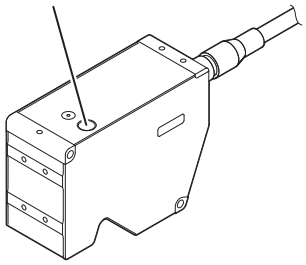
The LJ-V7000 Series are equipped with the following laser safety features.

● **Laser radiation LED**

Lights or flashes while the LJ-V7000 Series device is in operation.

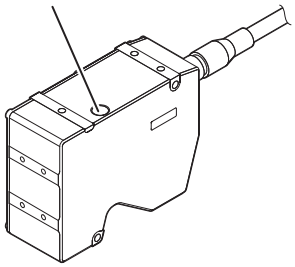
LJ-V7020/LJ-V7020K

Laser radiation LED



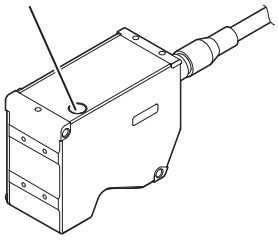
LJ-V7060/LJ-V7060K

Laser radiation LED



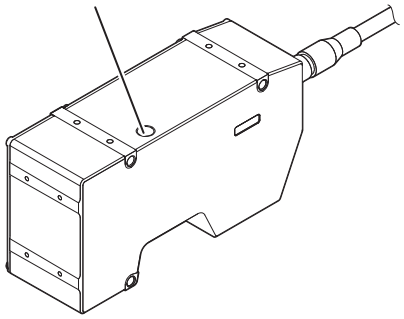
LJ-V7080

Laser radiation LED



LJ-V7200/V7300

Laser radiation LED



● **Laser beam control terminal**

The laser emission can be stopped by the following operations.

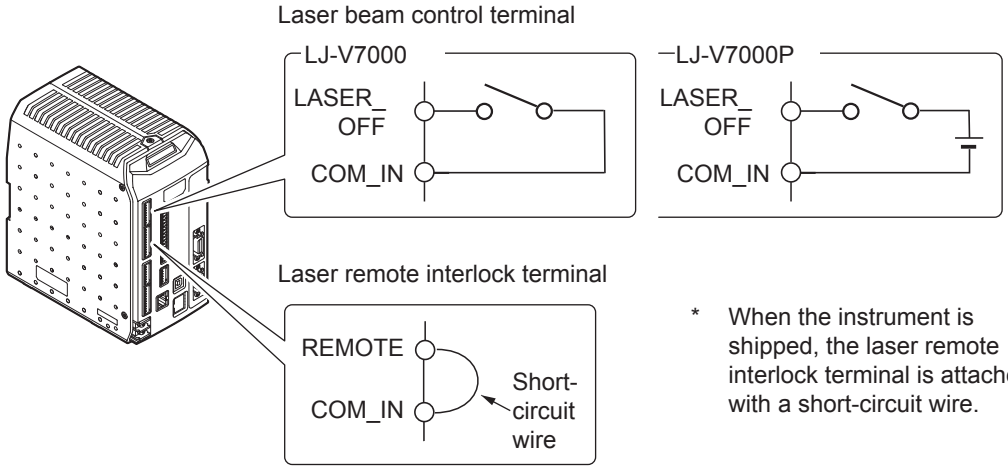
- LJ-V7000 (NPN type): Short-circuiting between the LASER_OFF terminal and the COM_IN terminal.
- LJ-V7000 (PNP type): Applying a voltage between the LASER_OFF terminal and the COM_IN terminal.

“Input terminal block 1” (Page 11-8)

● **Laser remote interlock terminal**

The laser emission stops upon opening the circuit between the REMOTE terminal and the COM_IN terminal.

“Input terminal block 2” (Page 11-10)



* When the instrument is shipped, the laser remote interlock terminal is attached with a short-circuit wire.

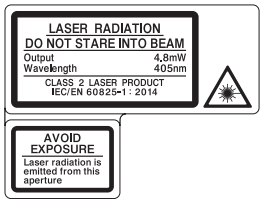
Warning labels

The contents of warning indications and locations for attaching warning labels are described below.
The IEC (English) warning labels are attached to the unit when shipped from the factory. Use the suitable warning label included in the package of this product according to the countries and/or regions where this product is used. In this case, it can be affixed on the IEC (English) warning label, which has already been affixed to this product.

● Warning label display content

LJ-V7060K/LJ-V7080/LJ-V7200/LJ-V7300

IEC (English)



DIN (German)



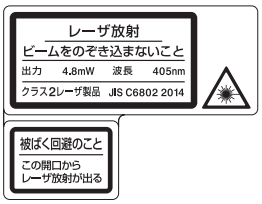
CEI (French)



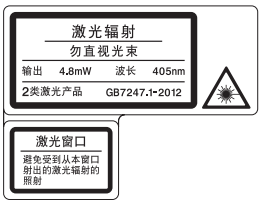
CEI (Italian)



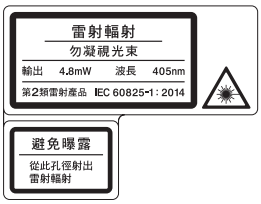
JIS (Japanese)



GB (Simplified Chinese)

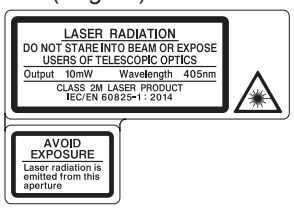


IEC (Traditional Chinese)



LJ-V7020/LJ-V7020K/LJ-V7060

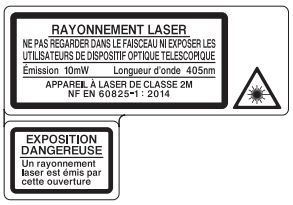
IEC (English)



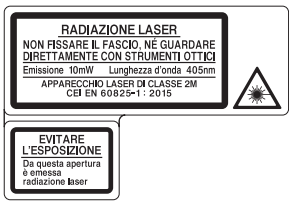
DIN (German)



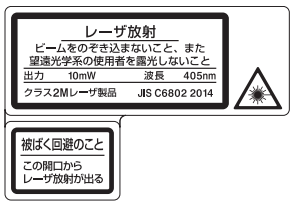
CEI (French)



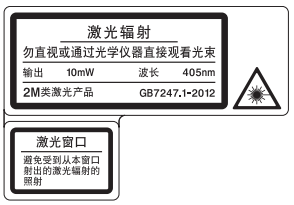
CEI (Italian)



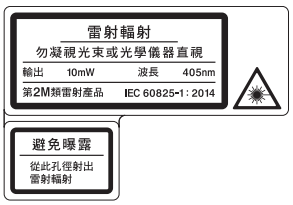
JIS (Japanese)



GB (Simplified Chinese)

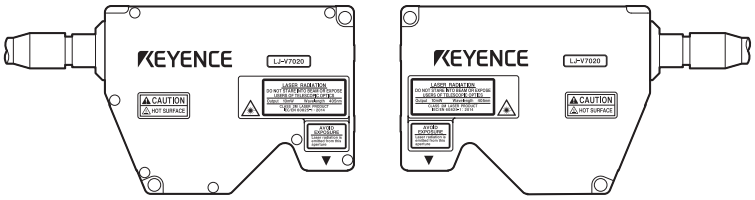


IEC (Traditional Chinese)

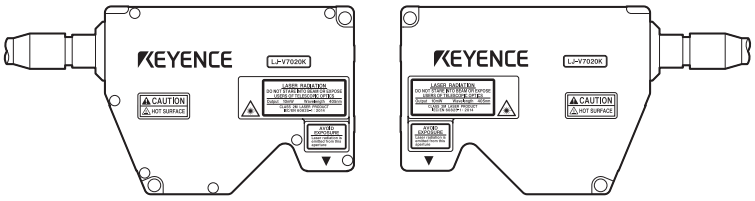


● Warning label attachment positions

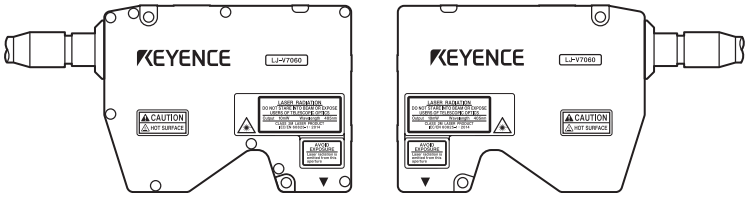
LJ-V7020



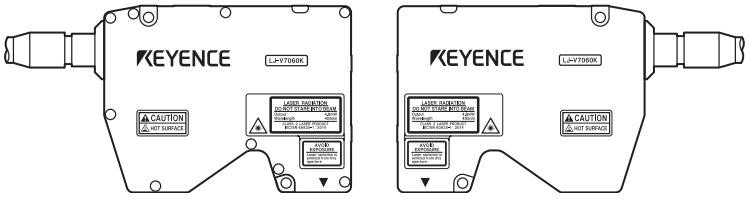
LJ-V7020K



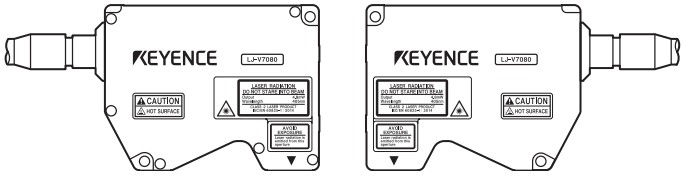
LJ-V7060



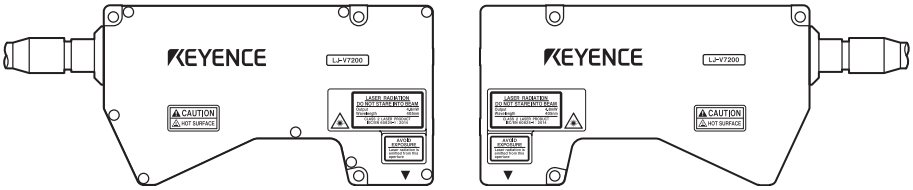
LJ-V7060K



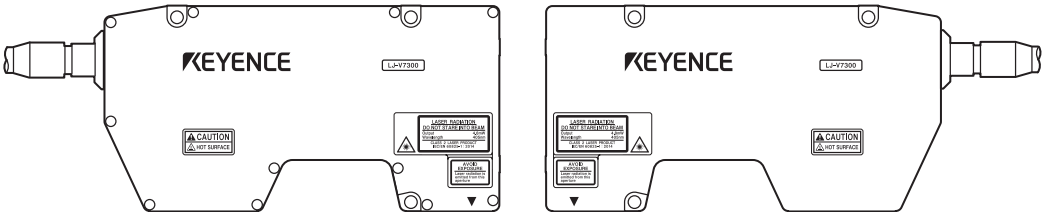
LJ-V7080



LJ-V7200



LJ-V7300



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-Navigator2 (""THIS SOFTWARE""), YOU ARE AGREEING TO BE BOUND BY ALL THE TERMS AND CONDITONS OF THIS AGREEMENT. IF YOU DO NOT AGREE TO THE TERMS OF THIS AGREEMENT, DO NOT USE THIS SOFTWARE.

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3.3. Without the prior permission of KEYENCE, the User may not reproduce or copy this Software for selling or distributing to a third party

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6.2 Under this Agreement the User's license will terminate immediately and automatically without any notice from KEYENCE if there is any failure to comply with any of the terms and conditions of this Agreement. Upon termination, the using of this Software shall cease, and all copies (full or partial) of this Software should be destroyed or returned to KEYENCE.

6.3 Compensation will be sought by KEYENCE should any violation or breach of this Agreement result in any incurred costs or lost profit to KEYENCE.

7. Governing Law.

7.1 This Agreement will be governed by and construed in accordance with the substantive laws of Japan.

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.

User Support

Update Service of the Software

The newest software versions for the following instruments can be downloaded from the KEYENCE homepage.

- LJ-V7000 Series setup, monitor software "LJ-Navigator2"*
- LJ-V7000 Series communication library software
- LJ-V7000 Series main unit operation software

* The software on the homepage is for updating and require that older versions of "LJ-Navigator2" have been installed.

For the installation procedure, see the instruction on the homepage.

● **Download URL**

LJ-V7000 Series Website
URL http://www.keyence.com/products/measure/laser2d/ljv7000/ljv7000.php

Visit the Web page above and select the software download.

Structure of the Manual

1	**Introduction**	This chapter describes the packaged items, optional parts, system configuration, and name and function of each part.
2	**Installation**	This chapter describes the installation and the connection of each unit.
3	**Operation Flow from Setting to Measurement and the Basic Operations**	This chapter describes the operation flow and the basic operation procedure.
4	**Setting Editing Methods and Program Operations**	How to edit, backup, and restore the settings and how to operate the program.
5	**Setting Image Conditions**	This chapter describes the contents and setup procedure on the trigger setup, imaging setup, and profile setup.
6	**Setting the Measurement Processing Conditions**	This chapter describes the contents and setup procedure on the master registration, position correction, profile mask, and OUT measurement setup.
7	**Setting the Terminal Output Condition/ the Storage Condition**	This chapter describes the contents and setup procedure on the determination output setup, analog output setup, and storage setup.
8	**Checking the Measurement Results**	This chapter describes the setup screen and operation procedure of functions available during the measurement.
9	**Measurement Common Setting**	This chapter describes the contents and setup procedure on the common settings for each measurement program.
10	**System Setting**	The system setting of the controller, LJ-Navigator2, display monitor/touch panel monitor are described. Contents and the setting procedure of the setting items are described.
11	**Communication Interface and I/O Terminals**	This chapter describes the communication specifications of the interface (Ethernet, USB, and RS-232C) and the input/output specifications available with LJ-V7000 Series.
12	**Timing Chart and Response Time**	This chapter describes the measurement setup, timing chart of input/output according to the system configuration, and the response time in the communication by respective interfaces.
13	**Specification/ Dimensions/ Characteristics**	This chapter describes the specifications and dimensions of the controller, display unit, and head, and characteristics of the head.
A	**Appendix**	

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1

Introduction

This chapter describes the package contents, the main parts and functions.

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System Configuration 1-5
Part Names and Functions 1-6
Software Installation 1-12

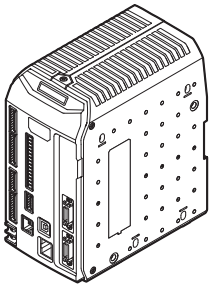
Checking the Package

Unpack the LJ-V7000 Series and check if the following parts are included in the package.
Information about the optional products, see “Optional Product List” (Page 1-3).
KEYENCE takes all possible measures to ensure correct packaging. If any parts are missing, please contact the nearest KEYENCE office.

Standard Set

■ Controller

LJ-V7001/LJ-V7001P ×1

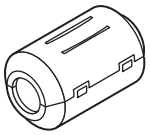


User's Manual ×1
(this manual)

Flathead screwdriver ×1

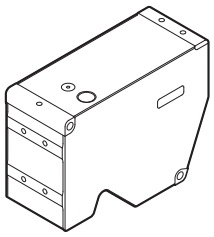


Ferrite core × 2

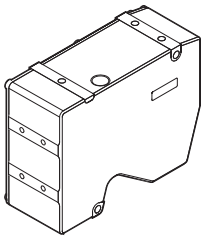


■ Head

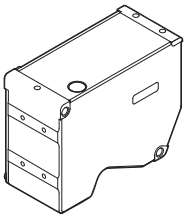
LJ-V7020/
LJ-V7020K



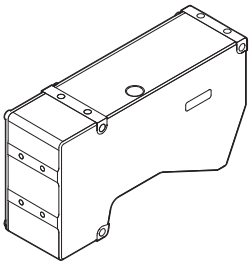
LJ-V7060/
LJ-V7060K



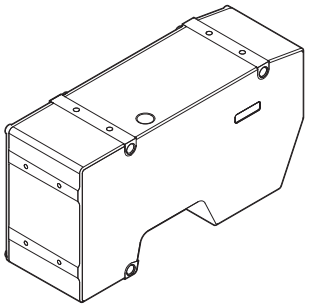
LJ-V7080

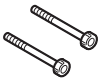


LJ-V7200

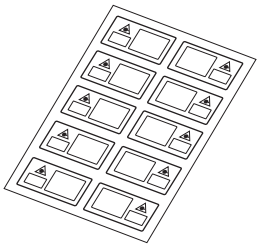


LJ-V7300



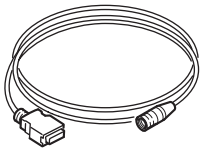


Hexagon socket bolts
LJ-V7020(K) : (M4×50) ×2
LJ-V7060(K) : (M4×50) ×2
LJ-V7080 : (M4×50) ×2
LJ-V7200 : (M4×50) ×3
LJ-V7300 : (M5×65) ×3



Warning labels ×1

■ Head cable

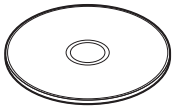


CB-B3 :
3m cable ×1
CB-B10 :
10m cable ×1



Head extension cable
CB-B5E : 5m extension cable ×1
CB-B10E : 10m extension cable ×1
CB-B20E : 20m extension cable ×1

■ PC software LJ-H3

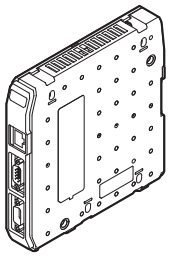


DVD
(Setup/Monitor software LJ-Navigator2/
LJ-Observer/Communication library software) ×1

Optional Product List

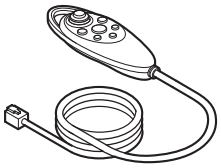
■ Display unit

LJ-VM100 ×1



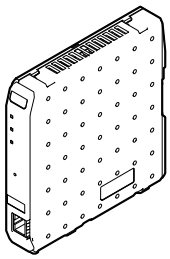
■ Console

OP-87504 ×1



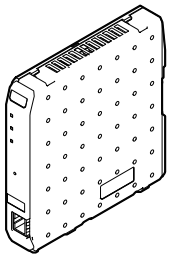
■ EtherNet/IP communication unit

CB-EP100 ×1



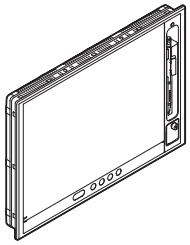
■ PROFINET communication unit

CB-PN100 ×1



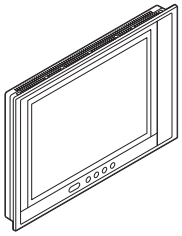
■ Touch panel monitor

CA-MP120T



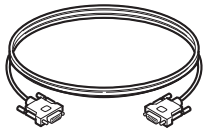
■ LCD Monitor

CA-MP120



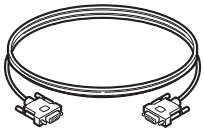
■ Touch panel signal cable

OP-87258: 3m cable
OP-87259: 10m cable



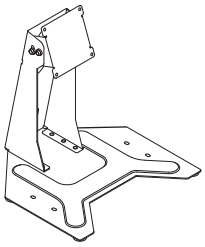
■ Monitor cable

OP-66842: 3m cable
OP-87055: 10m cable



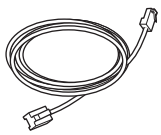
■ Touch panel stand

OP-87262



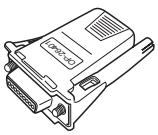
■ RS-232C cable (2.5m, straight)

OP-96368



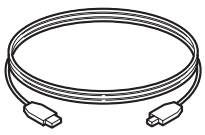
■ RS-232C conversion adapter (9-pin, female)

OP-26401



■ USB cable (2m)

OP-66844



External devices

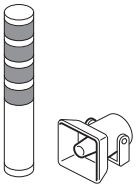
The following third party items need to be purchased separately and are not available from KEYENCE.

■ Ethernet cable (category 7 or higher or compatible with 10GBASE-T)

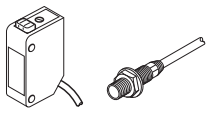
The normal Ethernet cable also allows the communication but leads to the decreased actual communication speed when errors increased in frequency due to external noise. To achieve the stable high-speed data communication, the Ethernet cable above mentioned is recommended, which is category 7 or upper or 10GBASE-T-compatible cable.

System Configuration

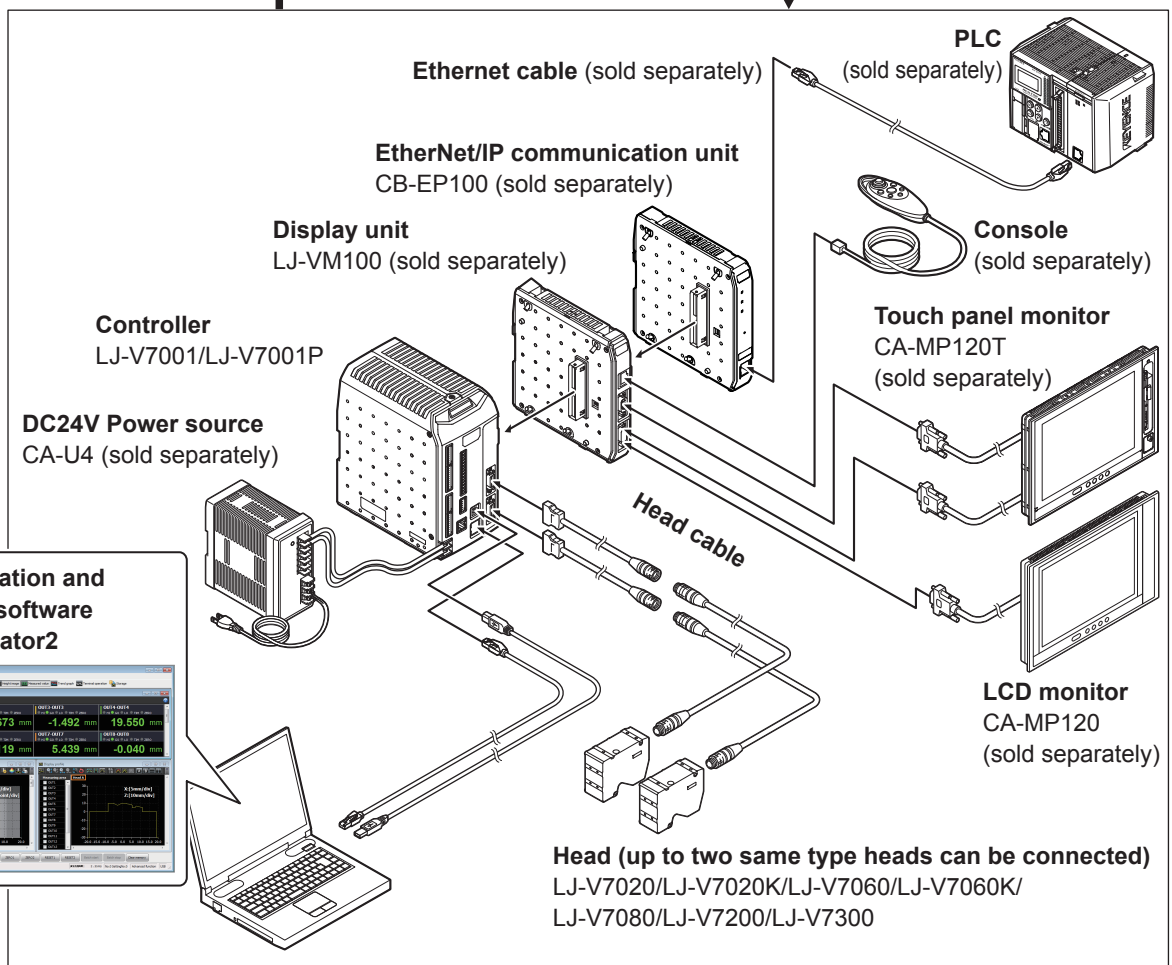
The LJ-V7000 Series can configure a system with the following devices and third party items.

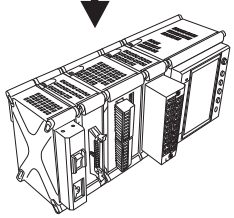


Stack light, buzzer, and others
Depending on the output of the determination result, notification such as warning can be generated.

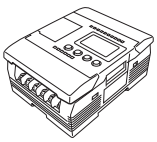


Encoder, photoelectric sensor, proximity sensor, and others
The sensors send a signal at a constant interval or when they detect any target object.

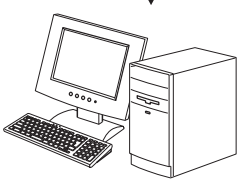




Digital data recorder
A recorder can record the measurement results.



Programmable controller
A programmable controller can receive the control output and measurement values as well as control timing of the measurement and switch operation functions.

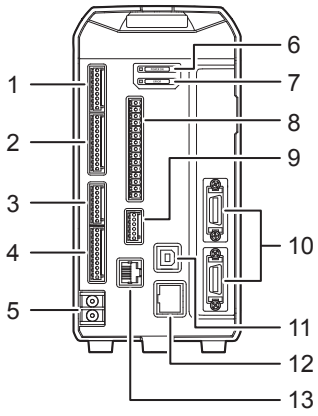


Personal computer
A personal computer can control and receive the profiles/measurement values via Ethernet communication and USB communication.

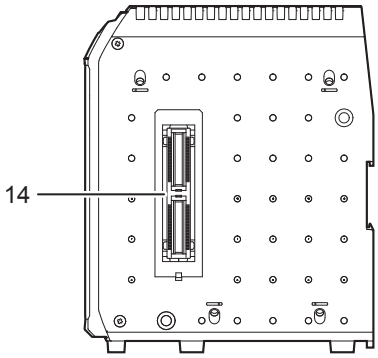
Part Names and Functions

Controller

Terminal side

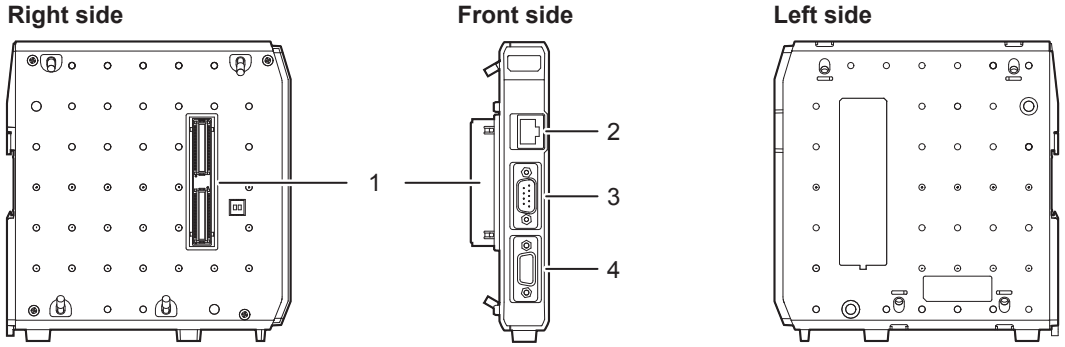


Left side



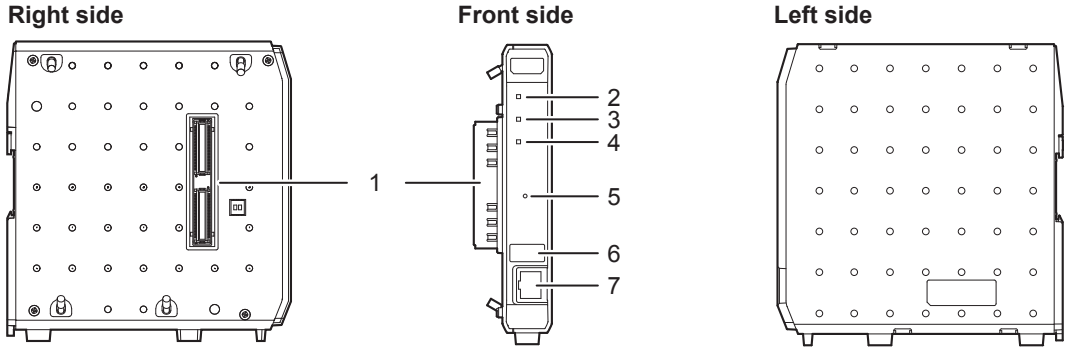
	Names	Contents
1	Input terminal block 1	Used for control signal input. 9-pole European terminal block
2	Input terminal block 2	Used for control signal input. 12-pole European terminal block
3	Output terminal block 1	Used for control signal output. 8-pole European terminal block
4	Output terminal block 2	Used for control signal output. 11-pole European terminal block
5	24V power input terminal block	Used for supply of the power source (24V). The upper side is +24V, the lower side is +0V.
6	POWER ON LED	Lights green when the controller normally turned on.
7	ERROR LED	Shows the controller status. Lights off: the controller is in the normal operation state. Lights red: Any error occurred.
8	Encoder input terminal block	Used for pulse signal input from the encoder. 15-pole European terminal block
9	Analog output terminal block	Used for analog voltage output. 6-pole European terminal block
10	Head connector	Connects the sensor head. There are two connectors, head A (bottom) and head B (top).
11	USB port	Connects to a personal computer with a USB cable. (Type B connector)
12	Ethernet port	Connects to a personal computer or PLC with the Ethernet cable. (RJ-45 connector)
13	RS-232C port	Connects to a personal computer or PLC with the RS-232C cable. (modular 6-pin connector)
14	Display unit connector	Connects the display unit.

Display unit



	Names	Contents
1	Controller connector	Connects the controller.
2	Console connector	Connects the console.
3	Touch panel signal connector	Connects the touch panel signal output from the touch panel monitor. (D-sub 9-pin connector)
4	Video signal connector	Connects the video signal input of the touch panel monitor or an analog RGB display monitor. (D-sub 15-pin connector)

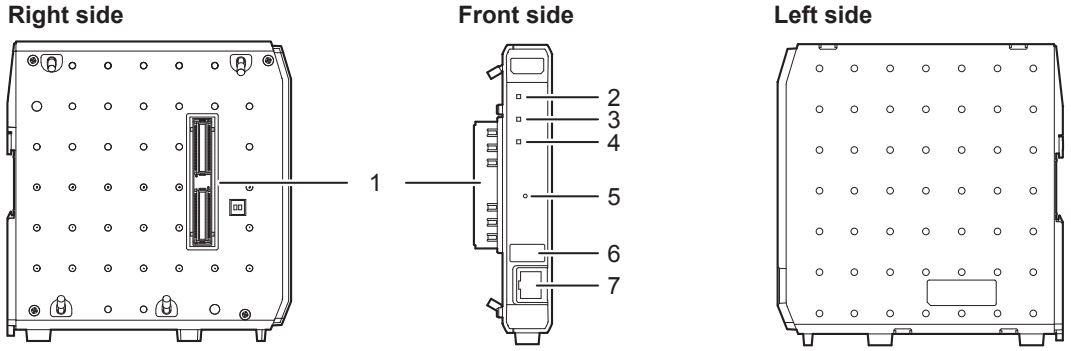
EtherNet/IP communication unit



	Names	Contents
1	Controller connector	Connects the controller.
2	LINC/ACT LED	Off : Not connected with the network. No power is supplied. Blinks green: Normally linked and sending and receiving data. Lights green: Normally linked.
3	MS LED	Shows the condition of the EtherNet/IP communication unit. Off : No power is supplied to the EtherNet/IP communication unit. Lights green: In the normal operation. Blinks red : Duplicated IP address or the connected controller in the error condition. Lights red : A system error occurred.
4	NS LED	Shows the condition of the EtherNet/IP communication unit. Off : No IP address is set on the controller. No power is supplied. Blinks green: The IP address is assigned but the connection has not been established. And the “Monitor data/External input” connection has not timed-out. Blinks red : The “Monitor data/External input” connection has timed-out. Lights red : It is detected that other device already uses the assigned IP address.
5	RESET button	Press and hold the button to reset the controller to the factory default.
6	MAC adress	Contains the MAC address of the controller.
7	Communication port	Connector for the Ethernet cable. (RJ-45 connector)

* For the details, refer to CB-EP100 User's Manual.

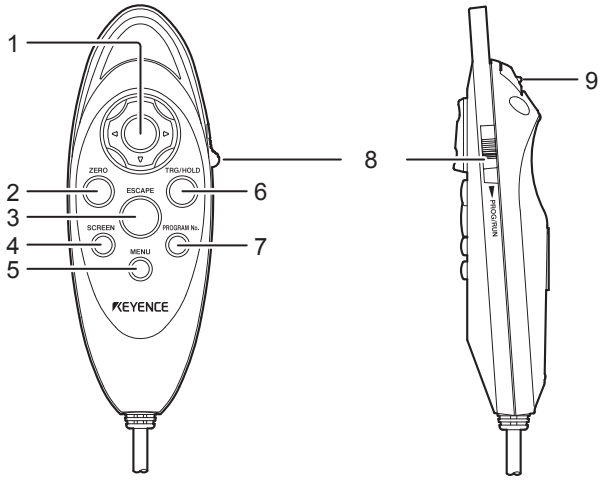
PROFINET communication unit



	Names	Contents
1	Controller connector	Connects the controller.
2	LINC/ACT LED (Link/Activity indicator)	Shows whether the CB-PN100 is normally linked with the Ethernet. Blinks green or lights green : In the normal operation. Off : Not connected with the network or no power is supplied.
3	SF LED (System Failure indicator)	Shows the normal/malfunction condition of the CB-PN100 and the error condition of the controller. Lights red : There is a system error in this device or the controller. Blinks orange: The Flash LED was requested from the IO controller. Flashes four times with the frequency of approximately a second. Off : In the normal operation.
4	BF LED (Bus Failure indicator)	Shows the PROFINET communication status. Lights red : Data exchange via the data I/O communication does not operate normally. Off : In the normal operation.
5	RESET button	Press and hold the button at least three seconds to reset the device to the factory default.
6	MAC adress	Contains the MAC address of the device.
7	Communication port	Connector for the Ethernet cable. (RJ-45 connector)

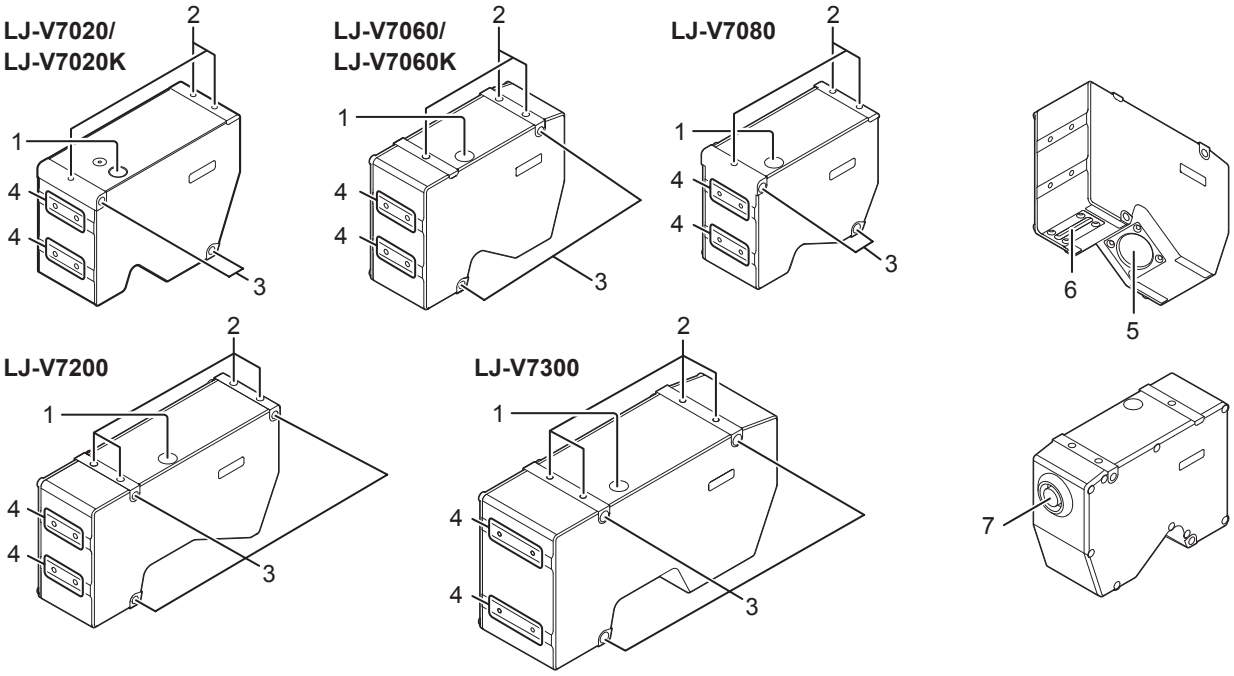
* For the details, refer to CB-PN100 User's Manual.

Console



	Names	Contents
1	[ENTER] Key	Press the button at the center to fix the setting items.
	[△] [▽] [◁] [▷] keys	Tilt the keys up, down, right, or left to move the selected item.
2	[ZERO] key	Press the key while entering a numeric value to change the value to zero. Press the key while measuring to start the auto-zero function. Press the key for three seconds to cancel the auto-zero function (the same function as the zero-input terminal).
3	[ESCAPE] key	Press the key to bring back the screen to the last display or operation. Or, reset the measurement value (the same function as the RESET input terminal).
4	[SCREEN] key	Swaps the displayed screen or the cursor.
5	[MENU] key	Displays the operation menu.
6	[TRG/HOLD] key	Holds the measurement value in case of the continuous trigger (the same function as the TIMING input terminal). Inputs a trigger in case of the external trigger (the same function as the TRG input terminal).
7	[PROGRAM No.] key	"Program switching" screen appears.
8	[PROG/RUN] switch	The measurement screen and setup screen are swapped at every sliding down operation of the switch. **Point** **The screen mode to be displayed depends on the time to slide down the key.** **• Slide down for a short time — The screen changes to the setup screen in the reference mode. The settings cannot be changed in the mode.** **• Slide down for a longer time — The screen changes to the setup screen in the normal mode.** **“Reference setting screen” (Page 8-2)**
9	[LOCK] key	Hold the [ENTER] key while holding down the [LOCK] key, all keys on consule are locked. Perform the same operation, the keys are unlocked. When the key is pressed while a screen with the [Help] button is displayed, the help dialog appears.

Head



	Names	Contents
1	Laser radiation LED	Lights or flashes while the LJ-V7000 Series device is in operation. Lights green: When the target object is at around the center of the measurement area*. Lights orange: When the target object is in the measurement area*. Blinks orange: When the target object is out of the specified measurement area. Lights red: When any system error occurred at the head.
2	Mounting screw holes	The screw holes can be used for mounting the head.
3	Mounting holes	Use the hexagon socket bolt (included) to affix the head. “Mounting the Head” (Page 2-2)
4	Mounting holes for the stray light shield	Use the holes to mount a plate for blocking stray light. Do not use for mounting the head.
5	Sensor (receiver)	Receives the laser beam for measurement. Protected by a glass cover.
6	Sensor (transmitter)	Emits the laser beam for measurement. Protected by a glass cover.
7	Cable connector	Connects with the head cable. “Connecting the controller and the head” (Page 2-9)

* “Lighting state of the laser emission LED” (Page 13-10)

Software Installation

This section describes the required system environment for the installation of the LJ-Navigator2 and the USB driver, and the installation procedure for them.

Required System Environment

The following personal computer system environment is required to use LJ-Navigator2.

Compatible OS	• Windows 10*1 • Windows 7 (SP1 or later)*2 • Windows Vista (SP2 or later)*3 • Windows XP (SP3 or later)*4
CPU	Core i3 2.3GHz or faster
Memory capacity	2GB or more
L2 cache memory	2MB or more
Graphic board	DirectX 9-compatible memory 128MB or more
Hard disk free space	10GB or more
Display	XGA (1024×768 pixel) or more, 256-colors or more
Interface	Any one of the following must be loaded. USB2.0/1.1*5, Ethernet 1000BASE-T/100BASE-TX*6

*1 Compatible with each edition of Home, Pro, and Enterprise.
*2 Compatible with Home Premium, Professional, and Ultimate editions.
*3 Compatible with Ultimate, Business, Home Premium, and Home Basic editions.
*4 Compatible with Home Premium and Professional editions.
*5 Connection through a USB hub or converter is not guaranteed.
*6 Connections with a LAN through a router or converter are not guaranteed.

Preparation for the Installation

Please check the following before installing LJ-Navigator2.

▶ Important **It is recommended to back up the master disk of LJ-Navigator2 to account for accidental damage.**

■ Hard drive free space

LJ-Navigator2 can be installed on a hard drive. 10MB free space is required on the hard drive for the installation.

■ Windows environment and installation destination

LJ-Navigator2 runs on Windows and its installation is also performed on Windows. Check that a supported OS is installed on the computer and is working properly.

■ Help file

The help file of this system is a PDF file. To use the help file, Adobe Reader, the dedicated viewing software supplied by Adobe System, must be installed on your personal computer.
Adobe Reader is distributed for free from the Adobe Systems Web site (http://www.adobe.com/).

Installing LJ-Navigator2

The following section describes the procedure to install LJ-Navigator2 onto your personal computer.
The example installation here takes place in Windows 7.

Important

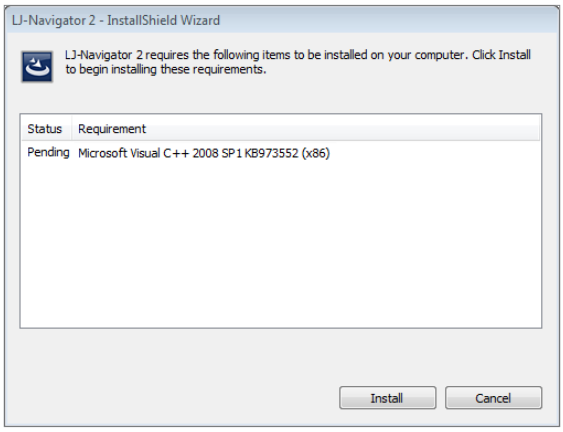
- **Before starting the installation, terminate all other applications running on the personal computer.**
- **Log onto the computer with an account that has Administrator privileges.**
- **Microsoft .NET Framework 2.0 is required to run LJ-Navigator2. If the OS of your PC is Windows 8 or later, install Microsoft .NET Framework 2.0 or 3.5 beforehand.**

1 Start up Windows and insert "LJ-H3" into the DVD drive.

An installation window for required components will appear.

Reference This window will not show up if all required components are already installed.

2 Click the [Install] button.



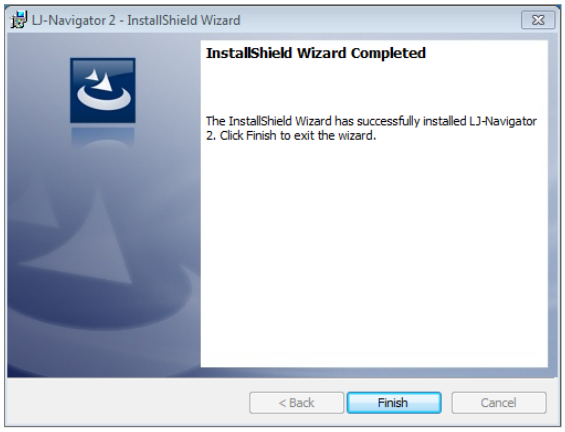
After the completion of all necessary items, "InstallShield Wizard" starts up and the "License Agreement" screen appears.

3 Read and check "Software License Agreement", select "I accept the terms in the license agreement" if you agree, and click the "Next" button.



Follow the instructions on the screen.
After the completion of the installation, the "InstallShield Wizard Completed" screen appears.

4 Click the [Finish] button.



5 Remove the DVD.

The installation of LJ-Navigator2 is completed.

Reference With the default setting, the software is installed in "C:\Program files\Keyence\LJ-Navigator2\".

Uninstalling LJ-Navigator2

The following section describes the procedure to uninstall LJ-Navigator2 from your personal computer. The example here describes uninstallation from Windows 7.

▶ Important

- **Before starting the uninstallation, terminate all other applications running on the personal computer.**
- **Log onto the computer with an account that has Administrator privileges.**

1 Double click "Uninstall Programs" in the Control Panel.

The "Uninstall or Change Programs" screen appears.

2 Select LJ-Navigator2 and click the [Uninstall] button.

The "Uninstallation confirmation" screen appears.

3 Click the [Yes] button.

The uninstallation starts.

4 Click the [Complete] button.

The uninstallation is complete.

2

Installation

This section explains the installation and connection of each instrument.

Mounting the Head 2-2
Mounting the Controller 2-4
Connecting Instruments to the Display Unit 2-6
Connecting Various Instruments 2-8

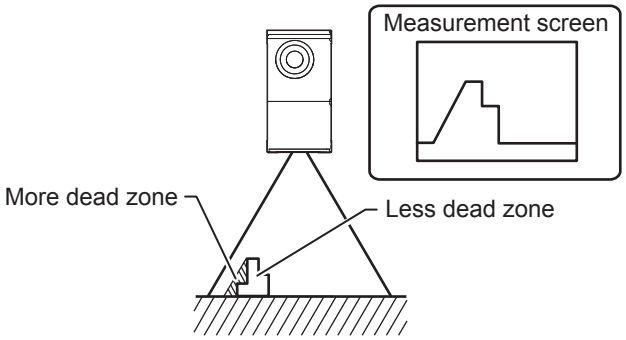
Mounting the Head

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

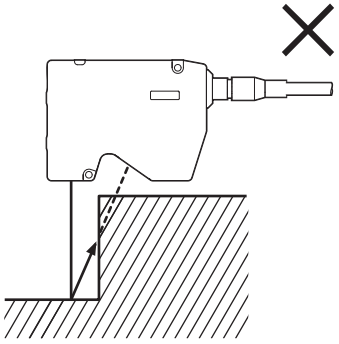
Installation cautions

Depending on their shape, some target objects create a dead zone in the measurement range. Make sure that the dead zone is not affecting the measurement result.
This unit features a fan shaped laser beam and receiver system. For this reason, the dead zone will be smaller near the center of the X axis measurement range.

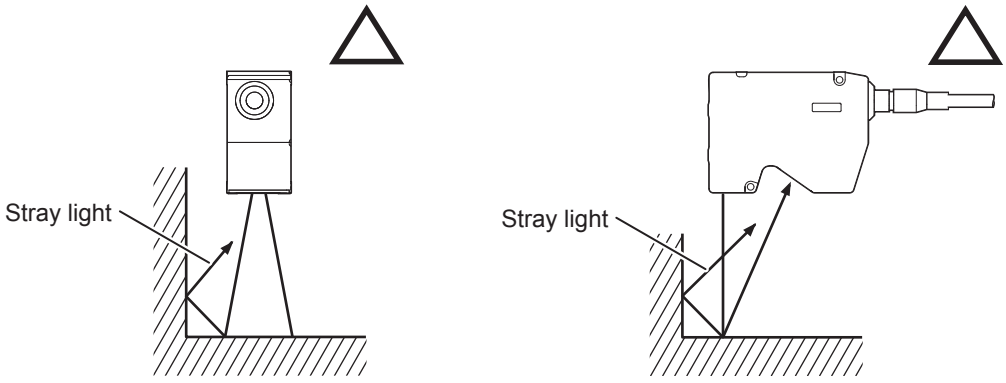
Point **LJ-V7020(K) and LJ-V7060 (K) irradiate laser beams almost in parallel, allowing you to perform measurements with less influence from the dead zone.**
“Dead Zone processing” (Page 5-25)
“Display setting of the [Display profile] screen (Setting of the method to display the dead zone data)” (Page 8-5)



Install the unit making sure that the laser beam irradiating the target object and the laser beam reflected from the target object and entering the receiver are not obstructed by a wall surface, etc.
“Head” (Page 1-11)
“Measurement range” (Page 13-7)



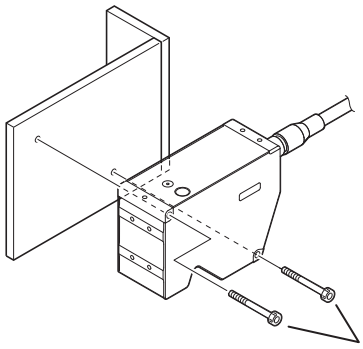
Make sure that the laser beam reflected from a wall is not becoming stray light and affecting the measurement.
“Masking the Unnecessary Parts of the Profile (Profile Mask)” (Page 6-20)
“Image mask” (Page 5-14)
“Peak selection” (Page 5-15)



Mounting

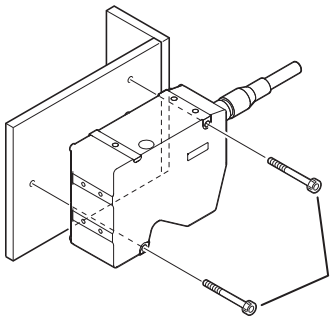
Adjust the distance between the head and the target object, and then mount the head using the provided bolts.

LJ-V7020/LJ-V7020K



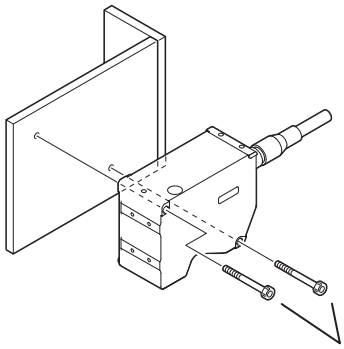
Hexagon socket head bolt
(included)
M4 x 50: 2 bolts

LJ-V7060/LJ-V7060K



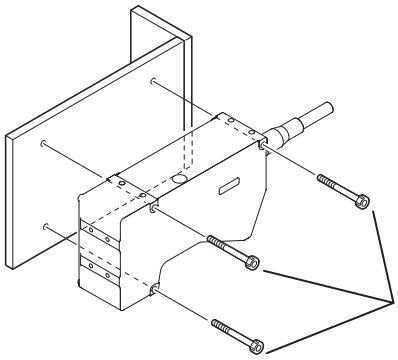
Hexagon socket head bolt
(included)
M4 x 50: 2 bolts

LJ-V7080



Hexagon socket head bolt
(included)
M4 x 50: 2 bolts

LJ-V7200/V7300



Hexagon socket head bolt
(included)
LJ-V7200 M4 x 50: 3 bolts
LJ-V7300 M5 x 65: 3 bolts

See "📖 "Dimensions" (Page 13-12)" for the installation method.
The tightening torque of the mounting screws should be in the following ranges:
M4 screw: 1.2 to 1.8 N·m
M5 screw: 2.0 to 3.0 N·m

⚠ CAUTION	**If you mount the head on a plate made from material having poor heat dissipation properties (such as resin), the head surface may become hot creating a burn hazard. Be sure to connect the head to a metallic plate for better heat dissipation.**

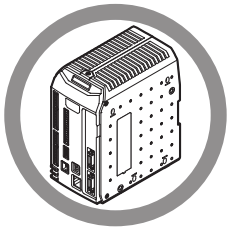
- If you are using two heads, see "📖 "Mutual interference area" (Page 13-25), 📖 "Mutual interference prevention" (Page 5-10)".
- Tilt correction functions are available.
  📖 "Tilt correction" (Page 5-25)
  📖 "Height correction" (Page 5-26)

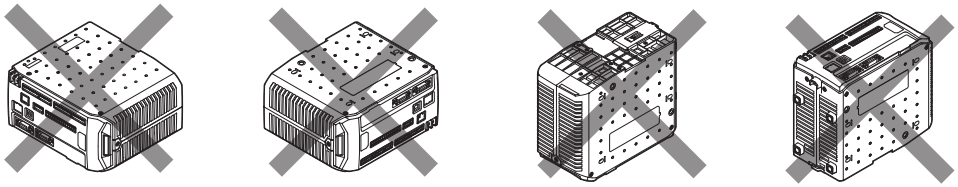
Mounting the Controller

Be sure to read the installation cautions carefully and install the controller correctly.
The controller unit should either be mounted on the DIN rail or installed by fixing the bottom panel using screws.

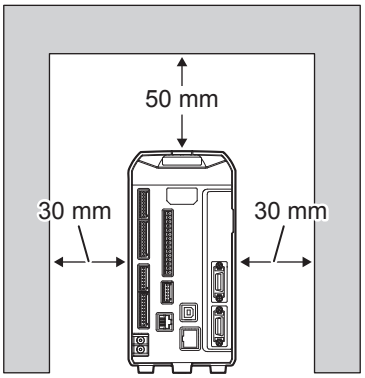
Installation cautions

The controller should be installed in the direction of the ○ symbol in the figure below. Do not install it in any other direction.

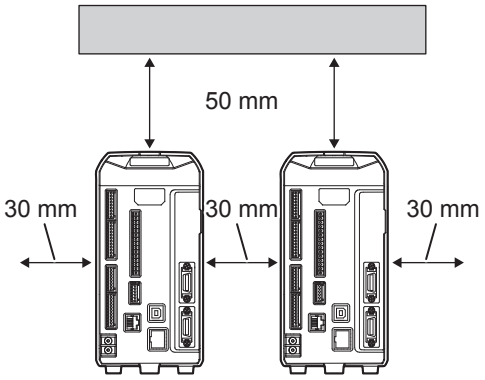




For proper ventilation, allow a space of 50 mm or more on top of the controller and a space of 30 mm or more on both sides.
In addition, allow a space of 90 mm or more in front of the terminal panel to ensure safe cable connection.



If you are mounting two or more controllers side by side, allow a space of 30 mm or more between the controllers and a space of 50 mm or more on top of the controllers.



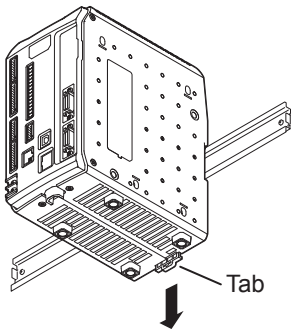
▶ Important

- Do not block the ventilation holes located on the top and bottom panels of the controller unit. Doing so may cause heat to build up inside the unit and this may cause the unit to malfunction.
- If the temperature inside the control board exceeds the rating of the operational ambient temperature (50 ºC), lower the operating ambient temperature below the rating using forced air cooling or by creating more space around the unit.

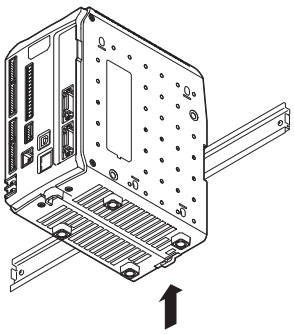
Mounting the controller to a DIN rail

This section explains the procedure for mounting the controller to a DIN rail.

1 **Pull the tab on the back panel of the controller, and then attach the controller to the DIN rail.**



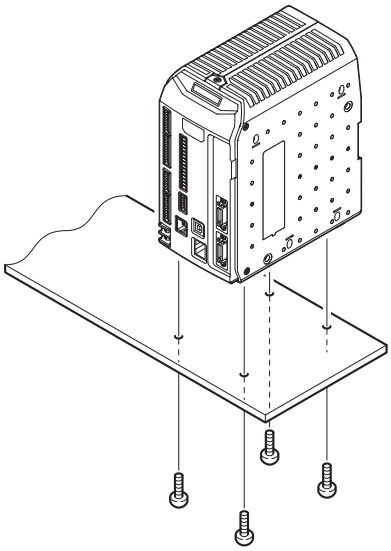
2 **Push in the tab to fix the controller in place.**



Mounting using the bottom panel

This section explains the procedure for mounting the controller using the bottom panel.

1 **Fasten the screws into the mounting holes on the bottom panel.**



M4 screw x 4 (Screw depth 6 mm)

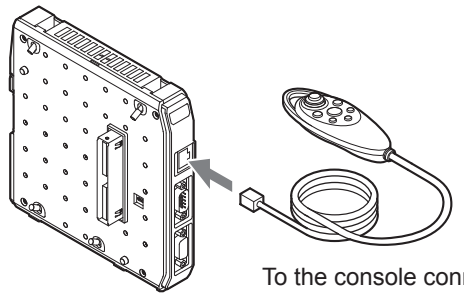
See "📖 "Dimensions" (Page 13-12)" for the installation method.

Connecting Instruments to the Display Unit

Mounting the console

This section explains the procedure for mounting the console.

1 Connect the console to the console connector of the display unit.



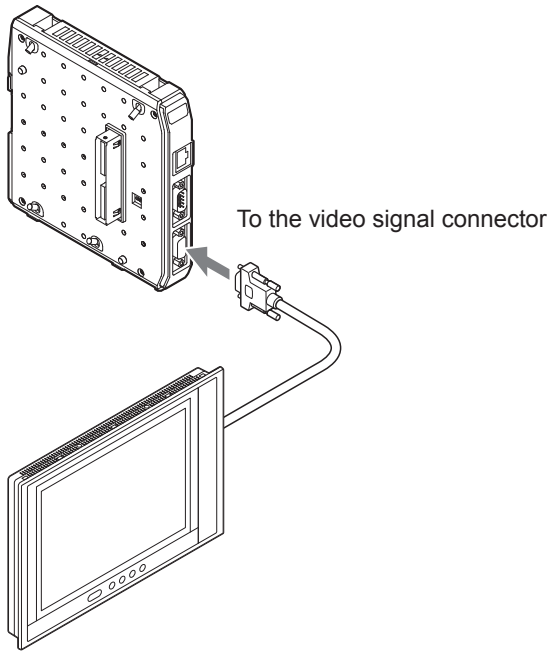
Mounting a display monitor

This section explains the procedure for mounting a display monitor.

▶ Important **If you use an off-the-shelf analog RGB monitor having a resolution other than XGA (1024 x 768 pixels), the screen resolution may become lower or the screen may be displayed incorrectly due to the specification of the monitor.**

1 Connect the monitor cable to the display monitor.

2 Connect the monitor cable (to which the display monitor has been connected) to the video signal connector of the display unit.



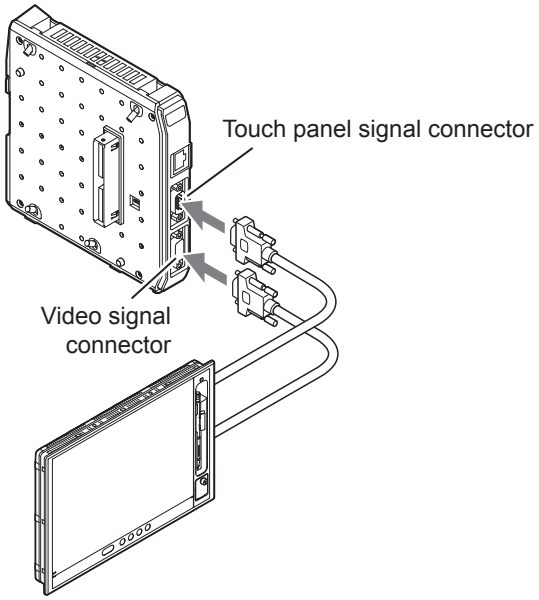
Mounting the touch panel monitor

This section explains the procedure for mounting the touch panel monitor.

NOTICE	**Only the KEYENCE CA-MP120T touch panel is supported.**

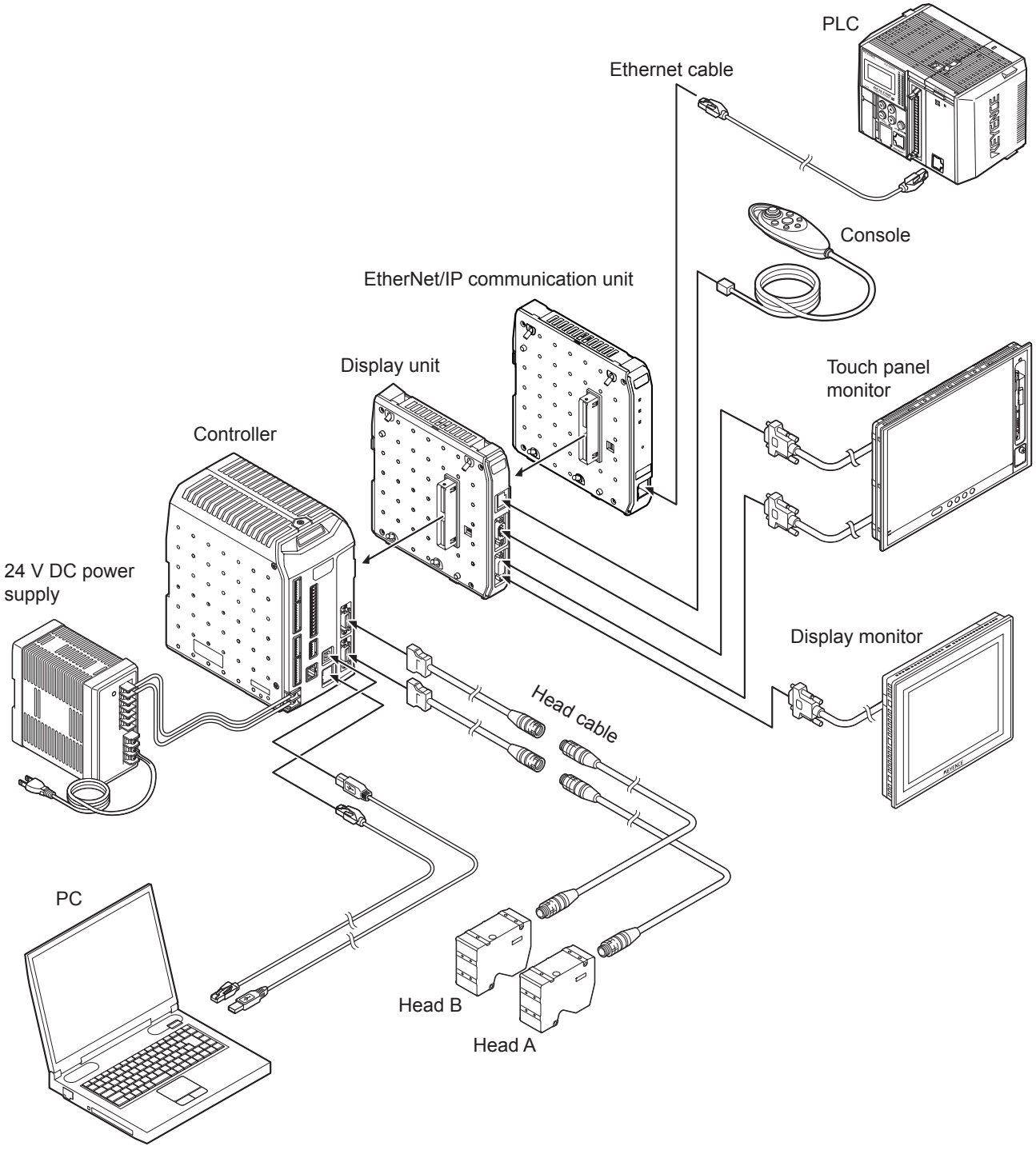
1 **Connect the touch panel signal cable and the monitor cable to the touch panel monitor.**

2 **Connect the corresponding cables to the touch panel signal connector and the video signal connector of the display unit.**



Connecting Various Instruments

This section explains the connection procedure for the configuration shown below.



Important

- **Always make sure to switch OFF the controller before connecting or removing cables. Connecting or removing cables with the controller switched ON may result in a malfunction.**
- **Plug in the connector making sure its orientation is correct. Inserting the connector in the wrong orientation may break the connector pins and result in a malfunction.**
- **Always use a class D grounding for the frame ground terminal of the 24 V DC power supply.**
- **If you are connecting two heads, be sure to use the same model head for both Head A and Head B. You cannot perform measurements if you connect two different model heads.**

Point

For details of the EtherNet/IP communication unit, refer to the CB-EP100 User's manual.

Connecting the controller and the head

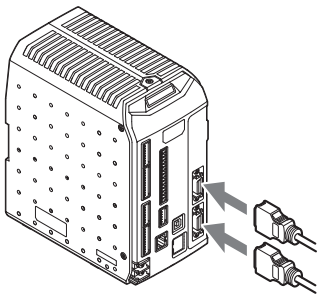
This section explains the procedure for connecting the controller and the head.

NOTICE	• **Do not supply power to the controller before connecting the head cable. Connecting the head cable while the controller is switched ON may damage the head and/or the controller.** • **Maintain a minimum bend radius of 22 mm or more for the head cable.** • **When using a cable tray, select a model with R100 or higher unless specified otherwise.**

1 Connect the head cable to the head connector of the controller.

If you are using only one head, connect it to the Head A connector.
Insert the cable firmly until you hear a clicking sound.

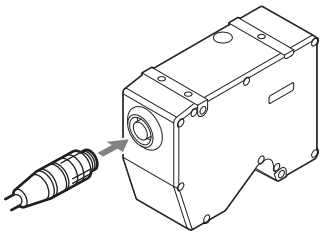
Point **To unplug the connector, pull it out while pushing the buttons located on both sides of the connector.**



2 Connect the head and the head cable.

Check the orientation of the connector, and then insert it all the way while slowly rotating it. Tighten the screw with a tightening torque of 1 to 1.5 N·m.

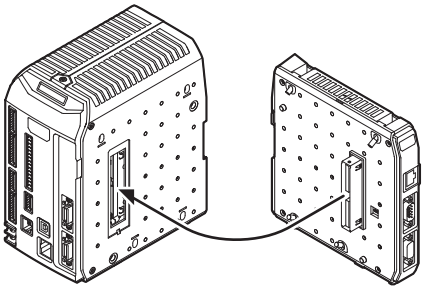
NOTICE	• **Plug in the connector making sure its orientation is correct. Inserting the connector in the wrong orientation may break the connector pins and result in a malfunction.** • **Insert the connector without tilting it, and then tighten it firmly. If the connector is not tightened enough, it may become loose due to vibration, etc. resulting in poor contact.** ***Tighten it firmly by hand and then retighten approx. 45° to 60°.**



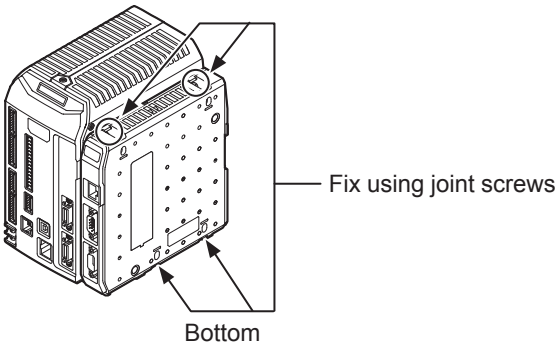
Connecting the controller and the display unit or the EtherNet/IP communication unit

This section explains the procedure for connecting the controller and the display unit or the EtherNet/IP communication unit for an example.

1 Insert the controller connector on the display unit or the EtherNet/IP communication unit side into the connector on the controller side.



2 Tighten the joint screws of the display unit or the EtherNet/IP communication unit using a screwdriver.



Connecting the controller and the PC

If you are communicating with the controller using LJ-Navigator2, you can connect to the PC using the following methods:

- "Connecting using USB"
- "Connecting using the Ethernet"

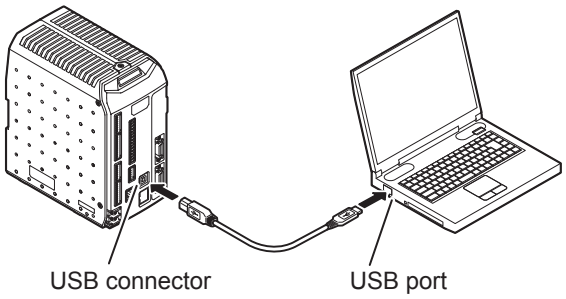
See "LJ-Navigator2 System Setting" (Page 10-11) for the communication settings.

Connecting using USB

This section explains the procedure for connecting the controller and the PC using USB.

▶ Important **Do not unplug the USB cable while the controller is in operation. Doing so may cause the controller to function improperly or stop functioning. If the cable gets unplugged and the connection is lost, restart LJ-Navigator2.**

1 Connect the connector of the controller and the USB port of the PC using a USB cable.



■ Connecting using the Ethernet

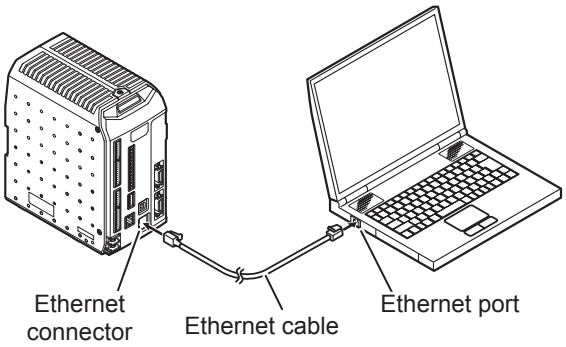
An Ethernet connection allows you to connect multiple controllers to a single PC. You can then select from and use one of the connected controllers for the communication. The communication protocol will be TCP/IP; and the communication model will be peer to peer.

▶ Important

- **You must set the IP address of the controller and the PC such that they do not overlap with each other in the network.**
- **Proper operation is not guaranteed for connections to LAN networks and/or connections via a router.**

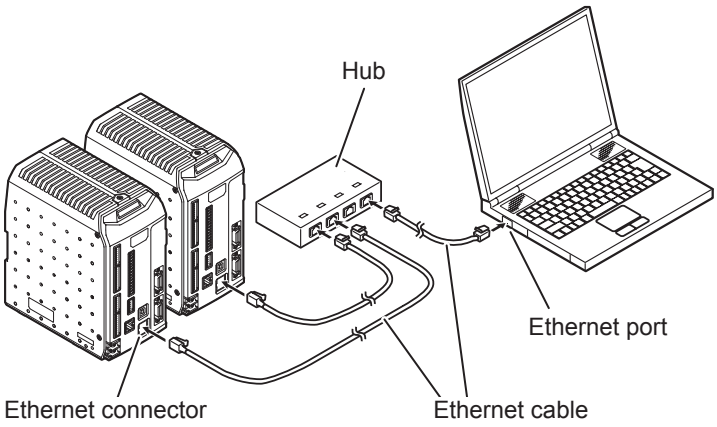
● Connecting the controller and the PC one-to-one

For this connection, use an off-the-shelf Ethernet cable (Category 7 or higher or 10GBASE-T compatible).



● Connecting two or more controllers to the PC

To connect two or more controllers, you will need a hub that supports 100BASE-TX or 1000BASE-T.
Use an off-the-shelf Ethernet cable (Category 7 or higher or 10GBASE-T compatible) for connecting the controller or PC and the hub.



Reference The controller supports the Auto MDI/MDI-X function (which automatically detects the required cable connection type and configures the connection appropriately), allowing you to use either a crossover or straight-through Ethernet cable.

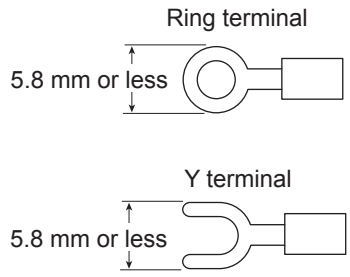
Connecting the power supply to the controller

This section explains the procedure for connecting the controller and the power supply.

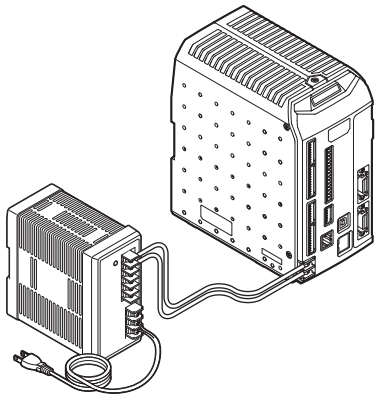
1 Connect the 24 V DC power supply to the 24 V power supply terminal of the controller.

NOTICE

- **Use a wire between AWG14 and AWG22.**
- **If you are using a solderless terminal, use a terminal that has the following size and suits the M3 screw:**



- **Tighten the screw firmly with a tightening torque of 0.5 to 0.75 [N·m].**



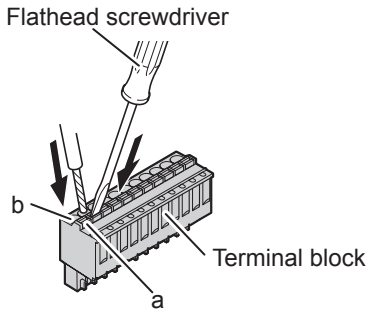
How to use the terminal block

This section explains how to use the terminal block.

▶ Important

- **Use the following wires according to the terminal block used:**
  - **For input terminal block (1, 2) and output terminal block (1, 2): AWG20 to AWG28**
  - **For encoder input terminal block: AWG16 to AWG28**
- **The end of the wire should be processed to the following length:**
  - **For input terminal block (1, 2) and output terminal block (1, 2): Approx. 8 mm**
  - **For encoder input terminal block: Approx. 9 mm**
- **Do not solder (pre-solder) the processed end of the wire.**
- **The wire should be inserted all the way into the terminal block.**
- **Attach the wire to the terminal block directly, without using a solderless terminal, etc.**

1 **Insert the wire into "part b" while pushing in "part a" of the terminal block with a screwdriver.**



2 **When the wire is inserted to the end, remove the screwdriver.**

Point **Lightly pull the wire to make sure it is fixed firmly.**

3

Operation Flow from Setting to Measurement and the Basic Operations

This section explains the operation flow from setting the measurement program to performing measurement, how to start and shut down this unit, as well as the basic operations of the PC software, display unit and touch panel.

Operation Flow from Setting to Measurement..... 3-2
Start-up and Termination..... 3-8
Basic Operations of LJ-Navigator2..... 3-10
Basic Operations of the Console..... 3-13
Basic Operations of the Touch Panel Monitor..... 3-21

Operation Flow from Setting to Measurement

This section explains the flow of settings from when the unit is started up to when you become able to perform your desired measurement.
See the corresponding reference pages for details on the setting items and setting methods.

→ Solid line: Mandatory procedure
⇢ Dotted line: Procedure that should be performed as required

■ Start-up

“Start-up and Termination” (Page 3-8)

■ Directly editing the setting for the current measurement

Click the [Direct setting] button.

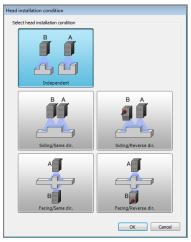


“Editing the controller setting directly (Edit direct set)” (Page 4-6)
“Loading the settings from a file or the controller and editing them (Edit local set)” (Page 4-9)
“Creating and editing a new setting file (Edit local set)” (Page 4-7)

<Only required for the first start-up after connecting two heads>

■ Setting the head installation condition

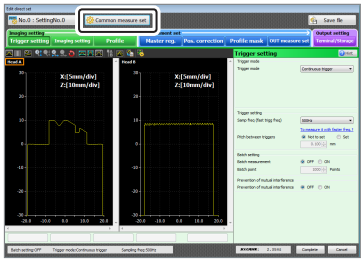
Select the current installation condition from the five pictures shown below.

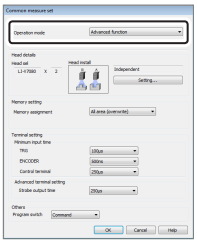


The displayed profiles will be flipped vertically/ horizontally based on the installation condition.
“Head details” (Page 9-4)

■ Selecting the operation mode

Click the [Common measure set] button.





Select either [High-speed] or [Advanced function] according to the measurement content, and then click the [OK] button.

If you wish to process the profile at high speed using custom software → Select [High-speed].
If you wish to perform all processes (from position correction and measurement through to judgement output) on the controller → Select [Advanced function].
“Operation mode” (Page 9-3)

■ Performing a trigger setting

“Setting the Trigger Conditions (Trigger Settings)” (Page 5-5)

[Trigger setting] screen



Select the trigger input method from [Continuous trigger]/[External trigger]/[Encoder trigger].

- To measure the profile in sync with the encoder input → “Encoder trigger” (Page 5-6)

Set the sampling frequency (fast trigg freq).

Point

To set a higher sampling frequency, you will need to change the related setting items first. Clicking [To measure it with faster freq.?] will bring up a hint page which allows you to check the setting items that are related to the sampling frequency.

Select whether to perform a batch measurement.
“Batch setting” (Page 5-9)

■ Setting the imaging condition

“Setting the Image Conditions (Image Settings)” (Page 5-12)

[Image setting] screen



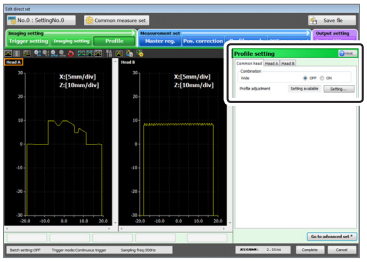
Set the imaging condition suitable for the target object.

- The difference in amount of reflected light is very large, producing a non-detectable area
- The profile is not displayed correctly due to stray light and/or multiple reflected lights.
- The measurement target is translucent and absorbs light.

For cases other than the above, select [Standard].

■ Setting the profile processing method

“Setting the Processing Method of the Profile (Profile Setting)” (Page 5-21)

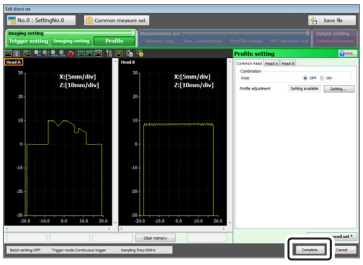


You can set the number of smoothing points, averaging count, etc. to make the measurement more stable. → “Filter setting” (Page 5-26)

<When using two heads>

- If you wish to bind the profiles of two units into a single profile → “Combining” (Page 5-21)
- If you wish to adjust the relationship between the displayed profiles of two units → “Profile adjustment” (Page 5-22)

<In high-speed mode>



Click the [Complete] button.

Point

To retrieve the profile out of the controller, you need software that uses the communication libraries. The communication libraries and the reference manual are included in the LJ-H3 DVD.
You can retrieve the profile using either Ethernet or USB communication.

<In advanced function mode>

Continues to next page

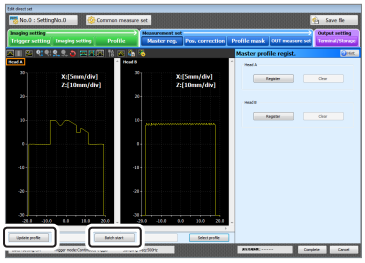
Continued

<In advanced function mode>

■ Registering the master profile

“Register the Master Profile (Master Registration)” (Page 6-4)

Set the target object, and then click the [Batch start] button. (This operation is not needed if batch measurement is OFF)
Click the [Update profile] button, when the target profile appears, and then click the [Register] button.



Reference

You can perform the OUT measurement setting without registering a master profile.

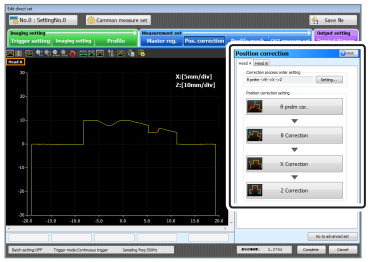
“OUT measurement setting” (Page 6-22)

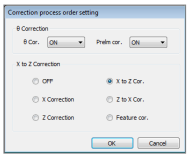
<If displacement or tilt variation of the target object occurs>

■ Correcting the profile displacement

“Correcting the Displacement of the Profile (Position Correction)” (Page 6-8)

Set the combination of position corrections and the processing order.
[Position correction] screen

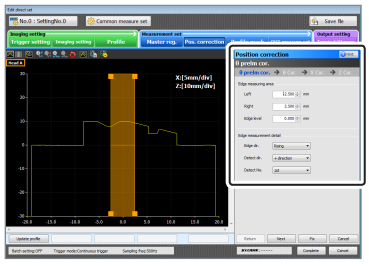




- If you wish to correct a displacement caused by a tilt → “θ correction” (Page 6-9)
- If you wish to correct a vertical/horizontal displacement → “X to Z correction” (Page 6-10), “Z to X correction” (Page 6-10)
- If you wish to correct a displacement in reference to a characteristic portion of the target object, such as its edge or peak → “Feature point correction” (Page 6-10)

<When using two heads>

- If you wish to correct a displacement or tilt variation when measuring a single target object using two heads → “Dual head mode” (Page 6-12)



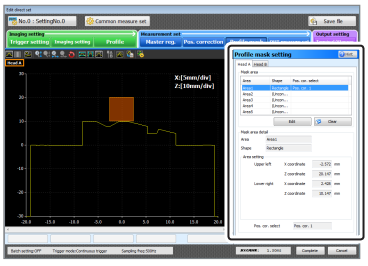
Set the correction area and correction content for each position correction.

<If you wish to exclude a certain area from the measurement process (such as stray light influences) for the profile data>

■ Masking an unwanted part of the profile

“Masking the Unnecessary Parts of the Profile (Profile Mask)” (Page 6-20)

Click the [Edit] button and set the mask area in a triangle or rectangle.

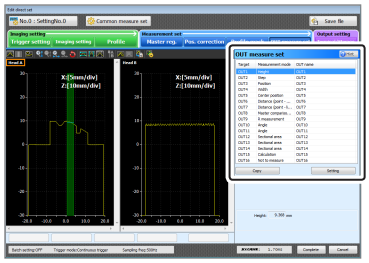


If you wish to make the mask region of the profile follow the movement of the target object → “Profile mask and position correction” (Page 6-20)

■ Setting the measurement details

“OUT measurement setting” (Page 6-22)

Select the [OUT measure set].



Select the measurement mode.
“Measurement mode” (Page 6-27)



If you wish to perform a 3D measurement in a simple manner → “Simple 3D measurement mode” (Page 6-30)

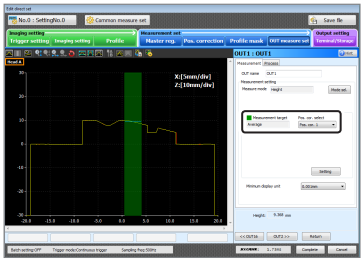
Set the measurement target, and then click the [Fix] button.
“Measurement target” (Page 6-23)



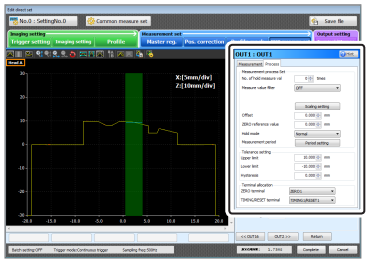
If you wish to specify a folded section of the profile as the measurement target
→ “Knee” (Page 6-65)

<If you have set a position correction>

Set [Pos. cor. select] for each measurement target as required.



Set the processing method for the OUT measurement value.
“Setting the Processing setting” (Page 6-76)



You can set the measure value filter, scaling process, hold mode, tolerance, etc.

- If you wish to perform a 3D measurement while applying a position correction
  → “Measurement period” (Page 6-32)

If you wish to set multiple OUTs, repeat the steps from [Selecting the OUT] to [Setting the processing method].

Reference

You can copy the setting for one OUT to another OUT.

“Setting copy” (Page 6-33)

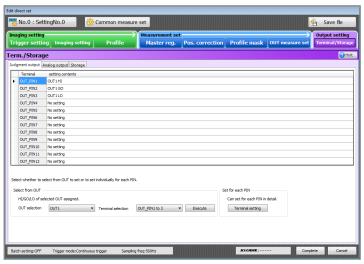
Continues to next page

Continued

<If you are using the terminal output or storage function>

■ Setting the judgement output condition

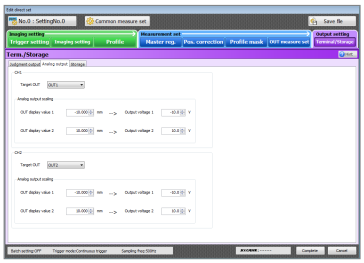
“Terminal output setting” (Page 7-3)



Set how to allocate the judgement result (HI/GO/LO) of each OUT to the judgement output terminals (OUT_PIN1 to OUT_PIN12).

■ Setting the analog output condition

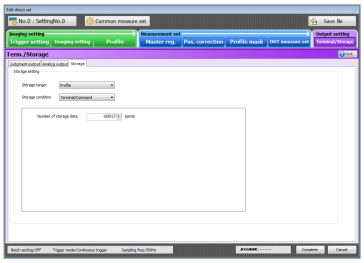
“Analog output” (Page 7-3)



Select the OUT for analog voltage output and set the scaling in the range of ±10.5 V.

■ Storing the OUT measurement value and profile

“Storage” (Page 7-7)



Select the storage target.
Select the storage condition.
Enter the number of storage data (i.e. the number of batches).

Setting complete

Click the [Complete] button at the bottom right corner of the screen.

■ Checking the measurement result

“Chapter 8 Checking the Measurement Results” (Page 8-1)

You can simultaneously display multiple types of measurement screens.

Measurement screen



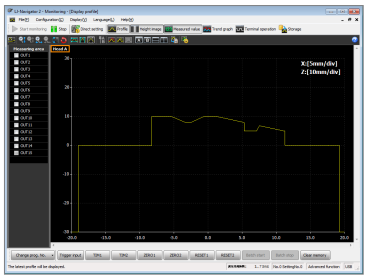
Point

If batch measurement is ON, executing [Batch start] will start the measurement.

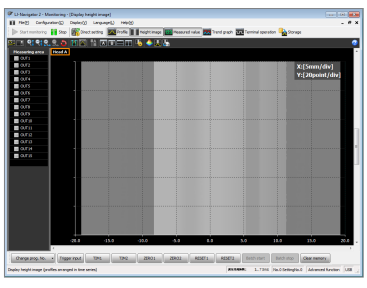
You can display each screen in enlarged size.

● **Screens that appear inside the measurement screen**

[Display profile] screen



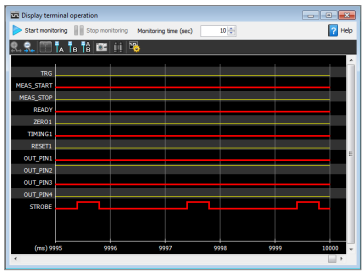
[Display height image] screen



● **Screens that appear in a new window**

[Display terminal operation] screen

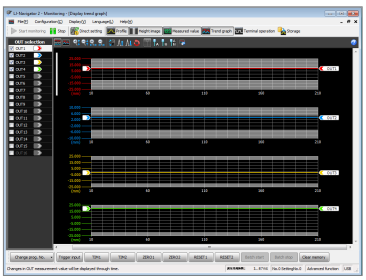
Clicking the [Start monitoring] button will plot the ON/OFF state of each terminal on the chart screen.



[Display measurement value] screen



[Display trend graph] screen



Storage screen

To start the storage process, execute [Start strg].

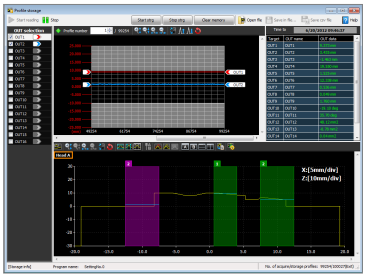
Point

If batch measurement is ON, Batch start is executed after Start storage has been executed.

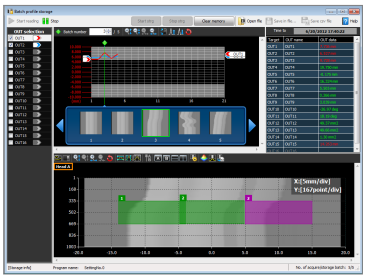
[Data storage] screen



[Profile storage] screen



[Batch profile storage] screen



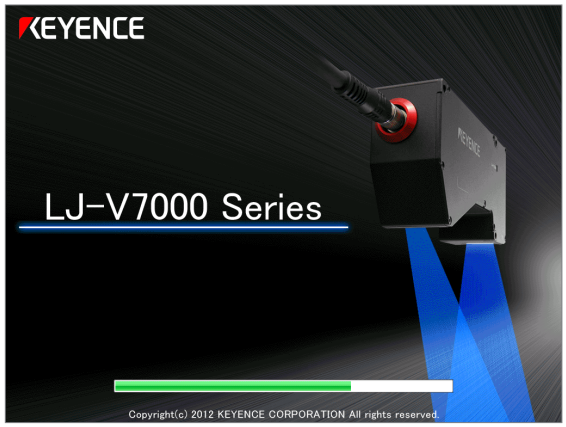
Start-up and Termination

Starting up LJ-Navigator2

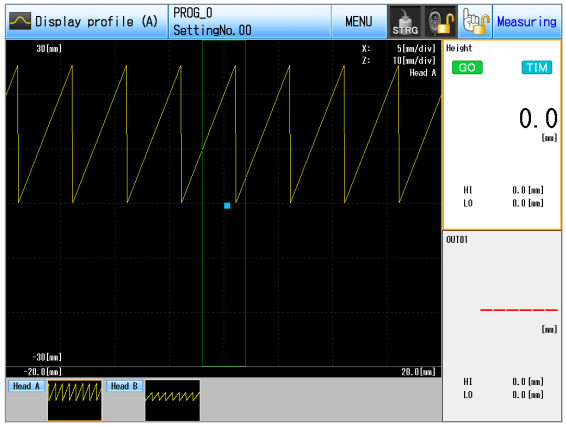
This section explains how to switch ON the power and start up the controller, the display monitor/touch panel monitor, and LJ-Navigator2.

■ Starting up the monitor/controller

Switch the power of the controller ON.
If a display monitor/touch panel monitor is connected, the start-up screen will appear on the display monitor/touch panel monitor.



If the controller starts up successfully, the measurement screen will appear.



Reference
- For the basic console operations, see “Basic Operations of the Console” (Page 3-13)
- For the basic touch panel operations, see “Basic Operations of the Touch Panel Monitor” (Page 3-21)
- If an error occurs during start-up, the corresponding error message will appear. “Error Messages” (Page A-39)
- The last displayed measurement screen from the previous start-up will appear first.

■ Starting up LJ-Navigator2

This section explains the procedure for starting up LJ-Navigator2.

1 Select [LJ-Navigator2] from the [Start] button, or double-click the [LJ-Navigator2] icon on the desktop.



The start-up screen will appear.



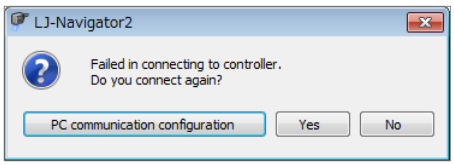
If the communication with the controller completes successfully, the measurement screen will appear.



Reference For the basic LJ-Navigator2 operations, see “Basic Operations of LJ-Navigator2” (Page 3-10)

If the communication with the controller fails, the connection failure notification dialog will appear. Go to **2**.

2 **Click the appropriate button.**



- [Yes]..... The connection will be retried.
- [No]..... The measurement screen will appear with the monitoring in stopped state. You can check/change the PC communication settings 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. “LJ-Navigator2 System Setting” (Page 10-11)

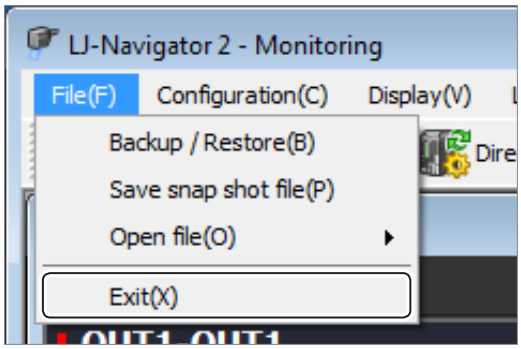
Shutting down LJ-Navigator2

This section explains how to shut down the controller, the display monitor/touch panel monitor, and LJ-Navigator2.

■ Shutting down LJ-Navigator2

This section explains the procedure for shutting down LJ-Navigator2.

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



The measurement screen will close and LJ-Navigator2 will shut down.

■ Shutting down the monitor/controller

The monitor/controller will shut down automatically when the power supply connected to the controller is switched OFF.

Basic Operations of LJ-Navigator2

This section explains the common basic operations for the measurement and settings screens of LJ-Navigator2.
See the subsequent chapters for details on how to operate each screen.

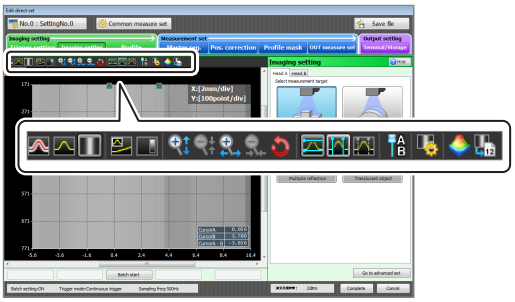
Basic operations of the toolbar

A toolbar will appear in the measurement screen, the profile display area of the setting screen, the height image display area, and the imaging display area.

Measurement screen



Setting screen



The following section explains the basic operations of the buttons on the toolbar.

● **Display area guide**

This button shows/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.

● **Display height scale**

(displayed in the [Display height image] view only)

This button shows/hides the height scale.



● **Indication of the amount of light received**

(displayed in the [Display imaging] view only)

This button shows/hides the indication of the amount of light received.



● **Enlarge/Reduce**

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

: Expand in vertical direction

: Reduce in vertical direction

: Expand in horizontal direction

: Reduce in horizontal direction

Reference  will appear in the [Display Imaging] view. The display size will be enlarged vertically and horizontally at the same time.

● **Fit display**

(displayed in the [Display profile] view only)

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**

This button resets the enlarged/reduced display size and the moved display position back to the default states.

● **Show/Hide cursor**

These buttons show/hide the vertical or horizontal cursor in the display area.

: Display the horizontal cursor.

: Display the vertical cursor.

: Hide the cursor.

● **Cursor operation**

These buttons control the cursors displayed using the [show cursor] button.

: Move Cursor A to the clicked position.

: Move Cursor B to the clicked position.

: Move Cursor A and Cursor B simultaneously by dragging, without altering the positional relationship between Cursor A and Cursor B.

● **Display master profile**

(displayed in the [Display profile] view only)

This button shows/hides the master profile.

"Register the Master Profile (Master Registration)" (Page 6-4)

● **Display profile overwriting**

(displayed in the [Display profile] view only)

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.

● **Display profile mask area**

(displayed in the [Display profile] view only)

This button shows/hides the mask area when the profile mask area has been set.
When the position correction is applied to the mask area, the mask area applied position correction is displayed.

● **Move display area**

The cursor will change to a hand when you move the mouse into the display area.
You can move the display area using drag & drop.

● **Switch head display**

These buttons switch the display method for Head A and Head B when two heads are connected to the unit.

: Display the profile of Head A only.

: Display the profile of Head B only.

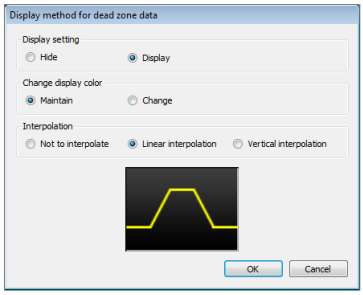
: Display the profiles of Head A and Head B side by side vertically.

: Display the profiles of Head A and Head B side by side horizontally.

● **Dead zone data display setting**

(displayed in the [Display profile] view only)

The [Display method for dead zone data] screen will appear.
You can set the display method for the dead zone data.

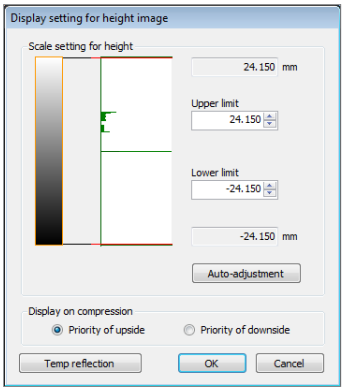


“Display setting of the [Display profile] screen (Setting of the method to display the dead zone data)” (Page 8-5)

● **Display setting for height image**

(displayed in the [Display height image] view only)

The [Display setting for height image] screen will appear.
You can set the height scale.



“Display setting of the [Display height image] screen (Display height image setting)” (Page 8-7)

● **3D display/2D display**

(displayed in the [Display height image] view only)

: Display the height image in 3D.

: Display the height image and the profile in parallel.

See “How to read and operate the 3D display” (Page 8-10)” for the details of the 3D display.
See “Using the 2D display for check” (Page 8-8)” for the details of the 2D display.

● **Profile copy**

(displayed in the [Display profile] view only)

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

● **Save as CSV**

Save all profile data of the height image as CSV format.

● **Switch between [Display imaging]/[Display profile]/ [Display height image] (in settings screens only)**

: Switch to the [Display imaging] view.

: Switch to [Display profile].

: Switch to the [Display height image] view.

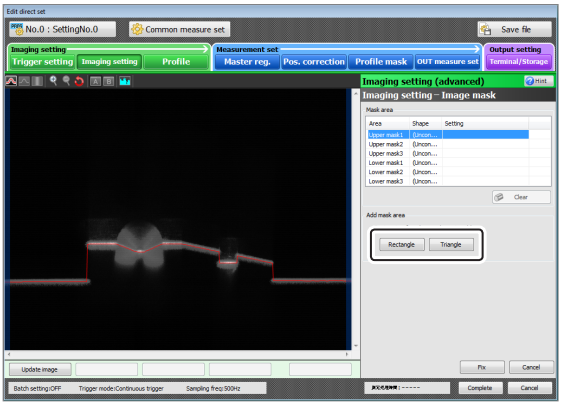
● **Help or hints**

This button displays the help or the hint page.

Editing the area

In the mask and measurement area settings, the areas will appear in the display region. The settings are performed by editing these areas.
This section explains how to edit the area using the mouse, using the image mask setting in the imaging setting as an example.

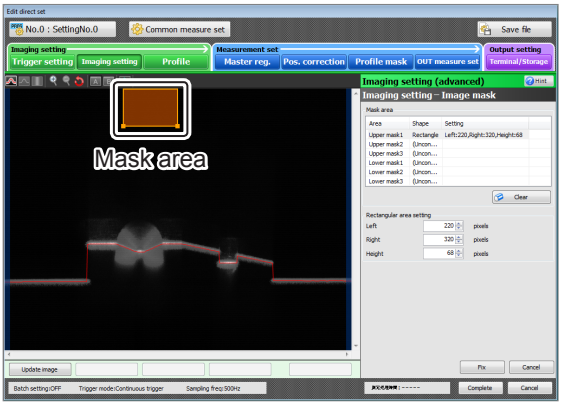
1 Select the shape of the mask area.



The mask area will appear in the imaging display area.

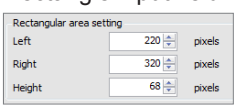
2 Edits the size of and/or moves the area.

The mouse cursor will change to when you hover it over the area.

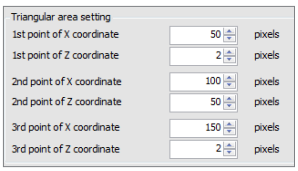


Reference You can also set the area by entering numeric values in the input fields for the setting edit area.

- Rectangle input field

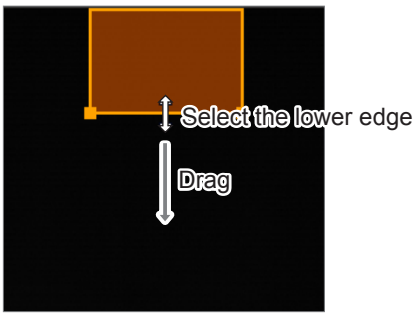


- Triangle input field

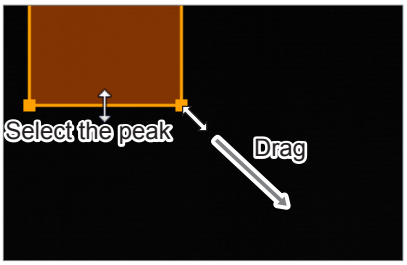


● Editing the size of the rectangle area

- You can resize the area by selecting and dragging its lower edge.

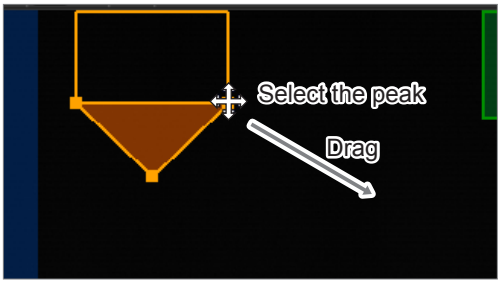


- You can resize the area by selecting and dragging its peak.



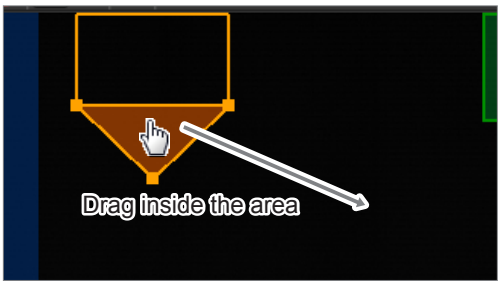
● Editing the size of the triangle area

You can move and resize the area by selecting and dragging its peak.



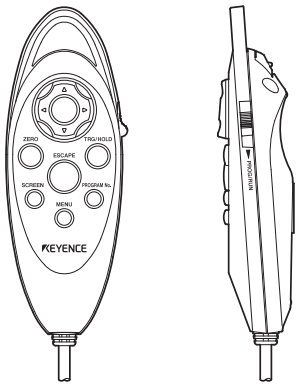
● Moving the area

You can move the area by dragging inside the area (i.e. parts other than the lower edge and the peak).



Basic Operations of the Console

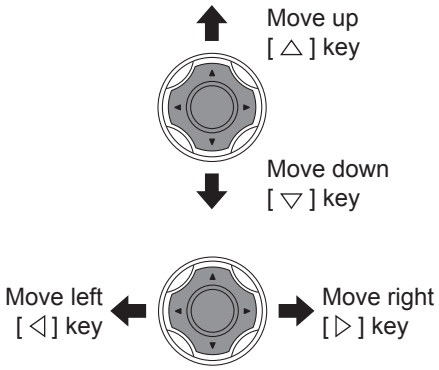
This section explains the basic operations of the console connected to the display unit.



Reference To lock the keys on consule or switch between measurement screen and setup screen, refer to “Console” (Page 1-10).

Moving the cursor

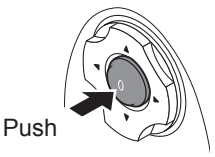
Use the [ENTER] key to move the cursor.
Move the [ENTER] key up, down, left or right will move the cursor in those directions.



Reference
- In this manual, operations requiring you to move the [ENTER] key up and down are denoted as [△] [▽] keys.
- Operations requiring you to move the [ENTER] key left and right are denoted as [◁] [▷] keys.

Selecting an item/Confirming a setting

To select an item or confirm a setting, press the center of the [ENTER] key.

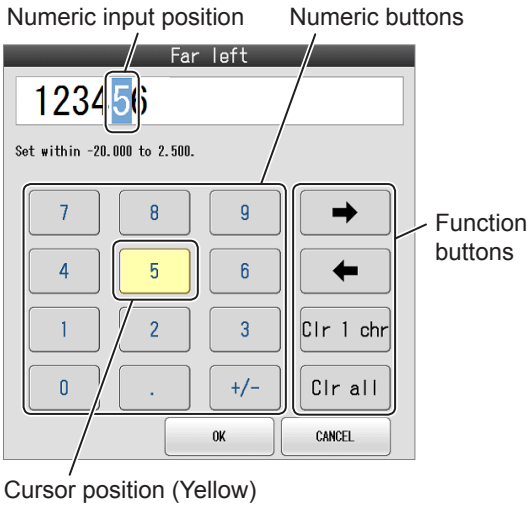


Reference To cancel the selection, press the [ESCAPE] key. The most recent selection will be canceled.

Entering numeric values

A numeric input dialog will appear when entering numeric values.

1 Move the cursor to the numeric buttons and function buttons using the [△] [▽] [◁] [▷] keys, and enter one numeric value at a time.



● Moving the numeric input position

Move the cursor to [←] or [→]. The numeric input position will move left or right each time you press the [ENTER] key.

● Entering numeric values

Moving the cursor to the numeric value you wish to enter and pressing the [ENTER] key will enter the numeric value.

● Erasing numeric values

Moving the input position to the numeric value you wish to erase. Selecting the [Clr 1 chr] button and pressing the [ENTER] key will erase the numeric value at the input position.
Selecting the [Clr all] button and pressing the [ENTER] key will erase all numeric values.

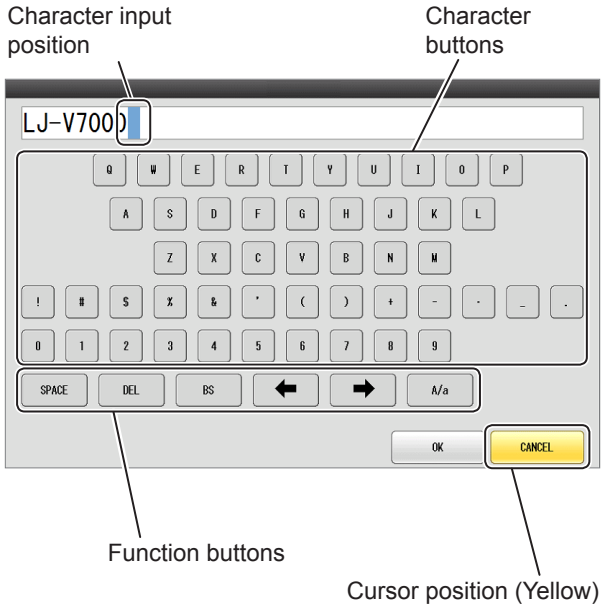
Reference The correspondence between the console keys and the numeric input dialog keys are as follows:

- [ESCAPE] key : [Cancel]
- [ZERO] key : [Clr all]
- [TRG/HOLD] key : [OK]
- [MENU] key : [+/-]
- [PROGRAM No.] key : [.] (Decimal point)

Entering characters

A character input dialog will appear for entering the device name, program name, etc.
This section explains the procedure using the character input screen for entering the device name as an example.

1 Move the cursor to the character type buttons, character buttons and function buttons using the [△] [▽] [◁] [▷] keys and enter one character at a time.



● **Moving the character input position**

Move the cursor to [←] or [→]. The character input position will move left or right each time you press the [ENTER] key.

● **Entering characters**

Moving the cursor to the character you wish to enter and pressing the [ENTER] key will enter the character.
To enter a blank space, move the cursor to the [SPACE] button and press the [ENTER] key.

● **Erasing characters**

Move the character input position and press the [DEL] button (deletes the currently selected character), or move the cursor to the [BS] button (deletes the character preceding the currently selected character) and press the [ENTER] key.

● **Switching between uppercase and lowercase characters.**

Move the cursor to the [A/a] button depending on the current character type. You can toggle between uppercase and lowercase characters by pressing the [ENTER] key.

Reference The correspondence between the console keys and the numeric input dialog keys are as follows:

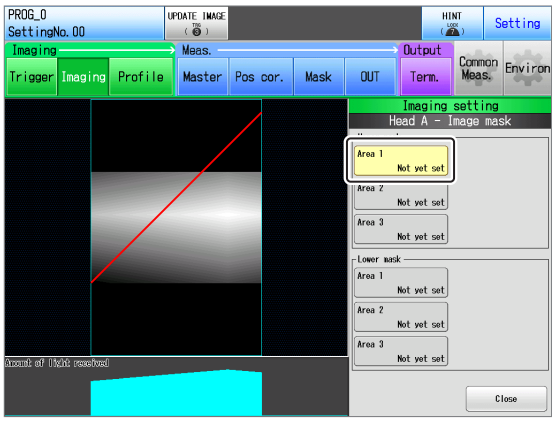
- [ESCAPE] key : [Cancel]
- [ZERO] key : [BS]
- [SCREEN] key : [←]
- [PROGRAM No.] key : [→]

2 Once you have entered the characters, move the cursor to the [OK] button and press the [ENTER] key.

Drawing the areas

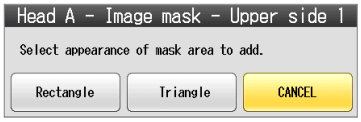
In the mask and measurement area settings, the areas will appear in the display region. The settings are performed by editing these areas.
This section explains how to edit the area using the console, using the image mask setting in the imaging setting as an example.

1 **Select the area you wish to set using the [△] [▽] [◁] [▷] keys, and then press the [ENTER] key.**



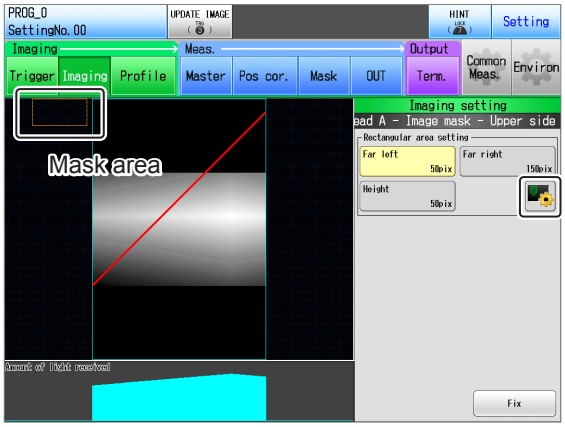
A dialog for selecting the area shape will appear.

2 **Select the area shape using the [△] [▽] [◁] [▷] keys, and then press the [ENTER] key.**



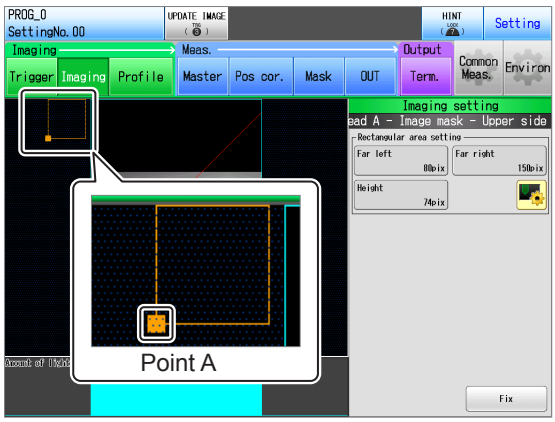
The mask area will appear.

3 **Select  using the [△] [▽] [◁] [▷] keys, and then press the [ENTER] key.**



The mask area will be selected and the cursor will appear at Point A.

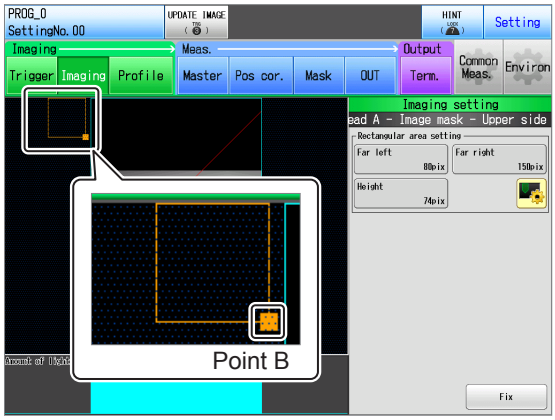
4 **Move the position of Point A using [△] [▽] [◁] [▷].**



5 **Press the [SCREEN] key.**

The cursor will move to Point B.

6 **Similarly, move the position of Point B using [△] [▽] [◁] [▷] keys.**

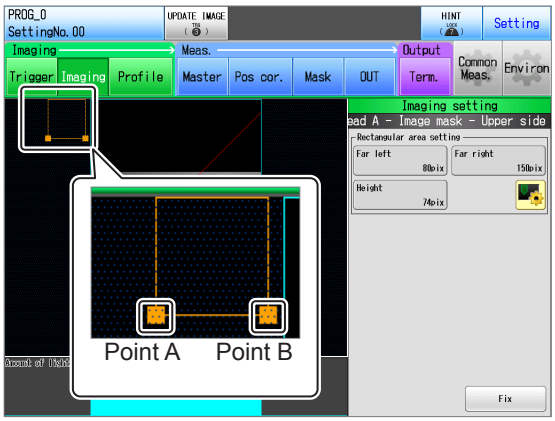


7 **Press the [SCREEN] key.**

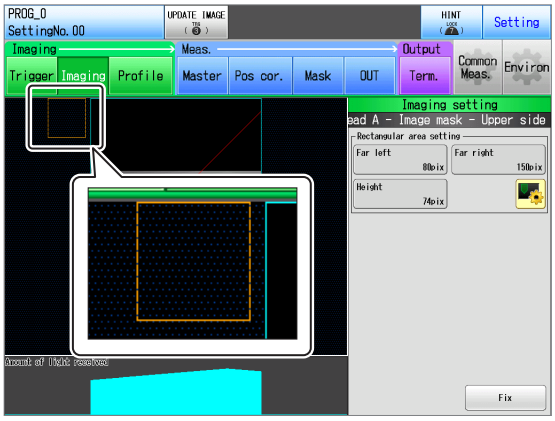
The cursor position will appear at both Point A and Point B.

8 **Move the position of using [△] [▽] [◁] [▷] keys.**

The area will move while maintaining the positions of Point A and Point B.



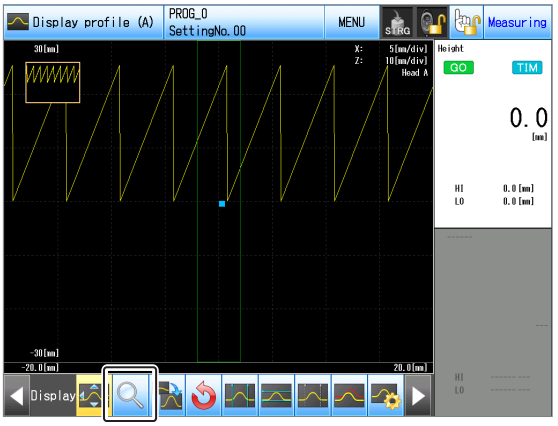
9 **Once you have decided the final position, press the [ENTER] key.**



Enlarge/Reduce

1 **Select the Enlarge/Reduce icon in the display menu and then press the [ENTER] key.**

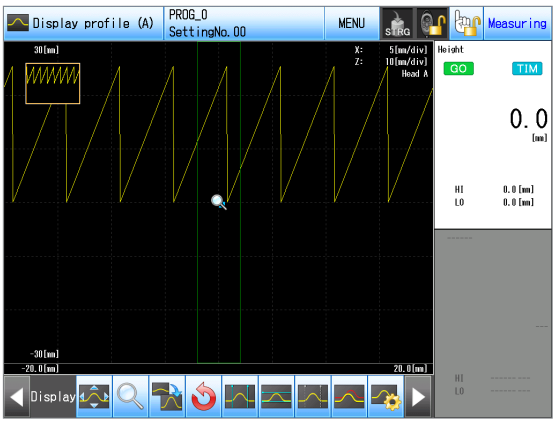
For displaying the display menu: “Displaying the operation menu” (Page 3-18)



The enlarge/reduce menu opens.
An icon appears on [Display profile] screen and enables operations.
Press the [ESCAPE] key during operations to return to the display menu.

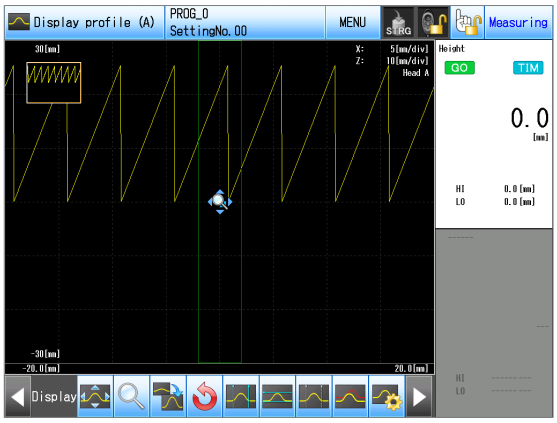
2 **Specify the center of the area where you want to enlarge/reduce with the [△], [▽], [◁], and [▷] keys.**

The display enlarges/reduces around the icon.



3 **Press the [ENTER] key.**

The icon changes its shape.



4 **Enlarge or reduce with the [△], [▽], [◁], and [▷] keys.**

△:Enlarge in Z direction
▽:Reduce in Z direction
◁ :Enlarge in X direction
▷ :Reduce in X direction

Reference

- You can also set the area by entering numeric values in the input fields for the setting edit area.
- If the screen is divided to display two profiles, enlargement/reduction in Z direction is available only for the profile with the icon displayed.
- Both of the profiles will change with the operation of enlargement/reduction in X direction.

5 **Press the [ESCAPE] key to return the icon to the state in Step *1*.**

The location for the center of enlargement/reduction can be reset.

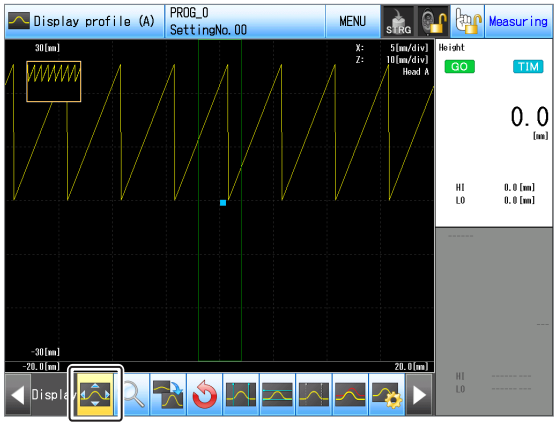
6 **Press the [ESCAPE] key to return the display menu.**

Move display area

Display area moves in the maximum display range.

1 **Select the Move display area icon in the display menu and then press the [ENTER] key.**

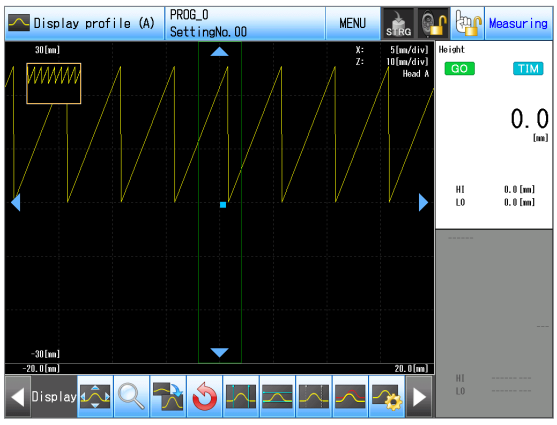
For displaying the display menu: “Displaying the operation menu” (Page 3-18)



The move display area menu opens.
An icon appears on [Display profile] screen and enables operations.
Press the [ESCAPE] key during operations to return to the display menu.

2 **Move the display area with the [△], [▽], [◁], and [▷] keys.**

△:Move along the Z-axis in the positive (+) direction
▽:Move along the Z-axis in the negative (-) direction
◁ :Move along the X-axis in the positive (+) direction
▷ :Move along the X-axis in the negative (-) direction



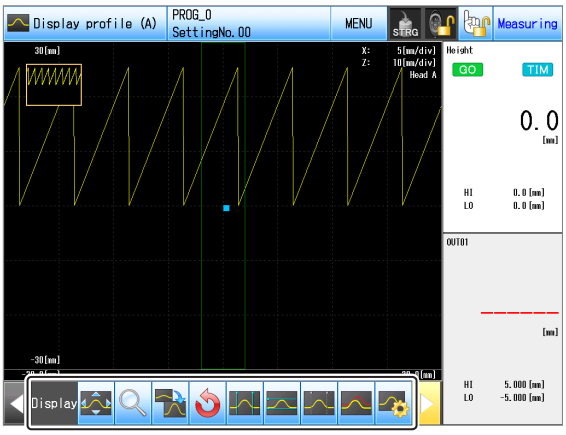
3 **Press the [ESCAPE] key to return the display menu.**

Basic operations of the operation menu

This section explains the basic operation of the operation menus used for operating the profile display, the height image display, and the numeric value display.

■ Displaying the operation menu

Press the [MENU] key to bring up the operation menu. The operation menu will appear at the bottom of the screen.



Several types of operation menus are available as shown below.
You can switch between them by pressing the [△] [▽] keys.
You can also switch between operation menus by selecting ◀ ▶ using [△] [▽] [◁] [▷] keys and pressing the [ENTER] key.



See the following for the basic button operations in each menu:
📖 “Basic operations of the display menu” (Page 3-18)
📖 “Basic operations of the operation 1 menu” (Page 3-20)
📖 “Basic operations of the operation 2 menu” (Page 3-20)
📖 “Basic operations of the storage menu” (Page 3-20)

■ Basic operations of the display menu

This section explains the basic operations of each button in the [display] menu.



● Move display area

This function can be operated after the [△], [▽], [◁], and [▷] icons appeared on the screen.
[△] [▽] key: Move the display area in vertical direction.
[◁] [▷] key: Move the display area in horizontal direction.

Reference The display area can be moved within the maximum display area.

● Enlarge/Reduce

This function can be operated after the magnifier icon appeared in the middle of the screen.
Specify the center of the enlargement/reduction by using the [△], [▽], [◁], and [▷] keys, and then press the [ENTER] key.
After the icon changed its shape, use the [△], [▽], [◁], and [▷] keys to perform the expand/reduce operation.
[△] [▽] key: Expand/reduce in vertical direction
[◁] [▷] key: Expand/reduce in horizontal direction

● 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

This button resets the enlarged/reduced display size and the moved display position back to the default states.

● Show/Hide cursor

These buttons show/hide the vertical or horizontal cursor in the display area.

: Display the vertical cursor.

: Display the horizontal cursor.

: Hide the cursor.

● Display master profile

(displayed in the [Display profile] view only)

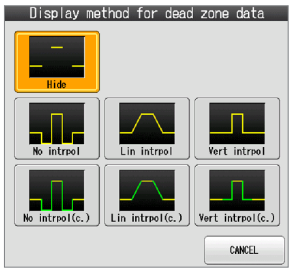
This button shows/hides the master profile.

● Display setting

The corresponding display settings screen will appear based on the display mode ([Display profile]/[Display height image]/[Display measurement value]).
See “Chapter 8 Checking the Measurement Results” (Page 8-1)” for the operations in each screen.

[Display method for dead zone data] screen

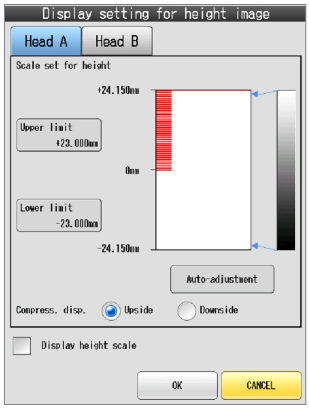
Selecting while in the [Display profile] view and pressing the [ENTER] key will bring up this settings screen.
You can set the display method for the dead zone data.



“Dead Zone processing” (Page 5-25)

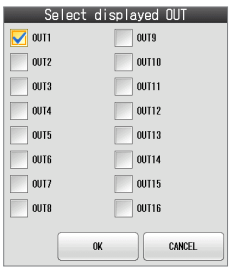
[Display setting for height image] screen

Selecting while in the [Display height image] view and pressing the [ENTER] key will bring up this setting screen.
You can set the upper/lower display limit for the height image, etc.



[Select displayed OUT] screen

Selecting while in the [Display measurement value] view and pressing the [ENTER] key will bring up this settings screen.
You can select the OUT to display for the numeric value display.



● Clear screen

(displayed in the [Display height image] view only)

This button clears the current height image display.

■ Basic operations of the operation 1 menu

This section explains the basic operations of each button in the [Op.1] menu.



● 

Trigger

This button issues the external trigger.

● 

Batch start/Batch complete

These buttons start/stop the batch measurement.

● 

Clear internal memory

(displayed in high-speed mode only)

This button clears the internal memory of the controller.

■ Basic operations of the operation 2 menu

This section explains the basic operations of each button in the [Op.2] menu.



● 

TIM1/TIM2

These buttons issue the timing requests for TIMING1/ TIMING2.

● 

ZERO1/ZERO2

These buttons issue the auto zero requests for ZERO1/ ZERO2.
Pressing this button for 3 seconds or more will issue the auto zero clear requests.

● 

RESET1/RESET2

These buttons issue the reset request for RESET1/ RESET2.

■ Basic operations of the storage menu

This section explains the basic operations of each button in the [storage] menu.



● 
Storage start/stop

This buttons start/stop the storage.

● 

Clear internal memory

This button clears the internal memory of the controller.

● 
Data check

This button brings up the [Profile storage] screen.
See “[Profile storage] Screen” (Page 8-20) for the screen operations.

■ Closing the menu

To close the menu, either press the [ESCAPE] key or press the  button at the far right of each menu.

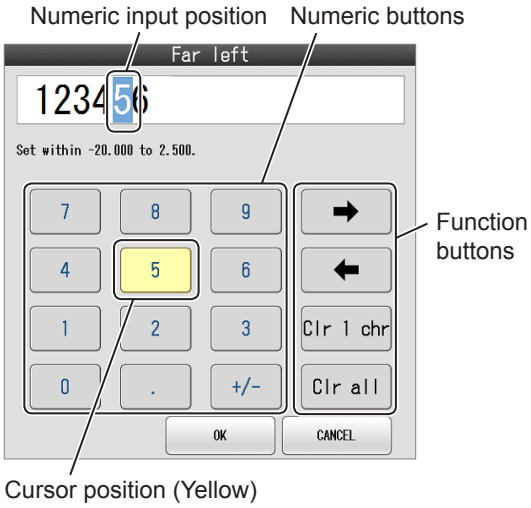
Basic Operations of the Touch Panel Monitor

This section explains the basic operations of the touch panel monitor connected to the display unit.

Entering numeric values

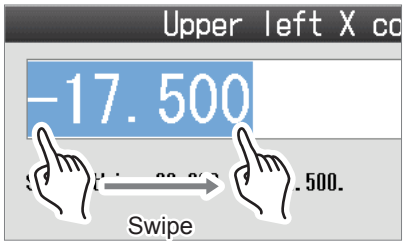
A numeric input dialog will appear when entering numeric values.

1 Enter one numeric value at a time by touching the numeric buttons and function buttons.



● **Moving the numeric input position**

Touch the desired input position.
You can select multiple digits by sliding your finger along the numbers.



Reference You can also move the numeric input position left or right by touching [←] or [→].

● **Entering numeric values**

Touch the numeric value you wish to enter.

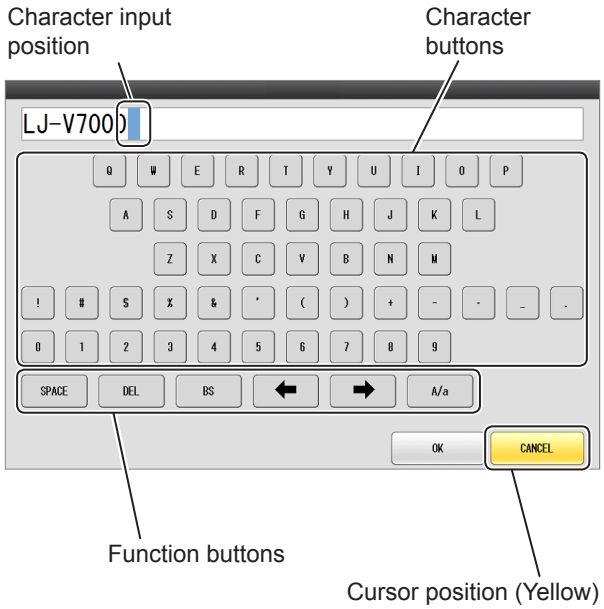
● **Erasing numeric values**

Select the numeric value you wish to delete, and then touch the [Clr 1 chr] button.
To erase all numeric values, touch the [Clr all] button.

Entering characters

A character input dialog will appear for entering the device name, program name, etc.
The required touch panel operations are as described below.
This section explains the procedure using the character input screen for entering the device name as an example.

1 Enter characters using the character type buttons, character buttons and function buttons.



● **Moving the character input position**

Touch the desired input position.

Reference You can also move the numeric input position left or right by touching [←] or [→].

● **Entering characters**

Touch the character you wish to enter.
To enter a blank space, touch the [SPACE] button.

● **Erasing characters**

Select the character you wish to erase and press the [DEL] button (deletes the currently selected character), or touch the [BS] button (deletes the character preceding the currently selected character).

● **Switching between uppercase and lowercase characters.**

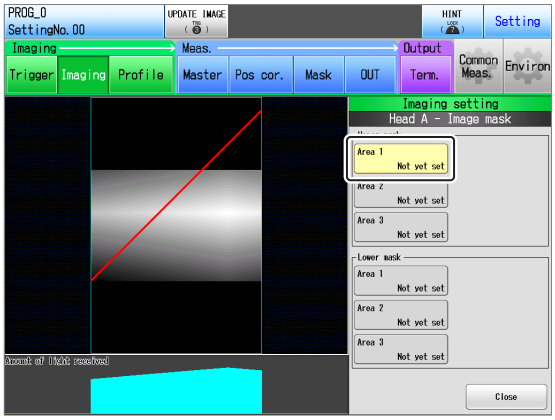
Move the cursor to the [A/a] button depending on the current character type. You can toggle between uppercase and lowercase characters by touching the button.

2 Once you have finished entering the characters, touch the [OK] button.

Drawing the areas

In the mask and measurement area settings, the areas will appear in the display region. The settings are performed by editing these areas.
This section explains how to edit the area using the mouse, using the image mask setting in the imaging setting as an example.

1 Touch the area you wish to set.



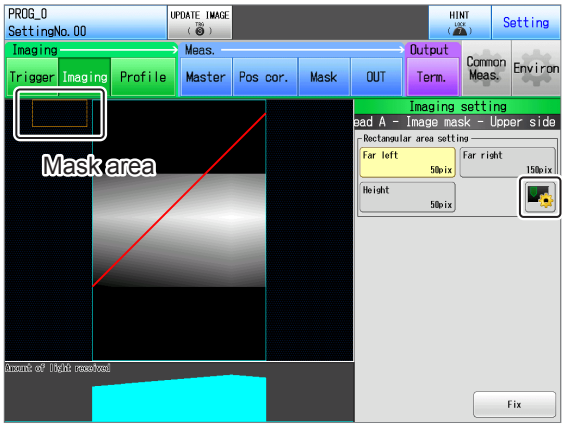
A dialog for selecting the area shape will appear.

2 Touch the shape of the mask area you wish to add.



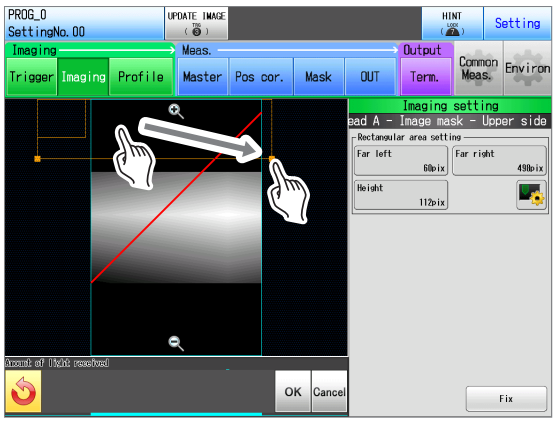
The mask area will appear.

3 Touch .

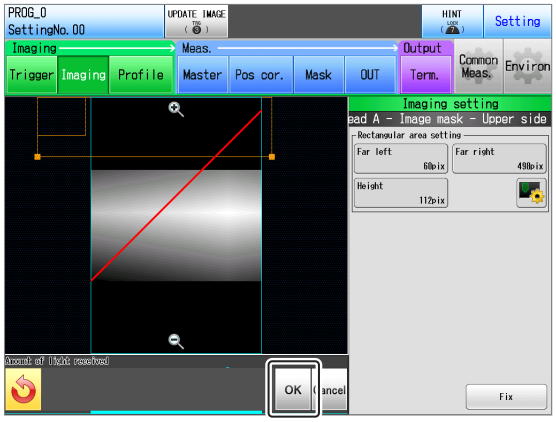


The mask area will be selected.

4 Move the position by dragging the peak of the selected area.



5 Once you have decided the final position, touch the [OK] button.



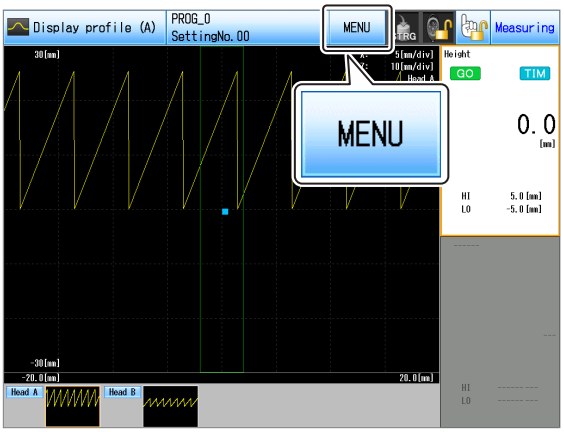
The area will be fixed.

Basic operations of the operation menu

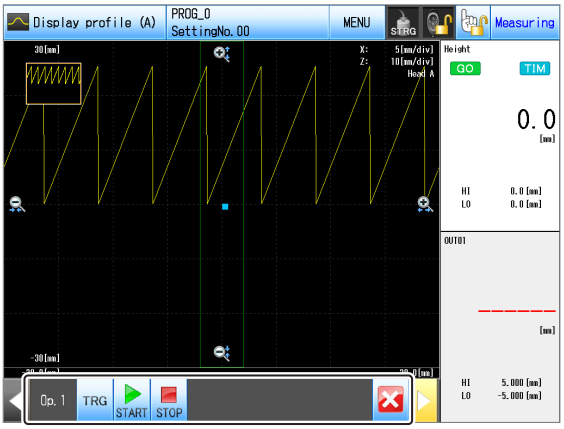
This section explains the basic operation of the operation menus used for operating the profile display, the height image display, and the numeric value display.

■ Displaying the operation menu

Press the [MENU] button at the top of the screen to bring up the operation menu.



The operation menu will appear at the bottom of the screen.



Several types of operation menus are available as shown below.

You can switch between them by touching ◀ ▶.



See the following for the basic button operations in each menu:

“Basic operations of the display menu” (Page 3-18)
“Basic operations of the operation 1 menu” (Page 3-20)
“Basic operations of the operation 2 menu” (Page 3-20)
“Basic operations of the storage menu” (Page 3-20)

■ Closing the menu

To close the menu, touch  at the far right of each menu.

4

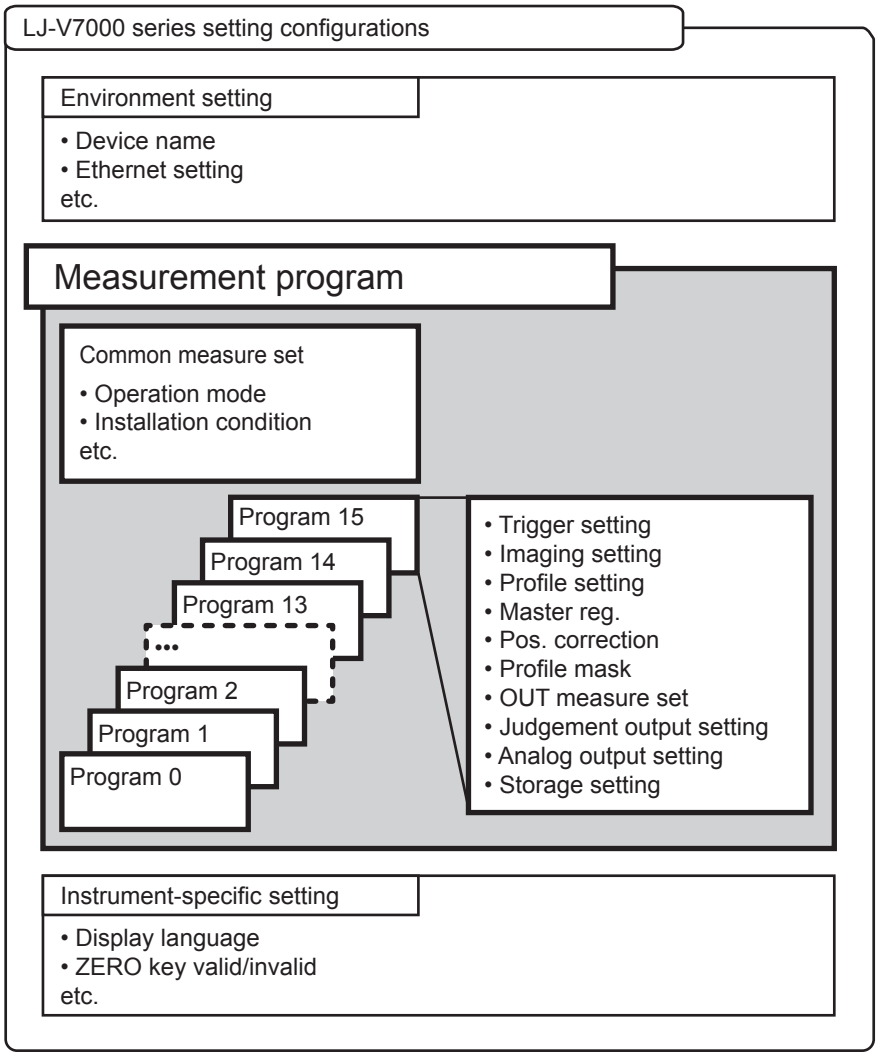
Setting Editing Methods and Program Operations

This section explains the summary of measurement programs, how to view the settings screen, and the procedures for setting measurement programs.
This section will also explain the procedures for backing up programs and restoring backed up programs.

Summary of the Setting Editing 4-2
Direct and Local Setting Editing 4-3
How to View the Settings Screen 4-4
Editing the Settings 4-6
Operating the Programs 4-10
Backing Up/Restoring All Settings 4-12
Resetting the Instrument Settings to their Factory Default States 4-14

Summary of the Setting Editing

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 measurement setting**

These settings are common for all measurements, such as the operation mode and head installation settings.
“Chapter 9 Measurement Common Setting” (Page 9-1)

● **Program 0 to Program 15**

A [Program] combines the sequence of settings from the trigger settings to storage settings* to define the measurement operation.
This unit 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.

* : Applicable to the advanced function mode. High speed mode only has trigger, imaging and profile settings.

From trigger setting to profile setting : “Chapter 5 Setting Image Conditions” (Page 5-1)
From master registration to OUT measurement setting : “Chapter 6 Setting the Measurement Processing Conditions” (Page 6-1)
From terminal output setting to storage setting : “Chapter 7 Setting the Terminal Output Condition/the Storage Condition” (Page 7-1)

Reference For the environment and instrument-specific settings, see “Chapter 10 System Setting” (Page 10-1).

Direct and Local Setting Editing

The LJ-V7000 series offers two methods for editing the settings. [Edit direct set] enables you to directly edit the settings (for the currently active measurement) that are stored on the controller; and [Edit local setting] enables you to create new settings and/or edit the settings that are stored on the PC.
This section explains the characteristics of each setting editing method.

Features of the direct setting editing

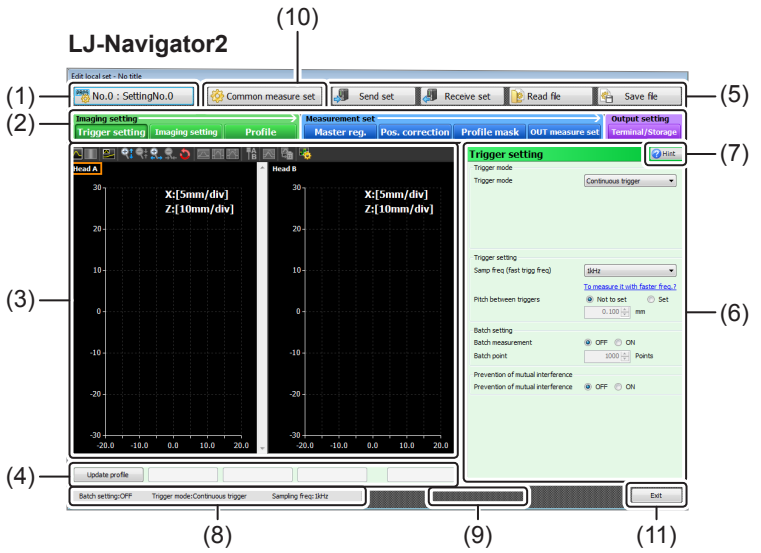
- You can directly edit the measurement program on the controller.
- Since the setting changes are reflected to the controller directly, you can change the settings as you check the measured profile and the changes in the height image display, etc.
- The editing of settings on the display monitor (console or touch panel) will also be direct setting editing.
- You cannot create a new measurement program.

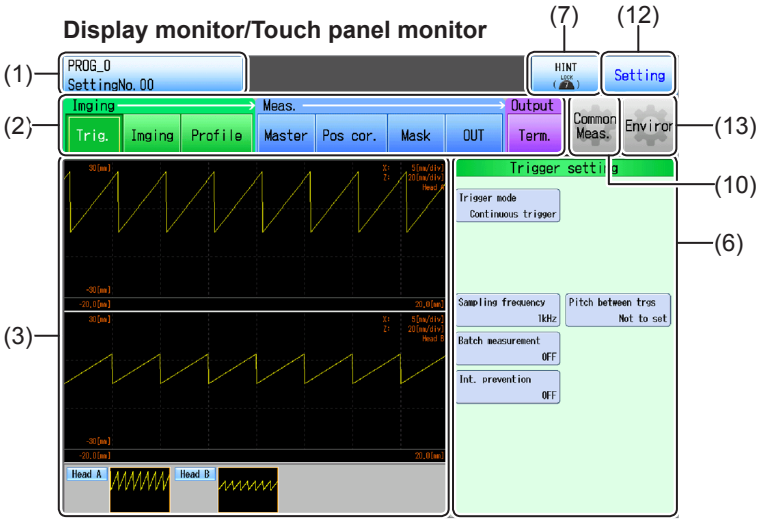
Features of the local setting editing

- You can create a new measurement program.
- You can edit measurement programs that are stored on the PC.
- You can load and edit measurement programs that are stored on the controller.
- The measurement programs that you created/edited can be sent to the controller or saved to the PC.
- The entire content of the measurement program (Common measurement setting + Program x 16) will be sent to the controller.
- The local setting function is only available for LJ-Navigator2.
- If multiple controllers are connected, you can send a measurement program (Common measurement setting + Program x 16) to each controller.

How to View the Settings Screen

This section explains how to view the setting screen, using the local setting editing 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.
“Switching between programs” (Page 4-10)

(2) Setting category switching button

The setting item categories will appear.
[Master reg.]/[Master] - [Terminal/Storage]/[Term.] will not appear if the current operation mode is high-speed mode.
Clicking this button will switch the setting item categories.
See the following items for the detailed setting procedures for each setting category:
“Chapter 5 Setting Image Conditions” (Page 5-1)
“Chapter 6 Setting the Measurement Processing Conditions” (Page 6-1)
“Chapter 7 Setting the Terminal Output Condition/ the Storage Condition” (Page 7-1)

(3) Profile display area/Operation buttons

The profile, height image or captured image will appear according to the setting.
You can also perform display setting operations such as switching the display screens, enlarging/ reducing the display size and showing/hiding the cursor.
“Basic Operations of LJ-Navigator2” (Page 3-10)
“Basic Operations of the Console” (Page 3-13)
“Basic Operations of the Touch Panel Monitor” (Page 3-21)

(4) Command operation area (only displayed in LJ-Navigator2)

This area contains the buttons for executing commands on the controller, such as [Trigger input], [Clear memory] and [Update profile].
The displayed buttons will vary depending on the setting category and the state of the profile display area.
See the following items for information on how to operate each button:
“Chapter 5 Setting Image Conditions” (Page 5-1)
“Chapter 6 Setting the Measurement Processing Conditions” (Page 6-1)
“Chapter 7 Setting the Terminal Output Condition/ the Storage Condition” (Page 7-1)

(5) Program operation buttons (displayed in LJ-Navigator2 only)

- [Send set] ..... The set measurement program (Common measurement setting + Program x 16) is sent to the controller.
- [Receive set]..... Loads a measurement program from the controller.
- [Read file] ..... Loads the measurement program file.
- [Save file] ..... Stores the set measurement program in a file. Setting files can be saved as not only the dedicated format of LJ-V7000 series, but also TSV (text) format.

* Buttons other than [Save file] only appear during local setting editing.

(6) Setting edit area

Detailed setting items will appear according to the setting category.
Only the basic setting items are displayed initially in each setting category. To perform more details settings, click the [Go to advanced set] button.
See the following items for the detailed setting procedures for each setting category:
“Chapter 5 Setting Image Conditions” (Page 5-1)
“Chapter 6 Setting the Measurement Processing Conditions” (Page 6-1)
“Chapter 7 Setting the Terminal Output Condition/ the Storage Condition” (Page 7-1)

(7) [Hint] button

Help information regarding the currently active setting edit area will appear.

(8) Settings summary area (only displayed in LJ-Navigator2)

The summary of the currently edited settings will appear.

(9) Display OUT measurement processing time (displayed in [Edit direct set] screen only)

The OUT measurement processing time is displayed in 0.01ms increments.
If the batch measurement is OFF, and the sampling time is shorter than the OUT measurement processing time, the measurement processing may not be finished and the profile will be discarded. In this case, change the settings so that the sampling time becomes longer than the OUT measurement processing time.

(10) [Common measure set] button/[Common meas.] button

Clicking these buttons will bring up the [Common measure set] screen.
“Chapter 9 Measurement Common Setting” (Page 9-1)

(11) Settings screen control button (only displayed in LJ-Navigator2)

This button is used for switching the setting category and for terminating/canceling the setting.

- [Exit] ..... [Complete] will appear for direct setting editing. The edited setting will be saved to the controller; 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.

(12) Measurement/Setting mode button (appears on the display monitor and touch panel monitor only)

The setting will complete and the measurement screen will appear when you press this button.
[Measuring] will appear on the measurement screen.

(13) [Environment] button (appears on the display monitor and touch panel monitor only)

The [Environment setting] screen will appear when you press this button.
“Chapter 10 System Setting” (Page 10-1)

Editing the Settings

This section explains the procedure for editing the following measurement program:

- Editing the controller setting directly (Edit direct set)
- Creating and editing a new setting file (Edit local set)
- Loading the settings from a file or the controller and editing them (Edit local set)

This section will also explain the procedures for switching the program to set, changing the program name, copying programs and initializing set program.

Editing the controller setting directly (Edit direct set)

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

“How to View the Settings Screen” (Page 4-4)
“Setting Conditions for Different Purposes” (Page A-48)
“Function Restrictions Applicable to the Combinations of Settings Items” (Page A-50)

Reference The procedure explained here is for LJ-Navigator2. See “Switching Screens on the Display Monitor/Touch Panel Monitor” (Page A-26) for operating procedures for the display monitor/touch panel monitor.

1 Click the [Direct setting] button on the measurement screen.

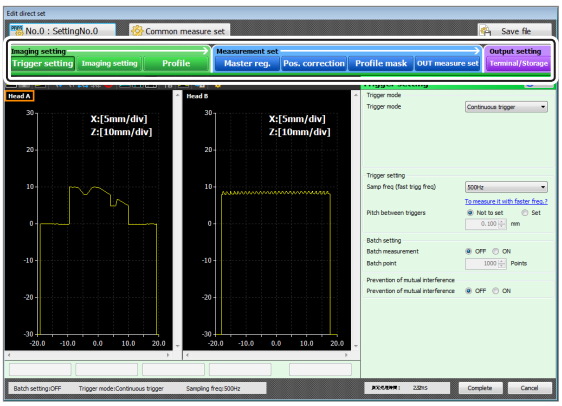


The [Edit direct set] screen will appear.

2 Switch to the program you wish to set.

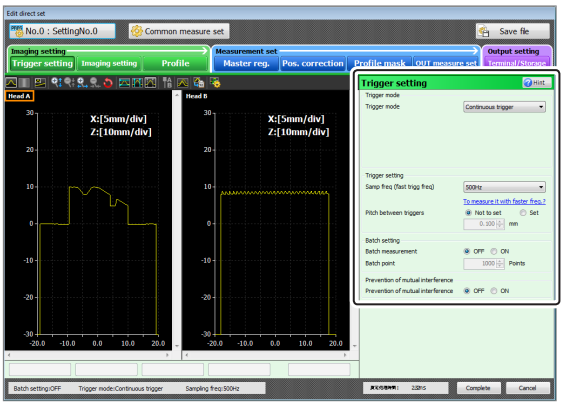
“Switching between programs” (Page 4-10)

3 Click the setting category you wish to edit.



4 Edit the measurement program in the setting edit area.

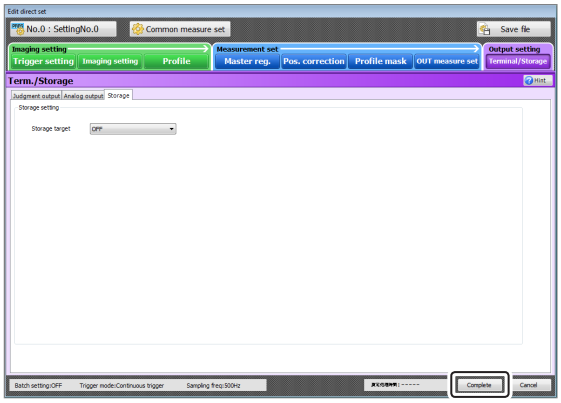
“Chapter 9 Measurement Common Setting” (Page 9-1)
“Chapter 5 Setting Image Conditions” (Page 5-1)
“Chapter 6 Setting the Measurement Processing Conditions” (Page 6-1)
“Chapter 7 Setting the Terminal Output Condition/ the Storage Condition” (Page 7-1)



When you change the setting, it will be reflected to the controller in directly and the profile display area will be updated.

Reference The [Program switch] in the common measurement settings will not be reflected directly.
It will be sent to the controller when the [Complete] button is clicked in ***5***.

5 **Once you have finished editing the setting, click the [Complete] button.**



You will return to the measurement screen.
“Chapter 8 Checking the Measurement Results” (Page 8-1)

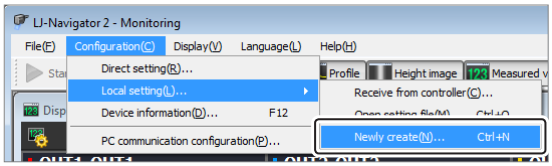
Creating and editing a new setting file (Edit local set)

This section explains the procedures for creating a new measurement program based on the initial values set according to the head model, the number of heads and the head installation, and sending it to the controller.

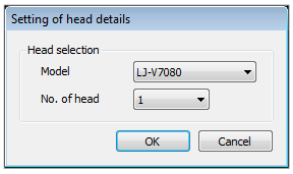
“How to View the Settings Screen” (Page 4-4)
“Setting Conditions for Different Purposes” (Page A-48)
“Function Restrictions Applicable to the Combinations of Settings Items” (Page A-50)

Reference The function for creating a new measurement program is only available in the local setting editing in LJ-Navigator2.

1 **Select [Local setting]→[Newly create] under the [Configuration] menu.**

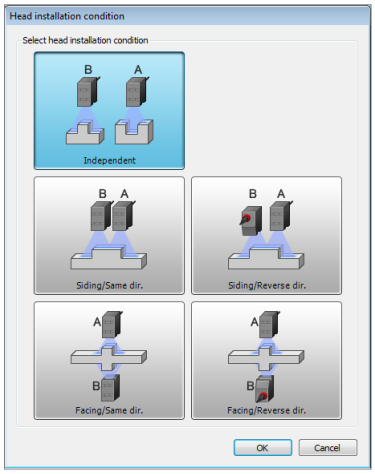


2 **Select the [Model] and [No. of head] of the head from the pull-down menu, and click the [OK] button.**



Proceed to **3** if the number of heads is [2]; and proceed to **4** if the number of head is [1].

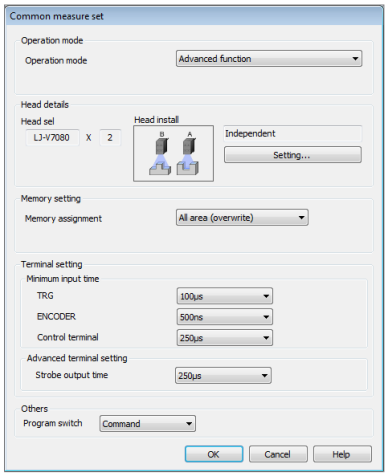
3 **Select the head installation in the [Head installation condition] dialog and click the [OK] button.**



The [Common measure set] dialog will appear.

4 **Set the common measurement settings and click the [OK] button.**

“Chapter 9 Measurement Common Setting” (Page 9-1)



The [Edit local set] screen will appear.

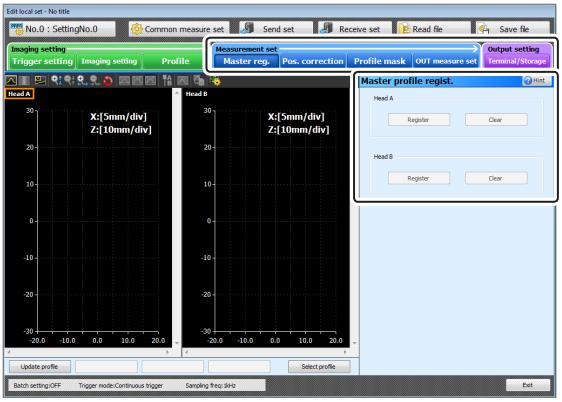
5 **Set the image setting.**

“Chapter 5 Setting Image Conditions” (Page 5-1)



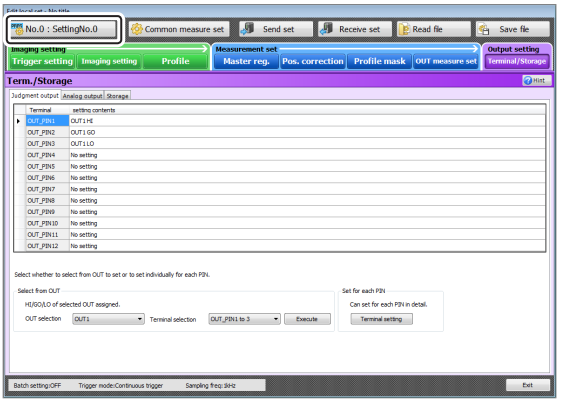
6 If you set the operation mode to [Advanced function] in the common measurement settings, you will set the measurement settings and the terminal output/storage settings.

“Chapter 6 Setting the Measurement Processing Conditions” (Page 6-1)
“Chapter 7 Setting the Terminal Output Condition/ the Storage Condition” (Page 7-1)

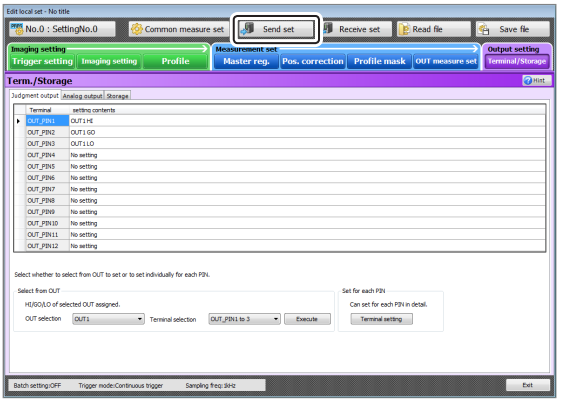


7 If you wish to set another program, switch to the desired program and repeat steps 5 and 6.

“Switching between programs” (Page 4-10)



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



A confirmation dialog for sending programs to the controller will appear.

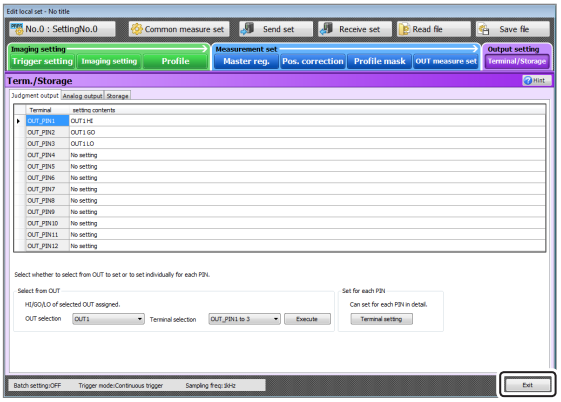
9 Click the [OK] button.

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

10 Click the [OK] button.

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

11 Click the [Exit] button.



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

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

- If you click the [Yes] button, the [Save File As] screen will appear. Select a desired folder and click the [Save] button. The measurement program will be saved; and you will be taken back to the measurement screen.
- Clicking the [No] button will take you back to the measurement screen without saving.

A new setting file has now been created.
“Chapter 8 Checking the Measurement Results” (Page 8-1)

Loading the settings from a file or the controller and editing them (Edit local set)

This section explains the procedure for editing the measurement program using local setting editing.
In local setting editing, you can edit the measurement programs using the following methods:

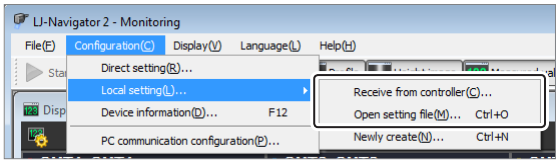
- Loading and editing a measurement program stored in a file
- Loading and editing a measurement program stored on the controller

You can select the editing method suitable for your purpose, and edit the measurement program.

"How to View the Settings Screen" (Page 4-4)
"Setting Conditions for Different Purposes" (Page A-48)
"Function Restrictions Applicable to the Combinations of Settings Items" (Page A-50)

Reference The local setting function is only available for LJ-Navigator2.

1 Click [Local setting] under the [Configuration] menu and select the editing method.



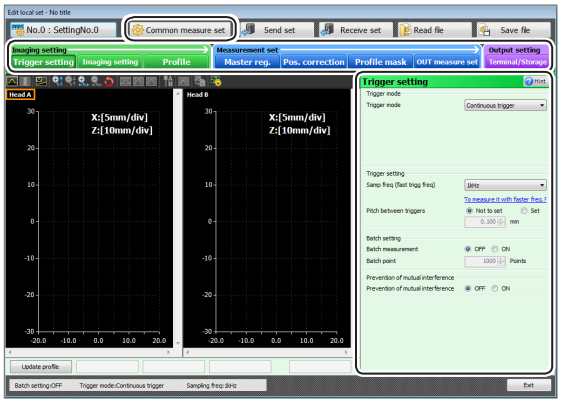
The [Edit local set] screen will appear.

2 Switch to the program you wish to set.

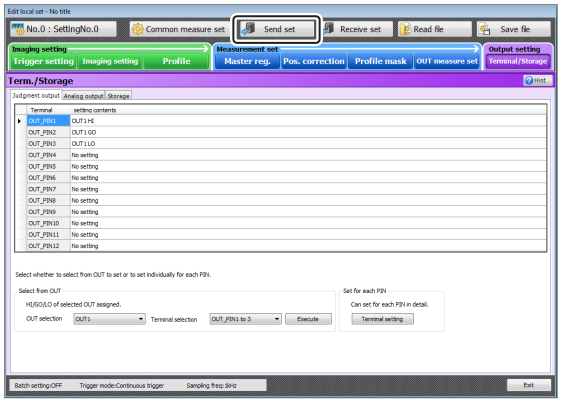
"Switching between programs" (Page 4-10)

3 Check the measurement program and edit the settings as necessary.

"Chapter 9 Measurement Common Setting" (Page 9-1)
"Chapter 5 Setting Image Conditions" (Page 5-1)
"Chapter 6 Setting the Measurement Processing Conditions" (Page 6-1)
"Chapter 7 Setting the Terminal Output Condition/ the Storage Condition" (Page 7-1)



4 When you have finished, click the [Send set] button.



A confirmation dialog for sending programs to the controller will appear.

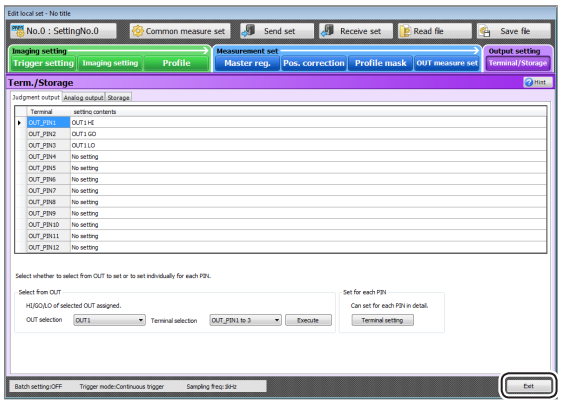
5 Click the [OK] button.

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

6 Click the [OK] button.

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

7 Click the [Exit] button.



Reference If the open setting file has been edited, a dialog for confirming whether to save the changes will appear. Save the changes as required.

You will return to the measurement screen.

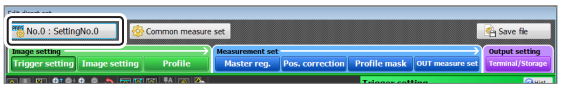
"Chapter 8 Checking the Measurement Results" (Page 8-1)

Operating the Programs

Switching between programs

This section explains the procedure for switching the program to set.

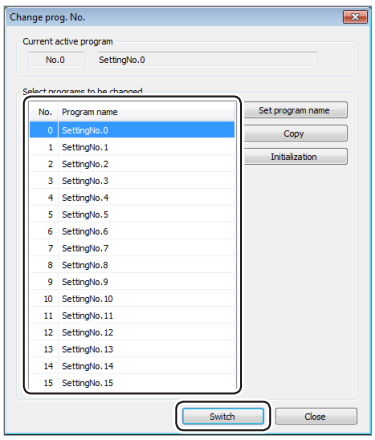
1 Click the change prog. No. button.



The [Change prog. No.] screen will appear.

2 Select the program you wish to switch from the list in [Select programs to be changed].

3 Click the [Switch] button.



The settings screen for the switched program will appear.

Changing the program name

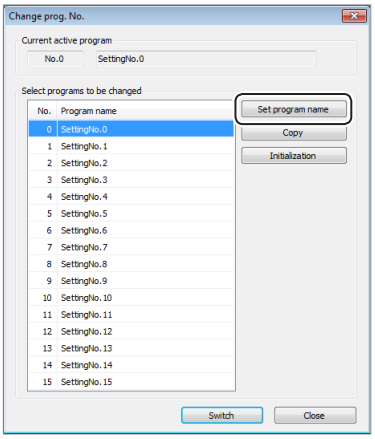
This section explains the procedure for renaming programs.

1 Click the change prog. No. button.



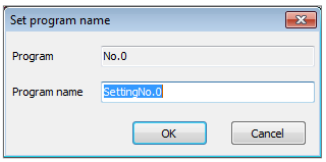
The [Change prog. No.] screen will appear.

2 Click the [Set program name] button.



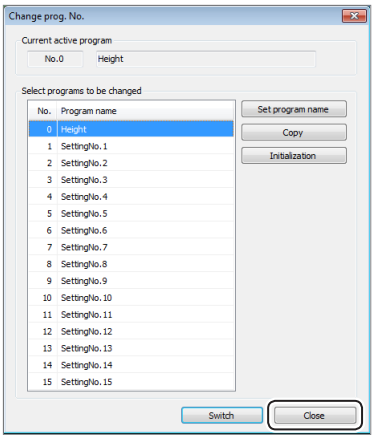
The screen for changing the program name will appear.

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



You will return to the [Change prog. No.] screen.

4 Click the [Close] button.

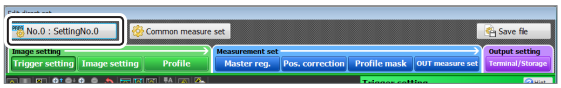


You will return to the settings screen.

Copying programs

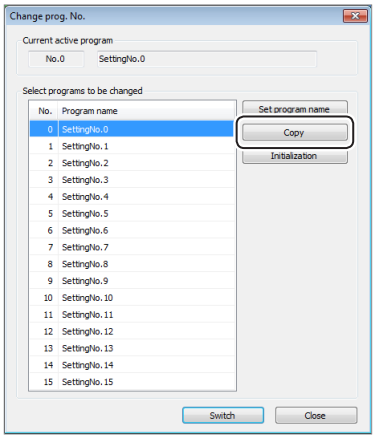
This section explains the procedure for copying the settings of one program No. to another program No.

1 Click the change prog. No. button.



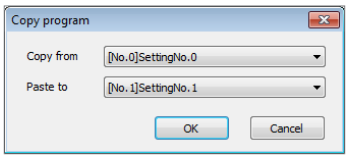
The [Change prog. No.] screen will appear.

2 Click the [Copy] button.



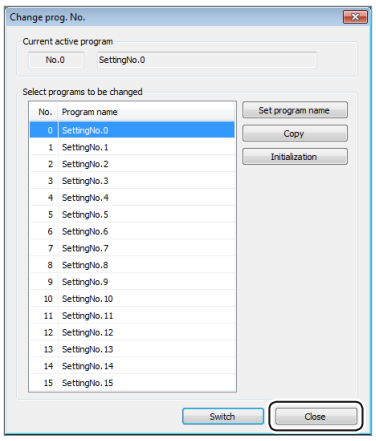
The screen for selecting the copy source and destination will appear.

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



You will return to the [Change prog. No.] screen.

4 Click the [Close] button.

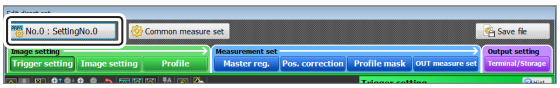


You will return to the settings screen.

Initializing programs

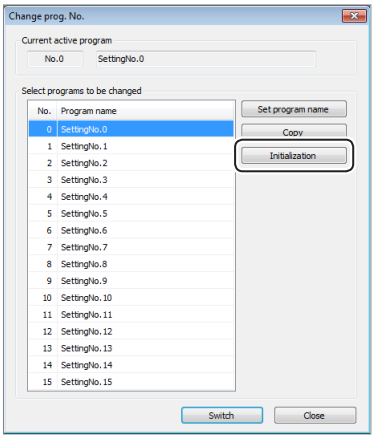
This section explains the procedure for initializing the program settings.

1 Click the change prog. No. button.



The [Change prog. No.] screen will appear.

2 Click the [Initialization] button.

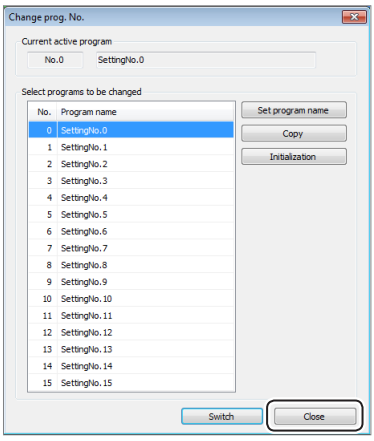


A dialog for confirming the initialization will appear.

3 Click the [OK] button.

You will return to the [Change prog. No.] screen.

4 Click the [Close] button.



You will return to the settings screen.

Backing Up/Restoring All Settings

Backing up settings

The backup function allows you to back up the controller settings to a file (*.cbk). The backed up data include the measurement program as well as the environment and instrument-specific settings.

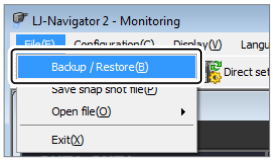
“Summary of the Setting Editing” (Page 4-2)

You are advised to back up the settings to prevent data loss in the event of system trouble or failure.

Reference The backup function is only available for LJ-Navigator2.

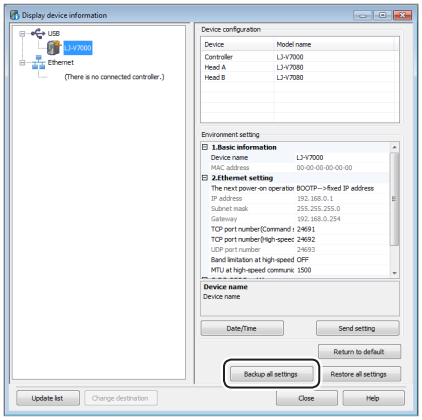
This section explains the procedure for backing up the controller settings.

1 Select [Backup / Restore] from the [File] menu.



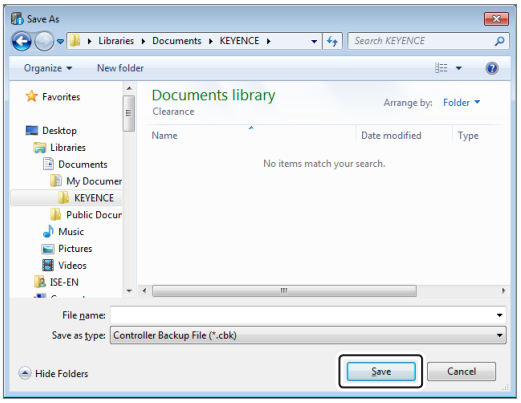
The [Display device information] screen will appear.

2 Click the [Backup all settings] button.



The [Save As] screen will appear.

3 Enter the file name and click the [Save] button.



The controller settings (Common measurement settings + 16 programs, environment setting and instrument-specific setting) will be saved to a file. When the backup is complete, a confirmation dialog will appear.

4 Click the [OK] button.

You will return to the [Display device information] screen.

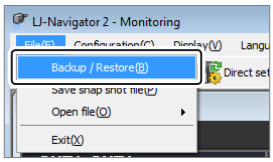
Restore

The restore function allows you to load and restore the controller settings from a file (*.cbk) that was saved using the backup function.

Reference The restoration function is only available for LJ-Navigator2.

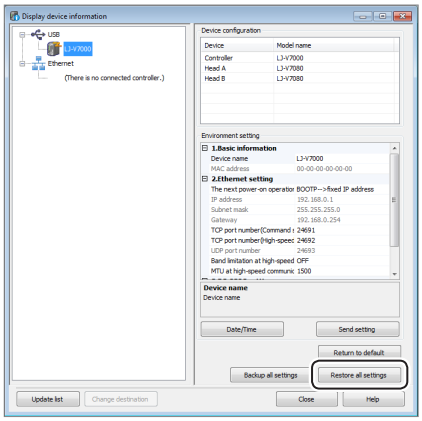
This section explains the procedure for restoring the controller settings.

1 Select [Backup / Restore] from the [File] menu.



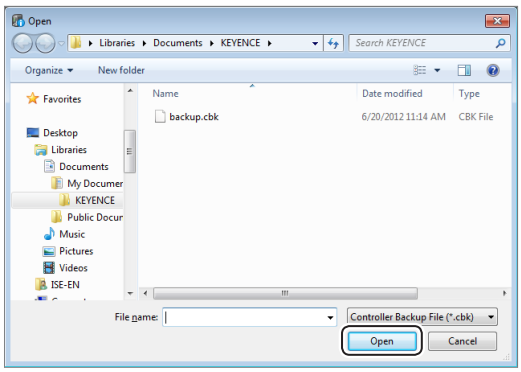
The [Display device information] screen will appear.

2 Click the [Restore all settings] button.



The [Open] screen will appear.

3 Select and open a backup file (*.cbk).



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

Reference If the head configuration (model, no. of heads) of the controller 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 the [Yes] button.

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

5 Click the [OK] button.

You will return to the [Display device information] screen.

Resetting the Instrument Settings to their Factory Default States

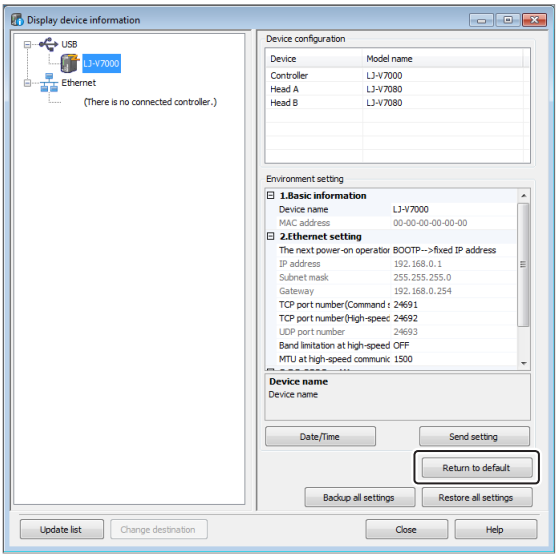
You can reset all settings of the destination controller to their default.
“Initial Values (Factory Default) and Setting Ranges” (Page A-52)

■ LJ-Navigator2

1 Open the [Display device information] screen.

“Displaying the controller system settings screen” (Page 10-2)

2 Click the [Return to default] button.



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

3 Click the [Yes] button.

A restart confirmation dialog will appear.

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

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

5 Click the [OK] button.

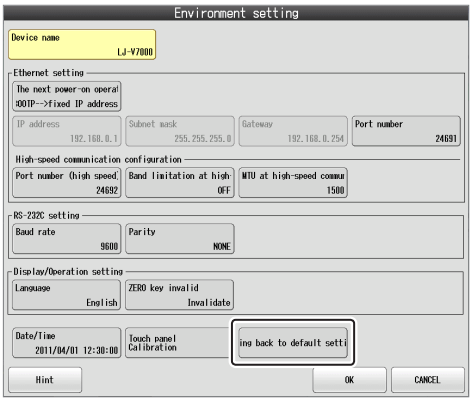
You will return to the [Display device information] screen.

■ Display monitor/Touch panel monitor

1 Open the [Environment setting] screen.

“Displaying the controller system settings screen” (Page 10-2)

2 Select the [Return to default] button using the [△] [▽] [◁] [▷] keys, and then press or touch the [ENTER] key.



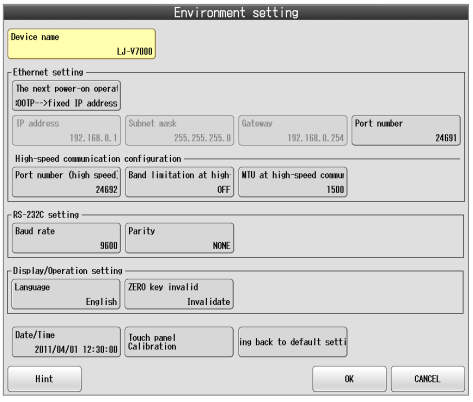
A dialog for confirming whether you wish to restore the factory settings will appear.

3 Select the [Yes] button using the [△] [▽] [◁] [▷] keys, and then press or touch the [ENTER] key.

A completion confirmation dialog will appear.

4 Press the [Enter] key, or touch the [OK] button.

You will return to the [Environment setting] screen.



5

Setting Image Conditions

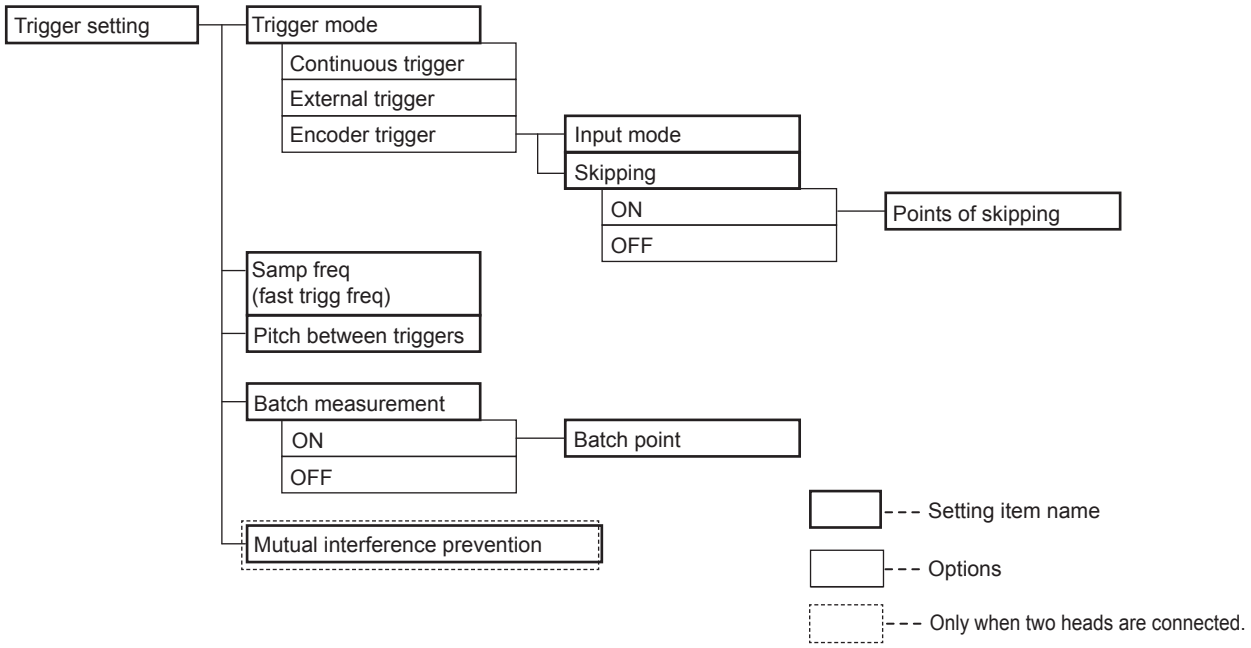
This chapter describes the contents and setup procedure on the trigger setup, imaging setup, and profile setup.

Setting Items of the Image Setting..... 5-2
Setting the Trigger Conditions (Trigger Settings) . 5-5
Setting the Image Conditions (Image Settings)... 5-12
Setting the Processing Method of the Profile (Profile Setting)..... 5-21

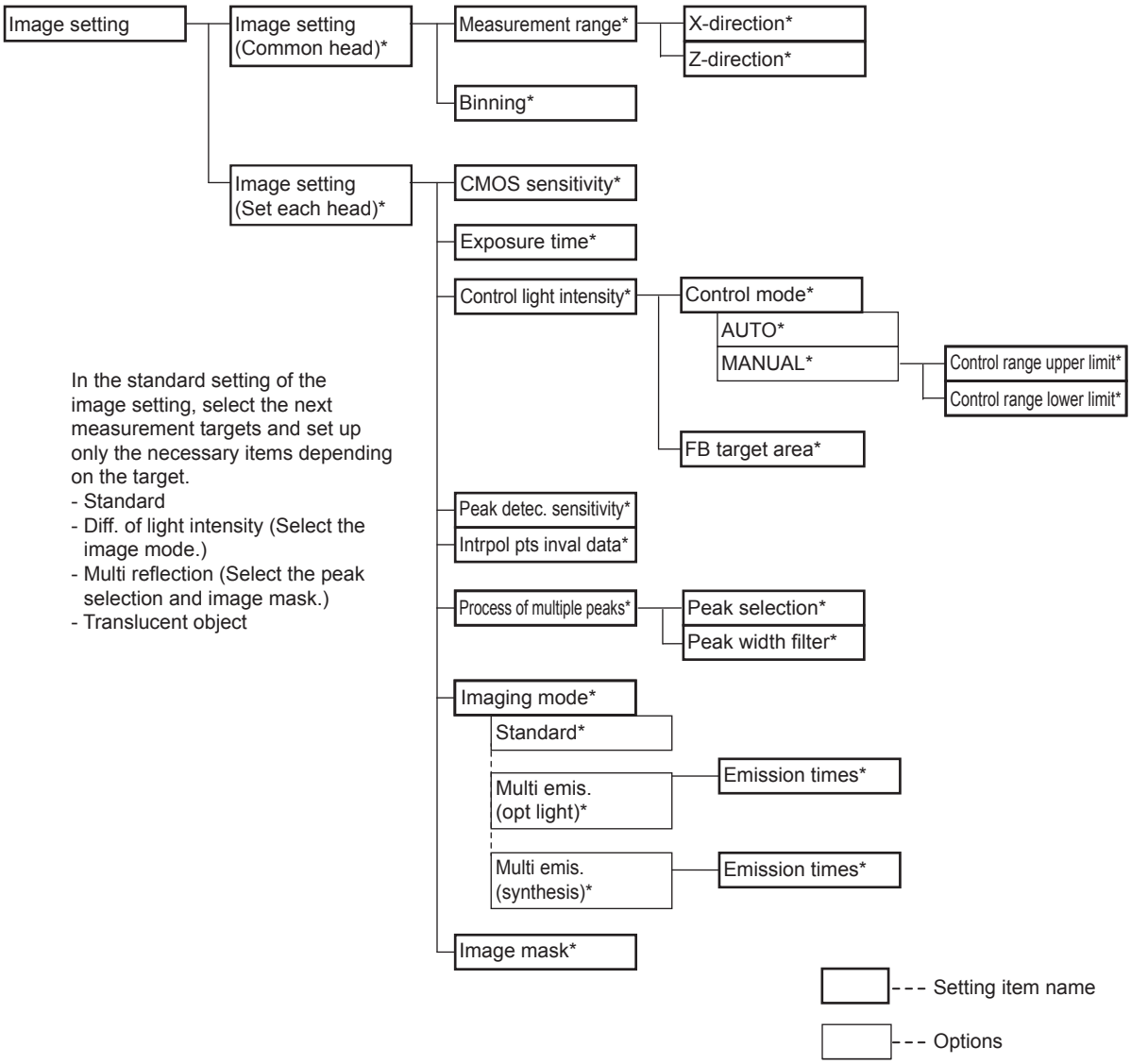
Setting Items of the Image Setting

The image setting sets the trigger conditions, image conditions, and profile processing conditions.
The available setting options for the image setting are listed below.
The available options include [Standard set] and [Advanced set]. The items with [*] are only available with [Advanced set].
Please refer to the following items for details of each setting items.
“Initial values and setting ranges for the imaging setting” (Page A-54)
“Setting the Trigger Conditions (Trigger Settings)” (Page 5-5)
“Setting the Image Conditions (Image Settings)” (Page 5-12)
“Setting the Processing Method of the Profile (Profile Setting)” (Page 5-21)

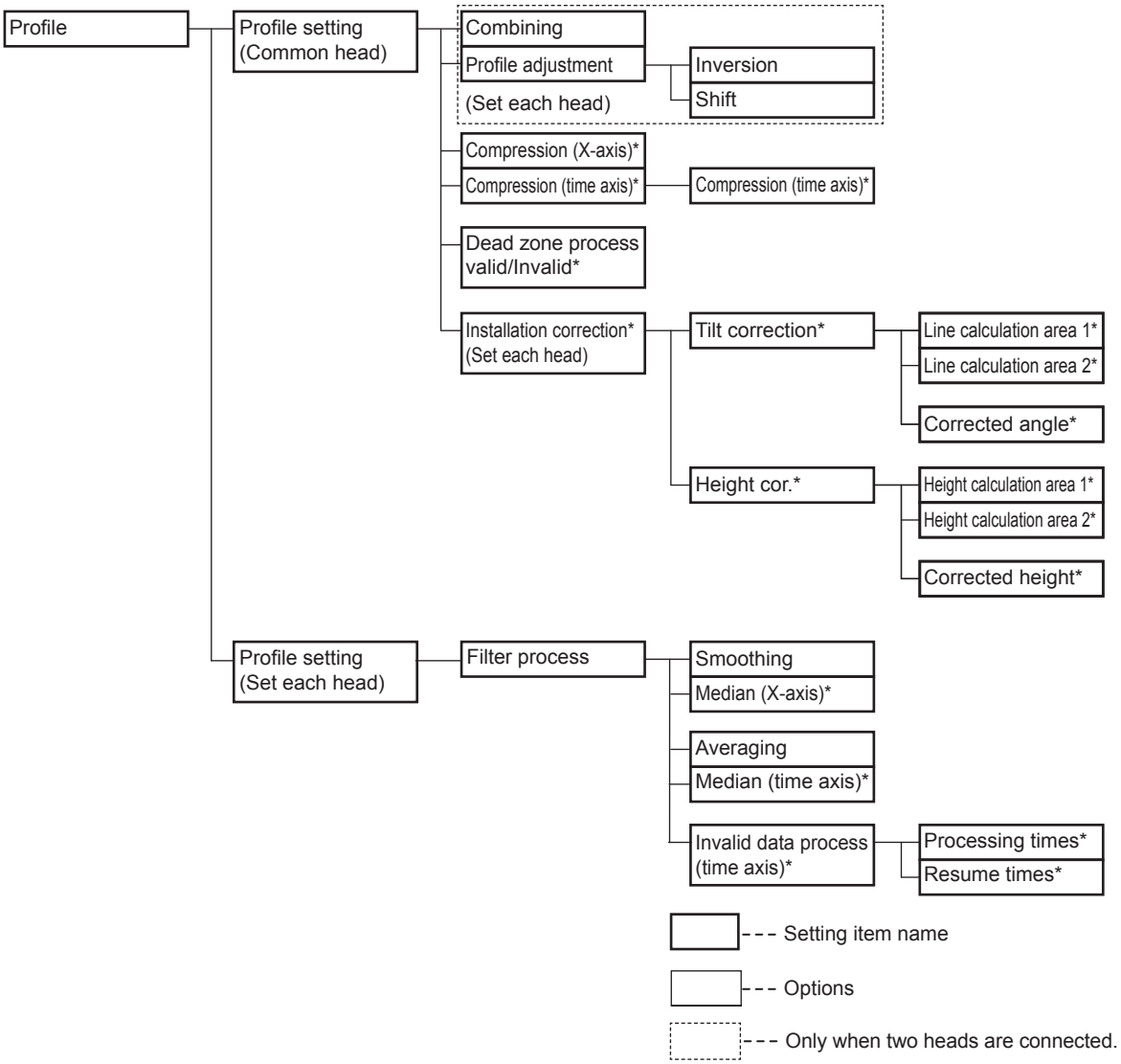
● **Trigger setting (Trigger conditions)**



● **Image setting (Image conditions)**



● **Profile setting (profile processing method)**



Setting the Trigger Conditions (Trigger Settings)

Trigger settings

The trigger is the timing signal used to perform sampling (imaging).
With the LJ-V7000, setting the trigger operation conditions allows continuous sampling or arbitrary sampling. In the trigger settings, the trigger operation conditions can be set for each target.
“Function Restrictions Applicable to the Combinations of Settings Items” (Page A-50)

■ Trigger mode

Two types of triggers are available: one is [Continuous trigger] to automatically and internally generate the triggers continuously, and the other is [External trigger] to generate the trigger at arbitrary timing by the external input.
The inputs for [External trigger] include the following.

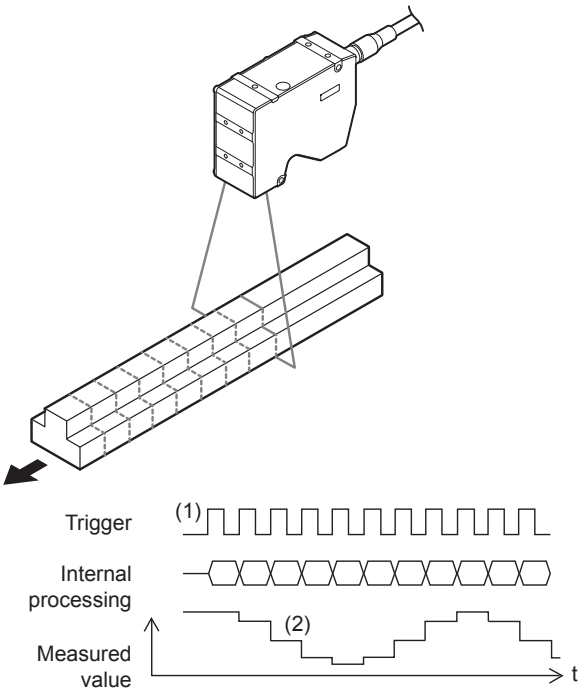
- Trigger input terminal
- Encoder signal input terminal
- Trigger button (LJ-Navigator2, console, and touch panel)
- Communication command (Ethernet, USB, and RS-232C)

The trigger mode can be selected from [Continuous trigger], [External trigger], and [Encoder trigger].

● Continuous trigger

This setting automatically generates the triggers continuously to continue sampling.
This setting disables the external trigger input.

Measurement example: Continuous measurement of the target.



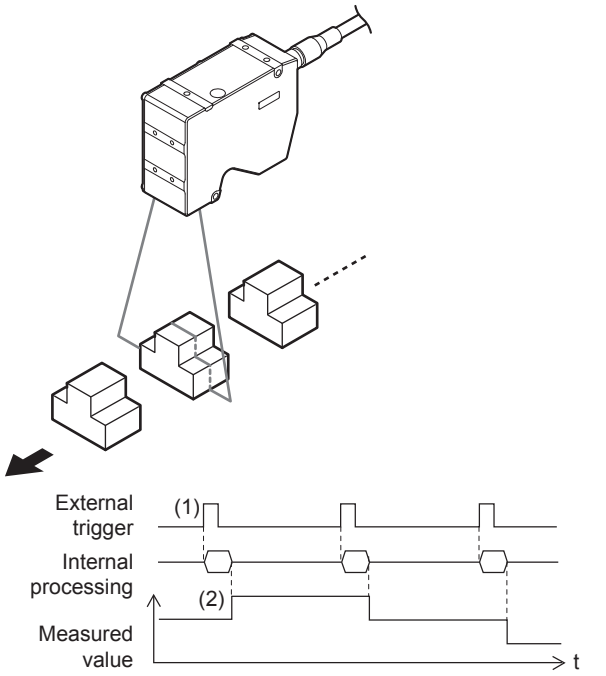
(1) The controller continuously generates the triggers at the set sampling frequency.

(2) The controller continuously performs the measurements.

● **External trigger**

With this setting, the trigger input from the communication command and the input terminal generate the trigger at arbitrary timing to perform sampling.

Measurement example: Measurement of the target one by one.



(1) The controller starts sampling in response to the trigger input at arbitrary timing.

(2) The controller measures the target at every trigger input.

● **Encoder trigger**

This setting accepts pulse signals (the signal output from an incremental encoder) entered into the encoder signal terminal as triggers.
An incremental encoder outputs pulse signals depending on the travel (distance and angle). The profile imaged by the encoder trigger is attached with [pulse count] obtained by counting the pulses input from the encoder.
When [Encoder trigger] is selected, set up [Input mode] and [Skipping].

• Input mode ..... Select from the following depending on the encoder to be used.
1-phase 1 TM (no dir.), 2-phase 1 time, 2-phase 2 times, and 2-phase 4 times
“Encoder trigger input modes” (Page A-2)

• Skipping..... When the encoder output is too fast for the trigger interval actually required for the imaging, trigger skipping can be enabled. It is set as [Point of skipping] how many triggers are skipped at one time. The triggers are emitted at the end of the [Point of skipping]. For example, if the [Point of skipping] is set to five points, the first through the fourth points will be skipped, then a trigger will be emitted on the fifth point.

Example) When the Skipping count is five.



Ignored by the setting of the trigger skipping.

Reference The triggers are skipped not according to the number of the encoder inputs but the pulse count.

■ Sampling frequency (Fast trigger frequency)

When the trigger mode is set to continuous trigger, the trigger is generated at the frequency set here. However, even if the trigger mode is set to external trigger, the trigger inputs at a faster frequency than that set here are ignored. The table below shows the fastest trigger frequency that can be input.

Measurement range		Binning	Parallel imaging (*1)	Settable fast sampling frequency (Fast trigger frequency)
Z-direction	X-direction			
FULL	FULL	OFF	OFF	1kHz (default setting[*2])
				2kHz
MIDDLE				4.13kHz
SMALL				4.13kHz
FULL	MIDDLE			4.13kHz
MIDDLE				4.13kHz
SMALL				8kHz
FULL	SMALL			4.13kHz
MIDDLE				8kHz
SMALL				8kHz
FULL	FULL	ON		8kHz
MIDDLE				8kHz
SMALL				16kHz
FULL	MIDDLE			8kHz
MIDDLE				16kHz
SMALL				16kHz
FULL	SMALL			16kHz
MIDDLE				16kHz
SMALL				32kHz
FULL	FULL	OFF	ON	4kHz
MIDDLE				4.13kHz
SMALL				8kHz
FULL	MIDDLE			4.13kHz
MIDDLE				4.13kHz
SMALL				8kHz
FULL	SMALL			4.13kHz
MIDDLE				8kHz
SMALL				16kHz

Measurement range		Binning	Parallel imaging (*1)	Settable fast sampling frequency (Fast trigger frequency)
Z-direction	X-direction			
FULL	FULL	ON	ON	8kHz
MIDDLE				16kHz
SMALL				16kHz
FULL	MIDDLE			16kHz
MIDDLE				16kHz
SMALL				32kHz
FULL	SMALL			16kHz
MIDDLE				32kHz
SMALL				64kHz

*1 [Parallel imaging] is only available in high speed mode.

The following settings slow the maximum sampling frequency (trigger frequency) down to about 1/2 of that before the settings.

- Turn on [Mutual interference prevention].
- With [Peak selection], select [Remove X multiple reflection] or [Remove Y multiple reflection].

The following settings slows the maximum sampling frequency (trigger frequency) by the multiple number of the time of emissions compared with that before the settings.

- With [Image mode], select [Multi emis. (opt light)].
- With [Image mode], select [Multi emis. (synthesis)].

*2 Because the default [Image mode] is [Multi emis. (opt light)/Emission times: 2] in addition to the display cell in the table above , the maximum sampling frequency (trigger frequency) is 1kHz.

When two heads are used, the maximum sampling frequency (trigger frequency) is the slower sampling frequency of the two heads.

“Initial Values (Factory Default) and Setting Ranges” (Page A-52)

■ Trigger-to-trigger pitch

Enter the travel distance of the target between triggers. The setting range is [0.001 to 50.00mm].

Reference When the obtained profile data is displayed in 3D view, If the exact interval in the Y-direction (time-axis direction) is known, the 3D data can be displayed correctly. 3D view is most accurate when an encoder trigger is used.

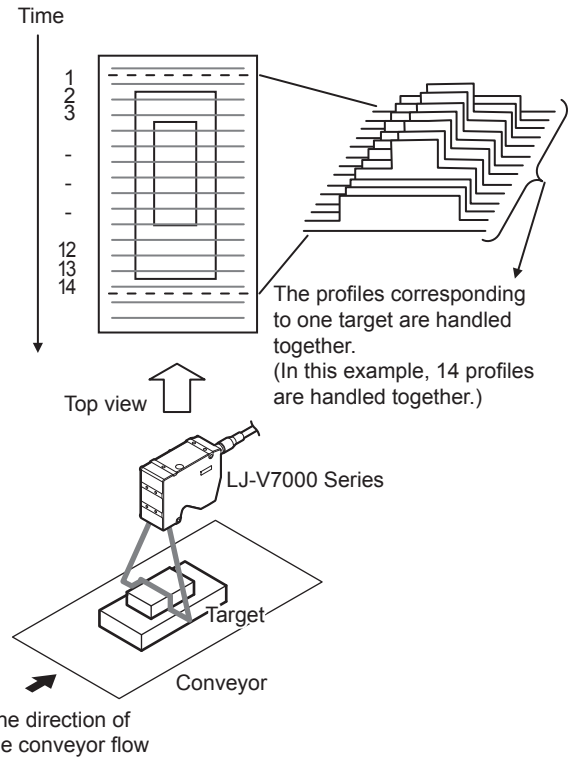
■ Batch setting

[Batch measurement] mode is designed to handle collection and processing of multiple profiles. In the batch measurement, the number of profiles to be handled together is called [Batch point].

- Batch measurement ... Select either ON or OFF.
- Batch point ..... Set the number of profiles to be processed as one unit.

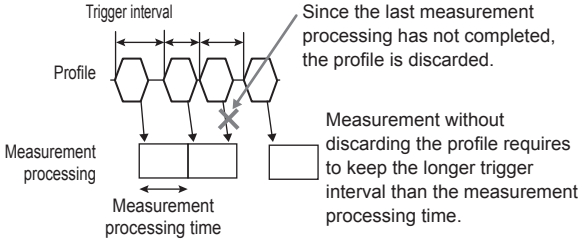
This function is convenient for processing one target as a unit (determination of OK/NG, etc). As in the figure below, this function can handle the profiles of one target together and simplified target based data processing and outputs.

Because the direction of conveyor motion, imaging is performed in the order of 1 → 2→...→ 14.

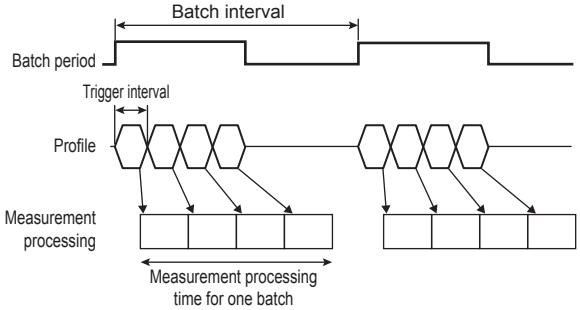


When the batch measurement is ON, the internal memory area prepares to store as many profiles as set by the patch point and then the sampling is performed by the number of the batch points. This allows the measurement processing (from the position correction setting to the measurement setting) to be performed later together.
This allows for high-speed sampling of one batch even when the measurement processing is time-consuming due to the setting.
When the batch interval (between the starts of the batch and the next batch) is longer than the measurement processing time, the measurement operation above can be repeated.

When the batch measurement is OFF.



In case that the batch measurement is ON.

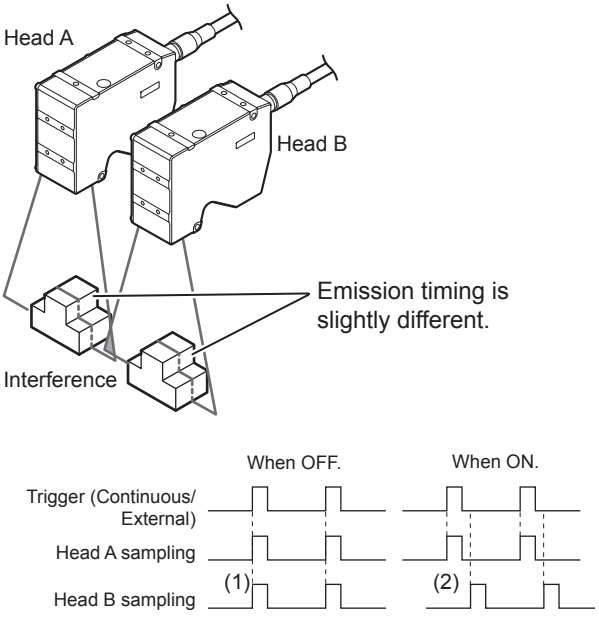


Even when the trigger interval is shorter than the measurement processing time, the measurement can be done at the fast trigger interval without discarding the profile. When the batch interval is longer than the measurement processing time for one batch, the measurement can be repeated at the fast trigger interval.

■ Mutual interference prevention

When multiple heads are used simultaneously, this function changes the timing of laser emission to prevent interference between laser beams emitted from the respective heads. Select either ON or OFF.

- OFF ..... Laser light is emitted at the same time for sampling.
- ON ..... The timing of laser light emission has a time difference between each other for sampling.



(1) When OFF is selected, sampling is performed at the same time.

(2) When ON is selected, the head A first performs sampling, and then the head B does.

“Mutual interference area” (Page 13-25)

Setting the Trigger Conditions

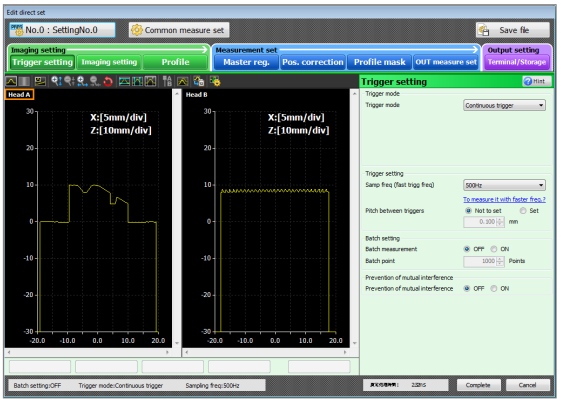
This section describes the procedure to set up the trigger conditions.

Reference The procedure described here is for LJ-Navigator2. For the operation procedure of the display monitor/touch panel monitor, refer to “Switching Screens on the Display Monitor/Touch Panel Monitor” (Page A-26).

1 Click [Direct setting].

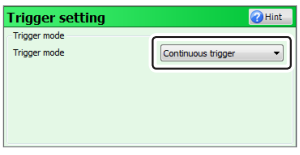


The [Edit direct set] screen appears.



Reference This section describes the procedure to edit the direct settings. To edit the local setting, refer to “Creating and editing a new setting file (Edit local set)” (Page 4-7), “Loading the settings from a file or the controller and editing them (Edit local set)” (Page 4-9).

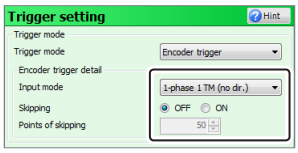
2 Select [Trigger mode] from the pull-down menu.



Reference
- For the settings of [Trigger mode], refer to “Trigger mode” (Page 5-5).
- When other than [Encoder trigger] is selected, go to ***4***.

3 When [Encoder trigger] is selected, set up [Encoder trigger detail].

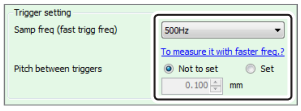
- Select [Input mode] from the pull-down menu.
- Select ON or OFF of [Skipping] and set [Points of skipping].



4 Select [Samp freq (fast trigg freq)] from the pull-down menu.

Reference For settings of [Samp freq (fast trigg freq)], refer to 📖 “Sampling frequency (Fast trigger frequency)” (Page 5-7).

5 Select Set/Not set of [Pitch between triggers] and set the pitch.

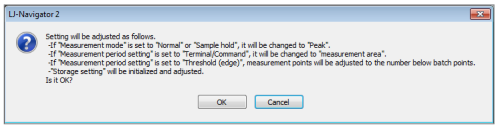


Reference
- The pitch can be set only when [Pitch between triggers] is set to [Set].
- For the settings of [Pitch between triggers], refer to 📖“Trigger-to-trigger pitch” (Page 5-9).

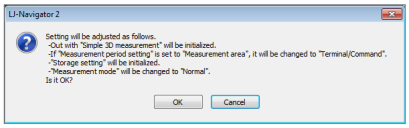
6 Select ON/OFF of [Batch measurement] and set [Batch point].



When [OFF] is switched to [ON], the following confirmation dialog appears. Click the [OK] button, if it is correct.



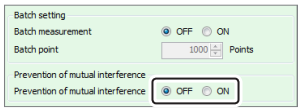
When [ON] is switched to [OFF], the following confirmation dialog appears. Click the [OK] button, if it is correct.



Point
- **When [Batch measurement] is switched from OFF to ON, the settings turn as below.**
  - **When [Hold mode] is [Normal] or [Sample hold], the setting turns to [Peak].**
  - **When [Measurement period] is [Terminal/Command], change the setting to [Measurement area].**
  - **[Storage setting] is initialized.**
- **When [Batch measurement] is switched from ON to OFF, the settings turn as below.**
  - **Change the [Hold Mode] to [Normal].**
  - **OUT with [Simple 3D setting] set to on is initialized.**
  - **When [Measurement period] is [Measurement area], change the setting to [Terminal/Command].**
  - **[Storage setting] is initialized.**

Reference
- For the settings of [Batch measurement] and [Batch point], refer to 📖 “Batch setting” (Page 5-9).
- For [Hold mode], [Measurement period], and [Simple 3D setting], refer to 📖 “Setting the Measurement (OUT Measurement Setting)” (Page 6-22).
- For the settings of [Storage setting], refer to 📖 “Storage Settings” (Page 7-7).

7 When 2 heads are connected, select ON/OFF of [Mutual interference prevention].



Reference
- For the settings of [Mutual interference prevention], refer to 📖 “Mutual interference prevention” (Page 5-10).
- To complete the setup, click the [Complete] button at the lower part of the screen. When the [Complete] button is clicked, the settings are sent to the controller.

Setting the Image Conditions (Image Settings)

Image settings

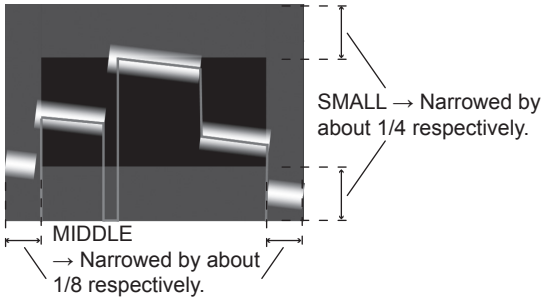
This product emits the laser beam and focuses the reflected light from the target through the condenser lens onto the imaging device, to provide the imaging data that generates the profile.
With the image setting, the operator sets the imaging conditions so as to provide the intended profiles, checking the image.
The settings common to the heads include the measurement rang and the binning.
The settings for each head include the light receiving properties, light intensity settings, peak processing, multiple peak processing, imaging modes, and image masks.

■ Measurement range

The image data from the imaging device in the head is sent to the controller for several calculations. Limiting the area to be measured to a smaller area decreases the data volume sent from the imaging device, which speeds up the measurement.
With [Measurement range], select FULL, MIDDLE, or SMALL in both X- and Z-directions to determine a valid area on the imaging device, which is used for the image processing.

- X-direction ..... MIDDLE narrows the area by about 1/8 each from the left/right sides, and SMALL narrows by about 1/4 each from the left/right sides.
  The area to be processed is as below.
  MIDDLE: About 3/4
  SMALL: About 1/2
- Z-direction ..... MIDDLE narrows the area by about 1/8 each from the upper/lower sides, SMALL narrows by about 1/4 each from the upper/lower sides.
  The area to be processed is as below.
  MIDDLE: About 3/4
  SMALL: About 1/2

The figure below shows a measurement area in the settings: X-direction: MIDDLE and Z-direction: SMALL. The line displayed in red is a profile generated based on the image data. The area shaded in gray is handled as the invalid image (data light volume is considered as 0). As for the area processed as an invalid image, the profile data is not generated.



■ Binning

Binning means processing to add up the pixels neighboring in the image sensor to decrease the resolution and, on the other hand, achieve high-speed and sensitivity.
The binning reduces the number of profile points to be generated to 1/2, and doubles the width in the X-direction of the neighboring profile data. By combining the binning with the settings of the measurement range, the number of the profile data points can be reduced to 200.
Also turning on the binning reduces the image data transfer time from the imaging device down to 1/4.

Reference This setting affects the number of the profiles to be generated and the fast trigger frequency that can be entered. For the influences on the fast trigger frequency, refer to “Initial Values (Factory Default) and Setting Ranges” (Page A-52).

■ CMOS sensitivity

Select the Characteristic of receive response of the imaging device from the four options: high accuracy, high dynamic range 1, high dynamic range 2, and high dynamic range 3, depending on the target.

- High dynamic range 1 to 3 .... By changing the setting from 1 to 3, the target with higher reflectance can be imaged.
- High precision... This setting allows imaging at high-sensitivity and high-S/N ratio. This setting has a small dynamic range, and is appropriate for a target with small reflectance.

■ Exposure time

This setting sets the maximum exposure time of the imaging device.
The maximum exposure time is subject to restrictions by the sampling frequency (fast trigger frequency) that has been set. Set this setting when the shorter exposure time is required.
Shorter exposure time may be required under the following conditions.

- The reflection light from the target is too strong.
- The scanning speed of the head (travel speed in the time direction) is fast.

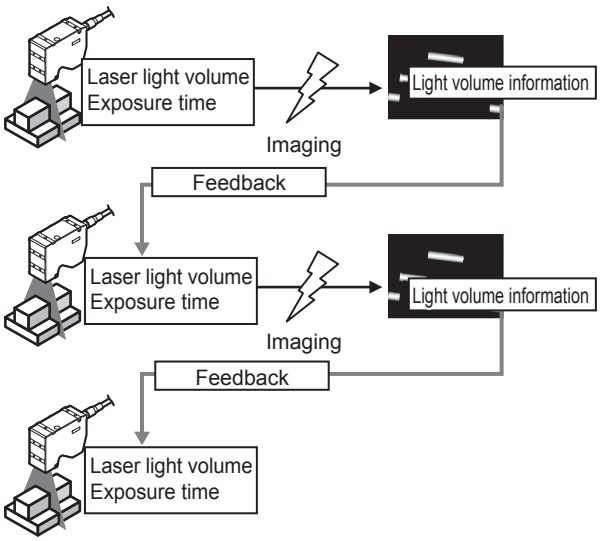
Reference This setting on the exposure time is ignored when the image mode is [Multi emission (synthesis)].

■ Image mode

Select the image mode from standard, multi emission (synthetic), and multi emission (optimum light).

● Standard

In the standard mode, this product operates in such way that the image parameters of the next image are adjusted (feedback processing) based on the light volume in the last image.



Reference Inclusion/Exclusion of the exposure time into the target of the feedback processing depends on the setting of [CMOS sensitivity]. When excluded form the FB target, the exposure time is fixed.

● Multi emission (synthesis)

For the target on which there are areas with higher and lower reflection rates, select the multi emission (synthesis) mode.
Follow the steps below to process in the multi emission (synthesis) mode.

(1) Position the target and image for low reflection so as to measure only the area with the higher reflection rate, and fix the profile data of the area whose peak can be detected.

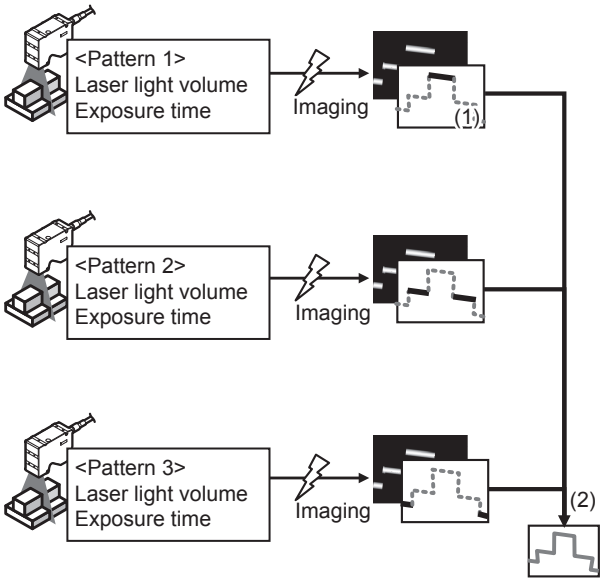
(2) Position the target and image for high reflection, and fix the profile data of the area whose peak can newly be detected.

The profile data that has been fixed in (1) is not revised. Repeat (1) and (2) several times (*1) to fix the profile data.
*1: This is set as [Emission times].

Reference The sampling frequency (fast trigger frequency) that can be set becomes low.

(1) Solid line: Profile data whose peak is detected
Dotted line: Profile data whose peak cannot be detected

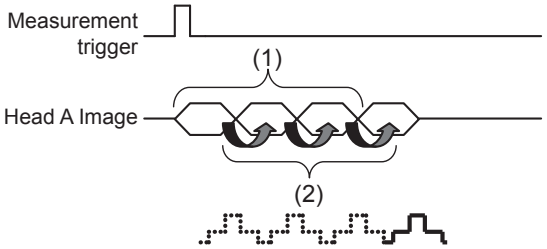
(2) Imaging is performed several times and their stable parts are synthesized.



● Multi emission (optimal light)

When the image parameter cannot be adjusted optimally by single image feedback processing, the image parameter can be optimized by repeating the feedback several times (*1).
*1: This is set as [Emission times].

Reference The maximum sampling frequency (fast trigger frequency) that can be set becomes low.

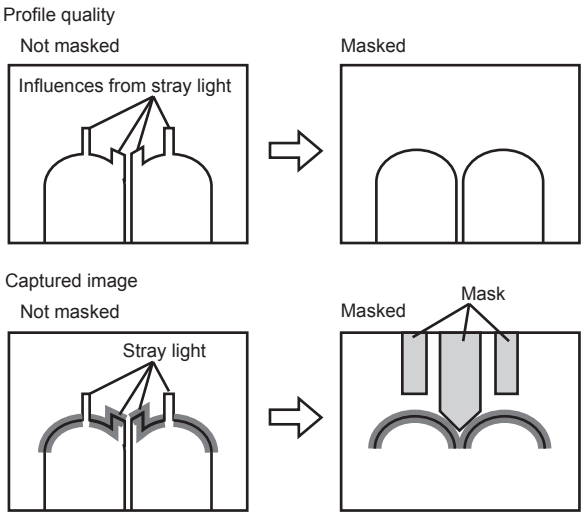


(1) The dummy image processing done to stabilize the imaging (the image parameter is improved so as to stabilize the imaging by feeding back the image parameter.) The dummy imaging does not generate the profile.

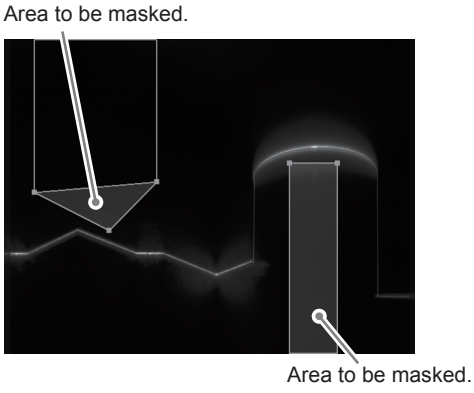
(2) The image parameter is fed back based on the light volume.

■ Image mask

Depending on the shape and surface conditions of the target and those of the environment where the target is installed, multi-reflected laser light (stray light) may occur, which interrupts obtaining the correct profile.
The [Image mask] masks the imaging device to disable the stray light entering into it, and cancels the influences by the stray light.
This function is set by setting the mask area onto the captured image. Select the area to be masked on the imaging device pixels.



The area can be set up to three on the upper/lower side respectively. Select either square or triangle for the shape of the mask area.
The figure below shows an example of relationship between the mask area setting and the area to be masked. The figure shows the area to be masked (shaded in gray) when the one upper triangle area and one lower square area are set. The triangle area is set by the three points and the square area is by 2 points.



The pixels on the lines connecting the setting points are included in the area to be masked.

■ Control light intensity

This setting sets [Control mode] and [FB target area].
The [Control mode] sets the adjustment range of the brightness that depends on the combination of the laser light volume and the exposure time. Select either AUTO or MANUAL. When MANUAL is selected, set the upper/lower limit values in the range [1 to 99]. The AUTO is equal to MANUAL with maximum value 99 and minimum value 1.
[FB target area] sets what area on the imaging device is used for controlling the feedback of the light volume.

■ Peak 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. Select [Detectability] level from 1 to 5 (5 means the easiest to detect (highest sensitivity) and 1 means hardest to detect (low sensitivity)).

■ Interpolated points invalid data

Invalid data means the profile data considered as not detectable due to excessive or insufficient light volume (*1).
The interpolated points invalid data can be set from the range [0 to 255] (*2).
When the number of invalid data continuing in the profile is less than the interpolate count, the invalid data are replaced with the data linearly-interpolated by the valid data at both sides of the continuing invalid data.

*1: Depending on the setting on the process of multi peaks (refer to [Peak selection] described below); this includes the data handled as invalid. Dead zone data (refer to 5-25) has no relation to the invalid data.

*2: When [255] is set, the invalid data are linearly-interpolated regardless of the number of the continuing invalid data.

■ Peak selection

[Peak selection] sets which peak is selected when multiple peaks exist on the same X-coordinate. Select from the following.

- Standard ..... Maximum peak
- NEAR ..... Peak closest to the NEAR side (side close to the head)
- FAR ..... Peak closest to the FAR side (side far from the head)
- Remove X multiple reflection ..... The peak to be used is determined by the W-polarized light function (*3) (multi reflection in the X-direction is canceled. This is effective for the target that has an irregularity in the direction of the laser light line.)
- Remove Y multiple reflection ..... The peak to be used is determined by the W-polarized light function (*3) (multi reflection in the Y-direction is canceled. This is effective for the target that has an irregularity in the direction perpendicular to the laser light line.)
- Invalidate data ..... When multiple peaks exist on the same X-coordinate, the data is handled as invalid data.

*3: W-polarized function
The W-polarized function emits the laser beam twice in different polarization direction (p/s) for one trigger.
The function, utilizing this property [multi reflected right causes difference in the light volume depending on the polarization direction], compares the two image data to invalidate the data with large differences, by which removing the influence from the multi reflected light.

* : The W-polarized function is not available in LJ-V7020 and LJ-7020K.

Reference

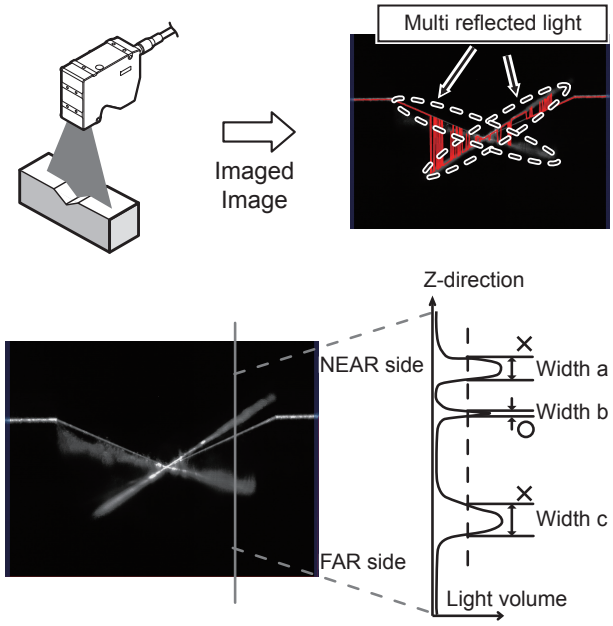
- When [Remove X multiple reflection] or [Remove Y multiple reflection] is selected in [Peak selection], the W-polarized light function works to emit the laser light twice (p- and s-polarized light) by one trigger. Because of this, this affects the fast trigger frequency. For details, refer to “Initial Values (Factory Default) and Setting Ranges” (Page A-52).
- Depending on the surface condition of the target, no effect may be observed even when [Remove X multiple reflection] is selected in case that the surface has roughness in the laser beam direction. In such case, also try [Remove Y multiple reflection].

■ Peak width filter

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 [Peak width filter].
This setting sets whether or not to perform this filter processing.

Reference The peak width filter, if it is on, does not affect the fast trigger frequency.

A specific example is shown below.



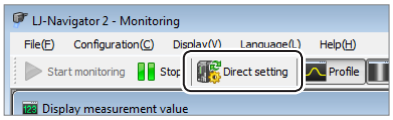
- Widths a and c > Peak width filter threshold value
  → The peak is considered as a result from the multi reflection and the detected peak is ignored.
- Width b < Peak width filter threshold value
  → The peak is considered as a normal peak.

Setting Procedure in Standard setting (Default)

This section describes the standard setup procedure of the image setting.

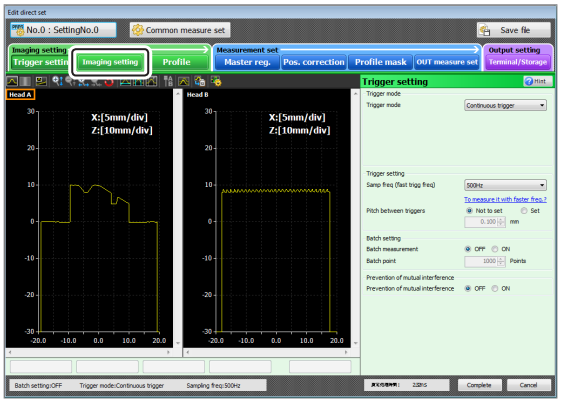
Reference The procedure described here is for LJ-Navigator2. For the operation procedure of the display monitor/touch panel monitor, refer to “Switching Screens on the Display Monitor/Touch Panel Monitor” (Page A-26).

1 Click [Direct setting].



The [Edit direct set] screen appears.

2 Click the [Imaging setting] button.

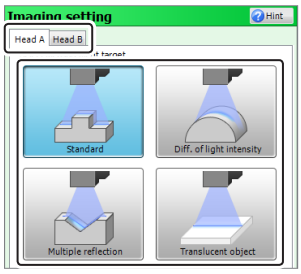


The [Trigger setting] area turns to the [Imaging setting] area.

Reference In case of one head, go to **4**.

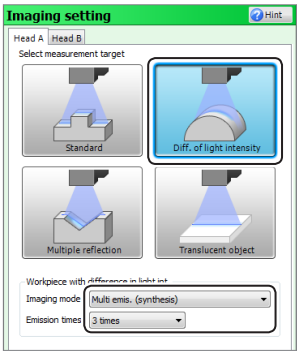
3 In case of two heads, select either [Head A] or [Head B] with the head selection tab.

4 Select the measurement target.



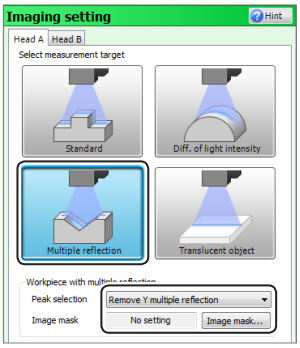
Reference When [Standard] or [Translucent object] is selected, the image setting is completed.

5 When [Diff. of light intensity] is selected, select [Imaging mode] and [Emission times] from the pull-down menu.



Reference For the settings of [Imaging mode], refer to “Image mode” (Page 5-13).

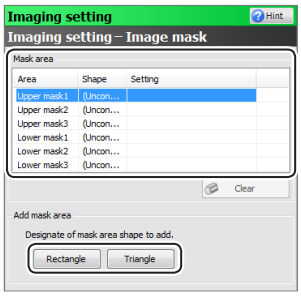
6 When [Multiple reflection] is selected, set up [Peak selection] and [Image mask].



- Select [Peak selection] from the pull-down menu.
- To set up [Image mask], click [Image mask]. The [Imaging setting] area turns to the [Imaging setting - Image mask] area.

Reference
- For the settings of [Peak selection], refer to “Peak selection” (Page 5-15).
- For the settings of [Image mask], refer to “Image mask” (Page 5-14).

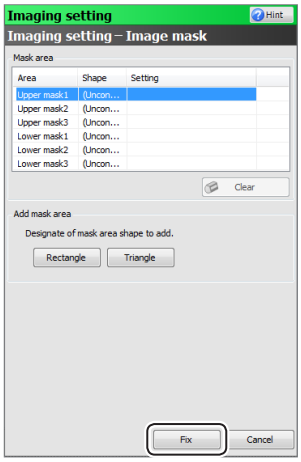
7 **To set up the image mask, click and select the area to be masked in [Mask area], and click either the [Rectangle] button or the [Triangle] button of the [Add mask area].**



The [Rectangle] button or the [Triangle] button is clicked, a rectangle or triangle mask area appears on the profile display area and the [Rectangular area setting] input box or the [Triangular area setting] input box appears.

Reference For the setup procedure of [Image mask], refer to “Editing the area” (Page 3-12).

8 **Click the [Fix] button to fix the [Image mask] settings.**



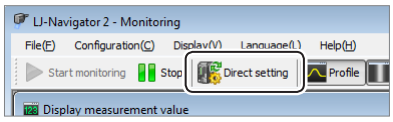
Reference To complete the setup, click the [Complete] button at the lower part of the screen. When the [Complete] button is clicked, the settings are sent to the controller.

Setting Procedure in the Advanced setting

This section describes the advanced setup procedure of the image setting.

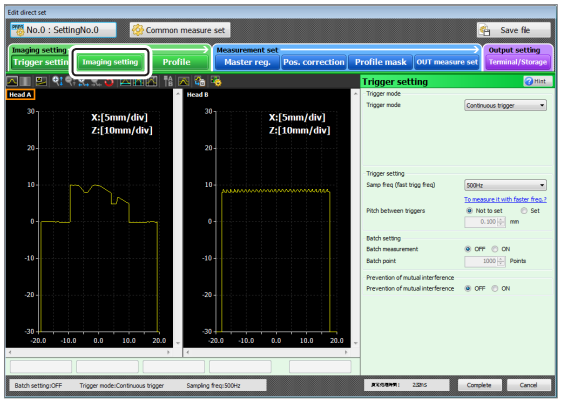
Reference The procedure described here is for LJ-Navigator2. For the operation procedure of the display monitor/touch panel monitor, refer to “Switching Screens on the Display Monitor/Touch Panel Monitor” (Page A-26).

1 **Click [Direct setting].**



The [Edit direct set] screen appears.

2 **Click the [Imaging setting] button.**



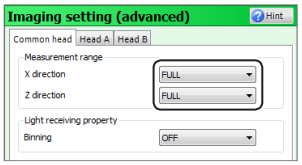
The [Trigger setting] area turns to the [Imaging setting] area.

3 **Click the [Go to advanced set] button.**



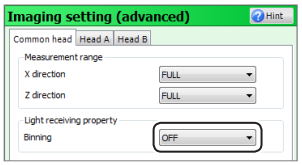
The [Imaging setting] area turns to the [Imaging setting (advanced)] area.

4 **Select [X direction] and [Z direction] from the pull-down menu of [Measurement range] of [Common head].**



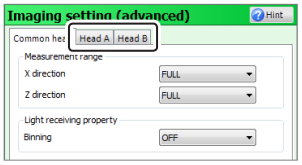
Reference For the settings of [Measurement range], refer to “Measurement range” (Page 5-12)

5 **Select [Binning] from the pull-down menu of [Light receiving property] of [Common head].**



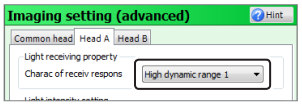
Reference For the settings of [Binning], refer to “Binning” (Page 5-12)

6 **Click [Head A] or [Head B] in the head selection tab.**



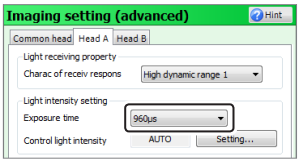
Reference In case of one head, only the [Head A] can be clicked.

7 **Select [CMOS sensitivity] from the pull-down menu.**



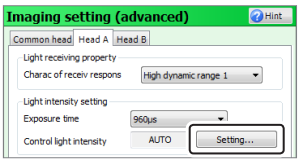
Reference For the settings of [CMOS sensitivity], refer to “CMOS sensitivity” (Page 5-12).

8 **Select [Exposure time] from the pull-down menu.**



Reference For the settings of [Exposure time], refer to “Exposure time” (Page 5-12).

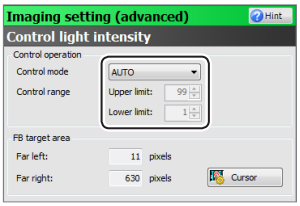
9 **When [Control light intensity] is not [AUTO], click the [Setting...] button.**



The [Imaging setting (advanced)] area turns to [Control light intensity] area.

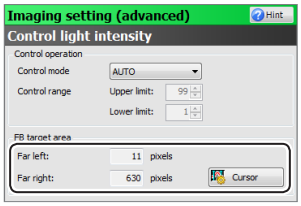
Reference
- For the settings of [Control light intensity], refer to “Control light intensity” (Page 5-14).
- When [Control light intensity] is used as [AUTO], go to ***13***.

10 **Set up [Control operation] under [Control light intensity].**

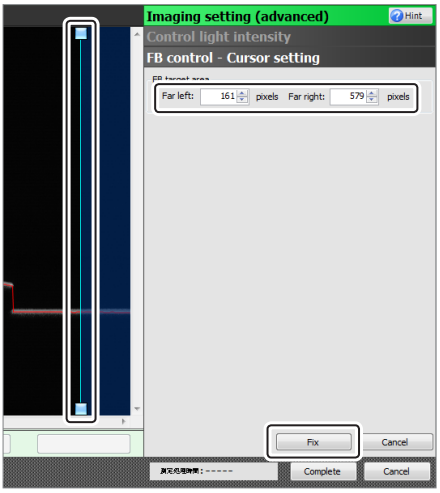


- Select [Control mode] from the pull-down menu.
- For [Lower limit] or [Upper limit] of [Control range], enter numerical values, or change the values using the arrow button.

11 Set up [Control light intensity] of [FB target area].



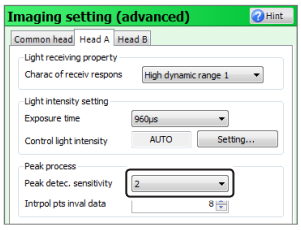
- When using [Far left] or [Far right] to set up, enter numerical values.
- When using the cursor displayed in the profile display area to set up, click the [Cursor] button. Move the cursor displayed in the profile display area, or enter numerical values in [Far left] or [Far right]. After the set up is completed, click the [Fix] button.



Reference For the cursor operation, refer to “Basic Operations of LJ-Navigator2” (Page 3-10).

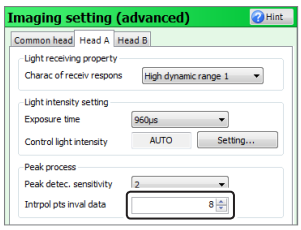
12 Click the [Close] button.

13 Select [Peak detec. sensitivity] from the pull-down menu.



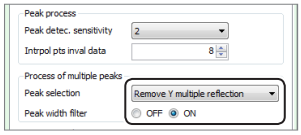
Reference For the settings of [Peak detec. sensitivity], refer to “Peak detection sensitivity” (Page 5-14).

14 Enter numerical values into [Intrpol pts inval data], or use the arrow buttons.



Reference For the settings of [Intrpol pts inval data], refer to “Interpolated points invalid data” (Page 5-15).

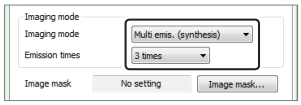
15 Set ON/OFF of [Peak selection] and [Peak width filter] as "Process of multiple peaks".



- Select [Peak selection] from the pull-down menu.

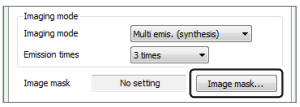
Reference
- For the settings of [Peak selection], refer to “Peak selection” (Page 5-15).
- For the settings of [Peak width filter], refer to “Peak width filter” (Page 5-15).

16 Select [Imaging mode] and [Emission times].



Reference
- For the settings of [Imaging mode] and [Emission times], refer to “Image mode” (Page 5-13).
- For [Samp freq (fast trigg freq)], refer to “Sampling frequency (Fast trigger frequency)” (Page 5-7).

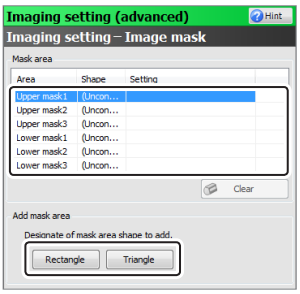
17 To set up [Image mask], click [Image mask...].



The [Imaging setting (advanced)] area turns to the [Imaging setting - Image mask] area.

Reference
- For the settings of [Image mask], refer to “Image mask” (Page 5-14).
- For the setup procedure of [Image mask], refer to “Editing the area” (Page 3-12) of "Basic operation of the LJ-Navigator2".

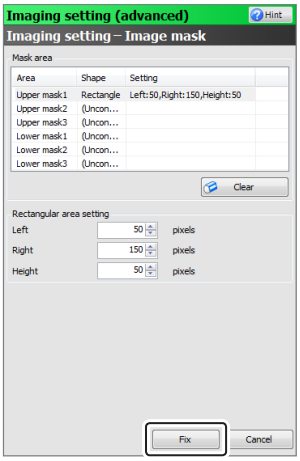
18 Click and select the area to be masked in the [Mask area], and click either the [Rectangle] button or the [Triangle] button of the [Add mask area].



The [Rectangle] button or the [Triangle] button is clicked, a rectangle or triangle mask area appears on the profile display area and the [Rectangular area setting] input box or the [Triangular area setting] input box appears.

Reference For the setup procedure of [Image mask], refer to “Editing the area” (Page 3-12).

19 Click the [Fix] button to fix the [Image mask] settings.



Reference To complete the setup, click the [Complete] button at the lower part of the screen. When the [Complete] button is clicked, the settings are sent to the controller.

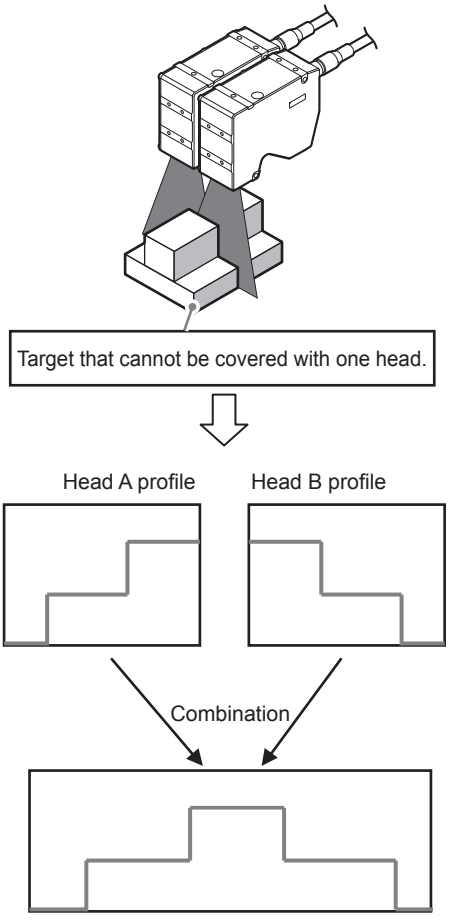
Setting the Processing Method of the Profile (Profile Setting)

Profile setting

This setting sets up the conditions to process the profile. The setting calculates the profiles of the heads A and B, and stabilizes the profiles.

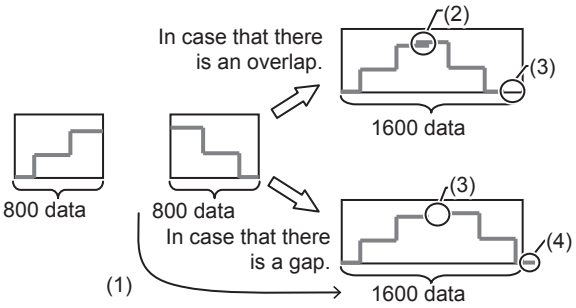
■ Combining

This setting is for the case where two heads are connected.
When [Combining] is set to ON, the profiles generated by two heads are combined with regard to the target whose width in the X-direction cannot be covered by one head.
Profiles of the heads A and B are arranged in a line to be combined into one profile.
The combined profile is handled as one profile in the later processing (There is no distinction between the profiles of the Heads A and B).
The amount of data of the generated profile is the sum total of those of the head A profile data and the head B profile data.



The subsequent processing is performed against the combined profile.
(There is no distinction between the heads A profile and head B profile.)

Depending on the settings on the installation correction, the combined profile may have an overlap or a gap at the combined area. In those cases, the following processing is applied.



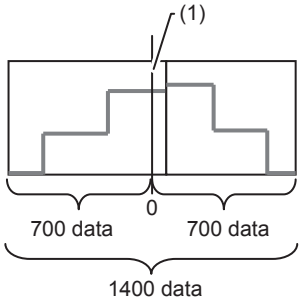
(1) The number of data of the generated profile is 800 + 800 = 1600 data.

(2) The profiles of the heads A and B are averaged.

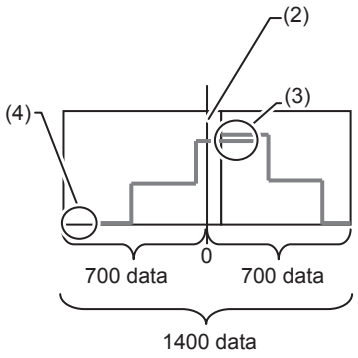
(3) Filled with invalid data.

(4) Discarded.

[X-coordinate = 0] after combining the profile is at the center of the number of the combined profile data.
When the number of combined profile data is 1400, 701st data is the data at X=0.



In case that the head A profile is shifted toward the positive direction of X.



(1) The number of the profile data of the heads A and B are added and X-coordinate = 0 is put on the center of the number.

(2) Regardless of shift of the head A profile, X-coordinate = 0 is put on the center of the generated profile.

(3) The profiles of the heads A and B are averaged.

(4) Filled with invalid data.

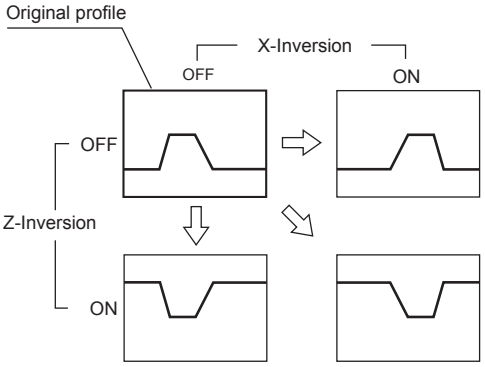
Reference

- When the combining is switched between ON and OFF, the following settings turn to the default values.
  - Master profile
  - Position correction setting
  - Profile mask
  - OUT setting
- In the combining mode, the dual head mode cannot be used.

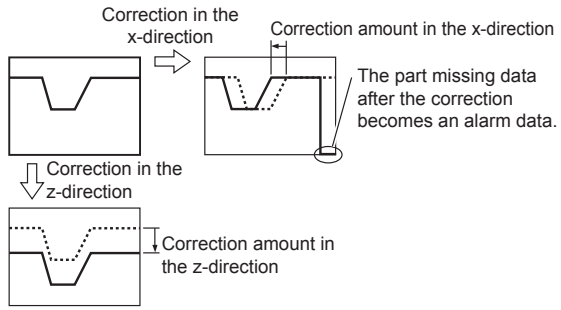
■ Profile adjustment

This setting is for the case where two heads are connected.
Due to restrictions on the installation of the head, the obtained profile may not show a shape easy to see at a glance. In such case, the following processing can be applied to the measured profile.

- Z-inversion (reverse ± of the Z-coordinate).
- X-inversion (reverse ± of the X-coordinate).



- Shift in the X/Y-direction.

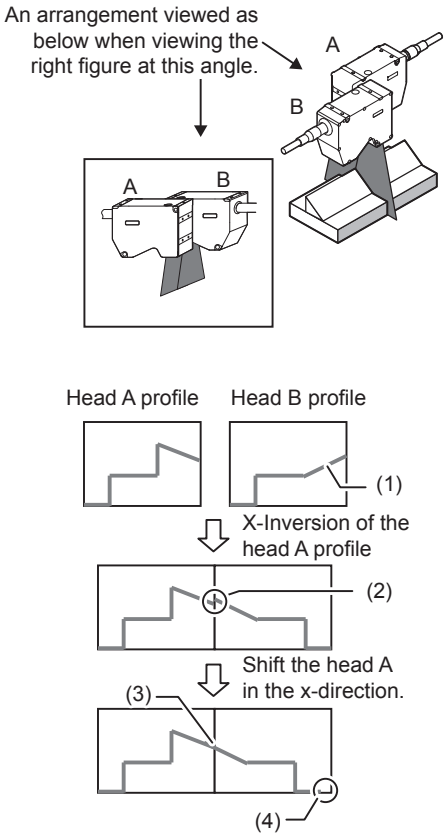


Reference

Depending on the setting of the head installation condition, the profile display method is automatically optimized at the initial condition.

Examples are shown below to illustrate the inversion and the shift.

● **In case that the profiles of the heads A and B are combined into one profile.**



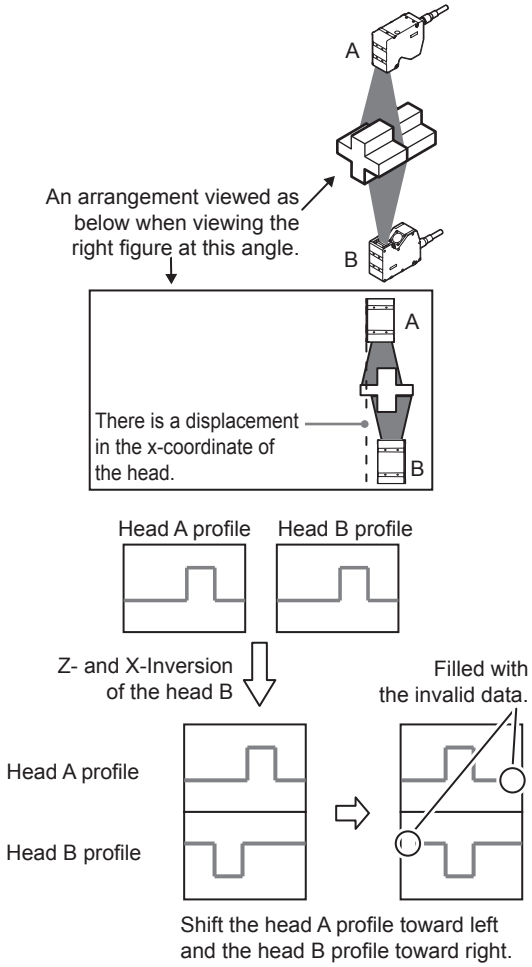
(1) The two heads are reversely directed each other, which generate reversely directed profiles.

(2) Overlap area of the profiles

(3) For the combining processing, refer to “Combining” (Page 5-21).

(4) Filled with invalid data.

● **In case that the heads A and B installed so as to sandwich the target, measure the profile of the target.**



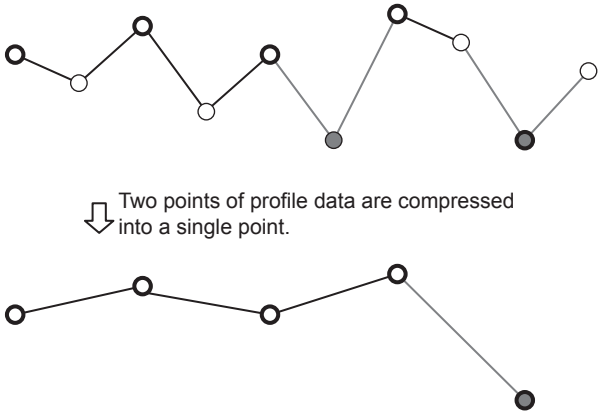
■ Compression setting

The compression setting includes the following two functions.

● Profile compression (X-direction)

This function compresses 2 or 4 points (selected 2 or 4) of the profile data into one point. The compression uses the extracted values for the 2 or 4 point profile data to recreate the profile data.
This processing decreases the number of the profile data keeping the measurement range as it is, which improves the performance of the subsequent processing and increases the data volume to be stored.
The figures below show an example of the profile compression (X-direction). The dots in gray in the figures show the invalid data and the dead zone data.

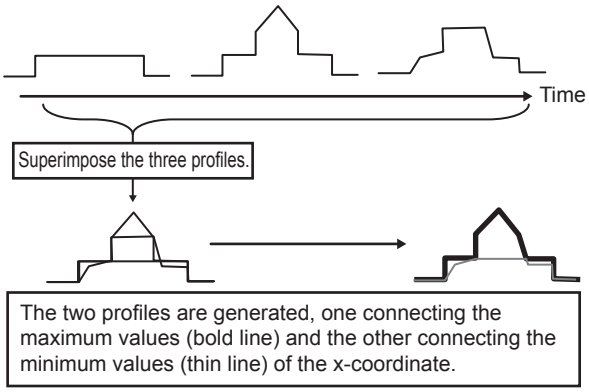
In case that the number of points to be compressed is two.



Reference Set the compression points so as the profile data points are greater than 200 points.
If the compression points are set makes the profile data points are less than 200 points, the compression points are adjusted automatically so as to be greater than 200 points.

● Profile compression (Time-direction)

This processing combines the specified number of profiles into one profile.
Combining multiple profiles into one decreases time required by the subsequent processing and increases the data volume to be stored.
Reducing the data size to be stored shortens the time required to acquire the profile data by the communication command.
The figure below shows an example of compressing three profiles.

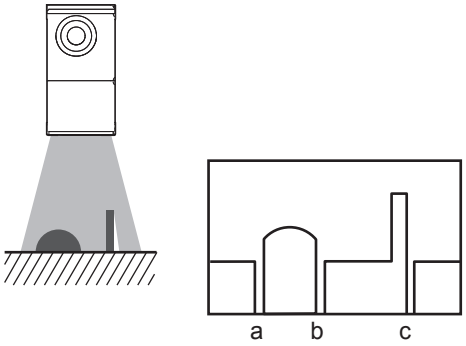


A set of two profiles after the compression is called the compressed profile. The profiles are compressed every time when the specified number of profiles are gathered, and then the compressed profiles are transferred to the subsequent processing.
When the profile data to be compressed include the invalid data and dead area data, the invalid and dead zone data are processed as large minus (-) values, and the profile on the minimum value side becomes the invalid data and dead zone data.
The setting items that can be set depend on whether the batch measurement is ON or OFF.

- In case that the batch measurement is OFF.
  ON and OFF of the compression (Time-axis) can be selected. In case of ON, set the number of profiles to the range of 2 to 1000. When the compression (time axis) is turned on, the set number of profiles is compressed.
- In case that the batch measurement is ON.
  Select from ON/OFF of the compression (time axis). When the batch measurement is set to ON, the profiles as many as [Batch point] are compressed. One batch measurement provides one compressed profile (one compressed profile is obtained for one target).

■ Dead Zone processing

Select either Able or Disable. When [Able] is selected, the data in the unmeasurable areas such as an area hidden by the target are handled as the [Dead zone] data in the profile generation process.



a and b: Non-measurable profile data due to insufficient light volume
→ Handled as invalid data.

c: Non-measurable profile data due to a shadow of the target
→ Selectable either handled as a dead zone data or invalid data.

Reference

- In case of the dead zone data, the display method can be changed by the setting of [Display method for dead zone data].
  “Display setting of the [Display profile] screen (Setting of the method to display the dead zone data)” (Page 8-5)
- In case of the invalid data, the data can be replaced with data linearly interpolated by the respective two neighboring data regardless of [Intrpol pts inval data].
  “Interpolated points invalid data” (Page 5-15)

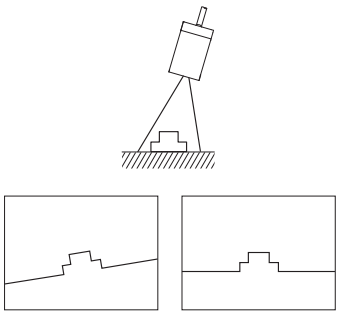
■ Installation correction

This setting corrects the measurement errors caused from the installation of the head or a tilt of the target and the stage on which the target is installed. The settings include [Tilt correction] and [Height correction].

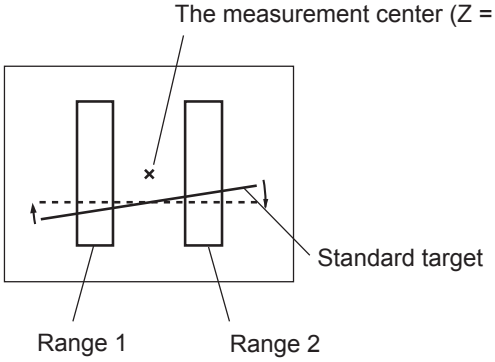
● Tilt correction

This setting corrects the tilt error in the x-axis direction caused from the installation of the head or a tilt of the target and the stage on which the target is installed. Select an area where the correct angle has been known in the profile before the correction, to store the displacement between the obtained profile and correct angle. The measured profile is corrected based on the stored displacement information.

Reference The correctable range of the tilt is -45 to +45 degrees.

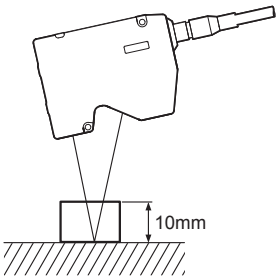


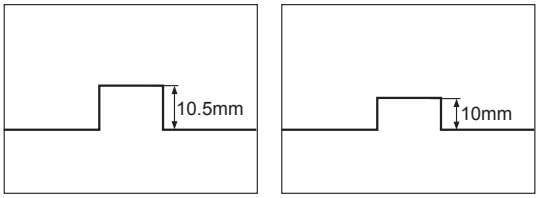
[Tilt correction] measures the standard target to perform the correction. The angle ([Corrected angle] in the settings) is set in such way that the ideal straight line calculated from the measurement data in the area 1 ([Line calculation area 1] in the settings) and area 2 ([Line calculation area 2] in the settings) becomes horizontal, and the rotation correction is performed. The center of the measurement is used as the center of the rotation.



● Height correction

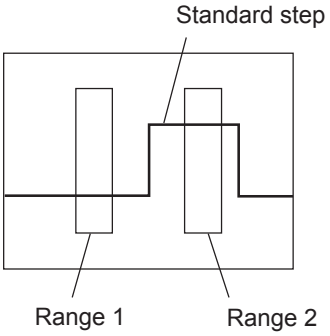
This settings correct the height error in the Z-axis direction caused from the installation of the head or a tilt of the target and the stage on which the target is installed.
Select an area where the correct height of a step has been known in the profile before the correction, to store the displacement from the true value (correction rate). The measured profile is corrected based on the stored correction factor.





[Height correction] measures the size of a known step to perform the correction.
The height is corrected by being multiplied with a factor ([Multiplying factor] in the settings) in such way that the difference between mean heights of the area 1 ([Height measuring area 1] in the settings) and the area 2 ([Height measuring area 2] in the settings) becomes the specified [Corrected height] (After-correction height).

Reference The settable range of the correction rate is 0 to 2 times.

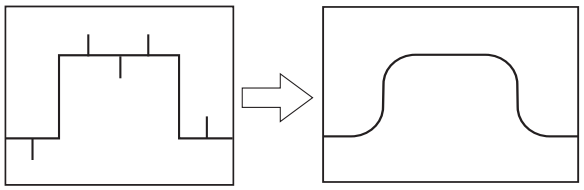


■ Filter setting

When the profile varies due to the shape and surface condition of the target, this function stabilizes the profile with the settings including [Smoothing], [Averaging], [Median (X-axis)], and [Median (Time-axis)].

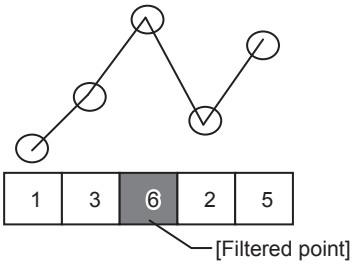
● Smoothing

The smoothing function uses the data of each point on the X-axis of the profile obtained by single sampling, to calculate a moving average. (The setting range is 1, 2, 4, ... to 64.)
Increased smoothing points stabilize the profiles without changing the response rate. The profile, however, will get rounder.



● Median (X-axis)

The median filter is used for the profile. (The setting range is OFF, 3, 5, 7, and 9.)
The figure below shows an example to process 5 points with the median filtering.

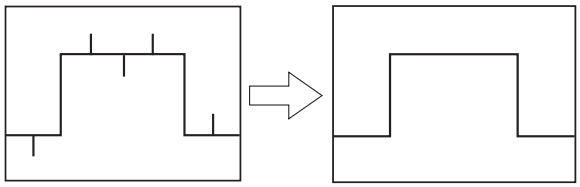


If the profile data are arranged in the ascending order, they will line as below.
1, 2, 3, 5, 6
Because there are five data and the center is the third data, the data [6] at [the filtered point] is replaced with [3].

Reference The two points, top and end, of the profile have no two data around [a certain position]. In this case, no filter processing is performed and the original data is used as it is.

● Averaging

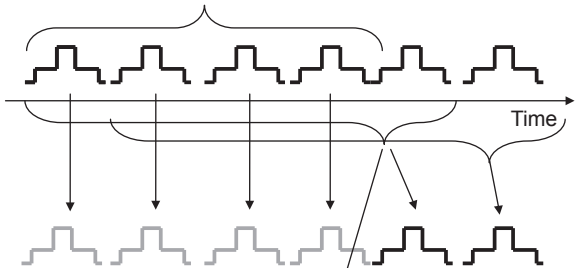
The averaging function samples the profiles as many as the specified averaging count, and then the data is processed with the moving average at the respective X-direction points on the respective profiles. (The setting range is 1, 2, 4, ... to 256.)
The profile can be stabilized without being rounded. The response rate, however, is increased.



● Median (Time-axis)

The profile may have turbulence partly when passing through any irregularities such as an edge of the target. To remove such temporal turbulence in the profile, the median processing is applied in the time-direction. (The setting range is OFF, 3, 5, 7, and 9.)
The following shows an example in case that the setting is 5.

The profile is regarded as [unfixed] until five profiles are ready.



After the five profiles are ready, the median processing is applied to the last 5 profiles.

● Invalid data processing (time-axis)

When holes and slanted planes on the target are measured, insufficient light, or unmeasurable parts may occur. This unmeasurable data is called [Invalid data]. This function cancels the invalid data. After the invalid data are detected once, the accidental data due to ambient light can also be canceled.

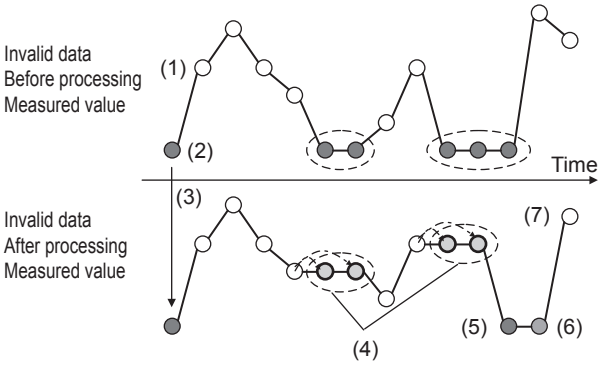
- Processing times

  This setting sets the number of the consecutive invalid data for each point on the profile, with which the data is regarded as invalid. (The setting range is 0 to 255.)
  When the number of processing ≥ [The number of consecutive invalid data], the last datum at the same X-coordinate is held.

- Resume times

  This setting sets the number of the consecutive normal data, with which the data is regarded as valid after the invalid data was once detected. (The setting range is 0 to 255.)

Example) The number of processing is 2, and the number of returning is 1.
Profile data (points on the same X-coordinate)



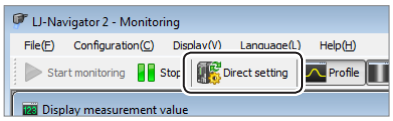
(1) Normal data
(2) Invalid data
(3) When the first point is an invalid data, the point remains invalid.
(4) Because only two (or less) invalid data continue, the two (or less) points are interpolated with the last normal datum and no invalid data appear.
(5) Because three (more than two) invalid data continued, the point is not interpolated and becomes invalid data.
(6) Because only one (less than one) normal data continues, the point does not recover from the invalid data.
(7) Because two (more than one) normal data continued, the normal data is output.

Setting Procedure in Standard setting (Default)

This section describes the standard setup procedure of the profile setting.

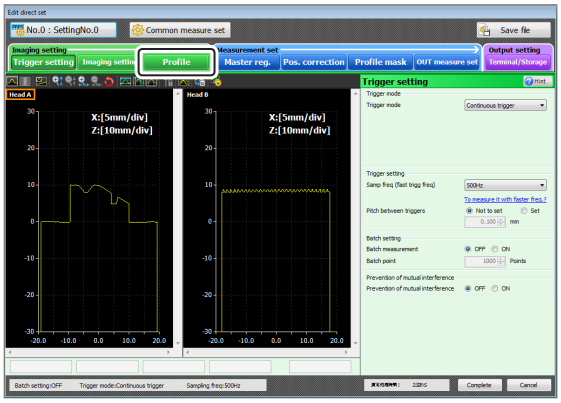
Reference The procedure described here is for LJ-Navigator2. For the operation procedure of the display monitor/touch panel monitor, refer to “Switching Screens on the Display Monitor/Touch Panel Monitor” (Page A-26).

1 Click [Direct setting].



The [Edit direct set] screen appears.

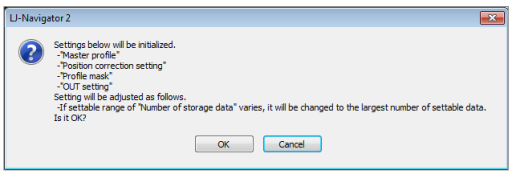
2 Click the [Profile] button.



The [Trigger setting] area turns to the [Profile setting] area.

3 In case of two heads, select ON/OFF of [Wide] common to the heads.

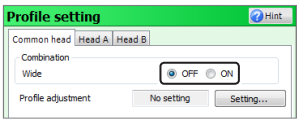
- When ON/OFF of [Wide] is switched, the following confirmation dialog appears. Click the [OK] button, if it is correct.



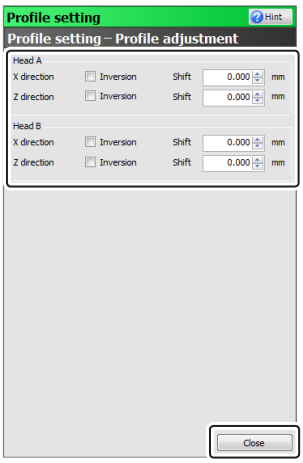
- When [ON] is selected, [Head A] and [Head B] of the head selection tab turn to [Wide].

Reference
- For the settings of [Wide], refer to “Combining” (Page 5-21).
- When ON/OFF of [Wide] is switched, the settings of [Master profile regist.], [Position correction], and [OUT measure set] are initialized.
- In case of one head, go to ***5***.

4 When performing [Profile adjustment] of [Common head], click the [Setting...] button.



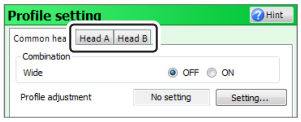
The [Profile setting] area turns to the [Profile setting - Profile adjustment] area.



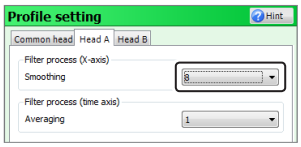
- When the X-inversion function is used, check the check box of [Inversion] in the X direction, and when the Z-inversion function is used, check the check box of [Inversion] in the Z direction.
- To shift in the X-/Y-directions, enter numerical values in the respective [Shift] input boxes, or use the arrow button to change.
- After the set up is completed, click the [Close] button.

Reference For the settings of [Profile adjustment], refer to “Profile adjustment” (Page 5-22).

5 **Click either [Head A] or [Head B] in the head selection tab.**

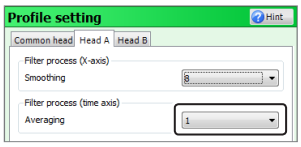


6 **Select the [Smoothing] count of [Filter process (X-axis)] from the pull-down menu.**



Reference For the settings of [Smoothing], refer to "Smoothing" (Page 5-26).

7 **Select the [Averaging] count of [Filter process (time axis)] from the pull-down menu.**



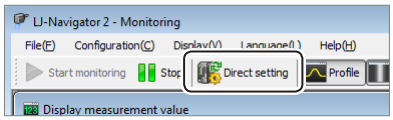
Reference
- For the settings of [Averaging], refer to "Averaging" (Page 5-27).
- To complete the setup, click the [Complete] button at the lower part of the screen. When the [Complete] button is clicked, the settings are sent to the controller.

Setting Procedure in the Advanced setting

This section describes the advanced setup procedure of the profile setting.

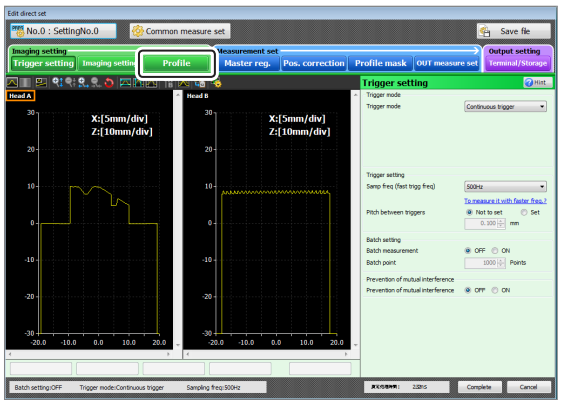
Reference The procedure described here is for LJ-Navigator2. For the operation procedure of the display monitor/touch panel monitor, refer to "Switching Screens on the Display Monitor/Touch Panel Monitor" (Page A-26).

1 **Click [Direct setting].**



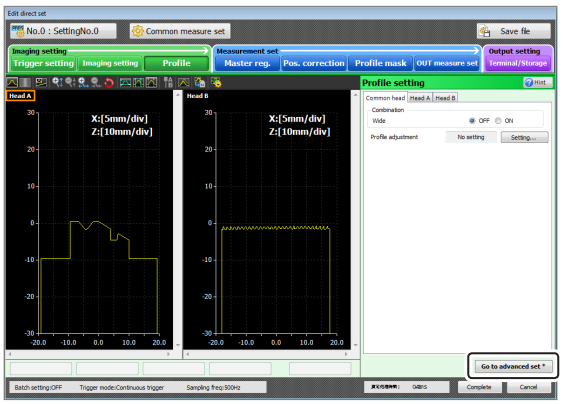
The [Edit direct set] screen appears.

2 **Click the [Profile] button.**



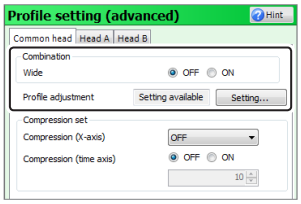
The [Trigger setting] area turns to the [Profile setting] area.

3 Click the [Go to advanced set] button.

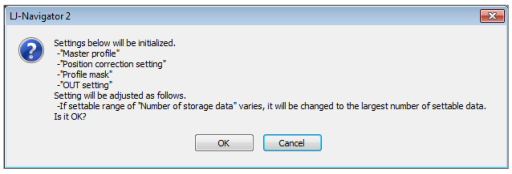


The [Profile setting] area turns to the [Profile setting (advanced)]area.

4 Same as in [Standard setting], in case of two heads, set up ON/OFF of [Wide] common to the heads and [Profile adjustment].



- When ON/OFF of [Wide] is switched, the following confirmation dialog appears. Click the [OK] button, if it is correct.



- When [ON] is selected in [Wide], [Head A] and [Head B] of the head selection tab turn to [Wide].

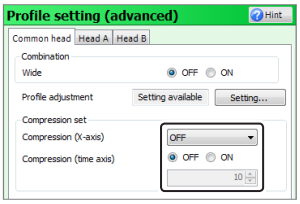
Reference
- For the settings of [Wide], refer to “Combining” (Page 5-21).
- When ON/OFF of [Wide] is switched, the settings of [Master profile regist.], [Position correction], and [OUT measure set] are initialized.
- For the settings of [Profile adjustment], refer to “Profile adjustment” (Page 5-22).
- In case of one head, go to **5**.

5 Select [Compression (X-axis)] of [Common head] from the pull-down menu.

Reference For the settings of [Compression (X-axis)], refer to “Profile compression (X-direction)” (Page 5-24).

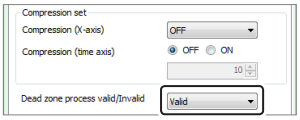
6 Select ON/OFF of [Compression (time axis)] of [Common head].

When [Compression (time axis)] is turned on, enter the compression counts in the input box, or use the arrow button to change.



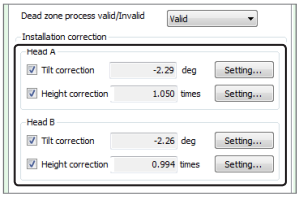
Reference For the settings of [Compression (time axis)], refer to “Profile compression (Time-direction)” (Page 5-24).

7 Select [Dead zone process valid/Invalid] of [Common head] from the pull-down menu.

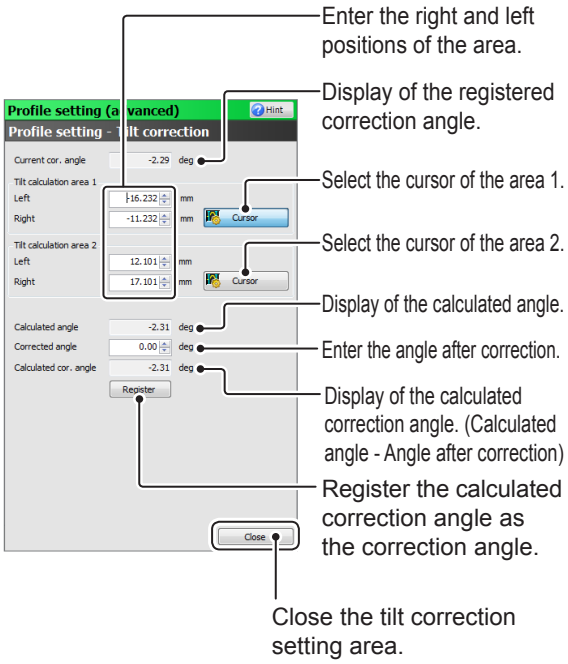


Reference For the settings of [Dead zone process valid/Invalid], refer to “Dead Zone processing” (Page 5-25).

8 Set up [Installation correction] of [Common head].



• When the tilt correction is performed, check the check box of [Tilt correction] and click the [Setting...] button. Set up in the [Profile setting - Tilt correction] area. After the set up is completed, click the [Close] button.



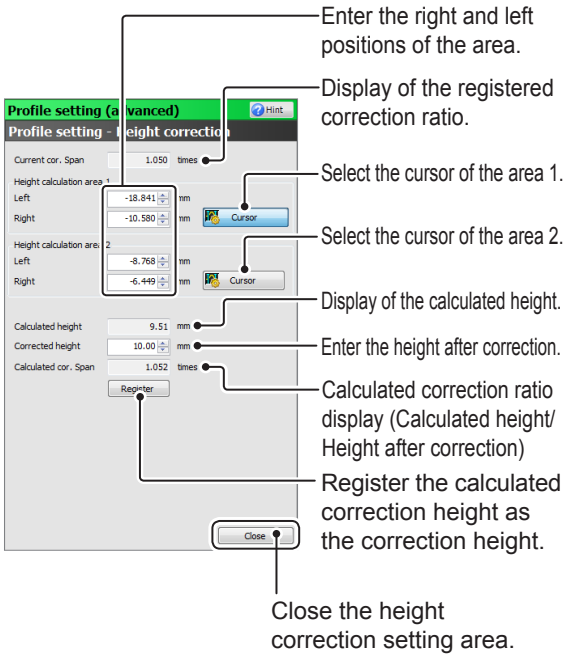
Point

- **The tilt is corrected with the registered correction value (fixed) for the measurement.**
- **Use [Position correction] to correct the variation in the positioning when measuring the target.**

Reference

- For the settings of [Tilt correction], refer to “Tilt correction” (Page 5-25).
- For the cursor operation, refer to “Drawing the areas” (Page 3-23).
- For the [Position correction], refer to “Position correction” (Page 6-8).

• To perform the height correction, check the check box of [Height correction] and click the [Setting...] button. Set up in the [Profile setting - Height correction] area. After the set up is completed, click the [Close] button.



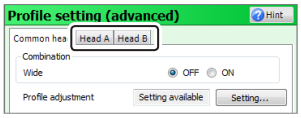
Point

- **The height is corrected with the registered correction value (fixed) for the measurement.**
- **The height correction is performed after the tilt correction.**
- **Use [Position correction] to correct the variation in the positioning when measuring the target.**

Reference

- For the settings of [Height correction], refer to “Height correction” (Page 5-26).
- For the cursor operation, refer to “Drawing the areas” (Page 3-23).
- For the [Position correction], refer to “Position correction” (Page 6-8).

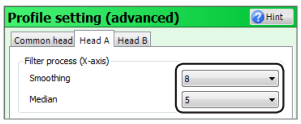
9 **In case of two heads, select either [Head A] or [Head B] with the head selection tab.**



10 **Select the [Smoothing] count of [Filter process (X-axis)] from the pull-down menu.**

Reference For the settings of [Smoothing], refer to “Smoothing” (Page 5-26).

11 **Select the [Median] of [Filter process (X-axis)] from the pull-down menu.**

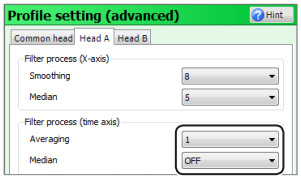


Reference For the settings of [Median], refer to “Median (X-axis)” (Page 5-26).

12 **Select the [Averaging] count of [Filter process (time axis)] from the pull-down menu.**

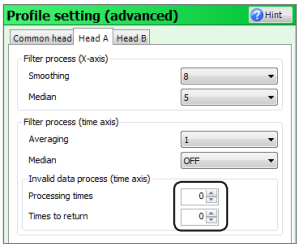
Reference For the settings of [Averaging], refer to “Averaging” (Page 5-27).

13 **Select the [Median] of [Filter processing (time axis)] from the pull-down menu.**



Reference For the settings of [Median], refer to “Median (Time-axis)” (Page 5-27).

14 **Set up [Processing times] and [Resume times] of [Invalid data process (time axis)].**



Reference
- For the settings of [Processing times] and [Resume times] of [Invalid data process (time axis)], refer to “Invalid data processing (time-axis)” (Page 5-27).
- To complete the setup, click the [Complete] button at the lower part of the screen. When the [Complete] button is clicked, the settings are sent to the controller.

6

Setting the Measurement Processing Conditions

This chapter describes the contents and setup procedure on the master registration, position correction, profile mask, and OUT measurement setup.

Setting Items of the Measurement Setting 6-2
Register the Master Profile (Master Registration) ... 6-4
Correcting the Displacement of the Profile (Position Correction) 6-8
Masking the Unnecessary Parts of the Profile (Profile Mask) 6-20
Setting the Measurement (OUT Measurement Setting) 6-22

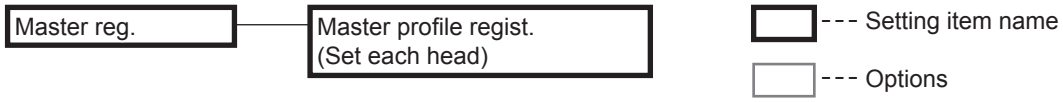
Setting Items of the Measurement Setting

The measurement setting sets up the master registration, position correction, profile mask, and the processing method of OUT measurement setting.
The setting items of the Measurement setting are as below.
The setting items include [Standard set] and [Advanced set]. The items with [*] are available only with the advanced set.

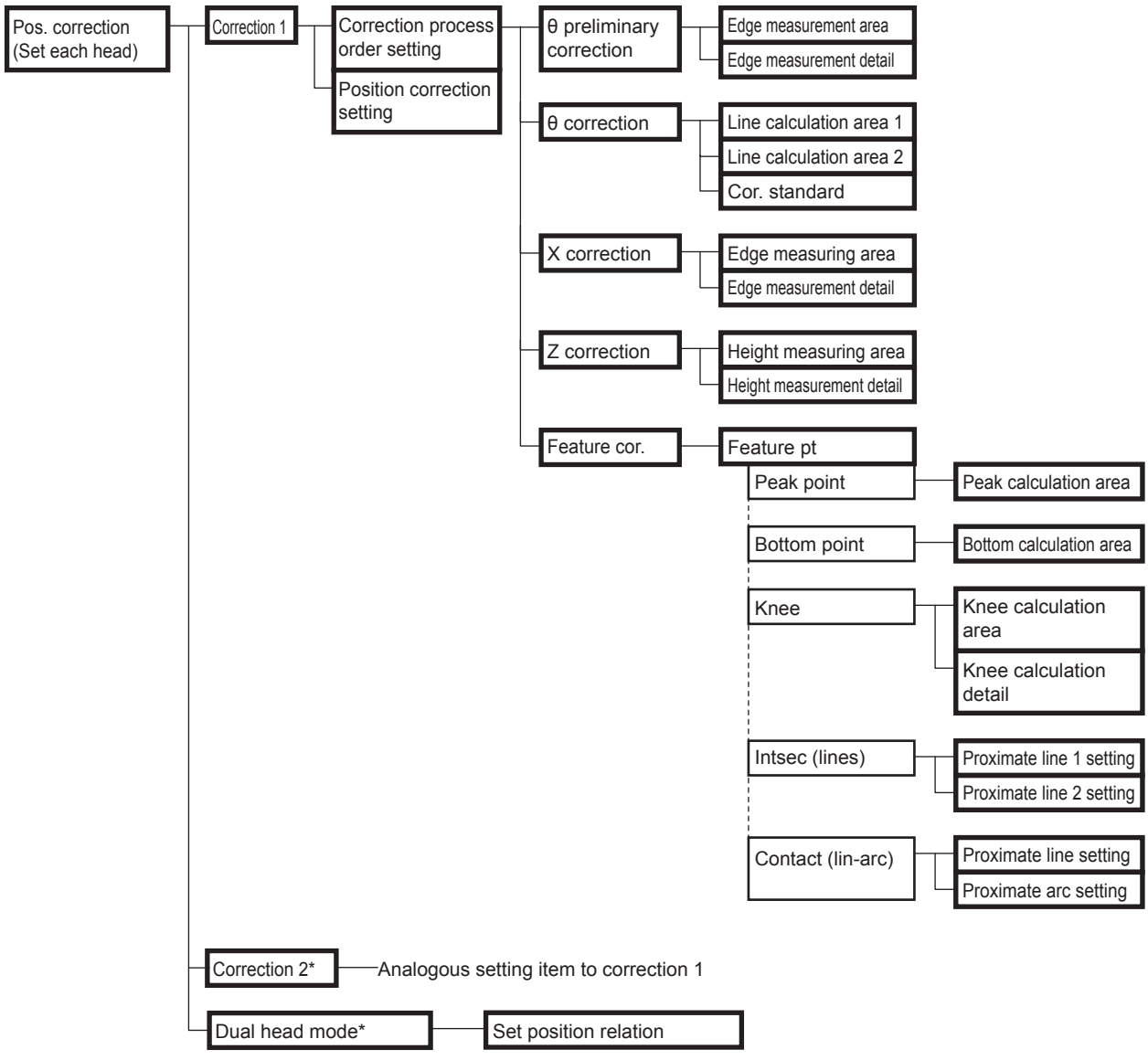
Please refer to the following items for details of each setting item.

- “Initial Values (Factory Default) and Setting Ranges” (Page A-52)
- “Register the Master Profile (Master Registration)” (Page 6-4)
- “Correcting the Displacement of the Profile (Position Correction)” (Page 6-8)
- “Masking the Unnecessary Parts of the Profile (Profile Mask)” (Page 6-20)
- “Setting the Measurement (OUT Measurement Setting)” (Page 6-22)

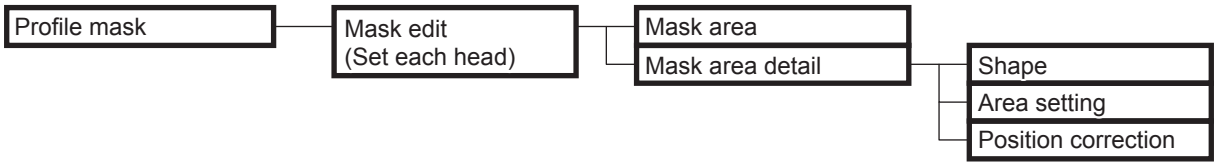
● **Master registration**



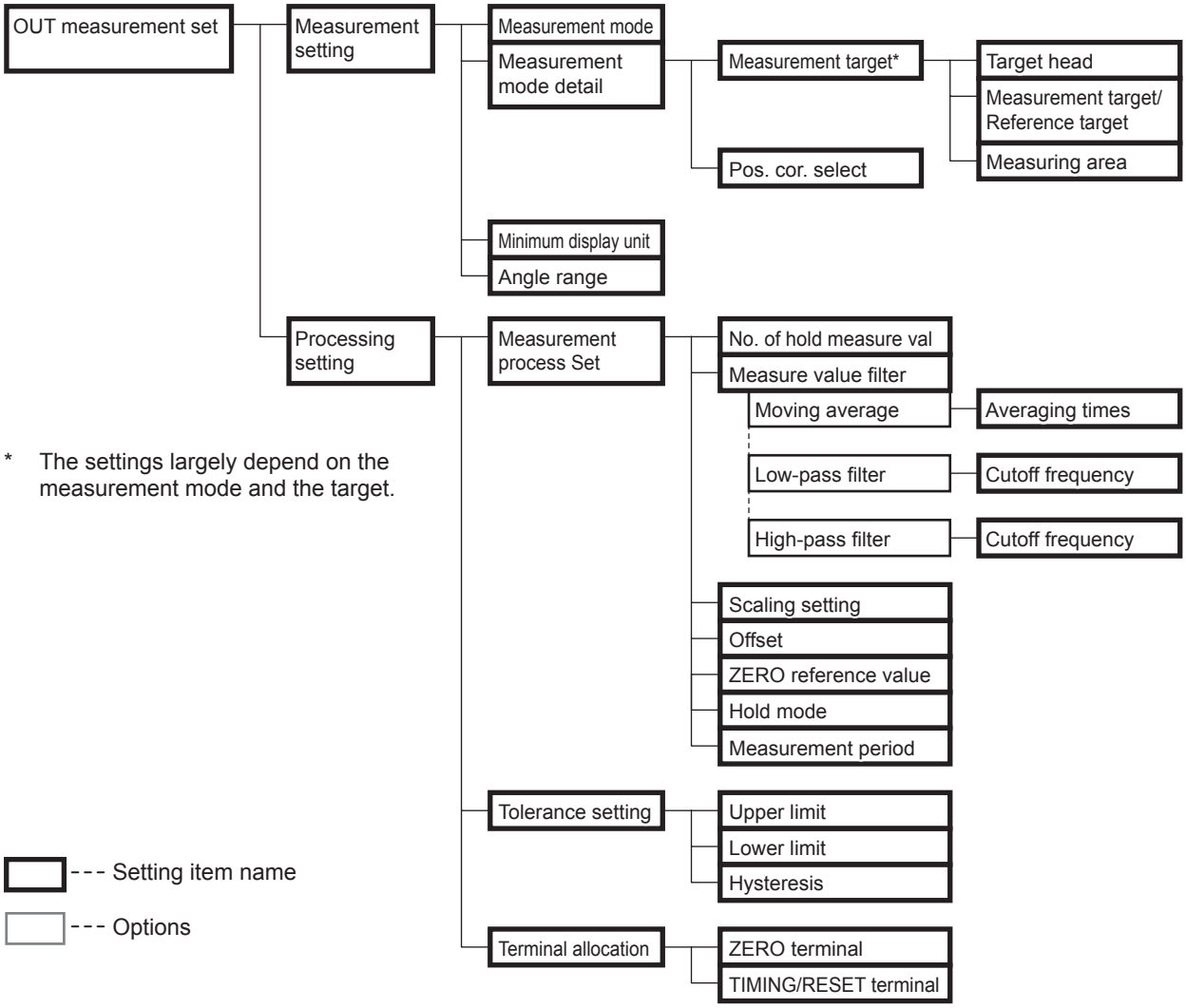
● **Position correction**



● **Profile mask**



● **OUT measurement setting**



Register the Master Profile (Master Registration)

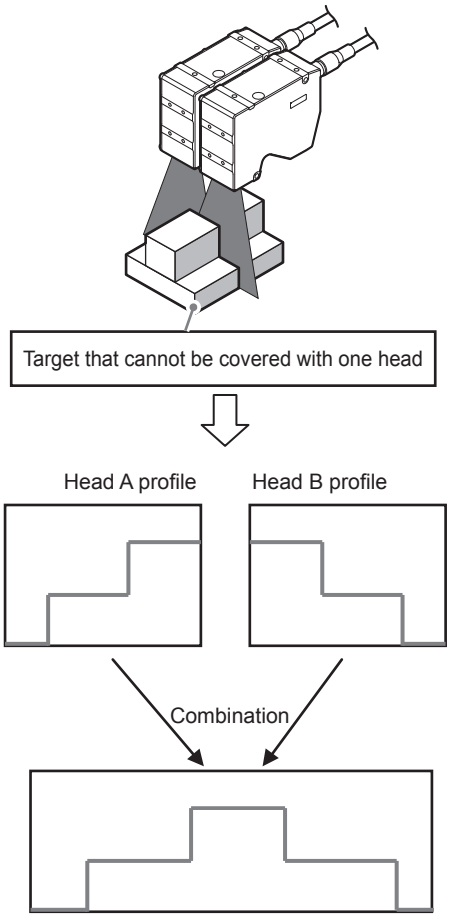
Master registration

[Master registration] is the process of profiling a measurement standard (master work piece) and registering the profile (master profile).
The master profile acts as the standard for the position correction, profile mask, and OUT measurement setting.

Point **The master registration is not available when the profile compression has been set in [Profile setting].**
“Setting the Processing Method of the Profile (Profile Setting)” (Page 5-21)

The OUT measurement setting can be done without the master registration.
“Initial values and setting ranges for the master registration” (Page A-56)
“Correcting the Displacement of the Profile (Position Correction)” (Page 6-8)
“Masking the Unnecessary Parts of the Profile (Profile Mask)” (Page 6-20)
“Setting the Measurement (OUT Measurement Setting)” (Page 6-22)
“Setting Conditions for Different Purposes” (Page A-48)
“Function Restrictions Applicable to the Combinations of Settings Items” (Page A-50)
“How to View the Settings Screen” (Page 4-4)

One master profile can be registered per head.
When the profiles are combined in [Profile setting], one wide profile can be registered.



The subsequent processing is performed against the combined profile.
(There is no distinction between the heads A profile and head B profile.)

Register the Master profile

This section describes the procedure of registering the master profile.

Reference The procedure described here is for the LJ-Navigator2. For the operation procedure of the display monitor/touch panel monitor, refer to “Switching Screens on the Display Monitor/Touch Panel Monitor” (Page A-26).

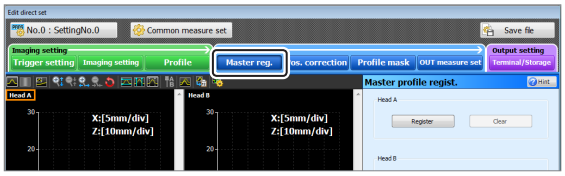
The master registration includes the following method.

- Registering the master profile
- Selecting and registering the profile from the height image

■ Registering the master profile

This section describes the procedure to register the master profile while checking the current profile.

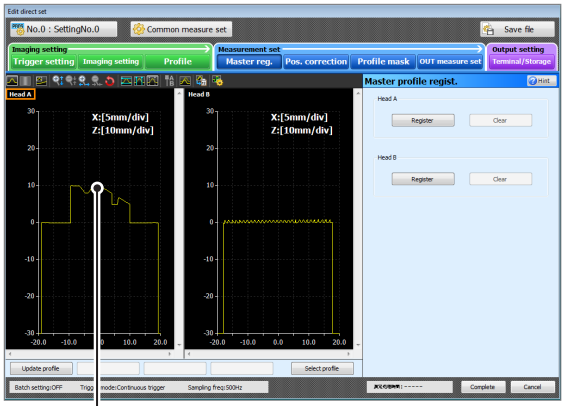
1 Click [Master reg.] on the measurement screen.



The [Master profile regist.] screen appears. The profile at a time of the click appears in the profile display area.

Reference The profile is not constantly updated in the master registration.

2 Check the profile displayed, and if required click the [Update profile] button to update the profile.

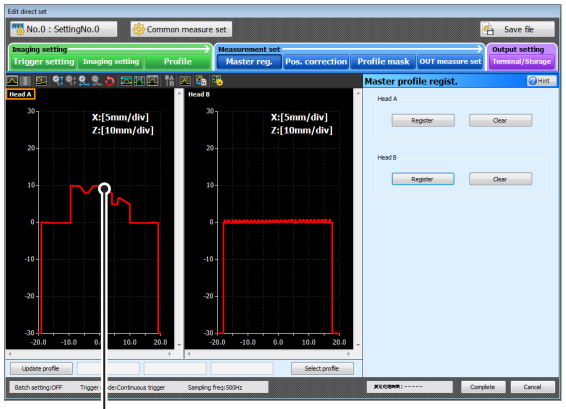


Profile before registration
(displayed with a yellow line)

3 Click the [Register] button o the head to be registered as a master profile.



The master profile is registered and the profile appears in red.

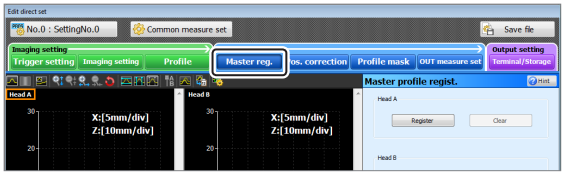


Registered master profile
(displayed with a red line)

■ Selecting and registering the profile from the height image

This section describes the procedure to register a master profile by selecting the profile from the height image.

1 Click [Master reg.] on the measurement screen.

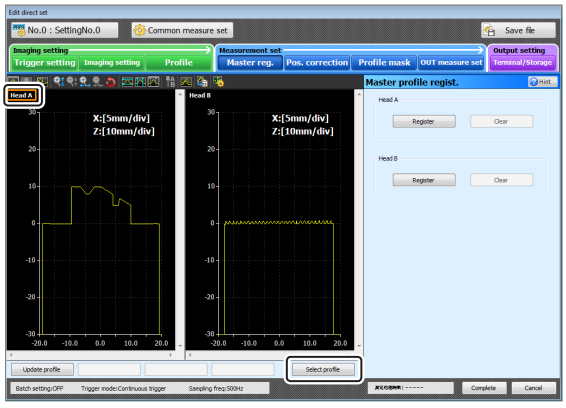


The [Master profile regist.] screen appears.
The profile at a time of the click appears in the profile display area.

Reference The profile is not continuously updated in the master registration.

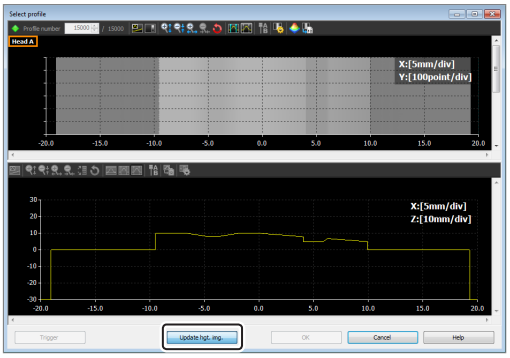
2 Select the profile display of the head to be registered as a master profile.

3 Click the [Select profile] button.



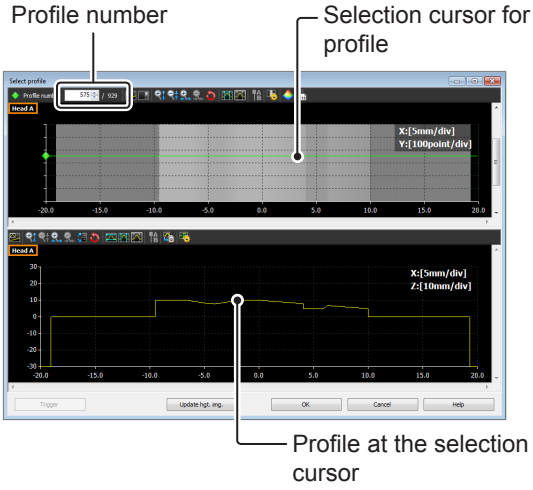
The [Select profile] screen appears.

4 Click the [Update hgt. img.] button to stop the update.

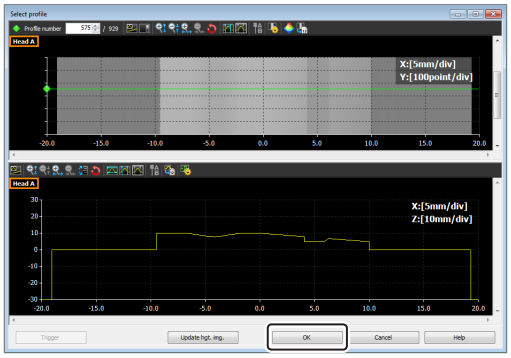


The selection cursor to select the profile appears on the height image display.

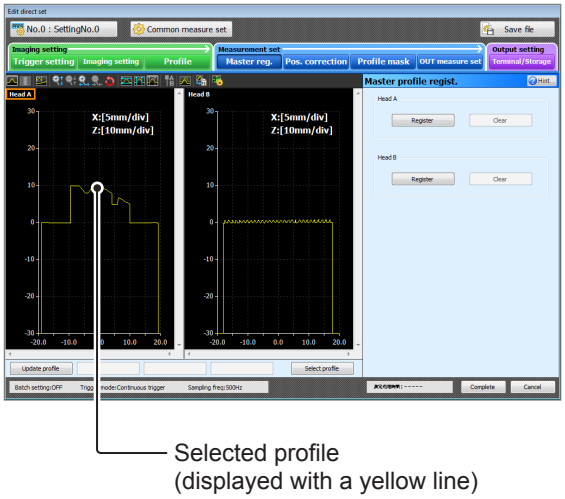
5 Drag the selection cursor or select [Profile number] to display the profile to be registered as a master profile.



6 The registered profile appears, and then click the [OK] button.



The screen returns to the [Master profile regist.] screen.
The profile selected from the height image display appears on the profile display.

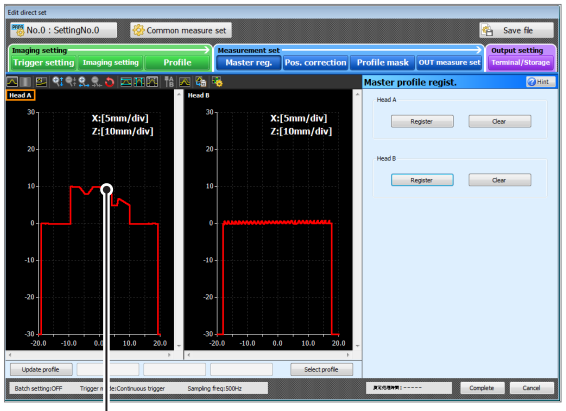


Selected profile
(displayed with a yellow line)

7 Click the [Register] button of the head to be registered as a master profile.



The master profile is registered and the profile appears in red.



Registered master profile
(displayed with a red line)

Reference To complete the setup, click the [Complete] button at the lower part of the screen. When the [Complete] button is clicked, the settings are sent to the controller.

Correcting the Displacement of the Profile (Position Correction)

Position correction

Variability (displacement) in positioning of the target causes displacement of the profile from the measurement area, which may lead to incorrect measurement.
With [Position correction], the controller internally calculates the displacement of the target in relation to the master profile to correct the measurement area position.

“Setting Conditions for Different Purposes” (Page A-48)
“Initial values and setting ranges for the position correction” (Page A-56)

Point

- **Errors caused by the dead zone cannot be corrected.**
  “Mounting the Head” (Page 2-2)
- **The measurement processing time is increased.**
- **In the display of [Measurement screen], the measurement area tracks the profile of the target. The display of the profile is not corrected.**
- **When the position correction failed, the measurement value from the area that has selected the correction becomes the alarm data. Set the position correction settings or review the positioning accuracy of the target.**
- **The master registration is required to perform the position correction.**
  “Register the Master Profile (Master Registration)” (Page 6-4)

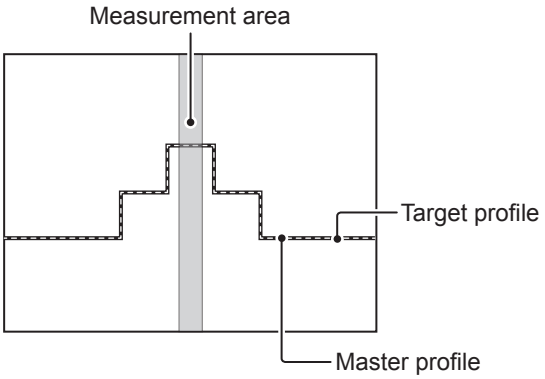
Reference

- The position correction can correct not only the measurement area but also the mask area position of the profile mask.
  “Masking the Unnecessary Parts of the Profile (Profile Mask)” (Page 6-20)
- Use [Installation correction] of the profile setting to correct the error caused from the installation of the head or a tilt of the target and the stage on which the target is installed.
  “Setting the Processing Method of the Profile (Profile Setting)” (Page 5-21)

■ Examples of the position correction

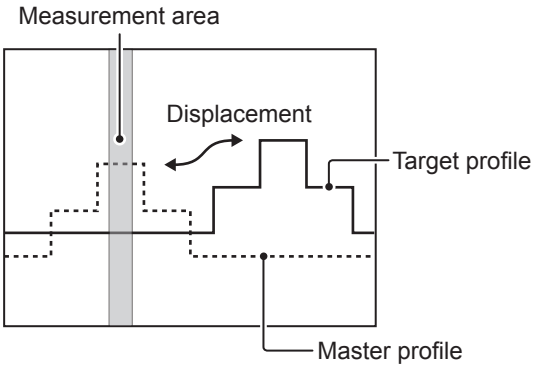
● No displacement

Because the target has been aligned with the measurement area correctly, the correct measurement is performed.



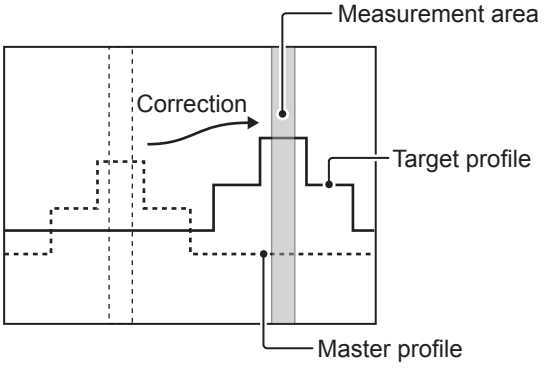
● With displacement but the position correction is not on

Displacement of the target brings the target out of the measurement area, and the measurement cannot be performed correctly.



● With displacement and position correction on

When the target is displaced, the controller calculates the displacement from the master profile. In accordance with the displacement, the position of the measurement area is corrected.



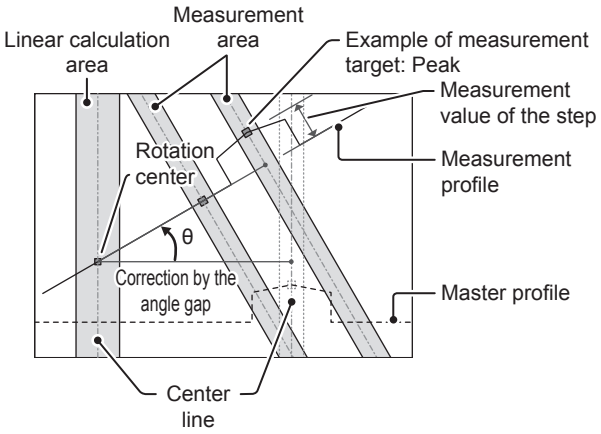
■ Types of the position correction

The position correction includes the following types.

- θ correction
- θ preliminary correction
- X correction
- Z correction
- X to Z correction
- Z to X correction

● θ correction

This function detects and corrects the tilt (angle θ) of the measurement profile from the standard. The displacement in the Z direction is also corrected.
Select [Master profile] or [Horizontal] as the standard.
When the standard is the master profile, a proximate line is calculated in the linear calculation area, and the proximate line is used to calculate the tilt (angle θ) of the measurement profile.
The proximate line can also be calculated from two linear calculation areas.
The measurement area is tilted by the detected tilt to correct the area.

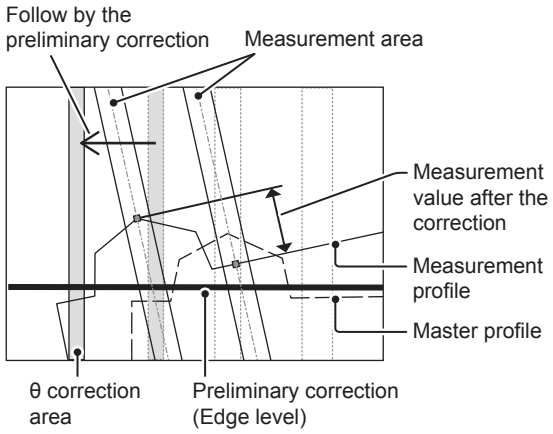


Point

- **The correction cannot be performed when the angle θ is out of the range from -45° to + 45°.**
- **When two linear calculation areas are set, the rotational center is positioned in the linear calculation area 1.**

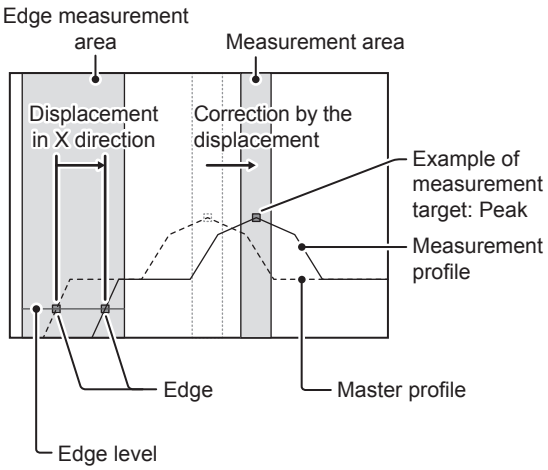
● θ preliminary correction

This performs position correction in the X direction first. Once the X correction has been completed, θ correction will then take place.
The procedure of the correction is the same as that of the X correction described later.
“No displacement” (Page 6-8)



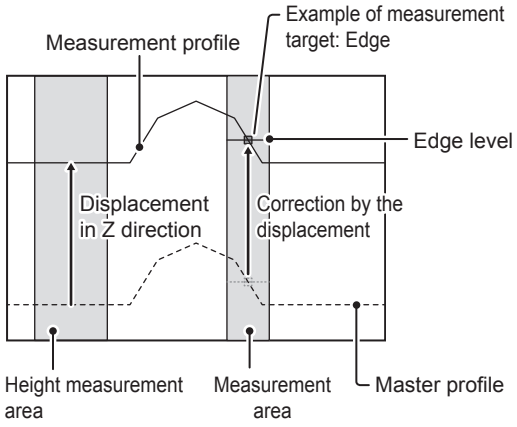
● X correction

This correction uses the edge surface (edge) of the target to correct the displacement in the X direction only.
The edge measurement area is applied to the master profile, by which the edge to be corrected is detected.
To detect the edge, set up [Edge level], [Edge dir.], [Detect dir.], and [Detect No.].



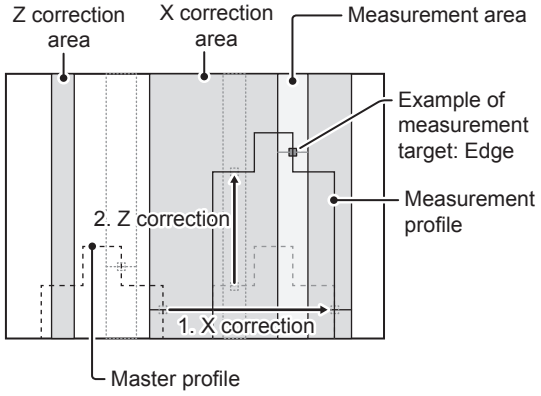
● Z correction

This correction uses the chosen edge of the target to correct the displacement in the Z direction only.
The height measurement area is applied to the master profile, by which the displacement in the Z direction is detected.
Select either [Peak], [Bottom], or [Average] from [Hgt. type] as a height standard, with which the displacement is calculated.
The Z correction targets the edge level in the measurement area.



● X to Z correction

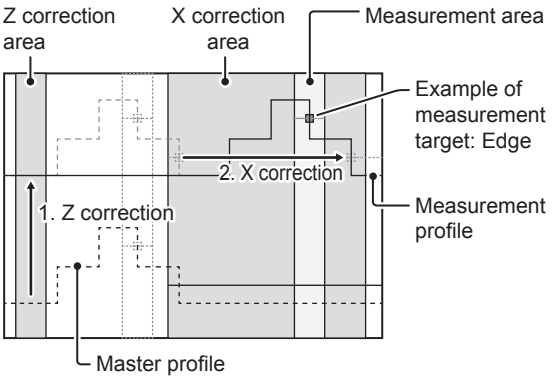
This correction corrects both displacements in X and Z directions. [X correction] corrects in the X direction first and then [Z correction] does in the Z direction.



Reference **A case of X to Z correction.**
When the displacement of the edge of the profile subjected to the X correction stays in the edge line area of the X correction area, but the plane part of the profile subjected to the Z correction may be out of the Z correction area.

● Z to X correction

This correction corrects both displacements in X and Z directions. [Z correction] corrects in the Z direction first and then [X correction] does in the X direction.

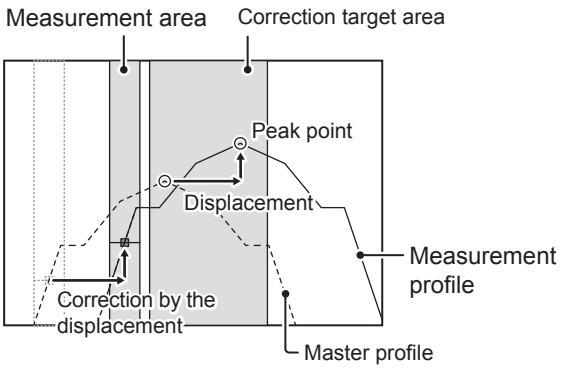


Reference **A case of Z to X correction**
When the plane part of the profile subjected to the Z correction stays in the Z correction area, but, the edge in the X correction may be out of the X correction area.

● Feature point correction

This correction detects the coordinate (X, Z) of the various feature points in the correction target area, and then corrects the displacement in both X and Z direction at the coordinate at the same time.
The feature point includes five types: [Peak point], [Bottom point], [knee], [Intsec(lines)], and [Contact(linar)]
In case of the knee, also set [Sensitivity], [Knee shape], [Detect dir.], and [Detect No.] in addition to the area.

The feature point: Correction example in case of [Peak point].



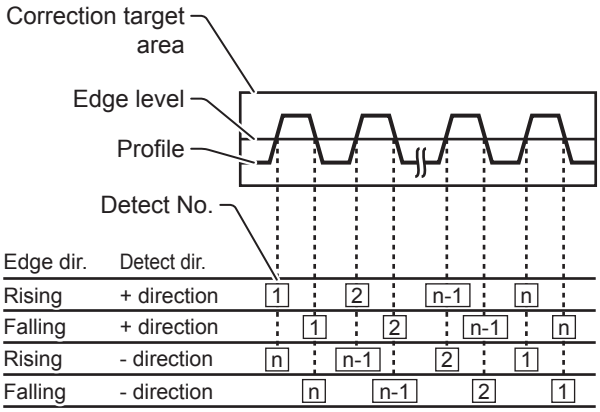
■ Combination of the position corrections and the order to process them

The position correction in θ, X direction, and Z direction can be combined to perform the correction.
The processing order of the position corrections in the combination includes the following types.

Types	θ correction	θ preliminary correction	Processing order
1	Nothing	Nothing	X to Z correction
2			Z to X correction
3	Done		θ to X correction
4			θ to Z correction
5			θ to X to Z correction
6			θ to Z to X correction
7			θ to feature point correction
8		Done	θ preliminary correction to θ to X correction
9			θ preliminary correction to θ to Z correction
10			θ preliminary correction to θ to X and Z correction
11			θ preliminary correction to θ to Z and X correction
12			θ preliminary correction to θ to feature point correction

■ Edge direction, Detection direction, and Detection No.

With the θ preliminary correction, X correction, and feature point correction (knee), set up the edge direction, detecting direction and detection No. to detect the edge.



● [Edge dir.]

This setting sets the direction intersecting the edge level when the profile changed from the X-axis - (minus) area to + (plus) area.

- Rising ..... Intersect the edge level on the rising slope
- Falling..... Intersect the edge level on the falling slope

● [Detect dir.]

Set up the direction to count [Detect No.]

- + direction..... Count in the + direction of the X-axis (left to right).
- - direction..... Count in the - direction of the X-axis (right to left).

● [Detect No.]

This setting selects an edge based off the settings defined in [Edge dir.] and [Detect dir.].

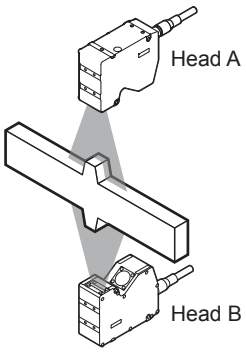
For the default values, refer to 🕮 “Initial values and setting ranges for the position correction” (Page A-56).

■ Dual head mode

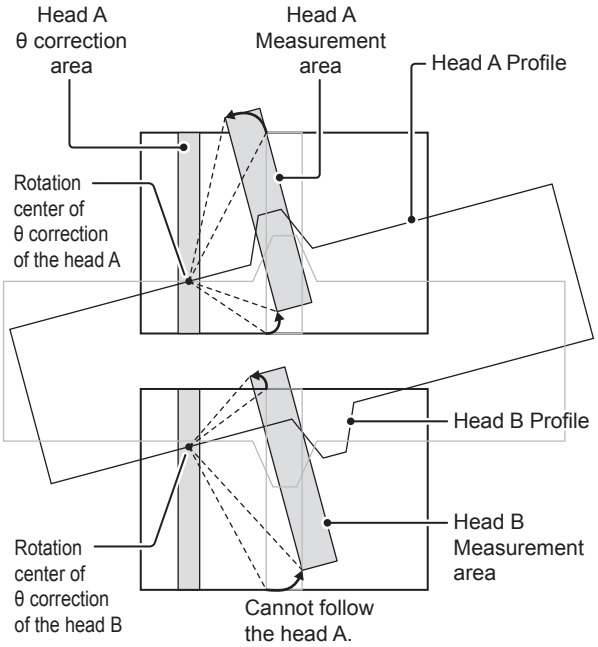
When two heads are imaging different parts of one target respectively, set the positional relationship between the heads by the relative position to the standard head.
When the head A is set with the positional correction, the position of the head B is also corrected following the head A.

Reference Set up the head installation status by [Head installation condition] of the measurement common setting.
"Setting the Measurement common setting (Advanced function mode)" (Page 9-6)

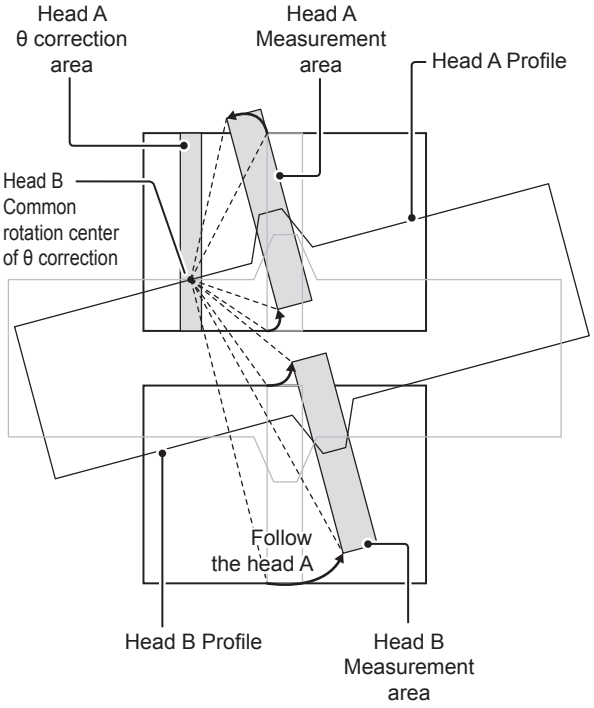
● Example of the sequential position correction (in [Facing/Same dir.])



Dual head mode = OFF
Even when the heads A and B are set with the θ correction with the same settings respectively, the head B measurement area cannot follow the head A due to the displacement of the rotation center of the head A profile from that of the target.



Dual head mode = ON
Set the displacements of the head B in the X and Z directions relative to the head A which is a standard. When the head A is set with the θ correction area, the position of measurement area of the head B is also corrected following the positional correction of the head A.



■ Standard setting and advanced setting

The setting items include [Standard set] and [Advanced set].
The advanced set can set up one more position correction ([Correction 2] tab) in addition to the standard setting ([Correction 1] tab).
When two heads are installed, the dual head mode can also be set up.

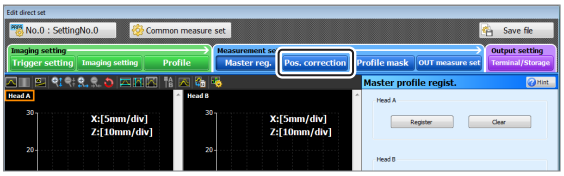
“Set up the position correction” (Page 6-13)
“Setting the dual head mode” (Page 6-18)

Set up the position correction

This section describes the setup procedure of the position correction.

Reference The procedure described here is for LJ-Navigator2. For the operation procedure of the display monitor/touch panel monitor, refer to “Switching Screens on the Display Monitor/Touch Panel Monitor” (Page A-26).

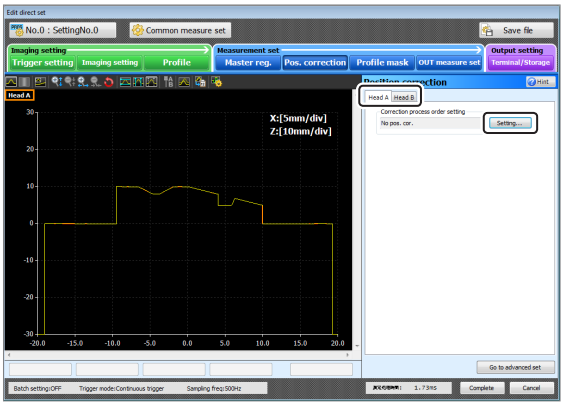
1 Click [Pos. correction].



The [Position correction] screen appears.

2 When two heads are installed, select the head to be set with the position correction.

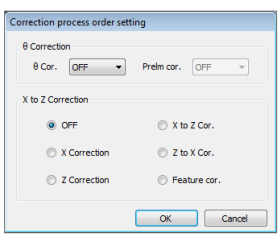
3 Click [Setting] of [Correction process order setting].



The [Correction process order setting] screen appears.

4 Select the correction processing to be set and click the [OK] button.

“Combination of the position corrections and the order to process them” (Page 6-11)

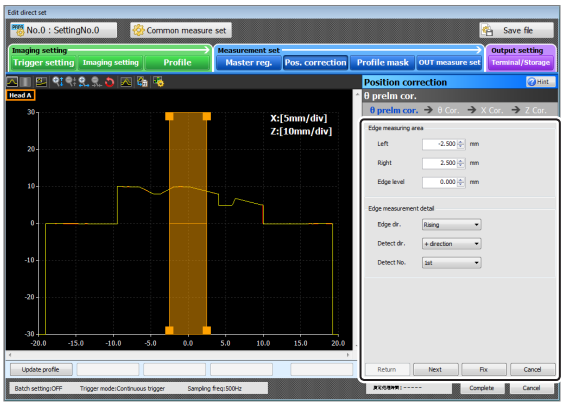


The screen returns to the [Position correction].

5 Set up the position correction according to the selected type.

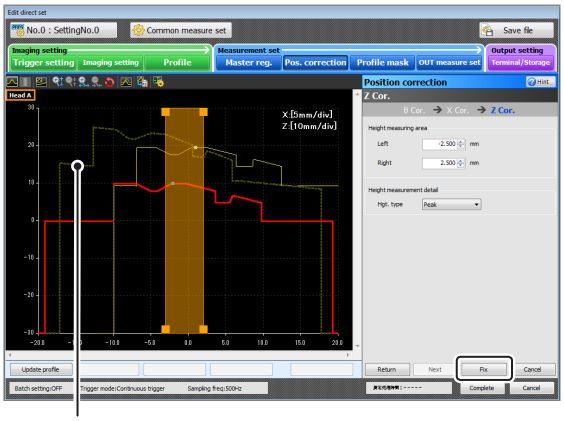
Please refer to the following items for the setup procedure of the position correction.

“Setting the θ correction” (Page 6-15)
“Profile mask and position correction” (Page 6-20)
“Setting the X correction” (Page 6-16)
“Setting the Z correction” (Page 6-16)
“Setting the feature point correction (peak point)” (Page 6-16)
“Setting the feature point correction (bottom point)” (Page 6-16)
“Setting the feature point correction (knee)” (Page 6-17)
“Setting the feature point correction (intsec (lines))” (Page 6-17)
“Setting the feature point correction (contact (lin-ar))” (Page 6-18)



Reference Click the [Return]/[Next] button to move the last/next setting of the position correction.

6 After all the position correction has completed, click the [Fix] button.



The profile processed with the position correction up to the last correction item is overlaid on the display. The display allows confirmation of the correct position correction for each correction item.

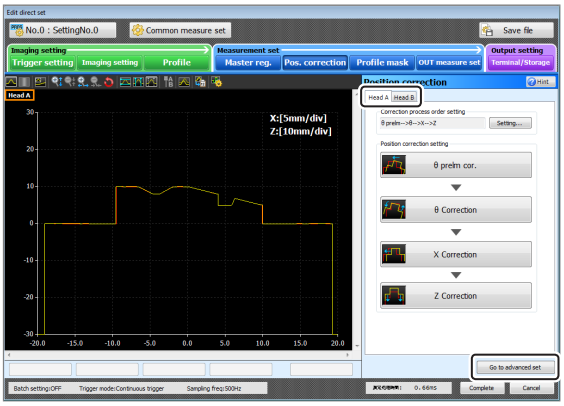
The [Position correction] screen appears.

7 When two heads are set, click the other head to set the position correction.

Reference When any one of the position correction buttons is clicked, the respective position correction setup screen appears, in which settings can be changed.

8 To apply another layer of position correction, click the [Go to advanced set] button.

Reference To return to the standard setting, click the [Go to standard set] button.



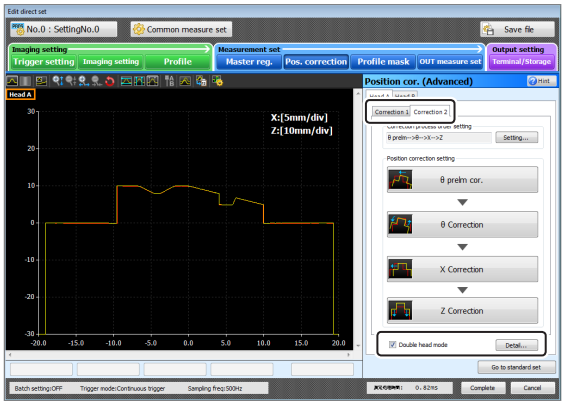
The [Position cor. (Advanced)] screen appears.

9 Click the [Correction 2] tab to set the position correction in the same way of the standard setting.

10 To set the dual head mode, select the tab for the head to be a standard and then check [Dual head mode].

11 **Click the [Detail...] button to set up the dual head mode.**

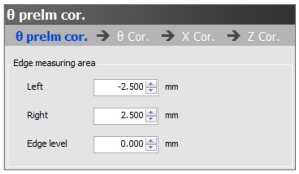
“Setting the dual head mode” (Page 6-18)



Reference To complete the setup, click the [Complete] button at the lower part of the screen. When the [Complete] button is clicked, the settings are sent to the controller.

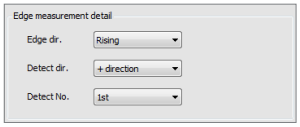
■ Setting the θ preliminary correction

1 **With [Edge measuring area], set [Left] and [Right] of the area and [Edge level], while checking the profile display.**



2 **With [Edge measurement detail], set [Edge dir.], [Detect dir.], and [Detect No.]**

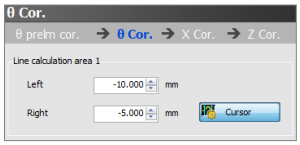
“Edge direction, Detection direction, and Detection No.” (Page 6-11)



3 **To set other position correction, return to the step *5* of “Set up the position correction” (Page 6-13).**

■ Setting the θ correction

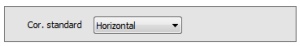
1 **With [Line calculation area 1], set [Left] and [Right] of the area, while checking the profile display.**



2 **When the proximate line is calculated from two linear calculation areas, check [Area 2 valid] of [Line calculation area 2], and set up [Left] and [Right].**



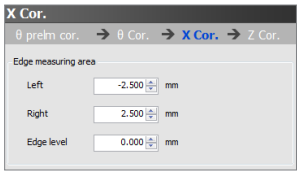
3 **With [Cor. standard], select the standard line for the angle calculation from [Horizontal] or [Master profile].**



4 **To set other position correction, return to the step *5* of “Set up the position correction” (Page 6-13).**

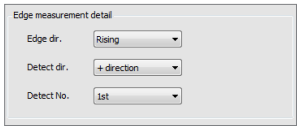
■ Setting the X correction

1 **With [Edge measuring area], set [Left] and [Right] of the area and [Edge level], while checking the profile display.**



2 **With [Edge measurement detail], set [Edge dir.], [Detect dir.], and [Detect No.]**

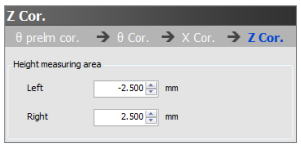
“Edge direction, Detection direction, and Detection No.” (Page 6-11)



3 **To set other position correction, return to the step *5* of “Set up the position correction” (Page 6-13).**

■ Setting the Z correction

1 **With [Height measuring area], set [Left] and [Right] of the area, while checking the profile display.**



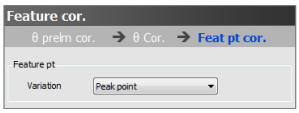
2 **Select either [Peak], [Bottom], or [Average] from the [Hgt. type] pull-down menu of [Hgt. measurement detail], with which the height is calculated.**



3 **To set other position correction, return to the step *5* of “Set up the position correction” (Page 6-13).**

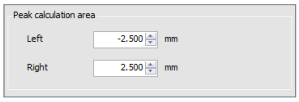
■ Setting the feature point correction (peak point)

1 **Select [Peak point] with [Variation].**



Setting items of the feature point correction (peak point) appear.

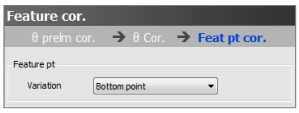
2 **With [Peak calculation area], set [Left] and [Right] of the area, while checking the profile display.**



3 **To set other position correction, return to the step *5* of “Set up the position correction” (Page 6-13).**

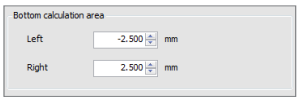
■ Setting the feature point correction (bottom point)

1 **Select [Bottom point] with [Variation].**



Setting options for the feature point correction (bottom point) appear.

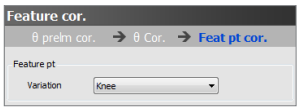
2 **With [Bottom calculation area], set [Left] and [Right] of the area, while checking the profile display.**



3 **To set other position correction, return to the step *5* of “Set up the position correction” (Page 6-13).**

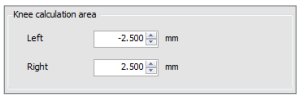
■ Setting the feature point correction (knee)

1 **Select [Knee] with [Variation].**



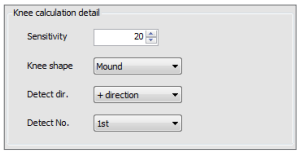
Setting options for the feature point correction (knee) appear.

2 **With [Knee calculation area], set [Left] and [Right] of the area, while checking the profile display.**



3 **With [Knee calculation detail], set [Sensitivity], [Knee shape], [Detect dir.], and [Detect No.].**

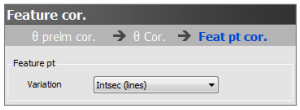
“Edge direction, Detection direction, and Detection No.” (Page 6-11)



4 **To set other position correction, return to the step *5* of “Set up the position correction” (Page 6-13).**

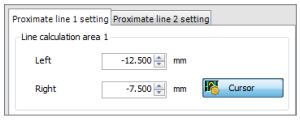
■ Setting the feature point correction (intsec (lines))

1 **Select [Intsec (lines)] with [Variation].**

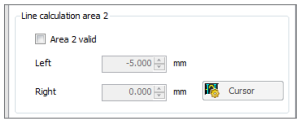


Setting options for the feature point correction (intersection (line-to-line)) appear.

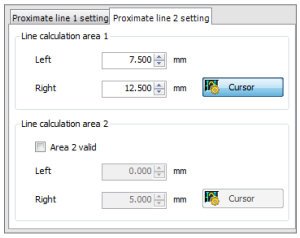
2 **Click the [Proximate line 1 setting] tab, and then with [Line calculation area 1], set [Left] and [Right] of the area, while checking the profile display.**



3 **When the proximate line is calculated from two linear calculation areas, check [Area 2 valid] of [Line calculation area 2], and set [Left] and [Right].**



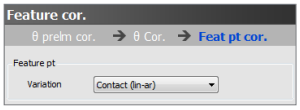
4 **Click the [Proximate line 2 setting] tab, and then set [Line calculation area 1] and [Line calculation area 2] in the same way as that of [Proximate line 1 setting].**



5 **To set other position correction, return to the step *5* of “Set up the position correction” (Page 6-13).**

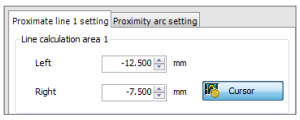
■ Setting the feature point correction (contact (lin-ar))

1 Select [Contact (lin-ar)] with [variation].

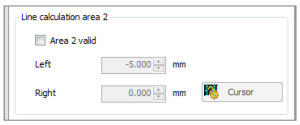


Setting options for the feature point correction (contact (lin-ar)) appear.

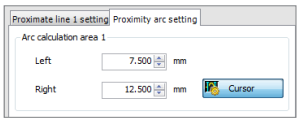
2 Click the [Proximate line 1 setting] tab, and then with [Line calculation area 1], set [Left] and [Right] of the area, while checking the profile display.



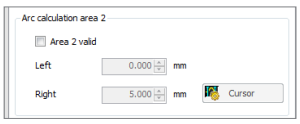
3 When the proximate line is calculated from two linear calculation areas, check [Area 2 valid] of [Line calculation area 2], and set [Left] and [Right].



4 Click the [Proximity arc setting] tab, and then with [Arc calculation area 1], set [Left] and [Right] of the area, while checking the profile display.



5 When the proximate arc is calculated from two Arc calculation areas, check [Area 2 valid] of [Arc calculation area 2], and set [Left] and [Right].



6 To set other position correction, return to the step *5* of 🕮 "Set up the position correction" (Page 6-13).

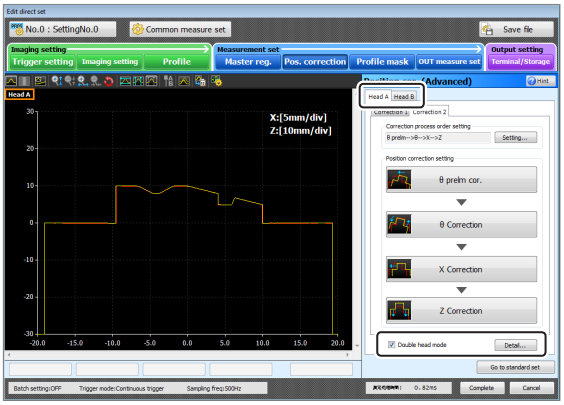
Setting the dual head mode

This section describes the setup procedure of the dual head mode.

Reference
- The dual head mode can be set only when the head installation status is other than [Independent].
- This mode is available only with the advanced setting.

🕮 "Dual head mode" (Page 6-12)

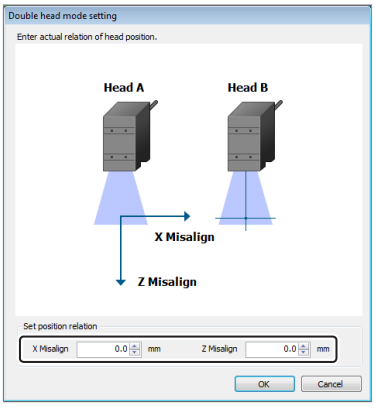
1 Check [Dual head mode] and click the [Detail...] button.



The [Dual head mode setting] screen appears.

2 Enter the actual positional relationship of the head B relative to the heads A as a standard.

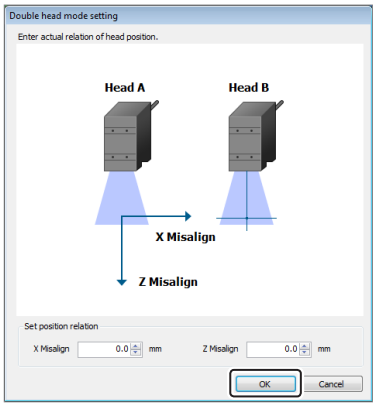
- [X Misalign]: Displacement of the optical center of the head B (X coordinate = 0) relative to the optical center (X coordinate = 0) of the head A. The displacement in the arrow direction of the coordinate axis is positive in the relationship between the heads shown in the figure.
- [Z Misalign]: Displacement of the standard distance of the head B (Z coordinate = 0) relative to the standard distance (Z coordinate = 0) of the head A. The displacement in the arrow direction of the coordinate axis is positive in the relationship between the heads shown in the figure.



(The screen shows [Siding/Same dir.].)

3 After the setup has been completed, click the [OK] button.

Reference In case of the direct setting editing, the settings are sent to the controller when the [OK] button is clicked.



The screen returns to [Position cor. (Advanced)].

Masking the Unnecessary Parts of the Profile (Profile Mask)

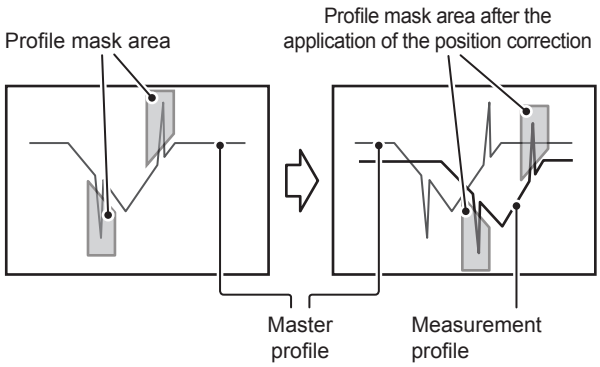
Profile mask

The profile mask masks the areas of the profile data unsuitable for the measurement processing. The masked areas can be excluded from the data for the measurement processing.
The profile mask can be specified up to five areas for each head.

Reference Unlike [Image mask] of [Imageing setting], the profile mask masks the profile.
The image mask masks the CMOS image captured.
“Image mask” (Page 5-14)

■ Profile mask and position correction

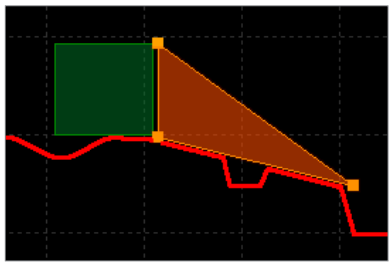
The profile mask setting can correct the area position depending on the position correction setting.



“Correcting the Displacement of the Profile (Position Correction)” (Page 6-8)

■ Shape of the mask area

The mask area is specified by a rectangle or triangle.
The mask area is specified by the coordinates at the upper left and lower right, and in case of the triangle, by the coordinates at three apexes.

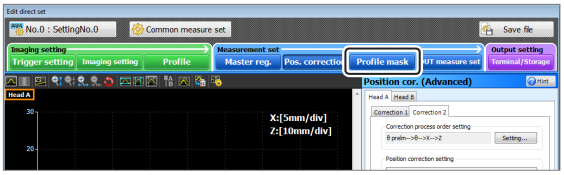


Setting profile mask

This section describes the standard setup procedure of the profile mask.

Reference The procedure described here is for LJ-Navigator2. For the operation procedure of the display monitor/touch panel monitor, refer to “Switching Screens on the Display Monitor/Touch Panel Monitor” (Page A-26).

1 Click [Profile mask] in the measurement screen.

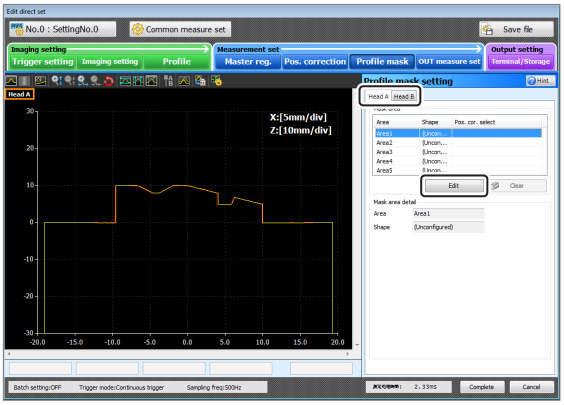


The [Profile mask setting] screen appears.

2 When two heads are installed, select the head to be set with the profile mask.

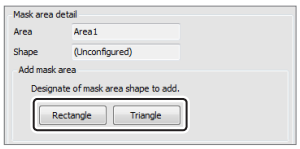
3 With [Mask area], select the mask area to be set, and click the [Edit] button.

Reference
- When a new mask area is set, select an area which [Shape] is [(Unconfigured)].
- When the mask area that has been set is selected and the [Clear] button is clicked, a confirmation message of the cancellation appears. Click [Yes] to clear the mask area.



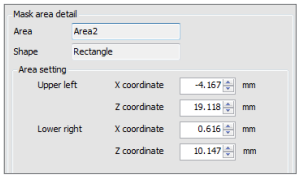
4 Select the mask area shape by [Add mask area].

Reference The shape can also be specified by right-clicking [(Unconfigured)] in the [Mask area] list and selecting [Rectangle]/[Triangle] on the menu displayed.

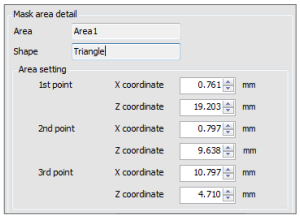


5 Set the mask area while checking the profile display.

- In case of the rectangle ... Specify [X coordinate] and [Z coordinate] of the upper left and lower right, respectively.



- In case of the triangle ... Specify [X coordinate] and [Z coordinate] of each apex.

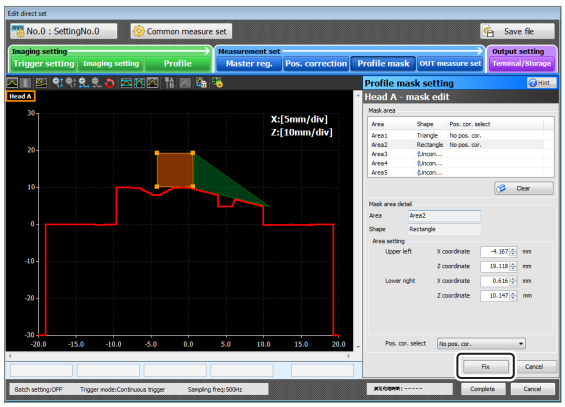


6 Set whether to apply the position correction to the mask area under [Pos. cor. select].

Reference When two position corrections are set in the advanced setting of the position correction, [Pos. cor. 1] and [Pos. cor. 2] can be set.
“Set up the position correction” (Page 6-13)



7 Click the [Fix] button to fix the mask area set.



Reference To complete the setup, click the [Complete] button at the lower part of the screen. When the [Complete] button is clicked, the settings are sent to the controller.

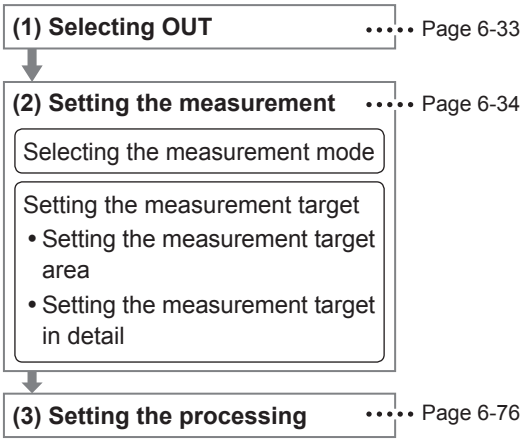
Setting the Measurement (OUT Measurement Setting)

OUT measurement setting

The OUT measurement setting sets the measurement target for the profile, and assigns the setting value to OUT.
The OUT setting can set different measurement conditions on OUT1 to OUT16, which can be measured at the same time.

Reference For the setting procedure of [OUT measurement setting], refer to “Starting the OUT measurement setting” (Page 6-33).

■ Flow of the measurement setting



(1) Selecting OUT

Select the OUT to which the measurement value is assigned.
Set up the measurement setting and the processing setting of the selected OUT.
Up to 16 OUT settings can be set for one profile.

(2) Setting the measurement

Set up the measurement mode (Page 6-27), the measurement target area (Page 6-22), and the measurement target (Page 6-23), which defines the measurement targets for the selected OUT.

(3) Setting the processing

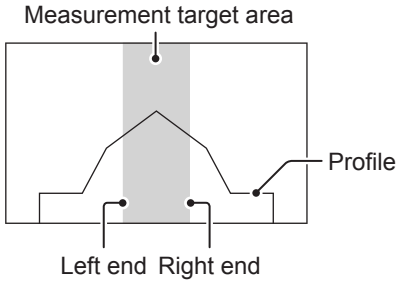
Set up the processing of the measurement values, such as settings for when the measurement values cannot be calculated, the filter setting for the measurement, how to measure the measurements, and the tolerance setting to determine whether the measurements are within the upper/lower limits.

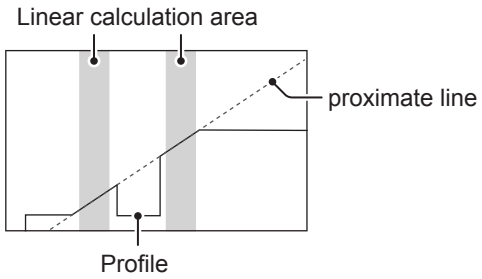
Measurement setting

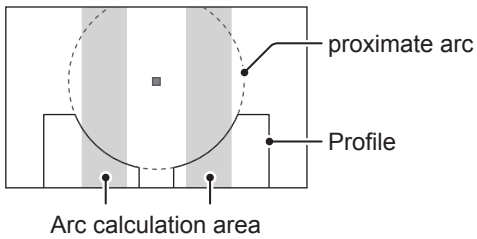
This section outlines the measurement target area, the measurement target, and the measurement modes, to be set up in the measurement setting.

■ Measurement target area

The measurement value is obtained by detecting "Measurement target" (Page 6-23) from among the profiles in [Measurement target area].
The measurement target area specifies X coordinates of the right and left ends of the profile. The Z direction has no limit.
The measurement target area is also utilized to measure the target on the profile in the area, as well as to obtain the proximate lines and arcs, and measure the target on the curves/lines.







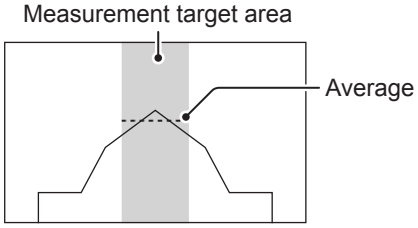
■ Measurement target

The measurement target sets up what part of the profile in the set measurement target area is obtained as the measurement value.

The measurement target includes the following types.

● Average

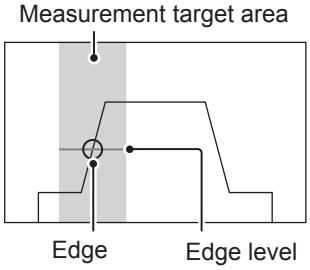
The average height of the profile is calculated in the measurement target area.



● Edge

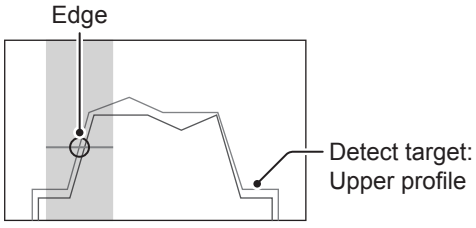
The position where the profile in the measurement area intersects the edge level is measured. Set [Edge dir.], [Detect dir.], and [Detect No.] in addition to [Edge level] for the measurement.

“Edge direction, Detection direction, and Detection No.” (Page 6-11)



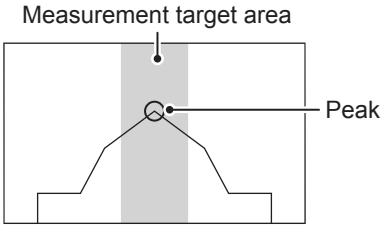
When [Compression (time axis)] of the profile is ON, set the [Detect target] to choose whether to measure on the upper or lower profiles.

“Setting the Processing Method of the Profile (Profile Setting)” (Page 5-21)



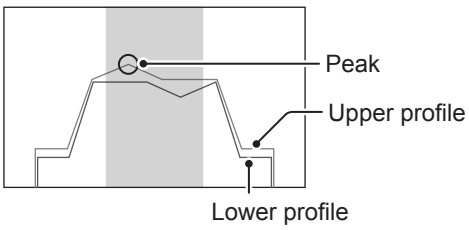
● Peak

The maximum value of the profile in the measurement target area is measured.



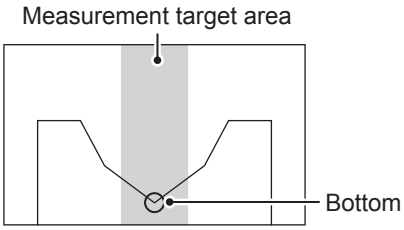
When [Compression (time axis)] of the profile is ON, the maximum value is measured from the upper profile.

“Setting the Processing Method of the Profile (Profile Setting)” (Page 5-21)



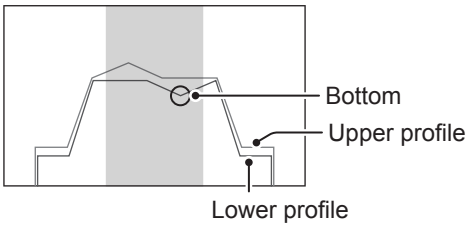
● Bottom

The minimum value of the profile in the measurement target area is measured.



When [Compression (time axis)] of the profile is ON, the minimum value is measured from the lower profile.

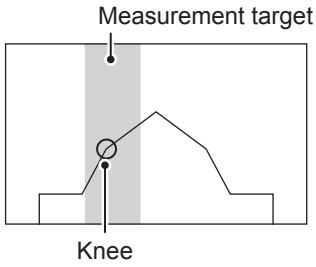
“Setting the Processing Method of the Profile (Profile Setting)” (Page 5-21)



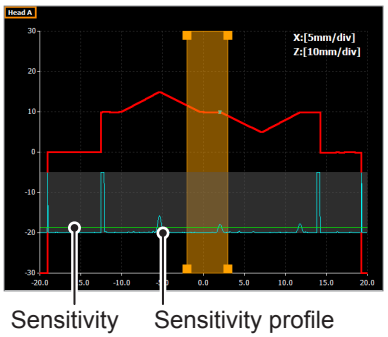
● Knee

The position where the profile in the measurement area is bent is measured. Set [Sensitivity], [Knee shape], [Detect dir.], and [Detect No.] to measure.

Reference [Sensitivity] is a threshold value to specify how much bend is detected as a knee.



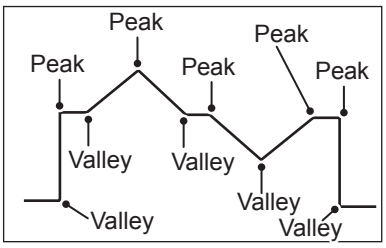
• Sensitivity



Sensitivity is a threshold value to specify how much change in the gradient (degree of the bend) is detected as the knee.
When setting the sensitivity, the differentiated waveform of the profile data (the sensitivity profile) appears to enhance the knee.
Set the sensitivity in the range between 1 to 100 such that the sensitivity profile of the point to be detected exceeds the threshold value.
The higher the intensity of the bend is in the profile, the higher the peak in will be in the sensitivity profile. Therefore, setting the threshold value properly will prevent detection of small irregularities of the profile.

Reference As for the knees between [Invalid data] and [Valid data], only the upwardly-peak type knees (invalid data to valid data) are detected.

• Knee shape



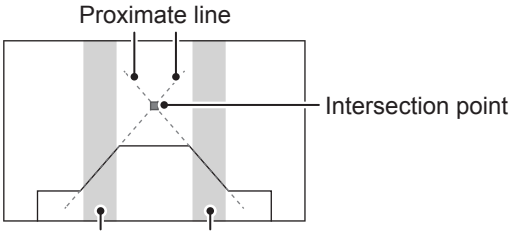
Peak Type: Knee at where the profile gradient decreases.
Valley Type: Knee at where the profile gradient increases.

• Detection direction/Detection No.

Only the knees with knee shape are counted from the specified direction among the knees detected in the measurement target area.

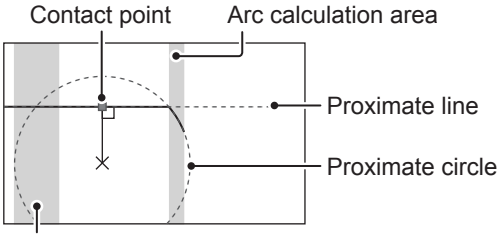
● Intersection point

The intersection of two proximate lines calculated from the profile in the measurement target area is measured,



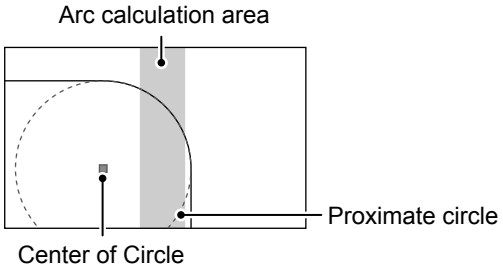
● Contact point

The contact point between one proximate line and one proximate arc, which are calculated from the profile in the measurement target area, is measured.
The contact point is the perpendicular distance between the center of the proximate circle to the proximate line.



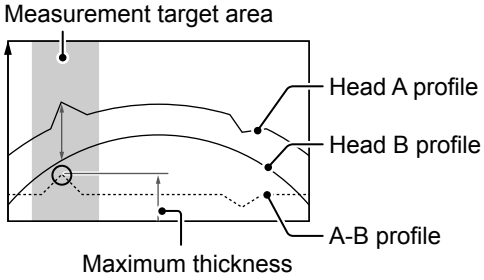
● **Center of Circle**

The center point of the proximate circle calculated from the profile in the measurement target area is measured.



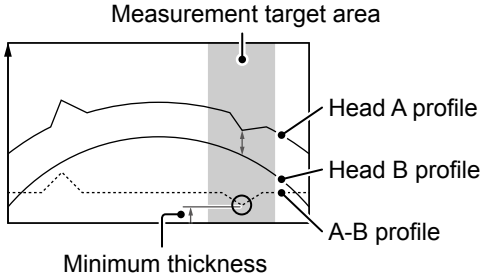
● **Maximum thickness**

The maximum thickness can be measured only when two heads are installed on either side of the target.
The maximum thickness is measured from the A-B profile calculated by subtracting the head B profile from the head A profile.
The thickness at the position where the A-B profile is maximum in the measurement target area is measured.



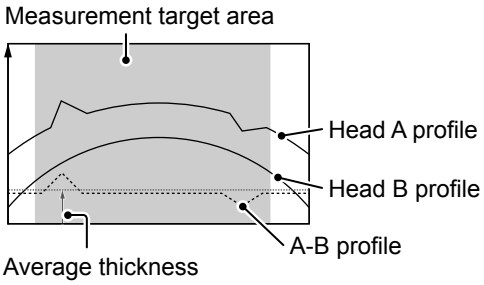
● **Minimum thickness**

Like the maximum thickness, the minimum thickness is measured from the A-B profile.
The thickness at the position where the A-B profile is minimum in the measurement target area is measured.



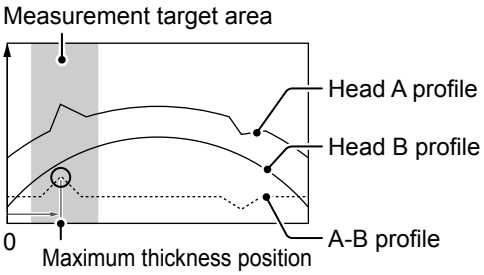
● **Average thickness**

Like the maximum thickness, the minimum thickness is measured from the A-B profile.
The average height of the A-B profile is measured in the measurement target area.



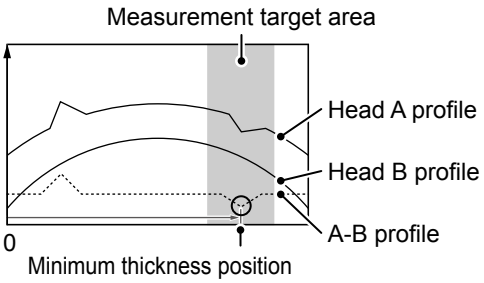
● **Maximum thickness position**

Like the maximum thickness, the minimum thickness is measured from the A-B profile.
The position of the maximum thickness in the X direction of the A-B profile in the measurement target area is measured.



● **Minimum thickness position**

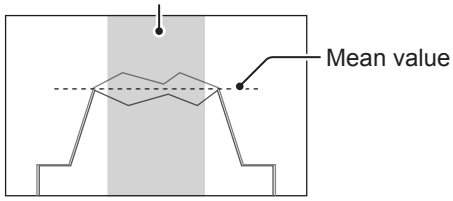
Like the maximum thickness, the minimum thickness is measured from the A-B profile.
The position in the X direction where the A-B profile indicates minimum thickness in the measurement target area is measured.



● **Mean value**

The mean value can be measured only when [Compression (time axis)] of the profile setting is ON. The average value obtained from all data between the upper and lower profiles is measured.

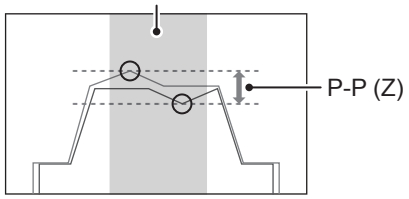
Measurement target area



● **P-P (Z)**

The mean value can be measured only when [Compression (time axis)] of the profile setting is ON. The difference between the peak and bottom of the profile in the measurement target area is measured. The peak and bottom are measured from the upper and lower profiles, respectively.

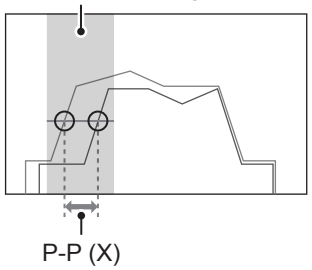
Measurement target area



● **P-P (X)**

The mean value can be measured only when [Compression (time axis)] of the profile setting is ON. The difference between the positions of the upper and lower profiles in the measurement target area is measured.
Set [Edge dir.], [Detect dir.], and [Detect No.] in addition to [Edge level] for the measurement.
“Edge direction, Detection direction, and Detection No.” (Page 6-11)

Measurement target area



■ Measurement mode

The measurement mode specifies the type of measurement that will take place.
For example, [Peak] of the measurement target outputs [Z coordinate] in the height mode and [X coordinate] in the position mode.
Some measurement modes perform measurement by setting the linear calculation area/arc calculation area or compares with the master profile, without specifying the measurement target.

● Types and output values of the measurement modes

The selectable measurement modes largely depend on ON/OFF condition of the [Compression (time axis)] setting and ON/OFF condition of the the batch measurement function. Additional measurement modes can be set by “Simple 3D measurement mode” (Page 6-30) in addition to the following modes, when the batch measurement is ON and the [Compression (time axis)] is OFF.

[Compression (time axis)]: OFF

Measurement mode		Measurement target	Output result
Height		Peak, Bottom, Average, Knee, Intersection, Contact point, and Center of Circle	Z coordinate of the measurement target
Step		Peak, Bottom, Average, Knee, Intersection, Contact point, and Center of Circle	Difference in [Height] between the measurement target (Z coordinate)
Position		Peak, Bottom, Edge, Knee, Intersection, Contact point, and Center of Circle	X coordinate of the measurement target
Center position		Peak, Bottom, Edge, Knee, Intersection, Contact point, and Center of Circle	X coordinate of the middle point of [Position] between the measurement targets.
Width		Peak, Bottom, Edge, Knee, Intersection, Contact point, and Center of Circle	The middle point of [Position] between the measurement targets (X coordinate)
Angle	Angle for horizon	-	Angle between the horizon and the proximate line obtained from the linear calculation area
	Angle between lines	-	Intersection angle of two proximate lines obtained from the linear calculation area
Radius measurement		-	Radius of the proximate curve obtained from the arc calculation area
Cross-Sectional area	Reference for 1 line	-	Area of region divided by one proximate line obtained from the measurement target area, profile, and linear calculation area
	Reference for 2 line	-	Area of region divided by two proximate lines obtained from the measurement target area, profile, and two linear calculation areas
	Master reference	-	Area of a region divided by the measurement area, profile, and master profile
Master comparison (Z)		-	Maximum value of difference in the Z coordinate between the profile in the measurement area and the master profile
Distance	point - point	Peak, Bottom, Knee, Intersection, Contact point, and Center of Circle	Straight distance between two measurement targets
	point - line	Peak, Bottom, Knee, Intersection, Contact point, and Center of Circle	Length of the perpendicular drawn from the measurement target to the proximate line obtained from the linear calculation area
Thickness		Maximum thickness, Minimum thickness, Average thickness, Max thickness position, Min thickness position	Z or X coordinate of the measurement target Average is only for Z direction.

[Compression (time axis)]: ON

Measurement mode	Measurement target	Output result
Height	Peak, Bottom, and Mean value	Z coordinate of the measurement target
Position	Peak, Bottom, and Edge	X coordinate of the measurement target
Deflection	P-P (Z)	Difference between the heights of the peak and bottom in the measurement area (Z direction)
	P-P (X)	Difference between the edge positions of the upper and lower profiles in the measurement target area (X coordinate)

■ Example measurements for various measurement modes

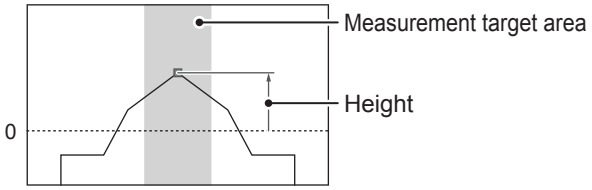
This section describes examples of basic measurements for various measurement modes.

Reference Please note that the examples described here are not all the measurements available with the measurement modes.
Please refer to the setting procedure of each mode for details.

● Height

The point of the head where its Z coordinate is zero is used as the standard to measure the height (Z coordinate) of the measurement target at one point of the profile.

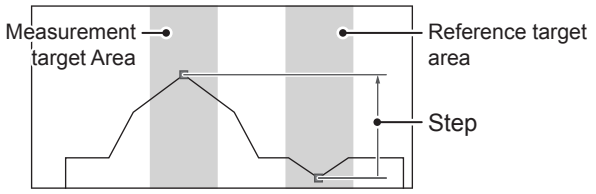
(Example) Measurement target: Peak



● Step

Specify two areas: [Reference target] to be the reference height and [Measurement target] whose step is measured. After measuring the height of each area to obtain the result of [Measurement target height] - [Reference target height], step measurement is available. The measurements are signed values.
If either one of the measurement values was undetectable, the measurement values returns alarm data.

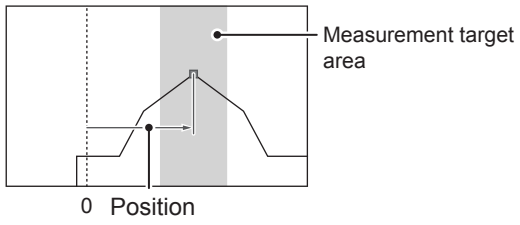
(Example)
Measurement target: Peak, Reference target: Bottom



● Position

The point of the head where its X coordinate is zero is used as the standard to measure the distance (X coordinate) of the measurement target at one point of the profile.

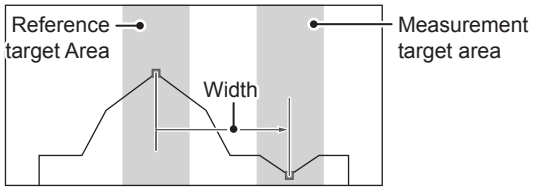
(Example) Measurement target: Peak



● Width

Specify two areas: [Reference target] to be the reference width and [Measurement target] whose width is measured. After measuring the position of each area to obtain the result of [Measurement target position] - [Reference target position], width measurement is available. The measurements are signed values.
If either one of the measurement values was undetectable, the measurement values returns alarm data.

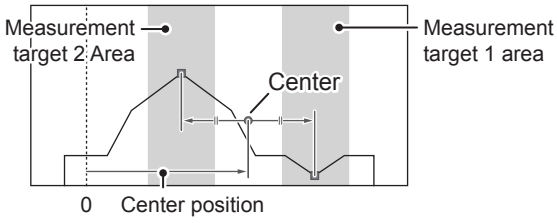
(Example)
Measurement target: Peak, Reference target: Bottom



● Center position

Specify two areas of [Measurement target 1] and [Measurement target 2]. The intermediate position between the area positions is measured.

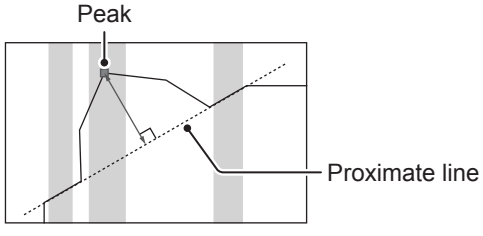
(Example) Measurement target 1: Peak, Measurement target 2: Bottom



● Distance

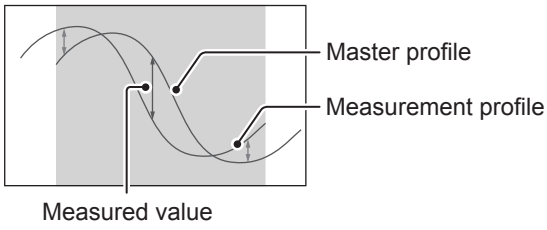
This mode measures the direct distance between two points on the profile or between the point and the line. In case of the point-to-point distance, specify two measurement targets to measure the distance between the two measurement targets.
In case of the point-to-line distance, the length of the perpendicular drawn from the point to the proximate line is measured. The measurement values are positive numbers.

(Example)
Measurement target: Peak,
Reference target: Proximate line



● Master comparison (Z)

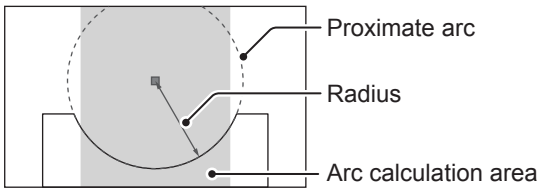
The maximum difference in the Z direction between the master profile registered as the standard and the profile in the measurement target area is measured.
The measurement value is the maximum absolute difference in the Z coordinates at the same X coordinates. The measurements are signed values. The measurement value is positive/negative number if the measured profile is at the upper/lower position than the mater profile, respectively.



● Radius measurement

The proximate circle is calculated from the profile in the curve calculation area to measure the length of R (radius) of the proximate circle.
If all data in the curve calculation area is invalid or dead zone data, the measurement values become alarm data.

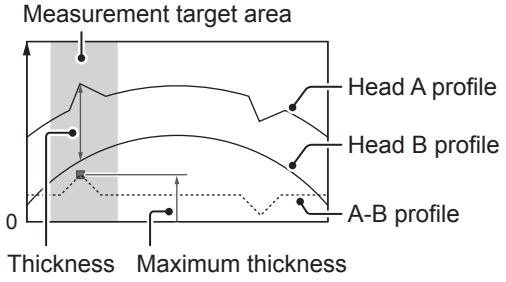
Reference Even when the center of the proximate circle is out of the measurement range, the measurement values are output.



● Thickness

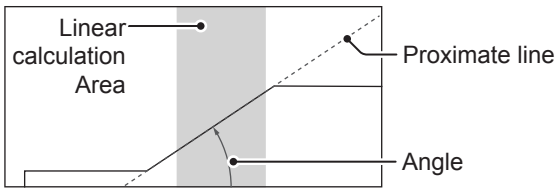
The thickness can be measured only when two heads are installed on either side of the target.
The thickness is measured from the [A-B profile] calculated by subtracting the head B profile from the head A profile.
The measurement target is set to [A-B profile] upon which we can measure the maximum thickness, minimum thickness, average thickness, maximum thickness position, and minimum thickness position.

(Example) Measurement target: Maximum thickness



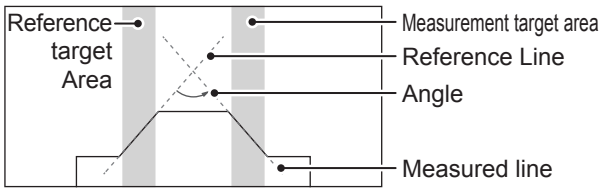
● Angle (angle for horizon)

The proximate line is calculated in the proximate line area to measure the angle (intersection angle with the X-axis) of the proximate line between the horizon.
If all data in the proximate line area is abnormal data, the measurement values become alarm data.



● Angle (angle between lines)

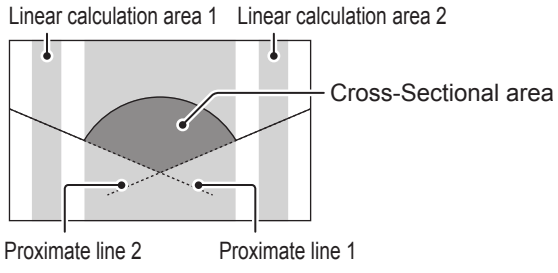
Two proximate lines are calculated in the two linear calculation areas of [Measurement target] and [Reference target] to measure the intersection angle between the proximate lines.
The angle is measured counterclockwise from the proximate line of the standard target towards the proximate line of the measurement target.
If all data in the proximate line area is abnormal data, the measurement values become alarm data.



● Cross-Sectional area

The Cross-Sectional area measures an area of the region divided by the profile, the measurement target area, and the reference line.
The standard target can be selected from [Ref for 1 line], [Ref for 2 lines], and [Master reference].
[Ref for 1 line], [Ref for 2 lines], and [Master standard] measure the areas divided by one proximate line, two proximate line, and the master profile, respectively.
In the following cases, the measurement values become alarm data.

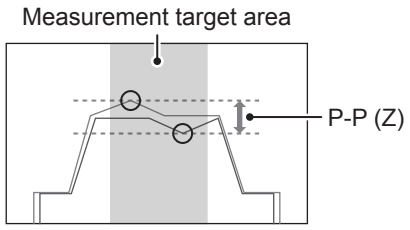
- All the data of either the measurement target area or the linear calculation area is abnormal.
- The intersection of the two lines is out of the area between the both center lines of the proximate line areas, in case of [Ref for 2 lines].
- No intersection of two lines exists, in case of [Ref for 2 lines].



● **Deflection**

[Deflection] can be set only when [Compression (Time-axis)] is ON.
The edge position difference in the X direction or P-P in the Z direction (difference between the maximum and minimum values) is measured.
For the measurement in the X direction, specify the measurement target area to measure the difference between the edge positions in the area.
For the P-P measurement in the Z direction, specify the measurement target area to measure the difference between the peak and bottom in the area.

(Example) measurement target: P-P (Z)



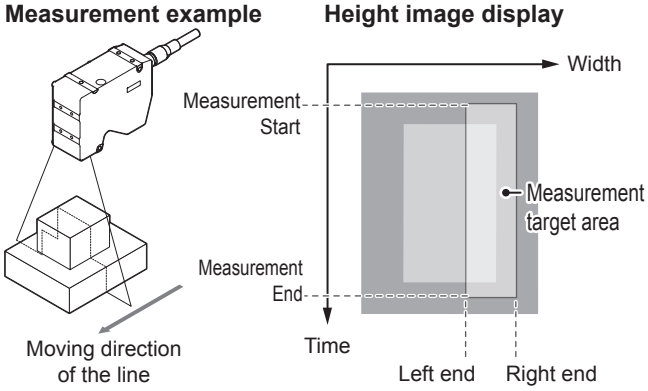
■ Simple 3D measurement mode

When [Batch measurement] of the trigger setting is ON and [Compression (time axis)] is OFF, the simple 3D measurement mode can be used in addition to the standard measurement mode.
In the simple 3D measurement mode, set the measurement setting on [Display height image] where the profiles are time-sequentially arranged by the batch points.

● **Differences in the setup procedure with that of the standard measurement mode**

In the standard measurement mode, setting is performed by right/left end (X-axis) in the measurement target area on the profile display.
In the simple 3D measurement mode, setting is performed on the height image display, which allows setting of the time period (measurement time).
Specify the measurement area by the X coordinates at the upper left and lower right and the batch point.

Measurement example **Height image display**



● **Types and output values of the simple 3D measurement mode**

Simple 3D measurement mode	Measurement target	Output result
Height	Peak, Bottom, Average, and P-P	Z coordinate of the measurement target detected from all the profile measurement width during the measurement period
Step	Peak, Bottom, and Average	Difference in [Height] between the measurement target (Z coordinate)
Position	Peak and Bottom	X coordinate of the measurement target detected from all the profile measurement width during the measurement period, or the coordinates from the start of the batch measurement * Depend on the setting of the trigger interval.

Processing setting

This section outlines several settings for measurement processing, tolerance setting, and terminal assignment.

■ Measurement hold point

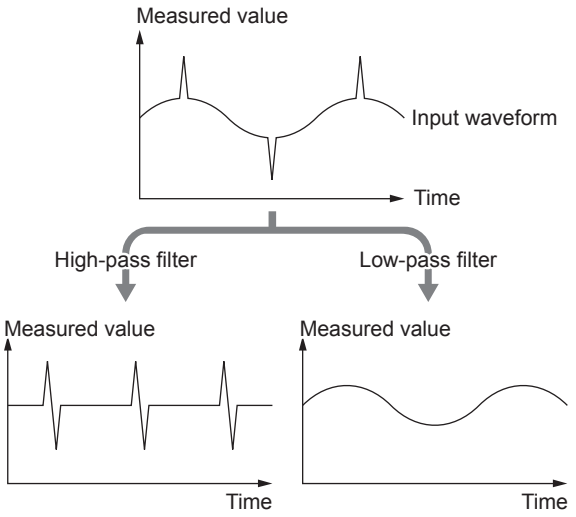
In the case that the target is not within the measurement range, there is insufficient light, or the position correction fails, the sensor cannot obtain a measurement and will go into an unmeasurable status.
This status is called the measurement value alarm status, and the data in the status is called the measurement value alarm data.
With the measurement value hold processing, set the number of sampling that holds the normal data just before the unmeasurable status.

Reference
- When the measurement alarm status is maintained for more samples than defined by the hold point, the measurement values will be changed to an ALARM.
- When the number of samples is set to zero, the measurement value alarm data is output without holding the last normal data.
- When the number of samples is set to the upper limit number 999, the last normal data is held until the normal measurement value is calculated.

■ Measurement value filter

The measurement values are processed with the moving average, the low-pass filter, and high-pass filter.

- Moving average ..... Set the number of the measurement values to be averaged.
- Low-pass filter ..... Set the cutoff frequency to prevent the frequency variation higher than the cutoff value.
- High-pass filter ..... Set the cutoff frequency to prevent the frequency variation lower than the cutoff value.



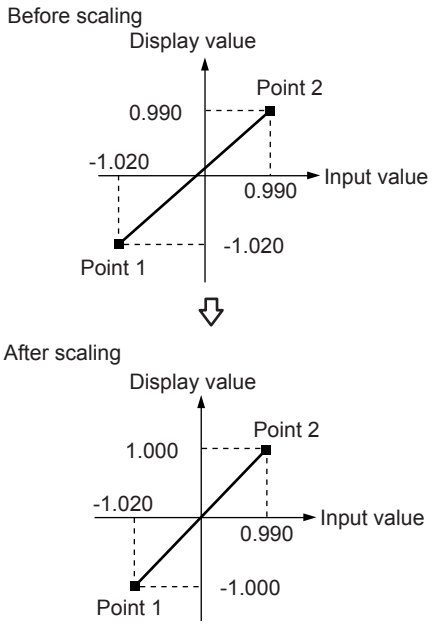
■ Scaling processing

The scaling processing corrects difference between the measurement value and the display value by setting the display value to an designated measurement value.
To do this, we take two measured values and assign a designated value to each.
The display values can be set either by direct entry of the numeric number as well as the values obtained from the controller.

Reference The measurement value alarm data is not valid when performing the scaling processing.

● Setting example of the scaling

Setting contents		Setting value
Point 1	Original input value 1	-1.020
	Display value 1 after the scaling	-1.000
Point 2	Original input value 2	+0.990
	Display value 2 after the scaling	+1.000



■ Offset processing

When using offset processing, a designated value will be added or subtracted to the actual measurement value to create the displayed value. When the offset value has been set, the offset value can also be displayed when the auto-zero is performed.
The offset value is applied to the measurement values after the hold mode processing and the auto-zero processing.

■ Auto-zero reference value

The auto-zero reference value is the measured value when the auto-zero function is turned on. The measurement values are updated every time when the auto-zero function is turned on.
The auto-zero value can also be entered directly without using the auto-zero function.
“Using the ZERO input (Auto-zero function)” (Page 8-30)

■ Hold mode

The hold mode relates to the way to hold the measurement values in the TIMING input.
Hold modes are available in both standard mode and batch mode.

Standard hold mode

- Normal ..... Hold the internal measurement value while TIMING is ON.
- Peak hold..... Hold the maximum value in the measurement period when switching OFF to ON.
- Bottom hold .... Hold the minimum value in the measurement period when switching OFF to ON.
- Peak to Peak hold ... Hold the peak-to-peak value in the measurement period when switching OFF to ON.
- Average hold ..... Hold the average value in the measurement period when switching OFF to ON.
- Sample hold ... Hold the measurement value when switching OFF to ON.

Reference The hold continues after switching from ON to OFF in any mode aside from normal.

Batch hold mode

- Peak ..... Updates the measurement value to the maximum value in the measurement period at the end of the measurement period.
- Bottom ..... Updates the measurement value to the minimum value in the measurement period at the end of the measurement period.
- Peak to peak ..... Updates the measurement value to the peak-to-peak value in the measurement period at the end of the measurement period.
- Average ..... Updates the measurement value to the average value in the measurement period at the end of the measurement period.

■ Measurement period

The measurement period sets how to start and end the period in which the measurement is performed.

- Terminal/ Command ..... Set the start/end of the measurement period by the TIMING input terminal or the communication command.
- Threshold (edge) ... After defining an edge and amount of measurement points, the measurement period will begin upon seeing the set edge. The measurement period will end when the number of the measurements reached the set number.
- Threshold (level) ... Set the upper/lower limits for the measurement value. The measurement period will start/end when the upper limit sees a falling edge of the lower limit sees a rising edge.
  When upper limit > lower limit, the measurement time is the time period that the measurement is outside the upper or lower limits.
  When lower limit ≥ upper limit, the measurement time is the time period that the measurement is inside the upper and lower limits.
- OUT reference... The measurement period starts/ends with the set range same as that of the designated OUT.
- Measurement area ... Set the measurement area in the height image. The measurement period starts/ends with the set measurement range.

■ Tolerance

The measurement values can be judged acceptable or not acceptable.
The range for the judgment is called the tolerance.
The tolerance is set with the upper and lower limits.
The hysteresis can also be set as a width of the threshold value with which the measurement value returns from LO or HI to GO.

Range of HI, GO, and LO

Judgment	Range	Measurement display on the screen
HI	Tolerance upper limit < Measurement value	The display turns red and the judgment appears with [HI].
GO	Tolerance lower limit ≤ Measured value ≤ Tolerance upper limit	The display turns green and the judgment appears with [GO].
LO	Measurement value < Tolerance lower limit	The display turns red and the judgment appears with [LO].
Judgement standby	The measurement value is displayed with [-----], and all the judgment results turn OFF.	
Measurement alarm	The measurement value is displayed as [ALARM] in red, and the judgment results HI and LO turn on at the same time.	

■ Terminal assignment

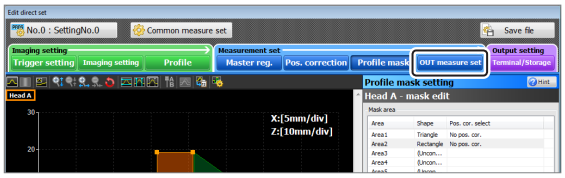
This setting sets whether the OUT will respond to ZERO 1 and TIMING/RESET 1 inputs or the ZERO 2 and TIMING/RESET 2 inputs. or neither.

Starting the OUT measurement setting

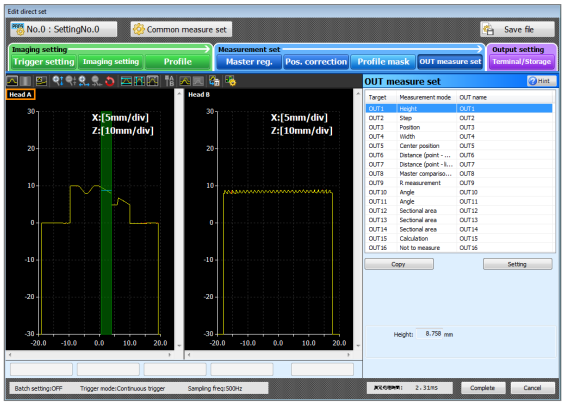
The OUT measurement setting includes [Measurement setting] corresponding to the measurement modes such as [Height] and [Addition], and [Processing setting] such as the measurement alarm and the filters.
This section describes the setup procedure for [Measurement setting] and [Processing setting].

Reference The procedure described here is for LJ-Navigator2. For the operation procedure of the display monitor/touch panel monitor, refer to “Switching Screens on the Display Monitor/Touch Panel Monitor” (Page A-26).

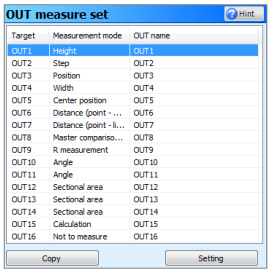
1 Click [OUT measure set] on the measurement screen.



The [OUT measure set] screen appears.



2 Select OUT to be set from the OUT setting list, and click the [Setting] button.



The [OUT measure set] screen of the selected OUT appears.

Reference
- Double-clicking the OUT to be set will also open the [OUT measure set] screen.
- Click the [Copy] button to copy the OUT setting.

3 Click the [Measurement] tab/[Process] tab to set [Measurement set] and [Processing setting].

“Setting the Measurement common setting” (Page 6-34)
“Setting the Processing setting” (Page 6-76)



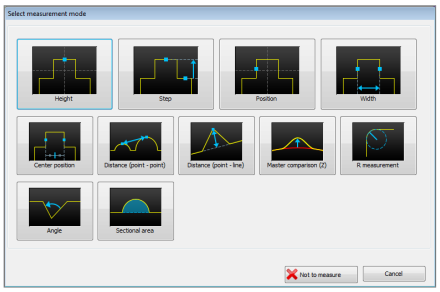
Reference
- The [OUT measure set] screen can be changed to the last or next screen by clicking the button at [<<OUT X] and [OUT X>>] (X is the number of OUT).
- Click the [Hint] button to display Help on the [OUT measure set] screen.

Setting the Measurement common setting

Select the measurement mode to set the measurement target and the measurement area. Also set whether to apply the position correction to the measurement area and the minimum unit display unit of the measurement values.

1 Click the [Measurement] tab.

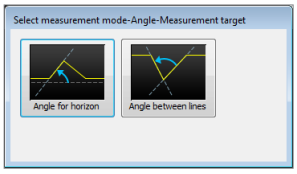
2 When the [Mode sel.] button of the measurement mode is clicked, the [Select measurement mode] screen appears.



Measurement mode type: “Measurement mode” (Page 6-27)

3 Click on the desired measurement mode.

4 When [Angle] or [Cross-Sectional area] is selected by [Measure mode], the [Measurement target] screen appears. Select the desired target.



Display example when the measurement mode [Angle] is selected

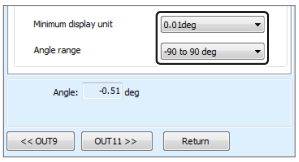
For the details of settings of each measurement mode, refer to “Setting the measurement mode detail” (Page 6-35).

5 After detailed setting of each measurement mode finished, the screen returns to the [OUT measure set] screen.

6 Select the minimum display unit of the measurement value from the [Minimum display unit] pull-down menu.

Reference The selectable unit depends on the measurement mode.

7 When [Angle] is selected by [Measure mode], select the range of the angle to be displayed from the [Angle range] pull-down menu.



Continue by selecting the processing settings.
“Setting the Processing setting” (Page 6-76)

Setting the measurement mode detail

With the measurement mode detail, select the measurement target and the measurement area, and whether to apply the position correction.
This section describes the setup procedure of the measurement target by the measurement mode.

Selectable measurement targets by the measurement mode

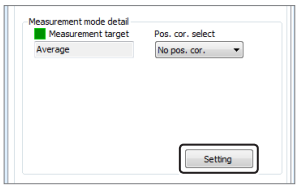
Measurement mode		Selectable measurement targets																	Reference to
		No option	Average	Edge	Peak	Bottom	Knee	Intsec (lines)	Contact (lin-arc)	Center of circle	Maximum thickness	Minimum thickness	Average thickness	Max thickness position	Min thickness position	P-P	Mean value	P-P (X)	P-P (Z)	
Height			○		○	○	○	○	○	○										6-36
Step			○		○	○	○	○	○	○										6-37
Position				○	○	○	○	○	○	○										6-39
Width				○	○	○	○	○	○	○										6-40
Center position				○	○	○	○	○	○	○										6-42
Distance (point-point)					○	○	○	○	○	○										6-43
Distance (point-line)					○	○	○	○	○	○										6-45
Master comparison (Z)		○																		6-46
Radius measurement		○																		6-47
Thickness											○	○	○	○	○					6-48
Angle (Angle for horizon)		○																		6-49
Angle (Angle between lines)		○																		6-50
Cross-Sectional area (Ref for 1 line)		○																		6-52
Cross-Sectional area (Ref for 2 line)		○																		6-53
Cross-Sectional area (Master reference)		○																		6-55
Calculation		○																		6-57
Height (Simple 3D set)			○		○	○										○				6-58
Step (Simple 3D set)			○		○	○														6-59
Position (Simple 3D set)					○	○														6-60
Compression (Time axis): ON	Height				○	○											○			6-36
	Position			○	○	○														6-39
	Deflection																	○	○	6-56
	Calculation	○																		6-57

■ Height

This section describes the setup procedure when [Height] is selected in [Measure mode].
One measurement target will be selected.

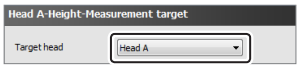
“Height” (Page 6-28)

1 Click [Setting] of [Measurement mode detail].

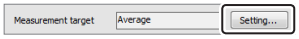


The [Height-Measurement target] screen appears.

2 Select the head to be used under [Target head].

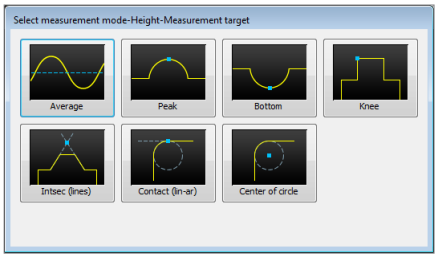


3 Click [Setting...] next to [Measurement target].



The [Select measurement mode-Height-Measurement target] appears.

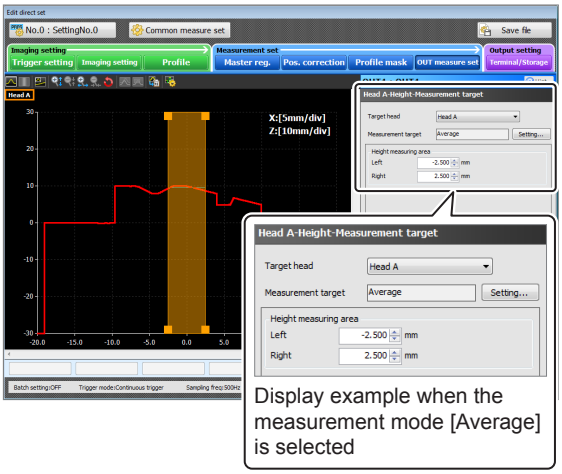
4 Click the measurement target button.



The screen returns to the [Height-Measurement target] screen.

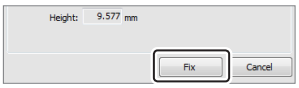
5 Set the measurement target area and the measurement target detail while checking the profile display.

“Setting the Measurement target area and the Measurement target detail” (Page 6-62)



Display example when the measurement mode [Average] is selected

6 After the setup is completed, click the [Fix] button.



The screen returns to the [OUT measure set] screen.

7 **Set whether to apply the position correction to the measurement target under [Pos cor. select].**

Reference When two position corrections are set in the advanced setting of the position correction, [Pos. cor. 1] and [Pos. cor. 2] can be set.
“Set up the position correction” (Page 6-13)



The measurement follows the displacement of the target object to correct the position of the measurement target area.

The measurement target area corrected by the position correction is displayed for the profile currently being measured.
It can be confirmed with this screen whether the measurement target area is corrected properly by the position correction.

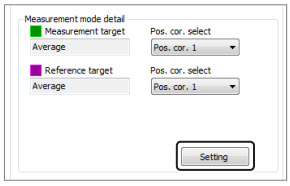
The setup for the height measurement is complete. Return to the step **6** of “Setting the Measurement common setting” (Page 6-34), and continue the measurement setting.

■ Step

This section describes the setup procedure when [Step] is selected in [Measure mode].
A measurement target and standard (reference) target will be selected.

“Step” (Page 6-28)

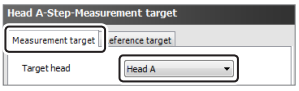
1 **Click [Setting] of [Measurement mode detail].**



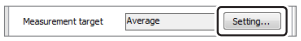
The [Step-Measurement target] screen appears.

2 **Select the [Measurement target] tab.**

3 **Select the head to be used under [Target head].**

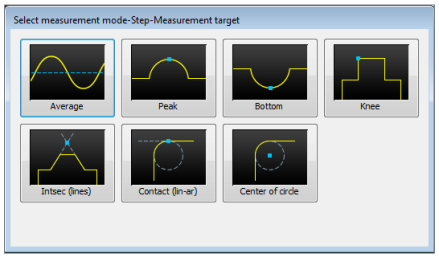


4 **Click [Setting...] next to [Measurement target].**



The [Select measurement mode-Step-Measurement target] appears.

5 **Click the measurement target button.**



The screen returns to the [Step-Measurement target] screen.

6 Set the measurement target area and the measurement target detail, while checking the profile display.

“Setting the Measurement target area and the Measurement target detail” (Page 6-62)

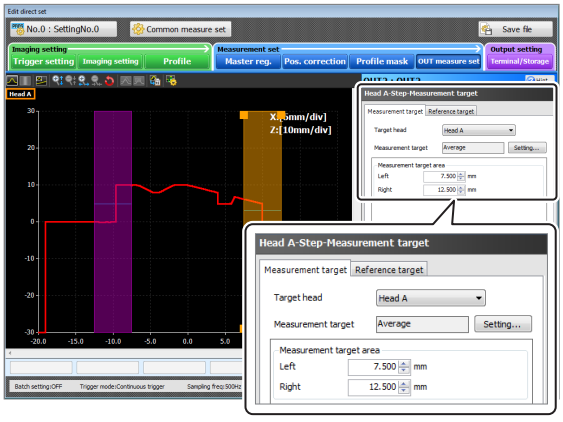


Display example when the measurement mode [Average] is selected

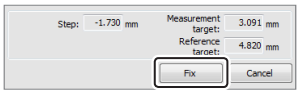
7 Click [Reference target tab].

8 Like the [Measurement target] tab, set the target head, the measurement area, and the measurement target detail.

“Setting the Measurement target area and the Measurement target detail” (Page 6-62)



9 After the setup is completed, click the [Fix] button.

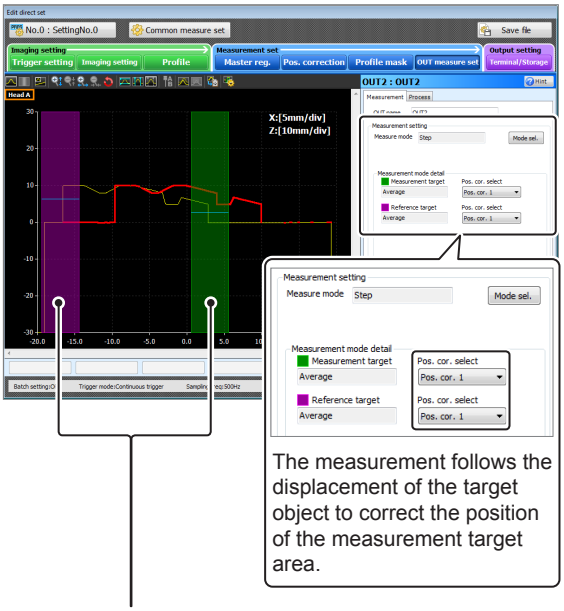


The screen returns to the [OUT measure set] screen.

10 Set whether to apply the position correction to the measurement target under [Pos cor. select].

Reference When two position corrections are set in the advanced setting of the position correction, [Pos. cor. 1] and [Pos. cor. 2] can be set.

“Set up the position correction” (Page 6-13)



The measurement follows the displacement of the target object to correct the position of the measurement target area.

The measurement target area corrected by the position correction is displayed for the profile currently being measured.
It can be confirmed with this screen whether the measurement target area is corrected properly by the position correction.

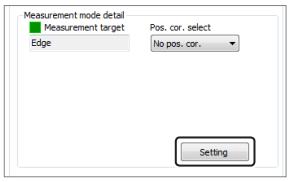
The setup for the step measurement is complete. Return to the step **6** of “Setting the Measurement common setting” (Page 6-34), and continue the measurement setting.

■ Position

This section describes the setup procedure when [Position] is selected in [Measure mode].
One measurement target will be selected.

“Position” (Page 6-28)

1 Click [Setting] of [Measurement mode detail].

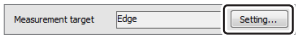


The [Position-Measurement target] screen appears.

2 Select the head to be used under [Target head].

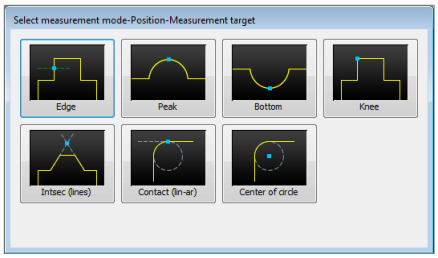


3 Click [Setting...] next to [Measurement target].



The [Select measurement mode-Position-Measurement target] appears.

4 Click the measurement target button.



The screen returns to the [Position-Measurement target] screen.

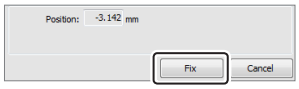
5 Set the measurement target area and the measurement target detail, while checking the profile display.

“Setting the Measurement target area and the Measurement target detail” (Page 6-62)



Display example when the measurement target [Edge] is selected

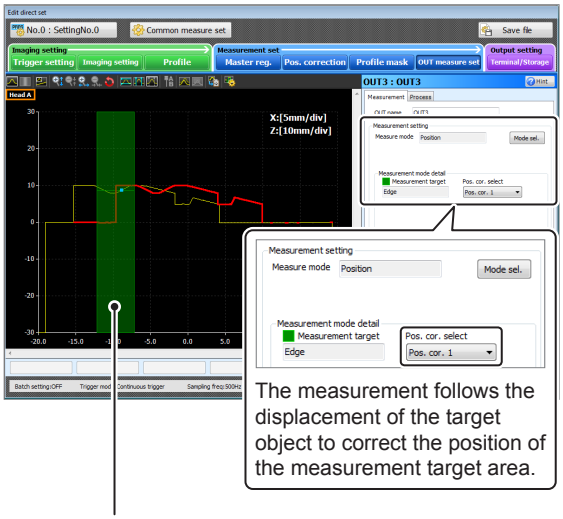
6 After the setup is completed, click the [Fix] button.



The screen returns to the [OUT measure set] screen.

7 **Set whether to apply the position correction to the measurement target under [Pos cor. select].**

Reference When two position corrections are set in the advanced setting of the position correction, [Pos. cor. 1] and [Pos. cor. 2] can be set.
“Set up the position correction” (Page 6-13)



The measurement target area corrected by the position correction is displayed for the profile currently being measured.
It can be confirmed with this screen whether the measurement target area is corrected properly by the position correction.

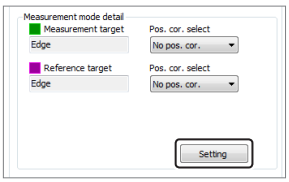
The setup for the position measurement is now complete. Return to the step **6** of “Setting the Measurement common setting” (Page 6-34), and continue the measurement setting.

■ Width

This section describes the setup procedure when [Width] is selected in [Measure mode].
A measurement target and standard (reference) target will be selected.

“Width” (Page 6-28)

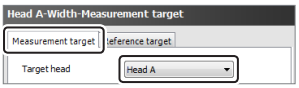
1 **Click [Setting] of [Measurement mode detail].**



The [Width-Measurement target] screen appears.

2 **Select the [Measurement target] tab.**

3 **Select the head to be used under [Target head].**

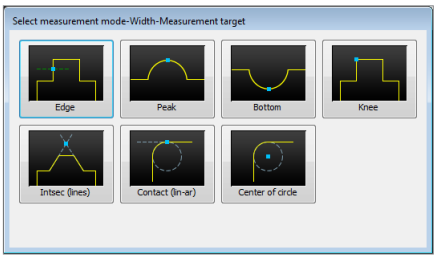


4 **Click [Setting...] next to [Measurement target].**



The [Select measurement mode-width-Measurement target] appears.

5 **Click the measurement target button.**



The screen returns to the [Width-Measurement target] screen.

6 Set the measurement target area and the measurement target detail, while checking the profile display.

“Setting the Measurement target area and the Measurement target detail” (Page 6-62)

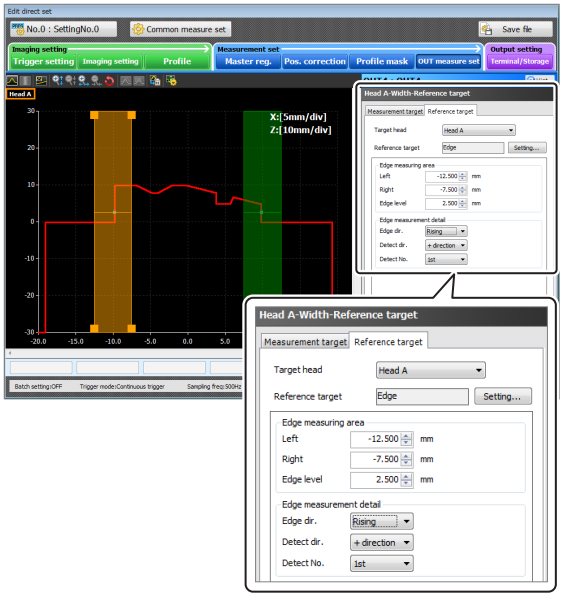


Display example when the measurement target [Edge] is selected

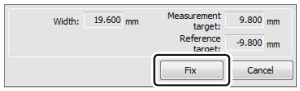
7 Click [Reference target] tab.

8 Like the [Measurement target] tab, set the target head, the target area, and the measurement target detail.

“Setting the Measurement target area and the Measurement target detail” (Page 6-62)



9 After the setup is completed, click the [Fix] button.



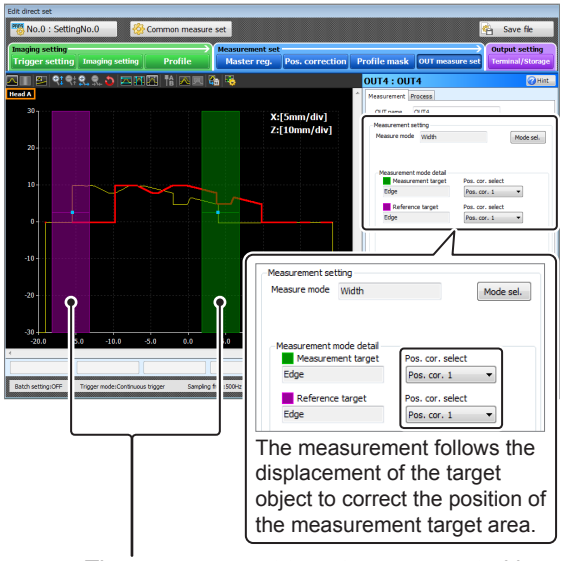
The screen returns to the [OUT measure set] screen.

10 Set whether to apply the position correction to the measurement target under [Pos cor. select].

Reference

When two position corrections are set in the advanced setting of the position correction, [Pos. cor. 1] and [Pos. cor. 2] can be set.

“Set up the position correction” (Page 6-13)



The measurement follows the displacement of the target object to correct the position of the measurement target area.

The measurement target area corrected by the position correction is displayed for the profile currently being measured.
It can be confirmed with this screen whether the measurement target area is corrected properly by the position correction.

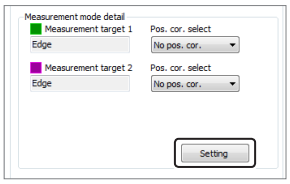
The setup for the width measurement is complete. Return to step **6** of “Setting the Measurement common setting” (Page 6-34), and continue the measurement setting.

■ Center position

This section describes the setup procedure when [Center position] is selected in [Measure mode].
One measurement target will be selected.

“Center position” (Page 6-28)

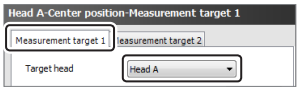
1 Click [Setting] of [Measurement mode detail].



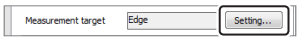
The [Center position-Measurement target 1] screen appears.

2 Select the [Measurement target 1] tab.

3 Select the head to be used under [Target head].

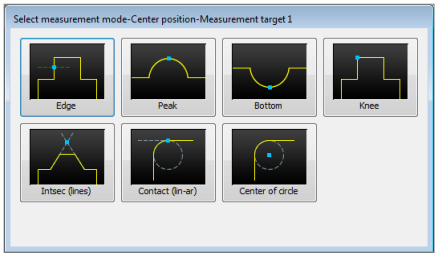


4 Click [Setting...] next to [Measurement target].



The [Select measurement mode-Center position-Measurement target 1] appears.

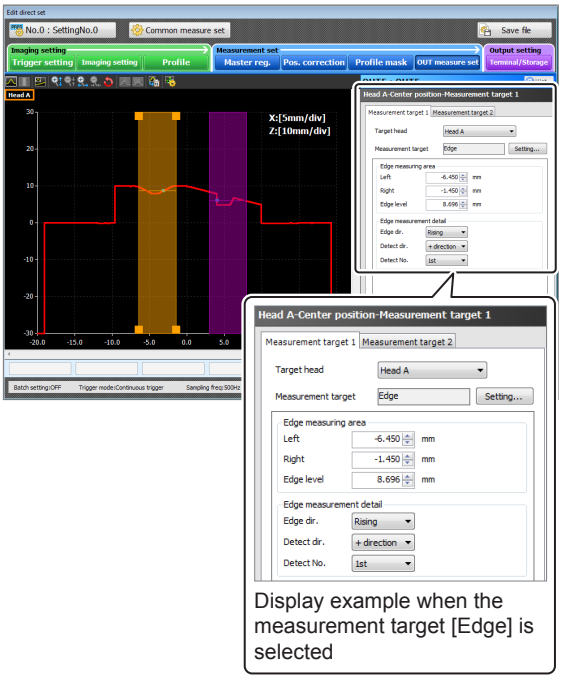
5 Click the measurement target button.



The screen returns to the [Center position-Measurement target 1] screen.

6 Set the measurement target area and the measurement target detail, while checking the profile display.

“Setting the Measurement target area and the Measurement target detail” (Page 6-62)



Display example when the measurement target [Edge] is selected

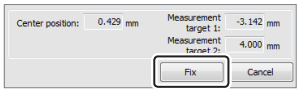
7 Click the [Measurement target 2] tab.

8 Like the [Measurement target 1] tab, set the target head, the target area, and the measurement target detail.

“Setting the Measurement target area and the Measurement target detail” (Page 6-62)



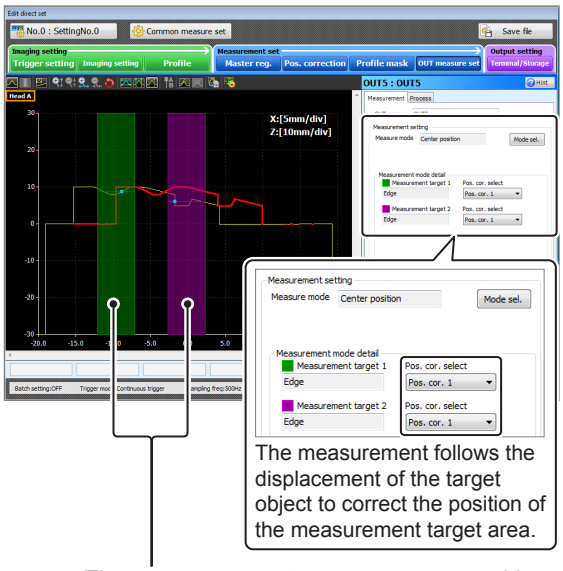
9 **After the setup is completed, click the [Fix] button.**



The screen returns to the [OUT measure set] screen.

10 **Set whether to apply the position correction to the measurement target under [Pos cor. select].**

Reference When two position corrections are set in the advanced setting of the position correction, [Pos. cor. 1] and [Pos. cor. 2] can be set.
“Set up the position correction” (Page 6-13)



The measurement follows the displacement of the target object to correct the position of the measurement target area.

The measurement target area corrected by the position correction is displayed for the profile currently being measured.
It can be confirmed with this screen whether the measurement target area is corrected properly by the position correction.

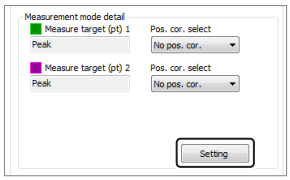
The setup for the center position measurement is complete. Return to the step **6** of “Setting the Measurement common setting” (Page 6-34), and continue the measurement setting.

■ Distance (point-point)

This section describes the setup procedure when [Distance (point-point)] is selected in [Measure mode]. One measurement target will be selected.

“Distance” (Page 6-28)

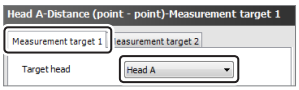
1 **Click [Setting] of [Measurement mode detail].**



The [Distance (point-point)-Measurement target 1] screen appears.

2 **Select the [Measurement target 1] tab.**

3 **Select the head to be used under [Target head].**

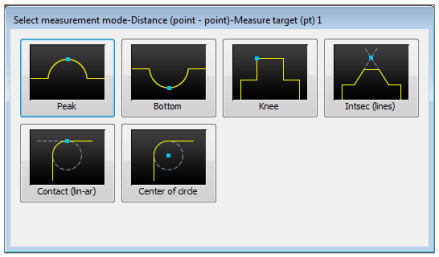


4 **Click [Setting...] next to [Measure target (pt)].**



The [Select measurement mode-Distance (point-point)-Measure target (pt) 1] appears.

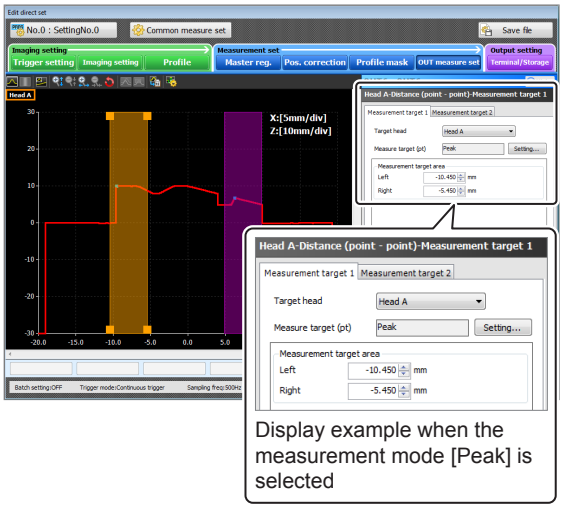
5 **Click the measurement target button.**



The screen returns to the [Distance (point-point)-Measurement target 1] screen.

6 Set the measurement target area and the measurement target detail, while checking the profile display.

“Setting the Measurement target area and the Measurement target detail” (Page 6-62)

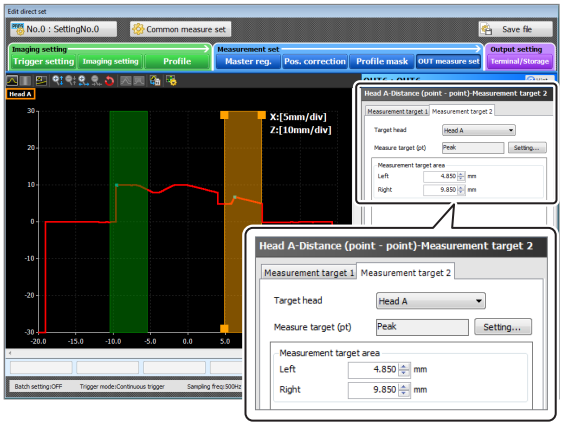


Display example when the measurement mode [Peak] is selected

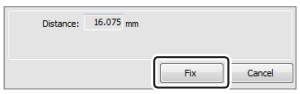
7 Click the [Measurement target 2] tab.

8 Like the [Measurement target 1] tab, set the target head, the target area, and the measurement target detail.

“Setting the Measurement target area and the Measurement target detail” (Page 6-62)



9 After the setup is completed, click the [Fix] button.

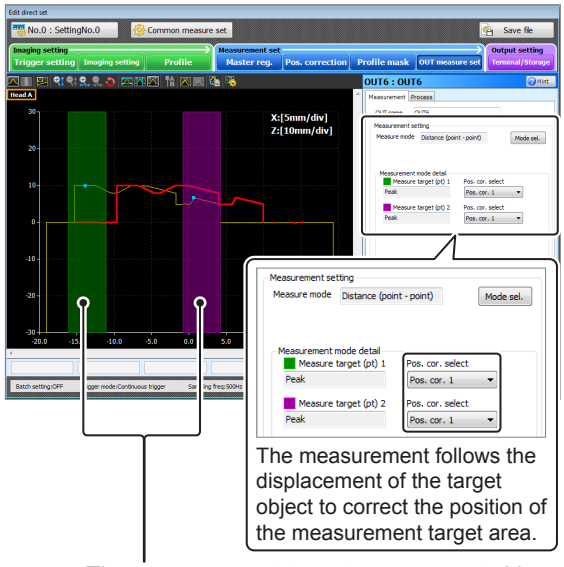


The screen returns to the [OUT measure set] screen.

10 Set whether to apply the position correction to the measurement target under [Pos cor. select].

Reference When two position corrections are set in the advanced setting of the position correction, [Pos. cor. 1] and [Pos. cor. 2] can be set.

“Set up the position correction” (Page 6-13)



The measurement follows the displacement of the target object to correct the position of the measurement target area.

The measurement target area corrected by the position correction is displayed for the profile currently being measured.

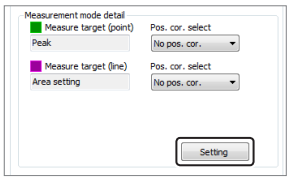
The setup for the distance (point to point) measurement is complete. Return to the step **6** of “Setting the Measurement common setting” (Page 6-34), and continue the measurement setting.

■ Distance (point-line)

This section describes the setup procedure when [Distance (point-line)] is selected in [Measure mode]. A point measurement target and line measurement target will be selected.

“Distance” (Page 6-28)

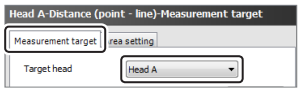
1 Click [Setting] of [Measurement mode detail].



The [Distance (point-line)-Measurement target] screen appears.

2 Select the [Measurement target] tab.

3 Select the head to be used under [Target head].

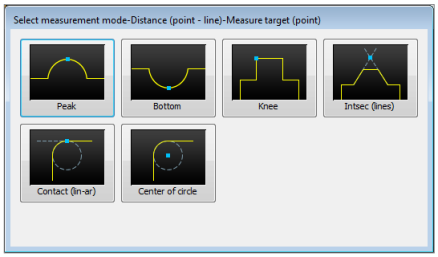


4 Click [Setting...] next to [Measure target (point)].



The [Select measurement mode-Distance (point-line)-Measure target (point)] appears.

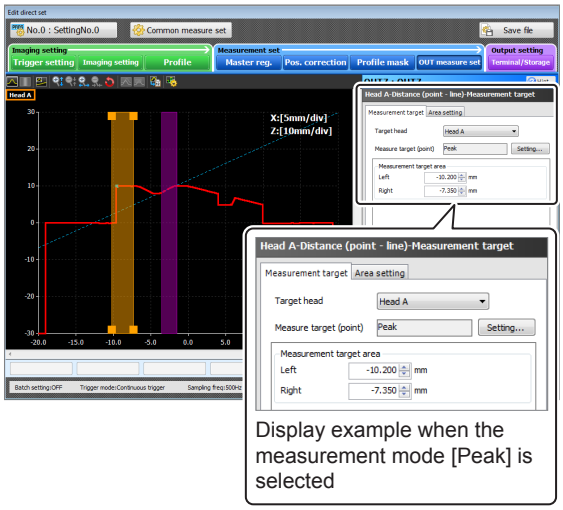
5 Click the measurement target button.



The screen returns to the [Distance (point-line)-Measurement target] screen.

6 Set the measurement target area and the measurement target detail, while checking the profile display.

“Setting the Measurement target area and the Measurement target detail” (Page 6-62)

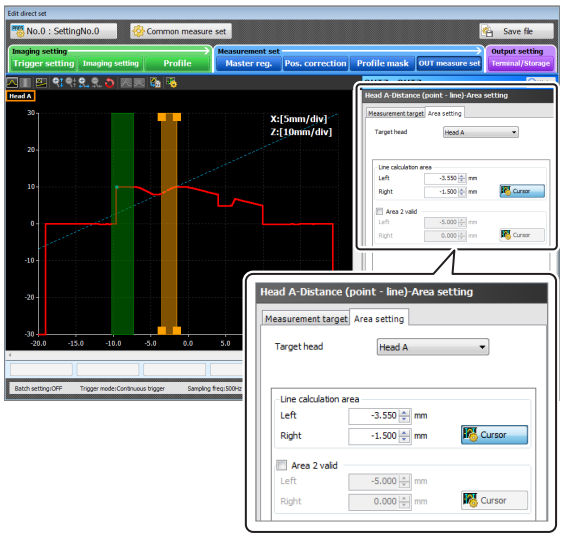


Display example when the measurement mode [Peak] is selected

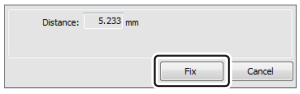
7 Click the [Area setting] tab.

8 Set the linear calculation area and the measurement target detail, while checking the profile display.

“Setting the Measurement target area and the Measurement target detail” (Page 6-62)



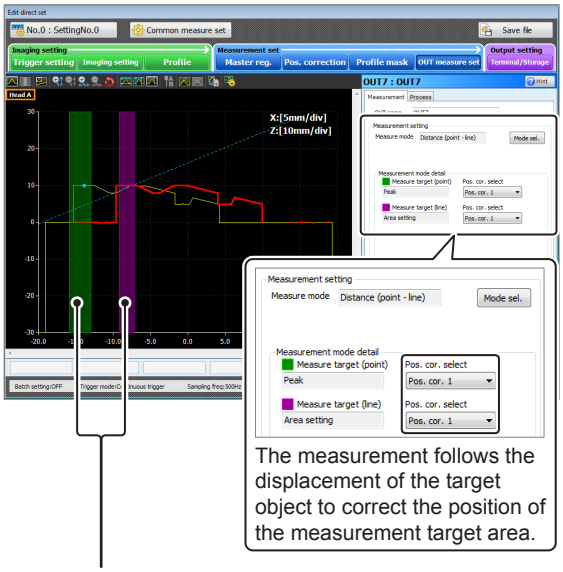
9 After the setup is completed, click the [Fix] button.



The screen returns to the [OUT measure set] screen.

10 Set whether to apply the position correction to the measurement target under [Pos cor. select].

Reference When two position corrections are set in the advanced setting of the position correction, [Pos. cor. 1] and [Pos. cor. 2] can be set.
“Set up the position correction” (Page 6-13)



The measurement target area corrected by the position correction is displayed for the profile currently being measured.
It can be confirmed with this screen whether the measurement target area is corrected properly by the position correction.

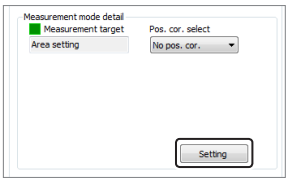
The setup for the distance (point to line) measurement is complete. Return to the step **6** of “Setting the Measurement common setting” (Page 6-34), and continue the measurement setting.

■ Master comparison (Z)

This section describes the setup procedure when [Master comparison (Z)] is selected in [Measure mode]. One measurement target will be selected.

“Master comparison (Z)” (Page 6-29)

1 Click [Setting] of [Measurement mode detail].



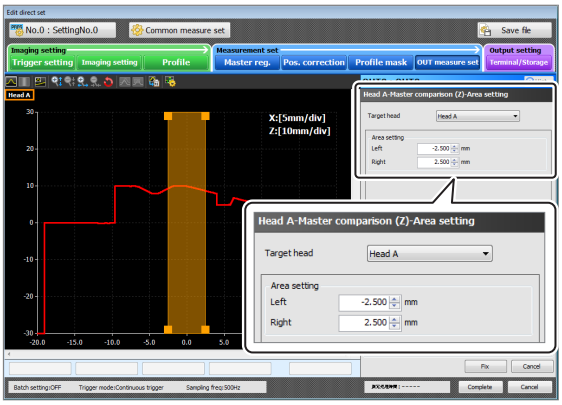
The [Master comparison (Z)-Area setting] screen appears.

2 Select the head to be used under [Target head].

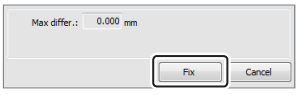


3 Set the measurement target area and the measurement target detail, while checking the profile display.

“Setting the Measurement target area and the Measurement target detail” (Page 6-62)



4 After the setup is completed, click the [Fix] button.



The screen returns to the [OUT measure set] screen.

5 Set whether to apply the position correction to the measurement target under [Pos cor. select].

Reference When two position corrections are set in the advanced setting of the position correction, [Pos. cor. 1] and [Pos. cor. 2] can be set.
“Set up the position correction” (Page 6-13)

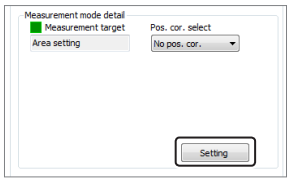


The setup for the master comparison (Z) is complete. Return to the step **6** of “Setting the Measurement common setting” (Page 6-34), and continue the measurement setting.

■ Radius measurement

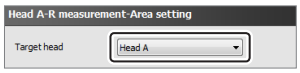
This section describes the setup procedure when [Radius measurement] is selected in [Measure mode]. One measurement target will be selected.
“Radius measurement” (Page 6-29)

1 Click [Setting] of [Measurement mode detail].



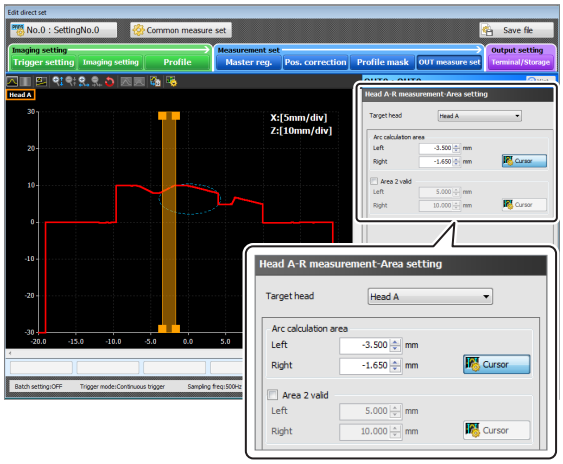
The [Radius measurement-Area setting] screen appears.

2 Select the head to be used under [Target head].

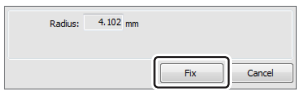


3 Set the curve calculation area and the measurement target detail, while checking the profile display.

“Setting the Measurement target area and the Measurement target detail” (Page 6-62)



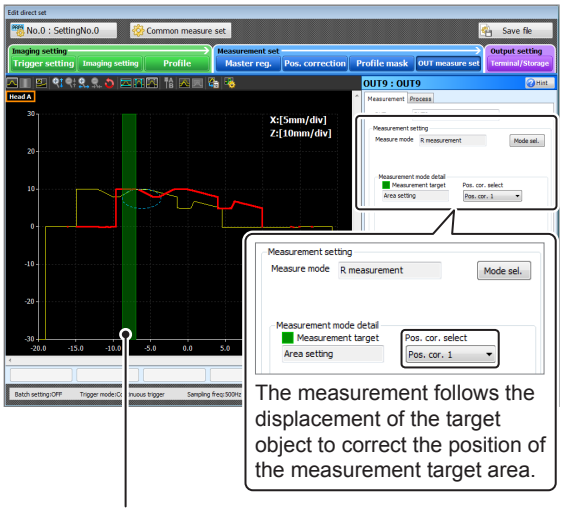
4 After the setup is completed, click the [Fix] button.



The screen returns to the [OUT measure set] screen.

5 **Set whether to apply the position correction to the measurement target under [Pos cor. select].**

Reference When two position corrections are set in the advanced setting of the position correction, [Pos. cor. 1] and [Pos. cor. 2] can be set.
“Set up the position correction” (Page 6-13)



The measurement target area corrected by the position correction is displayed for the profile currently being measured.
It can be confirmed with this screen whether the measurement target area is corrected properly by the position correction.

The setup for the radius measurement is complete. Return to the step **6** of “Setting the Measurement common setting” (Page 6-34), and continue the measurement setting.

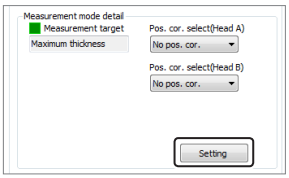
■ Thickness

This section describes the setup procedure when [Thickness] is selected in [Measure mode].
One measurement target will be selected.

“Thickness” (Page 6-29)

Reference [Thickness] can be set only when two heads are installed on either side of the target.

1 **Click [Setting] of [Measurement mode detail].**



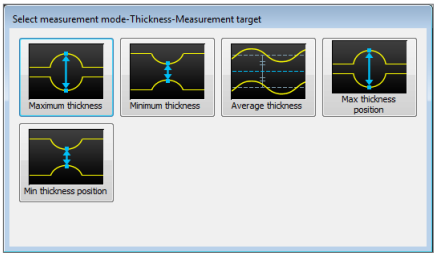
The [Thickness-Measurement target] screen appears.

2 **Click [Setting...] next to [Measurement target].**



The [Select measurement mode-Thickness-Measurement target] appears.

3 **Click the measurement target button.**

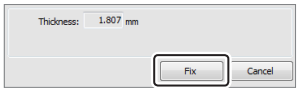


The screen returns to the [Thickness-Measurement target] screen.

4 **Set the measurement target area and the measurement target detail, while checking the profile display.**

“Setting the Measurement target area and the Measurement target detail” (Page 6-62)

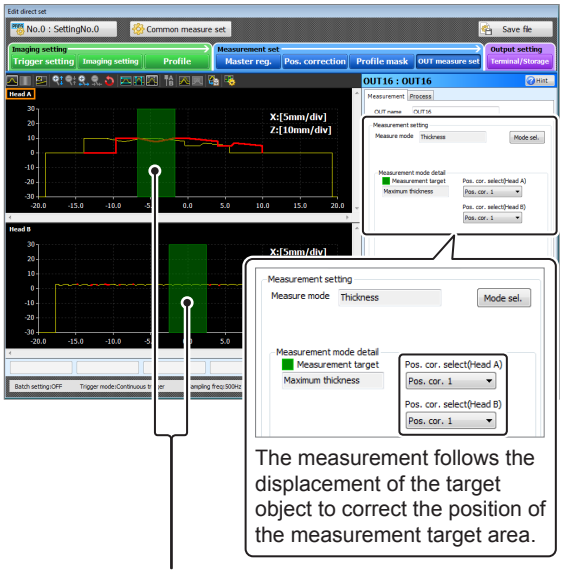
5 **After the setup is completed, click the [Fix] button.**



The screen returns to the [OUT measure set] screen.

6 **Set whether to apply the position correction to the measurement target under [Pos cor. select].**

Reference When two position corrections are set in the advanced setting of the position correction, [Pos. cor. 1] and [Pos. cor. 2] can be set.
“Set up the position correction” (Page 6-13)



The measurement follows the displacement of the target object to correct the position of the measurement target area.

The measurement target area corrected by the position correction is displayed for the profile currently being measured.
It can be confirmed with this screen whether the measurement target area is corrected properly by the position correction.

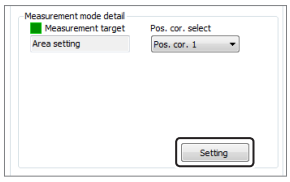
The setup for the thickness measurement is complete. Return to the step **6** of “Setting the Measurement common setting” (Page 6-34), and continue the measurement setting.

■ Angle (angle for horizon)

This section describes the setup procedure when [Angle (angle for horizon)] is selected in [Measure mode]. One measurement target will be selected.

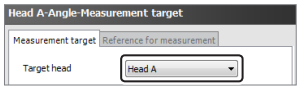
“Angle (angle for horizon)” (Page 6-29)

1 **Click [Setting] of [Measurement mode detail].**



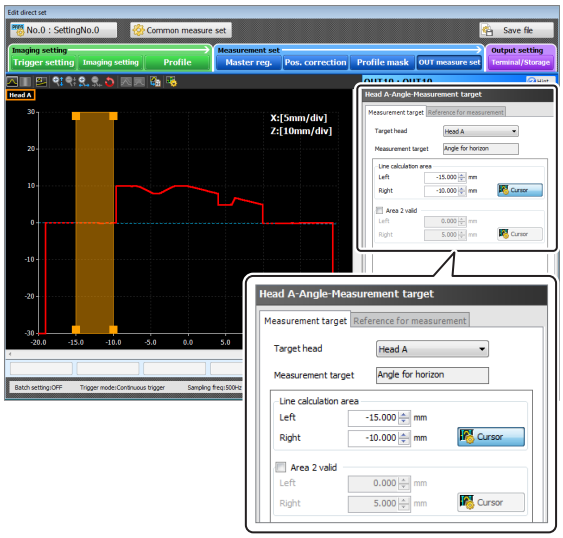
The [Angle-Measurement target] screen appears.

2 **Select the head to be used under [Target head].**

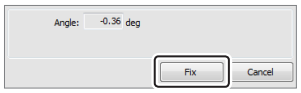


3 **Set the linear calculation area and the measurement target detail, while checking the profile display.**

“Setting the Measurement target area and the Measurement target detail” (Page 6-62)



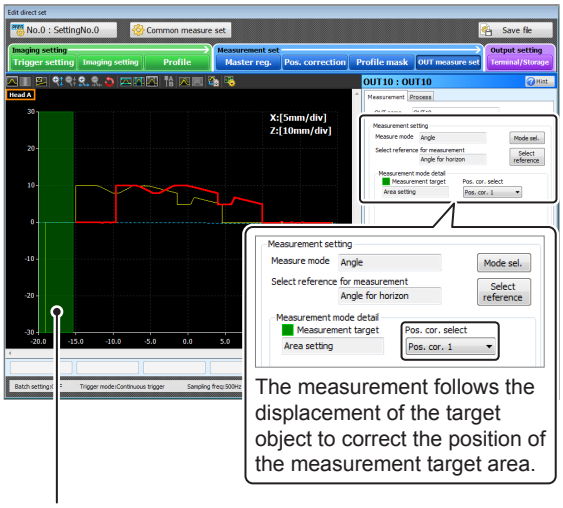
4 **After the setup is completed, click the [Fix] button.**



The screen returns to the [OUT measure set] screen.

5 Set whether to apply the position correction to the measurement target under [Pos cor. select].

Reference When two position corrections are set in the advanced setting of the position correction, [Pos. cor. 1] and [Pos. cor. 2] can be set.
“Set up the position correction” (Page 6-13)



The measurement target area corrected by the position correction is displayed for the profile currently being measured.
It can be confirmed with this screen whether the measurement target area is corrected properly by the position correction.

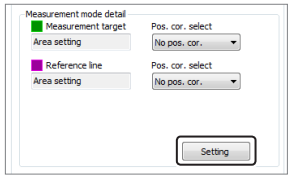
The setup for the angle (from the horizon) measurement is complete. Return to the step ***6*** of “Setting the Measurement common setting” (Page 6-34), and continue the measurement setting.

■ Angle (angle between lines)

This section describes the setup procedure when [Angle (angle between lines)] is selected in [Measure mode]. A measurement target will be selected as well as a standard (reference) target.
“Angle (angle between lines)” (Page 6-29)

1 Click [Setting] of [Measurement mode detail].

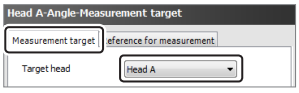
Reference The reference target can be switched by the [Select reference for measurement] pull-down menu/[Select reference] button.
“Angle (angle for horizon)” (Page 6-49)



The [Angle-Measurement target] screen appears.

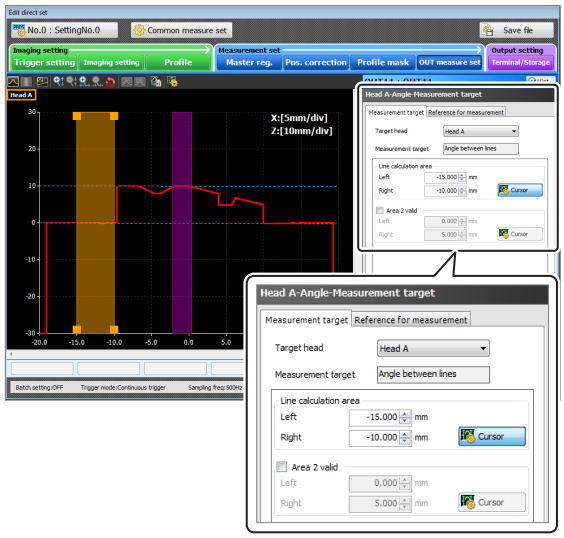
2 Select the [Measurement target] tab.

3 Select the head to be used under [Target head].



4 Set the linear calculation area and the measurement target detail, while checking the profile display.

“Setting the Measurement target area and the Measurement target detail” (Page 6-62)



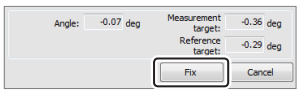
5 **Click the [Reference for measurement] tab.**

6 **Like the [Measurement target] tab, set the target head and the linear calculation area.**

“Setting the Measurement target area and the Measurement target detail” (Page 6-62)



7 **After the setup is completed, click the [Fix] button.**

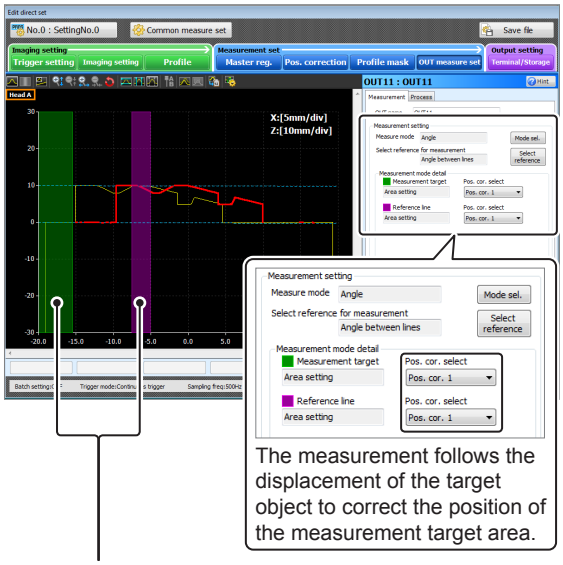


The screen returns to the [OUT measure set] screen.

8 **Set whether to apply the position correction to the measurement target under [Pos cor. select].**

Reference When two position corrections are set in the advanced setting of the position correction, [Pos. cor. 1] and [Pos. cor. 2] can be set.

“Set up the position correction” (Page 6-13)



The measurement follows the displacement of the target object to correct the position of the measurement target area.

The measurement target area corrected by the position correction is displayed for the profile currently being measured.
It can be confirmed with this screen whether the measurement target area is corrected properly by the position correction.

The setup for the angle (between two lines) measurement is complete. Return to the step ***6*** of “Setting the Measurement common setting” (Page 6-34), and continue the measurement setting.

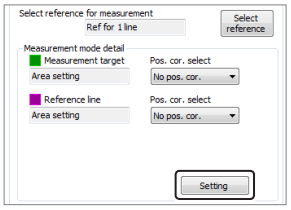
■ Cross-Sectional area (Ref for 1 line)

This section describes the setup procedure when [Cross-Sectional area (Ref for 1 line)] is selected in [Measure mode].
A measurement target will be selected as well as a standard (reference) target.

“Cross-Sectional area” (Page 6-29)

1 Click [Setting] of [Measurement mode detail].

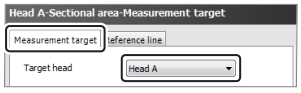
Reference The reference target can be switched by the [Select reference for measurement] pull-down/[Select reference] button.
“Cross-Sectional area (Ref for 2 lines)” (Page 6-53)
“Cross-Sectional area (Master reference)” (Page 6-55)



The [Cross-Sectional area-Measurement target] screen appears.

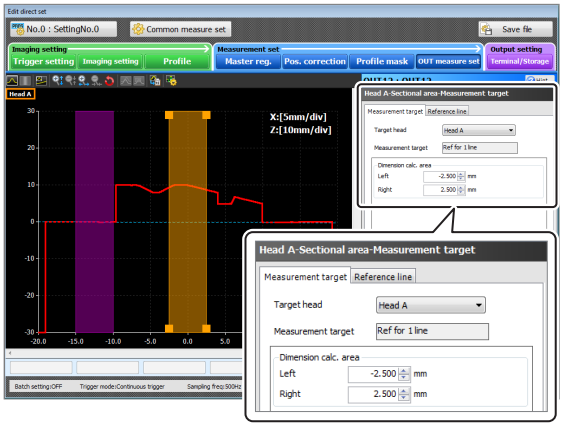
2 Select the [Measurement target] tab.

3 Select the head to be used under [Target head].



4 Set the dimension calculation area and the measurement target detail, while checking the profile display.

“Setting the Measurement target area and the Measurement target detail” (Page 6-62)



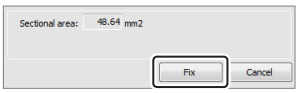
5 Click the [Reference line] tab.

6 Set the line calculation area and the measurement target detail, while checking the profile display.

“Setting the Measurement target area and the Measurement target detail” (Page 6-62)



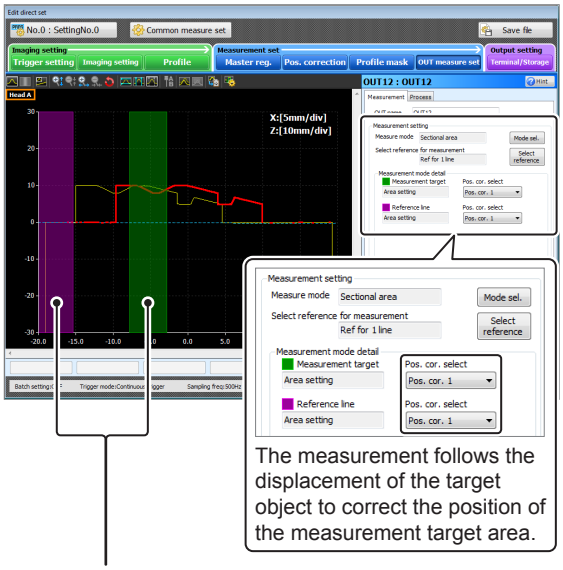
7 After the setup is completed, click the [Fix] button.



The screen returns to the [OUT measure set] screen.

8 Set whether to apply the position correction to the measurement target under [Pos cor. select].

Reference When two position corrections are set in the advanced setting of the position correction, [Pos. cor. 1] and [Pos. cor. 2] can be set.
“Set up the position correction” (Page 6-13)



The measurement target area corrected by the position correction is displayed for the profile currently being measured.
It can be confirmed with this screen whether the measurement target area is corrected properly by the position correction.

The setup for the Cross-Sectional area (referenced for 1 line) measurement is complete. Return to the step ***6*** of “Setting the Measurement common setting” (Page 6-34), and continue the measurement setting.

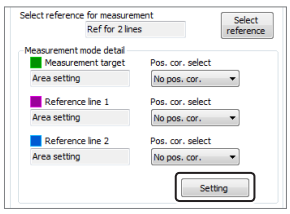
■ Cross-Sectional area (Ref for 2 lines)

This section describes the setup procedure when [Cross-Sectional area (Ref for 2 lines)] is selected in [Measure mode].
One measurement target will be selected along with 2 reference lines.

“Cross-Sectional area” (Page 6-29)

1 Click [Setting] of [Measurement mode detail].

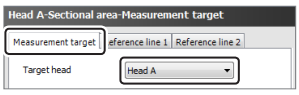
Reference The reference target can be switched by the [Select reference for measurement] pull-down/[Select reference] button.
“Cross-Sectional area (Ref for 1 line)” (Page 6-52)
“Cross-Sectional area (Master reference)” (Page 6-55)



The [Cross-Sectional area-Measurement target] screen appears.

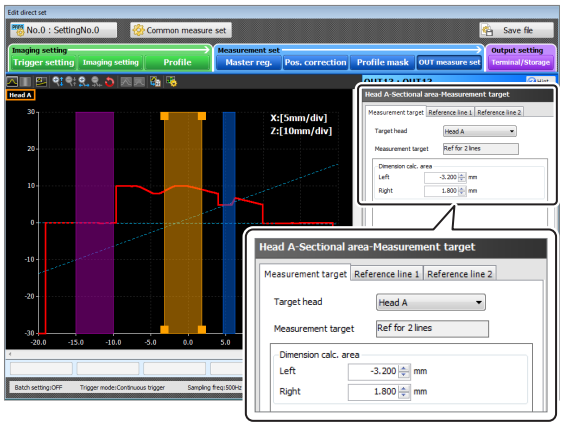
2 Select the [Measurement target] tab.

3 Select the head to be used under [Target head].



4 Set the dimension calculation area and the measurement target detail, while checking the profile display.

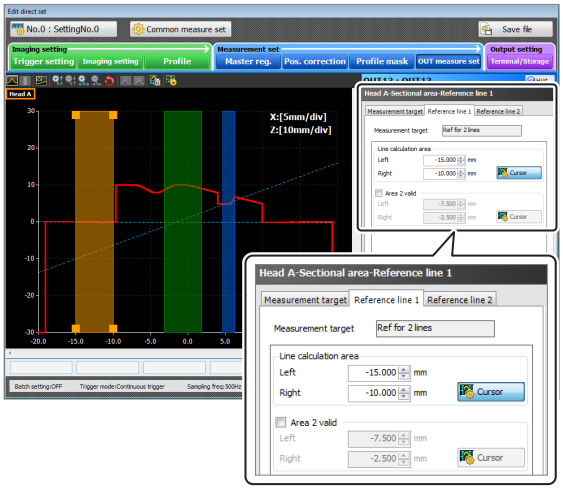
“Setting the Measurement target area and the Measurement target detail” (Page 6-62)



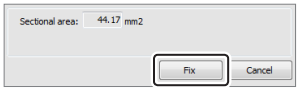
5 **Click the [Reference line 1] tab/[Reference line 2] tab.**

6 **Set the line calculation area and the measurement target of the reference line 1 and the reference line 2 detail, while checking the profile display.**

“Setting the Measurement target area and the Measurement target detail” (Page 6-62)



7 **After the setup is completed, click the [Fix] button.**

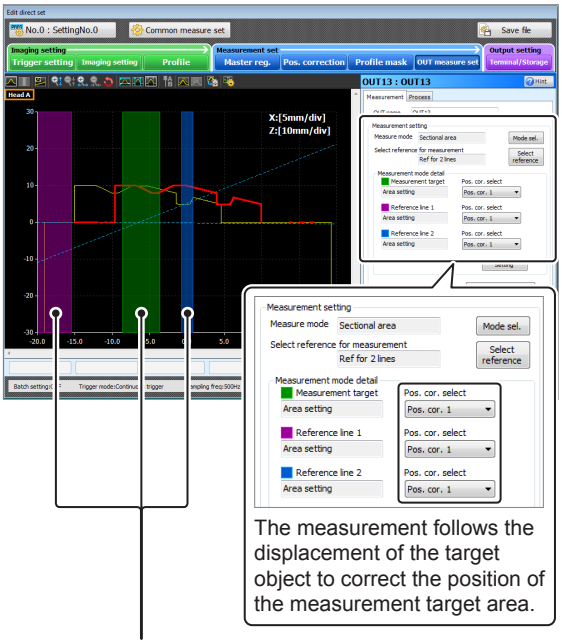


The screen returns to the [OUT measure set] screen.

8 **Set whether to apply the position correction to the measurement target under [Pos cor. select].**

Reference When two position corrections are set in the advanced setting of the position correction, [Pos. cor. 1] and [Pos. cor. 2] can be set.

“Set up the position correction” (Page 6-13)



The measurement follows the displacement of the target object to correct the position of the measurement target area.

The measurement target area corrected by the position correction is displayed for the profile currently being measured.
It can be confirmed with this screen whether the measurement target area is corrected properly by the position correction.

The setup for the Cross-Sectional area (reference for 2 lines) measurement is complete. Return to the step **6** of “Setting the Measurement common setting” (Page 6-34), and continue the measurement setting.

■ Cross-Sectional area (Master reference)

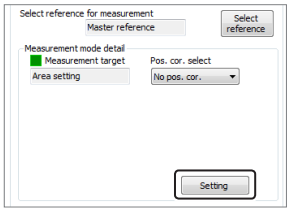
This section describes the setup procedure when [Cross-Sectional area (Master reference)] is selected in [Measure mode].
One measurement target will be selected.

“Cross-Sectional area” (Page 6-29)

1 Click [Setting] of [Measurement mode detail].

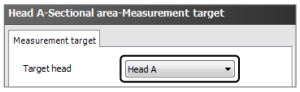
Reference

The reference target can be switched by the [Select reference for measurement] pull-down menu/[Select reference] button.
“Cross-Sectional area (Ref for 1 line)” (Page 6-52)
“Cross-Sectional area (Ref for 2 lines)” (Page 6-53)



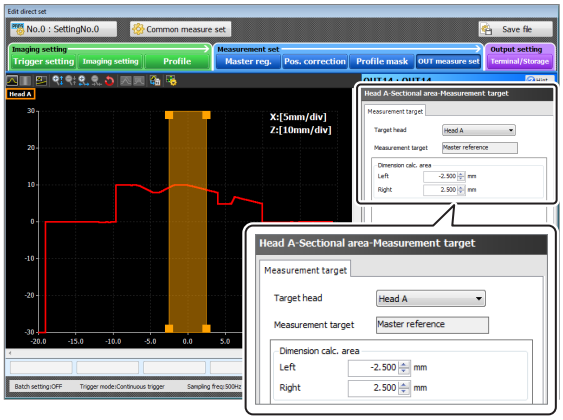
The [Cross-Sectional area-Measurement target] screen appears.

2 Select the head to be used under [Target head].

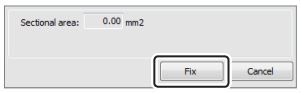


3 Set the dimension calculation area and the measurement target detail, while checking the profile display.

“Setting the Measurement target area and the Measurement target detail” (Page 6-62)



4 After the setup is completed, click the [Fix] button.

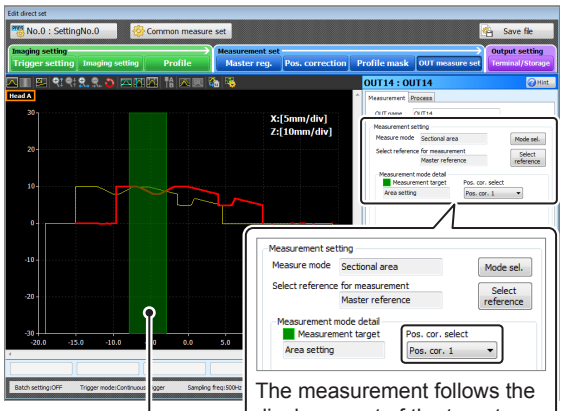


The screen returns to the [OUT measure set] screen.

5 Set whether to apply the position correction to the measurement target under [Pos cor. select].

Reference

When two position corrections are set in the advanced setting of the position correction, [Pos. cor. 1] and [Pos. cor. 2] can be set.
“Set up the position correction” (Page 6-13)



The measurement follows the displacement of the target object to correct the position of the measurement target area.

The measurement target area corrected by the position correction is displayed for the profile currently being measured.
It can be confirmed with this screen whether the measurement target area is corrected properly by the position correction.

The setup for the Cross-Sectional area (master reference) measurement is complete. Return to the step **6** of “Setting the Measurement common setting” (Page 6-34), and continue the measurement setting.

■ Deflection

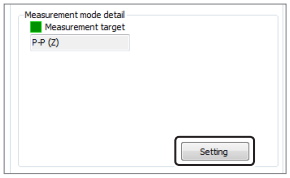
This section describes the setup procedure when [Deflection] is selected in [Measure mode].
One measurement target will be selected.

“Deflection” (Page 6-30)

Reference [Deflection] can be set only when [Compression (time axis)] is ON.

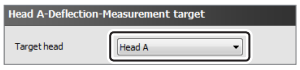
“Setting the Processing Method of the Profile (Profile Setting)” (Page 5-21)

1 Click [Setting] of [Measurement mode detail].

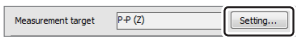


The [Deflection-Measurement target] screen appears.

2 Select the head to be used under [Target head].

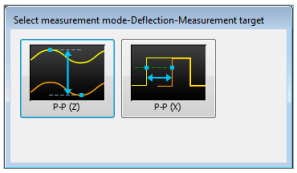


3 Click [Setting] next to [Measurement target].



The [Select measurement mode-Deflection-Measurement target] appears.

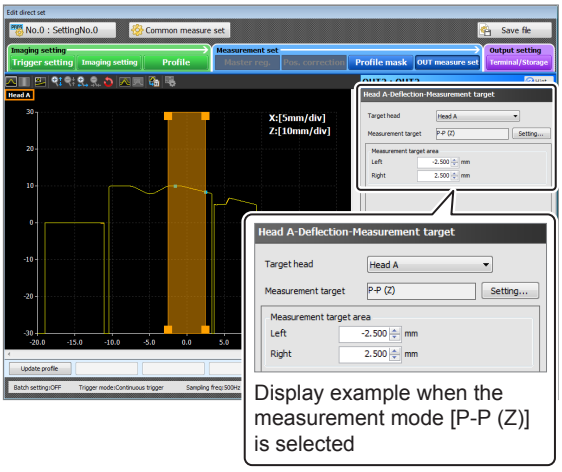
4 Click the measurement target button.



The screen returns to the [Deflection-Measurement target] screen.

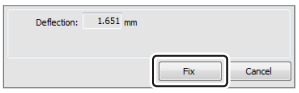
5 Set the measurement target area and the measurement target detail, while checking the profile display.

“Setting the Measurement target area and the Measurement target detail” (Page 6-62)



Display example when the measurement mode [P-P (Z)] is selected

6 After the setup is completed, click the [Fix] button.



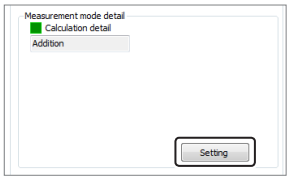
The screen returns to the [OUT measure set] screen.

The setup for the deflection measurement is complete. Return to the step **6** of “Setting the Measurement common setting” (Page 6-34), and continue the measurement setting.

■ Calculation

This section describes the setup procedure when [Calculation] is selected with [Measure mode].

1 Click [Setting] of [Measurement mode detail].



The [Calculation] screen appears.

2 Select [Calculation mode].



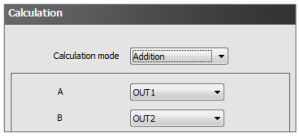
Depending on the calculation mode, the settings to be calculated appear.

3 Depending on the calculation mode, set OUT to be calculated.

Reference Only OUT's available will be those that were performed before the current OUT.

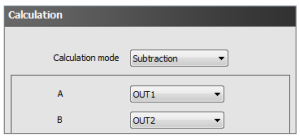
● **[Addition]**

Select OUT to be added (A+B) from the [A] and [B] pull-down menus.



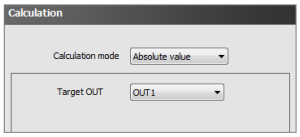
● **[Subtraction]**

Select OUT to be subtracted (A-B) from the [A] and [B] pull-down menus.



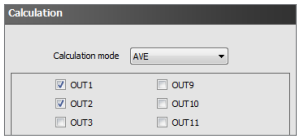
● **[Absolute value]**

Select OUT whose absolute value is calculated from the [Target OUT] pull-down menu.



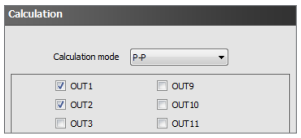
● **[AVE]**

Select OUT's to be averaged.



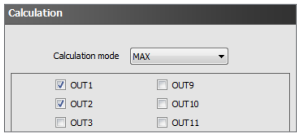
● **[P-P]**

Select OUT's whose P-P (difference between the peak and bottom of the selected OUT) is calculated.



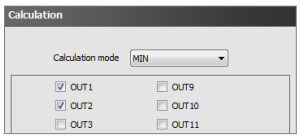
● **[Max]**

Select OUT's whose MAX (maximum value of the selected OUT) is calculated.

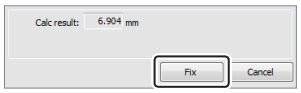


● **[MIN]**

Select OUT's whose MIN (minimum value of the selected OUT) is calculated.



4 After the setup is completed, click the [Fix] button.



The screen returns to the [OUT measure set] screen.

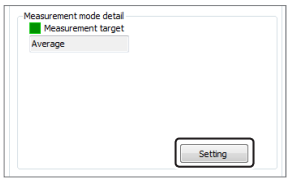
The setup for the calculation measurement is complete. Return to the step *6* of “Setting the Measurement common setting” (Page 6-34), and continue the measurement setting.

■ Height (simple 3D set)

This section describes the setup procedure when [Height (simple 3D set)] is selected in [Measure mode]. One measurement target will be selected.

“Simple 3D measurement mode” (Page 6-30)

1 Click [Setting] of [Measurement mode detail].

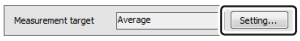


The [Height-Measurement target] screen appears.

2 Select the head to be used under [Target head].

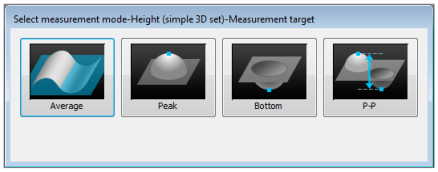


3 Click [Setting...] next to [Measurement target].



The [Select measurement mode-Height (simple 3D set)-Measurement target] appears.

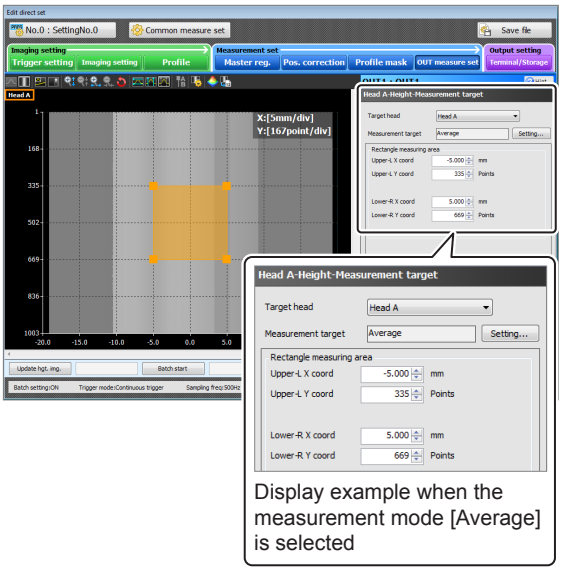
4 Click the measurement target button.



The screen returns to the [Height-Measurement target] screen.

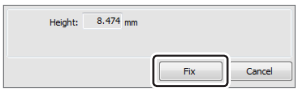
5 Set the measurement target area and the measurement target detail, while checking the height image display.

“Setting the Measurement target area and the Measurement target detail” (Page 6-62)



Display example when the measurement mode [Average] is selected

6 After the setup is completed, click the [Fix] button.



The screen returns to the [OUT measure set] screen.

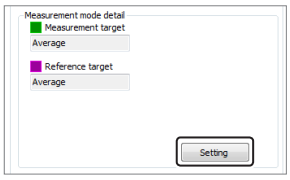
The setup for the height (simple 3D set) measurement is complete. Return to the step ***6*** of “Setting the Measurement common setting” (Page 6-34), and continue the measurement setting.

■ Step (simple 3D set)

This section describes the setup procedure when [Step (simple 3D set)] is selected in [Measure mode].
A measurement target and reference target will be selected.

“Simple 3D measurement mode” (Page 6-30)

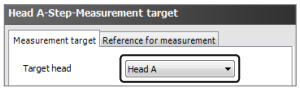
1 Click [Setting] of [Measurement mode detail].



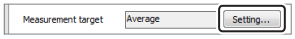
The [Step-Measurement target] screen appears.

2 Select the [Measurement target] tab.

3 Select the head to be used under [Target head].

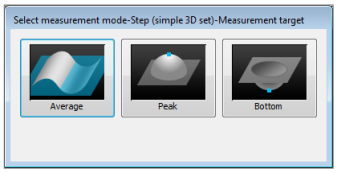


4 Click [Setting...] next to [Measurement target].



The [Select measurement mode-Step (simple 3D set)-Measurement target] screen appears.

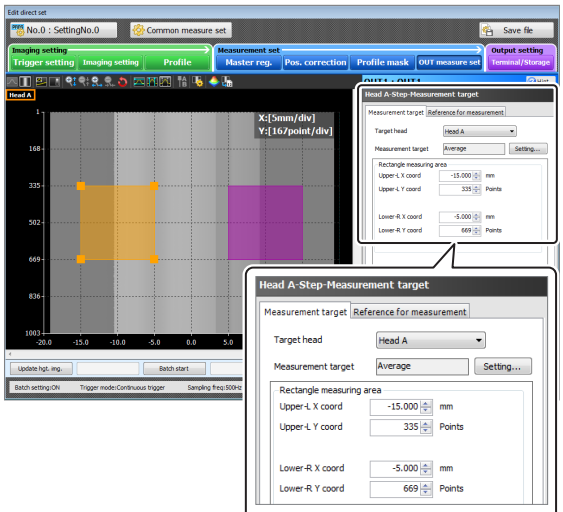
5 Click the measurement target button.



The screen returns to the [Step-Measurement target] screen.

6 Set the measurement target area and the measurement target detail, while checking the height image display.

“Setting the Measurement target area and the Measurement target detail” (Page 6-62)



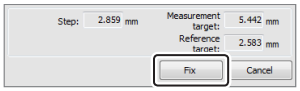
Display example when the measurement mode [Average] is selected

7 Click the [Reference for measurement] tab.

8 Like the [Measurement target] tab, set the target head, the measurement area, and the measurement target detail.

“Setting the Measurement target area and the Measurement target detail” (Page 6-62)

9 **After the setup is completed, click the [Fix] button.**



The screen returns to the [OUT measure set] screen.

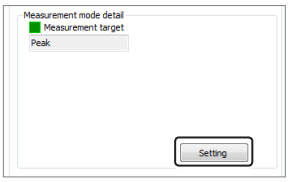
The setup for the step (simple 3D set) measurement is complete. Return to the step **6** of “Setting the Measurement common setting” (Page 6-34), and continue the measurement setting.

■ Position (simple 3D set)

This section describes the setup procedure when [Position (simple 3D set)] is selected in [Measure mode]. One measurement target will be selected.

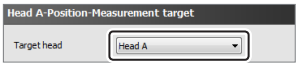
“Simple 3D measurement mode” (Page 6-30)

1 **Click [Setting] of [Measurement mode detail].**

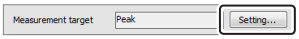


The [Position-Measurement target] screen appears.

2 **Select the head to be used under [Target head].**

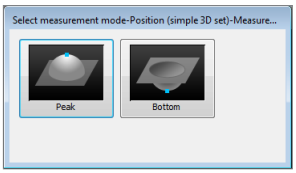


3 **Click [Setting...] next to [Measurement target].**



The [Select measurement mode-Position (simple 3D set)-Measurement target] screen appears.

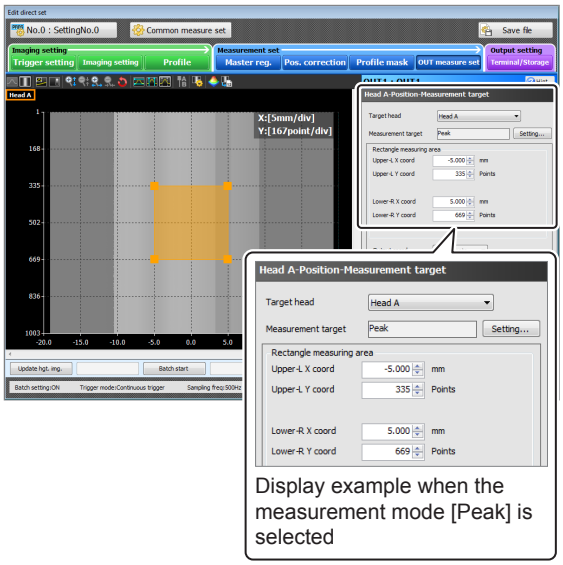
4 **Click the measurement target button.**



The screen returns to the [Position-Measurement target] screen.

5 Set the measurement target area and the measurement target detail, while checking the height image display.

“Setting the Measurement target area and the Measurement target detail” (Page 6-62)

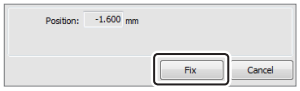


Display example when the measurement mode [Peak] is selected

6 Select the coordinate to be output as the measurement value by the [Output coord] pull-down menu.



7 After the setup is completed, click the [Fix] button.



The screen returns to the [OUT measure set] screen.

The setup for the position (simple 3D set) measurement is complete. Return to the step **6** of “Setting the Measurement common setting” (Page 6-34), and continue the measurement setting.

Setting the Measurement target area and the Measurement target detail

This section describes the setup procedure for measurement target area and the measurement target detail for the following measurement targets.

Measurement target	The measurement target area and the measurement target detail to be set	Refer to
Average	Height measurement area	6-63
Edge	Edge measurement area, Edge measurement detail	6-64
Peak	Height measurement area	6-64
Bottom	Height measurement area	6-65
Knee	Knee calculation area, Knee calculation detail	6-65
Intsec (lines)	Line calculation area × 2	6-66
Contact (lin-arc)	Line calculation area, Arc calculation area	6-67
Center of circle	Arc calculation area	6-68
Maximum thickness	Measurement area	6-68
Minimum thickness	Measurement area	6-69
Average thickness	Measurement area	6-69
Max thickness position	Measurement area	6-70
Min thickness position	Measurement area	6-70
Angle (Angle for horizon)	Line calculation area	6-71
Angle (Angle between lines)	Line calculation area × 2	6-71
Radius measurement	Arc calculation area	6-71
Cross-Sectional area (Ref for 1 line)	Dimension calculation area, Line calculation area	6-72
Cross-Sectional area (Ref for 2 lines)	Dimension calculation area, Line calculation area x 2	6-72
Cross-Sectional area (Master reference)	Dimension calculation area	6-72
Mean value	Measurement target area	6-72
P-P (Z)	Measurement target area	6-73
P-P (X)	Edge measuring area, Edge measurement detail	6-73
Simple 3D set: Average	Rectangle measurement area	6-74
Simple 3D set: Peak	Rectangle measurement area	6-74
Simple 3D set: Bottom	Rectangle measurement area	6-75
Simple 3D set: P-P	Rectangle measurement area	6-75

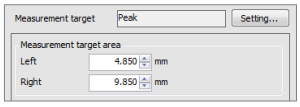
*: One proximate line or proximate circle can also be set in two linear calculation area/arc calculation areas.

■ Basic Operation

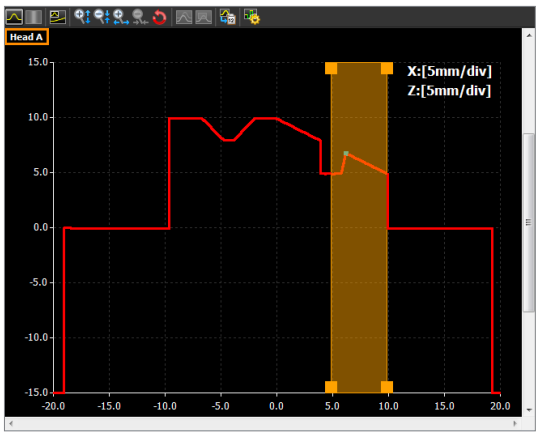
● Setting the area

The area can be set by entering numerical values for the left and right ends, or by directly operating the cursor on the profile display.
Select the setting procedure as appropriate.

Setting the area by numerical value



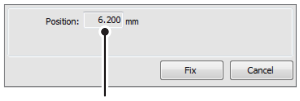
Setting the area by the cursor



For the cursor operation, refer to “Basic Operations of LJ-Navigator2” (Page 3-10).

● Displaying the measurement values

The measurement value appears at the lower part on the screen depending on the setting of the measurement target area. Use the measurement values displayed as a reference at the lower part of the screen to set the following measurement targets.



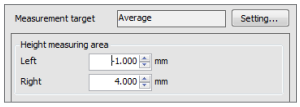
Measurement value

■ Average

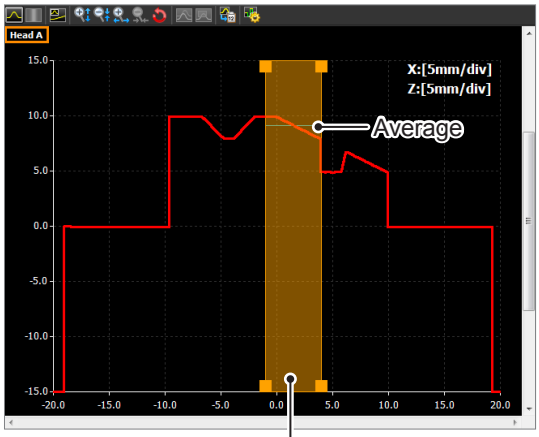
With [Average], specify one measurement target area to measure the average value in the area.

“Average” (Page 6-23)

1 Set [Left] and [Right] of the measurement target area, while checking the profile display.



A line to show the average appears on the profile in the measurement target area.



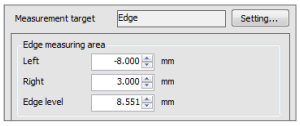
Measurement target area

■ Edge

With [Edge], specify one measurement target area and set [Edge dir.], [Detect dir.], and [Detect No.] in the area to measure the edge.

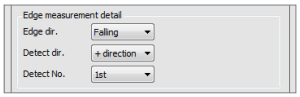
“Edge” (Page 6-23)

1 Set [Left] and [Right], and [Edge level] of the edge measurement area, while checking the profile display.

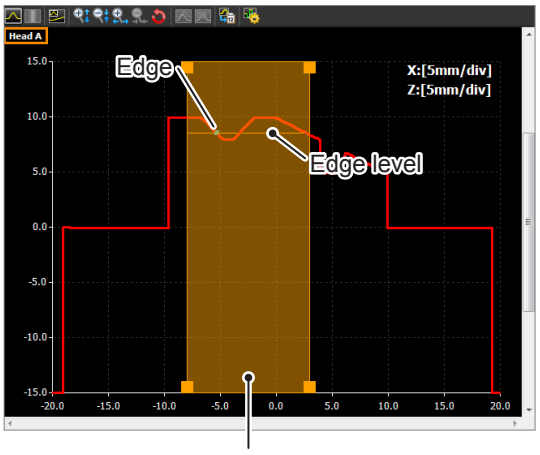


2 Set the conditions to detect edge by [Edge dir.], [Detect dir.], and [Detect No.].

“Edge direction, Detection direction, and Detection No.” (Page 6-11)



A point to show the detected edge appears on the profile in the measurement target area.



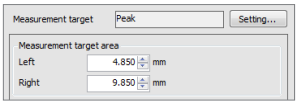
Measurement target area

■ Peak

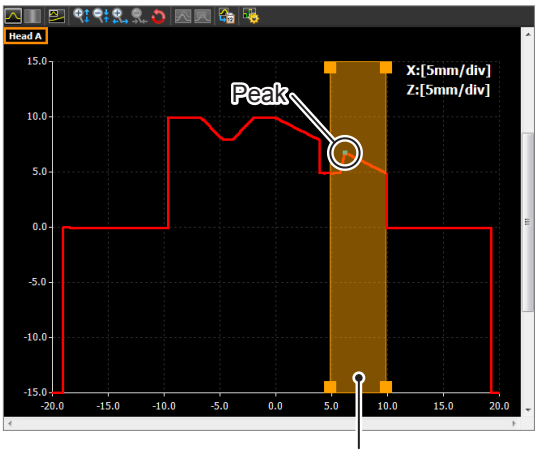
With [Peak], specify one measurement target area to measure the maximum value in the area.

“Peak” (Page 6-23)

1 Set [Left] and [Right] of the measurement target area, while checking the profile display.



A point to show the peak appears on the profile in the measurement target area.



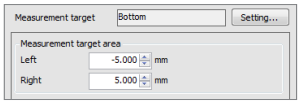
Measurement target area

■ Bottom

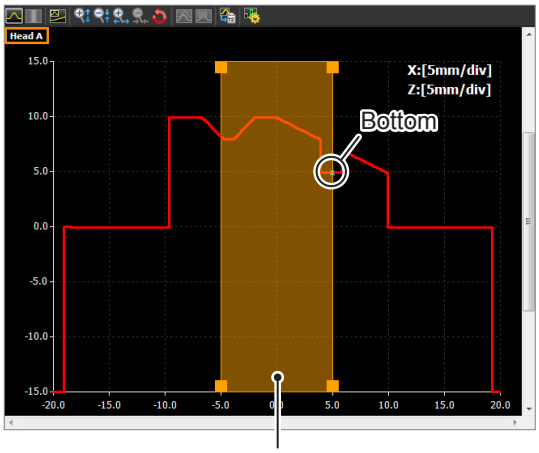
With [Bottom], specify one measurement target area to measure the minimum value in the area.

“Bottom” (Page 6-23)

1 Set [Left] and [Right] of the measurement target area, while checking the profile display.



A point to show the bottom appears on the profile in the measurement target area.

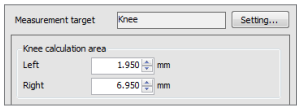


■ Knee

To measure [Knee], specify one measurement target area and set [Sensitivity], [Knee shape], [Detect dir.], and [Detect No.] in the area.

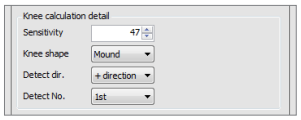
“Knee” (Page 6-24)

1 Set [Left] and [Right] of the measurement target area, while checking the profile display.

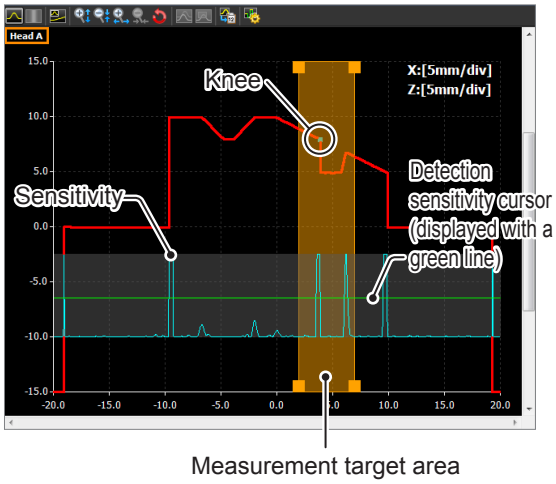


2 Set the conditions to detect the knee by [Sensitivity], [Knee shape], [Detect dir.], and [Detect No.].

“Knee” (Page 6-24)



A point to show the detected knee appears on the profile in the measurement target area.



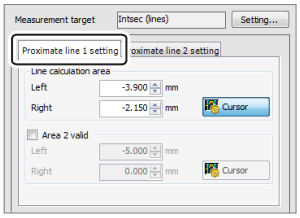
■ Intsec (lines)

With [Intsec (lines)], two proximate lines are calculated to measure their intersection point.

“Intersection point” (Page 6-24)

1 Click the [Proximate line 1 setting] tab.

2 Set [Left] and [Right] of the linear calculation area, while checking the profile display.

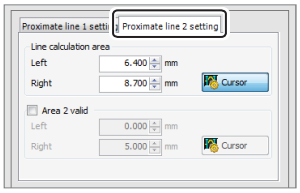


Reference When the calculation is done by using two areas, check [Area 2 valid] and set [Left] and [Right].

The proximate line 1 appears on the profile.

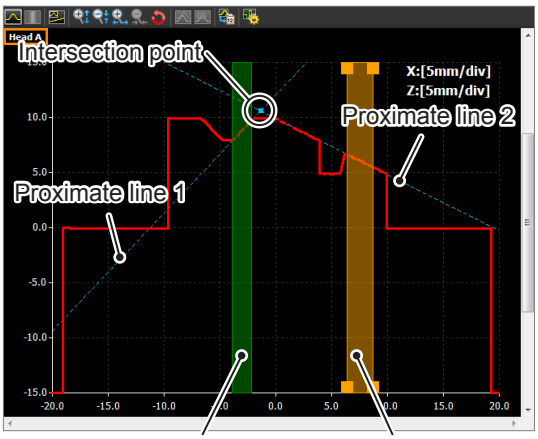
3 Click the [Proximate line 2 setting] tab.

4 Set [Left] and [Right] of the linear calculation area of the proximate line 2.



Reference When the calculation is done by using two areas, check [Area 2 valid] and set [Left] and [Right].

The proximate line 2 appears on the profile and a point appears at the intersection point with the proximate line 1.



The linear calculation area of [Proximate line 1 setting]

The linear calculation area of [Proximate line 2 setting]

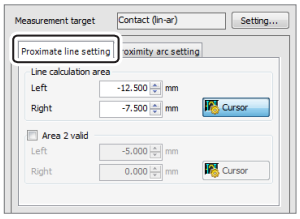
■ Contact (lin-ar)

With [Contact (lin-ar)], one proximate line and one proximate circle are calculated to measure their contact point.

“Contact point” (Page 6-24)

1 Click the [Proximate line setting] tab.

2 Set [Left] and [Right] of the linear calculation area, while checking the profile display.

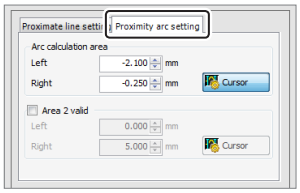


Reference When the calculation is done by using two areas, check [Area 2 valid] and set [Left] and [Right].

The proximate line appears on the profile.

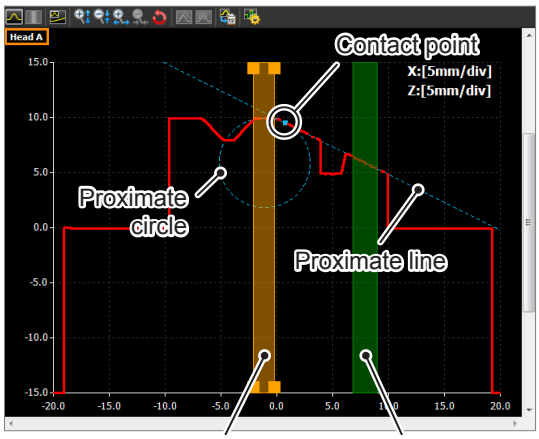
3 Click the [Proximity arc setting] tab.

4 Set [Left] and [Right] of the arc calculation area of the proximate arc.



Reference When the calculation is done by using two areas, check [Area 2 valid] and set [Left] and [Right].

The proximate circle appears on the profile and a point appears at the contact point with the proximate line.



The arc calculation area of [Proximate arc setting]

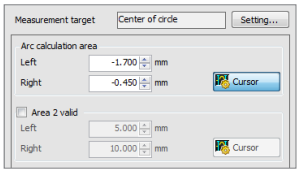
The linear calculation area of [Proximate line setting]

■ Center of circle

With [Center of circle], the proximate circle is calculated by the setting of the arc calculation area to measure the center of the calculated proximate circle.

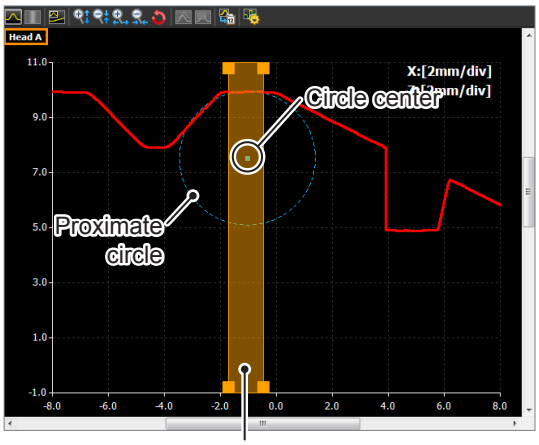
“Center of Circle” (Page 6-25)

1 Set [Left] and [Right] of the circle calculation area, while checking the profile display.



Reference When the calculation is done by using two areas, check [Area 2 valid] and set [Left] and [Right].

The proximate circle appears on the profile and a point appears at the center of the proximate circle.



Arc calculation area

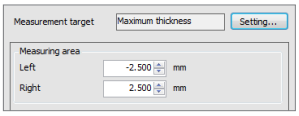
■ Maximum thickness

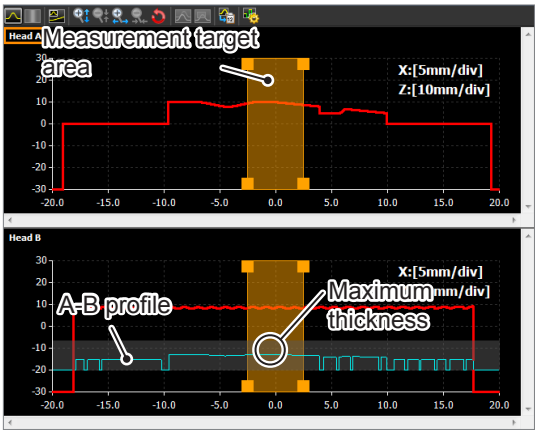
With [Maximum thickness], specify the measurement target area to measure the maximum thickness in the area.

“Maximum thickness” (Page 6-25)

Reference [Maximum thickness] can be set only when two heads are installed on either side of the target.

1 Set [Left] and [Right] of the measurement target area, while checking the profile display.





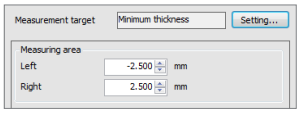
■ Minimum thickness

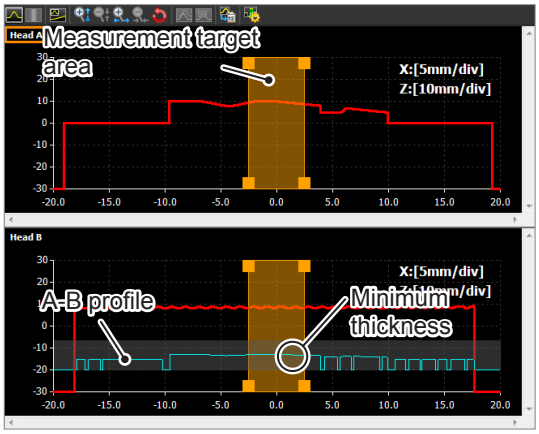
With [Minimum thickness], specify the measurement target area to measure the minimum thickness in the area.

“Minimum thickness” (Page 6-25)

Reference [Minimum thickness] can be set only when two heads are installed on either side of the target.

1 Set [Left] and [Right] of the measurement target area, while checking the profile display.





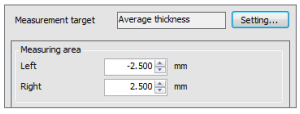
■ Average thickness

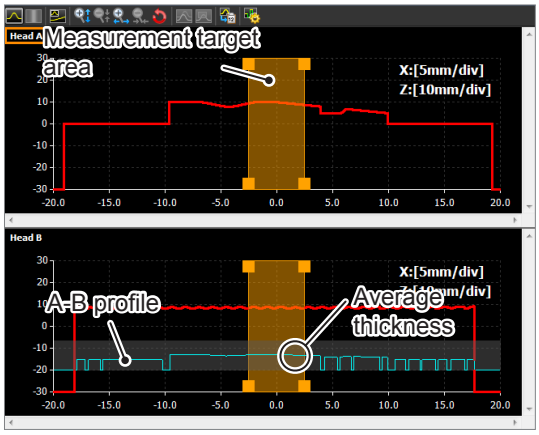
With [Average thickness], specify the measurement target area to measure the average thickness in the area.

“Average thickness” (Page 6-25)

Reference [Average thickness] can be set only when two heads are installed on either side of the target.

1 Set [Left] and [Right] of the measurement target area, while checking the profile display.





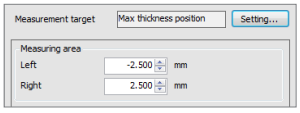
■ Max thickness position

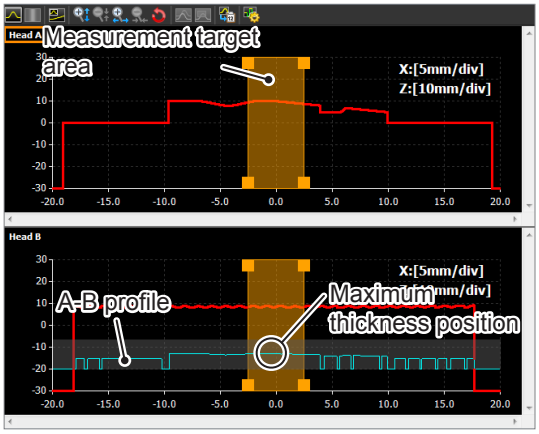
With [Max thickness position], specify the measurement target area to measure the maximum thickness position in the area.

“Maximum thickness position” (Page 6-25)

Reference [Max thickness position] can be set only when two heads are installed on either side of the target.

1 Set [Left] and [Right] of the measurement target area, while checking the profile display.





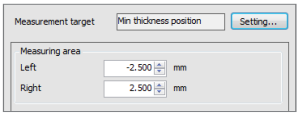
■ Min thickness position

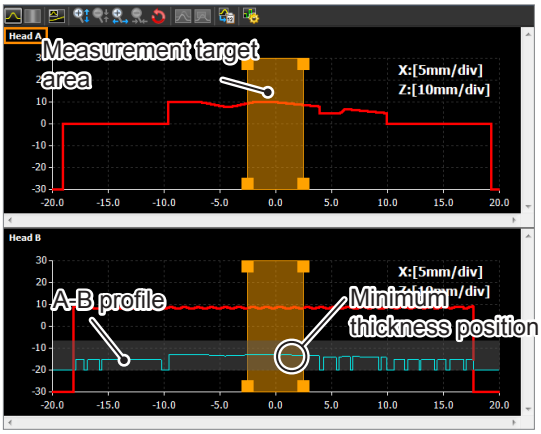
With [Min thickness position], specify the measurement target area to measure the minimum thickness position in the area.

“Minimum thickness position” (Page 6-25)

Reference [Min thickness position] can be set only when two heads are installed on either side of the target.

1 Set [Left] and [Right] of the measurement target area, while checking the profile display.



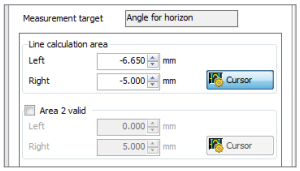


■ Angle

With [Angle], specify the linear calculation area to measure the angle from its horizontal proximate line (or from another proximate line).

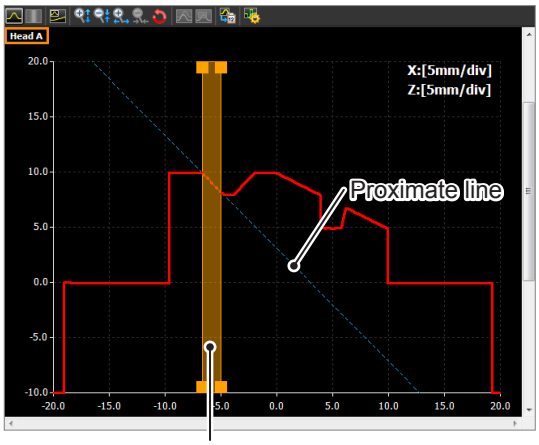
“Angle (angle for horizon)” (Page 6-29)
“Angle (angle between lines)” (Page 6-29)

1 Set [Left] and [Right] of the linear calculation area, while checking the profile display.



Reference When the calculation is done by using two areas, check [Area 2 valid] and set [Left] and [Right].

The proximate line appears on the profile and the angle from the horizon is measured.



Linear calculation area

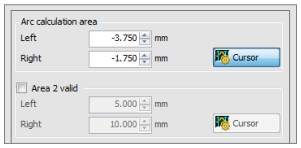
2 In case that the measurement target is [Angle between lines], click the [Reference for measurement] tab to set the proximate line in the linear calculation area.

■ Radius measurement

With [Radius measurement], specify the arc calculation area to calculate the proximate circle to measure R (radius) of the proximate circle.

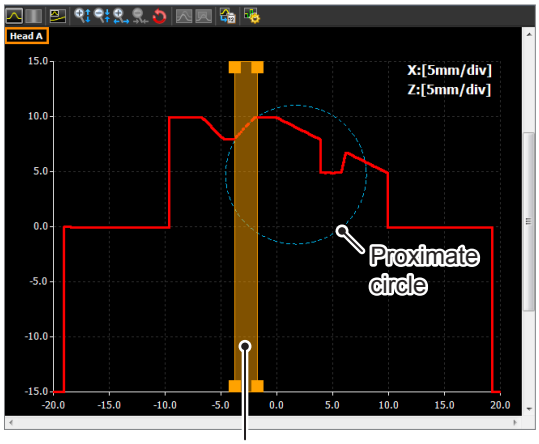
“Radius measurement” (Page 6-29)

1 Set [Left] and [Right] of the circle calculation area, while checking the profile display.



Reference When the calculation is done by using two areas, check [Area 2 valid] and set [Left] and [Right].

The proximate circle appears on the profile.



Arc calculation area

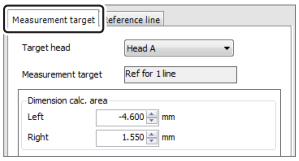
■ Cross-Sectional area

With [Cross-Sectional area], specify the linear calculation area to calculate the proximate line to divide the dimension calculation area to measure the Cross-Sectional area.

“Cross-Sectional area” (Page 6-29)

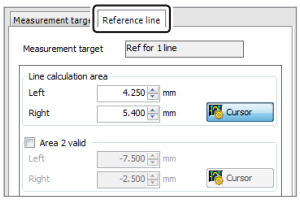
1 Click the [Measurement target] tab.

2 Set [Left] and [Right] of the dimension calculation area, while checking the profile display.



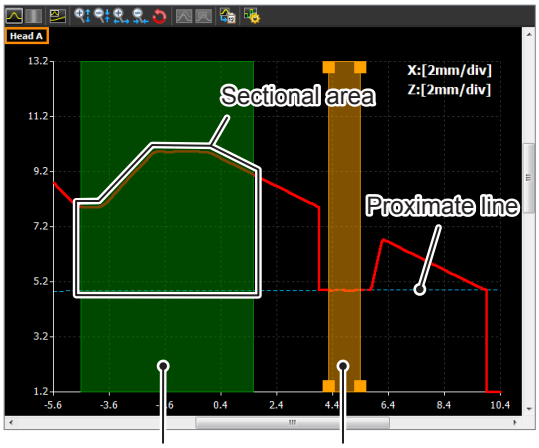
3 Click the [Reference line] tab.

4 Set [Left] and [Right] of the linear calculation area, while checking the profile display.



Reference When the calculation is done by using two areas, check [Area 2 valid] and set [Left] and [Right].

The proximate line appears on the profile and the Cross-Sectional area of the divided region of the dimension calculation area is calculated.



Dimension calculation area

Linear calculation area

5 In case that the measurement target is [Ref for 2 lines], click the [Reference line 2] tab to set the proximate line in the linear calculation area.

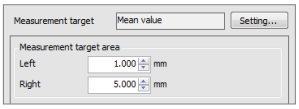
■ Mean value

With [Mean value], specify one measurement target area to measure the height mean value in the area.

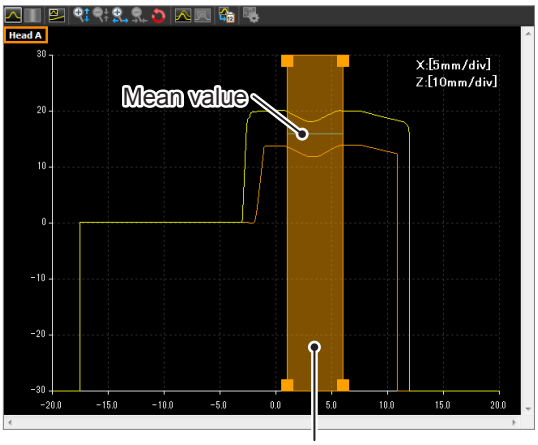
“Mean value” (Page 6-26)

Reference [Mean value] can be set only in case of [Compression (time axis)] is ON.
“Setting the Processing Method of the Profile (Profile Setting)” (Page 5-21)

1 Set [Left] and [Right] of the measurement target area, while checking the profile display.



A point to show the mean value appears in the measurement target area.



Measurement target area

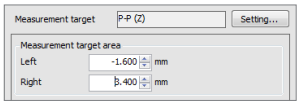
■ P-P (Z)

With [P-P (Z)], specify the measurement target area to measure P-P (Z) from the peak and bottom in the area.

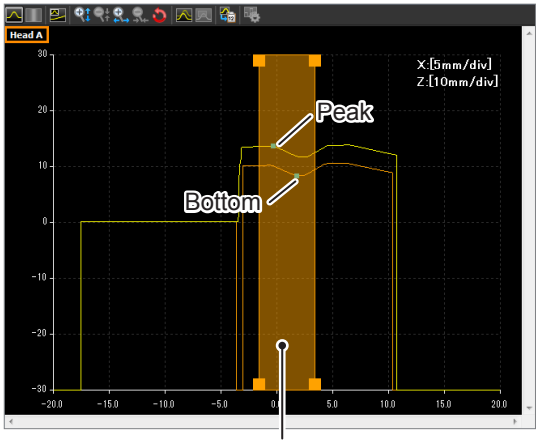
“P-P (Z)” (Page 6-26)

Reference [P-P (Z)] can only be set when [Compression (time axis)] is ON and the measurement target is [Deflection].
“Setting the Processing Method of the Profile (Profile Setting)” (Page 5-21)

1 Set [Left] and [Right] of the measurement target area, while checking the profile display.



Points to show the peak and bottom appear and P-P (Z) is calculated.



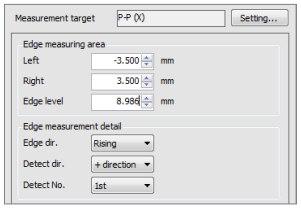
■ P-P (X)

With [P-P (X)], specify the measurement target area to measure P-P (X) from the maximum and minimum values in the X direction in the area.

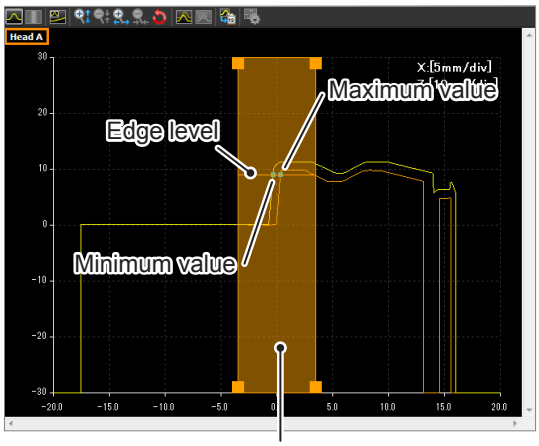
“P-P (X)” (Page 6-26)

Reference [P-P (X)] can only be set when [Compression (time axis)] is ON and the measurement target is [Deflection].
“Setting the Processing Method of the Profile (Profile Setting)” (Page 5-21)

1 Set [Left] and [Right] of the area and [Edge level] in the measurement target area, while checking the profile display.



Points to show the maximum and minimum values appear and P-P (X) is measured.

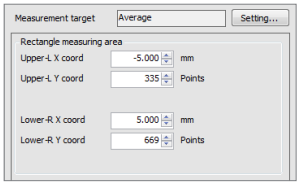


■ Simple 3D set: Average

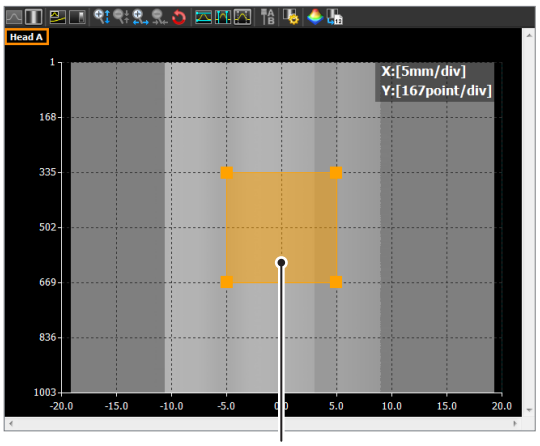
With [Average] of the simple 3D setting, specify the measurement target area on the height image display to measure the range and the measurement period of the measurement target.

“Average” (Page 6-23)

1 Set the coordinates of the upper left and lower right of the rectangle measurement area, while checking the height image display.



The average height in the range and period set on the height image display is calculated.



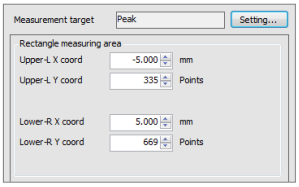
Measurement target area

■ Simple 3D set: Peak

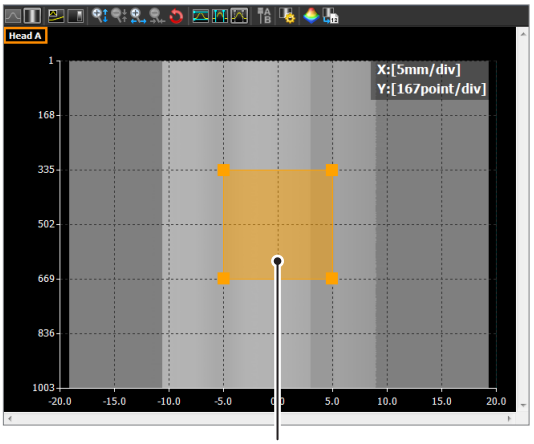
With [Peak] of the simple 3D setting, specify the measurement target area on the height image display to measure the range and the measurement period of the measurement target.

“Peak” (Page 6-23)

1 Set the coordinates of the upper left and lower right of the rectangle measurement area, while checking the height image display.



The maximum height in the range and period set on the height image display is calculated.



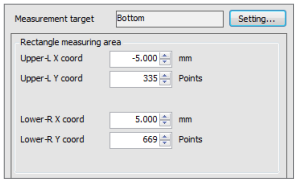
Measurement target area

■ Simple 3D set: Bottom

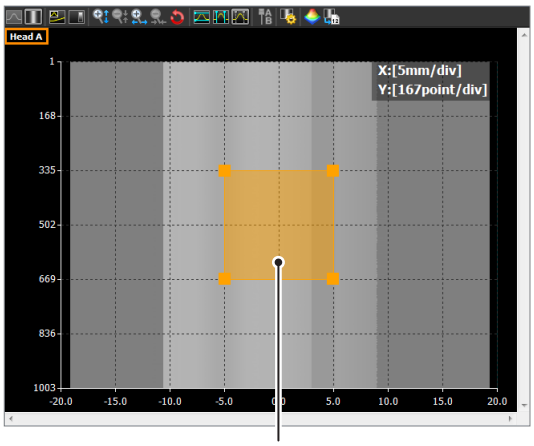
With [Bottom] of the simple 3D setting, specify the measurement target area on the height image display to measure the range and the measurement period of the measurement target.

“Bottom” (Page 6-23)

1 Set the coordinates of the upper left and lower right of the rectangle measurement area, while checking the height image display.



The minimum height in the range and period set on the height image display is calculated.



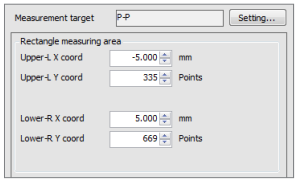
Measurement target area

■ Simple 3D set: P-P

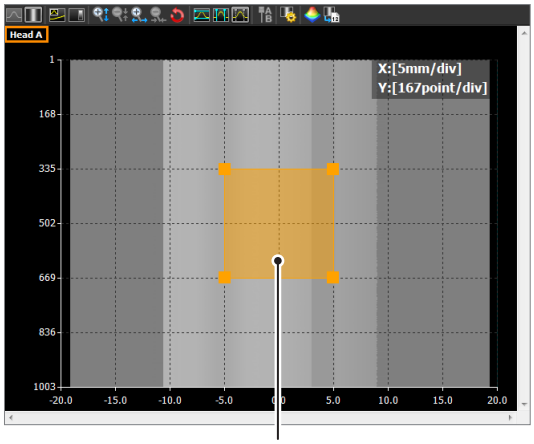
With [P-P] of the simple 3D setting, specify the measurement target area on the height image display to measure the range and the measurement period of the measurement target.

“P-P (Z)” (Page 6-26)

1 Set the coordinates of the upper left and lower right of the rectangle measurement area, while checking the height image display.



The difference between the peak and bottom in the range and period set on the height image display is calculated.



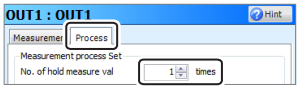
Measurement target area

Setting the Processing setting

1 **Click the [Process] tab.**

2 **Set [No. of hold measure val].**

“Measurement hold point” (Page 6-31)



3 **Select [Measure value filter] and select the contents of the filter processing.**



“Measurement value filter” (Page 6-31)

Reference [Measure value filter] does not appear in any of the following.

- [Compression (time axis)]: ON and [Batch measurement]: ON
- [Compression (time axis)]: OFF, and [Batch measurement]: ON, and [Measure mode]: [Simple setting]

“Setting the Processing Method of the Profile (Profile Setting)” (Page 5-21)

“Setting the Trigger Conditions (Trigger Settings)” (Page 5-5)

● **When [Moving average] is selected**

Select the number of points to average.



● **When [Low-pass filter] is selected**

Select the cutoff frequency.



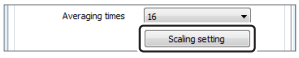
● **When [High-pass filter] is selected**

Select the cutoff frequency.



4 **Click the [Scaling setting] button.**

“Scaling processing” (Page 6-31)



The [Scaling setting] screen appears.

5 **Enter [Meas. val 1], [Meas. val 2], [Disp. val 1], and [Disp. val 2] to set the scaling.**

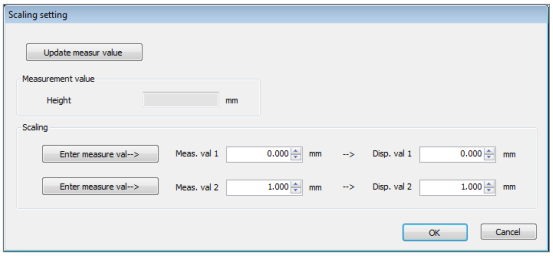
Reference **The following conditions are required to set the processing.**

- **Input value 1 ≠ Input value 2**
- $\left|\frac{\text{Disp val 2 - Disp val 1}}{\text{Meas. val 2 - Meas. val 1}}\right| < 10$

Reference

- When the [Update measur value] button is clicked, the settings in the [Measurement] tab are sent to the controller and [Measurement value] appears.
  This measurement value is not scaled.
- When the [Enter measure val-->] is clicked, the value in [Measurement value] is input to [Meas. val 1] and [Meas. val 2].
- Value that is updated by clicking the [Update measur value] button is the value when Measure value filter is OFF.

6 **After the setup is completed, click the [OK] button.**

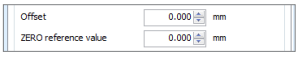


Reference In case of the direct setting editing, the scaling setting is sent to the controller.

The screen returns to the [OUT measure set] screen.

7 **Set [Offset] and [ZERO reference value].**

“Offset processing” (Page 6-31)
“Auto-zero reference value” (Page 6-32)



Reference [ZERO reference value] can be changed by the auto-zero function during the measurement.

“Using the ZERO input (Auto-zero function)” (Page 8-30)

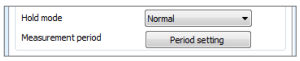
8 Select [Hold mode] from the pull-down menu, and click the [Period setting] button.

“Hold mode” (Page 6-32)
“Measurement period” (Page 6-32)

Reference [Hold mode] and [Measurement period] do not appear in any of the following.

- [Compression (time axis)]: ON and [Batch measurement]: ON
- [Compression (time axis)]: OFF, and [Batch measurement]: ON, and [Measure mode]: [Simple setting]

“Setting the Processing Method of the Profile (Profile Setting)” (Page 5-21)
“Setting the Trigger Conditions (Trigger Settings)” (Page 5-5)

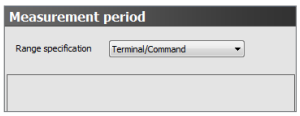


The [Measurement period] screen appears.

9 Select the target in the measurement period from the [Period setting] pull-down menu.

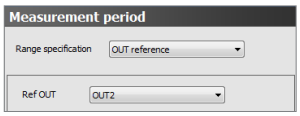
10 Specify the measurement period depending on the specified target.

● When [Terminal/Command] is selected



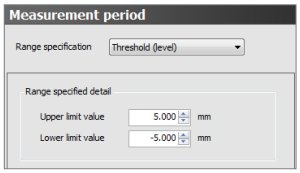
● When [OUT reference] is selected

Select OUT to be referred.



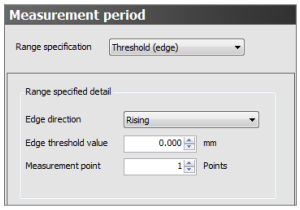
● When [Threshold (level)] is selected.

Set [Upper limit] and [Lower limit].



● When [Threshold (edge)] is selected.

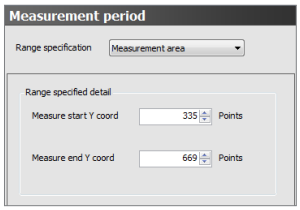
Set [Edge direction], [Edge threshold value], and [Measurement point].



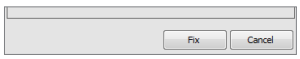
● When [Measurement area] is selected

Set the measurement period either by setting [Measure start Y coord] and [Measure end Y coord] in [Range specified detail] or operating the area on the height image display.

Reference [Measurement area] can be set only when [Batch measurement] is ON.



11 After the measurement range is set, click the [Fix] button.



The measurement range is fixed, and the screen returns to the [Process] tab.

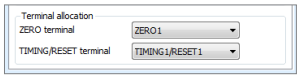
12 Set [Upper limit], [Lower limit], and [Hysteresis] of [Tolerance setting].

“Tolerance” (Page 6-32)



13 Set [ZERO terminal] and [TIMING/RESET terminal].

“Terminal assignment” (Page 6-32)



Reference To complete the setup, click the [Complete] button at the lower part of the screen. When the [Complete] button is clicked, the settings are sent to the controller.

MEMO

7

Setting the Terminal Output Condition/ the Storage Condition

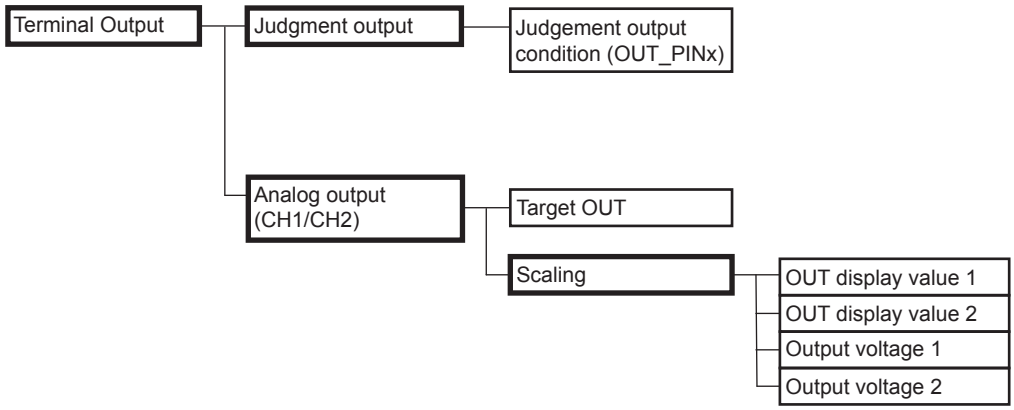
This chapter describes the contents and setup procedure on the judgement output setup, analog output setup, and storage setup.

Setting Items of Terminal Output/Storage Setting 7-2
Terminal Output Setting.....7-3
Storage Settings.....7-7

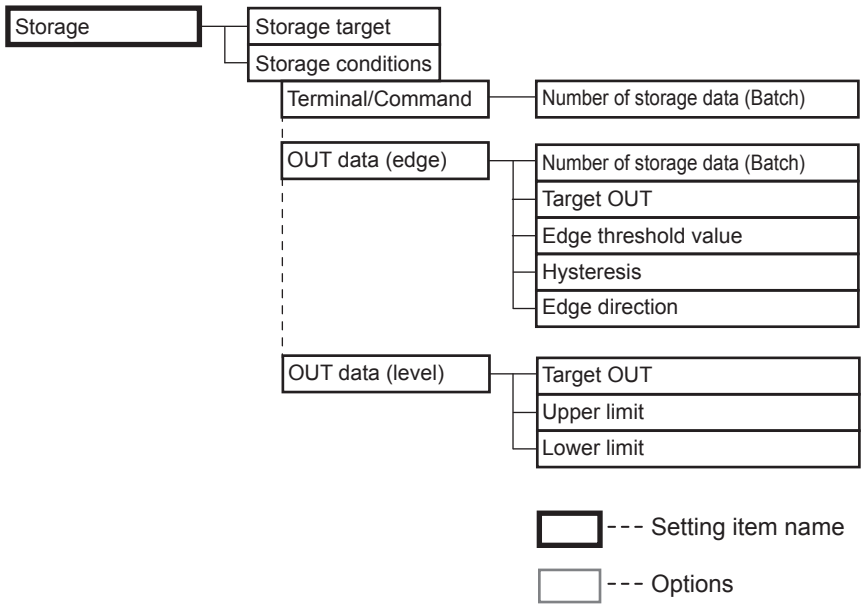
Setting Items of Terminal Output/Storage Setting

With the terminal setting/Storage setting, set up the terminal output of the judgement output/analog output and the storage.
The setting items of the terminal setting/Storage setting are as below.

● **Terminal output setting**



● **Storage Settings**



Terminal Output Setting

Terminal output setting

The terminal setting sets up the condition to turn on the judgement output terminal (OUT_PIN1 to OUT_PIN12) and the output condition of the analog signal from the analog voltage output terminal (ANA_OUT1 (V) and ANA_OUT2 (V)).

■ Judgement output

The judgement output sets up the condition to turn on the judgement output terminals (OUT_PIN1 to OUT_PIN12).
With this setting, select the combinations of the judgement results for each OUT (HI, GO, and LO) with options for AND, OR, and individual ouputs (not combined).
When AND is selected, the output is turned ON when all selected judgements are on.
When the output value is the measurement alarm, the output is handled as same as the judgement results of [HI] and [LO].
If no judgement value is active for a given out, then the default value for the out is [OFF].
Example:

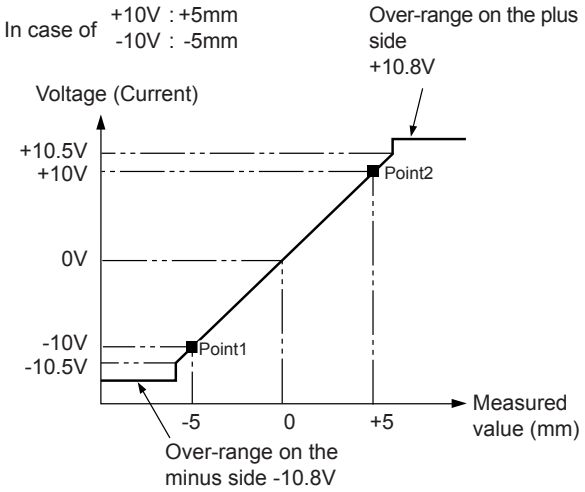
- In case of [OUT1: GO] OR [OUT2: HI] and OUT1 is waiting for the judgement and OUT2 is HI → [OFF] OR [ON] → ON
- In case of [OUT1:GO] AND [OUT2:HI], OUT1 is GO and OUT2 is waiting for the judgement → [ON] AND [OFF] → OFF
- In case of [OUT1: GO] OR [OUT2: HI] and OUT1 has not been set and OUT2 is GO → [OFF] OR [OFF] → OFF

Reference

- For the judgement output terminal, refer to “I/O Terminal” (Page 11-8).
- For the settings of the judgement results (HI, GO, and LO), refer to “Tolerance” (Page 6-32).
- At the timing when any judgement terminal is revised, the strobe signal turns ON. Refer to “Terminal setting” (Page 9-5).

■ Analog output

The analog voltage outputs (CH1/CH2) can be set to output values for a selected OUT. The output voltage can be scaled arbitrarily in the range of ±10.5V.
For example, ±5mm of the OUT measurement values can be scaled to correspond to ±10V for the analog output voltage. The relationship between the OUT value and voltage can be seen below.



When the result of the output value-to-voltage conversion is out of the ±10.5V range, an output voltage greater than +10.5V becomes [Over-range on the plus side] and an output voltage lower than -10.5V becomes [Over-range on the minus side]. The former outputs [+10.8V] and the latter outputs [-10.8V].
In addition, in case of the following condition, all the output voltages are [-10.8V].

- The OUT measurement values are the measurement value alarm data.
- The OUT measurement values are the judgement standby data.
- The OUT terminal has not been allotted.
- The OUT measurement mode has not been set.

● Analog target OUT

With this setting, set up the OUT to be output from the analog voltage output terminals (ANA_OUT1 (V) and ANA_OUT2 (V)).

● Scaling

Scaling sets [OUT display value 1/2] and [Output voltage 1/2] required for the conversion processing. (Output voltage: Selectable in 0.1V increments. OUT display value: in 0.001mm (length)/ in 0.01degree (Angle)/ in 0.01mm^2 (Area), respectively.)
This setting has restrictions shown below.

- OUT display value 1 ≠ OUT display value 2
- |(Output voltage 2 - Output voltage 1)/(OUT display value 2 - OUT display value 1)| ≤ 10
  Units of the calculations are: Output value: mV, OUT display value: 0.01µm (mm/µm length)/0.001 degree (Angle)/0.0001mm^2 (area).
  Example: When scaling ±1mm to ±10V, ±10V becomes ±10000 because the output voltage is in mV.
  Because the length of the OUT display value is in 0.01µm, ±1mm becomes ±100000.
  The calculation equation is |{10000 - (-10000)}/{100000 - (100000)}| = 0.1, which satisfies [< 10].

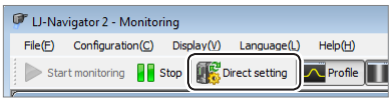
Reference
- When OUT is modified with its setting relating to the display range of OUT after the OUT assignation, the settings of the OUT display 1/2 are automatically adjusted.
- For the analog output terminal, refer to “I/O Terminal” (Page 11-8).

Setting the terminal output

This section describes the setup procedure of the terminal setting.

Reference The procedure described here is for LJ-Navigator2. For the operation procedure of the display monitor/touch panel monitor, refer to “Switching Screens on the Display Monitor/Touch Panel Monitor” (Page A-26).

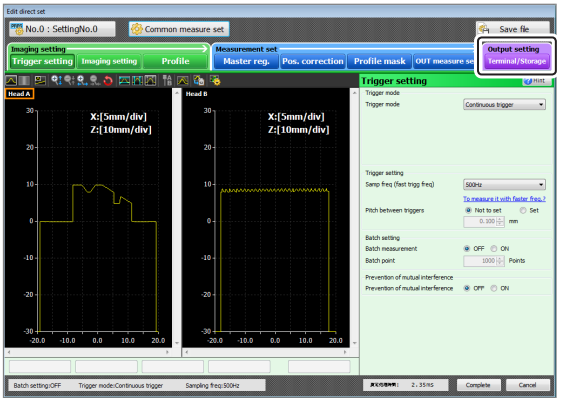
1 Click the [Direct setting] button on measurement screen.



The [Edit direct set] screen appears.

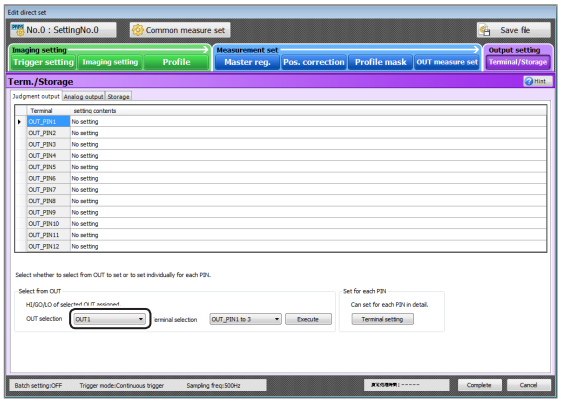
Reference This section describes the procedure to directly edit system settings. To edit the local settings, click [Local setting] and select [Newly create]. Then, set up [Setting of head details], [Head installation condition], and [Common measure set]. The [Edit local set] screen appears. For the procedure to show the [Edit local set] screen, refer to “Creating and editing a new setting file (Edit local set)” (Page 4-7).

2 Click [Terminal/Storage].

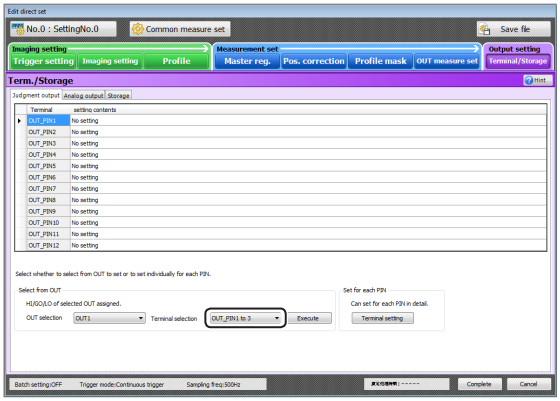


Reference
- To assign an OUT to each terminal by the judgement output condition setting, go to ***6***.
- To set up the analog output, go to ***10***.

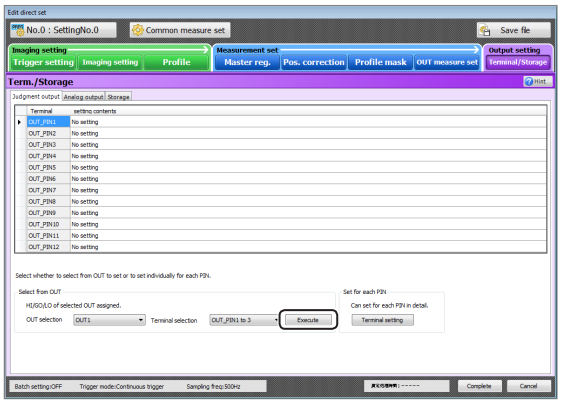
3 **To assign the terminal to OUT by the judgement output condition setting, select from [OUT1] to [OUT16] with the pull-down menu.**



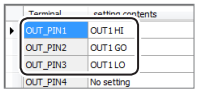
4 **Select from [OUT_PIN1 to 3/OUT_PIN4 to 6/ OUT_PIN7 to 9/OUT_PIN10 to 12] with the [Terminal selection] pull-down menu.**



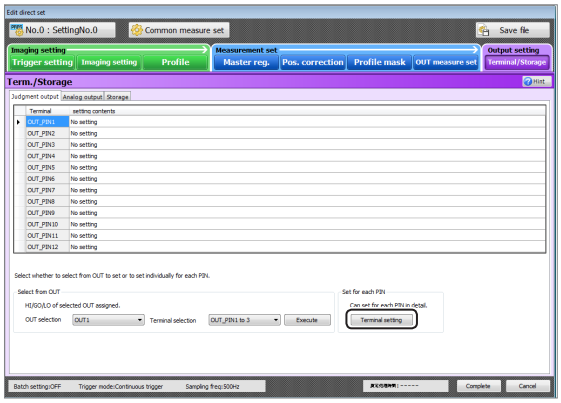
5 **Click [Execute].**



The assigned OUT and the judgement output condition appears in [setting contents] for the selected terminal.

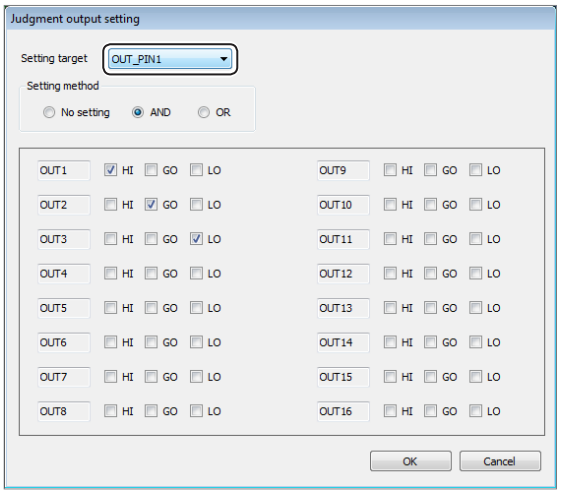


6 **To assign an OUT to each terminal by the judgement output condition setting, click [Terminal setting].**

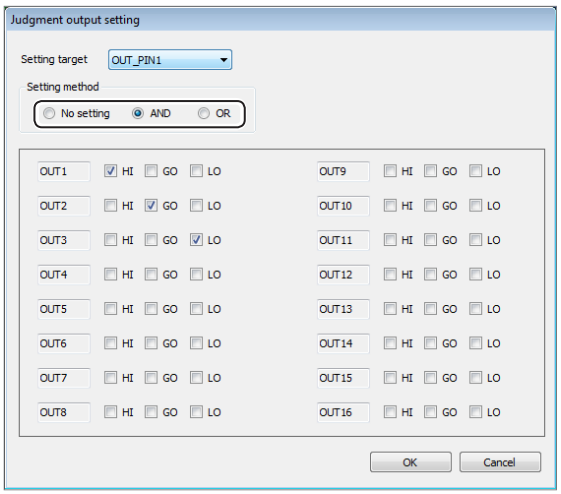


The [Judgment output setting] window appears.

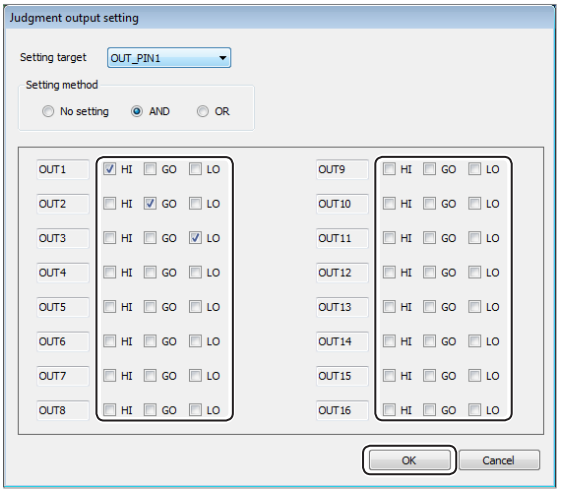
7 **Select the terminal under the [Setting target] pull-down menu.**



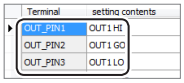
8 **Select [AND] or [OR] under [Setting method].**



9 **Select the judgement output by the [HI]/[GO]/[LO] check boxes of each OUT and click the [OK] button.**



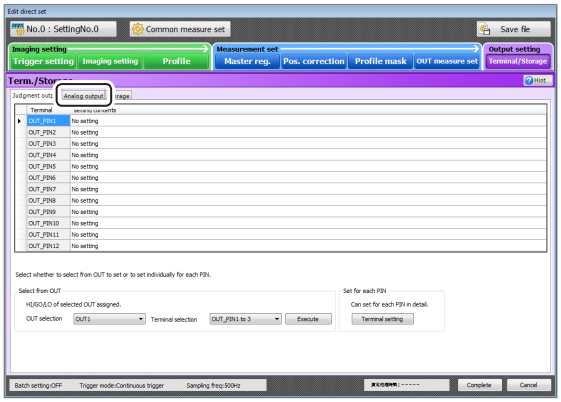
Clicking the [OK] button closes the [Judgment output setting] window, and the assigned OUT and the judgement output conditions appear in the [setting contents] of the selected terminal.



Point **When the terminal is changed via the pull-down menu of [Setting target], a confirmation message [Settings now being edited will be abandoned if a setting target is changed. Is it OK?] will appear. Clicking [Yes] will discard the settings.**

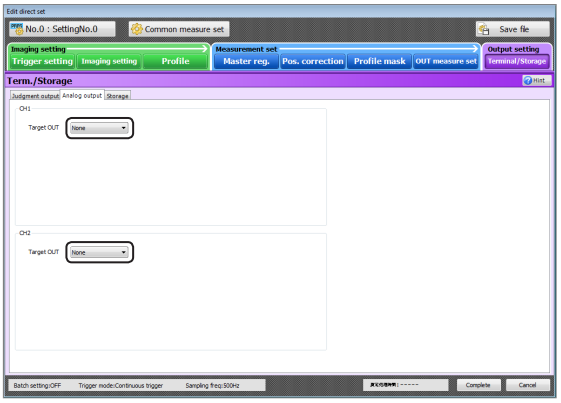
"Judgement output" (Page 7-3)

10 **To set up the analog output, click [Analog output].**

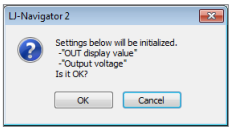


The screen turns to the [Analog output] setting area.

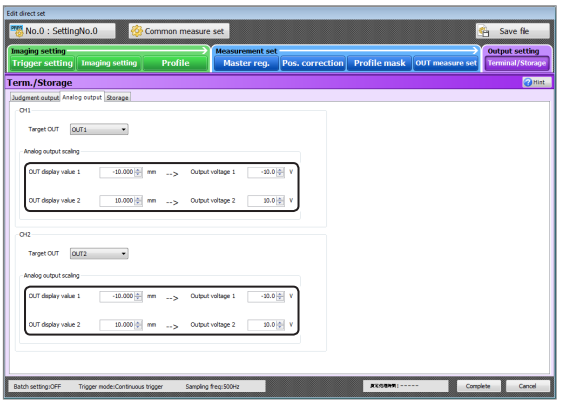
11 **Select desired OUT for an analog output under [Target OUT].**



When [Target OUT] is switched, the following confirmation dialog appears. Click the [OK] button, if it is correct.



12 **Set up the scaling via the entry boxes displayed next to [OUT display value 1]/[OUT display value 2] and [Output voltage 1]/[Output voltage 2].**



The unit of [OUT display value 1]/[OUT display value 2] depends on the OUT destination as below.
Length: mm, Area: mm^2, Angle: deg.

Reference To finish the setup, click the [Complete] button at the lower part of the screen. When the [Complete] button is clicked, the settings are sent to the controller.

"Analog output" (Page 7-3)

Storage Settings

Storage

Storage allows the measurement values of each OUT or the profile data and the internal measurement values to be saved into the internal memory of the controller. The stored data can be read by using the LJ-Navigator2 or communication commands.

Reference [Internal measurement value] means the measurement value just before the hold mode processing of the OUT measurement setting. Each OUT has one internal measurement value for each profile data.

Reference For the reading of the storage by the LJ-Navigator2, refer to “[Data storage] Screen” (Page 8-19).

Storage target

Select [OUT data] or [Profile].

- OUT data:
  Stores the measurement value.
- Profile:
  Stores the profile data + measurement value when batch measurement is OFF and the profile data + measurement value + internal measurement value when batch measurement is ON. * However, DLL commands can be used to read the internal measurement value even when batch measurement is OFF.

Storage condition

Available settings for storage depend on whether batch measurement is ON of OFF.

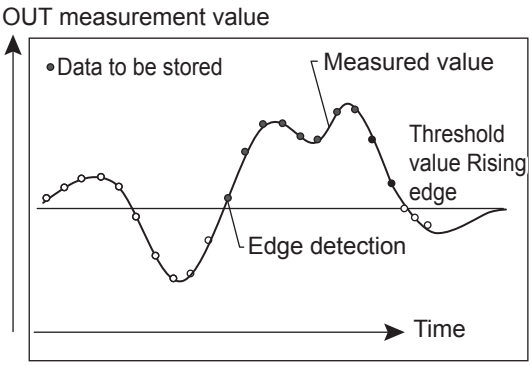
In the case that the batch measurement is OFF.
Use any one of the following methods to set up the storage period.

- Terminal input and communication command
  The storage period is controlled as shown below.

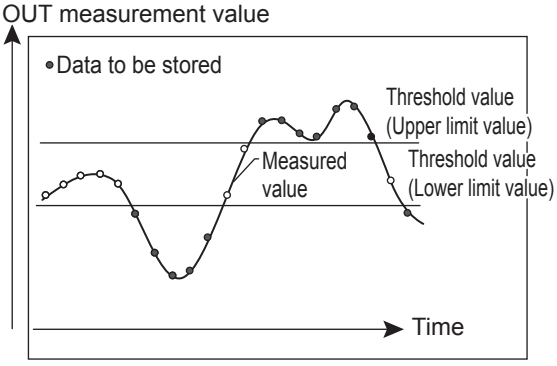
Operation	During storage period	Out of the storage period
STORAGE_START terminal turns from OFF to ON.	Ignored	The storage period starts.
STORAGE_STOP terminal turns from OFF to ON.	The storage period ends.	Ignored
Receive the storage start command.	Ignored	The storage period starts.
Receive the storage stop command.	The storage period ends.	Ignored

Operation	During storage period	Out of the storage period
After the storage period started, the data is stored as many as the number of data to be stored (the number of the storage data).	The storage period ends.	Impossible

- OUT data judgement condition (edge)
  The storage period starts based on the data whose edges are detected, and after the storage has completed as many as the preset number of data (the number of the storage data), the storage period will end.
  Set up the threshold value, hysteresis, and edge direction for the edge detection.
  The following figure illustrates an operation example in case of a setting that the number of data is ten and the detection is done at a rising edge.

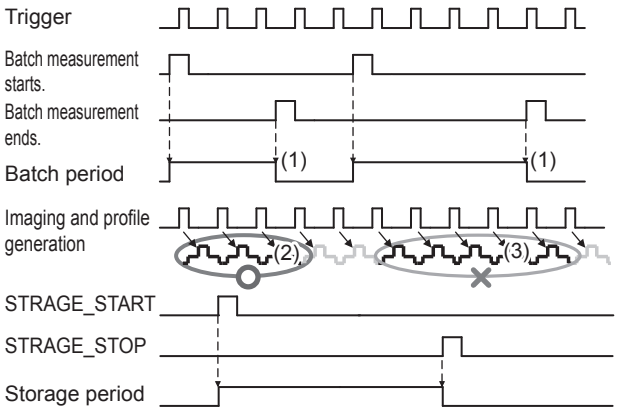


- OUT data judgement condition (level)
  Set up the upper limit value and the lower limit value. Time period where the output value exceeds the upper limit value or falls below the lower limit value becomes the storage period.



In the case that the batch measurement is ON.
Use any one of the following methods to set up the storage period.

- Terminal input and communication command
  The amount of batch data to be stored (Storage batch number) can be set. The storage period is controlled in the same way as that performed when the batch measurement is OFF.
  When the batch measurement is ON, whether the storage period has started or ended is determined at an end timing of the batch (the OUT measurement value is updated).



(1) The batch period ends when the batch measurement stops.
(2) Because the batch period ends in the storage period, all the profile + the internal measurement values are stored.
(3) Because the batch period ends out of the storage period, no data are stored.

- OUT data judgement condition (level)
  The operation is the same as that in case that the batch measurement is OFF except that one batch of data is stored together.

Specifications common to the batch measurement ON/OFF

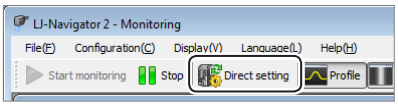
- When the free space of the storage memory has run out, the storage period does not start until the memory is cleared by the terminal or command (no additional data cannot be stored). However, switching the program or changing the settings will initialize the storage memory, which enables more data to be stored (this initialization of the storage memory can be disabled in the settings).
- The storage processing is performed at the following times during the storage period.
  - When storing the data: At a update of OUT measurement.
  - When storing the profiles: At a update of the profile.

Setting the Storage target and condition

This section describes the setup procedure for the storage target and condition.

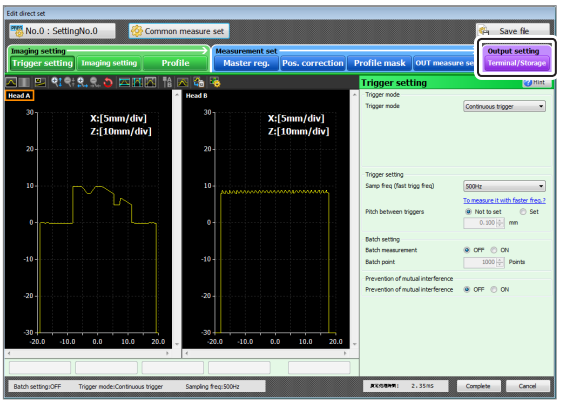
Reference The procedure described here is for LJ-Navigator2. For the operation procedure of the display monitor/touch panel monitor, refer to “Switching Screens on the Display Monitor/Touch Panel Monitor” (Page A-26).

1 Click the [Direct setting] button of the measurement screen.

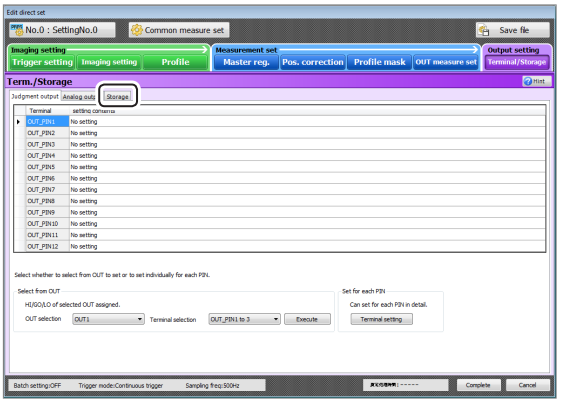


The [Edit direct set] screen appears.

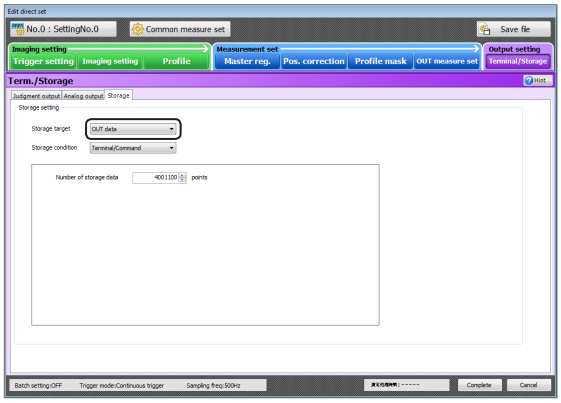
2 Click [Terminal/Storage].



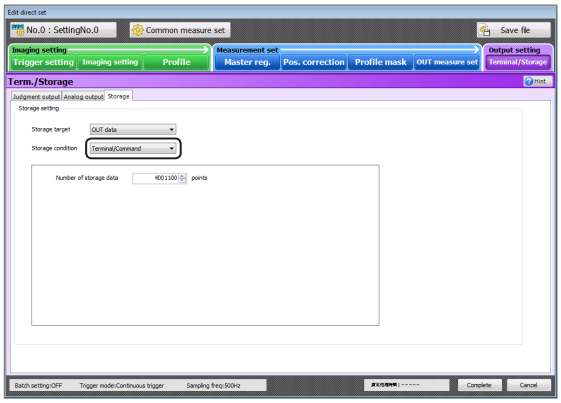
3 Click [Storage].



4 Select either the profile or the OUT value in the [Storage target] pull-down menu.



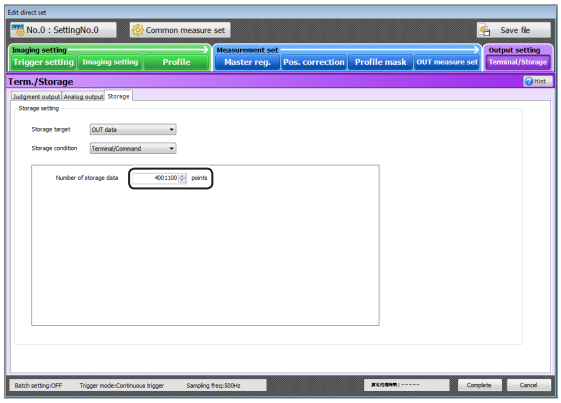
5 Select the storage condition in the [Storage condition] pull-down menu.



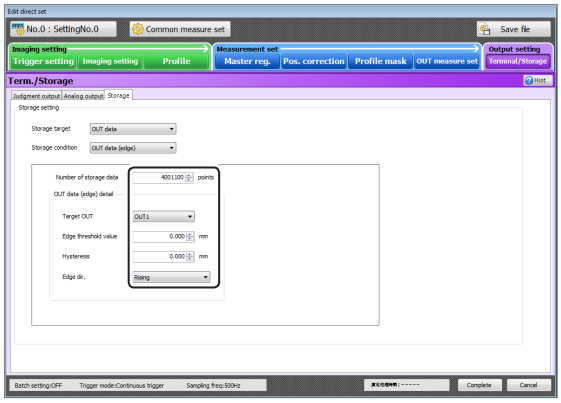
- When the batch measurement is OFF, select from the following.
  Terminal/Command, OUT data (edge), or OUT value (level)
- When the batch measurement is ON, select from the following.
  Terminal/Command or OUT data (level)

Reference
- When [OUT data (edge)] is selected by [Storage condition], go to ***7***.
- When [OUT data (level)] is selected by [Storage condition], go to ***8***.

6 When [Terminal/Command] is selected under [Storage condition], enter [Number of storage data] (the number of the storage batches).

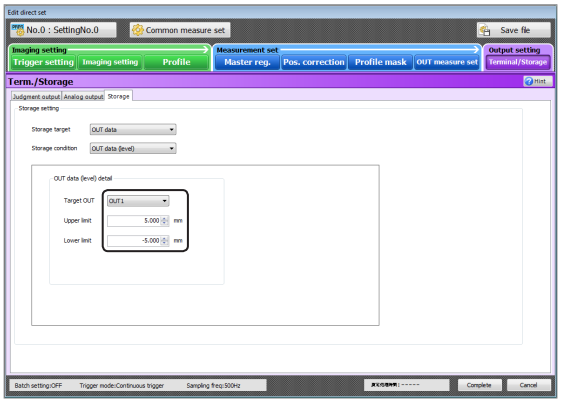


7 When [OUT data (edge)] is selected under [Storage condition], set up [OUT data (edge) detail] in addition to [Number of storage data].



In [OUT data (edge) detail], set up the following.
- Select an OUT storage target in the [Target OUT] pull-down menu.
- Enter the threshold value to determine the edge within the display range of the selected OUT into the [Edge threshold value] entry box.
- Enter the hysteresis to determine the edge within the display range of the selected OUT into the [Hysteresis] entry box.
- With the [Edge dir.] pull-down menu, select which [Rising] or [Falling] of the OUT measurement value is used for the edge determination.

8 When [OUT data (level)] is selected under [Storage condition], set up [OUT data (level) detail].



In [OUT data (level) detail], set up the following.

- Select OUT of the storage target in the [Target OUT] pull-down menu.
- Enter the upper limit value that defines the storage period into the [Upper limit] entry box.
- Enter the lower limit value that defines the storage period into the [Lower limit] entry box.

Reference To finish the setup, click the [Complete] button at the lower part of the screen. When the [Complete] button is clicked, the settings are sent to the controller.

8

Checking the Measurement Results

This chapter describes how to read the setup screen and operation procedure of functions available during the measurement.

Measurement Screen Outline and Switching Screens 8-2
[Display profile] Screen 8-4
[Display height image] Screen 8-6
[Measurement value] Screen/ [Display measurement value] Screen 8-12
[Display trend graph] Screen 8-15
[Display terminal operation] Screen 8-17
[Data storage] Screen 8-19
[Profile storage] Screen 8-20
[Batch profile storage] Screen 8-22
[Display device information] Screen 8-24
Backing Up/Restoring Monitor Data 8-26
Functions Available During Measurement 8-27

Measurement Screen Outline and Switching Screens

Measurement screen outline

LJ-V7000 series provide several screens for checking the measurement results.
The measurement screens include the types below.

- [Display profile] Screen
- [Display height image] Screen
- [Measurement value] Screen/[Display measurement value] Screen
- [Display trend graph] Screen*1
- [Display terminal operation] Screen*1
- [Data storage] Screen*1
- [Profile storage] Screen
- [Batch profile storage] Screen*1
- [Display device information] Screen*1
- Reference setting screen*2

*1: The screen is available only with the LJ-Navigator2.
*2: The screen is available only with the Display monitor/Touch panel monitor.

This section outlines each screen.
Please refer to the following items for details of each screen.

■ [Display profile] Screen

The screen is to monitor the profile.
The screen displays the newest profile obtained periodically from the controller.
In addition to the newest profile, the screen displays the master profile, layered profile, and measurement area of each OUT on the profile.
“[Display profile] Screen” (Page 8-4)

■ [Display height image] Screen

The screen arranges the profiles in time series obtained periodically from the controller and displays them.
The measurement value of the height is shown via a gray gradient (higher: white to lower: black).
Also, the screen displays 2D display that arranges and shows the profiles at a certain time and 3D display of the height image.
“[Display height image] Screen” (Page 8-6)

Reference The 3D display is available only with LJ-Navigator2.

■ [Measurement value] Screen/[Display measurement value] Screen

The screen displays the OUT measurement values set by the OUT measurement setting. The screen displays the OUT names, judgement results, measurement values, auto-zero statuses, and timing input statuses. Only the OUT to be displayed is selectable to show.
“[Measurement value] Screen/[Display measurement value] Screen” (Page 8-12)

■ [Display trend graph] Screen

The screen arranges the OUT measurement values in time series to display the trend graph.
“[Display trend graph] Screen” (Page 8-15)

■ [Display terminal operation] Screen

The screen plots the input/output status of each terminal in a graph. The screen allows you to check the ON/OFF status of the terminal without wiring them. Specify the length of time over which to monitor the terminals.
The screen provides the display of only the selected terminal and the function to search the position on the graph by using the terminal status as a search condition.
“[Display terminal operation] Screen” (Page 8-17)

■ [Data storage] Screen

The screen displays the storage data of the OUT measurement values.
The screen can start/stop the storage and read the stored data to display. The read data can be stored in a file.
“[Data storage] Screen” (Page 8-19)

■ [Profile storage] Screen

The screen displays the profile storage data when the batch measurement is OFF.
The screen can start/stop the storage and read the stored data to the display. The screen stores not only the profile but also the internal measurement value and the OUT measurement area. The read data can be stored in a file.
“[Profile storage] Screen” (Page 8-20)
“Storage” (Page 7-7)

■ [Batch profile storage] Screen

The screen displays the batch profile storage data when the batch measurement is ON.
The screen can start/stop the storage and read the stored data to display. The read data can be stored in a file.
“[Batch profile storage] Screen” (Page 8-22)

■ [Display device information] Screen

The screen displays the device configuration of the controller currently connected and the environmental configuration. The configurations can also be edited.
“[Display device information] Screen” (Page 8-24)

■ Reference setting screen

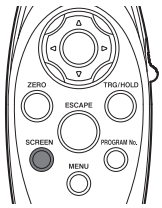
It displays the same information as the measurement screen but is meant for checking the current measurement program.
The screen is for reference only and no editing operation is available.
“Switching Screens during the switching of measurement/settings screens and programs” (Page A-28)

Switching screens

This section describes how to switch the screens of the Display monitor/Touch panel monitor and LJ-Navigator2.

■ Switching the screens of the display monitor

1 Press the [SCREEN] key.

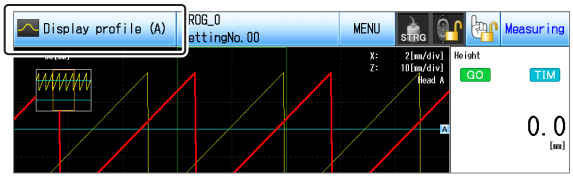


The screen will change every time when the key is pressed.

Reference The screen can also be switched by the [◁] or [▷] keys.

■ Switching the touch panel monitor screen

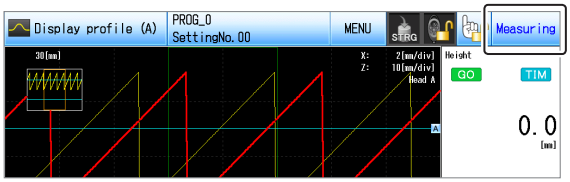
1 Touch the display switching button.



The screen will change every time the button is touched.

■ Displaying the reference setting screen

1 Press the [PROG/RUN] key or touch the measurement/setting mode button.



Reference Press and hold the [PROG/RUN] key, or touch and hold the measurement/setting mode button, and the editable setting screen appears.

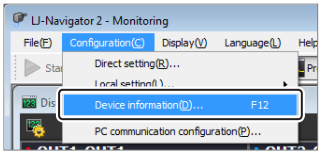
■ Switching the LJ-Navigator2 screen

1 Use the tool bar at the top to switch the screen.



- Profile ..... Shows the [Display profile] screen. 📖 "[Display profile] Screen" (Page 8-4)
- Height image ..... Shows the [Display height image] screen. 📖 "[Display height image] Screen" (Page 8-6)
- Measured value ..... Shows the [Display measurement value] screen. 📖 "[Measurement value] Screen/ [Display measurement value] Screen" (Page 8-12)
- Trend graph ..... Shows the [Display trend graph] screen. 📖 "[Display trend graph] Screen" (Page 8-15)
- Terminal operation ..... Shows the [Display terminal operation] screen. 📖 "[Display terminal operation] Screen" (Page 8-17)
- Storage ..... Shows the [Data storage] screen, [Profile storage] screen, and [Batch profile storage] screen, depending on the storage setting. 📖 "[Data storage] Screen" (Page 8-19) 📖 "[Profile storage] Screen" (Page 8-20) 📖 "[Batch profile storage] Screen" (Page 8-22)

Reference Shows the [Display device information] screen found under [Configuration] - [Device information].



📖 "[Display device information] Screen" (Page 8-24)

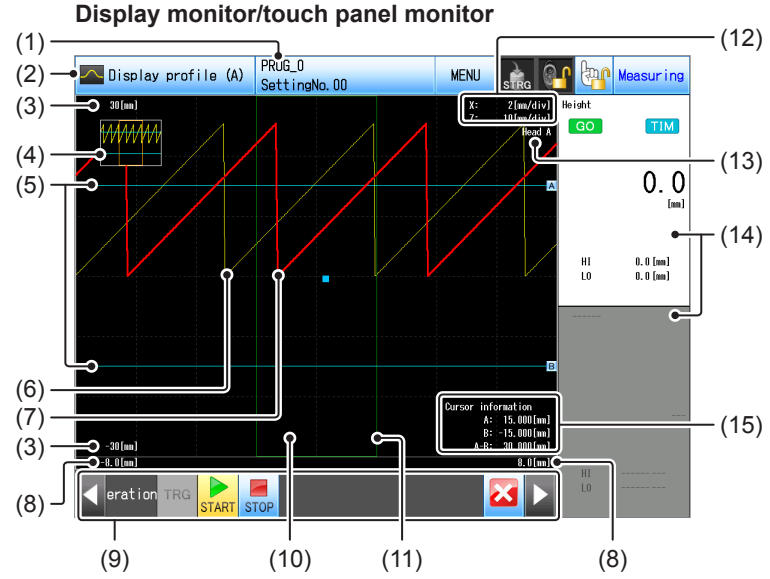
[Display profile] Screen

This section describes how to read the [Display profile] screen and the display setting.

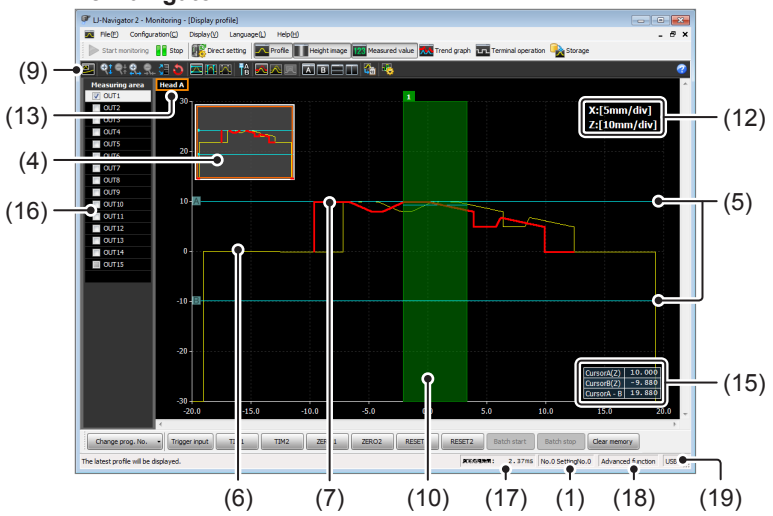
How to read the [Display profile] screen

This section describes the items displayed on the [Display profile] screen.

Display monitor/touch panel monitor



LJ-Navigator2



(1) Program name
The name of the active program is displayed here. In case of the display monitor/touch panel monitor, selecting the program name switches the program.
“Switching the programs” (Page 8-27)

(2) Display switching button
The button switches the display screen.
“Switching screens” (Page 8-3)

(3) Z-axis display range
The top number is the upper limit on the Z-axis and the bottom number is the lower limit.

(4) Display area guide
The guide indicates the position being currently displayed.
- The display monitor/touch panel monitor: Green
  When the operation menu is not shown, the guide appears in the menu area at the bottom of the screen.
- LJ-Navigator2: Orange

(5) Measurement cursor
The cursor is used to check the value at any position.
“Basic Operations of LJ-Navigator2” (Page 3-10)

(6) Profile (Yellow line)
The newest profile obtained from the controller.

(7) Master profile (Red line)
The master profile can be shown when it is registered.
“Register the Master profile” (Page 6-5)

(8) X-axis display range
The left side of the screen is the lower limit of the X-axis and the right side is the upper limit.

(9) Operation menu
The menu operates the display.
“Chapter 3 Operation Flow from Setting to Measurement and the Basic Operations” (Page 3-1)

(10) Measurement area
This is the measurement area set by the OUT measurement setting.
For Display monitor/Touch panel monitor, only one of the selected OUT measurement areas can be displayed.
“Setting the Measurement (OUT Measurement Setting)” (Page 6-22)

(11) Grid (Gray line)
8 X 6 grid (width x height)

(12) Grid scale
Dimension per division of the grid

(13) Head name
The name of the head being currently shown appears.

(14) Measurement value display
This area shows the measurement value of OUT set by the OUT measurement setting.

(15) Measurement cursor information
The coordinate at the measurement cursor

(16) Selection of the measurement area (LJ-Navigator2 only)
Select the OUT setting displayed in the [Display profile] screen.

(17) Display OUT measurement processing time
The time takes on OUT measurement processing is displayed in 0.01ms units.
If the batch measurement is OFF, and the sampling time is shorter than the OUT measurement processing time, the measurement processing may not be finished and the profile will be discarded. In this case, change the settings so that the sampling time becomes longer than the OUT measurement processing time.

(18) Operation mode (LJ-Navigator2 only)
The current operation mode (advanced function mode/high-speed mode) appears.

(19) PC communication method (LJ-Navigator2 only)
The communication mode between the current PC and the controller appears.

Reference When two heads are connected, the profiles can be arranged vertically or horizontally.

Display setting of the [Display profile] screen (Setting of the method to display the dead zone data)

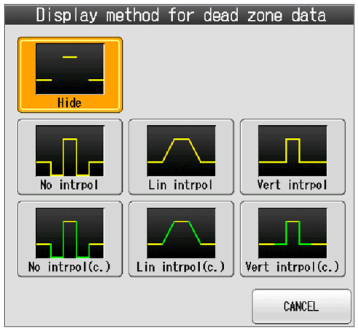
This section describes the setup procedure for the display method of the dead zone data on the profile.
“Dead Zone processing” (Page 5-25)

■ Display monitor/Touch panel monitor

1 Select the  on the operation menu, and press or touch the [ENTER] key.
“Basic Operations of the Console” (Page 3-13)
“Basic Operations of the Touch Panel Monitor” (Page 3-21)

The [Display method for dead zone data] screen appears.

2 Select the display method of the dead zone data by selecting the [△], [▽], [◁], or [▷] key, and press or touch the ENTER" key.



The display method of the dead zone is set.

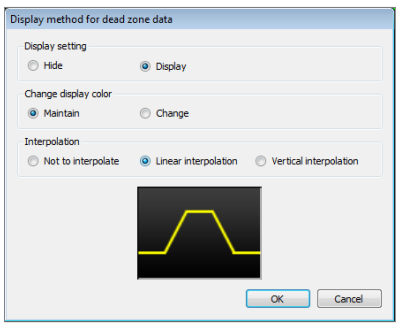
Reference Changes in the settings of the display method for dead zone data do not change the storage data and profile data used for the OUT measurement.

■ LJ-Navigator2

1 Click  on the operation menu.
“Basic Operations of LJ-Navigator2” (Page 3-10)

The [Display method for dead zone data] screen appears.

2 Select [Display setting], [Change display color], and [Interpolation], and click the [OK] button.



The display method of the dead zone is set.

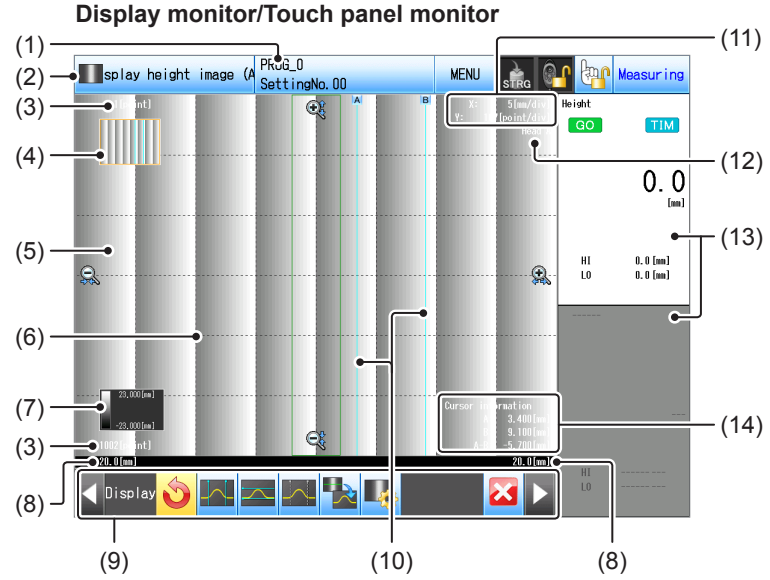
[Display height image] Screen

This section describes how to read the [Display height image] screen, display setting, and display procedure of the 2D and 3D displays.

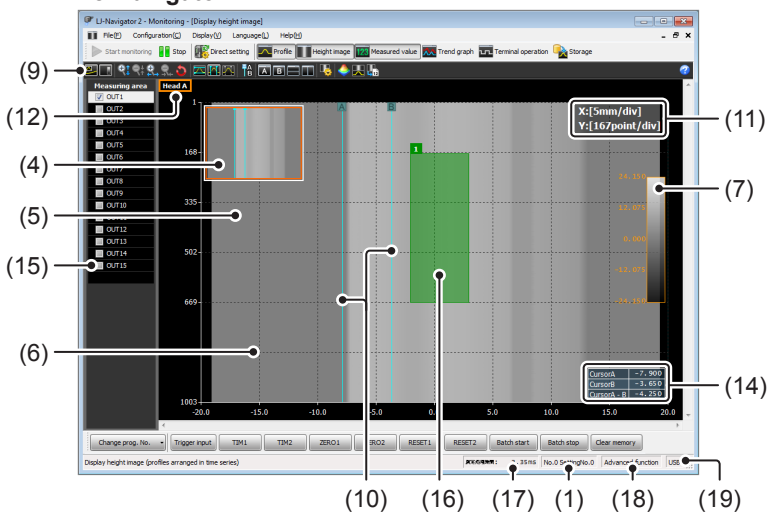
How to read the [Display height image] screen

This section describes the items displayed on the [Display height image] screen.

Display monitor/Touch panel monitor



LJ-Navigator2



(1) Program name
The name of the program currently being measured appears.
In the case of the display monitor/touch panel monitor, selecting the program name allows switching the program.
“Switching the programs” (Page 8-27)

(2) Display switching button
The button switches the display screen.
“Switching screens” (Page 8-3)

(3) Y-axis display range
The area shows the time-axis. The upper end of the screen is the origin.

(4) Display guide
The guide indicates a position being currently displayed.
- The display monitor/touch panel monitor: Green
  When the operation menu is not shown, the guide appears in the menu area at the lower part of the screen.
- LJ-Navigator2: Orange

(5) Height image display
The height appears in gray gradient.
The higher the position is, the whiter the display is, and the lower the position is, the darker the display is.
The display setting can be changed.
“Display setting of the [Display height image] screen (Display height image setting)” (Page 8-7)

(6) Grid (Gray line)
8 X 6 grid (width x height)

(7) Height scale
Relationship between the height scale and the gradient appears.

(8) X-axis display range
The left side of the screen is the lower limit of the X-axis and the right side is the upper limit.

(9) Operation menu
The menu operates the display.
“Chapter 3 Operation Flow from Setting to Measurement and the Basic Operations” (Page 3-1)

(10) Measurement cursor
The cursor is used to check the value at any position.
“Chapter 3 Operation Flow from Setting to Measurement and the Basic Operations” (Page 3-1)

(11) Grid scale
Dimension per one division of the grid

(12) Head name
The name of the head being currently shown appears.

(13) Measurement value display
The area shows the measurement value of OUT set by the OUT measurement setting.

(14) Measurement cursor information
The area shows the measurement value at the measurement cursor.

(15) Selection of the measurement area (LJ-Navigator2 only)
Select the OUT setting displayed in the [Display height image] screen.

(16) The measurement area (LJ-Navigator2 only)
The area set by the OUT measurement setting appears.
“Setting the Measurement (OUT Measurement Setting)” (Page 6-22)

(17) Display OUT measurement processing time
The time required for OUT measurement processing is displayed here in units of 0.01ms.
If the batch measurement is OFF, and the sampling time is shorter than the OUT measurement processing time, the measurement processing may not be finished and the profile will be discarded. In this case, change the settings so that the sampling time becomes longer than the OUT measurement processing time.

(18) Operation mode (LJ-Navigator2 only)
The current operation mode (advanced function mode/high-speed mode) appears.

(19) PC communication method (LJ-Navigator2 only)
The communication mode between the current PC and the controller appears.

Reference When two heads are connected, the profiles can be arranged vertically or horizontally.

Display setting of the [Display height image] screen (Display height image setting)

This section describes the setup procedure for the peak/bottom of the height image and the enhanced display.

■ Display monitor/Touch panel monitor

1 Select the  in the operation menu, and press or touch the [ENTER] key.

“Basic Operations of the Console” (Page 3-13)
“Basic Operations of the Touch Panel Monitor” (Page 3-21)

The [Display setting for height image] screen appears.

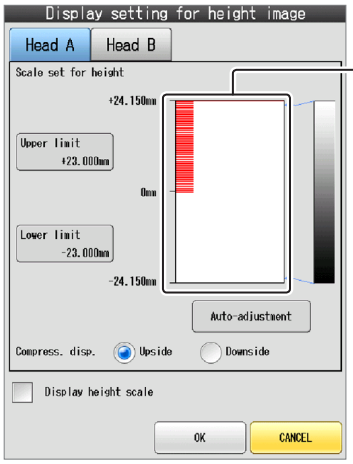
2 When two heads are installed, select the head to be set.

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

Reference Selecting the [Auto-adjustment] button and pressing or touching the [ENTER] key automatically sets the upper/lower limits based on the histogram distribution.

4 When the compression (time axis) is ON, select either the upper points or lower points to connect to display the profile, by using [Compress. disp.].

5 After the setup is completed, select the [OK] button.



Reference When [Display height scale] is checked, the height scale appears on the [Display height image] screen.

The display method for the height image is set.

■ LJ-Navigator2

1 When two heads are installed, select the head to be set.

2 Click in the operation menu.

“Basic Operations of LJ-Navigator2” (Page 3-10)

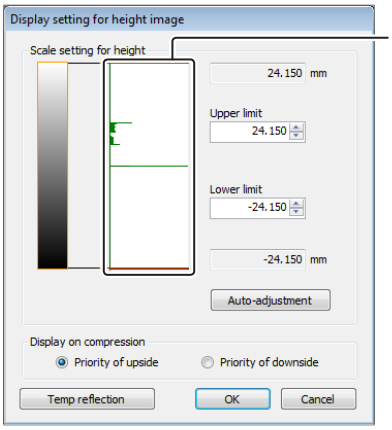
The [Display setting for height image] screen appears.

3 Set the upper/lower limit values of the measurable range, checking the histogram.

Reference Selecting the [Auto-adjustment] button automatically sets the upper/lower limits based on the histogram distribution.

4 When the compression (time axis) is ON, select whether to connect the upper or lower points of the profiles under [Display on compression].

5 After the setup is completed, select the [OK] button.



The display method for the height image is set.

Using the 2D display for check

The 2D display extracts the profile on the height image display at certain time to arrange and display it together with the height image display. This allows checks for the profiles and measurement values.
This section describes the procedure to switch the screen to the 2D display and check the measurement results.

■ Display monitor/Touch panel monitor

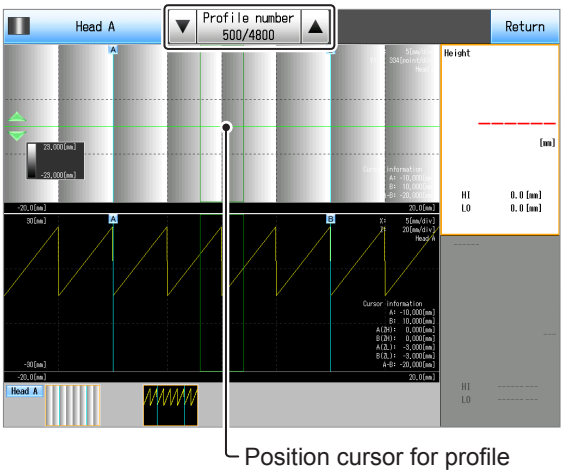
1 Select the in the operation menu, and press or touch the [ENTER] key.

“Basic Operations of the Console” (Page 3-13)
“Basic Operations of the Touch Panel Monitor” (Page 3-21)

The [2D display] screen appears.

2 Specify the profile number to be extracted using [Profile number].

- The dialog to enter the numeric value appears. Enter a numeric value to specify the profile number.
  “Entering numeric values” (Page 3-13), (Page 3-21)
- Also using ▼ and ▲ allows you to specify the profile number.
- Specifying the profile number will move the profile position cursor.



The specified profile position appears on the height image display and the profile at that time appears.

■ LJ-Navigator2

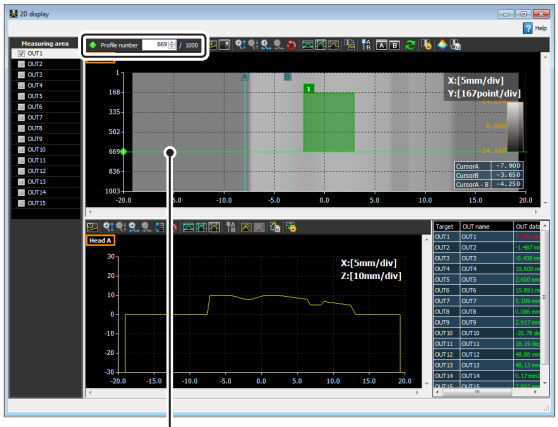
1 **Click in the operation menu.**

“Basic Operations of LJ-Navigator2” (Page 3-10)

The [2D display] screen appears.

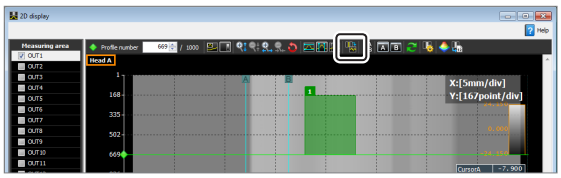
2 **Specify the profile number to be extracted by using [Profile number].**

- Moving the profile position cursor also specifies the profile number.

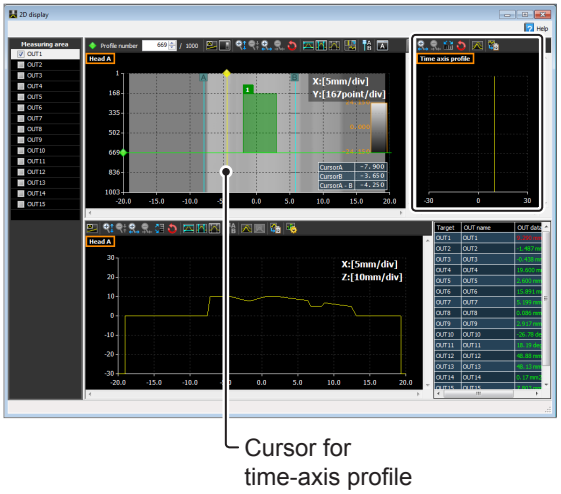


The specified profile position appears on the height image display and the profile at that time appears.

3 **To check the trend results of the profile at any X-coordinate, click .**



[Time axis profile] appears.



Using the 3D display for check (LJ-Navigator2 only)

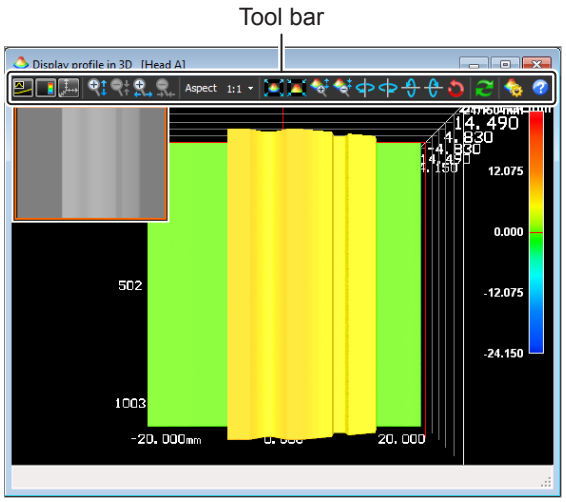
The 3D display shows the profile stereoscopically based on the measurement data of width (x), time (y), and height (z).
The height is shown via a gradient from red to green to blue with red signifying a greater height. The gradient setting can be changed to partly enhance the change of the display.
This section describes the procedure to switch the screen to the 3D display and check the measurement results.

1 **Click in the operation menu.**

“Basic Operations of LJ-Navigator2” (Page 3-10)

The profile appears stereoscopically based on the height image being displayed.

2 **Adjust the display position by using the tool bar to check.**

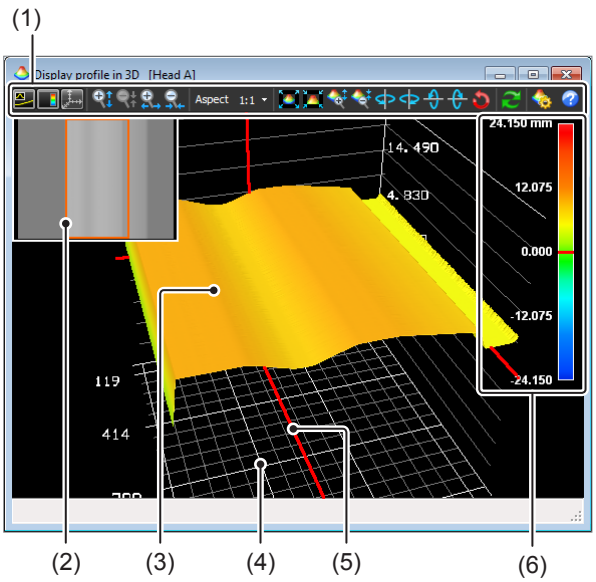


For the tool bar operation, refer to “How to read and operate the 3D display” (Page 8-10).

How to read and operate the 3D display

This section describes how to read the 3D display and operate the tool bar.

■ How to read the 3D display



(1) 3D tool bar
The buttons for adjusting the 3D display.
"Operation of the 3D tool bar" (Page 8-10)

(2) Display area guide
The guide shows what part of the current height image display is shown stereoscopically.
The orange frame shows the current display position.
To move the position, drag the frame.

(3) 3D display
The 3D display is generated based on the height image display. The height is shown via a gradient from red to green to blue with red signifying a greater height.
No image appears in the invalid data area. Dead zone data display changes depending on the settings how to display the dead zone data in [Display profile] screen.
The 3D display can be rotated and moved by using the mouse.

- Dragging (left button) ..... Rotation
- Dragging (right button) ..... Movement in X- and Y-directions
- Dragging (left and right buttons) ..... Rotation around Z-axis

(4) 3D grid (Gray line)
The grid shows the display area of the 3D display.

(5) Zero grid (Red line)
The zero grid shows the positions where x-, y-, and z-axes are zero respectively.

(6) 3D scale
Relationship between the height scale and the gradient.

■ Operation of the 3D tool bar

This section describes how to operate the 3D tool bar.



● **Show/hide the display area guide**

Switch show/hide of the display area guide.

● **Show/hide the 3D scale**

Switch show/hide of the 3D scale.

● **Show/hide the 3D grid**

Switch show/hide of the 3D grid.

● **Expansion/reduction of the display area**

The display area expands/reduces every time when the icon is clicked.

: Vertical expansion
: Expand vertically
: Horizontal expansion
: Expand horizontally

● **Change the aspect ratio**

Select the ratio (X:Y) in X- and Y-directions from the below.
1:1, 1:2, 1:4, 1:8, 1:16

● **Zoom around the center point**

Zoom-in and -out the display around the center point.

: Zoom-in around the center point
: Zoom-out around the center point

Reference The zoom function sets the distance of the viewing position from the 3D display, which leads to expansion/reduction of the 3D display.
This differs from the expansion/reduction of the display area.

● **Zoom-in and -out in the Z-direction**

Expand/Reduce the 3D display in the Z-direction.

: Zoom-in in the Z-direction
: Zoom-out in the Z-direction

● **3D display rotation**

Rotate the 3D display around the vertical or horizontal axis.

: Rotate in the counterclockwise.

: Rotate in the clockwise.

: Rotate upward.

: Rotate downward.

● **Reset the display to the default position.**

The 3D display returns to the default display.

● **Update the height data**

This function obtains the image displayed on the [Display height image] screen again to depict the 3D display.

● **3D display setting**

The [3D display setting] screen appears.
Set the upper/lower limits of the measurable area of the 3D display.
“Display setting of the [3D display setting] screen” (Page 8-11)

● **Help**

The help information on the [3D display setting] screen appears.

Display setting of the [3D display setting] screen

This section describes the setup procedure for the upper/lower limits of the measurable area of the 3D display.

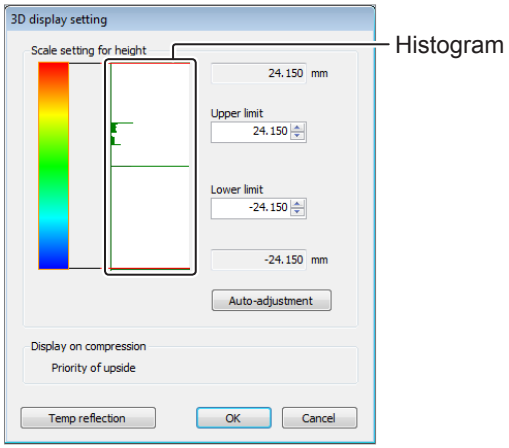
1 Click on the 3D tool bar.

The [3D display setting] screen appears.

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

Reference
- Dragging the display range (red line) can also set the upper/lower limits.
- Selecting the [Auto-adjustment] button automatically sets the upper/lower limits based on the histogram distribution.
- Clicking the [Temp reflection] button temporally reflects the set value of the upper/lower limits onto the 3D display.

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



The display method for the height image is set and the screen turns to the [Display height image] screen.

[Measurement value] Screen/[Display measurement value] Screen

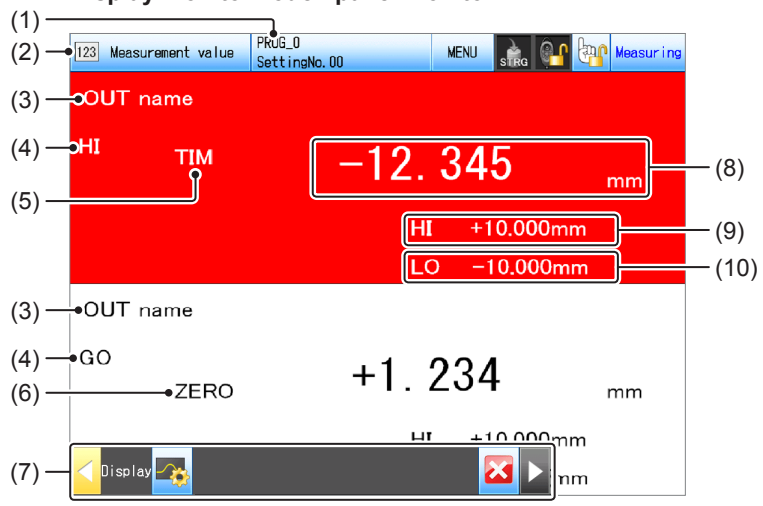
This section describes how to read the [Measurement value] screen/[Display measurement value] screen.

How to read the [Measurement value] screen/[Display measurement value] screen

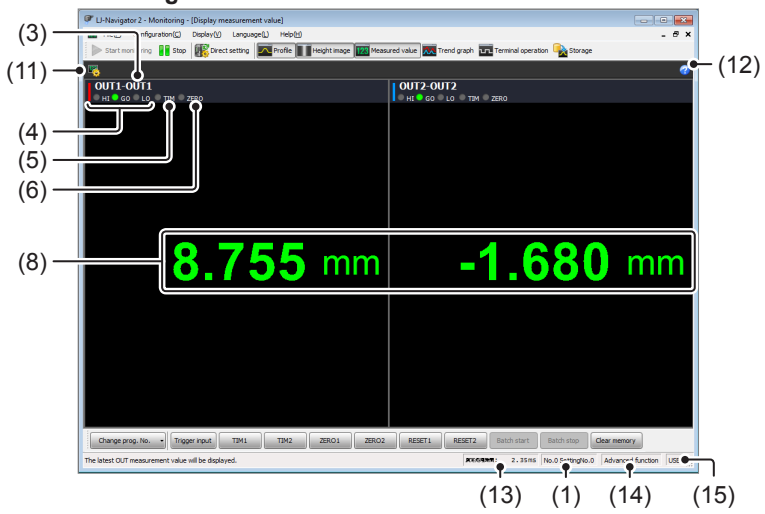
This section describes the items displayed on the [Measurement value] screen/[Display measurement value] screen.

Reference When the [Measurement value] screen /[Display measurement value] screens appear, the screens are divided to be displayed depending on the number of OUT. (maximum 16 divided)
This section describes the screen when the number of OUT is 2.

Display monitor/Touch panel monitor



LJ-Navigator2



(1) Program name
The name of the program currently being measured appears.
In case of the display monitor/touch panel monitor, selecting the program name switches the program.
“Switching the programs” (Page 8-27)

(2) Display switching button
The button switches the display screen.
“Switching screens” (Page 8-3)

(3) OUT name
The OUT name appears.
With LJ-Navigator2, the OUT identifier also appears.

(4) Judgement result
The judgement result on the measurement appears.
HI : Tolerance upper limit < Measurement value
GO : Tolerance lower limit ≤ Measurement value ≤ Tolerance upper limit
LO : Measurement value < Tolerance lower limit

- Display monitor/Touch panel monitor:
  In HI or LO, the background is red.
  In GO, the background is white.
- LJ-Navigator2:
  In HI or LO, the display lamp lights red.
  In GO, the display lamp lights yellow.

(5) Timing input status
The area shows the timing input status for each OUT.
- Display monitor/Touch panel monitor:
  When the timing input status is ON, [TIM] appears.
- LJ-Navigator2:
  When the timing input status is ON, the display lamp turns yellow.

(6) Auto-zero input status
The area shows the auto-zero input status for each OUT.
- Display monitor/Touch panel monitor:
  When the auto-zero input status is ON, [ZERO] appears.
- LJ-Navigator2:
  When the auto-zero input status is ON, the display lamp turns light blue.

(7) Operation menu
The menu operates the display.
“Chapter 3 Operation Flow from Setting to Measurement and the Basic Operations” (Page 3-1)

(8) Measurement value
The measurement value appears.

(9) The upper limit of the tolerance (Display monitor/Touch panel monitor only)
The upper tolerance limit appears for each OUT.

(10) The lower limit of the tolerance (Display monitor/Touch panel monitor only)
The lower tolerance limit appears for each OUT.

(11) Display setting
The [Display setting of measurement value] screen appears.
In the Display monitor/Touch panel monitor, this function corresponds to in the operation menu.
“Display setting of the [Measurement value] screen/[Display measurement value] screen (Selecting the OUT to be displayed)” (Page 8-14)

(12) Help (LJ-Navigator2 only)
The help information on the [Display measurement value] screen appears.

(13) Display OUT measurement processing time
The time takes on OUT measurement processing is displayed in units of 0.01ms.
If the batch measurement is OFF, and the sampling time is shorter than the OUT measurement processing time, the measurement processing may not be finished and the profile will be discarded. In this case, change the settings so that the sampling time becomes longer than the OUT measurement processing time.

(14) Operation mode (LJ-Navigator2 only)
The current operation mode (advanced function mode/high-speed mode).

(15) PC communication method (LJ-Navigator2 only)
The communication mode between the current PC and the controller.

Display setting of the [Measurement value] screen/[Display measurement value] screen (Selecting the OUT to be displayed)

This section describes the procedure to select OUT displayed on the [Measurement value] screen/[Display measurement value] screen.

■ Display monitor/Touch panel monitor

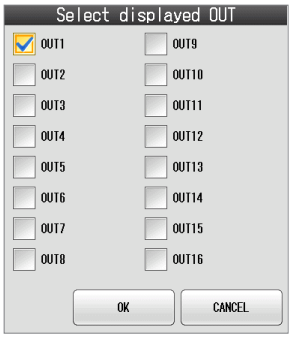
1 Select the  in the operation menu, and press or touch the [ENTER] key.

“Basic Operations of the Console” (Page 3-13)
“Basic Operations of the Touch Panel Monitor” (Page 3-21)

The [Select displayed OUT] screen appears.

2 Check the check box for the OUT to be displayed and press or touch the [ENTER] key.

3 Check all the check boxes for the OUT to be displayed, select the [OK] button, and press or touch the [ENTER] key.



The selected OUT appears on the [Measurement value] screen.

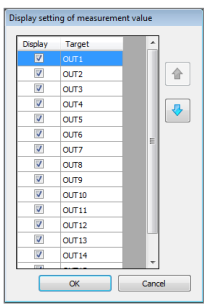
■ LJ-Navigator2

1 Click  of the operation menu.

“Basic Operations of LJ-Navigator2” (Page 3-10)

The [Display setting of measurement value] screen appears.

2 Check the check box for the OUT to be displayed and click the [OK] button.



The selected OUT appears on the [Display measurement value] screen.

[Display trend graph] Screen

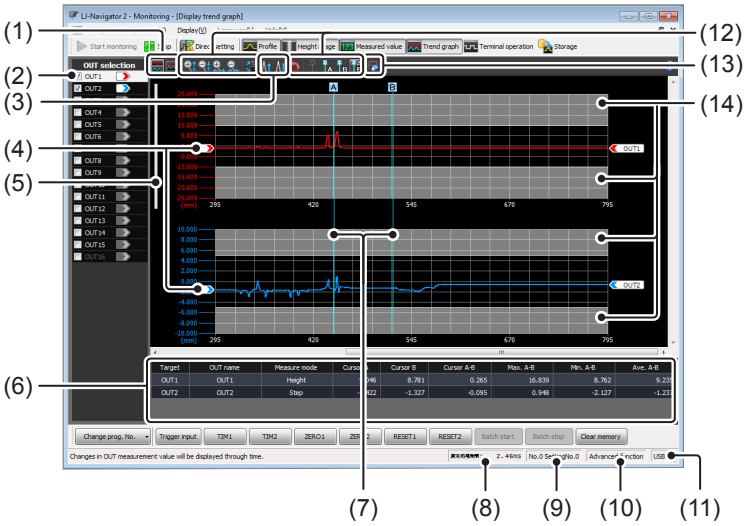
This section describes how to read the [Display trend graph] screen and the display setting.

Reference The [Display trend graph] screen appears only with LJ-Navigator2.

How to read the [Display trend graph] screen

This section describes the items displayed on the [Display trend graph] screen.

LJ-Navigator2



(1) Stacking/splitting the trend graphs

When multiple trend graphs are shown, this function switches the display method between stacking the trend graphs in one graph and splitting them into individual graphs.

- ..... Split the graphs individually.
- ..... Stack the graphs on one graph.

(2) OUT type list

Select the OUT to display the trend graph.

(3) Moving the trend graph

Move the trend graph vertically.

- ..... Move the selected trend graph upward.
- ..... Move the selected trend graph downward.

(4) Trend graph

The OUTs selected will be displayed in a trend graph over time in this area.
Each graph shows the label showing the OUT type.

Reference
- When batch processing is ON, the graph appears based on the OUT measurement values for one batch.
- When batch processing is OFF, the graph appears based on the OUT measurement values for one profile.

"Setting the Trigger Conditions (Trigger Settings)" (Page 5-5)

(5) Trend graph being selected

The cursor shows the trend graph being selected.

(6) Measurement cursor information

This area shows the following information at the cursor position.

- Cursor A value
- Cursor B value
- Cursor A value - B value
- Maximum value between the cursors A and B
- Minimum value between the cursors A and B
- Average value between the cursors A and B

(7) Measurement cursor
The cursor is used to check the value at any position.
“Basic Operations of LJ-Navigator2” (Page 3-10)

(8) Display OUT measurement processing time
The time takes on OUT measurement processing is displayed in units of 0.01ms.
If the batch measurement is OFF, and the sampling time is shorter than the OUT measurement processing time, the measurement processing may not be finished and the profile will be discarded. In this case, change the settings so that the sampling time becomes longer than the OUT measurement processing time.

(9) Program name
The name of the program currently being measured.

(10) Operation mode
The current operation mode (advanced function mode/high-speed mode).

(11) PC communication method
The communication mode between the current PC and the controller appears.

(12) Tool bar
The tool bar operates the display of the trend graph.
“Basic Operations of LJ-Navigator2” (Page 3-10)

(13)  Clearing the graph
Clear the trend graph.

(14) Tolerance display (Gray part)
The upper and lower tolerance limits appear for each OUT.

[Display terminal operation] Screen

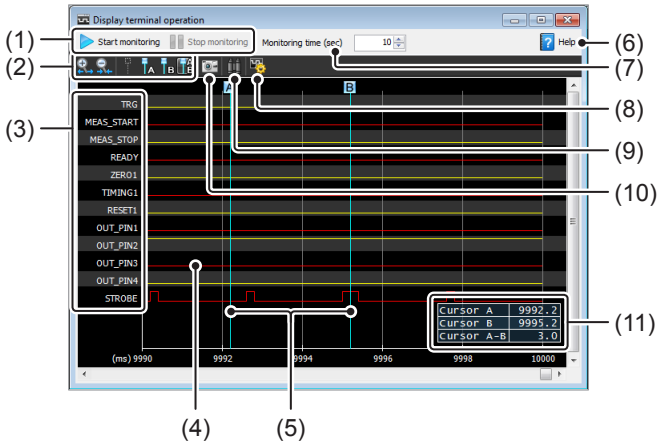
This section describes how to read the [Display terminal operation] screen, use the display settings, and operate the searching function.

Reference The [Display terminal operation] screen appears only with LJ-Navigator2.

How to read the [Display terminal operation] Screen

This section describes the items displayed on the [Display terminal operation] screen.

LJ-Navigator2



(1) Start/Stop monitoring
Switch monitoring the terminal operation between on and off.
The monitoring automatically stops after the setting time of [Monitoring time (sec)].

(2) Tool bar
The tool bar operates the display of the trend operation.
"Basic Operations of LJ-Navigator2" (Page 3-10)

(3) Terminal name
The area lists the names of the terminals, whose operations set in [Display setting of terminal operation] are monitored.
"Display setting of the terminal operation" (Page 8-18)

(4) Terminal operation graph
This area graphs the ON/OFF statuses of the terminals in time-series (every 200µsec.).
The graphs appear in red and yellow by terminal alternately.

Point **The monitoring automatically stops when the operation mode is changed while monitoring.**
The monitoring continues when the settings other than the operation mode are changed.

Reference Changes in the terminal statuses shorter than 200µs are not shown on the graph.

(5) Measurement cursor
The cursor is used to check the time at any position.
"Basic Operations of LJ-Navigator2" (Page 3-10)

(6) [Help] button
The help information regarding the [Display terminal operation] screen appears.

(7) Specify the monitoring time (sec.)
Specify the monitoring time for the terminal operation in seconds.
The monitoring automatically stops after the monitoring time.

(8) Display setting
The [Display setting of terminal operation] screen appears.
Set show/hide of the terminals on the [Display terminal operation] screen and their order.
"Display setting of the terminal operation" (Page 8-18)

(9) Searching the terminal operation display
The [Search display of terminal operation] screen appears.
Specify the terminal to search the points of rising edges and falling edges of input/output.
"Searching the Terminal operation" (Page 8-18)

(10) Screen image copy
Use this function to copy the [Display terminal operation] screen image onto the clip board.

Reference Regardless of whether the graph is displayed or not, the function copies the screen image at a time when the button is clicked.

(11) Measurement cursor information
The area shows a time at the cursor position.

Display setting of the terminal operation

This section describes the setup procedure to show/hide the terminals on the [Display terminal operation] screen and their order.

1 Click .

The [Display setting of terminal operation] screen appears.

2 Set which terminals to show/hide on the [Display terminal operation] screen.

● **To show a hidden terminal**

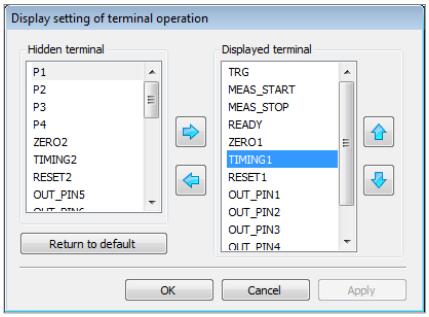
Select the terminal to be shown from the [Hidden terminal] list, and click .
The selected terminal moves to the [Displayed terminal] list.

● **To hide a shown terminal**

Select the terminal to be hidden from the [Displayed terminal] list, and click .
The selected terminal moves to the [Hidden terminal] list.

3 Change order of terminals by selecting a terminal and clicking .

- ..... Move up one slot.
- ..... Move down one slot.



4 After the setup is completed, click the [Apply] button.

Reference Clicking the [Return to default] button puts the order back to the default show/hide and order.

The display of the [Display terminal operation] screen changes.

5 Click the [OK] button.

The [Display setting of terminal operation] screen closes.

Searching the Terminal operation

This section describes the procedure to specify the terminal, and search the points of rising edges and falling edges of input/output.

1 Click .

The [Search display of terminal operation] screen appears.

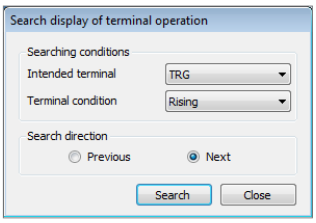
2 Select which terminal to search under [Intended terminal].

3 Select the terminal status to be searched from [Terminal condition].

4 Select the direction to search under [Search direction].

- [Previous] .. Search toward the start of monitoring.
- [Next] ..... Search toward the end of monitoring.

5 Click the [Search] button.



The measurement cursor appears at the position where satisfies the conditions of the [Display terminal operation] screen.

Reference
- The measurement cursor moves to the position of the search result every time when the [Search] button is pressed.
- Pressing the [F3] key searches in the [Next] direction.
- Pressing the [Shift] and [F3] keys searches in the [Previous] direction.

6 To end searching, click the [Close] button.

The [Search display of terminal operation] screen closes.

[Data storage] Screen

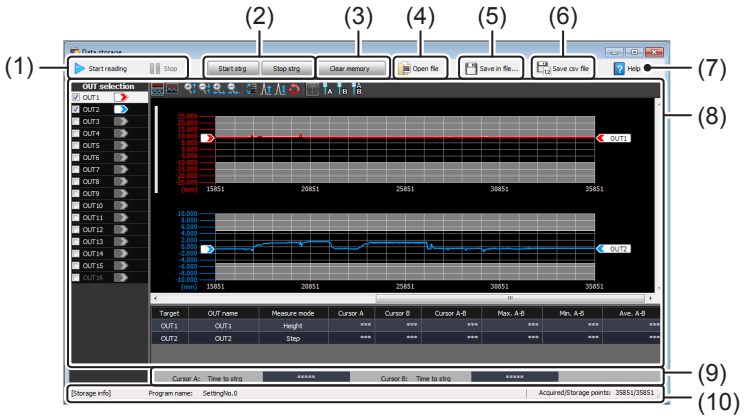
This section describes how to read the [Data storage] screen.

Reference The [Data storage] screen appears only with LJ-Navigator2.

How to read the [Data storage] screen

This section describes the items displayed on the [Data storage] screen.

LJ-Navigator2



(1) [Start reading]/[Stop] button
Use this button to show the storage data, which is stored in the internal memory of the controller, in the trend graph.

(2) [Start strg]/[Stop strg] button
Use this button to start/pause storing the OUT measurement values.
- [Start strg].. Start storing the OUT measurement values to the internal memory of the controller.
- [Stop strg].. Pause storing the OUT measurement values.

Point **The [STORAGE_START]/[STORAGE_STOP] terminals and the communication command can also control the start/pause of the storage.**
“Setting the Storage target and condition” (Page 7-8)

(3) [Clear memory] button
Use this button to clear the storage data stored in the internal memory of the controller.

Reference When the data is being stored, the confirmation dialog appears.
After the storing is paused, the storage data is cleared.

(4) [Open file] button
Use the button to open the saved storage file.

(5) [Save in file...] button
Use this button to save the displayed storage data in a file (*.dstr format).

(6) [Save csv file] button
Save the displayed storage data as CSV format.

(7) [Help] button
The help information on the [Data storage] screen appears.

(8) Trend graph display area
The storage data appears in the trend graph.

Reference The contents to be displayed are the same as those of the [Display trend graph] screen.
“[Display trend graph] Screen” (Page 8-15)

(9) Storage time stamp
The time stamp of the storage data at the cursor position appears.

(10) Storage data information
The program name and amount of stored data is shown here.

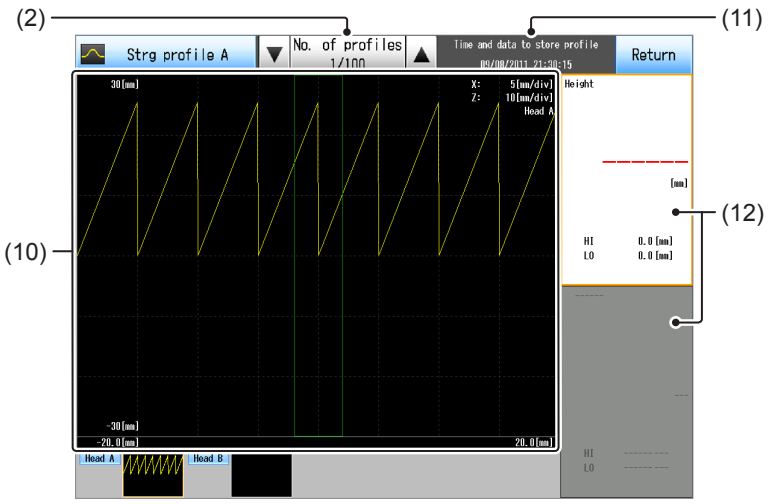
[Profile storage] Screen

This section describes how to read the [Profile storage] screen.

How to read the [Profile storage] screen

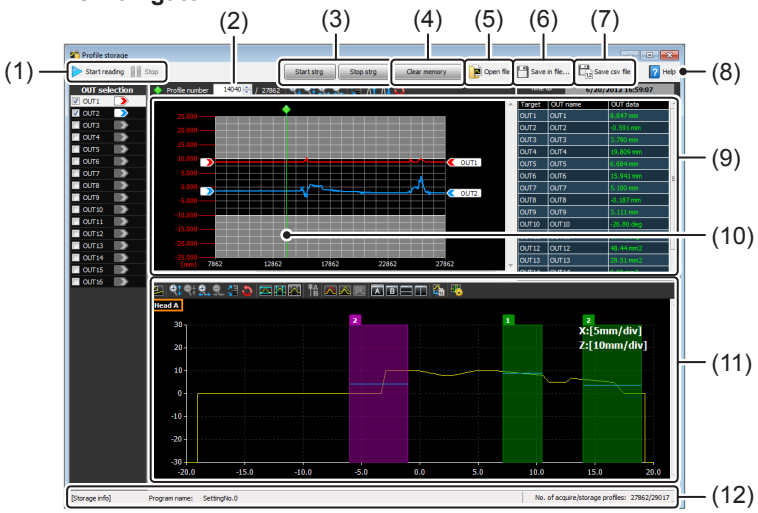
This section describes the items displayed on the [Profile storage] screen.

Display monitor/Touch panel monitor



Reference — Use the [MENU] key to show the operation menu.
“Chapter 3 Operation Flow from Setting to Measurement and the Basic Operations” (Page 3-1)

LJ-Navigator2



(1) [Start reading]/[Stop] button
Use this button to show the measurement values, which are stored in the internal memory of the controller, in the trend graph.

(2) Profile number selection
Specify the profile number to be displayed from the profile storage data.
Selecting the profile number moves the cursor onto the selected profile on the trend graph, and the [Display profile] screen area shows the profile of the selected number.

(3) [Start strg]/[Stop strg] button

Use this button to start/pause storing the profile data.

- [Start strg].. Start storing the profile data to the internal memory of the controller.
- [Stop strg].. Stop storing the profile data.

Point **The [STORAGE_START]/ [STORAGE_STOP] terminals and the communication command can also control the start/pause of the storage.**
“Setting the Storage target and condition” (Page 7-8)

(4) [Clear memory] button

Use this button to clear the profile data stored in the internal memory of the controller.

Reference When the data is being stored, the confirmation dialog appears to confirm whether to clear the profile data.
After the storing is cleared, the profile data are cleared.

(5) [Open file] button

Use the button to open the stored profile storage file.

(6) [Save in file...] button

Use this button to save the displayed profile storage data in a file (*.pstr format).

(7) [Save csv file] button

Save the displayed profile storage data as CSV format.

(8) [Help] button

The help information on the [Profile storage] screen appears.

(9) Trend graph display area

The profile storage data appears in the trend graph.

Reference The contents to be displayed are the same as those of the [Display trend graph] screen.
“[Display trend graph] Screen” (Page 8-15)

(10) Position cursor for profile

The cursor shows the position of the profile selected by the profile number selection.
When the cursor position is dragged, the profile number in the profile number selection also changes.

(11) [Display profile] area

The profile at the position of the profile selection cursor appears.

Reference The contents to be displayed are the same as those of the [Display profile] screen.
“[Display profile] Screen” (Page 8-4)

(12) Program name/Storage information

The program name, the number of the obtained profiles and the number of the stored profiles is shown here.

(13) Measurement value display

The measurement value of OUT set by the OUT measurement setting appears.

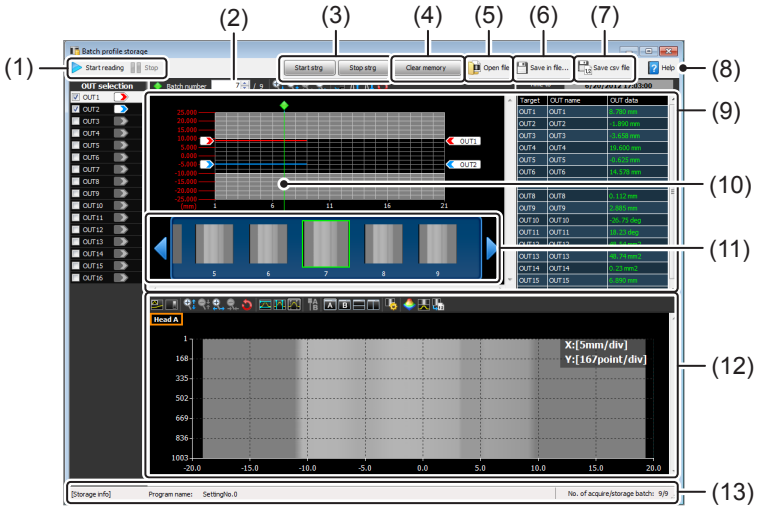
[Batch profile storage] Screen

This section describes how to read the [Batch profile storage] screen.

How to read the [Batch profile storage] screen

This section describes the items displayed on the [Batch profile storage] screen.

LJ-Navigator2



(1) [Start reading]/[Stop] button
Use this button to show the storage data, which is stored in the internal memory of the controller, on the trend graph.

(2) Batch number selection
Specify the batch number to be displayed from the batch profile storage data.
Selecting the batch number moves the batch position cursor onto the selected batch profile on the trend graph, and the height image display area shows the height image of the selected number.

(3) [Start strg]/[Stop strg] button
Use this button to start/pause storing the batch profile data.

- [Start strg].....Start storing the batch profile data to the internal memory of the controller.
- [Stop strg].....Stop storing the batch profile data.

Point

The [STORAGE_START]/[STORAGE_STOP] terminals and the communication command can also control the start/pause of the storage.
"Setting the Storage target and condition" (Page 7-8)

(4) [Clear memory] button
Use this button to clear the batch profile data stored in the internal memory of the controller.

Reference

The dialog appears to confirm whether to clear the storage.
After the storing is stopped, the storage data are cleared.

(5) [Open file] button
Use the button to open the stored batch profile storage file.

(6) [Save in file...] button
Use this button to save the displayed batch profile storage data in a file (*.bstr format).

(7) [Save csv file] button
Save the displayed batch profile storage data as CSV format.

(8) [Help] button
The help information on the [Batch profile storage] screen appears.

(9) Trend graph display area
The batch profile storage data appear in the trend graph.

Reference

The contents to be displayed are the same as those of the [Display trend graph] screen.
"[Display trend graph] Screen" (Page 8-15)

(10) Position cursor for batch profile

The cursor shows the position of the batch profile selected by the batch profile number selection. When the cursor position is dragged, the profile number in the batch number selection also changes.

(11) Height image thumbnail display

The thumbnails of the height images appear, which are two batches each before and after the batch profile select by the batch number selection. Clicking [◁] and [▷] moves the thumbnails by one batch.

(12) Height image display area

The height image at the position of the batch profile selection cursor appears.

Reference The contents to be displayed are the same as those of the [Display height image] screen.
“[Display height image] Screen” (Page 8-6)

(13) Program name/Storage information

The program name, the number of the obtained profiles and the number of the stored profiles are shown here.

[Display device information] Screen

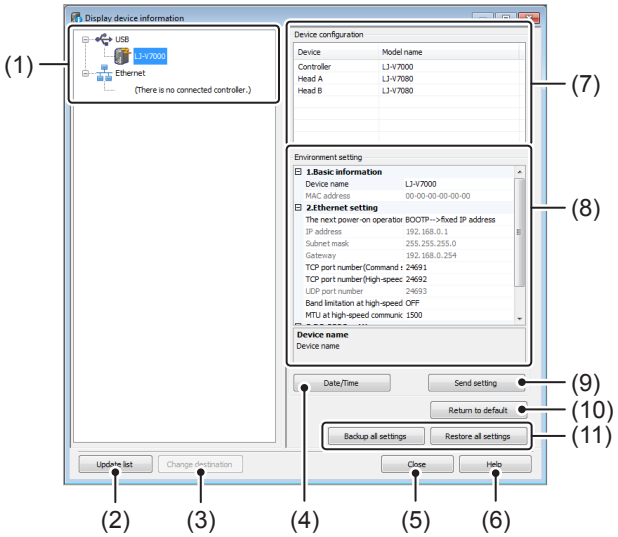
This section describes how to read the [Display device information] screen.

Reference The [Display device information] screen appears only with LJ-Navigator2.

How to read the [Display device information] screen

This section describes the items displayed on the [Display device information] screen.

LJ-Navigator2



(1) Controller list

The area lists the controllers connected via the USB connection, Ethernet connection, and Ethernet connection (BOOT client).
The statuses of the controllers are shown by the icons.

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

Reference When the controller has been selected as a connection destination, the icon shows on it.



(2) [Update list] button

Update the controller list by searching the controller that can be connected.

Reference Double clicking the icon of the controller list or pressing the [F5] key also update the list.

(3) [Change destination] button

Use the button to set the selected controller as the connection destination.

(4) [Date/Time] button

The [Date/Time] button appears.
Set the data/time of the controller.
“Setting the date/time in the controller” (Page 10-6)

(5) [Close] button

Close the [Display device information] screen.

(6) [Help] button

The help information on the [Device information display] screen appears.

(7) Device configuration display

The area shows the type, version and model name of the device connected to the connection destination controller and the controller.

(8) Environmental configuration display

The area shows the environmental configuration of the connection destination controller. 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 10-4)

(9) [Send settings] button

Use this button to send the settings to the controller, when the setting are changed.
“Setting the device name/communication specifications” (Page 10-4)

(10) [Return to default] button

Reset the settings of the connection destination controller to the factory default values.
“Resetting the Instrument Settings to their Factory Default States” (Page 4-14)

(11) [Backup all settings]/[Restore all settings] button

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

- Measurement program (Measurement common setting + program x 16)
- Environmental configuration
- Stored information on the display unit

“Backing Up/Restoring All Settings” (Page 4-12)

Backing Up/Restoring Monitor Data

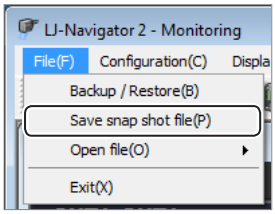
Backing up monitor data

The monitor data backup function backs up the newest profile data, the newest OUT measurement value, height image data and trend graph data as a (*.pss) file. This function is used to confirm the monitor data on LJ-Navigator2 afterward.

Reference The monitor data backup function is only available for LJ-Navigator2.

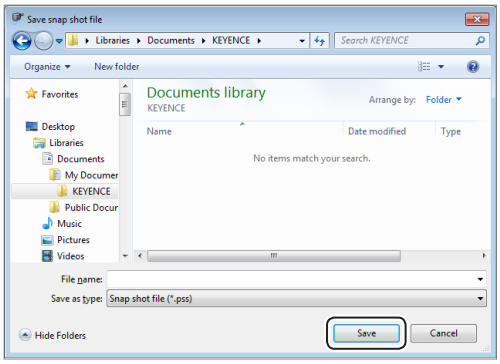
This section explains the procedure for backing up the monitor data.

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



The [Save snap shot file] screen will appear.

2 Enter a file name and click the [Save] button.



The newest profile data, the newest OUT measurement value, height image data and trend graph data will be saved to the file.
When the backup is complete, a confirming dialogue will appear.

3 Click the [OK] button.

Reference 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.

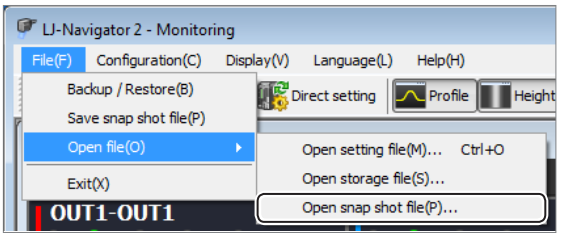
Restoring monitor data

The monitor data restoring function allows you to restore the monitor data that was saved in a file with backup function on LJ-Navigator2.

Reference The monitor data restoring function is only available for LJ-Navigator2.

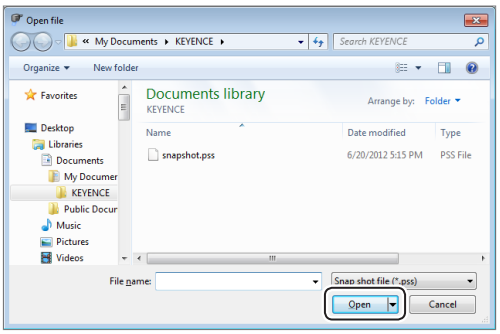
This section explains the procedure for restoring the monitor data.

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



The [Open file] screen will appear.

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



The backed up monitor data appears on LJ-Navigator2.

Reference Monitor data can also appear on LJ-Navigator2 by double clicking the saved file. In this case, LJ-Navigator2 starts up with the monitoring in the stopped state.

Functions Available During Measurement

Functions available during measurement are as shown below.

- Switching the programs
- Using the trigger input
- Using the TIMING input*
- Using the ZERO input (Auto-zero function)*
- Resetting the measurement value*
- Starting/Stopping the batch measurement
- Clearing the internal memory

*: Functions only during the measurement of advanced function mode

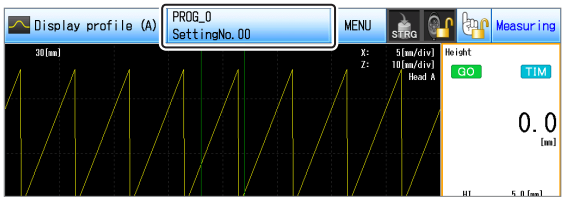
This section describes the outline and the operation procedure of each function.

Switching the programs

This section describes the procedure for switching programs.

■ Display monitor/Touch panel monitor

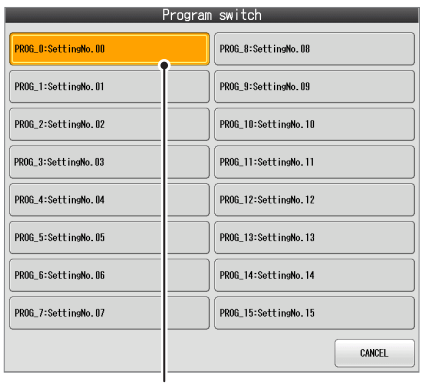
1 Press the [PROG No.] key or touch the program name button.



[Program switch] screen appears.

Reference The measurement pauses.

2 Select the button of the program No. to be switched by the [△], [▽], [◁], or [▷] key and press or touch the [ENTER] key.

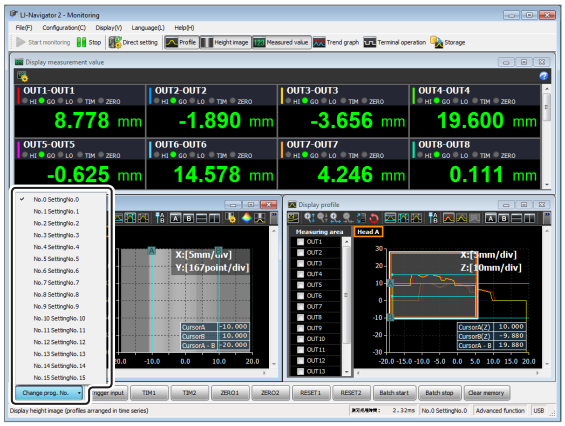


Program being selected (Orange)

The program switches and the measurement starts with the selected program.

■ LJ-Navigator2

1 Click the [Change prog. No.] button to show the list of the program, and select the program to be switched from the list.



The program switches and the measurement starts on the selected program.

Using the trigger input

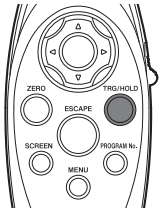
To use the trigger input, set [Trigger mode] of the trigger setting to [External trigger].
“Setting the Trigger Conditions” (Page 5-10)

The input of the trigger includes the following methods.

- Trigger button (LJ-Navigator2, console, and touch panel)
- External input terminal
- Communication command (Ethernet, USB, and RS-232C)

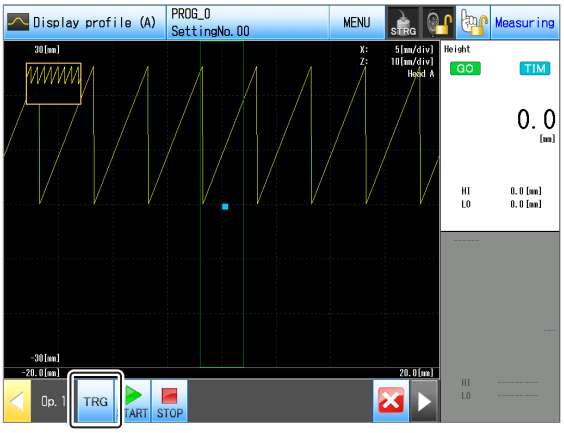
Console

Sampling is performed once by pressing the [TRG] key.



[TRG] button of the Display monitor/Touch panel monitor

Sampling is performed once by selecting the [TRG] button on the operation menu 1 by the [△], [▽], [◁], or [▷] key, and pressing or touching the [ENTER] key.



[Trigger input] button of LJ-Navigator2

Sampling is performed once by clicking the [Trigger input] button on the operation panel.



External input terminal

The external trigger can be input by shorting the [TRG] and [COM_IN] terminals of the input terminal block.
“I/O Terminal” (Page 11-8)

Communication command

The external trigger can be input by sending a command via several interfaces such as the Ethernet, USB, and RS-232C from the external device.
“Trigger” (Page A-8)

Using the TIMING input

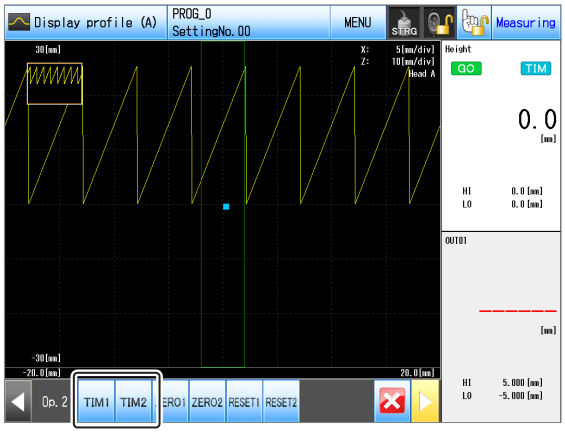
TIMING1 and TIMING2 can be input at any time to the OUT measurement setting to which TIMING1 and TIMING2 are assigned.

The TIMING input includes the following methods.

- [TIM1] or [TIM2] button of the Display monitor/Touch panel monitor
- [TIM1] or [TIM2] button of LJ-Navigator2
- External input terminal
- Communication command (Ethernet, USB, and RS-232C)

[TIM1] or [TIM2] button of the Display monitor/ Touch panel monitor

TIMING1 and TIMING2 are input by selecting the [TIM1] or [TIM2] button on the operation menu 2 by [△], [▽], [◁], or [▷] key and pressing or touching the [ENTER] key.
The TIMING is toggled ON/OFF every time the [ENTER] key is pressed or touched.



[TIM1] or [TIM2] button of LJ-Navigator2

TIMING1 and TIMING2 are input by clicking the [TIM1] or [TIM2] button of the operation panel.
The TIMING is toggled ON/OFF each time the button is clicked.



External input terminal

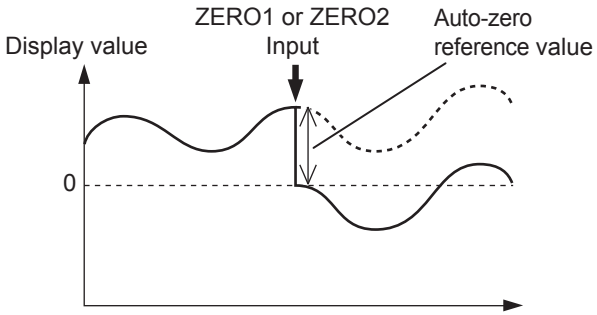
The measurement value can be held by shorting the [TIMING1]/[TIMING2] and [COM_IN] terminals of the input terminal block.
“I/O Terminal” (Page 11-8)

Communication command

The measurement value can be held by sending a command via several interfaces such as the Ethernet, USB, and RS-232C from the external device.
“Timing (Single OUT)” (Page A-9)
“Timing (Multiple OUT)” (Page A-10)
“Timing (All OUT)” (Page A-10)

Using the ZERO input (Auto-zero function)

ZERO1 and ZERO2 can be input at any time to the OUT measurement setting to which ZERO1 and ZERO2 are assigned.
Inputting ZERO immediately shifts the measurement value to zero. Also, the auto-zero reference value is replaced with the shifted value, and subtraction starts at the measurement value after the ZERO input.

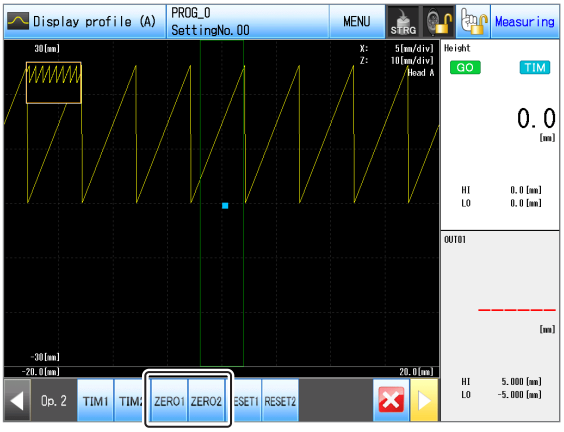


The input of ZERO includes the following methods.

- [ZERO1] or [ZERO2] button of the Display monitor/ Touch panel monitor
- [ZERO1] or [ZERO2] button of LJ-Navigator2
- External input terminal
- Communication command (Ethernet, USB, and RS-232C)

[ZERO1] or [ZERO2] button of the Display monitor/Touch panel monitor

ZERO1 and ZERO2 are input by selecting the [ZERO1] or [ZERO2] button on the operation menu 2 by [△], [▽], [◁], or [▷] key and pressing or touching the [ENTER] key.
The measurement value when the [ENTER] key is pressed or touched becomes the auto-zero reference value.



Reference When the auto-zero function is ON, pressing (or touching) and holding the [ENTER] key turns the auto-zero function OFF.

[ZERO1] or [ZERO2] button of LJ-Navigator2

ZERO1 and ZERO2 are input by clicking the [ZERO1] or [ZERO2] button of the operation panel.
The measurement value at the click becomes the auto-zero reference value.



External input terminal

The anto-zero can be input by shorting the [ZERO1]/ [ZERO2] and [COM_IN] terminals of the input terminal block.
“I/O Terminal” (Page 11-8)

Communication command

ZERO can be input by sending a command via several interfaces such as the Ethernet, USB, and RS-232C from the external device.
“Auto zero (Single OUT)” (Page A-9)
“Auto zero (Multiple OUT)” (Page A-9)
“Auto zero (All OUT)” (Page A-9)

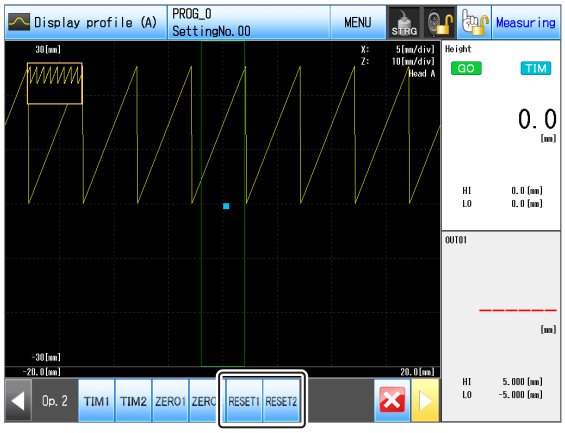
Resetting the measurement value

The RESET input resets the intermediate states of the measurement alarm processing, measurement filter processing, and measurement processing back to the initial states. The judgement results are also reset.
This section describes the procedure to reset the measurement value of an OUT using the RESET terminal set for the specific OUT.
The RESET inputs include the following methods.

- [RESET1] or [RESET2] button of the Display monitor/ Touch panel monitor
- [RESET1]or [RESET2] button of LJ-Navigator2
- External input terminal
- Communication command (Ethernet, USB, and RS-232C)

[RESET1] or [RESET2] button of the Display monitor/Touch panel monitor

RESET1 and RESET2 are input by selecting the [RESET1] or [RESET2] button on the operation menu 2 by [△], [▽], [◁], or [▷] key and pressing or touching the [ENTER] key.
This operation resets the states of the measurement alarm processing, measurement filter processing, and measurement processing.



[RESET1] or [RESET2] button of LJ-Navigator2

RESET1 and RESET2 are input by clicking the [RESET1] or [RESET2] button of the operation panel. This operation resets the states of the measurement alarm processing, measurement filter processing, and measurement processing.



External input terminal

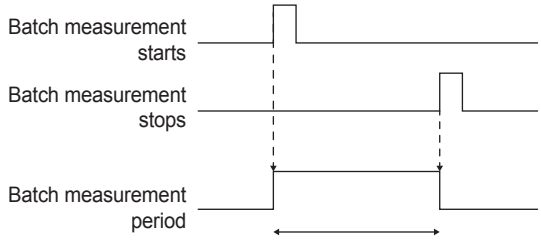
The measurement values can be reset by shorting the [RESET1]/[RESET2] and [COM_IN] terminals of the input terminal block.
“I/O Terminal” (Page 11-8)

Communication command

The measurement values can be reset by sending a command via several interfaces such as the Ethernet, USB, and RS-232C from the external device.
“Reset (Single OUT)” (Page A-10)
“Reset (Multiple OUT)” (Page A-10)
“Reset (All OUT)” (Page A-10)

Starting/Stopping the batch measurement

The batch measurement period can be set by using the batch start/stop when [Batch measurement] is set to [ON] in the trigger setting.



The profile generation and measurement processing is performed only for the triggers entered in this period.

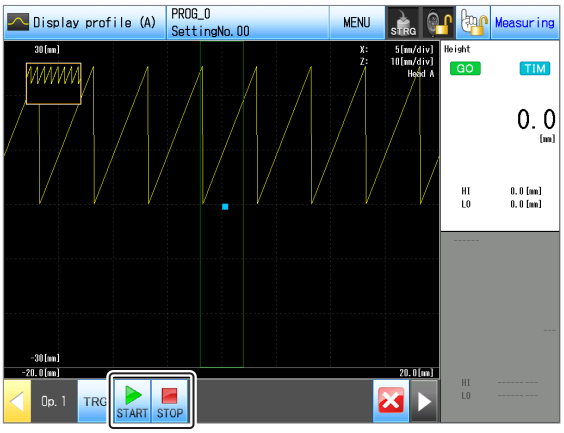
Reference When the batch measurement is OFF, the batch measurement start/stop buttons and commands are disabled.

The batch measurement can be controlled using the following methods.

- [START]/[STOP] button of the Display monitor/Touch panel monitor
- [Batch start]/[Batch stop] button of LJ-Navigator2
- External input terminal
- Communication command (Ethernet, USB, and RS-232C)

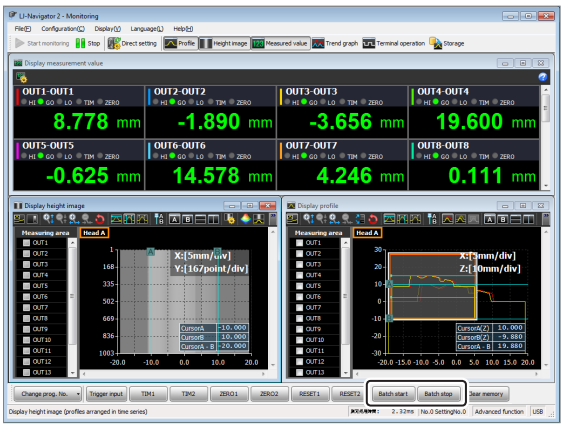
■ [START]/[STOP] button of the Display monitor/ Touch panel monitor

Select the [START]/[STOP] button in operation menu 1 using the [△], [▽], [◁], or [▷] keys and press or touch the [ENTER] key.
The [START] button starts the batch measurement period and the [STOP] button stops it.



■ [Batch start]/[Batch stop] button in LJ-Navigator2

Click the [Batch start]/[Batch stop] button on the operation panel.
The [Batch start] button starts the batch measurement period and the [Batch stop] button stops it.



■ External input terminal

The batch measurement can be started/stopped by shorting the [MEASURE_START]/[MEASURE_STOP] and [COM_IN] terminals of the input terminal block.
“I/O Terminal” (Page 11-8)

■ Communication command

The measurement can be started/stopped by sending a command via several interfaces such as the Ethernet, USB, and RS-232C from the external device.
“Batch start” (Page A-8)
“Batch stop” (Page A-8)

Clearing the internal memory

The internal memory of the controller stores the captured images sequentially depending on the settings of [Memory setting] of the measurement common setting.
“Chapter 9 Measurement Common Setting” (Page 9-1)

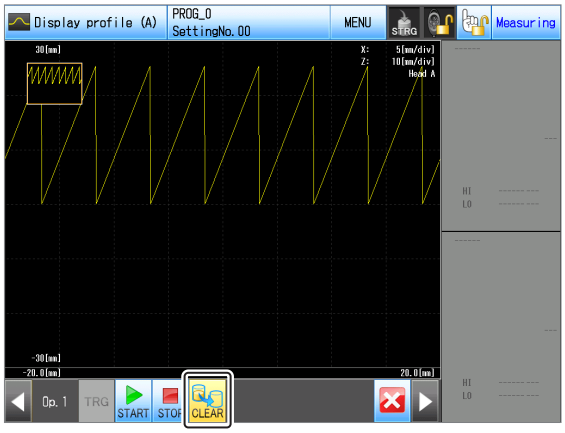
Methods to clear the internal memory include the following.

- The [CLEAR] button of the Display monitor/Touch panel monitor
- [Clear memory] button of LJ-Navigator2
- External input terminal
- Communication command (Ethernet, USB, and RS-232C)

[CLEAR] button of the Display monitor/Touch panel monitor

Select the [CLEAR] button in operation menu 1 using the [△], [▽], [◁], or [▷] keys and press or touch the [ENTER] key.
This operation clears the internal memory of the controller.

Reference The internal memory can be cleared only when [Operation mode] is set to [High-speed] mode in the measurement common setting.



[Clear memory] button in LJ-Navigator2

Click the [Clear memory] button on the operation panel.
This operation clears the internal memory.



External input terminal

The internal memory can be cleared by shorting the [CLEAR] and [COM_IN] terminals of the input terminal block.
“I/O Terminal” (Page 11-8)

MEMO

9

Measurement Common Setting

This chapter describes the settings and the setup procedure common to all the measurement programs.

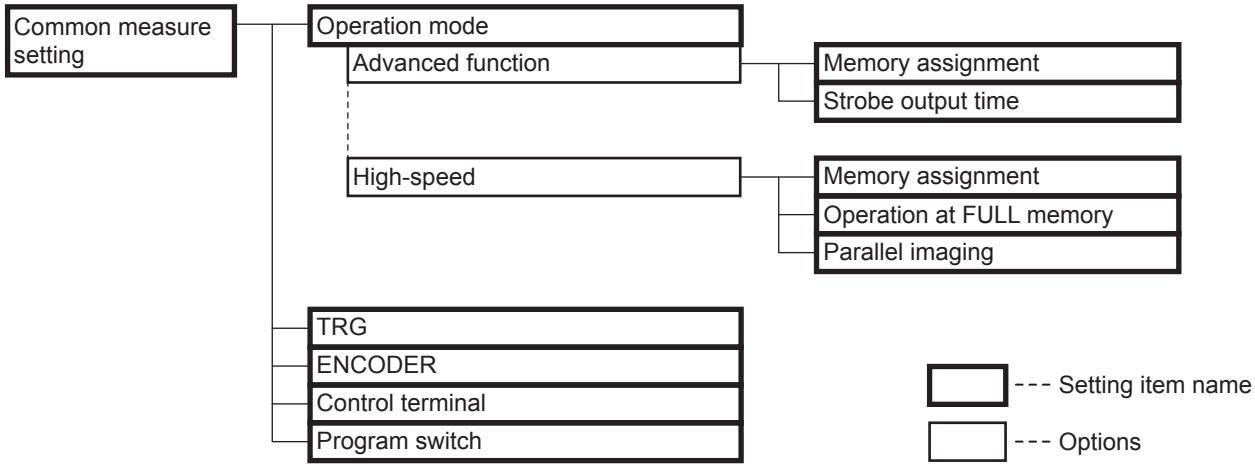
Setting Items of the Measurement Common Setting... 9-2
Setting the Measurement Common Setting..... 9-3

Setting Items of the Measurement Common Setting

The measurement common setting sets up the setting items common to all of the measurement programs such as the memory assignment and terminal operation of the controller.

▶ Important **The measurement common setting affects all the measurement programs.**

The setting items of the Measurement common setting are as below.



Please refer to the following items for details on each setting item.
“Initial values and setting ranges for the common measurement setting” (Page A-53)
“Setting the Measurement Common Setting” (Page 9-3)

Setting the Measurement Common Setting

Measurement common setting

The following items will be set up in measurement common setting and apply to all measurement programs.

- Operation mode
- Head details
- Memory setting
- Terminal setting
- Others

This section describes the contents of each setting item.

■ Operation mode

The LJ-V7000 series have two separate processing blocks in the controller.

1. One processor handles imaging and generation / buffering of the profile data.
2. Another processor handles measurements performed on the profile and checks to see whether the measurement are within tolerance or not.

The operation mode defines the range of the processing above to be controlled by the controller.
The operation mode includes [High-speed] and [Advanced function].

● Advanced function mode

The advanced function mode utilizes both of the processors described above. This mode allows position correction, measurement processing, judgement outputs, and data storage.
The advanced function mode limits measurement speeds as more processing power is required for profile analysis.

● High-speed mode

The high-speed mode utilizes processor 1 to perform high-speed imaging, profile generation, and buffering. Because the high-speed mode does not perform the profile analysis, more processing power is available to allow high-speed output of the profiles.
The high-speed mode is used to obtain profiles from the controller at high speeds by using the provided communication library.

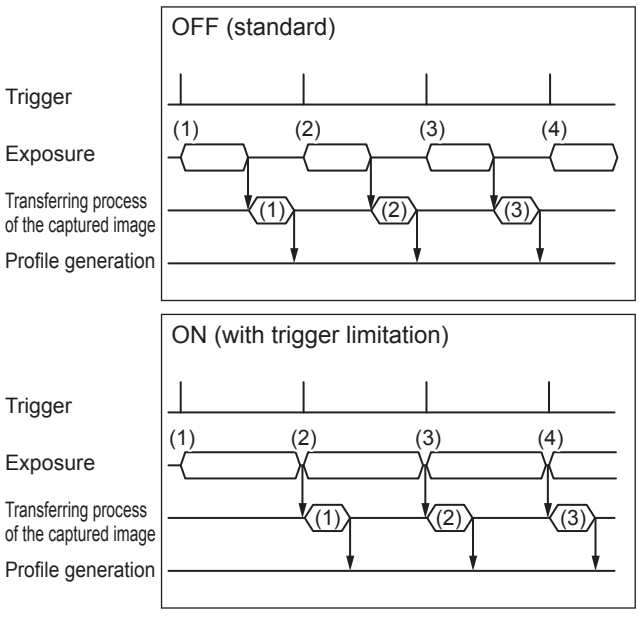
● Parallel imaging setting (for the high-speed mode only)

This setting sets up whether or not the "Exposure" and "sending of captured image" will occur in parallel.

- ON (with trigger limitation)... "Exposure" and "Sending of image captured by the last trigger" are performed in parallel.
  Because this setting allows for exposure up to the end of the sampling period, this setting is effective when high light volume is required while performing high-speed sampling.

NOTICE	**Restrictions on the trigger** **• The captured image is not sent to the controller until the next trigger input and no profile is generated.** **Therefore, input more triggers than the required number.** **• When the trigger interval becomes larger than 10ms, the last imaging condition cannot be held. In this case, the profile generated by the next trigger input will be invalid data.** **• When the parallel imaging is ON, the TRG_ERROR terminal turns on at the timing when the trigger interval exceeded 10ms.** **“Output terminal block 2” (Page 11-14)**

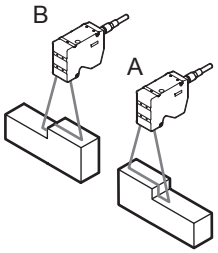
- OFF (Standard)... "Sending the captured image" is performed after "Exposure".



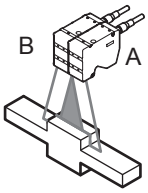
■ Head details

When using two heads, set up the installation condition of the heads.
The installation conditions can be selected from five options as below.
Based on the selected installation condition, the initial display of the profile (with/without Z- and X-inversion) is automatically adjusted.

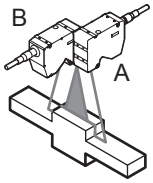
- [Independent] ... A condition where the heads A and B have been installed independently.



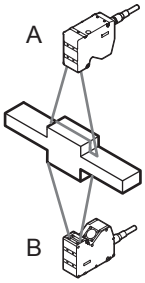
- [Adjacent/ Same dir.] ..... A condition where the heads A and B are installed side by side facing the same direction.



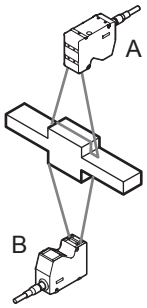
- [Adjacent/ Reverse dir.] ... A condition where the heads A and B are installed side by side with their direction inverted in the X-direction.



- [Facing/ Same dir.] ..... A condition where the heads A and B are installed opposing each other in the vertical direction, heading in the same direction



- [Facing/ Reverse dir.] .... A condition where the heads A and B are installed opposing each other in the vertical direction with their direction inverted horizontally



■ Memory setting

This section describes the role of the internal memory of the controller per operation mode.

- In the high-speed mode ... After the measurement has started, the internal memory automatically buffers the generated profiles. With the initial setting, the internal memory can buffer about 250,000 profiles at maximum.
- In the advanced function mode ... With the storage function, the profiles and OUT measurement values are stored in the internal memory. “Storage” (Page 7-7)

NOTICE	**In the high-speed mode, the storage function is not available.** **All the stored data is cleared in the following cases.** **• The program is switched (when the double buffer is selected, only the data on one side is cleared).** **• [Clear memory] is performed.** **• Setting is changed.** **• [Return to default] is performed.** **• The controller is turned off.** **• The system error occurred.**

The memory setting relates to the assignment of the internal memory of the controller used for buffering the profiles and the processing in case that the memory has no free space.

The assignment includes the following method.

- Double buffer ..... The internal memory is divided into two sides A and B, and the sides A and B are used alternately every time when the program is switched. Because the stored data does not disappear immediately even after the program is once switched, the data can be read while measuring the next program. However, switching the program twice clears all previously stored data.
- All area (overwrite) ... The entire area of the internal memory is used for buffering the profiles and storing the OUT measurement values. This setting can maximize the data volume that can be stored (buffering) in one program measurement. Switching the program will clear the stored (buffered) data.
- All area (do not overwrite) (Advanced function mode only) ... The entire area of the internal memory is used for storing the profiles and the OUT measurement values.Even when you switch the program, the data stored in the internal memory will not be cleared. You can store the data continuously while switching programs, and read the stored data as a whole at the end.

NOTICE	**For this setting, all stored data can be read only when using a customer's program with the supplied communication library. (Only the data stored in the current program can be read in LJ-Navigator2.)**

When the operation mode is [High-speed], in addition to the internal memory assignment setting, set up 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 (or one side of the memory area when the double buffer is selected) has run out.

■ Terminal setting

This setting sets up the minimum input time for the TRG input terminal, ENCODER input terminal, and other input terminals.
In addition, when the operation mode is [Advanced function], also set up [Strobe output time].

■ Others

With this setting, set whether to use the communication command and the LJ-Navigator2 or the external terminals (P1/P2/P3/P4), to switch programs.

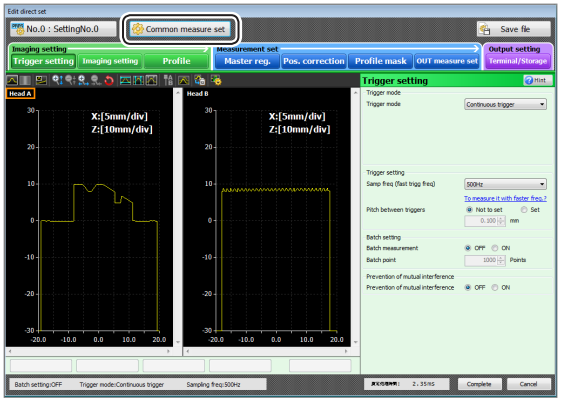
Setting the Measurement common setting (Advanced function mode)

This section describes the setup procedure of the measurement common setting in the Advanced function mode.

Reference The procedure described here is for LJ-Navigator2. For the operation procedure of the display monitor/touch panel monitor, refer to “Switching Screens on the Display Monitor/Touch Panel Monitor” (Page A-26).

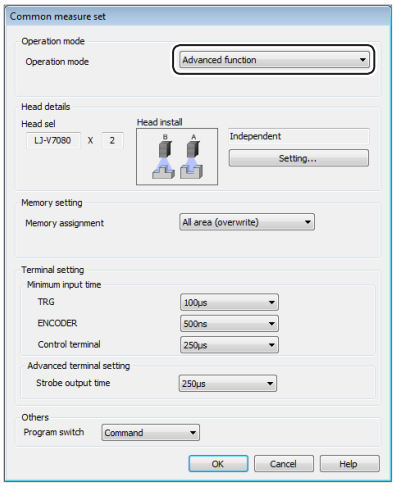
1 Click the [Common measure set] button of the setup screen.

The display method of the setup screen: “Editing the Settings” (Page 4-6)



The [Common measure set] screen appears.

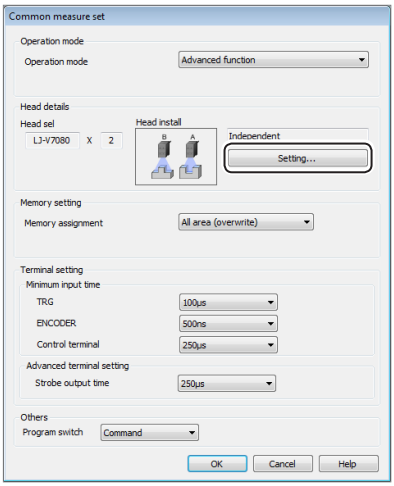
2 Select [Advanced function] by the [Operation mode] pull-down menu.



The setting items of the advanced function mode appear.

3 To change the installation condition of the head, click the [Setting...] button of the [Head install].

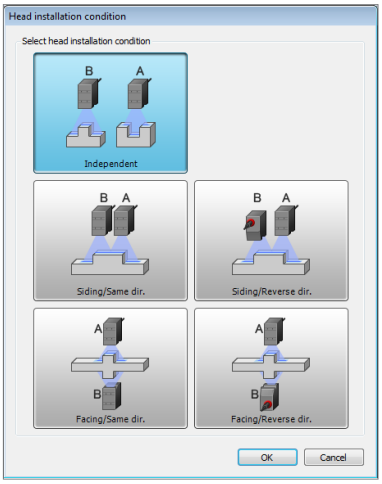
Reference The installation condition of the head can be set only when two heads are used. In case of one head, go to ***5***.



The [Head installation condition] screen appears.

4 Click the button of the head installation condition and click the [OK] button.

“Head details” (Page 9-4)



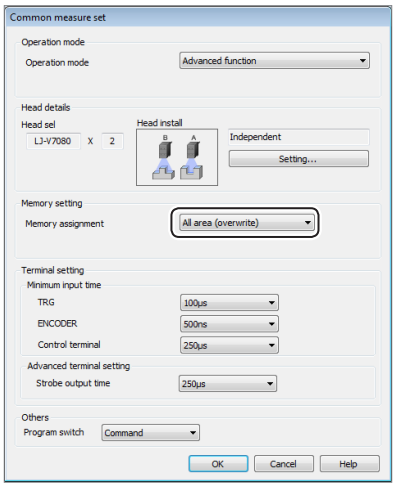
The screen returns to [Common measure set] screen.

5 **Select the assignment method of the internal memory of the controller in the [Memory assignment] pull-down menu of [Memory setting].**

“Memory setting” (Page 9-5)

Point

Because [Number of storage data] of [Term./Storage] is adjusted when [All area (overwrite)] or [All area (do not overwrite)] is changed to [Double buffer], the dialog appears to confirm the change.
Clicking [OK] changes [Memory assignment] to [Double buffer] and adjusts [Number of storage data].



6 **Select the minimum input time for the TRG input terminal by the [TRG] pull-down menu of [Terminal setting].**

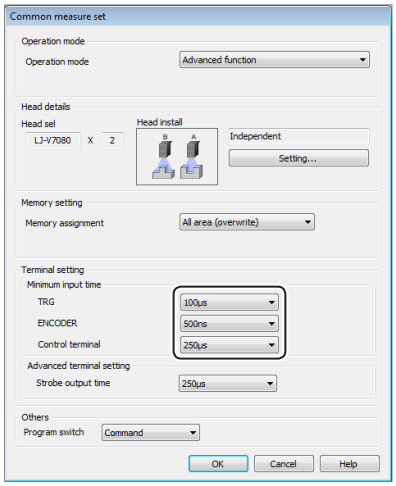
“Terminal setting” (Page 9-5)

7 **Select the minimum input time for the ENCODER input terminal by the [ENCODER] pull-down menu of [Terminal setting].**

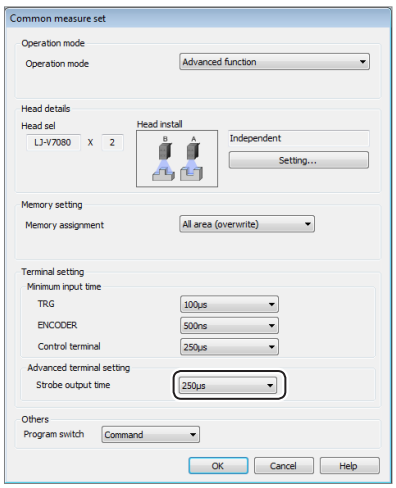
“Terminal setting” (Page 9-5)

8 **Select either [250µs] or [1ms] for the minimum input time of the terminals other than TRG and ENCODER by the [Control terminal] pull-down menu of [Terminal setting].**

“Terminal setting” (Page 9-5)



9 **Select the ON time for the STROBE output terminal by the [Strobe output time] pull-down menu of [Advanced terminal setting].**

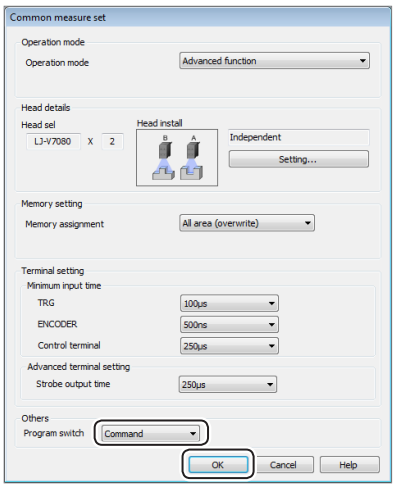


10 **Select either [Command] or [Terminal] as the method for switching programs in the [Program switch] pull-down menu of [Others].**

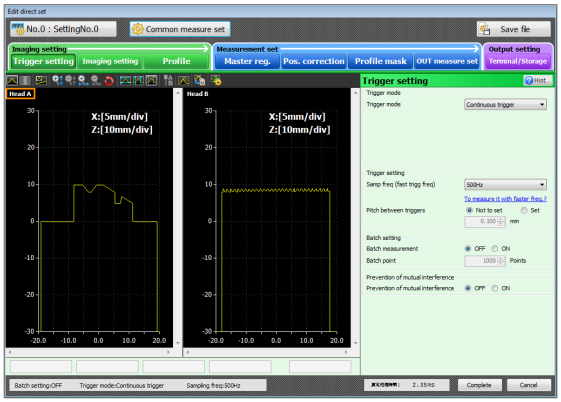
“Others” (Page 9-5)

Point **The setting change from [Command] to [Terminal] is not reflected by the controller until completion of the setup. [Until the completion of the setup] means clicking the [Complete] button in direct setting, and clicking the [Send set] button in the local setting.**

11 **After the setup is completed, click the [OK] button.**



The settings are revised and the screen returns to the setting screen.



Reference To complete the setup, click the [Complete] button at the lower part of the screen. When the [Complete] button is clicked, the settings are sent to the controller.

Setting the Measurement common setting (High-speed mode)

This section describes the setup procedure of the measurement common setting in the high-speed mode.

Reference The procedure described here is for LJ-Navigator2. For the operation procedure of the display monitor/touch panel monitor, refer to “Switching Screens on the Display Monitor/Touch Panel Monitor” (Page A-26).

1 **Click the [Common measure set] button of the setup screen.**

The display method of the setup screen: “Editing the Settings” (Page 4-6)

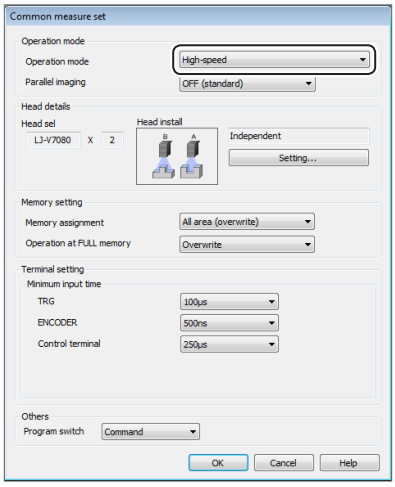


The [Common measure set] screen appears.

2 **Select [High-speed] in the [Operation mode] pull-down menu.**

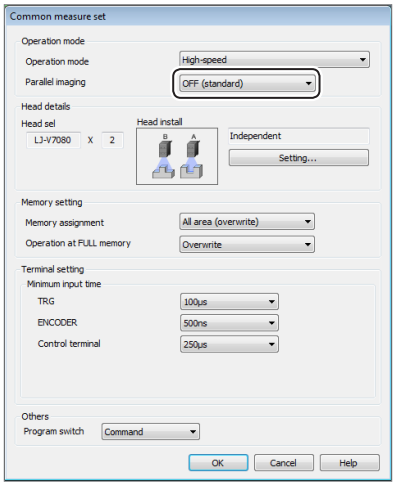
Point

Because [Measurement set] and [Output setting] will be initialized when [Advanced function] is changed to [High-speed], the dialog appears to confirm the change.
Clicking [OK] changes [Operation mode] to [High-speed], and [Measurement set] and [Output setting] are initialized.
“Chapter 6 Setting the Measurement Processing Conditions” (Page 6-1)
“Chapter 7 Setting the Terminal Output Condition/the Storage Condition” (Page 7-1)



The setting items of the high-speed mode appear.

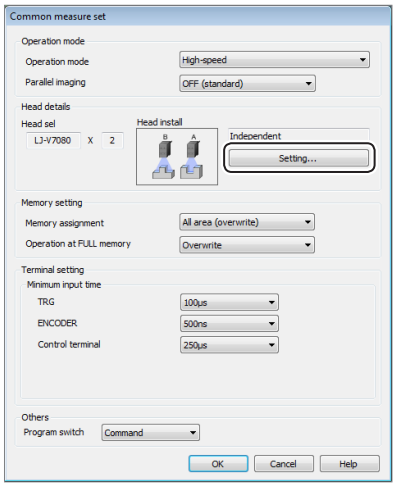
3 **Select either [OFF (standard)] or [ON (with trigger limitation)] for the parallel processing operation of the exposure and the image transfer in the [Parallel imaging] pull-down menu.**



4 **To change the installation condition of the head, click the [Setting...] button of the [Head install].**

Reference

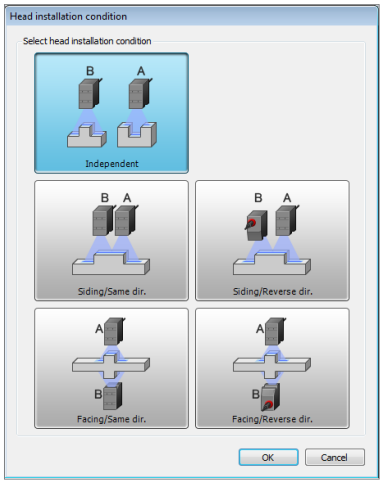
The installation condition of the head can be set only when two heads are used.
In case of one head, go to ***6***.



The [Head installation condition] screen appears.

5 **Click the button of the head installation condition, and click the [OK] button.**

“Head details” (Page 9-4)



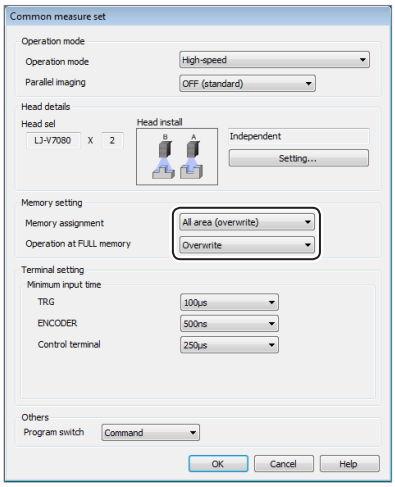
The screen returns to [Common measure set] screen.

6 **Select the assignment method of the internal memory of the controller by the [Memory assignment] pull-down menu of [Memory setting].**

“Memory setting” (Page 9-5)

7 **Select either [Overwrite] or [Stop] for when the internal memory is full, under [Operation at FULL memory] of [Memory setting].**

“Memory setting” (Page 9-5)



8 **Select the minimum input time for the TRG input terminal in the [TRG] pull-down menu of [Terminal setting].**

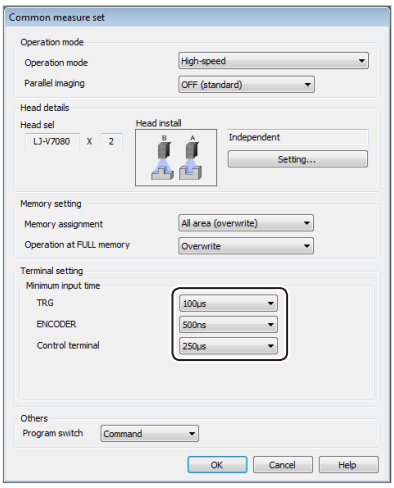
“Terminal setting” (Page 9-5)

9 **Select the minimum input time for the ENCODER input terminal in the [ENCODER] pull-down menu of [Terminal setting].**

“Terminal setting” (Page 9-5)

10 **Select either [250μs] or [1ms] for the minimum input time for the terminals other than TRG and ENCODER in the [Control terminal] pull-down menu of [Terminal setting].**

“Terminal setting” (Page 9-5)



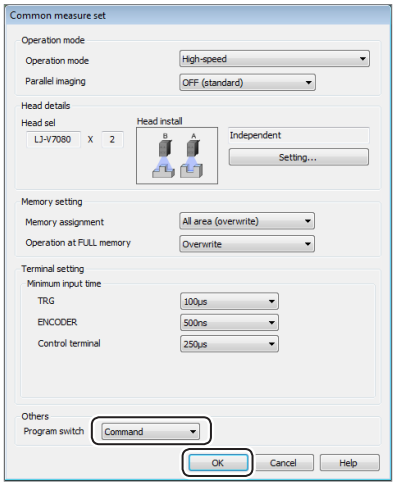
11 **Select either [Command] or [Terminal] for the switching method of the program in the [Program switch] pull-down menu of [Others].**

“Others” (Page 9-5)

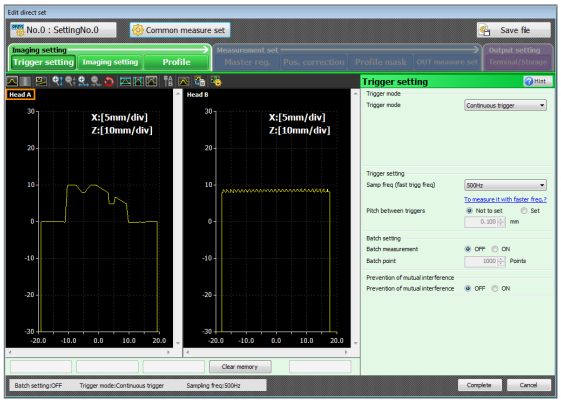
Point

The setting change from [Command] to [Terminal] is not reflected by the controller until completion of the setup. [Until the completion of the setup] means clicking the [Complete] button in the direct setting, and clicking the [Send set] button in the local setting.

12 After the setup is completed, click the [OK] button.



The settings are revised and the screen returns to the setting screen.



Reference To complete the setup, click the [Complete] button at the lower part of the screen. When the [Complete] button is clicked, the settings are sent to the controller.

MEMO

10

System Setting

This section explains the details and setting procedures for the instrument information, PC communication and language settings.

Controller System Settings 10-2
Display Monitor/Touch Panel Monitor System Settings..... 10-8
LJ-Navigator2 System Setting..... 10-11

Controller System Settings

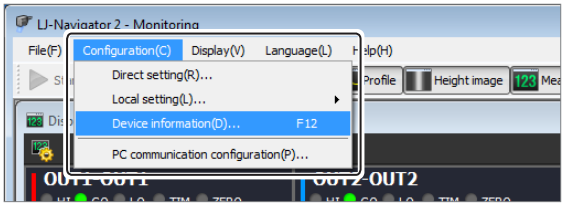
You can edit the system settings of the controller connected via USB or Ethernet.
In LJ-Navigator2, open the [Display device information] screen.
On the display monitor/touch panel monitor, open the [Environment setting] screen.
“Displaying the controller system settings screen” (Page 10-2)

Displaying the controller system settings screen

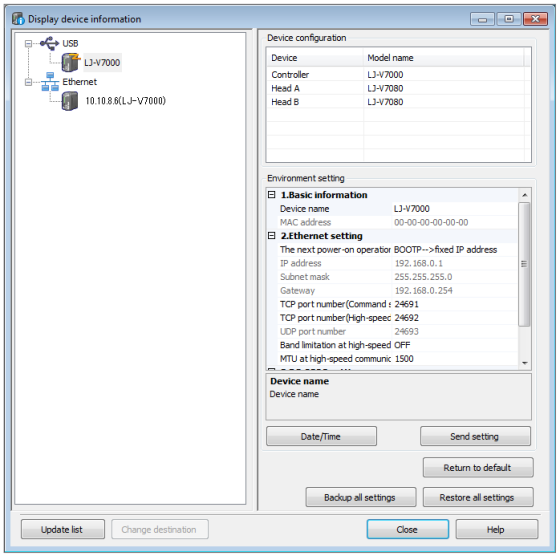
This section explains the procedure for displaying the screen for setting the instrument information.

■ LJ-Navigator2

1 Click [Device information] under the [Configuration] menu.

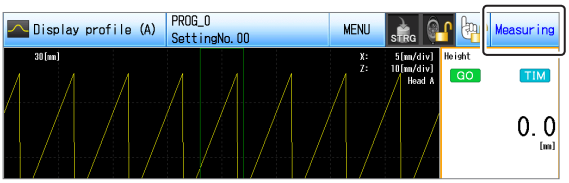


The [Display device information] screen will appear.
“How to read the [Display device information] screen” (Page 8-24)



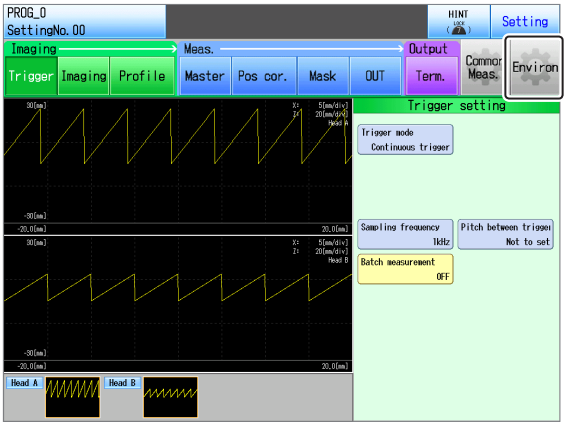
■ Display monitor/Touch panel monitor

1 Hold down the [PROG/RUN] switch or hold down the measurement/setting mode button.

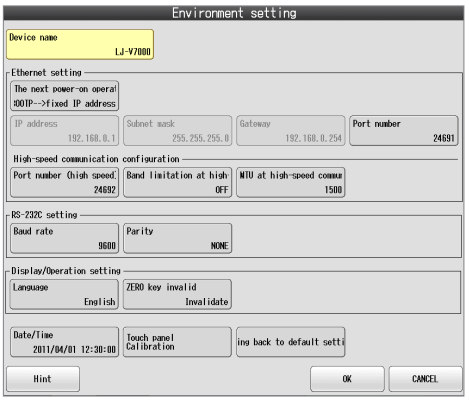


Reference Tapping the [PROG/RUN] switch or tapping the measurement/setting mode button will display the measurement screen in reference mode.

2 Select the [Environ] button using the [△] [▽] [◁] [▷] keys, and then press or touch the [ENTER] key.



The [Environment setting] screen will appear.



Switching the controller to connect to LJ-Navigator2

From the list of controllers, select and switch to the controller you wish to connect.

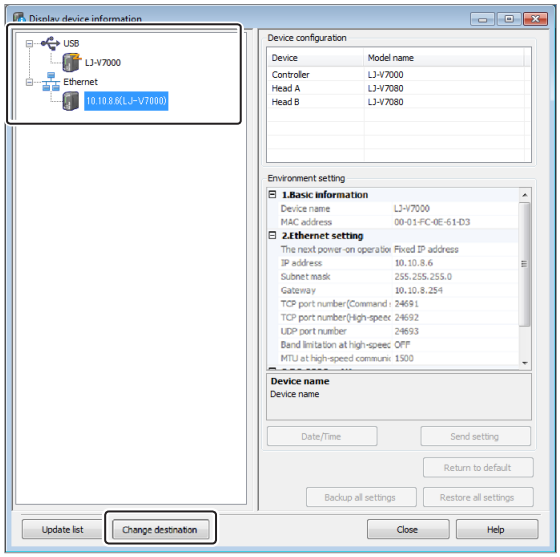
Reference You can only perform this setting in LJ-Navigator2.

1 Open the [Display device information] screen.

“Displaying the controller system settings screen” (Page 10-2)

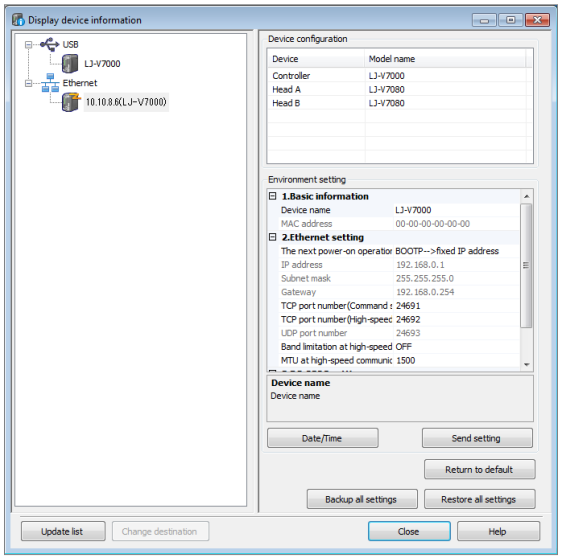
2 From the list of controllers, select the controller you wish to connect.

3 Click the [Change destination] button.



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

The connection will switch to the selected controller.



Reference 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 controller.

Setting the device name/communication specifications

You can set the device name of the destination controller and the Ethernet/RS-232C communication specifications.
The items you can set are:

● **Name of the device**

You can enter your desired name for the controller.

● **The next power-on operation**

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

- [BOOTP→fixed IP address]
  Once you start the controller using the IP address, subnet mask and gateway acquired from BOOTP, the acquired values will be stored as the network setting of the controller. 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 ignore the set IP address, subnet mask and gateway and will start automatically acquiring a new network setting.

● **IP address/subnet mask/gateway**

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

Point

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 = 11111111.11111111.11111111.01000000 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 controller for sending and receiving commands (1 to 65535).

● **TCP port number (High-speed communication)**

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

Reference High-speed communication is a mode in which data is sent continuously from the controller to the PC.
See the communication library reference manual for details.
The communication library software and the reference manual are included in the LJ-H3 DVD.

● **Band limitation at high-speed communication**

Reference It is only valid in the high-speed communication mode.
You can set a limit on the data output bandwidth (communication speed) to reduce the load on the network.
For example, if [200 Mbps] is set, the data will not be sent at a speed faster than 200 Mbps.

● **MTU at high-speed communication**

Reference It is only valid in the high-speed communication mode.
The MTU is the maximum size of a single data unit that can be transmitted in one transfer (also known as the frame size).

Point

- **Even if you have set the MTU, the standard frame size (1518 bytes) will be used for the communication if the receiving instrument does not support the increase of frame size.**
- **The communication will not work if an instrument not supporting the increase of frame size exists in the communication path.**

● **Baud rate**

Set the baud rate for the RS-232C communication

● **Parity**

Set the parity of the RS-232C communication.

“RS-232C Interface” (Page 11-5)

■ LJ-Navigator2

1 Open the [Display device information] screen.

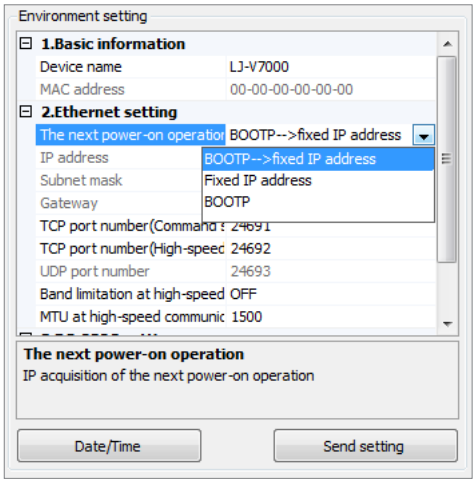
“Displaying the controller system settings screen” (Page 10-2)

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

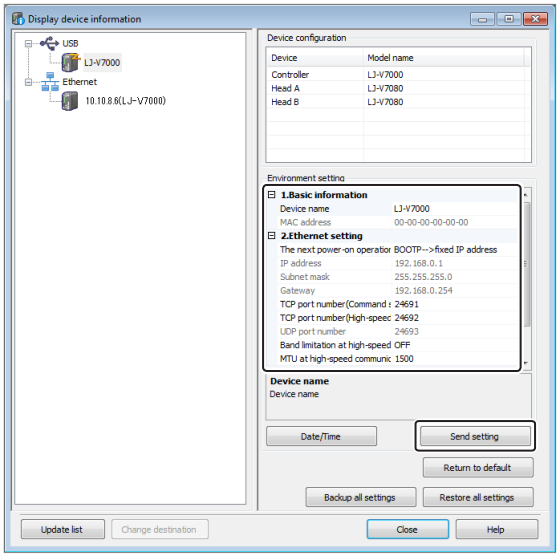
3 Edit the environment setting values.

Reference

- [MAC address] and [UDP port number] cannot be edited.
- You can set [IP address], [Subnet mask] and [Gateway] if [The next power-on operation] is set to [Fixed IP address].

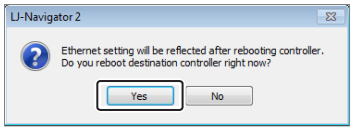


4 Click the [Send setting] button.



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

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



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

6 Click the [OK] button.



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

■ Display monitor/Touch panel monitor

1 Open the [Environment setting] screen.

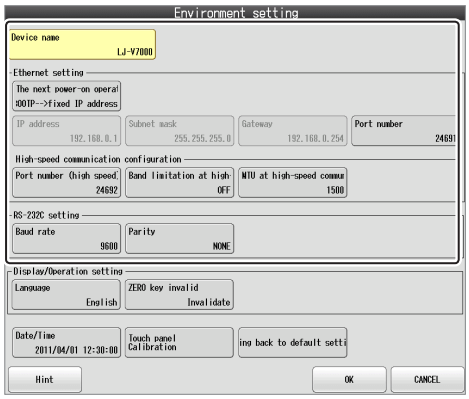
“Displaying the controller system settings screen” (Page 10-2)

2 Select the setting item using the [△] [▽] [◁] [▷] keys, and then press or touch the [ENTER] key.

3 Edit the environment setting values.

“Entering numeric values” (Page 3-13), (Page 3-21)
“Entering characters” (Page 3-14), (Page 3-22)

Reference You can set [IP address], [Subnet mask] and [Gateway] if [The next power-on operation] is set to [Fixed IP address].



4 Select the [OK] button using the [△] [▽] [◁] [▷] keys, and then press or touch the [ENTER] key.

Setting the date/time in the controller

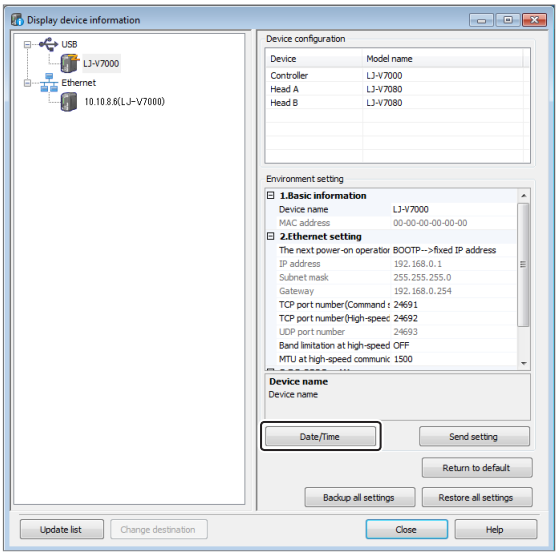
You can set the date/time in the controller.

■ LJ-Navigator2

1 Open the [Display device information] screen.

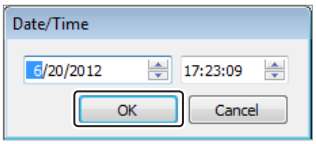
“Displaying the controller system settings screen” (Page 10-2)

2 Click the [Date/Time] button.



The [Date/Time] screen will appear.

3 Set the date/time and click the [OK] button.



The setting will be sent to the destination controller.

4 Click the [OK] button.

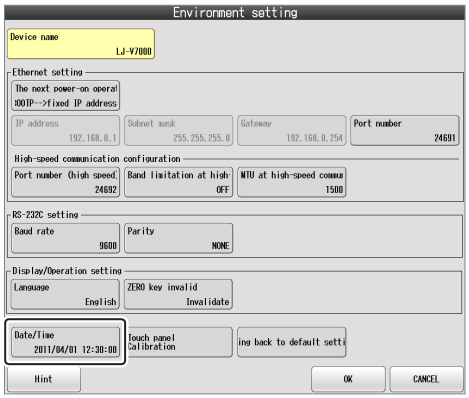
You will return to the [Display device information] screen.
The date/time of the controller will be set.

■ Display monitor/Touch panel monitor

1 **Open the [Environment setting] screen.**

“Displaying the controller system settings screen” (Page 10-2)

2 **Select the [Date/Time] button using the [△] [▽] [◁] [▷] keys, and then press or touch the [ENTER] key.**



The [Date/Time] screen will appear.

3 **Set the date/time.**

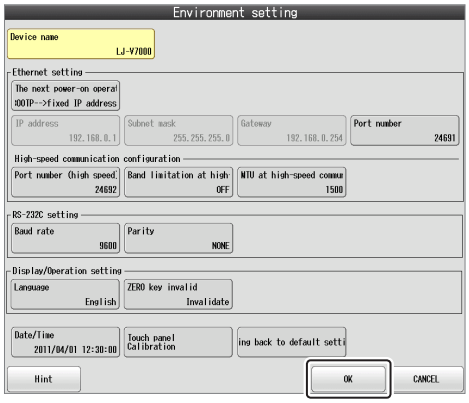
“Entering numeric values” (Page 3-13), (Page 3-21)

4 **Select the [OK] button using the [△] [▽] [◁] [▷] keys, and then press or touch the [ENTER] key.**



You will return to the [Environment setting] screen.

5 **Select the [OK] button using the [△] [▽] [◁] [▷] keys, and then press or touch the [ENTER] key.**



Display Monitor/Touch Panel Monitor System Settings

Switching the language of the display monitor

The display monitor/touch panel monitor supports the following languages:

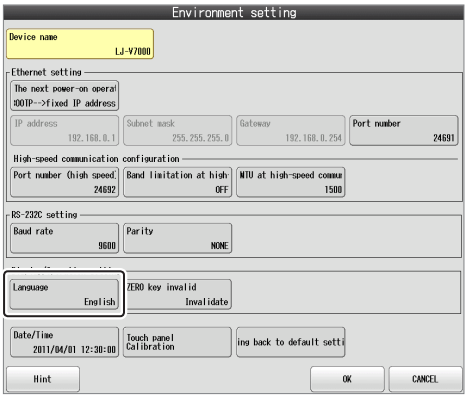
- English
- Japanese

Reference The system will initially start in Japanese.

1 Open the [Environment setting] screen.

"Displaying the controller system settings screen" (Page 10-2)

2 Select the [Language] button using the [△] [▽] [◁] [▷] keys, and then press or touch the [ENTER] key.



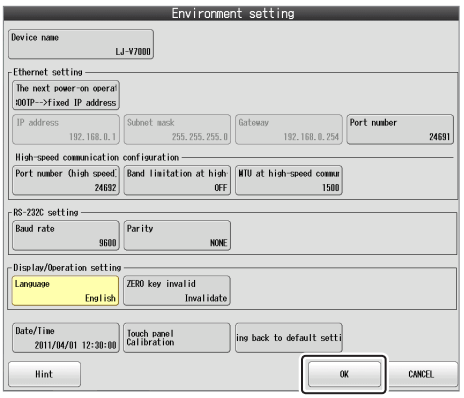
The [Language] dialog will appear.

3 Select the language you wish to set using the [△] [▽] keys, and then press or touch the [ENTER] key.



You will return to the [Environment setting] screen.

4 Click the [OK] button.



Calibrating the touch panel

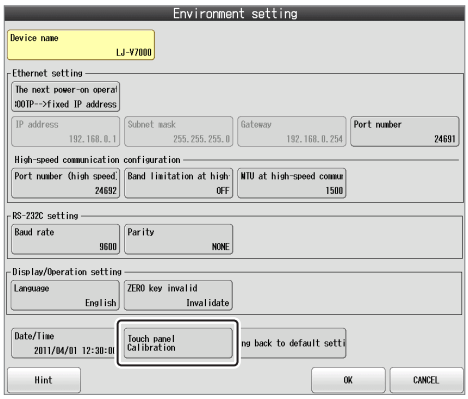
You can calibrate the touch panel to make the touched position and the position information of the touch panel consistent with each other.

Point **You can only perform this setting using the touch panel monitor.**

1 Open the [Environment setting] screen.

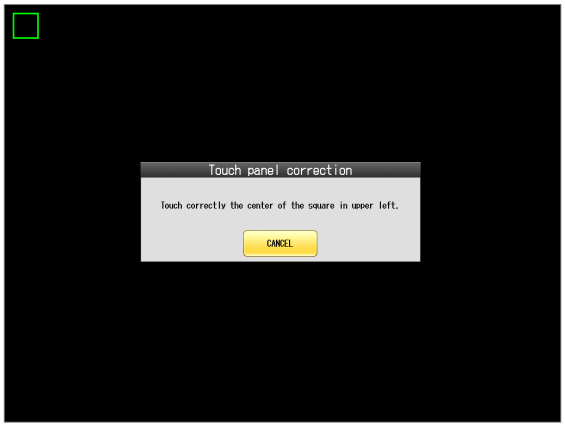
“Displaying the controller system settings screen” (Page 10-2)

2 Touch the [Touch panel Calibration] button.

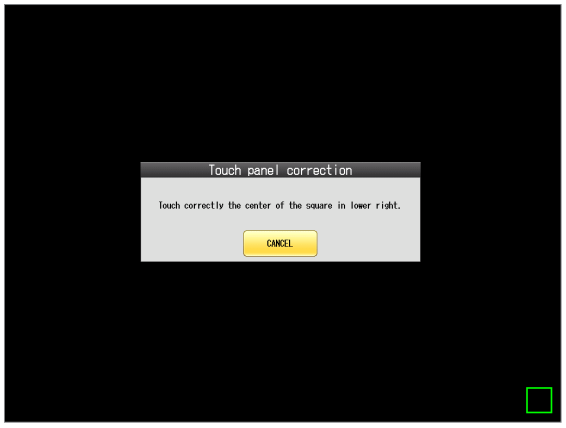


The touch panel calibration screen will appear.

3 Touch the center of the square displayed at the top left of the touch panel.



4 Touch the center of the square displayed at the bottom right of the touch panel.



5 Check the calibration result by touching the four squares shown on the touch panel.

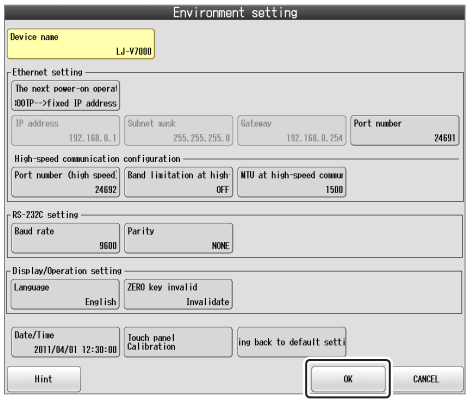
6 Touch the [OK] button.

You will return to the [Environment setting] screen.

Reference If you wish to start over, tap the [Correct again] button.



7 Touch the [OK] button.



Disabling the ZERO key of the console

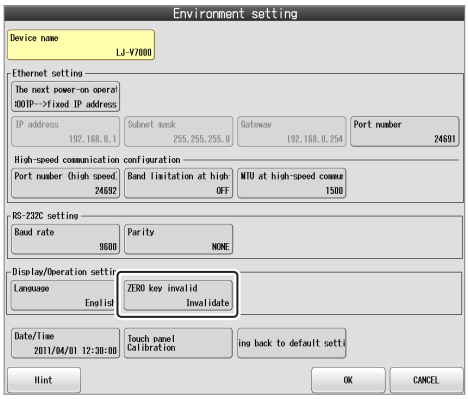
Select whether to make the ZERO key operations valid/invalid.
If you only wish to disable the [ZERO] key invalid instead of all console keys, select [Invalidate].

Point **You can only perform this setting on the display monitor/touch panel monitor.**

1 Open the [Environment setting] screen.

“Displaying the controller system settings screen” (Page 10-2)

2 Select the [ZERO key valid/invalid] button using the [△] [▽] [◁] [▷] keys, and then press or touch the [ENTER] key.



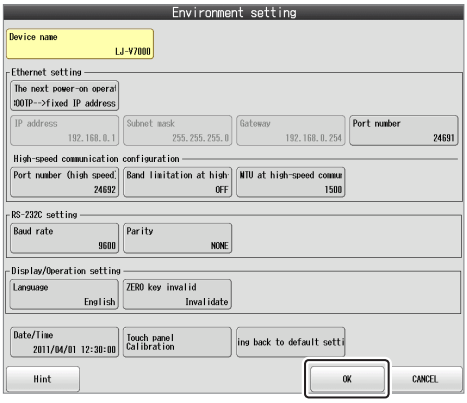
The [ZERO key invalid] screen will appear.

3 Select whether to make the ZERO key operations valid/invalid using the [△] [▽] keys, and then press or touch the [ENTER] key.



You will return to the [Environment setting] screen.

4 Click the [OK] button.



LJ-Navigator2 System Setting

You can edit the PC communication settings for connecting to the controller.

Point **You can only perform this setting in LJ-Navigator2.**

Available communication configurations

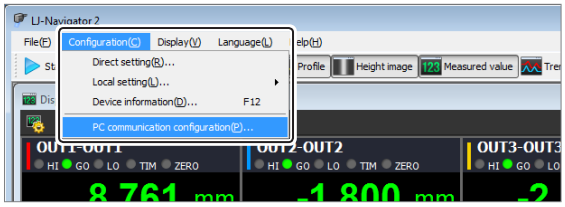
You can edit the communication setting of the connected controller.
The following types of settings are available:

- USB
  “Selecting the USB communication” (Page 10-12)
- Ethernet
  “Selecting the Ethernet communication” (Page 10-12)

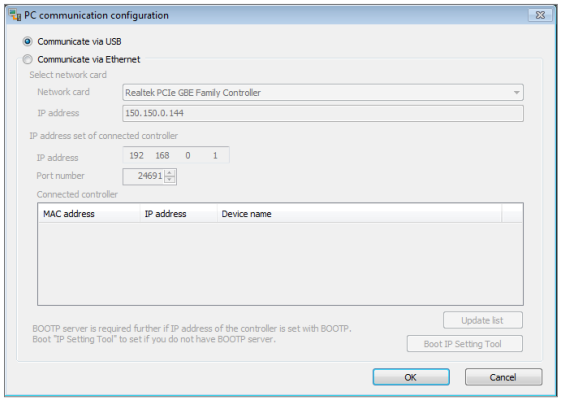
Displaying the [PC communication configuration] screen

You can set the communication mode on the [PC communication configuration] screen.

1 Click [PC communication configuration] under the [Configuration] menu.



The [PC communication configuration] screen will appear.



Selecting the USB communication

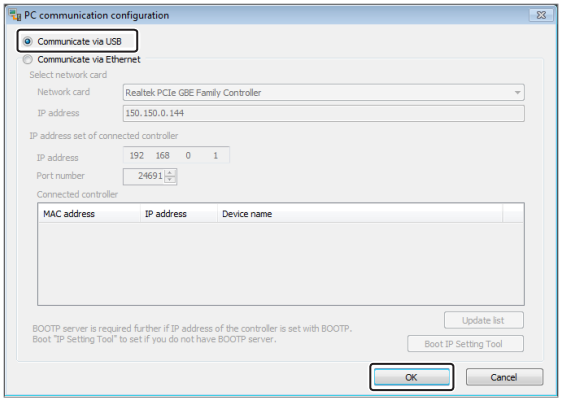
This section explains the setting procedure for connecting to the controller using USB.

1 Open the [PC communication configuration] screen.

"Displaying the [PC communication configuration] screen" (Page 10-11)

2 Select [Communicate via USB].

3 Click the [OK] button.



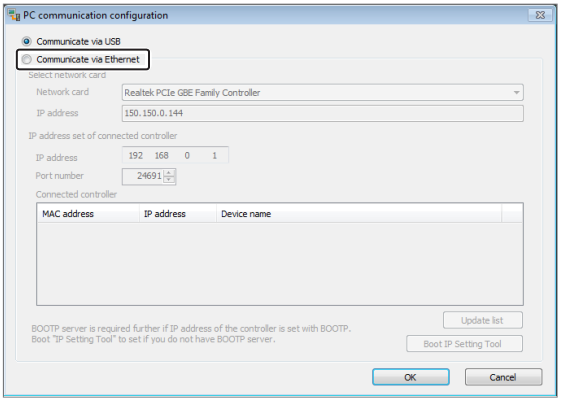
Selecting the Ethernet communication

This section explains the setting procedure for connecting to the controller using Ethernet.

1 Open the [PC communication configuration] screen.

"Displaying the [PC communication configuration] screen" (Page 10-11)

2 Select [Communicate via Ethernet].



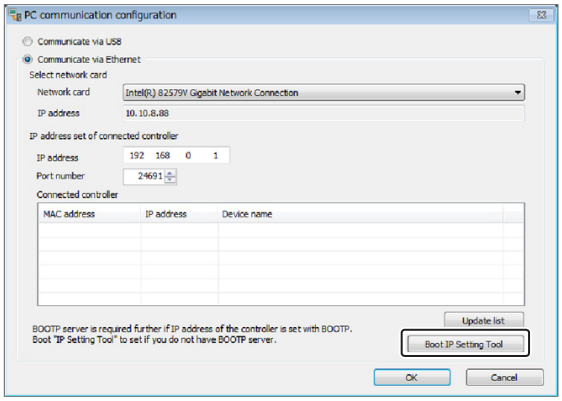
3 Select the network card you wish to use from the [Network card] pull-down menu under [Select network card].

Reference You can perform this setting when two or more network cards are inserted in the PC.

If you are connecting to the controller using Ethernet for the first time (i.e. in the factory default state), either use a BOOTP server or configure the communication setting using the included IP Setting Tool.
The following explains the procedure for starting and setting the IP Setting Tool.

Point **If the controller you wish to connect to is shown in the [Connected controller] field, go to *10*.**

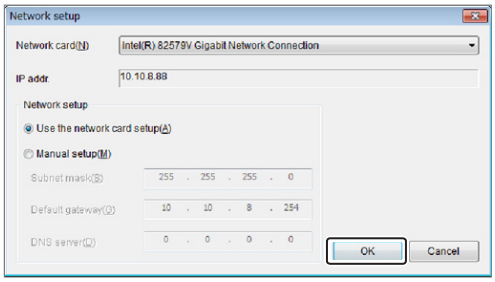
4 **Click the [Boot IP Setting Tool] button to start up the IP Setting Tool.**



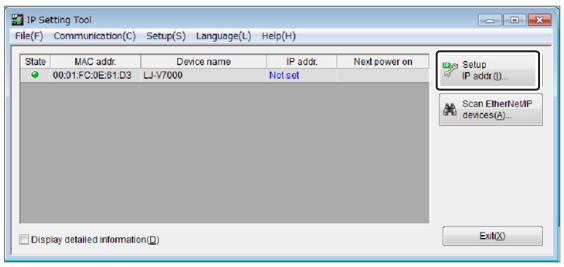
Reference If the IP Setting Tool is not installed, the [Boot IP Setting Tool] button will be grayed out. The IP Setting Tool is included on the LJ-H3 DVD. Install the IP Setting Tool and then open the [PC communication configuration] screen again.

When the IP Setting Tool starts, the [Network setup] screen will appear initially.

5 **As in step *3*, select a network card and click the [OK] button.**



6 **A start-up of BOOTP on an Ethernet device with no allocated IP address will be detected and displayed on the screen. Select the controller you wish to connect to, and click the [Setup IP addr.] button.**



Reference If the controller you wish to connect to is not shown, check the following:

- Check whether the PC and the controller are properly connected to the network.
- Make sure that the firewall of the PC is not blocking the IP Setting Tool.
- Make sure that the [The next power-on operation] setting of the controller is not set to [Fixed IP address].

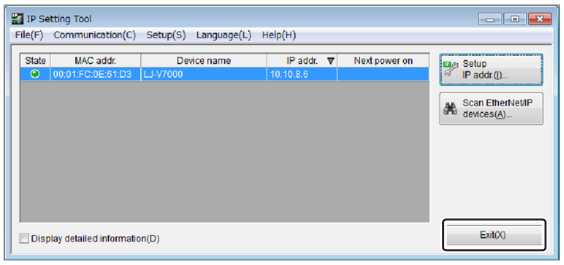
To perform these checks, you will need to connect the instrument via USB.

“The next power-on operation” (Page 10-4)

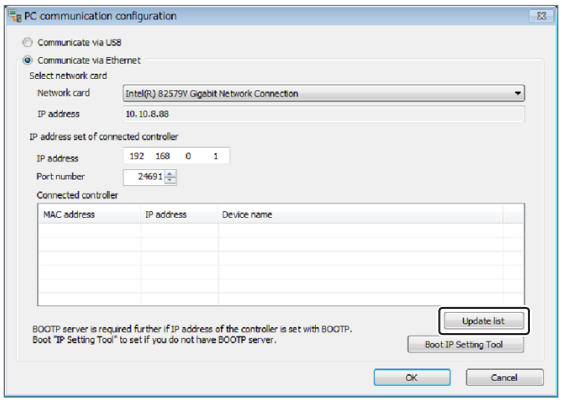
7 **Click the [Search available IP addresses] button to search for available IP addresses. When an available IP address is found, enter it in the [IP addr. (requiered)] field and click the [OK] button.**



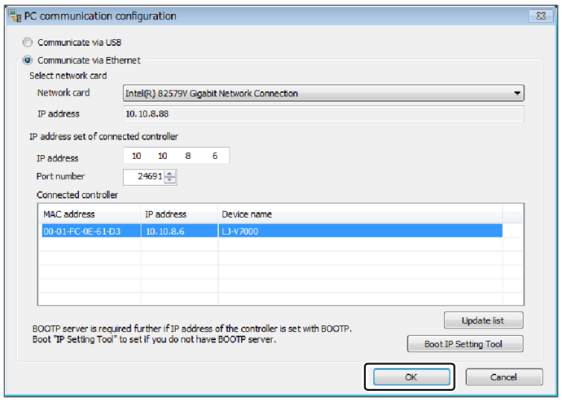
8 **When the IP address is set successfully, a screen such as shown below will appear. Click the [Exit] button to shut down the IP Setting Tool.**



9 **Click the [Update list] button to show the controller you have just set in the [Connected controller] field.**



10 **When you have selected the controller you wish to connect to from the [Connected controller] field, the IP address will be set to [IP address set of connected controller]. Click the [OK] button to close the screen.**



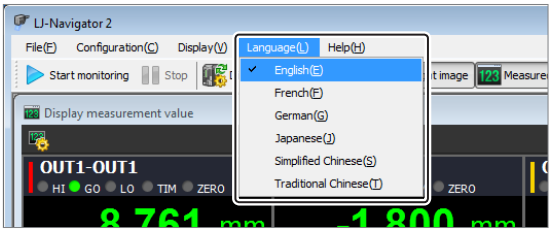
Switching the display language

The LJ-V7000 series supports a variety of languages. Available languages are:

- English
- French
- German
- Japanese
- Simplified Chinese
- Traditional Chinese

Reference When the system is started for the first time, it will follow the language setting of the operating system.

1 **Go to the [Language] menu and select the language you wish to switch to.**



When you select a language, a dialog indicating that the selected language will be active from the next start-up will appear.

2 **Click the [OK] button.**

3 **Restart LJ-Navigator2.**

11

Communication Interface and I/O Terminals

This section explains the communication specifications of the interfaces available for the LJ-V7000 series (Ethernet, USB, and RS-232C) and the specifications of the I/O terminals.

Available I/O Interfaces 11-2
Ethernet Interface 11-3
USB Interface 11-4
RS-232C Interface 11-5
I/O Terminal 11-8

Available I/O Interfaces

This unit offers two communication modes for sending/receiving commands and for high-speed data transfer.

● **For sending/receiving commands**

This unit provides Ethernet, USB and RS-232C interfaces for sending and receiving commands.
They perform controls such as sending and receiving settings, acquiring profile data and issuing triggers.
The included communication libraries are used for sending and receiving commands via Ethernet/USB.
The communication library software and the reference manual are included in the LJ-H3 DVD.

Point **Commands will not be accepted again after a command has been sent until a response is received. All commands input will therefore be ignored.**

● **For high-speed communication**

This unit provides Ethernet and USB interfaces for high-speed transfer.
The profile data is sent from the controller continuously at high speed.
Continuous transmission will begin when [High-speed communication start] is requested via the interface for sending and receiving commands. Similarly, continuous transmission will stop when [High-speed communication stop] is requested.
The included communication libraries are used for the high-speed Ethernet/USB communications.
The communication library software and the reference manual are included in the LJ-H3 DVD.

Point **High-speed communication is only available in high-speed mode.**
The profile data will be transferred at high speed as soon as it is buffered in the internal memory.
In the internal memory, transferred profiles are treated as blank and can therefore be overwritten.

Ethernet Interface

Basic specifications/Connector specifications

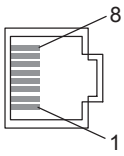
The IP address, port number, subnet mask, gateway, etc. in the system settings of the controller will be used.
See “Setting the device name/communication specifications” (Page 10-4) for details.

● Basic specifications

- Connector: RJ-45
- Medium: 100BASE-TX/1000BASE-T
- Communication protocol:
  - -TCP/IP (Free transmission)
  - -UDP (Free transmission)

● Connector specifications

The specifications of the Ethernet port of this unit are as shown below.



(Controller side)

	100BASE-TX		1000BASE-T	
No.	Signal	Signal direction	Signal	Signal direction
1	TX +	Output	TRX +	I/O
2	TX -	Output	TRX -	I/O
3	RX +	Input	TRX +	I/O
4	Not used	—	TRX +	I/O
5	Not used	—	TRX -	I/O
6	RX -	Input	TRX -	I/O
7	Not used	—	TRX +	I/O
8	Not used	—	TRX -	I/O

NOTICE	**If you are connecting using 1000BASE-T, use a Category 7 or 10GBASE compatible Ethernet cable.**

USB Interface

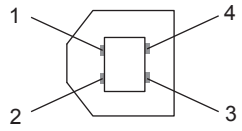
Basic specifications/Connector specifications

● Basic specifications

- Connector: Type B female connector
- Standards: USB Ver.2.0 compliant; High-Speed supported (USB Ver.1.1Full-Speed compatible)

● Connector specifications

The specifications of the USB port of this unit are as shown below.



(Controller side)

No.	Signal	Signal description	Signal direction
1	VBUS	VBUS	—
2	D -	Differential signal -	I/O
3	D +	Differential signal +	I/O
4	GND	GND	—

RS-232C Interface

Communication specifications

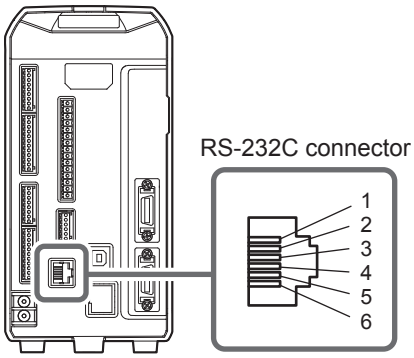
EIA RS-232C compliant (Modem defined)

Communication mode	Full duplex
Synchronization mode	Start-stop synchronization
Transmission code	ASCII
Data length	8 bit
Stop length	1 bit
Parity *	None (Initial value), Even, Odd
Baud rate*	9600 (Initial value), 19200, 38400, 57600, 115200 bps
Data Delimiter	CR
Flow control	None

*: The parity and baud rate in the system settings of the controller will be used.
“Setting the device name/communication specifications” (Page 10-4)

Connector specifications

Compatible connector specifications: Modular 6-pin plug connector
A 2.5 m RS-232C straight-through cable (OP-96368) is provided.
“Optional Product List” (Page 1-3)

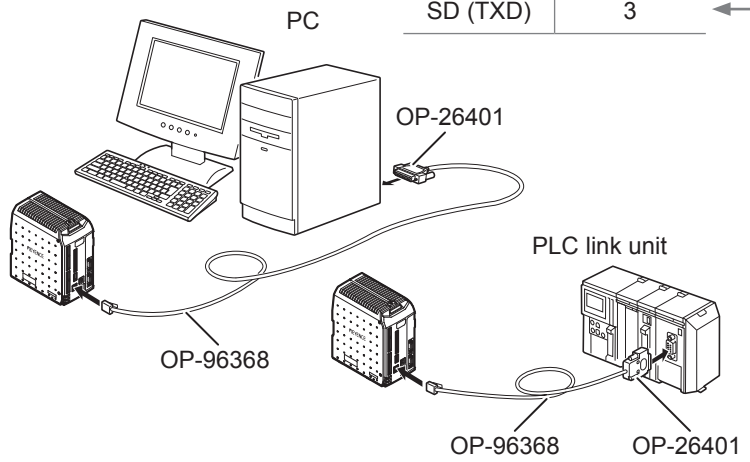


Terminal No.	Signal name	Content
1	(Not used)	-
2	(Not used)	-
3	SD (TXD)	Receive from external instrument (Input)
4	SG (GND)	GND
5	RD (RXD)	Send to external instrument (Output)
6	(Not used)	-

*: Do not use unused terminals as it may result in a malfunction.
*: 24 V DC (-) and SG (GND) are insulated.
*: SD will be receiving (input to this unit) and RD will be sending (output from this unit) respectively as defined by the modem.

Connection with the PLC link unit or PC

Dedicated cables OP-96368 (Straight-through cable, 2.5 m) and OP-26401 (D-sub, 9 pins) are used in combination for the connections.
Before connecting the instruments, read the instruction manuals of the PC and the PLC link unit.
“Optional Product List” (Page 1-3)



LJ-V7000 series side		PC side	
		OP-26401	Signal name
RD (RXD)	5	2	RD (RXD)
SG (GND)	4	5	SG (GND)
SD (TXD)	3	3	SD (TXD)
		7	RS (RTS)
		8	CS (CTS)
		6	DR (DSR)
			CD (DCD)
		4	ER (DTR)

Outputting measurement values and changing settings using commands

By connecting this unit to external instruments such as the PC or PLC link unit, you can export measurement values and modify the settings of this unit.

Point **When creating a control program, check the reply command from this unit and then send the following command to the unit.**

■ Command types

The following four types of commands are available:

● Measurement control commands

These commands are used for controlling the measurement. You can perform operations such as trigger input, measurement value output, timing input, auto zero input, reset etc.
“Measurement control command list” (Page A-7)

● Settings control commands

These commands are used for controlling the settings. You can perform operations such as setting save request, setting save completion check, program initialization, program switching, etc.
“Setting control command list” (Page A-12)

● Settings change command

These commands are used for editing the measurement program settings. You can change the [No. of hold measure val], [Measure value filter], [Hold mode], [Tolerance setting], etc.
“Settings change command list” (Page A-14)

● Setting check command

These commands are used for checking the measurement program settings.
“Settings check command list” (Page A-18)

■ Command format

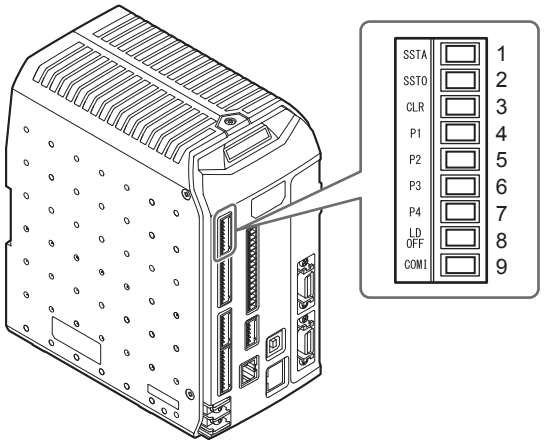
This unit performs the controls specified in the command received from the external instrument and then returns a reply command to the external instrument.
A CR (carriage return) is used for separating the received and reply command data.
“Command format” (Page A-4)

I/O Terminal

This section explains the names of the I/O terminals (Input terminal block 1, Input terminal block 2, Encoder signal input terminal block, Output terminal block 1, Output terminal block 2, Analog voltage terminal block, 24 V power supply terminal block) of this unit and their arrangements.
“Part Names and Functions” (Page 1-6)

Input terminal block 1

Compatible socket block (main unit mountable component): FK-MC0.5/9-ST-2.5 (Phoenix contact)
Compatible cable specification: AWG20 to 28, Tip processing length 8 mm



No.	Terminal symbol	Signal name	Signal description	Circuit diagram	
				LJ-V7001	LJ-V7001P
1	SSTA	STORAGE_START	Storage start input Starts the storage process.	No-voltage input	Voltage input
2	SSTO	STORAGE_STOP	Storage stop input Stops the storage process.		
3	CLR	CLEAR	Clear internal memory input Clears the internal memory.		
4	P1	P1	Program No. switching input Selects and switches to a program No. from 0 to 15. If you wish to enable the program switching input, you will need to change the [Program switch] in the common measurement settings to the terminals.		
5	P2	P2			
6	P3	P3			
7	P4	P4			
8	LDOFF	LASER_OFF	Laser OFF input Starts/stops the measurement by switching the laser ON/OFF.		
9	COMI	COM_IN	Common for input		

Point **No insulation exists between each I/O circuit. Exercise caution to prevent a potential difference from occurring.**
“Insulated condition between each I/O circuit” (Page 11-19)

Reference REMOTE and COM_IN1 are short-circuited in their factory default state.
“I/O circuit” (Page 11-17)
“How to use the terminal block” (Page 2-12)
“Chapter 12 Timing Chart and Response Time” (Page 12-1)

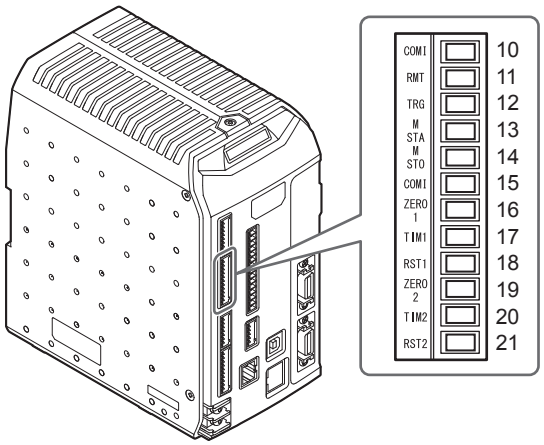
To switch between the program numbers, maintain P1 to P4 terminals in the following states:

Program No.	P4	P3	P2	P1
00	OFF	OFF	OFF	OFF
01	OFF	OFF	OFF	ON
02	OFF	OFF	ON	OFF
03	OFF	OFF	ON	ON
04	OFF	ON	OFF	OFF
05	OFF	ON	OFF	ON
06	OFF	ON	ON	OFF
07	OFF	ON	ON	ON
08	ON	OFF	OFF	OFF
09	ON	OFF	OFF	ON
10	ON	OFF	ON	OFF
11	ON	OFF	ON	ON
12	ON	ON	OFF	OFF
13	ON	ON	OFF	ON
14	ON	ON	ON	OFF
15	ON	ON	ON	ON

- LJ-V7000 (NPN type)
  ON: Short circuit with the COM_IN2 terminal
  OFF: Open state
- LJ-V7000P (PNP type)
  ON: Voltage applied state
  OFF: Open state

Input terminal block 2

Compatible socket block (main unit mountable component): FK-MC0.5/12-ST-2.5 (Phoenix contact)
Compatible cable specification: AWG20 to 28, Tip processing length 8 mm



No.	Terminal symbol	Signal name	Signal description	Circuit diagram	
				LJ-V7001	LJ-V7001P
10	COMI	COM_IN	Common for input		
11	RMT	REMOTE	Laser remote interlock input Emits the laser in short-circuited state with the common terminal for input. The emission will stop with open state. REMOTE and COM_IN1 terminals are short-circuited in their factory default state.	No-voltage input (N.C.)	No-voltage input (N.C.)
12	TRG	TRG	Trigger input Issues the external trigger.	No-voltage input	Voltage input
13	MSTA	MEASURE_START	Batch measurement start input Starts the batch measurement.		
14	MSTO	MEASURE_STOP	Batch measurement stop input Stops the batch measurement.		
15	COMI	COM_IN	Common for input		
16	ZERO1	ZERO1/TRG_ERROR_RESET	Auto zero 1 input/Imaging trigger error clear input Sets the OUT measurement value allocated to ZERO1 to zero. Auto zero will be cleared if it is ON for two seconds or longer. Clears the error when an imaging trigger error occurs.	No-voltage input	Voltage input
17	TIM1	TIMING1	Timing 1 input Functions as the hold function for holding the measurement value of the OUT allocated to TIMING1.		

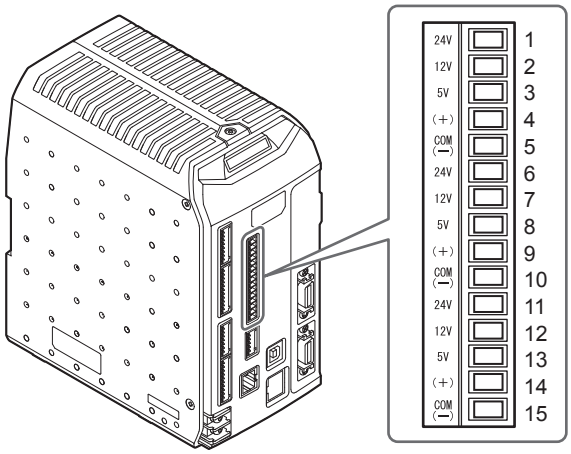
No.	Terminal symbol	Signal name	Signal description	Circuit diagram	
				LJ-V7001	LJ-V7001P
18	RST1	RESET1	Reset 1 input Resets the OUT measurement value allocated to RESET1. The data will be judgement standby data until the measurement value is updated.	No-voltage input	Voltage input
19	ZERO2	ZERO2	Auto zero 2 input Sets the OUT measurement value allocated to ZERO2 to zero. Auto zero will be cleared if it is ON for two seconds or longer.		
20	TIM2	TIMING2	Timing 2 input Functions as the hold function for holding the measurement value of the OUT allocated to TIMING2.		
21	RST2	RESET2	Reset 2 input Resets the OUT measurement value allocated to RESET2. The data will be judgement standby data until the measurement value is updated.		

Point **No insulation exists between each I/O circuit. Exercise caution to prevent a potential difference from occurring.**
“Insulated condition between each I/O circuit” (Page 11-19)

Reference REMOTE and COM_IN1 are short-circuited in their factory default state.
“I/O circuit” (Page 11-17)
“How to use the terminal block” (Page 2-12)
“Chapter 12 Timing Chart and Response Time” (Page 12-1)

Encoder signal input terminal block

Compatible socket block (main unit mountable component): FK-MCP1.5/15-ST-3.5 (Phoenix contact)
Compatible cable specification: AWG16 to 28, Tip processing length 9 mm



No.	Terminal symbol	Signal name	Signal description	Circuit diagram	
				LJ-V7001	LJ-V7001P
1	24 V	ENCODER_A + (24 V)	Encoder A-phase input (24 V)	Encoder input circuit (Open collector output support)	
2	12 V	ENCODER_A + (12 V)	Encoder A-phase input (12 V)		
3	5 V	ENCODER_A + (5 V)	Encoder A-phase input (5 V)		
4	(+)	ENCODER_A +	Encoder A-phase input (Line driver)	Encoder input circuit (Line driver output supported)	
5	COM (-)	ENCODER_A -	Encoder A-phase input (-)	Encoder input circuit	
6	24 V	ENCODER_B + (24 V)	Encoder B-phase input (24 V)	Encoder input circuit (Open collector output support)	
7	12 V	ENCODER_B + (12 V)	Encoder B-phase input (12 V)		
8	5 V	ENCODER_B + (5 V)	Encoder B-phase input (5 V)		
9	(+)	ENCODER_B +	Encoder B-phase input (Line driver)	Encoder input circuit (Line driver output supported)	
10	COM (-)	ENCODER_B -	Encoder B-phase input (-)	Encoder input circuit	
11	24 V	ENCODER_Z + (24 V)	Encoder Z-phase input (24 V)	Encoder input circuit (Open collector output support)	
12	12 V	ENCODER_Z + (12 V)	Encoder Z-phase input (12 V)		
13	5 V	ENCODER_Z + (5 V)	Encoder Z-phase input (5 V)		
14	(+)	ENCODER_Z +	Encoder Z-phase input (Line driver)	Encoder input circuit (Line driver output supported)	
15	COM (-)	ENCODER_Z -	Encoder Z-phase input (-)	Encoder input circuit	

Point

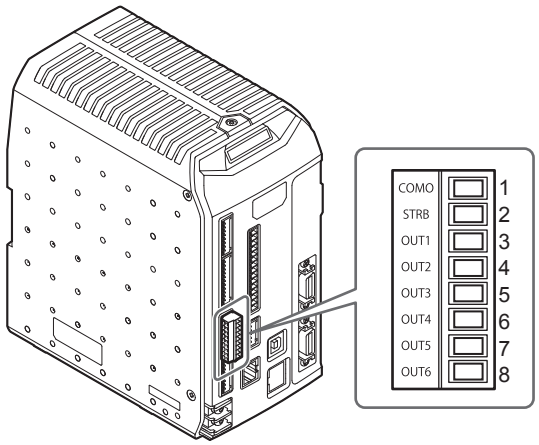
- **For how to use the Z-phase input, refer to the Communication Library Reference Manual.**
- **No insulation exists between each I/O circuit. Exercise caution to prevent a potential difference from occurring. “Insulated condition between each I/O circuit” (Page 11-19)**

Reference

“Encoder input” (Page 11-20)
“How to use the terminal block” (Page 2-12)
“Chapter 12 Timing Chart and Response Time” (Page 12-1)

Output terminal block 1

Compatible socket block (main unit mountable component): FK-MC0.5/8-ST-2.5 (Phoenix contact)
Compatible cable specification: AWG20 to 28, Tip processing length 8 mm



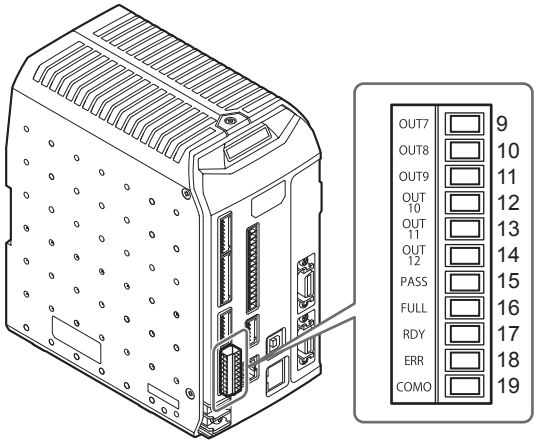
No.	Terminal symbol	Signal name	Signal description		Circuit diagram	
					LJ-V7000	LJ-V7000P
1	COMO	COM_OUT	Common for output			
2	STRB	STROBE	Strobe output ON at the timing when the judgement output is updated. ON when a program is switched or a reset is input.		NPN Open Collector Output	PNP Open Collector Output
3	OUT1	OUT_PIN1	Judgement output 1	The HI/GO/LO judgement result of each OUT is assigned freely.		
4	OUT2	OUT_PIN2	Judgement output 2			
5	OUT3	OUT_PIN3	Judgement output 3			
6	OUT4	OUT_PIN4	Judgement output 4			
7	OUT5	OUT_PIN5	Judgement output 5			
8	OUT6	OUT_PIN6	Judgement output 6			

Point **No insulation exists between each I/O circuit. Exercise caution to prevent a potential difference from occurring.**
“Insulated condition between each I/O circuit” (Page 11-19)

Reference
“I/O circuit” (Page 11-17)
“How to use the terminal block” (Page 2-12)
“Chapter 12 Timing Chart and Response Time” (Page 12-1)
“Judgement output” (Page 7-3)

Output terminal block 2

Compatible socket block (main unit mountable component): FK-MC0.5/11-ST-2.5 (Phoenix contact)
Compatible cable specification: AWG20 to 28, Tip processing length 8 mm



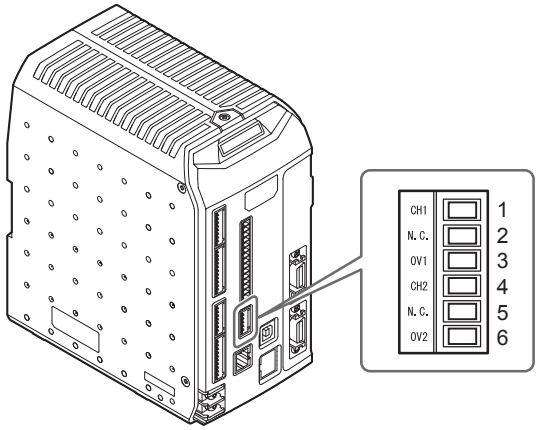
No.	Terminal symbol	Signal name	Signal description		Circuit diagram	
					LJ-V7000	LJ-V7000P
9	OUT7	OUT_PIN7	Judgement output 7	The HI/GO/LO judgement result of each OUT is assigned freely.	NPN Open Collector Output	PNP Open Collector Output
10	OUT8	OUT_PIN8	Judgement output 8			
11	OUT9	OUT_PIN9	Judgement output 9			
12	OUT10	OUT_PIN10	Judgement output 10			
13	OUT11	OUT_PIN11	Judgement output 11			
14	OUT12	OUT_PIN12/ TRG_ERROR	Judgement output 12 / Imaging trigger error output "Parallel imaging settings and the roles of terminals" (Page A-50)	ON when an imaging trigger error occurs.		
15	PASS	TRG_PASS	Trigger invalid output On when a trigger was not accepted.			
16	FULL	MEMORY_FULL	Internal memory full output On when the internal memory is full.			
17	RDY	READY	Trigger ready output On when trigger input is acceptable.			
18	ERR	ERROR	System error output (N.C.) On when the power is switched on and when a system error occurs.			
19	COMO	COM_OUT	Common for output			

Point **No insulation exists between each I/O circuit. Exercise caution to prevent a potential difference from occurring.**
"Insulated condition between each I/O circuit" (Page 11-19)

Reference
- "I/O circuit" (Page 11-17)
- "How to use the terminal block" (Page 2-12)
- "Chapter 12 Timing Chart and Response Time" (Page 12-1)
- "Judgement output" (Page 7-3)
- "External trigger" (Page 5-6)

Analog voltage output terminal block

Compatible socket block (main unit mountable component): FK-MC0.5/6-ST-2.5 (Phoenix contact)
Compatible cable specification: AWG20 to 28, Tip processing length 8 mm

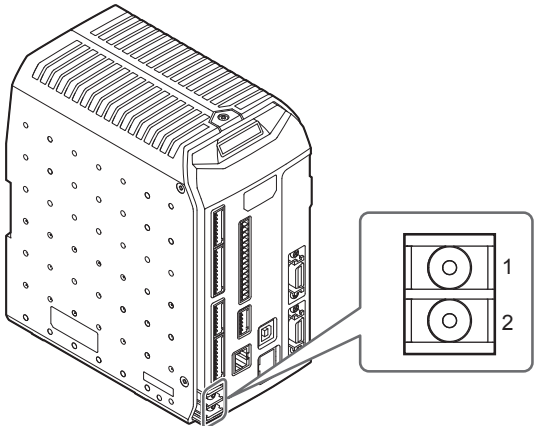


No.	Terminal symbol	Signal name	Signal description	Circuit diagram	
				LJ-V7000	LJ-V7000P
1	CH1	CH1_(+)	Analog voltage output + side terminal for CH1 The output will be ±10.5 V.	Analog voltage output circuit	
2	N.C.	N.C.	Do not connect anything to this spare terminal.		
3	0V1	CH1_0V	Analog voltage output 0 V terminal for CH1	Analog voltage output circuit	
4	CH2	CH2_(+)	Analog voltage output + side terminal for CH2 The output will be ±10.5 V.	Analog voltage output circuit	
5	N.C.	N.C.	Do not connect anything to this spare terminal.		
6	0V2	CH2_0V	Analog voltage output 0 V terminal for CH2	Analog voltage output circuit	

Point **No insulation exists between each I/O circuit. Exercise caution to prevent a potential difference from occurring.**
“Insulated condition between each I/O circuit” (Page 11-19)

Reference
“I/O circuit” (Page 11-17)
“How to use the terminal block” (Page 2-12)
“Chapter 12 Timing Chart and Response Time” (Page 12-1)
“Analog output” (Page 7-3)

24 V power supply terminal block



No.	Terminal symbol	Signal name	Signal description	Circuit diagram	
				LJ-V7000	LJ-V7000P
1	24 V DC (+)	24 V DC (+)	24 V input for the power supply		
2	24 V DC (-)	24 V DC (-)	0 V input for the power supply		

Point **No insulation exists between each I/O circuit. Exercise caution to prevent a potential difference from occurring.**
“Insulated condition between each I/O circuit” (Page 11-19)

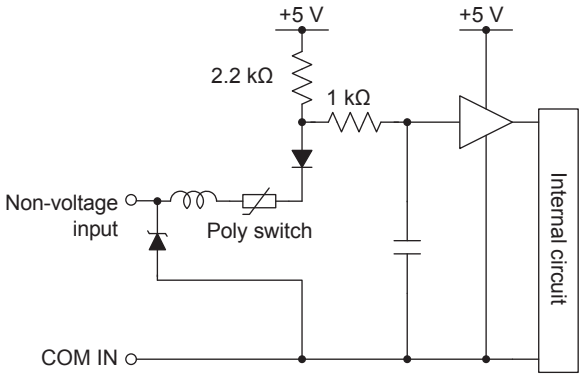
Reference
“I/O circuit” (Page 11-17)
“Connecting the power supply to the controller” (Page 2-11)
“Chapter 12 Timing Chart and Response Time” (Page 12-1)

I/O circuit

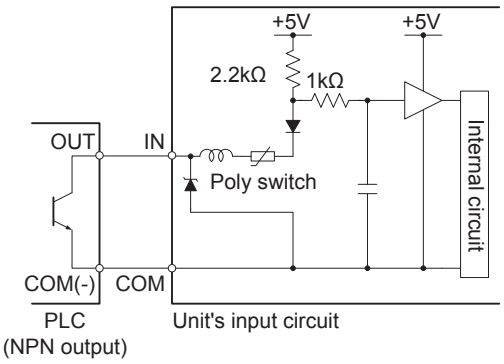
■ LJ-V7001 (NPN type)

● Non-voltage input

ON voltage	1 V or less
OFF current	0.6 mA or less
Short-circuit current (Typ.)	2 mA

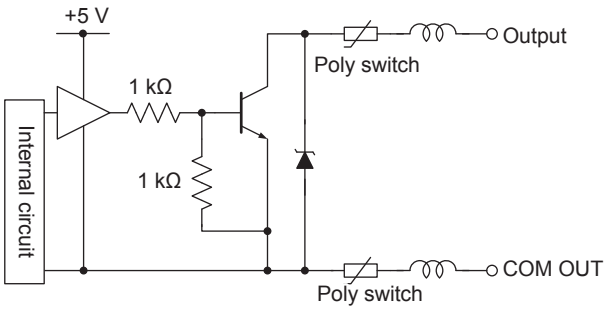


A connection example for an NPN output PLC that is connected to the unit's non-voltage input.

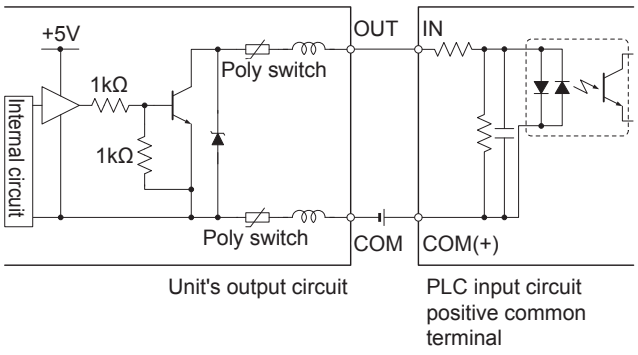


● NPN open collector output

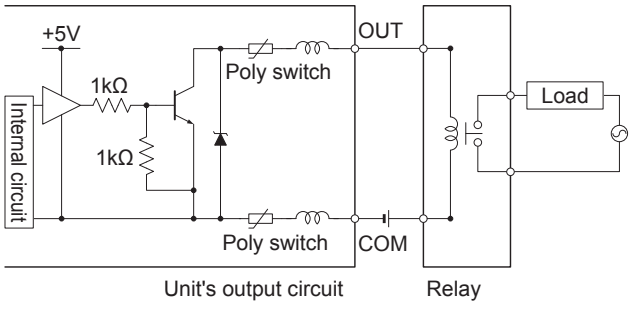
Maximum applied voltage	40 V
Maximum sink current	50 mA
Residual voltage	1.0 V or less (50 mA) 0.5 V or less (20 mA)
Leak current	0.1 mA or less



A connection example for inputting the unit's NPN output into the PLC via the positive common terminal.



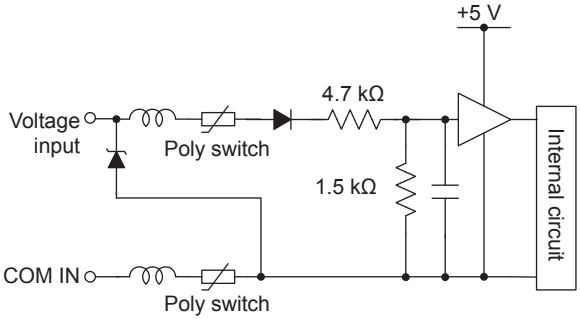
A connection example for inputting the unit's NPN output into the relay



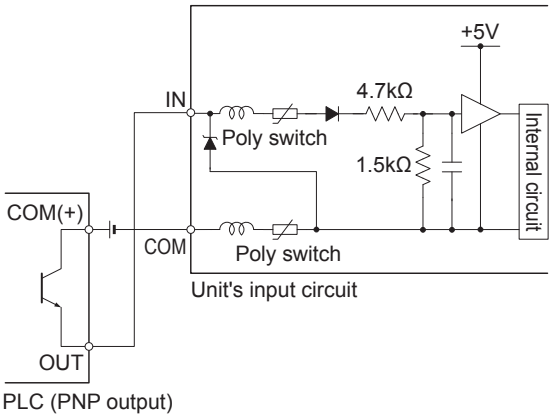
■ LJ-V7001P (PNP type)

● Voltage input

Maximum rated input	26.4 V
ON voltage	10.8 V or higher
ON current (Typ.)	2 mA or more
OFF current	0.6 mA or less

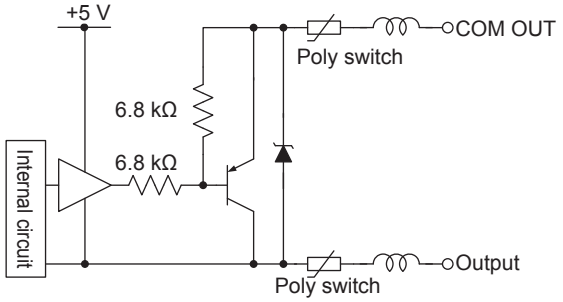


A connection example for an PNP output PLC that is connected to the unit's voltage input.

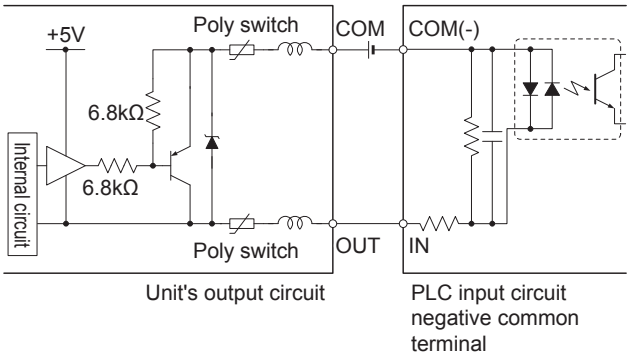


● PNP open collector output

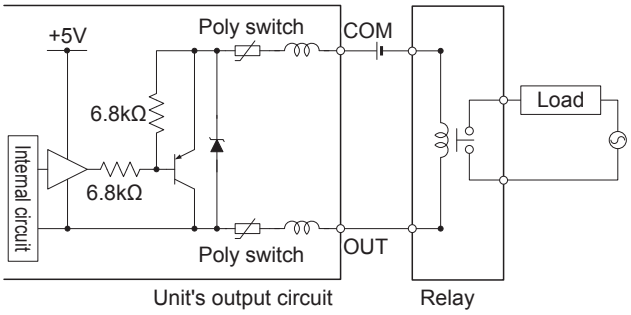
Maximum applied voltage	30 V
Maximum source current	50 mA
Residual voltage	1.0 V or less (50 mA) 0.5 V or less (20 mA)
Leak current	0.1 mA or less



A connection example for inputting the unit's PNP output into the PLC via the negative common terminal.

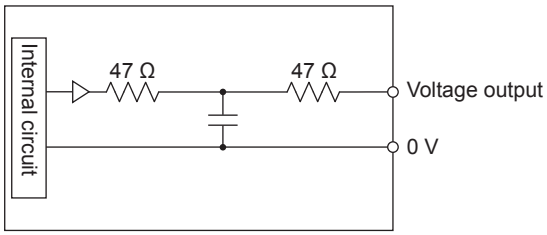


A connection example for inputting the unit's PNP output into the relay



■ Common for LJ-V7001/LJ-V7001P

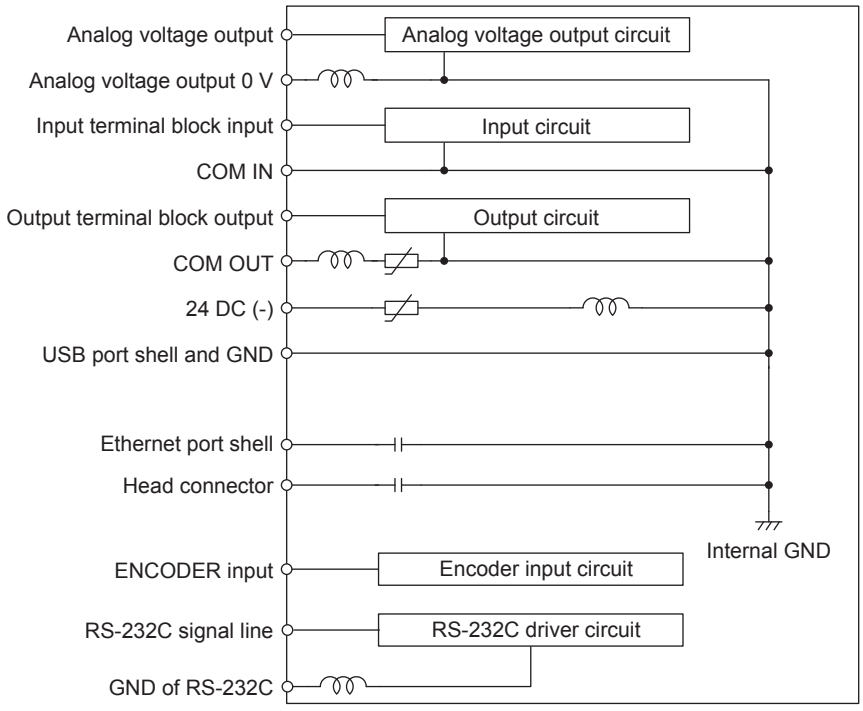
● Analog voltage output



Output range	±10.8 V (Measurement value: ±10.5 V)
Resolution	2 mV
Accuracy	±0.05% of F.S. (F.S. = 20 V; Accuracy against displayed value)
Output impedance	Approx. 100 Ω
Response delay time	Approx. 2 μs (after updating the measurement value)

● Insulated condition between each I/O circuit

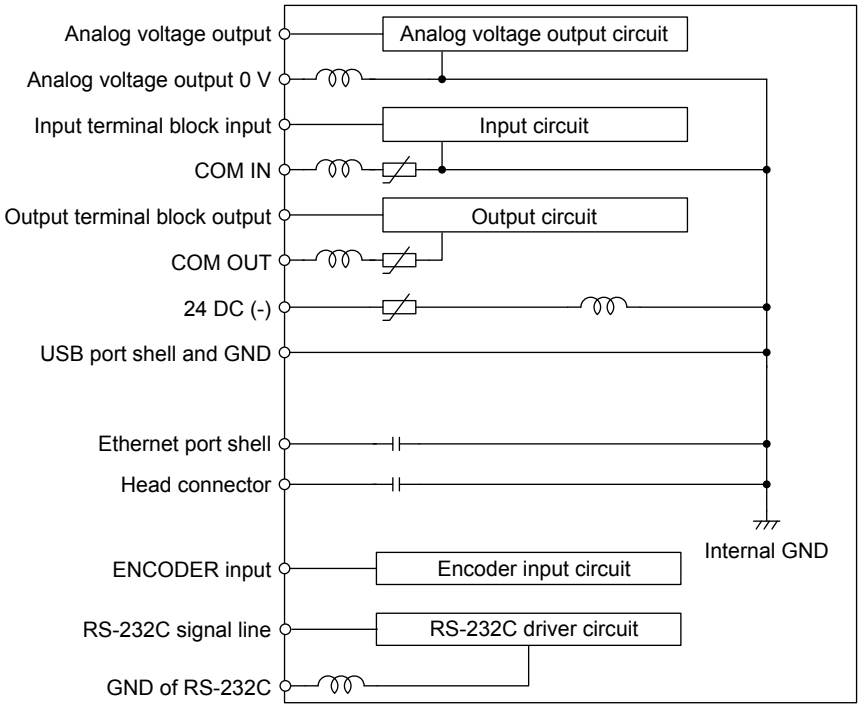
LJ-V7000 (NPN open collector type)



- The Ethernet port shell and the head connector are coupled with the internal GND and the capacitor, respectively.
- RS-232C and ENCODER inputs are insulated from the internal GND.

NOTICE	**24 V DC (-), COM_IN, COM_OUT and the analog voltage output 0 V are not insulated.** **Also, 24 V DC (-), the metallic USB port shell and GND are not insulated.** **Exercise caution to avoid a potential difference between the common internal terminals due to the + grounding environment or potential difference between the instruments.** **It may result in malfunction of the unit or the external instruments connected to the unit such as the PC.**

LJ-V7000 (PNP open collector type)



- The Ethernet port shell and the head connector are coupled with the internal GND and the capacitor, respectively.
- RS-232C and ENCODER inputs are insulated from the internal GND.

NOTICE	**24 V DC (-), COM_IN and the analog voltage output 0 V are not insulated.** **Also, 24 V DC (-), the metallic USB port shell and GND are not insulated.** **Exercise caution to avoid a potential difference between the common internal terminals due to the + grounding environment or potential difference between the instruments.** **It may result in malfunction of the unit or the external instruments connected to the unit such as the PC.**

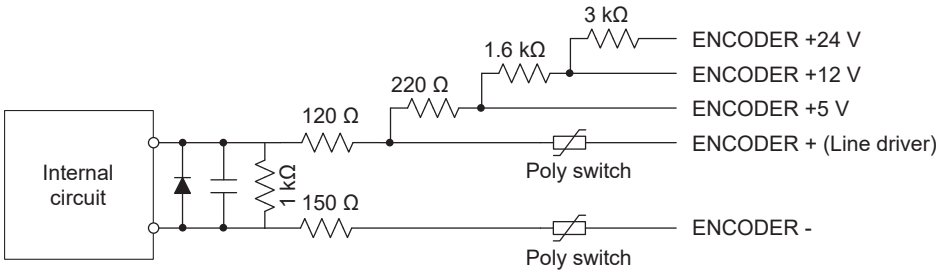
Encoder input

Electric specifications and input circuit example of encoder input

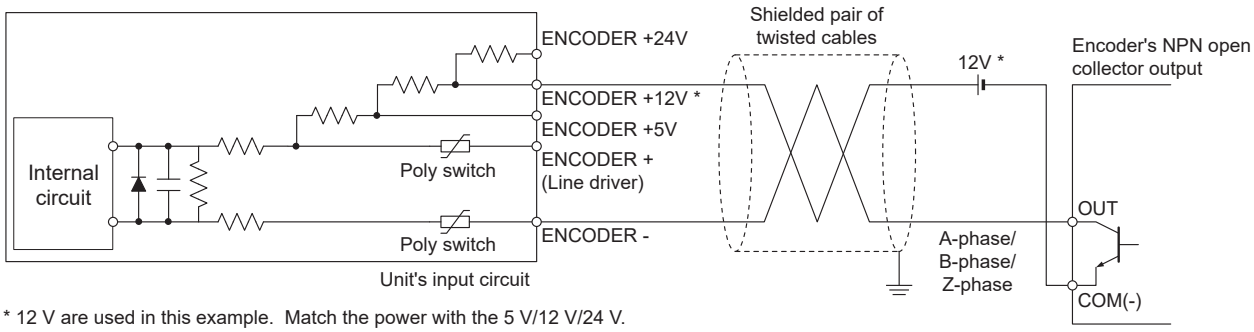
Encoder input specifications

Encoder input channels	Open collector power voltage			Line driver
	24 V DC	12 V DC	5V DC	
Maximum rated input	26.4 V DC	13.2 V DC	5.5 V DC	(equivalent to AM26LS31)
Minimum ON voltage	21.6 V DC	10.8 V DC	3.5 V DC	
Maximum OFF voltage	3.6 V DC	2.4 V DC	1.0 V DC	
Minimum ON current	2 mA			

The encoder input circuit diagram is common for A-phase, B-phase and Z-phase

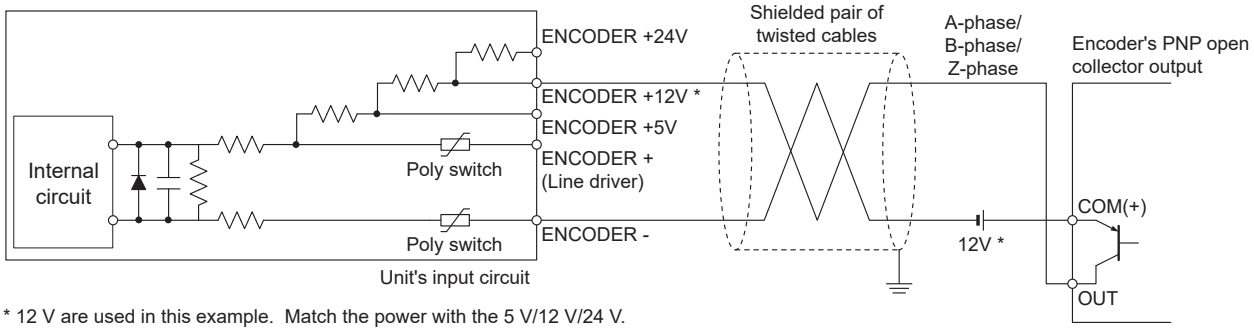


Connection example : When the encoder is an NPN open collector output



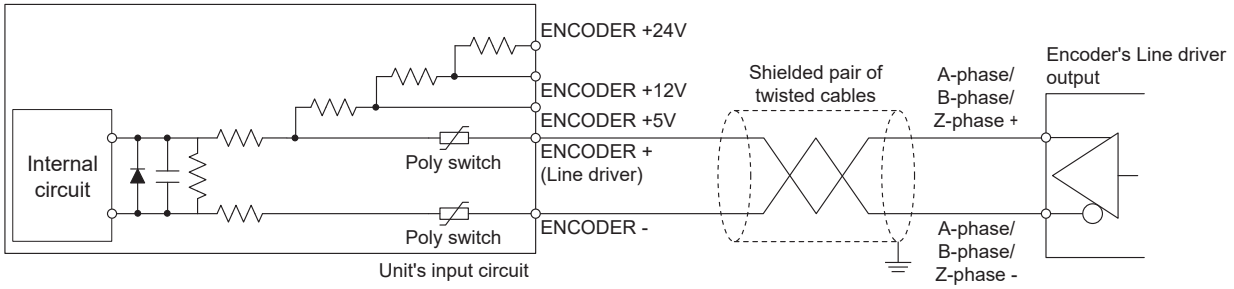
* 12 V are used in this example. Match the power with the 5 V/12 V/24 V.

Connection example : When the encoder is an PNP open collector output



* 12 V are used in this example. Match the power with the 5 V/12 V/24 V.

Connection example : When the encoder is a line driver output



MEMO

12

Timing Chart and Response Time

This section explains the I/O timing charts based on the measurement, system settings and the communication response time of each interface.

Encoder Trigger 12-2
Timing Chart (High-speed Mode) 12-4
Timing Chart (Advanced Function Mode) 12-18
Timing Chart (Common) 12-55
State Table 12-58

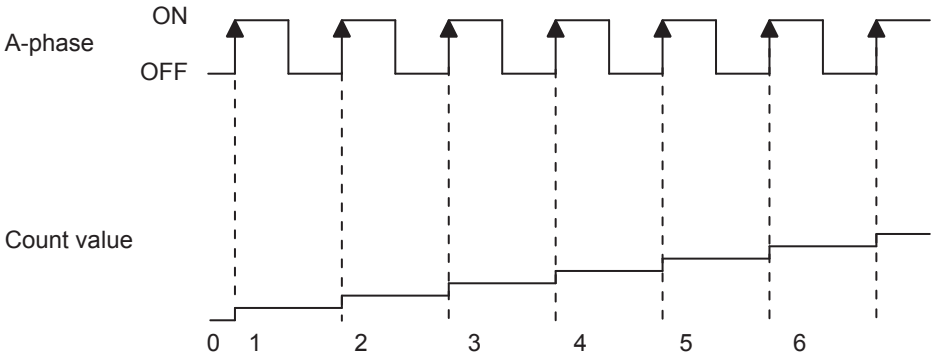
Encoder Trigger

Encoder trigger input modes

This section explains the four types of input modes that are available for the encoder trigger.

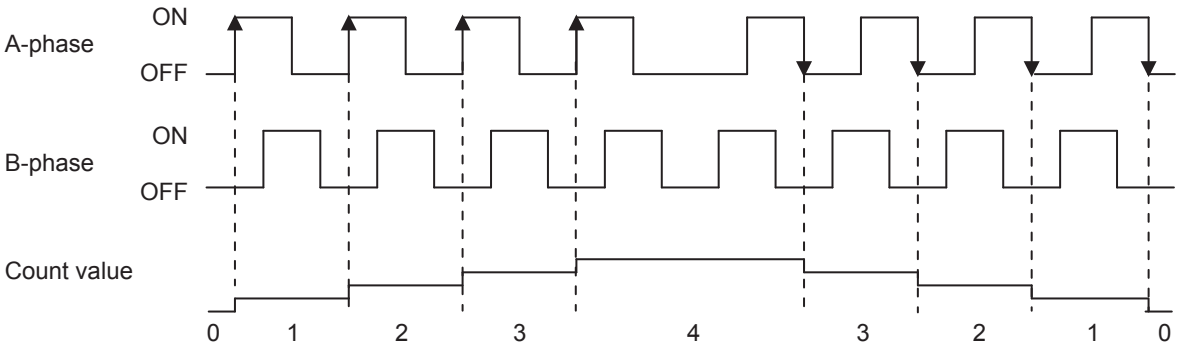
■ 1-phase 1 TM (no dir.)

Counts the rising of A-phase.



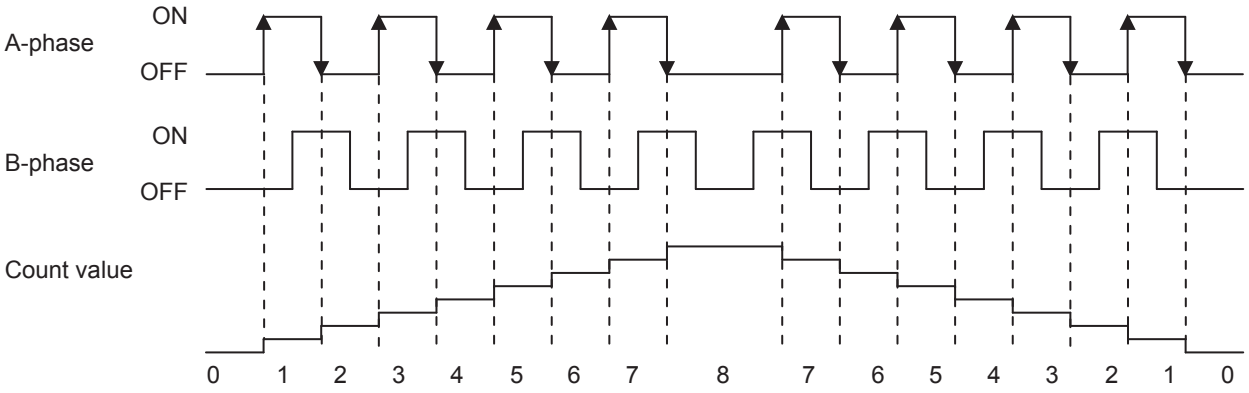
■ 2-phase 1 time

When B-phase is OFF, the count value will be incremented by the rising of A-phase.
When B-phase is OFF, the count value will be decremented by the falling of A-phase.



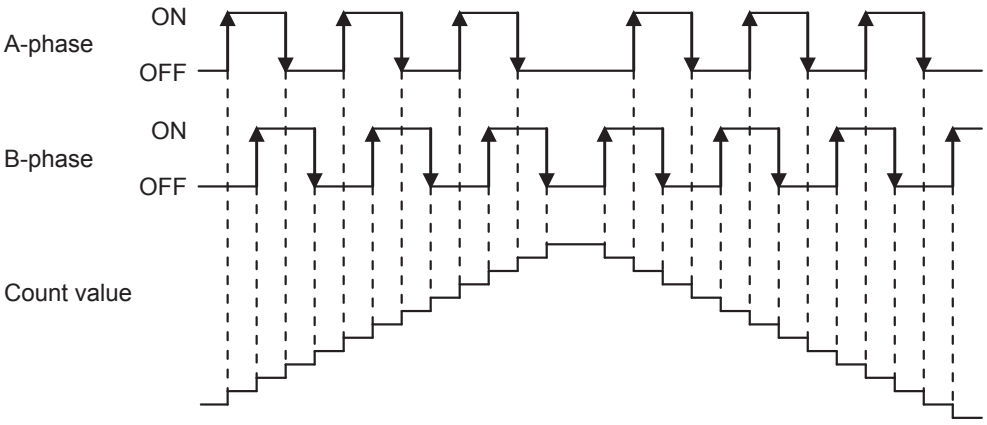
■ 2-phase 2 times

When B-phase is OFF, the count value will be incremented by the rising of A-phase.
When B-phase is OFF, the count value will be decremented by the falling of A-phase.
When B-phase is ON, the count value will be decremented by the rising of A-phase.
When B-phase is ON, the count value will be incremented by the falling of A-phase.



■ 2-phase 4 times

When B-phase is OFF, the count value will be incremented by the rising of A-phase.
When B-phase is OFF, the count value will be decremented by the falling of A-phase.
When B-phase is ON, the count value will be decremented by the rising of A-phase.
When B-phase is ON, the count value will be incremented by the falling of A-phase.
When A-phase is ON, the count value will be incremented by the rising of B-phase.
When A-phase is ON, the count value will be decremented by the falling of B-phase.
When A-phase is OFF, the count value will be decremented by the falling of B-phase.
When A-phase is OFF, the count value will be incremented by the falling of B-phase.



Encoder input frequency

Indicates the maximum input frequency of the encoder for each input mode in the ENCODER minimum input time settings.

ENCODER minimum input time (Page 9-7, Page 9-10)	Maximum encoder input frequency			
	1-phase 1 TM (no dir.)	2-phase 1 time	2-phase 2 times	2-phase 4 times
120 ns	3.2 MHz	1.6 MHz	3.2 MHz	6.4 MHz
150 ns	2 MHz	1 MHz	2 MHz	3.2 MHz
250 ns	1 MHz	500 kHz	1 MHz	2 MHz
500 ns	500 kHz	200 kHz	500 kHz	1 MHz
1 µs	200 kHz	100 kHz	200 kHz	500 kHz
2 µs	100 kHz	50 kHz	100 kHz	200 kHz
5 µs	50 kHz	20 kHz	50 kHz	100 kHz
10 µs	20 kHz	10 kHz	20 kHz	50 kHz
20 µs	10 kHz	5 kHz	10 kHz	20 kHz

Timing Chart (High-speed Mode)

Timing chart list (High-speed mode)

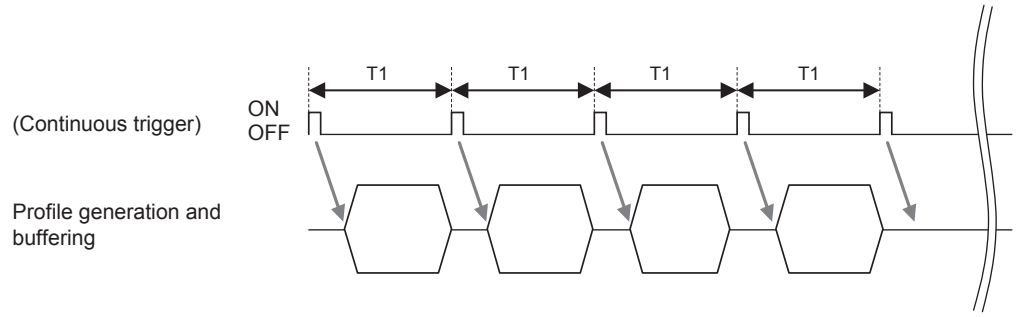
Timing chart type	Reference page
Parallel imaging OFF, Continuous trigger	Page 12-5
Batch measurement OFF	Page 12-5
Batch measurement ON	Page 12-6
Parallel imaging OFF, External trigger/Encoder trigger	Page 12-7
Batch measurement OFF	Page 12-7
Batch measurement ON	Page 12-10
Parallel imaging ON, Continuous trigger	Page 12-12
Batch measurement OFF	Page 12-12
Batch measurement ON	Page 12-13
Parallel imaging ON, External trigger/Encoder trigger	Page 12-14
Batch measurement OFF	Page 12-14
Batch measurement ON	Page 12-16

Parallel imaging OFF, Continuous trigger

Imaging will be performed at the sampling frequency.

■ [Batch measurement]: OFF, [Compression (time axis)]: OFF

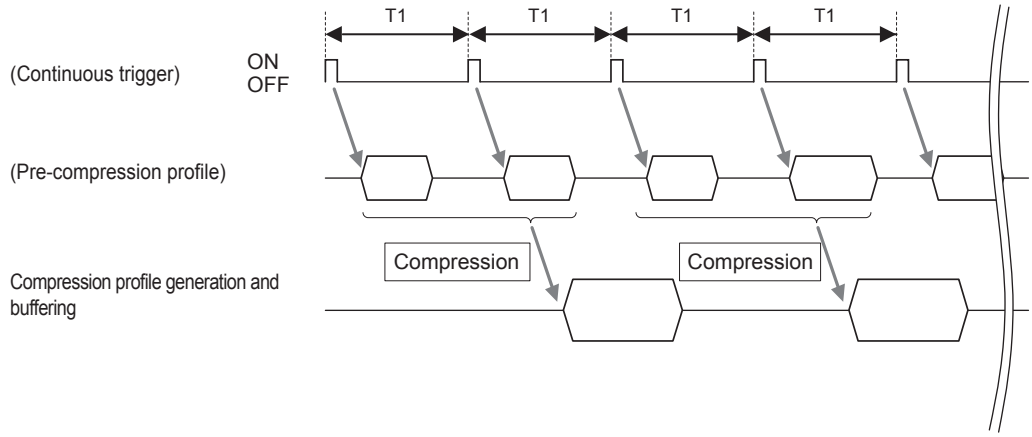
All generated profiles will be buffered to the internal memory.



■ [Batch measurement]: OFF, [Compression (time axis)]: ON

One profile (compressed in the time axis direction) will be buffered per compression point.

[Compression points (time axis)]: The following explanation uses 2 points as an example.

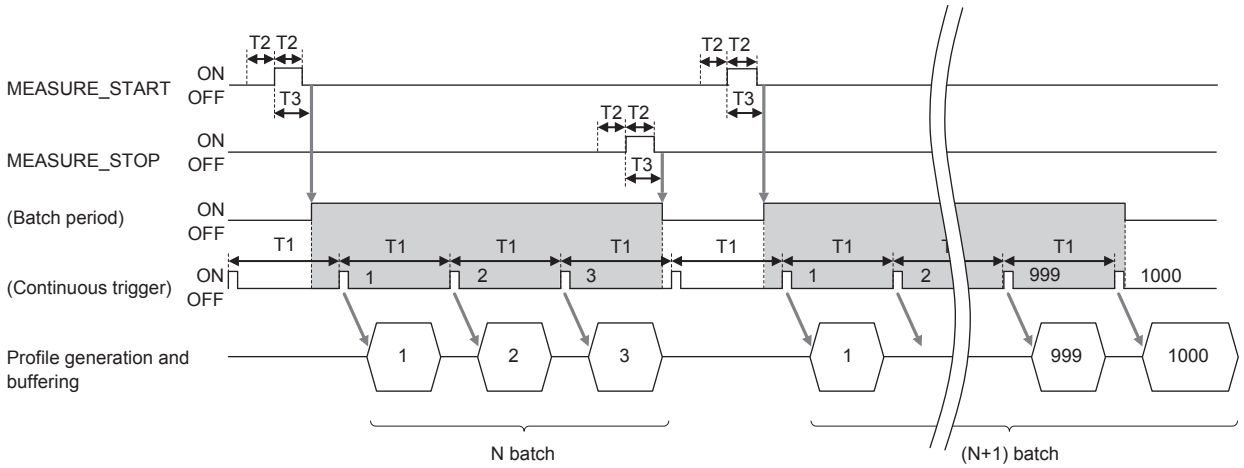


T1	Sampling frequency	[Samp freq (fast trigg freq)] Page 5-7

■ [Batch measurement]: ON, [Compression (time axis)]: OFF

The batch period will be controlled using the MEASURE_START/MEASURE_STOP terminals.
The batch period will end automatically once the batch period number of triggers have been issued.
Only those profiles imaged during the batch period will be buffered to the internal memory.

[Batch point]: The following explanation uses 1000 points as an example.

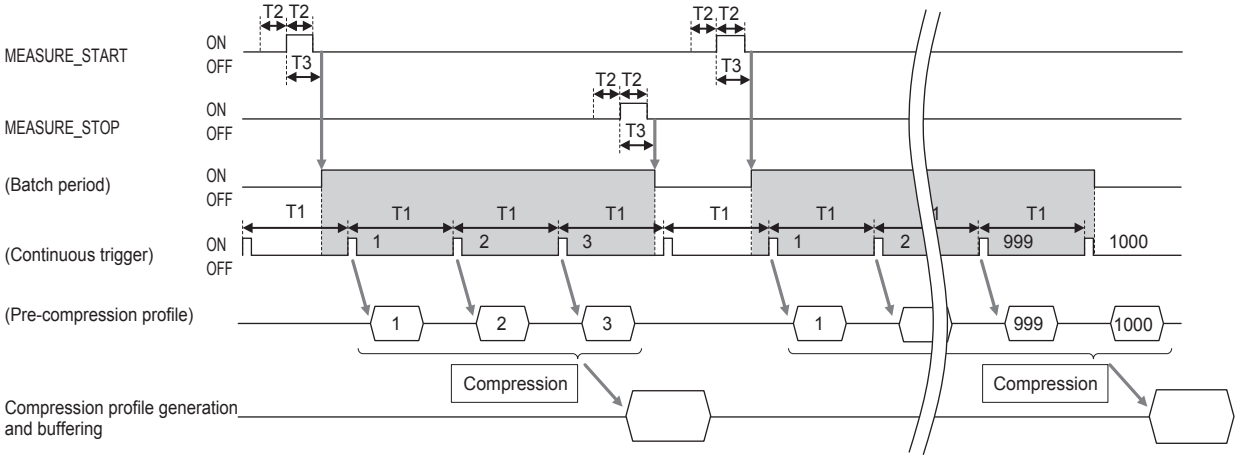


T1	Sampling frequency	[Samp freq (fast trigg freq)] Page 5-7
T2	Control terminal minimum input time	[Minimum input time] - [Control terminal] or longer Page 9-7
T3	Control terminal response time	T2 + 400 µs or less

■ [Batch measurement]: ON, [Compression (time axis)]: ON

The batch period will be controlled using the MEASURE_START/MEASURE_STOP terminals.
The batch period will end automatically once the batch period number of triggers have been issued.
The profiles imaged during the batch period will be compressed in the time axis direction and buffered to the internal memory.

[Batch point]: The following explanation uses 1000 points as an example.



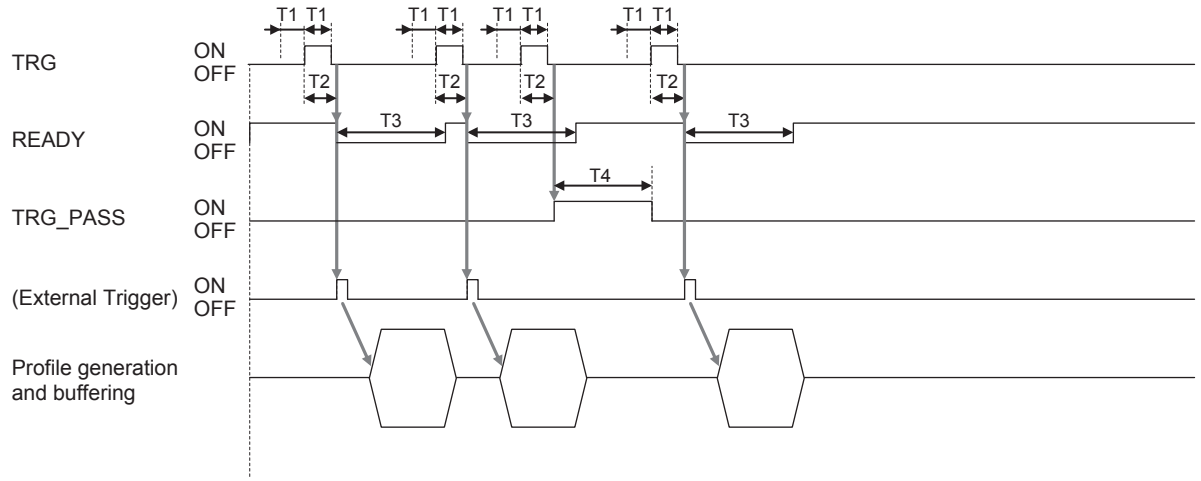
T1	Sampling frequency	[Samp freq (fast trigg freq)] Page 5-7
T2	Control terminal minimum input time	[Minimum input time] - [Control terminal] or longer Page 9-7
T3	Control terminal response time	T2 + 400 µs or less

Parallel imaging OFF, External trigger/Encoder trigger

Perform imaging in sync with the TRG or ENCODER input.
External and encoder triggers have different trigger input methods. However, after the triggers have been issued, their timing charts will be the same.
This section first explains the differences between the external and encoder triggers before they are issued.

■ [Batch measurement]: OFF, [Compression (time axis)]: OFF, External trigger

All generated profiles will be buffered to the internal memory.



T1	TRG minimum input time	[Minimum input time] - [TRG] or longer Page 9-7
T2	TRG response time	T1 + 9 µs or less
T3	READY OFF time	See the table below.
T4	TRG_PASS output time	20 ms

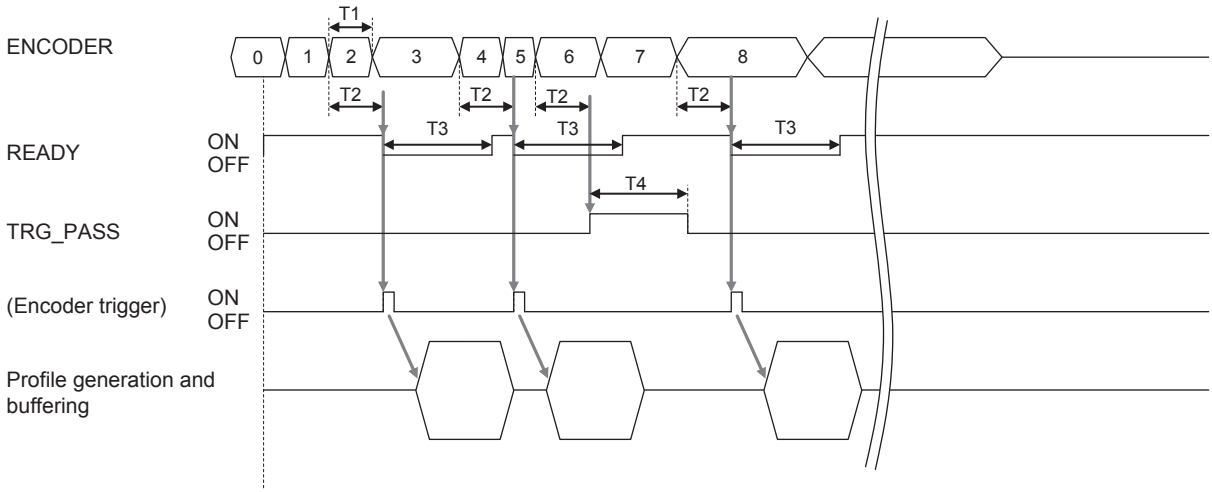
- The TRG input will be ignored while READY is OFF. In such event, the TRG_PASS output will turn ON.
- The ON time of the TRG_PASS output will not be extended even if another TRG input is ignored while the TRG_PASS output is already ON.

Relationship between the sampling frequency (fastest trigger frequency) and the maximum READY OFF time

[Samp freq (fast trigg freq)]	Max. READY OFF time (µs)	
10 Hz	97500	
20 Hz	48750	
50 Hz	19500	
100 Hz	9750	
200 Hz	4875	
500 Hz	1954	
1 kHz	977	
2 kHz	492	
4 kHz	250	
4.13 kHz	235	
8 kHz	125	= Sampling frequency
16 kHz	62.5	
32 kHz	31.25	
64 kHz	15.625	

■ [Batch measurement]: OFF, [Compression (time axis)]: OFF, Encoder trigger

All generated profiles will be buffered to the internal memory.
[Points of skipping]: The following explanation uses 2 points as an example.



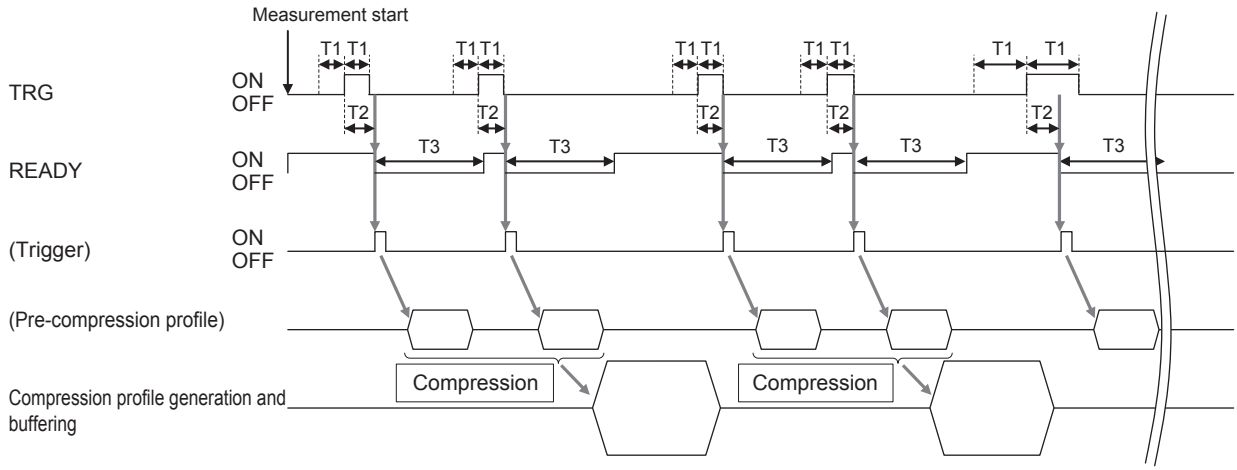
- The TRG input will be ignored while READY is OFF. In such event, the TRG_PASS output will turn ON.
- The ON time of the TRG_PASS output will not be extended even if another TRG input is ignored while the TRG_PASS output is already ON.

T1	Encoder input frequency	Varies depending on the [Minimum input time] - [ENCODER] setting. Page 12-3
T2	Encoder response time	[Minimum input time] - [ENCODER] + 9 µs or less
T3	READY OFF time	Page 12-7
T4	TRG_PASS output time	20 ms

■ [Batch measurement]: OFF, [Compression (time axis)]: ON, External trigger/Encoder trigger

One profile (compressed in the time axis direction) will be buffered per compression point.

The following explanation uses the external trigger as an example. (Also see Page 12-8 for the encoder trigger)
[Compression points (time axis)]: The following explanation uses 2 points as an example.

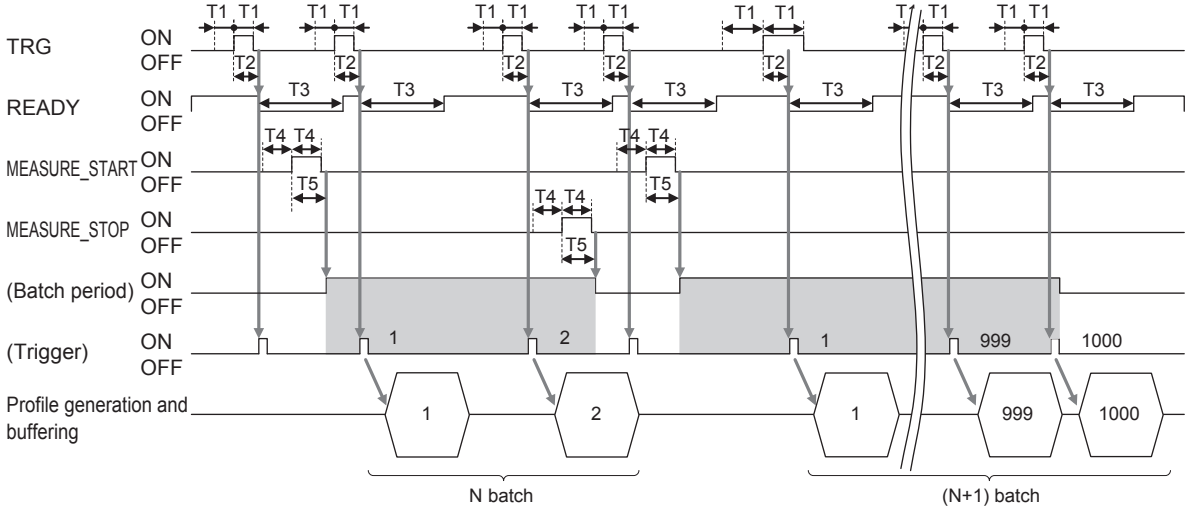


T1	TRG minimum input time	[Minimum input time] - [TRG] or longer Page 9-7
T2	TRG response time	T1 + 9 µs or less
T3	READY OFF time	Page 12-7

■ [Batch measurement]: ON, [Compression (time axis)]: OFF, External trigger/Encoder trigger

The batch period will be controlled using the MEASURE_START/MEASURE_STOP terminals.
The batch period will end automatically once the batch period number of triggers have been issued.
Only those profiles imaged during the batch period will be buffered to the internal memory.

The following explanation uses the external trigger as an example. (Also see Page 12-8 for the encoder trigger)
[Batch point]: The explanation uses 1000 as an example.

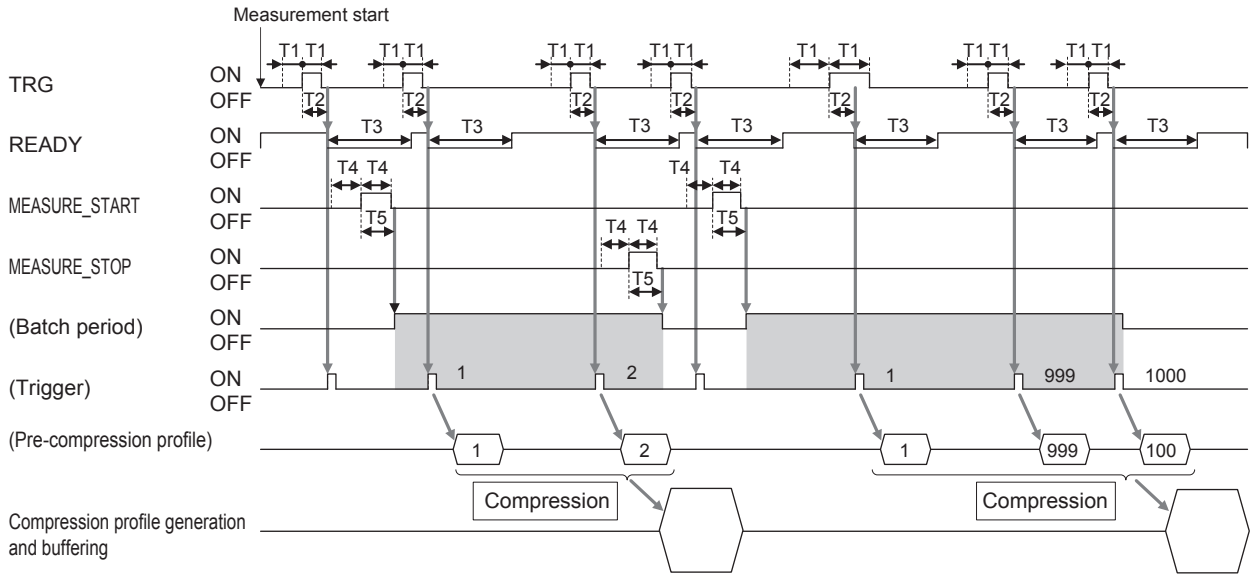


T1	TRG minimum input time	[Minimum input time] - [TRG] or longer Page 9-7
T2	TRG response time	T1 + 9 µs or less
T3	READY OFF time	Page 12-7
T4	Control terminal minimum input time	[Minimum input time] - [Control terminal] or longer Page 9-7
T5	Control terminal response time	T4 + 400 µs or less

■ [Batch measurement]: ON, [Compression (time axis)]: ON, External trigger/Encoder trigger

The batch period will be controlled using the MEASURE_START/MEASURE_STOP terminals.
The batch period will end automatically once the batch period number of triggers have been issued.
The profiles imaged during the batch period will be compressed in the time axis direction and buffered to the internal memory.

The following explanation uses the external trigger as an example. (Also see Page 12-8 for the encoder trigger)



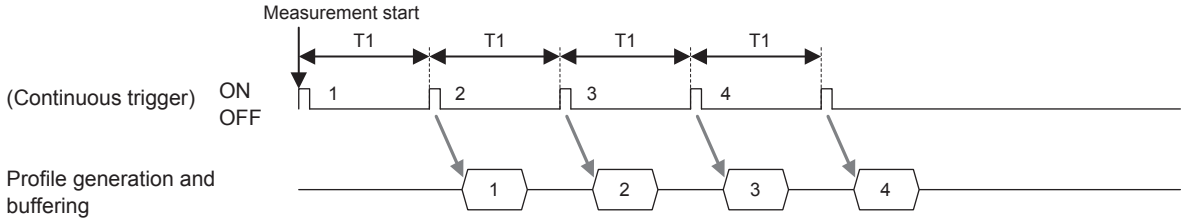
T1	TRG minimum input time	[Minimum input time] - [TRG] or longer Page 9-7
T2	TRG response time	T1 + 9 µs or less
T3	READY OFF time	Page 12-7
T4	Control terminal minimum input time	[Minimum input time] - [Control terminal] or longer Page 9-7
T5	Control terminal response time	T4 + 400 µs or less

Parallel imaging ON, Continuous trigger

Imaging will be performed at the sampling frequency.

■ [Batch measurement]: OFF, [Compression (time axis)]: OFF

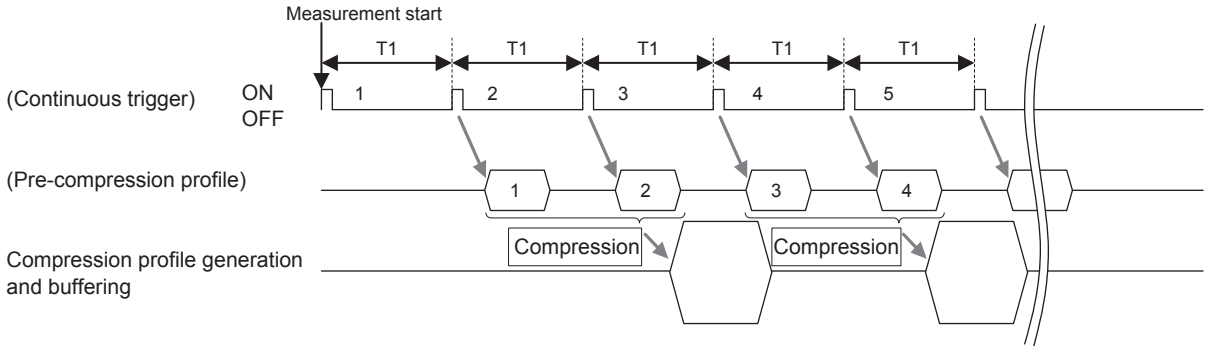
If parallel imaging is ON, the profile will be generated/buffered at the timing when the next trigger is input.



■ [Batch measurement]: OFF, [Compression (time axis)]: ON

If parallel imaging is ON, the profile (before compression) will be generated at the timing when the next trigger is input. One profile (compressed in the time axis direction) will be generated/buffered per compression point.

[Compression points (time axis)]: The following explanation uses 2 points as an example.

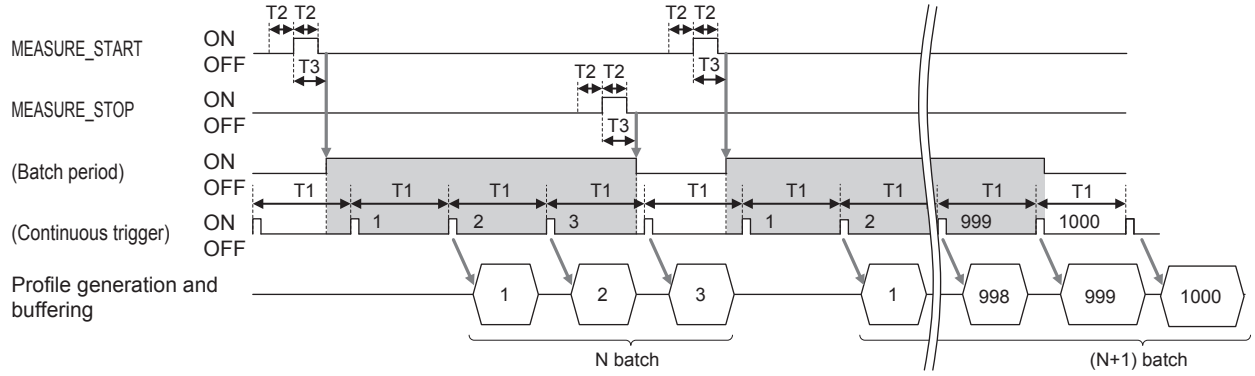


T1	Sampling frequency	[Samp freq (fast trigg freq)] Page 5-7

■ [Batch measurement]: ON, [Compression (time axis)]: OFF

If parallel imaging is ON, the profile will be generated at the timing when the next trigger is input.
The batch period will be controlled using the MEASURE_START/MEASURE_STOP terminals.
The batch period will end automatically once the batch period number of triggers have been issued.
Only those profiles imaged during the batch period will be buffered to the internal memory.
The profile imaged last in the batch period will be generated/buffered at the timing when the trigger is input again after the batch period has ended.

[Batch point]: The following explanation uses 1000 as an example.

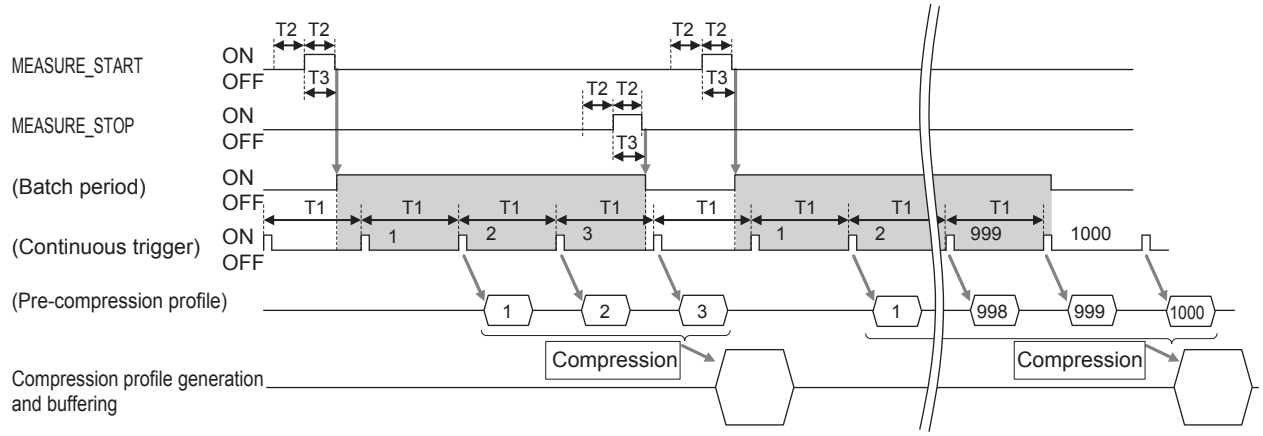


T1	Sampling frequency	[Samp freq (fast trigg freq)] Page 5-7
T2	Control terminal minimum input time	[Minimum input time] - [Control terminal] or longer Page 9-7
T3	Control terminal response time	T2 + 400 µs or less

■ [Batch measurement]: ON, [Compression (time axis)]: ON

If parallel imaging is ON, the profile will be generated at the timing when the next trigger is input.
The batch period will be controlled using the MEASURE_START/MEASURE_STOP terminals.
The batch period will end automatically once the batch period number of triggers have been issued.
The profiles imaged during the batch period will be compressed in the time axis direction and buffered to the internal memory.
The compression profile will be buffered at the timing when the trigger is input again after the batch period has ended.

[Batch point]: The following explanation uses 1000 as an example.



T1	Sampling frequency	[Samp freq (fast trigg freq)] Page 5-7
T2	Control terminal minimum input time	[Minimum input time] - [Control terminal] or longer Page 9-7
T3	Control terminal response time	T2 + 400 µs or less

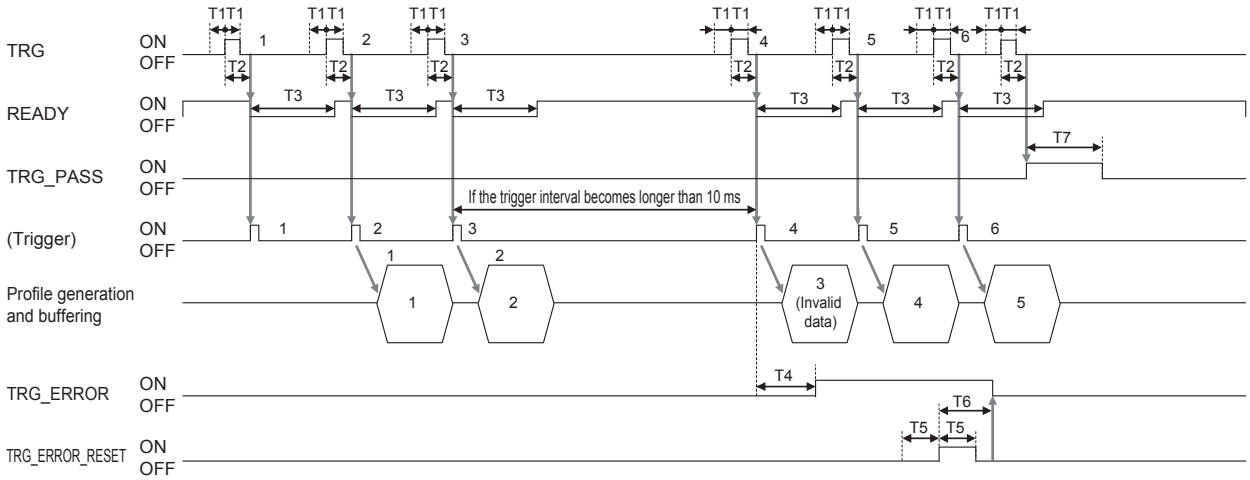
Parallel imaging ON, External trigger/Encoder trigger

Perform imaging in sync with the TRG or ENCODER input.
External and encoder triggers have different trigger input modes. However, after the trigger has been issued, their timing charts will be the same.

[Batch measurement]: OFF, [Compression (time axis)]: OFF, External trigger/Encoder trigger

If parallel imaging is ON, the profile will be generated at the timing when the next trigger is input.
If the trigger interval becomes longer than 10 ms, the profile will be generated at the timing of the next trigger input but will be totally invalid data.
If the trigger interval becomes longer than 10 ms, the TRG_ERROR output will turn ON at the timing when the next trigger is input.
The TRG_ERROR output will turn OFF when TRG_ERROR_RESET is input.

The following explanation uses the external trigger as an example. (Also see Page 12-8 for the encoder trigger)



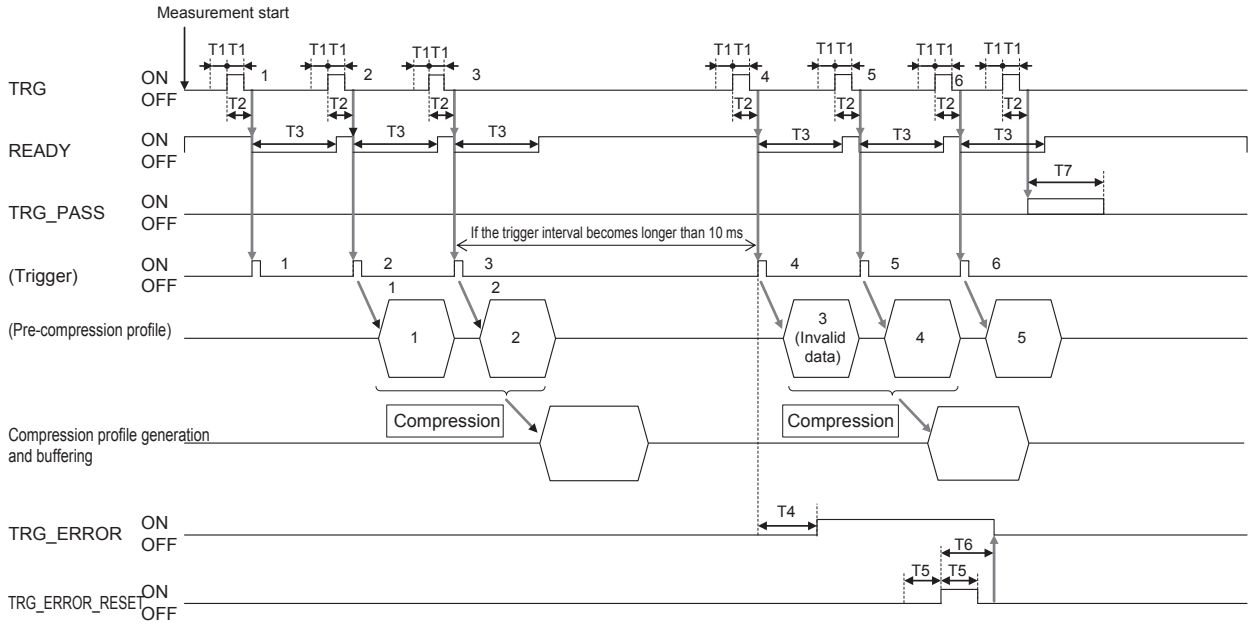
- The TRG input will be ignored while READY is OFF. In such event, the TRG_PASS output will turn ON.
- The ON time of the TRG_PASS output will not be extended even if another TRG input is ignored while the TRG_PASS output is already ON.

T1	TRG minimum input time	[Minimum input time] - [TRG] or longer Page 9-7
T2	TRG response time	T1 + 9 µs or less
T3	READY OFF time	Page 12-7
T4	TRG_ERROR response time	2 ms or less
T5	Control terminal minimum input time	[Minimum input time] - [Control terminal] or longer Page 9-7
T6	Control terminal response time	T5 + 400 µs or less
T7	TRG_PASS output time	20 ms

■ [Batch measurement]: OFF, [Compression (time axis)]: ON, External trigger/Encoder trigger

If parallel imaging is ON, the profile (before compression) will be generated at the timing when the next trigger is input.
One profile (compressed in the time axis direction) will be generated/buffered per compression point.
If the trigger interval becomes longer than 10 ms, the pre-compression profile will be generated at the timing of the next trigger input but will be totally invalid data.
If the trigger interval becomes longer than 10 ms, the TRG_ERROR output will turn ON at the timing when the next trigger is input.
The TRG_ERROR output will turn OFF when TRG_ERROR_RESET is input.

The following explanation uses the following as an example: [Averaging] = [Compression points (time axis)] = 2 points.
The following explanation uses the external trigger as an example. (Also see Page 12-8 for the encoder trigger)



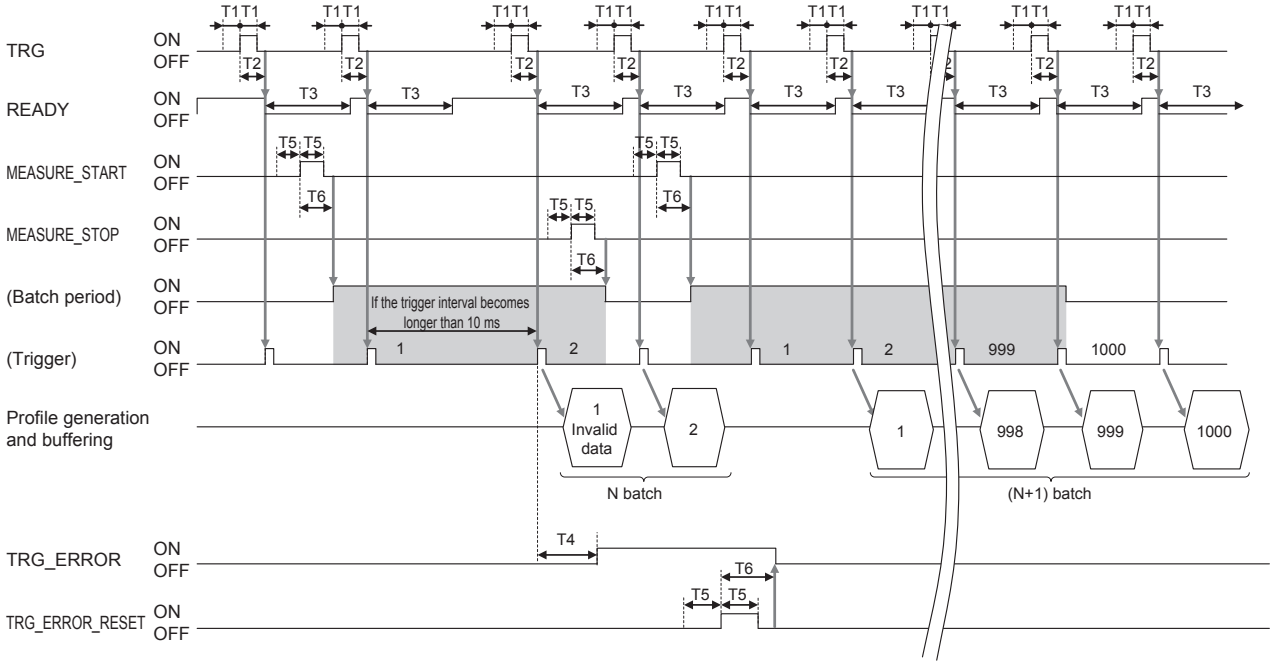
- The TRG input will be ignored while READY is OFF. In such event, the TRG_PASS output will turn ON.
- The ON time of the TRG_PASS output will not be extended even if another TRG input is ignored while the TRG_PASS output is already ON.

T1	TRG minimum input time	[Minimum input time] - [TRG] or longer Page 9-7
T2	TRG response time	T1 + 9 µs or less
T3	READY OFF time	Page 12-7
T4	TRG_ERROR response time	2 ms or less
T5	Control terminal minimum input time	[Minimum input time] - [Control terminal] or longer Page 9-7
T6	Control terminal response time	T5 + 400 µs or less
T7	TRG_PASS output time	20 ms

■ [Batch measurement]: ON, [Compression (time axis)]: OFF, External trigger/Encoder trigger

If parallel imaging is ON, the profile will be generated at the timing when the next trigger is input.
If the trigger interval becomes longer than 10 ms, the profile will be generated at the timing of the next trigger input but will be totally invalid data.
If the trigger interval becomes longer than 10 ms, the TRG_ERROR output will turn ON at the timing when the next trigger is input.
The TRG_ERROR output will turn OFF when TRG_ERROR_RESET is input.
The batch period will be controlled using the MEASURE_START/MEASURE_STOP terminals.
The batch period will end automatically once the batch period number of triggers have been issued.
Only those profiles imaged during the batch period will be buffered to the internal memory.
The profile imaged last in the batch period will be generated/buffered at the timing when the trigger is input again after the batch period has ended.

[Batch point]: The following explanation uses 1000 as an example.
The following explanation uses the external trigger as an example. (Also see Page 12-8 for the encoder trigger)



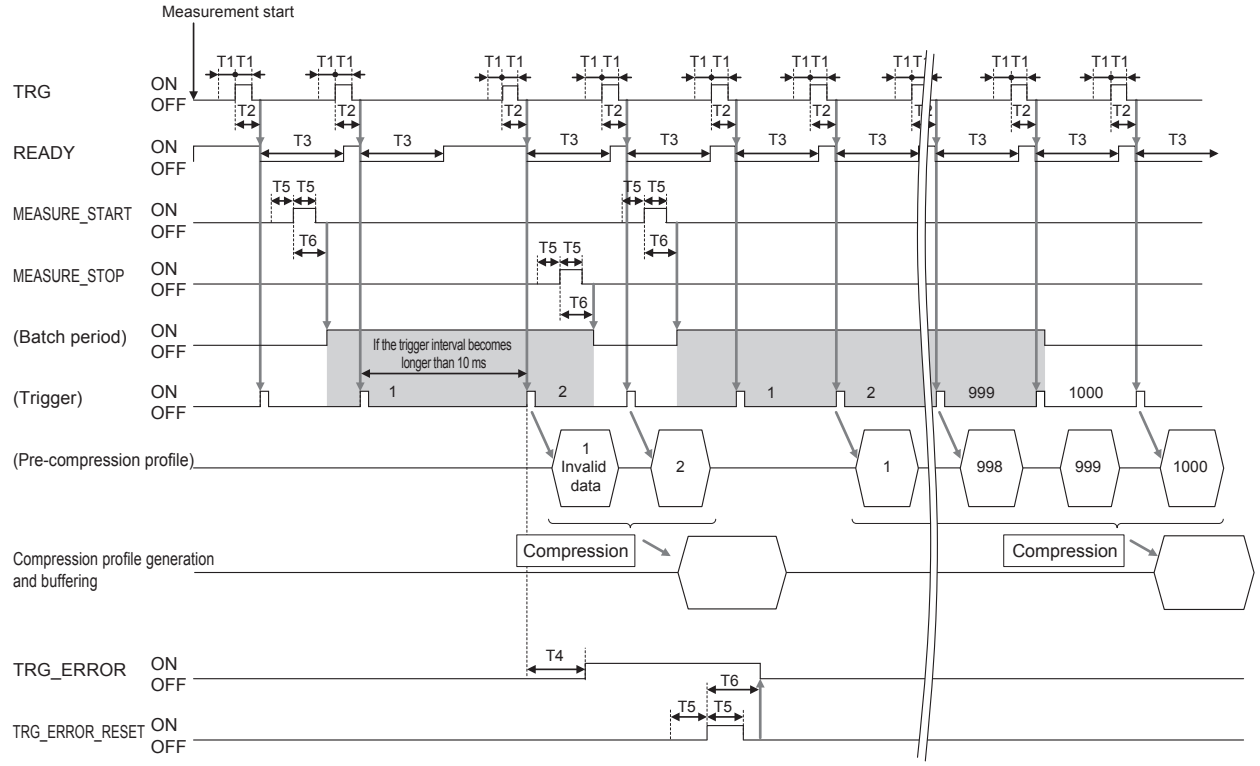
T1	TRG minimum input time	[Minimum input time] - [TRG] or longer Page 9-7
T2	TRG response time	T1 + 9 µs or less
T3	READY OFF time	Page 12-7
T4	TRG_ERROR response time	2 ms or less
T5	Control terminal minimum input time	[Minimum input time] - [Control terminal] or longer Page 9-7
T6	Control terminal response time	T5 + 400 µs or less

The TRG input will be ignored while READY is OFF. In such event, the TRG_PASS output will turn ON.
See Page 12-14 for the TRG_PASS timing chart.

■ [Batch measurement]: ON, [Compression (time axis)]: ON, External trigger/Encoder trigger

If parallel imaging is ON, the profile (before compression) will be generated at the timing when the next trigger is input.
If the trigger interval becomes longer than 10 ms, the profile will be generated at the timing of the next trigger input but will be totally invalid data.
If the trigger interval becomes longer than 10 ms, the TRG_ERROR output will turn ON at the timing when the next trigger is input.
The TRG_ERROR output will turn OFF when TRG_ERROR_RESET is input.
The batch period will be controlled using the MEASURE_START/MEASURE_STOP terminals.
The batch period will end automatically once the batch period number of triggers have been issued.
The profiles imaged during the batch period will be compressed in the time axis direction and buffered to the internal memory.
The compression (time axis) profile will be generated/buffered at the timing when the trigger is input again after the batch period has ended.

[Batch point]: The following explanation uses 1000 as an example.
The following explanation uses the external trigger as an example. (Also see Page 12-8 for the encoder trigger)



T1	TRG minimum input time	[Minimum input time] - [TRG] or longer Page 9-7
T2	TRG response time	T1 + 9 µs or less
T3	READY OFF time	Page 12-7
T4	TRG_ERROR response time	2 ms or less
T5	Control terminal minimum input time	[Minimum input time] - [Control terminal] or longer Page 9-7
T6	Control terminal response time	T5 + 400 µs or less

The TRG input will be ignored while READY is OFF. In such event, the TRG_PASS output will turn ON.
See Page 12-14 for the TRG_PASS timing chart.

Timing Chart (Advanced Function Mode)

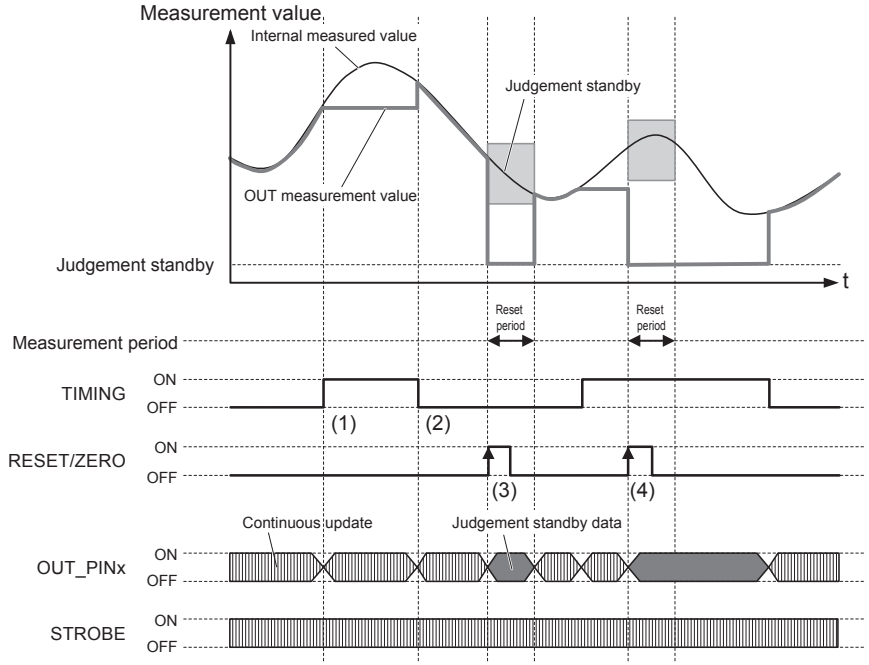
Timing chart list (Advanced function mode)

Timing chart type	Reference page
Summary of the hold mode ([Batch measurement]: OFF)	Page 12-19
[Hold mode]: Normal	Page 12-19
[Hold mode]: Peak hold/Bottom hold/Peak to Peak hold/Average hold	Page 12-20
[Hold mode]: Sample hold	Page 12-21
[Measurement period]: Threshold (level)	Page 12-22
[Measurement period]: Threshold (edge)	Page 12-23
Summary of the hold mode ([Batch measurement]: ON)	Page 12-24
[Measurement period]: Measurement area	Page 12-24
[Measurement period]: Threshold (level)	Page 12-25
[Measurement period]: Threshold (edge)	Page 12-26
[Compression (time axis)]: ON	Page 12-27
Summary of continuous triggers	Page 12-28
[Batch measurement]: OFF, [Compression (time axis)]: OFF	Page 12-29
OUT measurement value ([Hold mode]: Normal)	Page 12-30
OUT measurement value ([Hold mode]: Peak hold/Bottom hold/ Peak to Peak hold/Average hold/Sample hold)	Page 12-32
[Batch measurement]: OFF, [Compression (time axis)]: ON	Page 12-33
[Batch measurement]: ON, [Compression (time axis)]: OFF	Page 12-34
[Batch measurement]: ON, [Compression (time axis)]: ON	Page 12-36
Supplementary note: STROBE output	Page 12-38
Supplementary note: Long OUT measurement processing time	Page 12-39
Summary of external/encoder triggers	Page 12-41
[Batch measurement]: OFF, [Compression (time axis)]: OFF	Page 12-42
[Batch measurement]: OFF, [Compression (time axis)]: ON	Page 12-43
[Batch measurement]: ON, [Compression (time axis)]: OFF	Page 12-44
[Batch measurement]: ON, [Compression (time axis)]: ON	Page 12-45
Continuous trigger, Supplementary note: STROBE output	Page 12-46
Continuous trigger, Supplementary note: Long OUT measurement processing time	Page 12-46
Summary of the storage process (Batch measurement OFF)	Page 12-49
[Storage condition]: Terminal/Command	Page 12-49
[Storage condition]: OUT data (level)	Page 12-50
[Storage condition]: OUT data (edge)	Page 12-50
Summary of the storage process ([Batch measurement]: ON)	Page 12-51
[Storage condition]: Terminal/Command	Page 12-51
[Storage condition]: OUT value (level)	Page 12-51
Control using STORAGE_START/STORAGE_STOP terminals	Page 12-52
[Hold mode]: Normal	Page 12-52
[Hold mode]: Peak hold/Bottom hold/Peak to Peak hold/Average hold	Page 12-53
[Batch measurement]: ON	Page 12-54

Summary of the hold mode ([Batch measurement]: OFF)

■ [Batch measurement]: OFF

● **[Measurement period]: Terminal/Command**
[Hold mode]: Normal

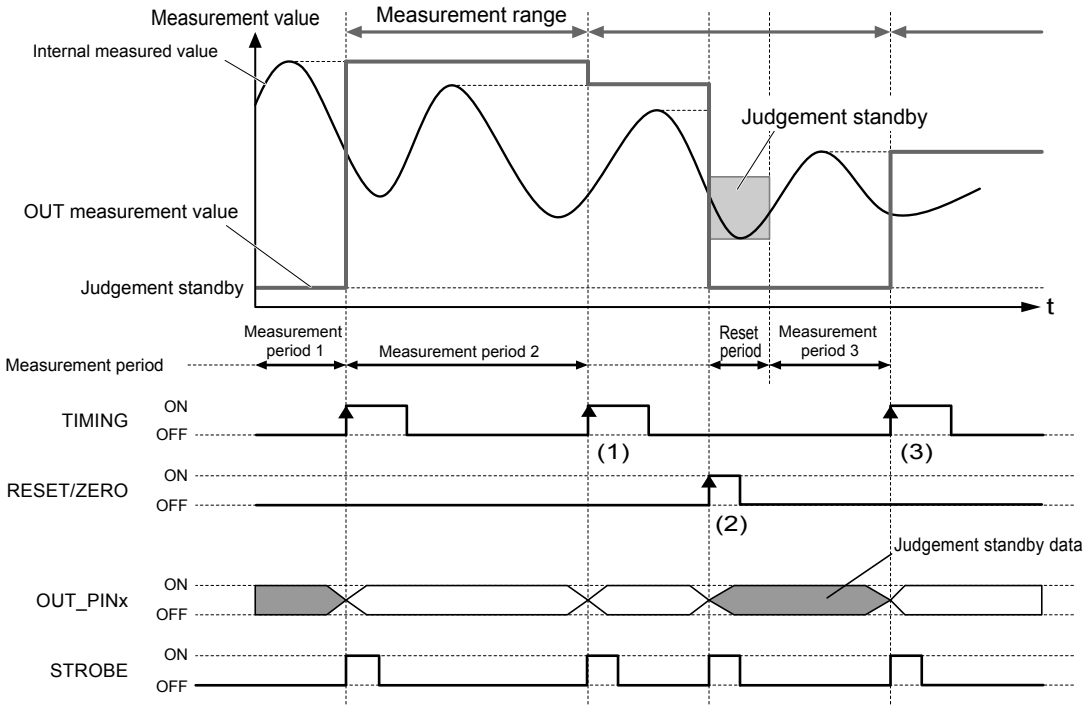


The internal measurement value will be updated and output one after another.

Reference [Internal measurement value] refers to the measurement value immediately preceding the hold mode process of the OUT measurement setting.

(1) The TIMING input will hold the OUT measurement value with the internal measurement value immediately before the input.
(2) The hold will be cleared when the TIMING input is cleared.
(3) The internal measurement and OUT measurement values will be reset when RESET/ZERO is input. It will output judgement standby data during the reset period.
(4) If ZERO/RESET is input during the hold, the OUT measurement value will continue outputting judgement standby data until the hold is cleared.

[Hold mode]: Peak hold/Bottom hold/Peak to Peak hold/Average hold
The following explanation uses [Peak hold] as an example.



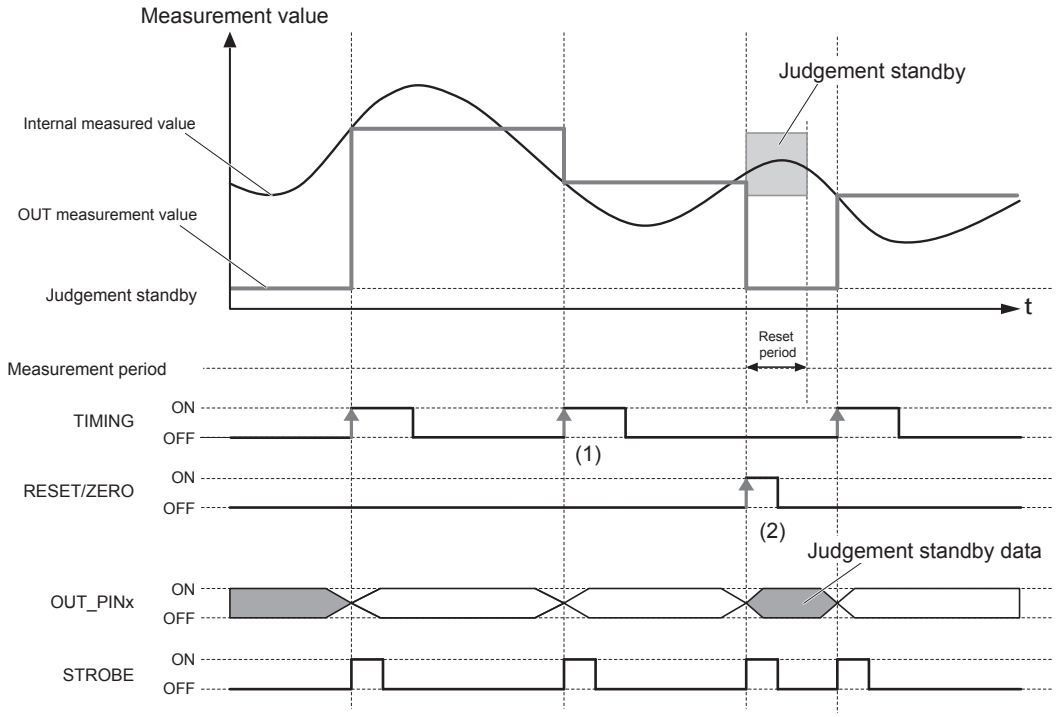
The period from when the TIMING input has turned ON until the next TIMING input turns ON will be the measurement range.
When the TIMING input turns ON, the OUT measurement value of the immediately preceding measurement range will be output.

Peak hold: It will output the maximum internal measurement values within the measurement range.
Bottom hold: It will output the minimum internal measurement value within the measurement range.
Peak to Peak hold: It will output the maximum/minimum internal measurement values within the measurement range.
Average hold: It will output the average internal measurement value within the measurement range.

(1) When TIMING is input, it will output the maximum internal measurement value during measurement period 2.
(2) When RESET/ZERO is input, the internal measurement value will be reset and the OUT measurement value will output judgement standby data until the next TIMING input turns ON.
(3) When TIMING is input, it will output the maximum internal measurement value during measurement period 3. (The data before the reset period will not be used.)

Internal measurement value : 🕮 “[Measurement period]: Terminal/Command” (Page 12-19)

[Hold mode]: Sample hold



It will hold the internal measurement value at the point when the TIMING input became ON.

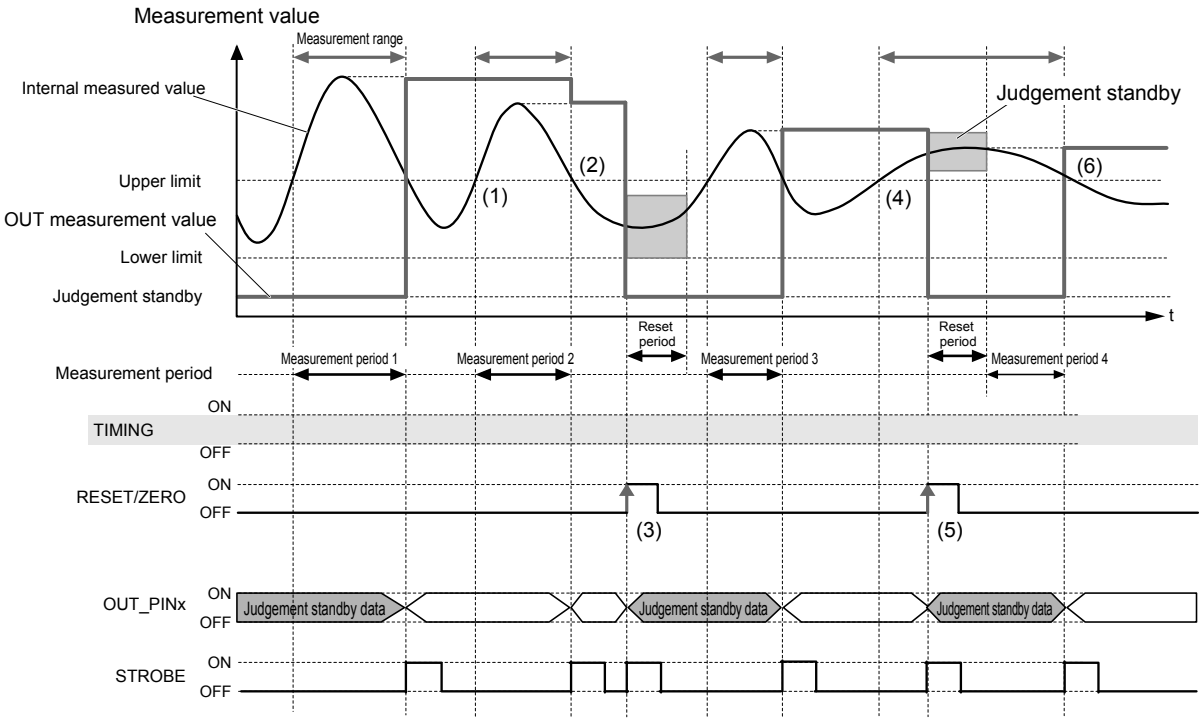
(1) When TIMING is input, it will hold and output the internal measurement value immediately before the input.
(2) When RESET/ZERO is input, the internal measurement value will be reset and the OUT measurement value will output judgement standby data until the next TIMING input turns ON.

Internal measurement value : 🕮 “[Measurement period]: Terminal/Command” (Page 12-19)

● **[Measurement period]: Threshold (level)**

[Hold mode]: Peak hold/Bottom hold/Peak to Peak hold/Average hold

The following explanation uses [Peak hold] as an example.



The period during which the internal measurement value is greater than the upper limit value or smaller than the lower limit value will be the measurement range.

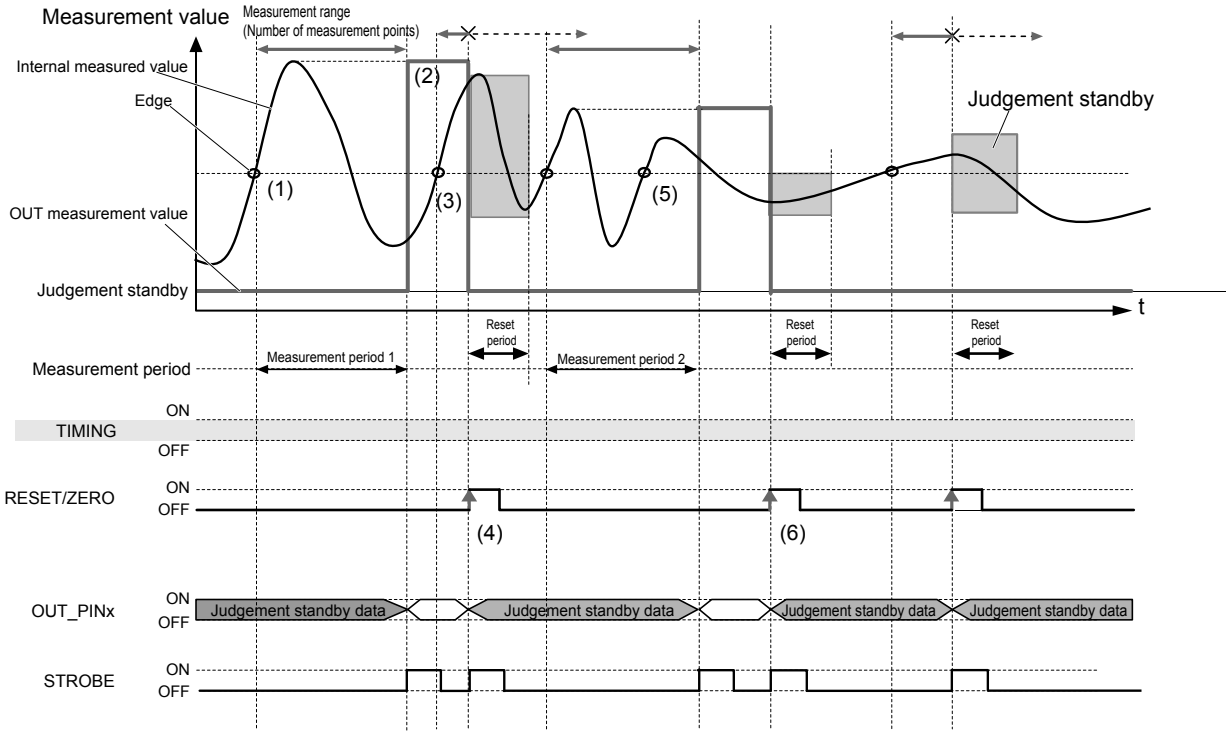
(1) The measurement period will start when the internal measurement value exceeds the upper limit value.
(2) When the internal measurement value falls below the upper limit value, the measurement period will end and the OUT measurement value will be updated.
(3) When RESET/ZERO is input, the internal measurement value will be reset and the OUT measurement value will output judgement standby data until the end of the next measurement period.
(4) The measurement period will start when the internal measurement value exceeds the upper limit value.
(5) If RESET/ZERO is input during the measurement period, the internal measurement value will be reset and the measurement period will start after the reset period has ended.
(6) When the internal measurement value falls below the upper limit value, the measurement period will end and the OUT measurement value will be updated. (The data before the reset period will not be used.)

Internal measurement value : 🕮 “[Measurement period]: Terminal/Command” (Page 12-19)

● **[Measurement period]: Threshold (edge)**

[Hold mode]: Peak hold/Bottom hold/Peak to Peak hold/Average hold

The following explanation uses [Peak hold] as an example.



The number of measurement points from when the internal measurement value has exceeded (or fallen below) the edge threshold value will be the measurement range.

(1) The measurement period will begin when the internal measurement value exceeds the edge threshold.
(2) When the internal measurement values accumulated for the number of measurement points, the measurement period will end and the OUT measurement value will be updated.
(3) The measurement period will begin when the internal measurement value exceeds the edge threshold.
(4) If RESET/ZERO is input during the measurement period, the internal measurement value will be reset and the measurement range will end.
(5) All edges detected during the measurement range will be ignored.
(6) When RESET/ZERO is input, the internal measurement value will be reset and the OUT measurement value will output judgement standby data until the end of the next measurement period.

Internal measurement value : “[Measurement period]: Terminal/Command” (Page 12-19)

Summary of the hold mode ([Batch measurement]: ON)

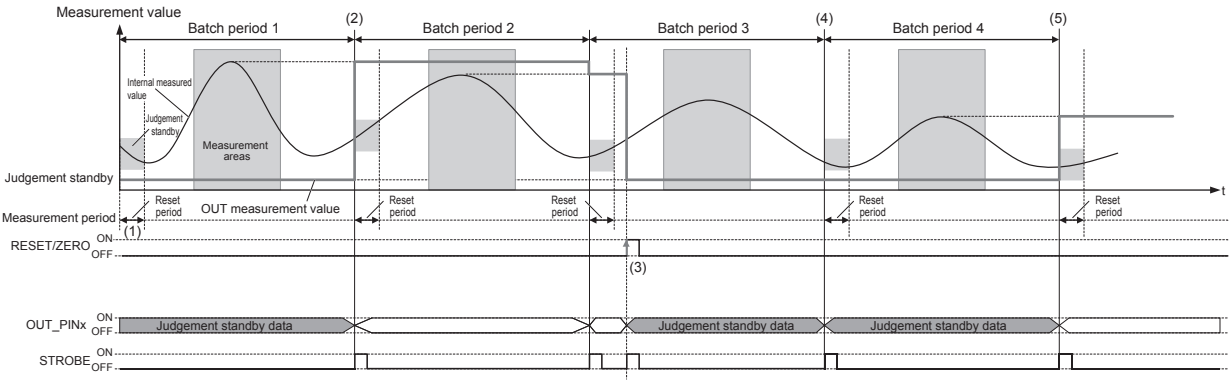
■ [Batch measurement]: ON, [Compression (time axis)]: OFF

Even when the simple 3D measure mode is used, the timing chart is the same as below.

● **[Measurement period]: Measurement area**

[Hold mode]: Peak hold/Bottom hold/Peak to Peak hold/Average hold

The following explanation uses [Peak hold] as an example.



The maximum internal measurement value in the measurement area will be output per batch period.

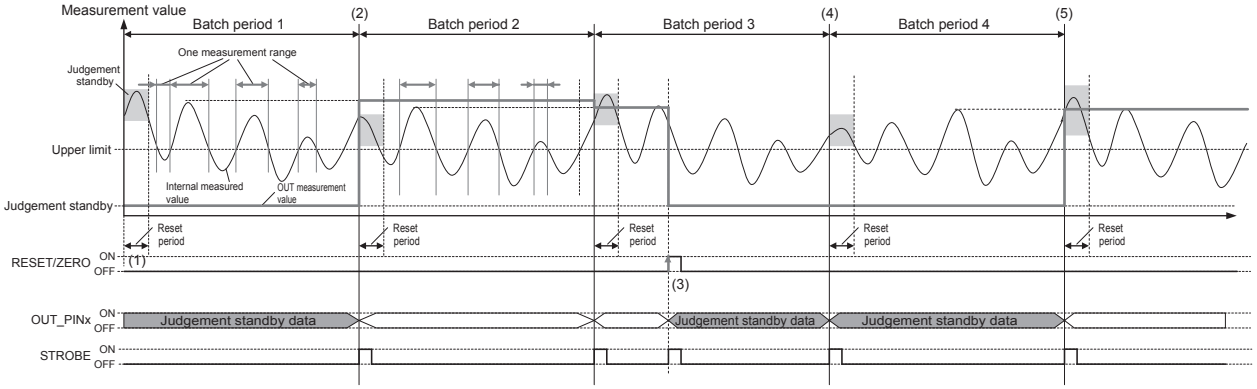
(1) When the batch period starts, the internal measurement value will be in the reset period during which it will be treated as judgement standby data.
(If the reset period and the measurement area overlap, the internal measurement value during the reset period will be excluded from the measurement target.)
(2) When the batch period ends, the maximum value in the measurement area (batch period 1) will be output.
(3) When RESET/ZERO is input, the OUT measurement value will be reset and will output judgement standby data until the end of the next batch period.
(The internal measurement value will not be reset.)
(4) After the batch period has ended, it will output judgement standby data if RESET/ZERO has been input during the batch period (batch period 3).
(5) The maximum value in the measurement area (batch period 4) will be output.

Internal measurement value : 🕮 “[Measurement period]: Terminal/Command” (Page 12-19)

● **[Measurement period]: Threshold (level)**

[Hold mode]: Peak hold/Bottom hold/Peak to Peak hold/Average hold

The following explanation uses [Peak hold] as an example.



The period during which the internal measurement value is greater than the upper limit value or smaller than the lower limit value will be the measurement range.
The maximum internal measurement value in the measurement range will be output per batch period.

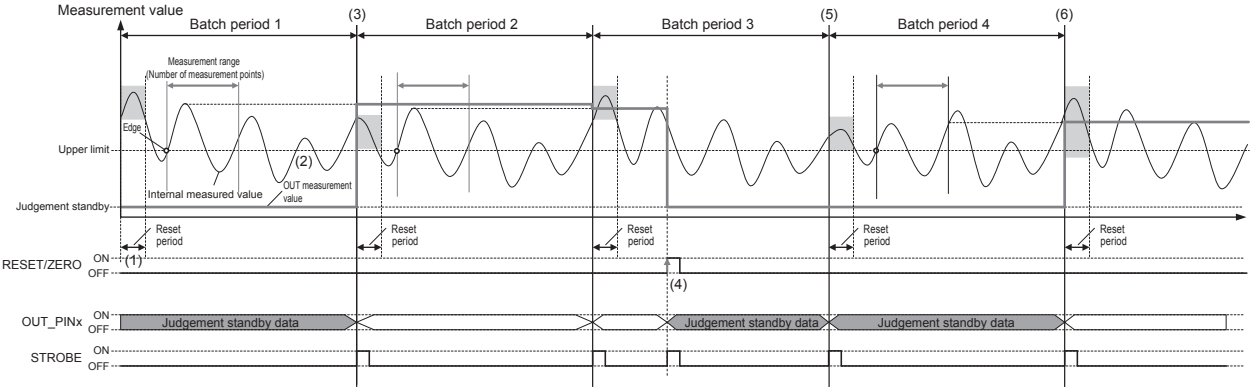
(1) When the batch period starts, the internal measurement value will be in the reset period during which it will be treated as judgement standby data.
(If the reset period and the measurement area overlap, the internal measurement value during the reset period will be excluded from the measurement target.)
(2) When the batch period ends, the maximum value in the measurement range (batch period 1) will be output.
(3) When RESET/ZERO is input, the OUT measurement value will be reset and will output judgement standby data until the end of the next batch period.
(The internal measurement value will not be reset.)
(4) After the batch period has ended, it will output judgement standby data if RESET/ZERO has been input during the batch period (batch period 3).
(5) When the batch period ends, the maximum value in the measurement range (batch period 4) will be output.

Internal measurement value : 🕮 “[Measurement period]: Terminal/Command” (Page 12-19)

● **[Measurement period]: Threshold (edge)**

[Hold mode]: Peak hold/Bottom hold/Peak to Peak hold/Average hold

The following explanation uses [Peak hold] as an example.

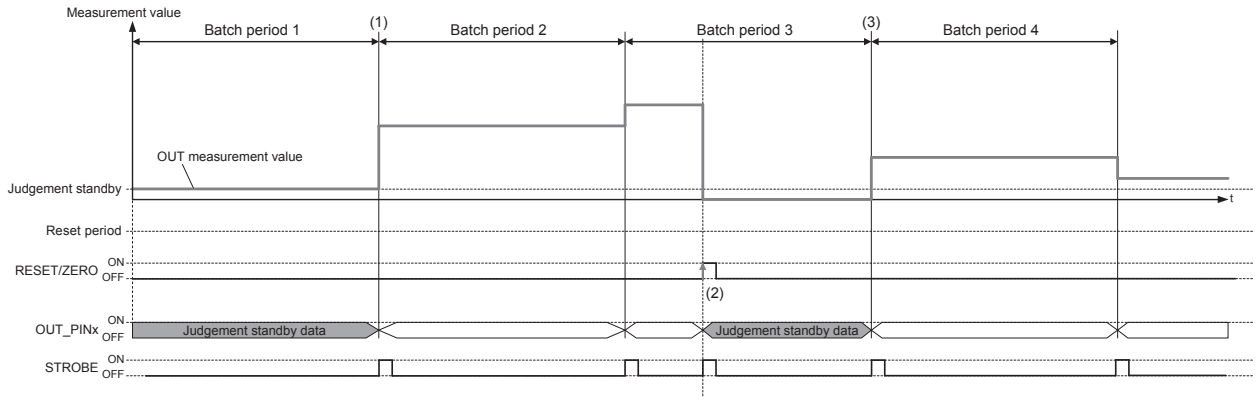


The number of measurement points from when the internal measurement value has exceeded (or fallen below) the edge threshold value will be the measurement range.
The maximum internal measurement value in the measurement range will be output per batch period.

(1) When the batch period starts, the internal measurement value will be in the reset period during which it will be treated as judgement standby data.
(If the reset period and the measurement area overlap, the internal measurement value during the reset period will be excluded from the measurement target.)
(2) All the second- or later-detected edges during the batch period are ignored.
(3) When the batch period ends, the maximum value in the measurement range (batch period 1) will be output.
(4) When RESET/ZERO is input, the OUT measurement value will be reset and will output judgement standby data until the end of the next batch period.
(The internal measurement value will not be reset.)
(5) After the batch period has ended, it will output judgement standby data if RESET/ZERO has been input during the batch period (batch period 3).
(6) When the batch period ends, the maximum value in the measurement range (batch period 4) will be output.

Internal measurement value : 🕮 “[Measurement period]: Terminal/Command” (Page 12-19)

■ [Batch measurement]: ON, [Compression (time axis)]: ON



The OUT measurement value will be updated per batch period.
(The internal measurement value does not exist; and the compression profile will be generated per batch period.)

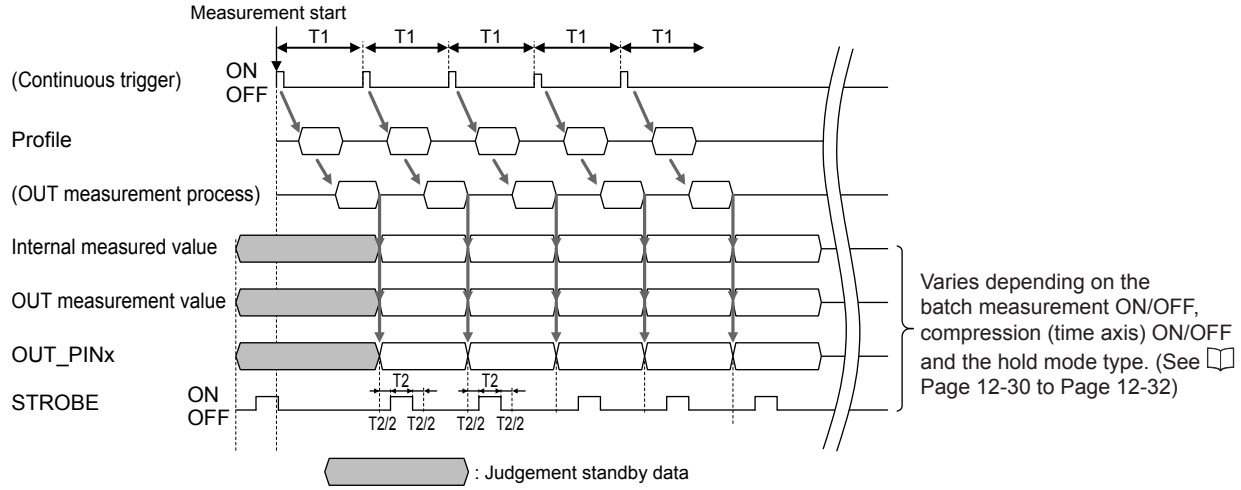
(1) When the batch period ends, the OUT measurement value (batch period 1) will be updated.
(2) When RESET/ZERO is input, the OUT measurement value will output judgement standby data.
(3) When the batch period ends, the OUT measurement value (batch period 3) will be updated.

Internal measurement value : 🕮 “[Measurement period]: Terminal/Command” (Page 12-19)

Continuous trigger

■ Summary

Imaging will be performed at the sampling frequency.
The following explanation uses the following as an example: [Hold mode]: Normal, [Averaging] = OFF, [Moving average] = OFF.

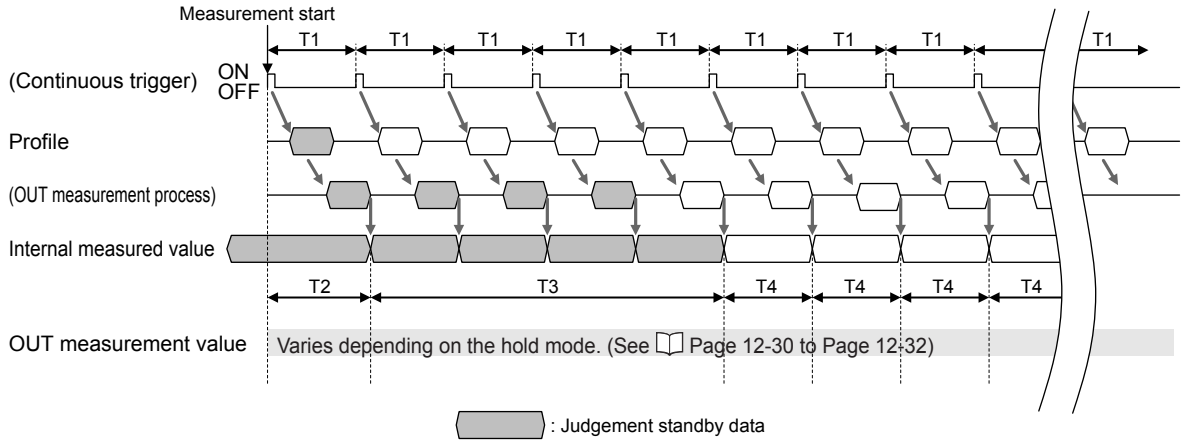


T1	Sampling frequency	[Samp freq (fast trigg freq)] Page 5-7
T2	STROBE output time	[Strobe output time] Page 9-6

Internal measurement value : “[Measurement period]: Terminal/Command” (Page 12-19)

■ [Batch measurement]: OFF, [Compression (time axis)]: OFF

The explanation uses the following as an example: [Averaging] = 2 times, [Moving average] = 4 times.



Normal data will be output after judgement standby data have been output for a certain period of time from the start of measurement.
The judgement standby period will vary depending on the median (time axis) count, averaging count, and measurement filter settings.
If the OUT measurement processing time is within the sampling frequency, the internal measurement value will be updated per sampling frequency.

T1	Sampling frequency	[Samp freq (fast trigg freq)] Page 5-7
T2	Internal measurement response time	T1 × 2 + 2 ms or less…Central value (*1)
T3	Internal measurement value judgement standby time	T1 x (K + L + M)…Central value (*1) (*2) K → Median (time axis) count - 1 L → Averaging count -1 M → [Measure value filter] = OFF … 0, Moving average … [Averaging times] -1, HPF, LFP … 11
T4	Internal measurement update interval	T1…Central value (*1)

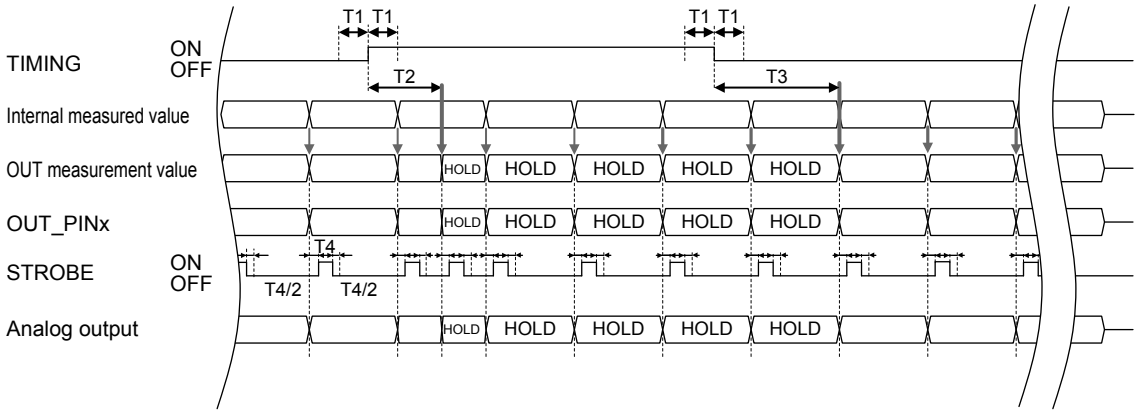
(*1) Varies depending on the load of the OUT measurement process (Internal processes from position correction setting to OUT measurement setting). The center value will be for when the OUT measurement processing time is within T1. If the OUT measurement processing time exceeds T1, see Page 12-39 - Page 12-40.
(*2) Excludes when judgement standby data is being held by the measurement value alarm process.

Internal measurement value : "[Measurement period]: Terminal/Command" (Page 12-19)

■ OUT measurement value ([Hold mode]: Normal)

● TIMING input

It will hold the OUT measurement value when the TIMING input turns ON.
If the TIMING input is set to OFF, the OUT measurement value will clear the hold at the timing when the internal measurement value is updated next time.



T1	Control terminal minimum input time	[Minimum input time] - [Control terminal] or longer Page 9-7
T2	TIMING ON response delay time	T1 + 400 µs + T5 or less … Central value (*1)
T3	TIMING OFF response delay time	T1 + 400 µs + T5 x 2 or less ... Central value (*1)
T4	STROBE output time	[Strobe output time] Page 9-6

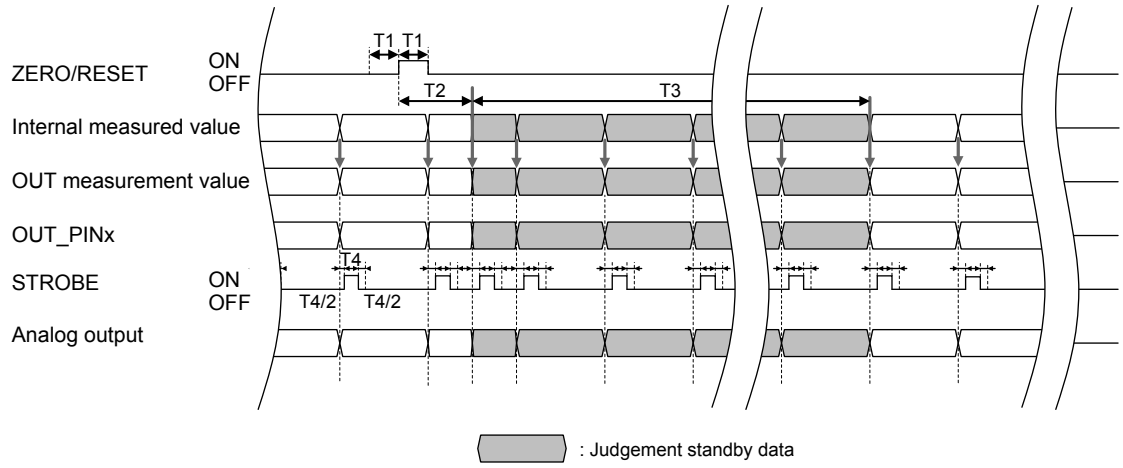
T5: Sampling frequency (fastest trigger frequency) Page 5-7

(*1) Varies depending on the load of the OUT measurement process (Internal processes from position correction setting to OUT measurement setting). The center value will be for when the OUT measurement processing time is within T5. If the OUT measurement processing time exceeds T5, see Page 12-39 - Page 12-40.

Internal measurement value : “[Measurement period]: Terminal/Command” (Page 12-19)

● **ZERO/RESET input**

Judgement standby data will be output when the ZERO/RESET input turns ON.



T1	Control terminal minimum input time	[Minimum input time] - [Control terminal] or longer 🕮 Page 9-7 However, the ON period when auto zero is cleared will be [Minimum input time] - [Control terminal] + 2 s or longer.
T2	ZERO/RESET response delay time	T1 + 400 µs + T5 or less … Central value (*1) However, the ON period when auto zero is cleared will be T1 + T5 or less.
T3	Reset time	T5 x M (*2) or less … Central value (*1) (*3) M → [Measure value filter] = OFF … 2, Moving average … [Averaging times] + 1, HPF, LFP … 13
T4	STROBE output time	[Strobe output time] 🕮 Page 9-6

T5: Sampling frequency (fastest trigger frequency) 🕮 Page 5-7

(*1) Varies depending on the load of the OUT measurement process (Internal processes from position correction setting to OUT measurement setting). The center value will be for when the OUT measurement processing time is within T5. If the OUT measurement processing time exceeds T5, see 🕮 Page 12-39 - Page 12-40.

(*2) If ZERO/RESET is input after T5 x {(Averaging count -1) + (Median (time axis) count -1)} has elapsed after the start of measurement.

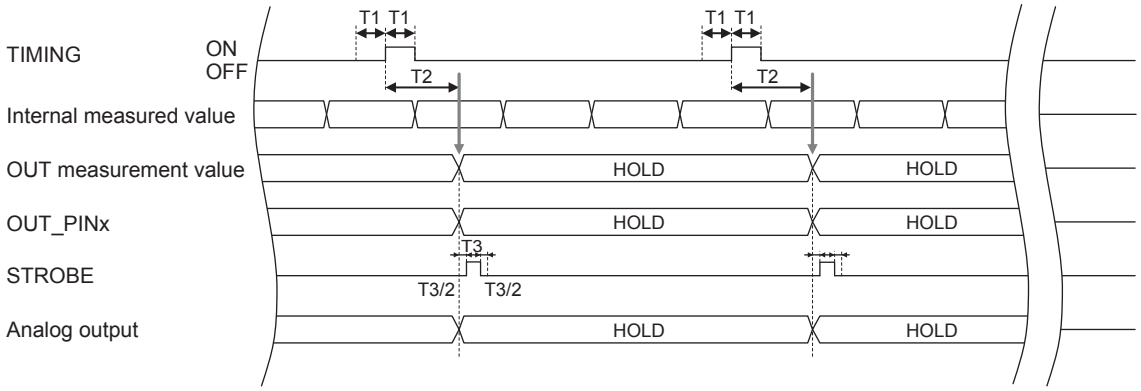
(*3) Excludes the case when judgement standby data is being held by the measurement alarm process.

Internal measurement value : 🕮 "[Measurement period]: Terminal/Command" (Page 12-19)

■ OUT measurement value ([Hold mode]: Peak hold/Bottom hold/Peak to Peak hold/Average hold/Sample hold)

● TIMING input

The OUT measurement value will be updated when the TIMING input turns ON.



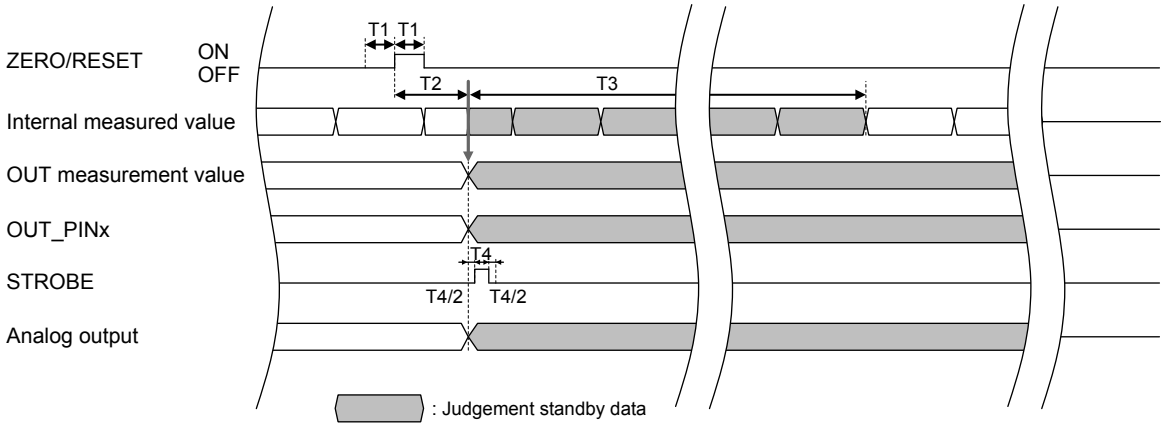
T1	Control terminal minimum input time	[Minimum input time] - [Control terminal] or longer Page 9-7
T2	TIMING response delay time	T1 + 400 µs + T4 or less … Central value (*1)
T3	STROBE output time	[Strobe output time] Page 9-6

T4: Sampling frequency (fastest trigger frequency) Page 5-7

(*1) Varies depending on the load of the OUT measurement process (Internal processes from position correction setting to OUT measurement setting). The center value will be for when the OUT measurement processing time is within T4. If the OUT measurement processing time exceeds T4, see Page 12-39 - Page 12-40.

● ZERO/RESET input

Judgement standby data will be output when the ZERO/RESET input turns ON.



T1	Control terminal minimum input time	[Minimum input time] - [Control terminal] or longer Page 9-7 However, the ON period when auto zero is cleared will be [Minimum input time] - [Control terminal] + 2s or longer.
T2	ZERO/RESET response delay time	T1 + 400 µs + T5 or less … Central value (*1) However, the ON period when auto zero is cleared will be T1 + T5 or less.
T3	Reset time	T5 x M (*2) or less ... Central value (*1) (*3) M → [Measure value filter] = OFF … 2, Moving average … [Averaging times] + 1, HPF, LFP … 13
T4	STROBE output time	[Strobe output time] Page 9-6

T5: Sampling frequency (fastest trigger frequency) Page 5-7

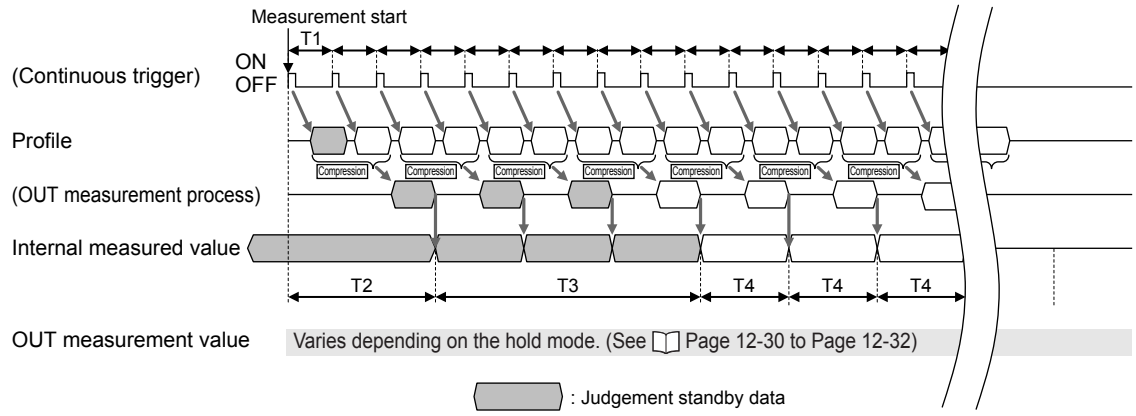
(*1) Varies depending on the load of the OUT measurement process (Internal processes from position correction setting to OUT measurement setting). The center value will be for when the OUT measurement processing time is within T5. If the OUT measurement processing time exceeds T5, see Page 12-39 - Page 12-40.
(*2) If ZERO/RESET is input after T5 x {(Averaging count -1) + (Median (time axis) count -1)} has elapsed after the start of measurement.
(*3) Excludes the case when judgement standby data is being held by the measurement alarm process.

Internal measurement value : “[Measurement period]: Terminal/Command” (Page 12-19)

■ [Batch measurement]: OFF, [Compression (time axis)]: ON

Carries out the OUT measurement process for the compression profiles that are generated per compression point.

The following explanation uses the following as an example: [Compression points (time axis)] = 2 points, [Averaging] = 2 times, [Moving average] = 4 times.



Normal data will be output after judgement standby data have been output for a certain period of time from the start of measurement.
The judgement standby period will vary depending on the median (time axis) count, averaging count, and measurement filter settings.
If the OUT measurement processing time is within in the sampling frequency x compression points (time axis), the internal measurement value will be updated per sampling frequency x compression points (time axis).

T1	Sampling frequency	[Samp freq (fast trigg freq)] Page 5-7
T2	Internal measurement response time	T1 x ([Compression points (time axis)] +1) + 2 ms or less ... Central value (*1)
T3	Internal measurement value judgement standby time	T1 x [Compression points (time axis)] x M (*2) … Central value (*1) (*3) M → [Measure value filter] = OFF … 0, Moving average … [Averaging times] -1, HPF, LFP … 11
T4	Internal measurement update interval	T1 x [Compression points (time axis)] … Central value (*1)

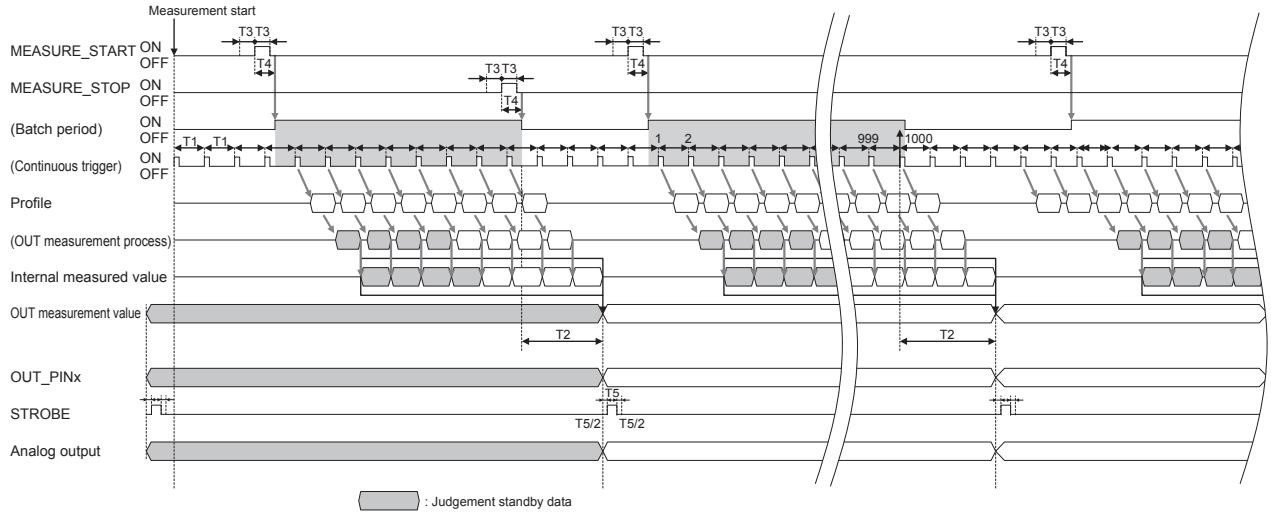
(*1) Varies depending on the load of the OUT measurement process (Internal processes from position correction setting to OUT measurement setting). The center value will be for when the OUT measurement processing time is within the T1 x compression points (time axis). See Page 12-39 to Page 12-40 if the OUT measurement processing time exceeds the T1 x compression points (time axis).
(*2) When the total of the averaging count and the median (time axis) count is less than the compression points (time axis)
(*3) Excludes the case when judgement standby data is being held by the measurement alarm process.

Internal measurement value : “[Measurement period]: Terminal/Command” (Page 12-19)

■ [Batch measurement]: ON, [Compression (time axis)]: OFF

The batch period will be controlled using the MEASURE_START/MEASURE_STOP terminals.
Only those profiles imaged during the batch period will be the OUT measurement target.
The batch period will end automatically once the batch period number of triggers have been issued.

The following explanation uses the following as an example: [Batch point]: 1000 points, [Averaging] = 2 times, [Moving average] = 4 times.



The OUT measurement value will be updated after the batch period has ended.
The judgement standby period for the internal measurement value will vary depending on the median (time axis) count, averaging count, and measurement filter settings.

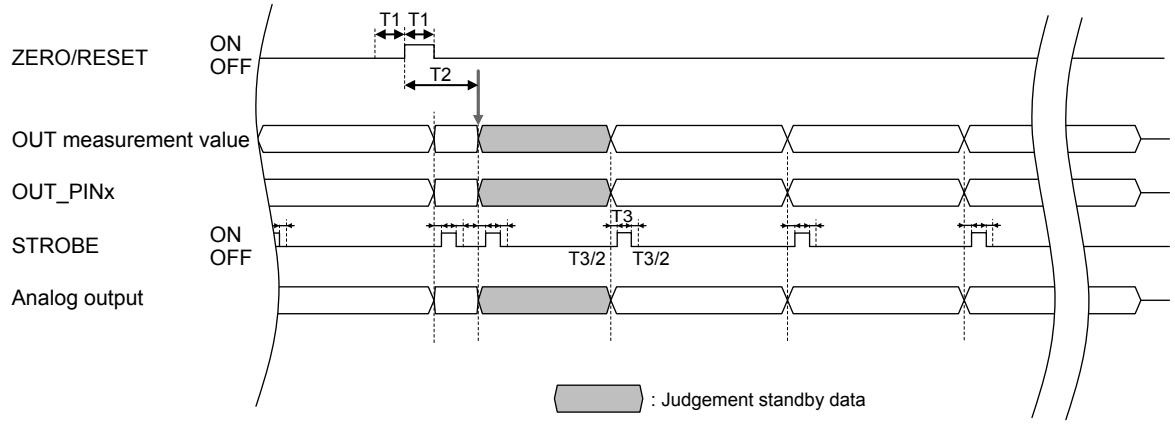
T1	Sampling frequency	[Samp freq (fast trigg freq)] 🕮 Page 5-7
T2	Output response time	T1 × 3 + 2 ms or less … Central value (*1)
T3	Control terminal minimum input time	[Minimum input time] - [Control terminal] or longer 🕮 Page 9-7
T4	Control terminal response time	T3 + 400 µs or less
T5	STROBE output time	[Strobe output time] 🕮 Page 9-6

(*1) Varies depending on the load of the OUT measurement process (Internal processes from position correction setting to OUT measurement setting). The center value will be for when the OUT measurement processing time is within T1. If the OUT measurement processing time exceeds T1, see 🕮 Page 12-39 - Page 12-40.

Internal measurement value : 🕮 “[Measurement period]: Terminal/Command” (Page 12-19)

● **ZERO/RESET**

Judgement standby data will be output when the ZERO/RESET input turns ON.



T1	Control terminal minimum input time	[Minimum input time] - [Control terminal] or longer Page 9-7 However, the ON period when the auto-zero is canceled is equal to or more than [Minimum input time] - [Control terminal] + 2 s.
T2	ZERO/RESET response delay time	T1 + 400 µs + T4 or less … Central value (*1) However, the ON period when auto zero is cleared will be T1 + T4 or less.
T3	STROBE output time	[Strobe output time] Page 9-6

T4: Sampling frequency (fastest trigger frequency) Page 5-7

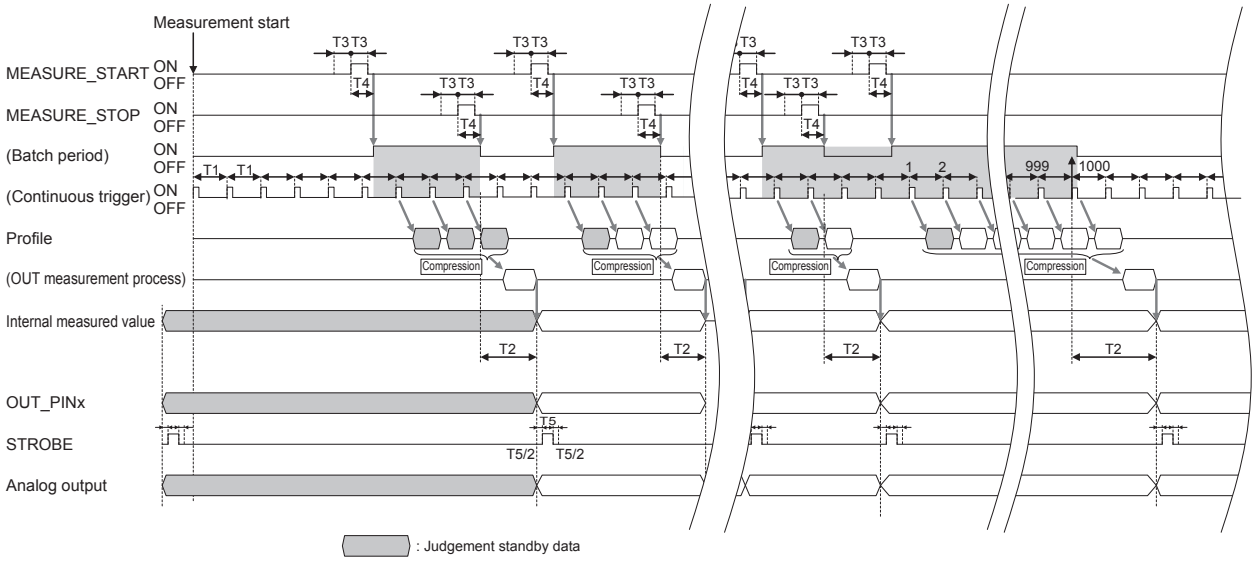
(*1) Varies depending on the load of the OUT measurement process (Internal processes from position correction setting to OUT measurement setting). The center value will be for when the OUT measurement processing time is within T4. If the OUT measurement processing time exceeds T4, see Page 12-39 - Page 12-40.

Internal measurement value : “[Measurement period]: Terminal/Command” (Page 12-19)

■ [Batch measurement]: ON, [Compression (time axis)]: ON

The batch period will be controlled using the MEASURE_START/MEASURE_STOP terminals.
One compression (time axis) profile will be generated per batch period; and the internal measurement value will be updated.
The batch period will end automatically once the batch period number of triggers have been issued.

[Batch point]: 1000 points, [Averaging] = 2 times, [Measure value filter]: The following explanation uses OFF as an example.



The internal measurement value will be updated after the batch period has ended.
The judgement standby period will vary depending on the median (time axis) count and averaging count setting.

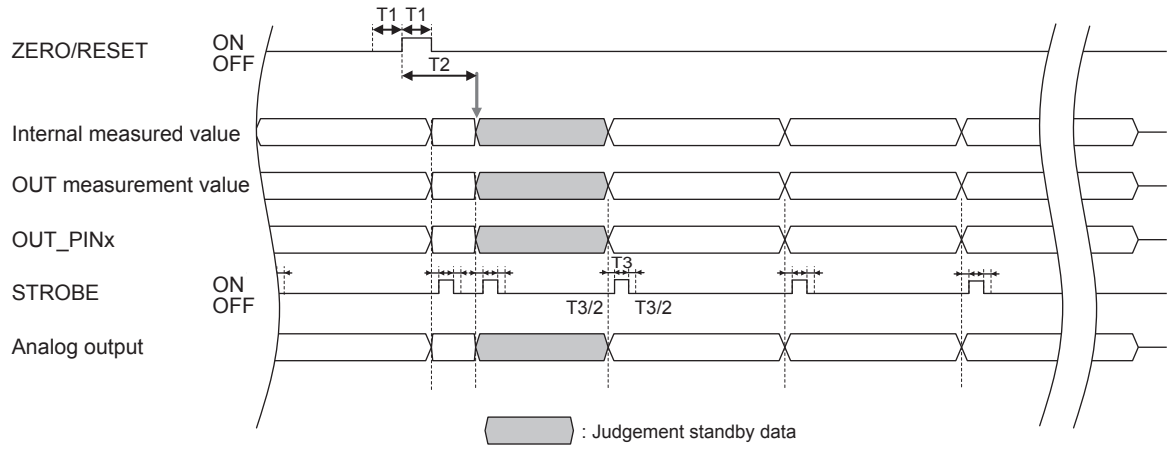
T1	Sampling frequency	[Samp freq (fast trigg freq)] 🕮 Page 5-7
T2	Internal measurement response time	T1 x 3 + 2 ms or less ... Central value (*1)
T3	Control terminal minimum input time	[Minimum input time] - [Control terminal] or longer 🕮 Page 9-7
T4	Control terminal response time	T4 + 400 µs or less
T5	STROBE output time	[Strobe output time] 🕮 Page 9-6

(*1) Varies depending on the load of the OUT measurement process (Internal processes from position correction setting to OUT measurement setting). The center value will be for when the OUT measurement processing time is within the T1. See 🕮 Page 12-39 to Page 12-40 if the OUT measurement processing time exceeds the T1.

Internal measurement value : 🕮 “[Measurement period]: Terminal/Command” (Page 12-19)

● **ZERO/RESET**

Judgement standby data will be output when the ZERO/RESET input is set to ON.



T1	Control terminal minimum input time	[Minimum input time] - [Control terminal] or longer 🕮 Page 9-7 However, the ON period when auto zero is cleared will be [Minimum input time] - [Control terminal] + 2s or longer.
T2	ZERO/RESET response delay time	T1 + 400 µs + T4 or less … Central value (*1) However, the ON period when auto zero is cleared will be T1 + T4 or less.
T3	STROBE output time	[Strobe output time] 🕮 Page 9-6

T4: Sampling frequency (fastest trigger frequency) 🕮 Page 5-7

(*1) Varies depending on the load of the OUT measurement process (Internal processes from position correction setting to OUT measurement setting). The center value will be for when the OUT measurement processing time is within the T4. See 🕮 Page 12-39 to Page 12-40 if the OUT measurement processing time exceeds the T4.

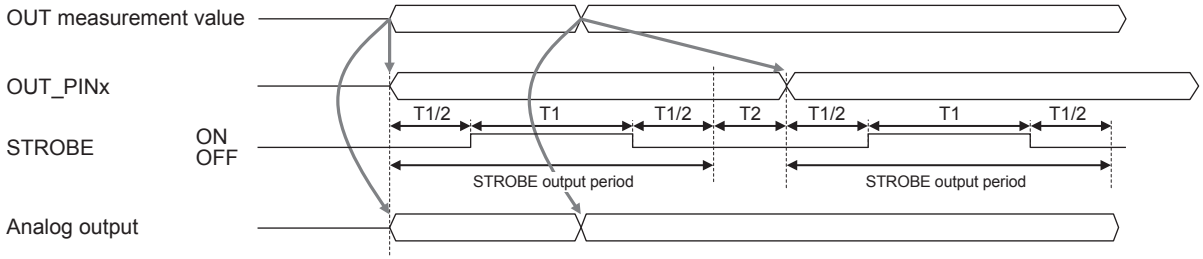
Internal measurement value : 🕮 “[Measurement period]: Terminal/Command” (Page 12-19)

■ Supplementary note: STROBE output

● If the OUT measurement value has been updated during the STROBE output period

Analog output will be updated at the point when the OUT measurement value has been updated. However, OUT_PIN will be updated after the STROBE output period has ended.
At this time, OUT_PIN will be updated based on the latest OUT measurement value.
The STROBE output will turn ON again after OUT_PIN has been updated.

Occurs when the [Strobe output time] setting is longer than the output update time or when the update timings overlap due to the TIMING/ZERO/RESET input.



T1	STROBE output time ON time	[Strobe output time] Page 9-6
T2	STROBE output delay time	T3 or less … Central value (*1)

T3: Sampling frequency (fastest trigger frequency) Page 5-7

(*1) Varies depending on the load of the OUT measurement process (Internal processes from position correction setting to OUT measurement setting). The center value will be for when the OUT measurement processing time is within T3. If the OUT measurement processing time exceeds T3, see Page 12-39 - Page 12-40.

● If the STROBE output timing is different for each OUT_PIN

When multiple hold modes are being used, the STROBE output timings will be different for each mode as the output update timings are different.
In such case, the STROBE output will turn ON at the timing when one of the OUT_PIN outputs is updated.

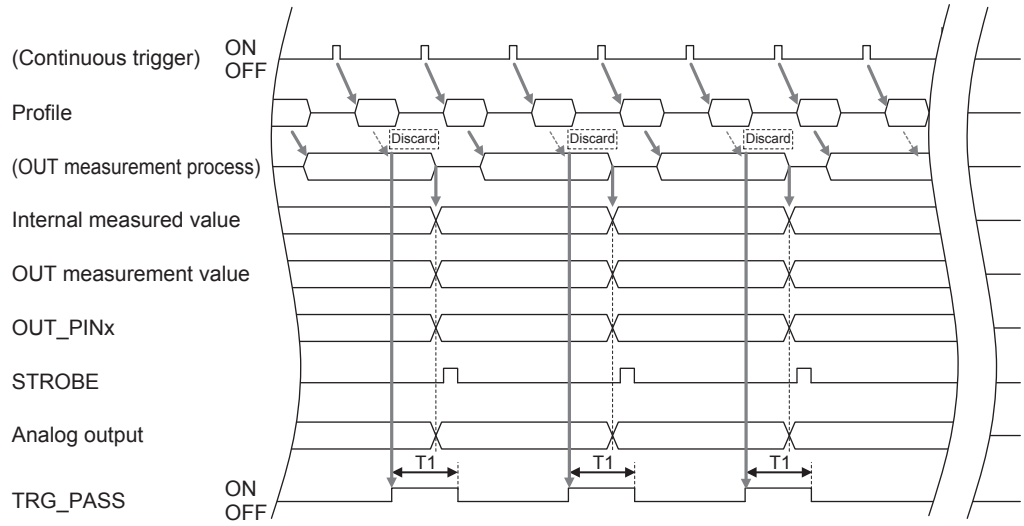
Internal measurement value : “[Measurement period]: Terminal/Command” (Page 12-19)

■ Supplementary note: Long OUT measurement processing time

● [Batch measurement]: OFF

Profiles that are too late for the OUT measurement process will be discarded. The TRG_PASS output will turn ON at this time.
The ON time of the TRG_PASS output will not be extended even if another TRG input is ignored while the TRG_PASS output is already ON.

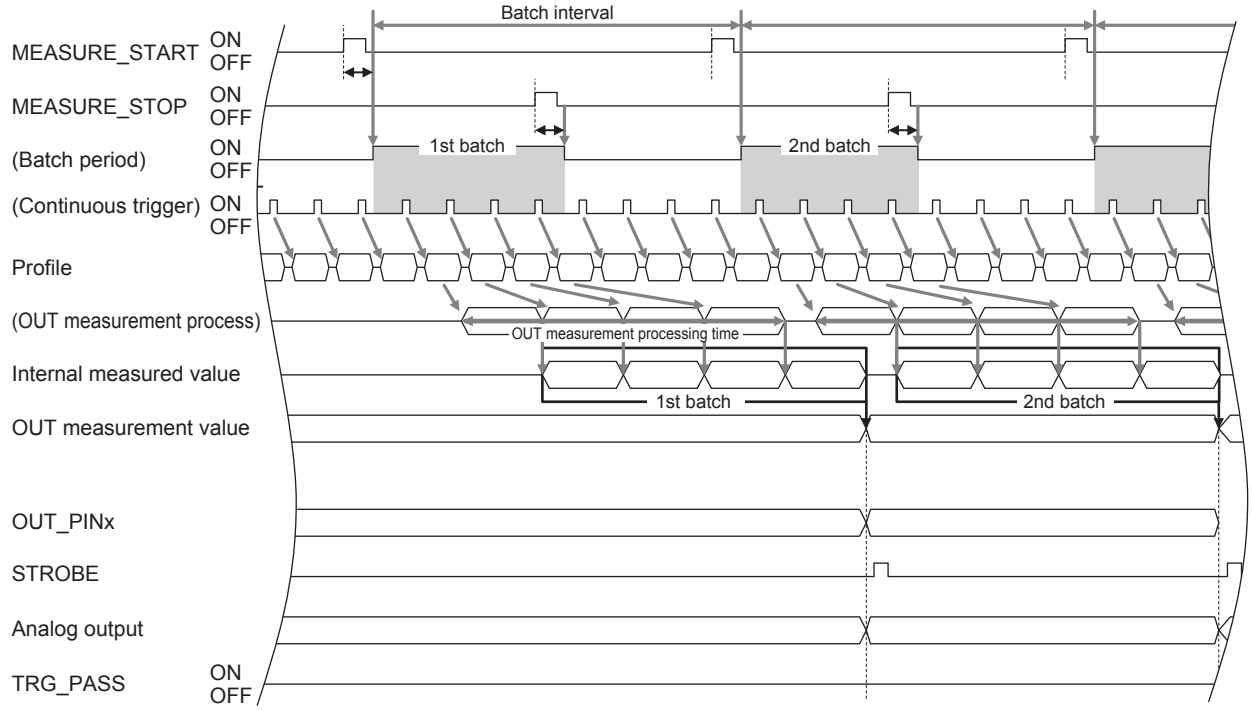
The following explanation uses the following as an example: [Compression (time axis)]: OFF, [Hold mode]: Normal.



T1	TRG_PASS output time	20 ms

● [Batch measurement]: ON

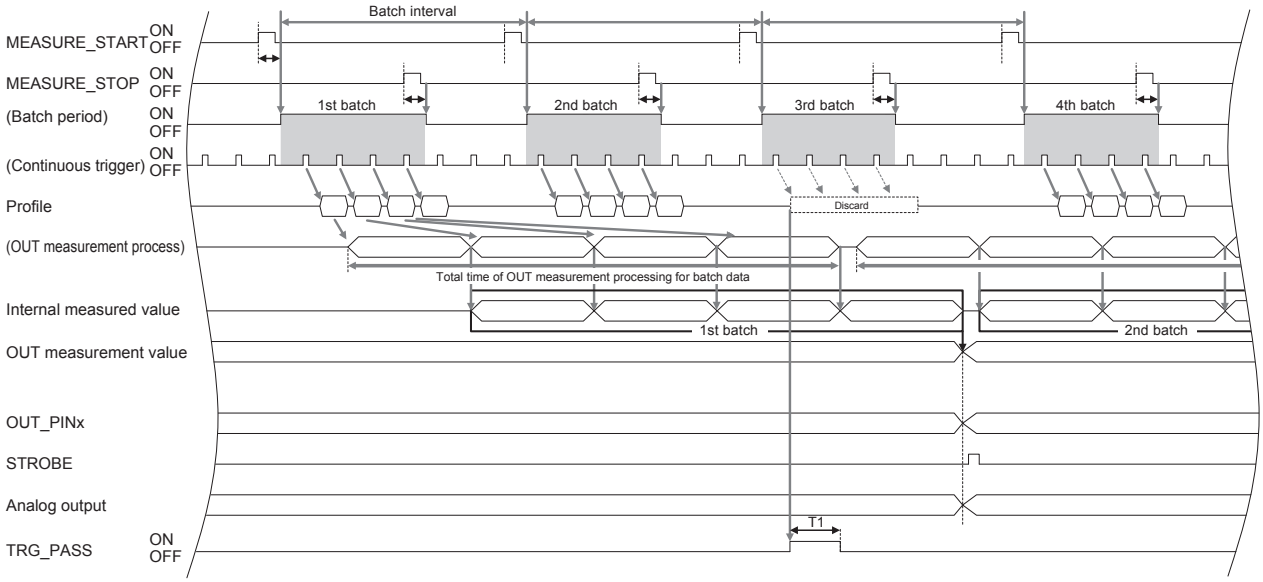
If the batch interval (i.e. the period from the current batch start until the start of next batch) is within the OUT measurement processing time, the OUT measurement can be performed without any profile being discarded.



Internal measurement value : “[Measurement period]: Terminal/Command” (Page 12-19)

● **An example where the profile is discarded**

When (Batch interval) > (OUT measurement processing time for the batch data), all profiles during the overflowed batch period (3rd batch) will be discarded. In such a case, the TRG_PASS output will turn ON.
The ON time of the TRG_PASS output will not be extended even if another TRG input is ignored while the TRG_PASS output is already ON.
It should therefore be used such that the batch interval will be within the OUT measurement processing time.



T1	TRG_PASS output time	20 ms

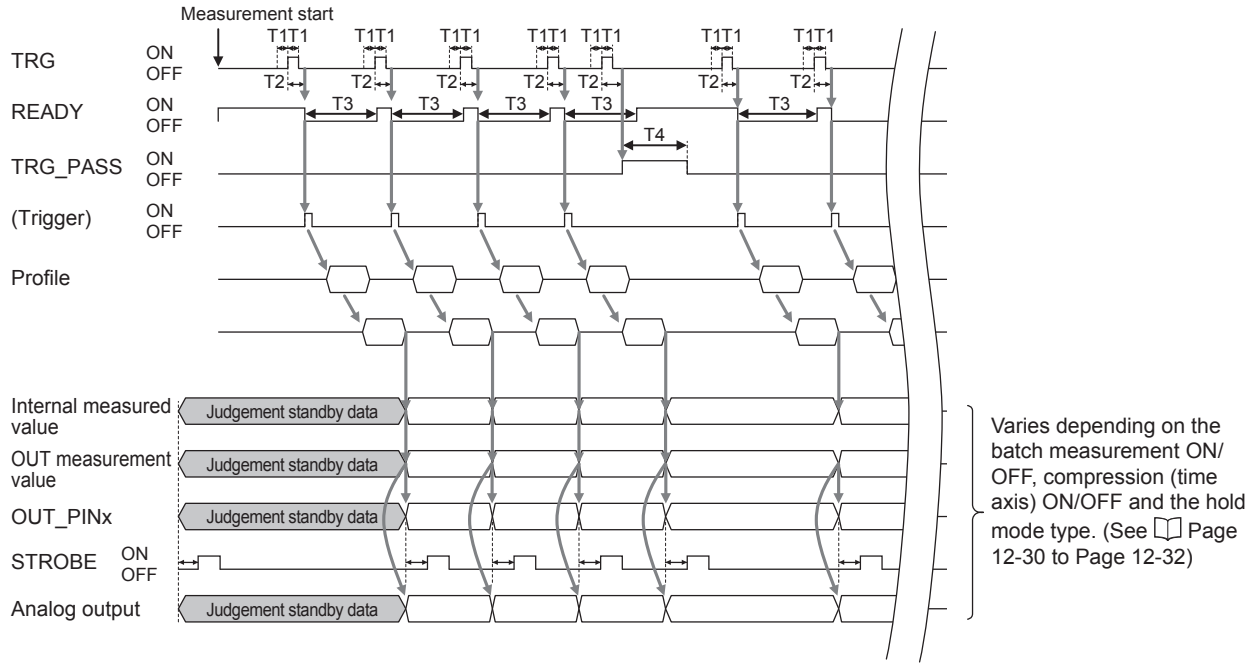
Internal measurement value : “[Measurement period]: Terminal/Command” (Page 12-19)

External trigger/Encoder trigger

■ Summary

Imaging is performed in sync with the TRG or encoder input.
External and encoder triggers have different trigger input methods. However, after the triggers have been issued, their timing charts will be the same.
Hereafter, the following explanation uses the external trigger as an example. (Also see Page 12-8 for the encoder trigger)

The following explanation uses the following as an example: [Hold mode]: Normal, [Batch measurement]: OFF, [Compression (time axis)]: OFF, [Averaging] = OFF, [Moving average] = OFF.



T1	TRG minimum input time	[Minimum input time] - [TRG] or longer Page 9-7
T2	TRG response time	T1 + 9 µs or less
T3	READY OFF time	T5 … Central value (*1)
T4	TRG_PASS output time	20 ms

T5: Sampling frequency (fastest trigger frequency) Page 5-7

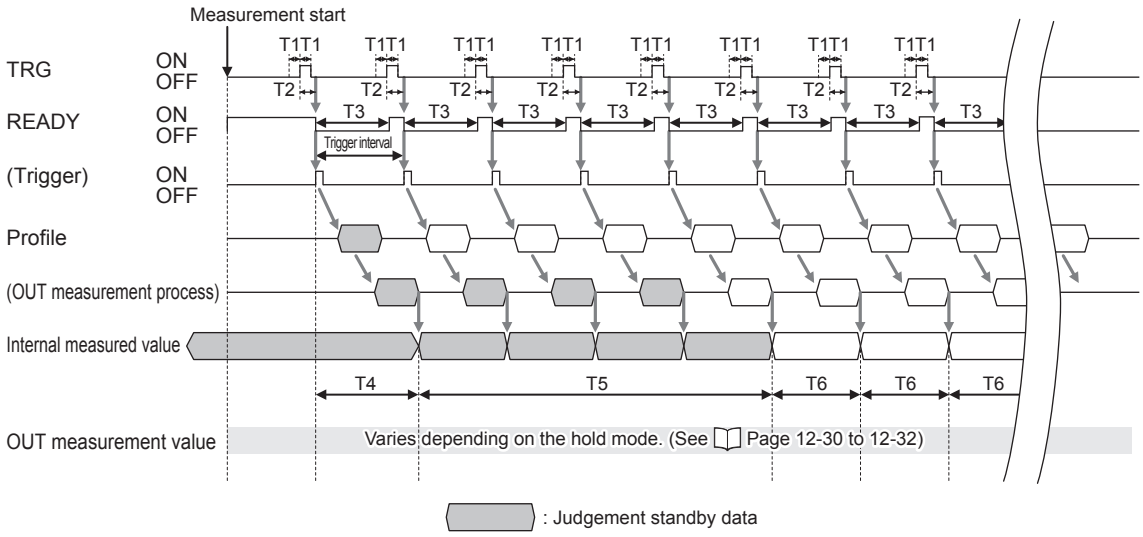
(*1) Varies depending on the load of the OUT measurement process (Internal processes from position correction setting to OUT measurement setting). The center value will be for when the OUT measurement processing time is within T5. If the OUT measurement processing time exceeds T5, see Page 12-46 - Page 12-48.

- The TRG input will be ignored while READY is OFF. In such event, the TRG_PASS output will turn ON.
- The ON time of the TRG_PASS output will not be extended even if another TRG input is ignored while the TRG_PASS output is already ON.

Internal measurement value : "[Measurement period]: Terminal/Command" (Page 12-19)

■ [Batch measurement]: OFF, [Compression (time axis)]: OFF, External trigger/Encoder trigger

The following explanation uses the following as an example: [Averaging] = 2 times, [Moving average] = 4 times.
The following explanation uses the external trigger as an example. (Also see Page 12-8 for the encoder trigger)



Normal data will be output after judgement standby data have been output for a certain period of time from the start of measurement.
The judgement standby period will vary depending on the median (time axis) count, averaging count, and measurement filter settings.

T1	TRG minimum input time	[Minimum input time] - [TRG] or longer Page 9-7
T2	TRG response time	T1 + 9 μs or less
T3	READY OFF time	T7 … Central value (*1)
T4	Internal measurement response time	T7 × 2 + 2 ms or less … Central value (*1)
T5	Internal measurement value judgement standby time	T7 x (K + L + M) … Central value (*1) (*2) K → [Median (time axis) count] - 1 L → [Averaging count] -1 M → [Measure value filter] = OFF … 0, Moving average … [Averaging times] -1, HPF, LFP … 11
T6	Internal measurement update interval	T7 … Central value (*1)

T7: Sampling frequency (fastest trigger frequency) Page 5-7
(*1) Varies depending on the load of the OUT measurement process (Internal processes from position correction setting to OUT measurement setting). The center value will be for when the OUT measurement processing time is within T7. If the OUT measurement processing time exceeds T7, see Page 12-46 - Page 12-48.
(*2) When there is no judgement standby hold by the measurement alarm process

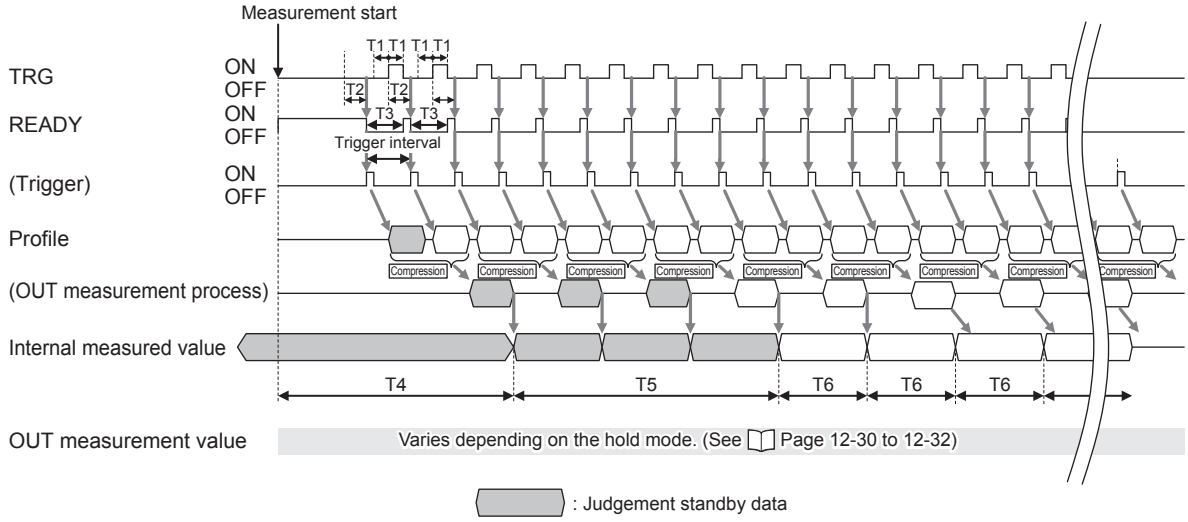
- The TRG input will be ignored while READY is OFF. In such event, the TRG_PASS output will turn ON.
- The ON time of the TRG_PASS output will not be extended even if another TRG input is ignored while the TRG_PASS output is already ON. (See Page 12-41)

Internal measurement value : "[Measurement period]: Terminal/Command" (Page 12-19)

■ [Batch measurement]: OFF, [Compression (time axis)]: ON, External trigger/Encoder trigger

Carries out the OUT measurement process for the compression profiles that were generated per compression point.

The following explanation uses the following as an example: [Compression points (time axis)] = 2 points, [Averaging] = 2 times, [Moving average] = 4 times.
The following explanation uses the external trigger as an example. (Also see Page 12-8 for the encoder trigger)



Normal data will be output after judgement standby data have been output for a certain period of time from the start of measurement.
The judgement standby period will vary depending on the median (time axis) count, averaging count, and measurement filter settings.

T1	TRG minimum input time	[Minimum input time] - [TRG] or longer Page 9-7
T2	TRG response time	[Minimum input time] - [TRG] + 9 µs or less
T3	READY OFF time	T7 … Central value (*1)
T4	Internal measurement response time	T7 × ([Compression points (time axis)] + 1) + 2 ms or less … Central value (*1)
T5	Internal measurement value judgement standby time	T7 x [Compression points (time axis)] x M (*2) … Central value (*1) (*3) M → [Mesure value filter] = OFF … 0, Moving average … [Averaging times] -1, HPF, LFP … 11
T6	Internal measurement update interval	T7 x [Compression points (time axis)] … Central value (*1)

T7: Sampling frequency (fastest trigger frequency) Page 5-7
(*1) Varies depending on the load of the OUT measurement process (Internal processes from position correction setting to OUT measurement setting). The center value will be for when the OUT measurement processing time is within T7. If the OUT measurement processing time exceeds T7, see Page 12-46 - Page 12-48.
(*2) When the total of the averaging count and the median (time axis) count is less than the compression points (time axis)
(*3) Excludes the case when judgement standby data is being held by the measurement alarm process.

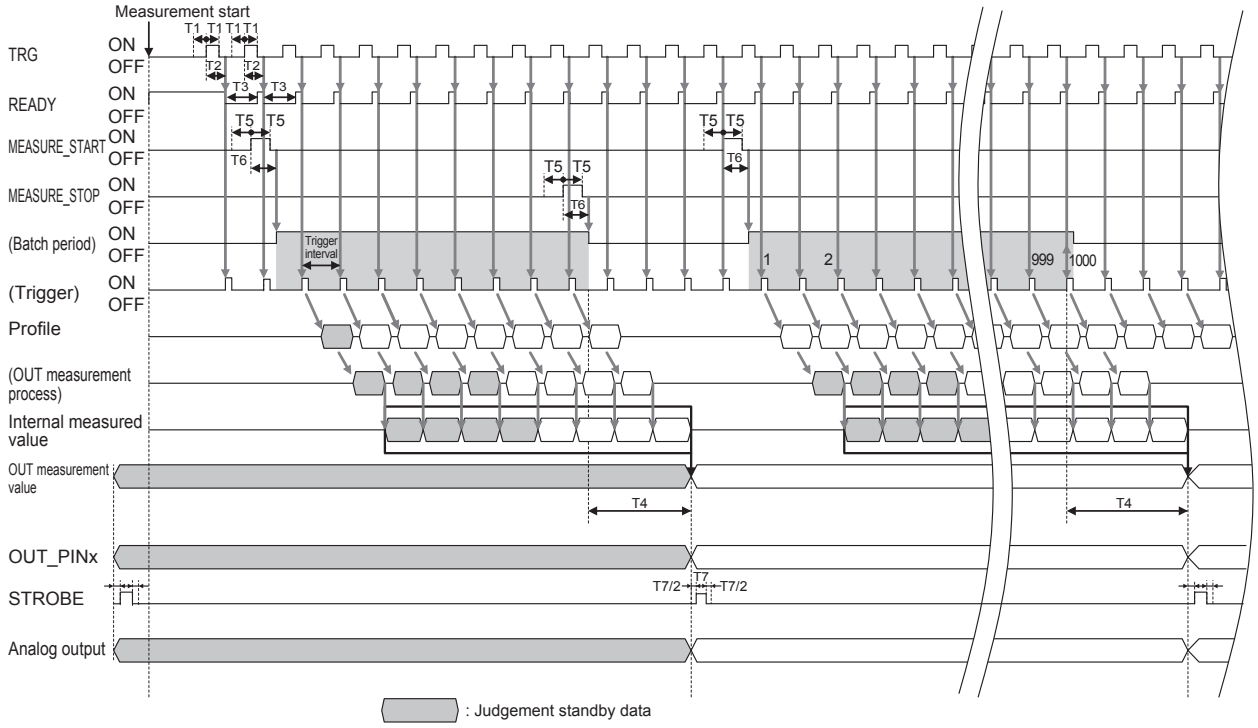
- The TRG input will be ignored while READY is OFF. In such event, the TRG_PASS output will turn ON.
- The ON time of the TRG_PASS output will not be extended even if another TRG input is ignored while the TRG_PASS output is already ON. (See Page 12-41)

Internal measurement value : "[Measurement period]: Terminal/Command" (Page 12-19)

■ [Batch measurement]: ON, [Compression (time axis)]: OFF, External trigger/Encoder trigger

The batch period will be controlled using the MEASURE_START/MEASURE_STOP terminals.
Only those profiles imaged during the batch period will be the OUT measurement target.
The batch period will end automatically once the batch period number of triggers have been issued.

The following explanation uses the following as an example: [Batch point]: 1000 points, [Averaging] = 2 times, [Moving average] = 4 times.
The following explanation uses the external trigger as an example. (Also see Page 12-8 for the encoder trigger)



The OUT measurement value will be updated after the batch period has ended.
The judgement standby period will vary depending on the median (time axis) count, averaging count, and measurement filter settings.

T1	TRG minimum input time	[Minimum input time] - [TRG] or longer Page 9-7
T2	TRG response time	T1 + 9 µs or less
T3	READY OFF time	Page 12-7
T4	Output response time	T8 × 3 + 2 ms or less … Central value (*1)
T5	Control terminal minimum input time	[Minimum input time] - [Control terminal] or longer Page 9-7
T6	Control terminal response time	T5 + 400 µs or less
T7	STROBE output time	[Strobe output time] Page 9-6

T8: Sampling frequency (fastest trigger frequency) Page 5-7

(*1) Varies depending on the load of the OUT measurement process (Internal processes from position correction setting to OUT measurement setting). The center value will be for when the OUT measurement processing time is within T8. If the OUT measurement processing time exceeds T8, see Page 12-46 - Page 12-48.

- The TRG input will be ignored while READY is OFF. In such event, the TRG_PASS output will turn ON.
- The ON time of the TRG_PASS output will not be extended even if another TRG input is ignored while the TRG_PASS output is already ON. (See Page 12-41)

Internal measurement value : "[Measurement period]: Terminal/Command" (Page 12-19)

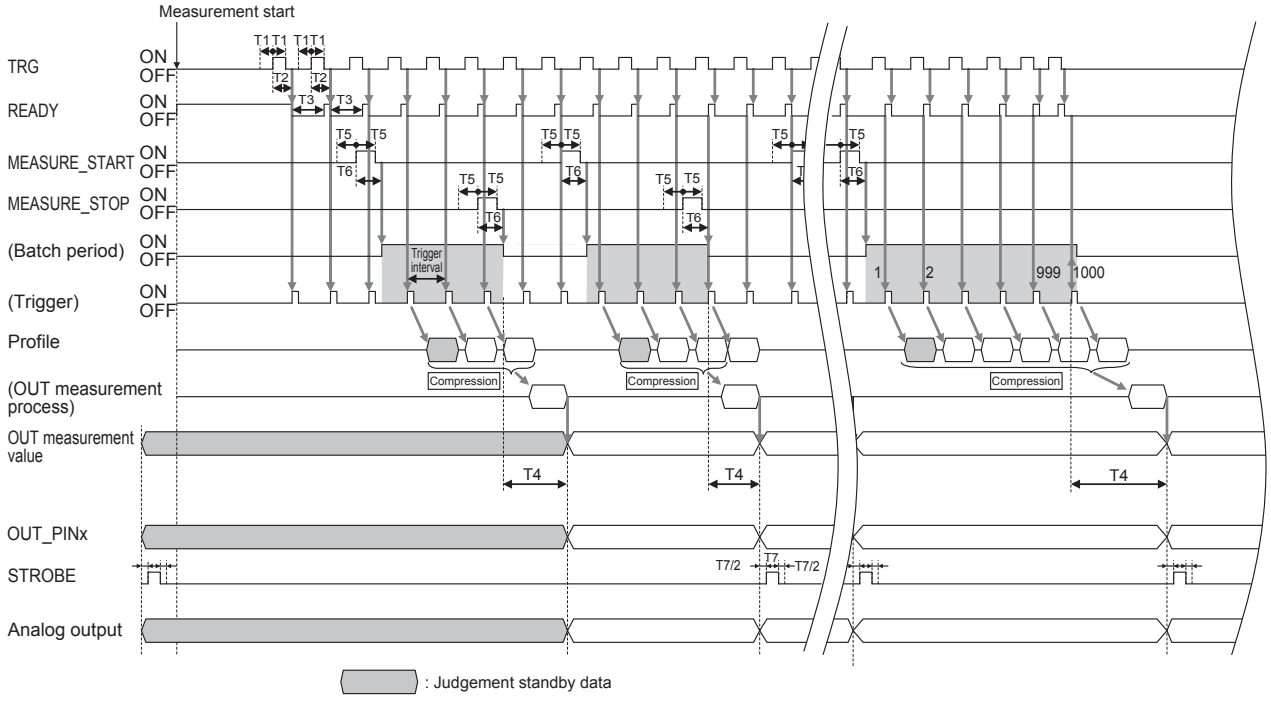
● ZERO/RESET

Page 12-35

■ [Batch measurement]: ON, [Compression (time axis)]: ON, External trigger/Encoder trigger

The batch period will be controlled using the MEASURE_START/MEASURE_STOP terminals.
One compression profile will be created and the OUT measurement process will be carried out during the batch period.
The batch period will end automatically once the batch period number of triggers have been issued.

The following explanation uses the following as an example: [Batch point]: 1000 points, [Averaging] = 2 times, [Measure value filter]: OFF.
The following explanation uses the external trigger as an example. (Also see Page 12-8 for the encoder trigger)



The internal measurement value will be updated after the batch period has ended.
The judgement standby period will vary depending on the median (time axis) count and averaging count setting.

T1	TRG minimum input time	[Minimum input time] - [TRG] or longer Page 9-7
T2	TRG response time	[Minimum input time] - [TRG] + 9 µs or less
T3	READY OFF time	Page 12-7
T4	Internal measurement response time	T8 x 3 + 2 ms … Central value (*1)
T5	Control terminal minimum input time	[Minimum input time] - [Control terminal] or longer Page 9-7
T6	Control terminal response time	T5 + 400 µs or less
T7	STROBE output time	[Strobe output time] Page 9-6

T8: Sampling frequency (fastest trigger frequency) Page 5-7

(*1) Varies depending on the load of the OUT measurement process (Internal processes from position correction setting to OUT measurement setting). The center value will be for when the OUT measurement processing time is within the T8. See Page 12-46 to Page 12-48 if the OUT measurement processing time exceeds the T8.

- The TRG input will be ignored while READY is OFF. In such event, the TRG_PASS output will turn ON.
- The ON time of the TRG_PASS output will not be extended even if another TRG input is ignored while the TRG_PASS output is already ON. (See Page 12-41)

Internal measurement value : "[Measurement period]: Terminal/Command" (Page 12-19)

● ZERO/RESET

Page 12-37

■ Supplementary note: STROBE output

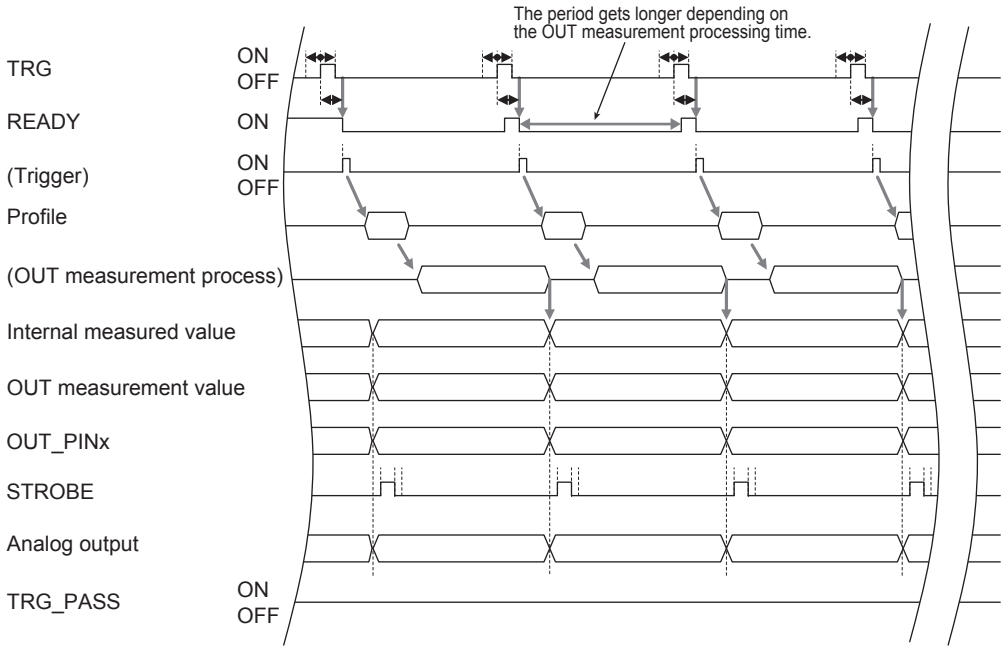
The timing chart will be the same for continuous triggers. (See 🕮 Page 12-38)

■ Supplementary note: Long OUT measurement processing time

● [Batch measurement]: OFF

If the OUT measurement processing time gets longer, so will the period for which READY remains OFF.
Profiles will not be discarded unless the trigger is input while READY is OFF.

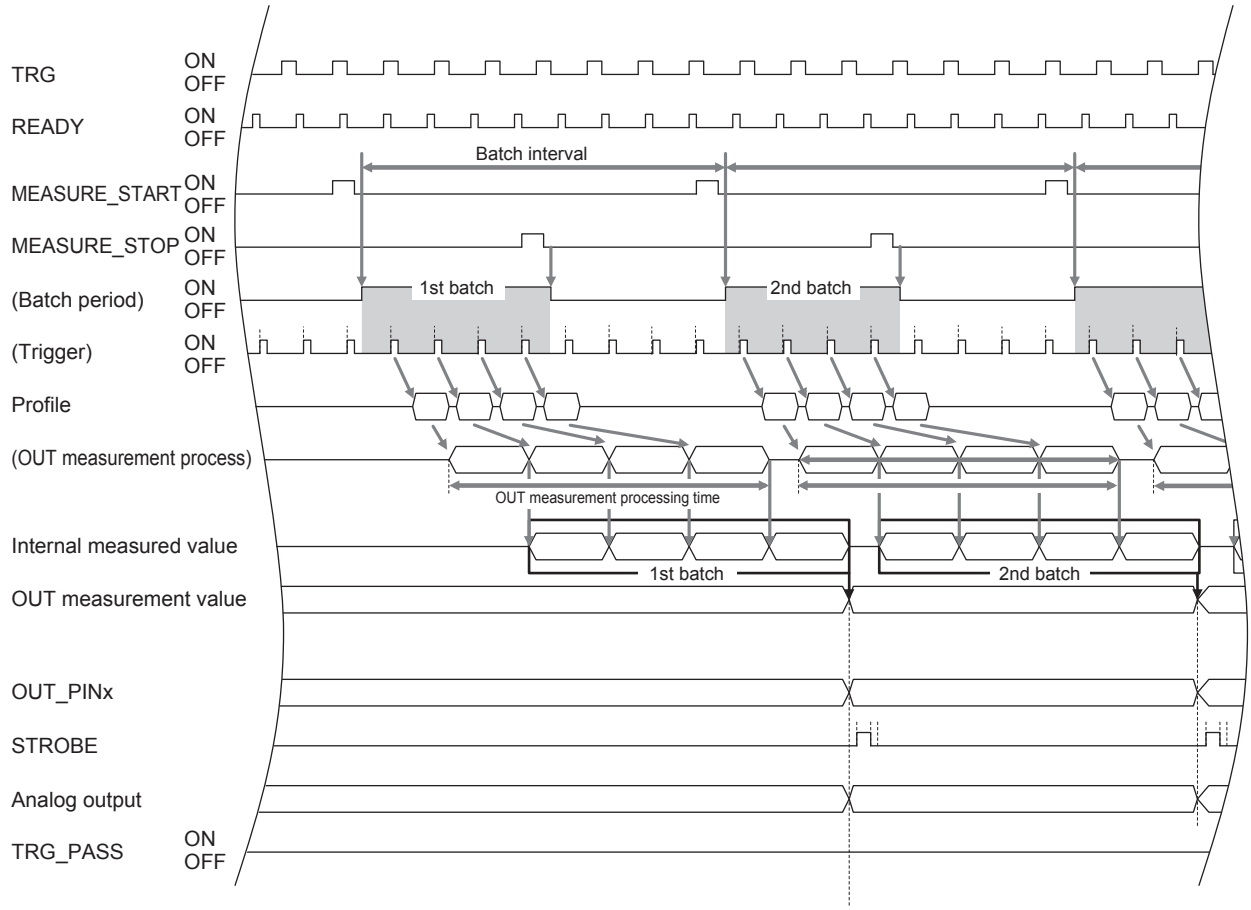
The following explanation uses the following as an example: [Compression (time axis)]: OFF, [Hold mode]: Normal.



Internal measurement value : 🕮 “[Measurement period]: Terminal/Command” (Page 12-19)

● **Batch measurement ON**

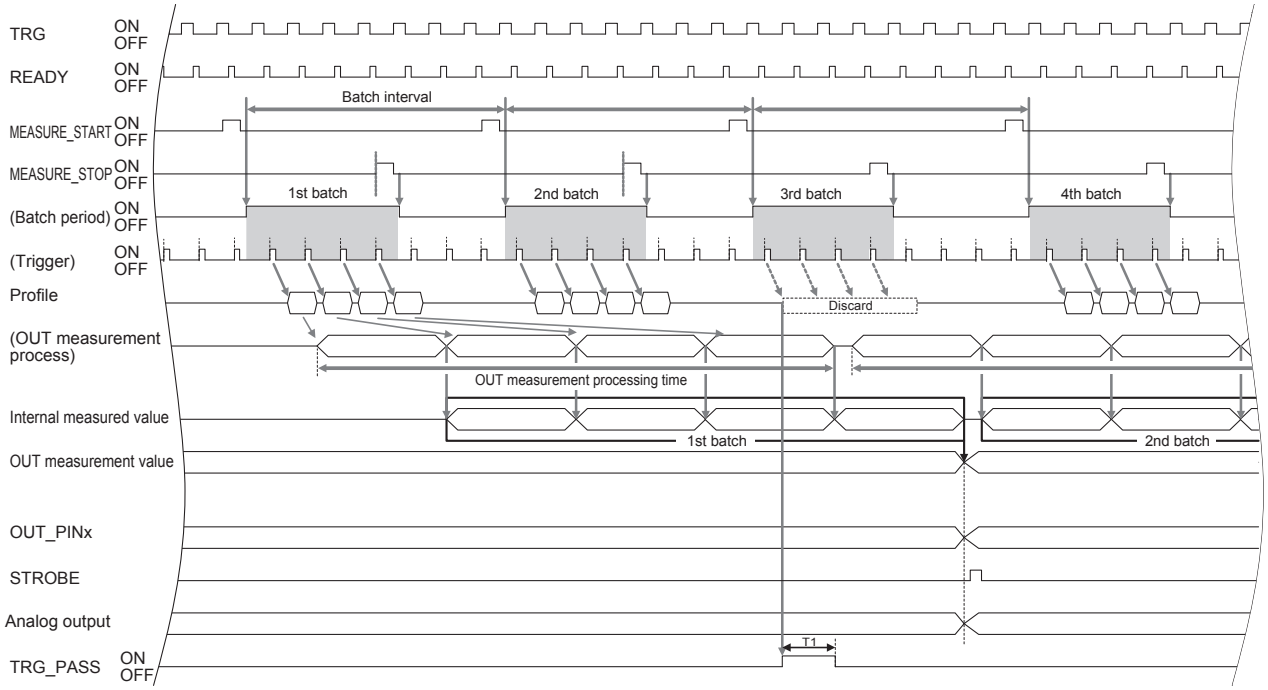
If the batch interval (i.e. the period from the current batch start until the start of next batch) is within the OUT measurement processing time, the OUT measurement can be performed without any profiles being discarded.



Internal measurement value : “[Measurement period]: Terminal/Command” (Page 12-19)

● **An example where the profile is discarded**

When (Batch interval) > (OUT measurement processing time for the batch data), all profiles during the overflowed batch period (3rd batch) will be discarded. The TRG_PASS output will turn ON at this time. The ON time of the TRG_PASS output will not be extended even if another profile is discarded while the TRG_PASS output is already ON.
It should therefore be used such that the batch interval will be within the OUT measurement processing time.



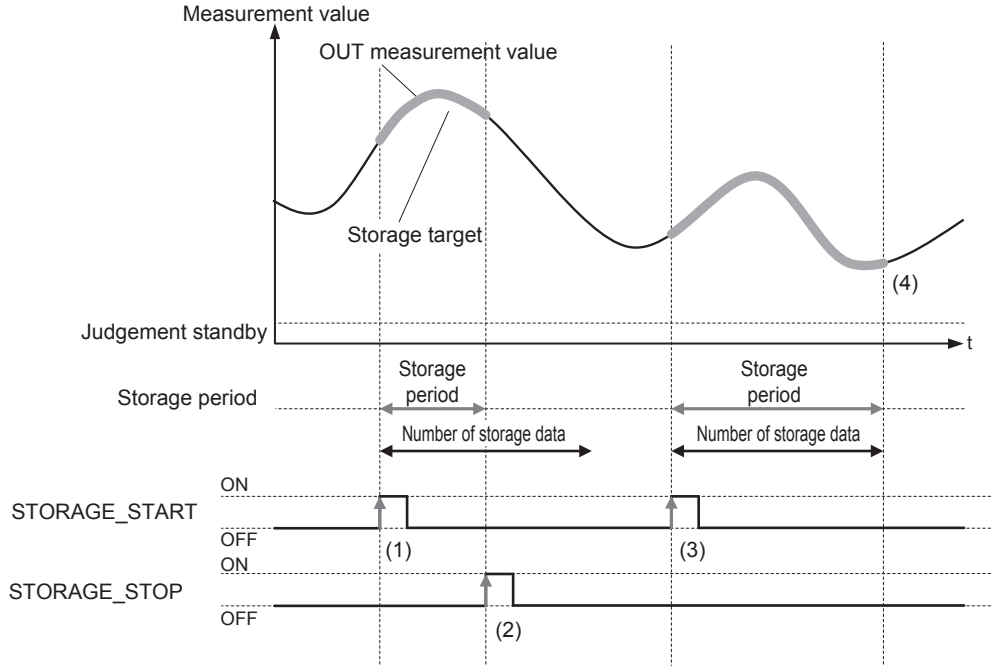
T1	TRG_PASS output time	20 ms

Internal measurement value : “[Measurement period]: Terminal/Command” (Page 12-19)

Summary of the storage process ([Batch measurement]: OFF)

■ [Batch measurement]: OFF, [Compression (time axis)]: Common for ON/OFF

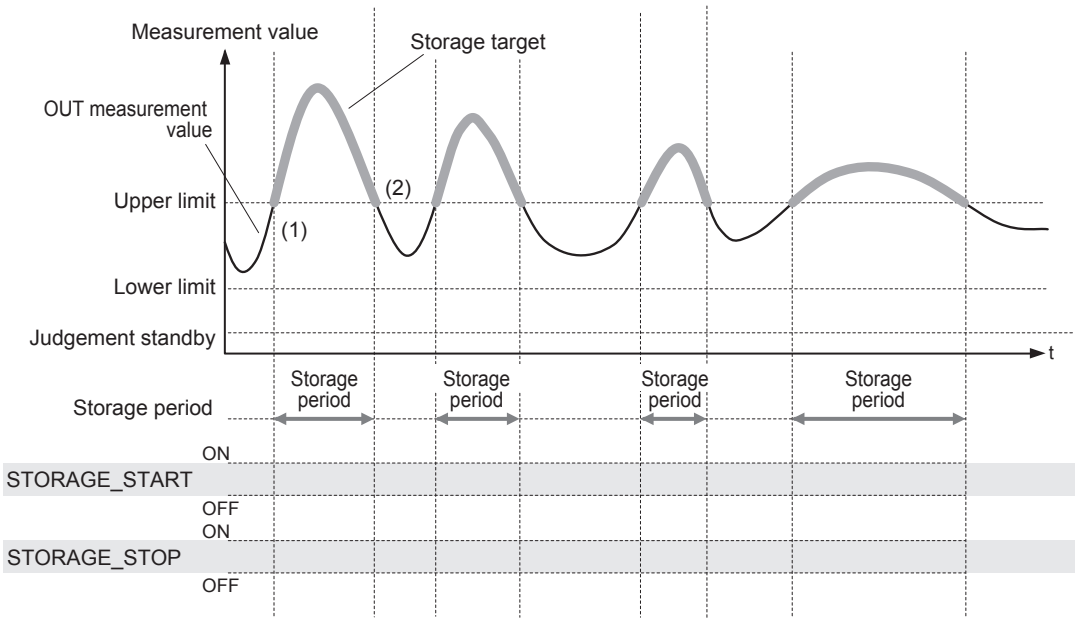
● **[Storage condition]: Terminal/Command**
[Hold mode]: Normal



The STORAGE_START input will start the storage period.
The storage period will end when STORAGE_STOP is input or when the specified number of storage data have been accumulated.

(1) The STORAGE_START input will start the storage.
(2) The STORAGE_STOP input will stop the storage. (When equal to or less than the specified number of storage data)
(3) The STORAGE_START input will start the storage.
(4) The storage will end when the specified number of storage data have been accumulated.

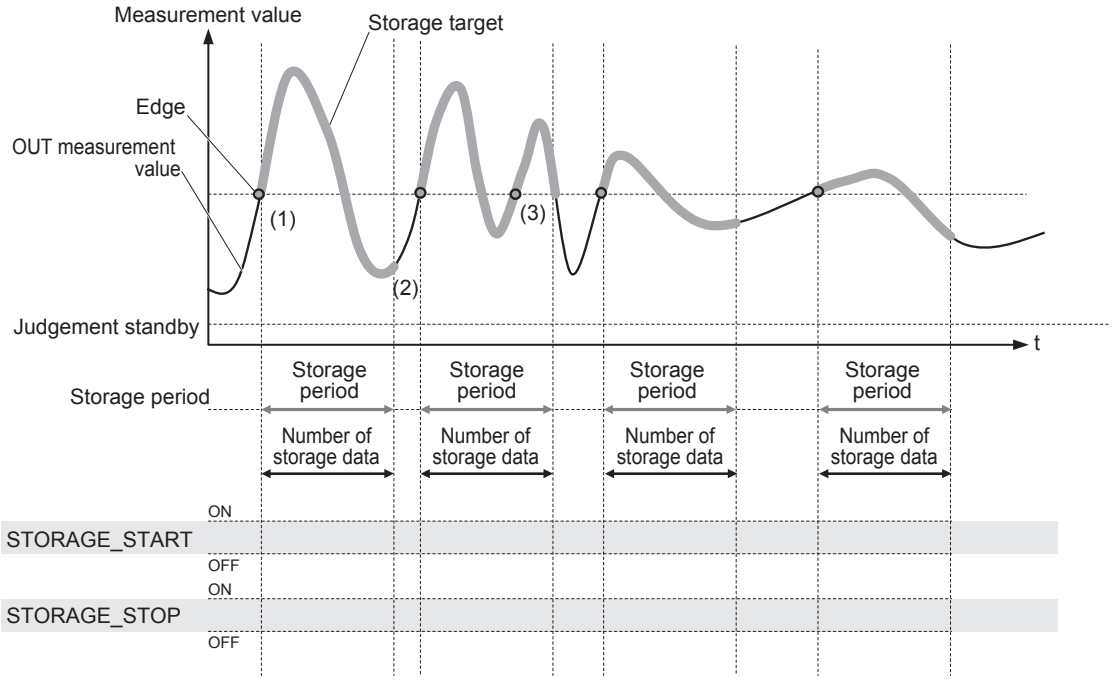
● **[Storage condition]: OUT data (level)**



The period during which the OUT measurement value is greater than the upper limit value or smaller than the lower limit value will be the storage period.

(1) The storage will begin when the OUT measurement value exceeds the upper limit value.
(2) The storage will stop when the OUT measurement value falls below the upper limit value.

● **[Storage condition]: OUT data (edge)**



The period from when the OUT measurement value has exceeded (or fallen below) the edge threshold up to the specified number of storage data will be the storage period.

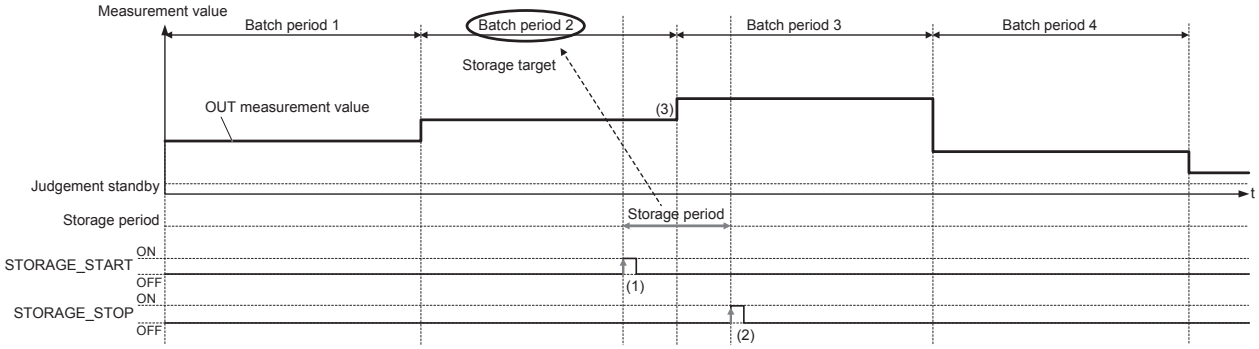
(1) The storage will begin when the OUT measurement value exceeds the edge threshold.
(2) The storage will end when the specified number of storage data have been accumulated.
(3) All edges detected during the storage period will be ignored.

Summary of the storage process ([Batch measurement]: ON)

■ [Batch measurement]: ON, [Compression (time axis)]: Common for ON/OFF, Common for simple 3D measure mode

● [Storage condition]: Terminal/Command

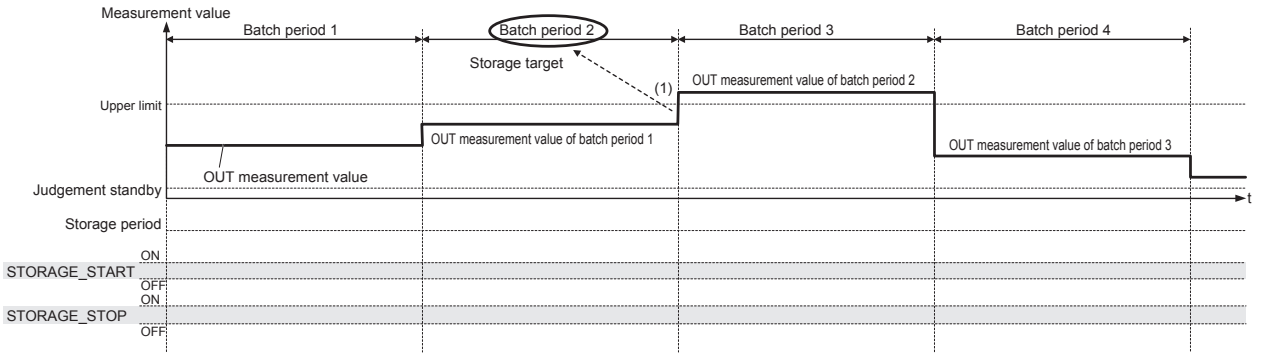
[Hold mode]: Normal



The STORAGE_START input will start the storage period.
The storage period will end when STORAGE_STOP is input or when the specified number of storage batch data have been accumulated.
If the OUT measurement value is updated during the storage period, the batch period will be the storage target.

(1) The STORAGE_START input will start the storage.
(2) The STORAGE_STOP input will stop the storage.
(3) Batch period 2 will be the storage target as the OUT measurement value was updated during the storage period.

● Storage condition: OUT value (level)



If the OUT measurement value during the batch period is greater than the upper limit value or smaller than the lower limit value, this batch period will be the storage target.

(1) Since the OUT measurement value of the batch period 2 is greater than the upper limit value, the batch period 2 will be the storage target.

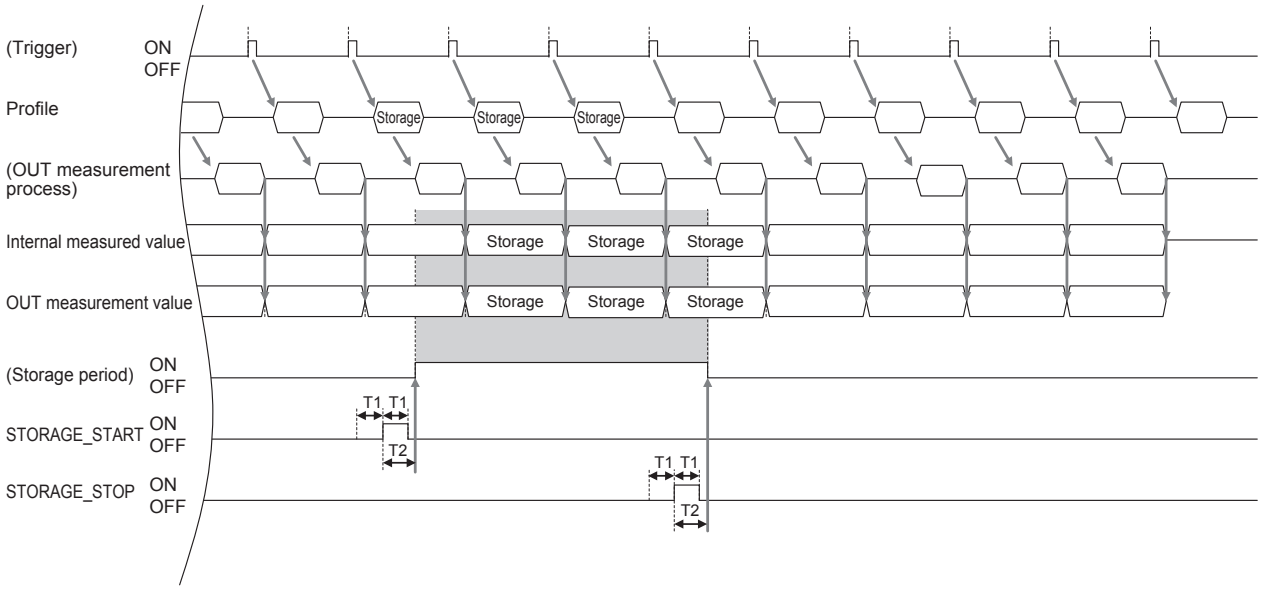
Control using STORAGE_START/STORAGE_STOP terminals

If you have selected [Storage condition]: Terminal/Command, the storage period can be controlled using the STORAGE_START/STORAGE_STOP terminals.

■ [Batch measurement]: OFF

● [Hold mode]: Normal

In the data storage process, if the OUT measurement value is updated during the storage period, the OUT measurement value at that point in time will be stored.
In the profile storage process, if the OUT measurement value is updated during the storage period, the profile, the corresponding internal measurement and OUT measurement values at that point in time will be stored.



T1	Control terminal minimum input time	[Minimum input time] - [Control terminal] or longer Page 9-7
T2	Control terminal response time	T1 + 400 µs + T3 or less … Central value (*1)

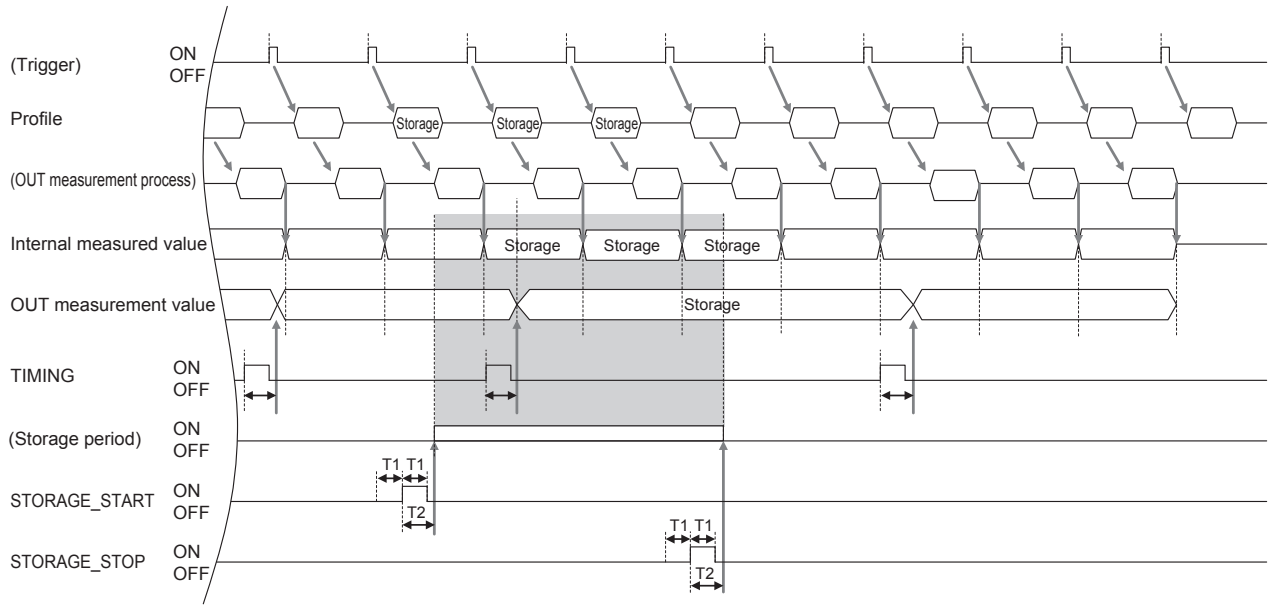
T3: Sampling frequency (fastest trigger frequency) Page 5-7

(*1) Varies depending on the load of the OUT measurement process (Internal processes from position correction setting to OUT measurement setting). The center value will be for when the OUT measurement processing time is within T3.

Internal measurement value : "[Measurement period]: Terminal/Command" (Page 12-19)

● **[Hold mode]: Peak hold/Bottom hold/Peak to Peak hold/Average hold**

In the data storage process, if the OUT measurement value is updated during the storage period, the OUT measurement value at that point in time will be stored.
In the profile storage process, if the internal measurement value is updated during the storage period, the profile, the corresponding internal measurement and OUT measurement values at that point in time will be stored.



T1	Control terminal minimum input time	[Minimum input time] - [Control terminal] or longer Page 9-7
T2	Control terminal response time	T1 + 400 µs + T3 or less … Central value (*1)

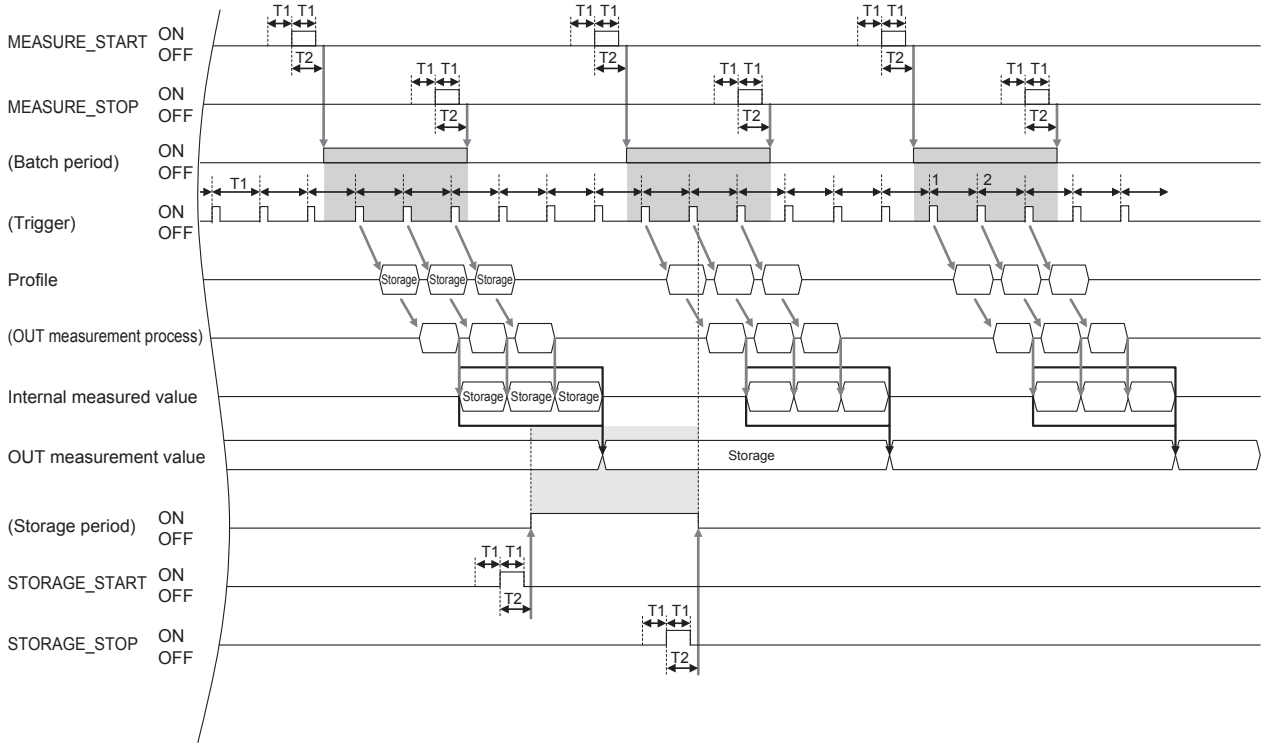
T3: Sampling frequency (fastest trigger frequency) Page 5-7

(*1) Varies depending on the load of the OUT measurement process (Internal processes from position correction setting to OUT measurement setting). The center value will be for when the OUT measurement processing time is within T3.

Internal measurement value : "[Measurement period]: Terminal/Command" (Page 12-19)

■ [Batch measurement]: ON

In the data storage process, if the OUT measurement value is updated during the storage period, the OUT measurement value at that point in time will be stored.
In the profile storage process, if the OUT measurement value is updated during the storage period, the profile in the batch period, the corresponding internal measurement and OUT measurement values at that point in time will be stored.



T1	Control terminal minimum input time	[Minimum input time] - [Control terminal] or longer Page 9-7
T2	Control terminal response time	T1 + 400 µs + T3 or less … Central value (*1)

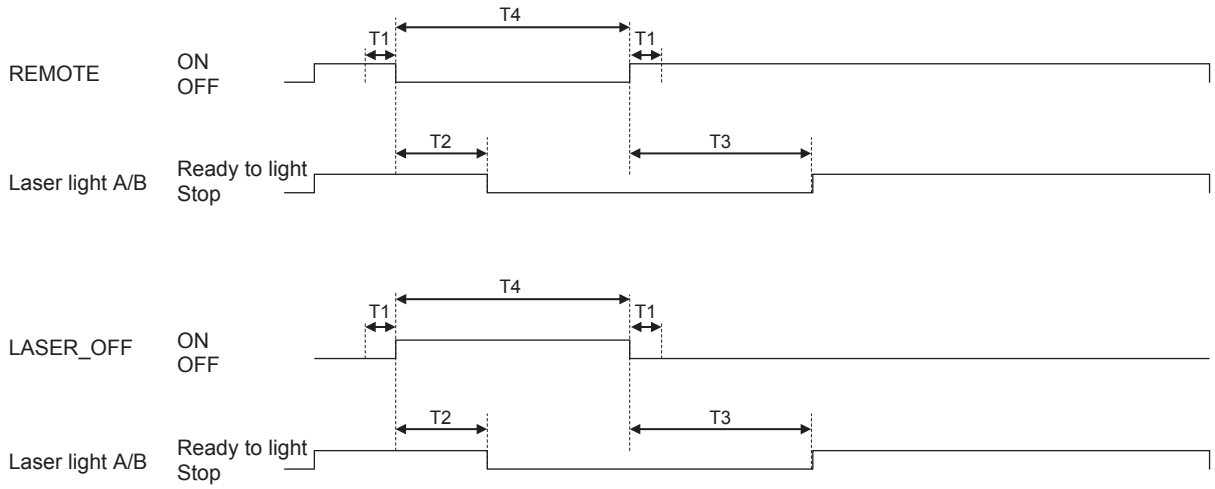
T3: Sampling frequency (fastest trigger frequency) Page 5-7

(*1) Varies depending on the load of the OUT measurement process (Internal processes from position correction setting to OUT measurement setting). The center value will be for when the OUT measurement processing time is within T3.

Internal measurement value : “[Measurement period]: Terminal/Command” (Page 12-19)

Timing Chart (Common)

Laser emission control input

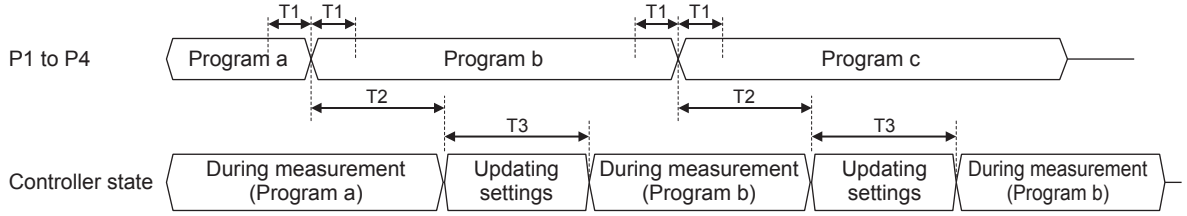


T1	Control terminal minimum input time	[Minimum input time] - [Control terminal] or longer Page 9-7
T2	Control terminal response time	T1 + T5 + 100 ms or less
T3	Laser emission response time	T1 + (No. of heads) x T5 + 100 ms or less
T4	Laser emission input time	300 ms or longer

T5: Sampling frequency (fastest trigger frequency) Page 5-7

Program switching

For the state of each terminal during measurement or settings update, see the [State table] or the time charts.



T1	Control terminal minimum input time	1 ms
T2	Control terminal response time	100 ms or less
T3	Program No. switching time	(No. of heads) x (50 ms + T4) or less

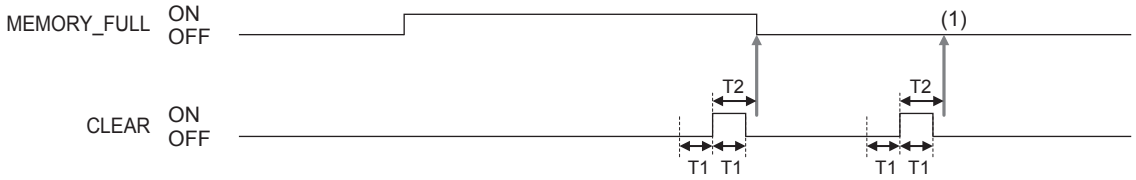
T4: Sampling frequency (fastest trigger frequency) Page 5-7

Internal memory control I/O

The MEMORY_FULL output will turn ON when the data storage area of the internal memory runs out of space.
The data storage area refers to the following areas:

- For high-speed mode: The area in which the profiles are buffered
- For advanced function mode: The area in which the storage data are accumulated

If you have selected [Double buffer] for [Memory assignment], it will refer to one of the above two data storage areas.



T1	Control terminal minimum input time	[Minimum input time] - [Control terminal] or longer Page 9-7
T2	[Clear] terminal response time	High-speed mode … 100 ms + (No. of heads) x T3 or less Advanced function mode … 100 ms or less

T3: Sampling frequency (fastest trigger frequency) Page 5-7

(1) You can clear the internal memory even if empty space is left in the data storage area of the internal memory. If [All area (not to overwrite)] is select in [Memory assignment], inputting [CLEAR] will clear all storage data.

Start-up time

It indicates the period of time from when the power is switched ON until a transition to the [Measuring] state is made.
See the power ON state in the [State table] for the I/O states during a power ON reset.

Start-up time	10 seconds or less (*1)

(*1) When the Ethernet communication is used, the start-up time is less than approximately 15 seconds. However, this depends on the PC and the network setting.

MEMO

State Table

			Output terminal							Input terminal (*1)					
			READY	MEMORY_FULL	TRG_PASS	Judgement output (OUT_PINx)	STROBE	Analog voltage output	TRG_ERROR (*6)	ERROR	REMOTE	LASER_OFF	TRG	ENCODER	MEASURE_ STARTMEASURE_STOP	
At power ON (Starting)			OFF	OFF	OFF	OFF	OFF	-10.8 V	OFF	OFF	x	x	x	x	x	
Measuring	High-speed mode		Depends on the measurement	Depends on the measurement	Depends on the measurement	OFF	OFF	-10.8 V	Depends on the measurement	ON	✓	✓	✓ (*4)	✓ (*5)	✓	
	Advanced function mode	Normal measurement data				Judgement result (*7)	Depends on the measurement	Depends on the measurement value (*2)	-							
		Judgement standby data						-10.8 V								
		Measurement alarm data						-10.8 V								
Updating settings			OFF	Hold	OFF (*3)	Hold	OFF (*3)	Hold	Hold				x	x	x	
REMOTE: OFF or LASER_OFF: ON			OFF	Hold	OFF (*3)	OFF	Depends on the measurement (*8)	-10.8 V	Hold	ON	✓	✓	x	x	x	
Error state			OFF	Hold	OFF (*3)	Hold	OFF (*3)	Hold	Hold	OFF	x	x	x	x	x	

*1 ✓ and × in the table have the following meanings. ✓: Valid, x: Invalid. [Invalid] means that the input will be ignored.
*2 It will be ±10.8 V if ±10.5 V is exceeded. It will be -10.8 V if the output terminal has not yet been allocated.
*3 If it was ON at the time of state transition, it will retain the ON state for the set strobe output time.
*4 It is only valid when the trigger mode is [External trigger].
*5 It is only valid when the trigger mode is [Encoder trigger].
*6 The TRG_ERROR and TRG_ERROR_RESET terminals are only meaningful in high-speed mode and when parallel imaging is ON.
*7 HI, GO and LO will be OFF for the judgement standby data, and HI and LO will turn ON simultaneously for alarm data.
*8 STROBE will be output when a transitions to/from the REMOTE: OFF, LASER_OFF: ON state occurs.
*9 OUT measurement value is outputted with the following units per type of the measure mode:
Length (height/width etc.) : 0.01 µm
Cross-sectional area : 0.00001 mm^2
Angle : 0.001 °
*10 The specified value is output with the minimum display unit set in the program setting.

	Input terminal (*1)							Display		EtherNet/IP PROFINET		DLL	
	ZERO	TIMING	RESET	STORAGE_ STARTSTORAGE_STOP	P1 to P4	CLEAR	TRG_ERROR_RESET (*6)	OUT measurement value	Judgement	OUT measurement value	Judgement	OUT measurement value	Judgement
	x	x	x	x	x	x	x	OFF	-	-2147483648 (0x80000000)	All bits are 0	-10^{10}	All bits are 0
	x	x	x	x	✓	✓	✓	-	-	-2147483648 (0x80000000)	All bits are 0	-10^{10}	All bits are 0
	✓	✓	✓	✓			-	Measurement value	Judgement result	Measurement value (*9)	Judgement result	Measurement value (*10)	Judgement result
	x							------	All OFF	-2147483648 (0x80000000)	All bits are 0	-10^{10}	All bits are 0
								ALARM	HI and LO are ON simultaneously	-2147483648 (0x80000000)	Both HI and LO are 1	-10^{10}	Both HI and LO are 1
	x	x	x	x	x	x	x	Hold	All OFF	Hold	All bits are 0	Hold	All bits are 0
	✓	✓	✓	✓	✓	✓	✓	------	All OFF	-2147483648 (0x80000000)	All bits are 0	-10^{10}	All bits are 0
	x	x	x	x	x	x	x	Hold	Hold	Hold	Hold	Hold	Hold

MEMO

13

Specification/ Dimensions/ Characteristics

This section explains the specifications, dimensions, settings values and I/O state table of the controller, display unit and the head.

Specifications **13-2**
Dimensions **13-12**
Characteristics **13-22**

Specifications

Controller specifications

Model		LJ-V7000	LJ-V7000P
No. of connected heads		Up to 2	
Display	Minimum display unit	0.1 µm, 0.00001 mm^2, 0.01°	
	Maximum display range	±9999.99 mm, ±9999.99 mm^2	
Input Terminal block	Laser remote Interlock input	Non-voltage input	
	Encoder input	NPN open collector output / PNP open collector output (5 V/12 V/24 V), line driver output	
	Trigger input	Non-voltage input	Voltage input
	Timing 1, 2 input		
	Auto zero 1, 2 input		
	Reset 1, 2 input		
	Measurement start/ stop input		
	Storage start/stop input		
	Clear memory input		
	Laser OFF input		
	Program switching input	Non-voltage input x 4 inputs	Voltage input x 4 inputs
Output Terminal block	Analog voltage output	±10 V × 2 outputs; Output impedance 100 Ω	
	OUT judgement output	NPN open collector output 12 outputs (16 OUT x 3-level judgement result can be allocated freely)	PNP open collector output 12 outputs (16 OUT x 3-level judgement result can be allocated freely)
	Strobe output	NPN open collector output	PNP open collector output
	Trigger invalid output		
	Memory FULL output		
	Ready output		
	Error output	NPN open collector output (N.C.)	PNP open collector output (N.C.)
Ethernet interface		1000BASE-T/100BASE-TX	
USB interface		USB2.0 HI-SPEED supported (USB1.1 Full-SPEED compatible)	
RS232C interface		Measurement data output and control I/O (Baud rate up to 115200 bit/s can be selected)	
Rating	Power supply voltage	24 V DC ±10% Incl. ripple (P-P)	
	Maximum current consumption	One head: 1.3 A or less / Two heads: 1.9 A or less	
Environment resistance	Operating ambient temperature	0 to +50 °C	
	Operating ambient humidity	20 to 85% RH (No condensation)	
Weight		Approx. 1500 g	

- The rating of the NPN open collector output is max. 50 mA (40 V or less) and 1 V or less residual voltage.
- The rating of the PNP open collector output is max. 50 mA (30 V or less) and 1 V or less residual voltage.
- The rating of the non-voltage input is ON voltage 1V or less and OFF current 0.6 mA or less.
- The rating of the voltage input is maximum input voltage 26.4 V, minimum ON voltage 10.8 V, and OFF current 0.6 mA or less.

Display unit specifications

Model		LJ-VM100
Monitor output		Analog RGB XGA (1024×768) Dedicated cable for the touch panel monitor (CA-MP120T) is included.
Power supply voltage		Supplied from the controller
Power consumption		2.5 W or less
Environment resistance	Operating ambient temperature	0 to +50 °C
	Operating ambient humidity	20 to 85% RH (No condensation)
Weight		Approx. 400 g

EtherNet/IP communication unit specifications

Name		EtherNet/IP communication unit
Model		CB-EP100
Compatible network		EtherNet/IP and displacement meter specific protocol (Socket communication)
EtherNet	Compatible standard	IEEE802.3 (10BASE-T) IEEE802.3u (100BASE-TX)
	Transmission rate	10Mbps (10BASE-T) 100Mbps (100BASE-TX)
	Transmission medium	STP, or UTP in category 3 or higher (10BASE-T) STP, or UTP in category 5 or higher (100BASE-TX)
	Max. cable length	100m (between the controller and EtherNet switch)
	Max. number of connection stages*1	4 (10BASE-T) 2 (100BASE-TX)
EtherNet/IP	Supported functions	Cyclic communication (Implicit message)
		Message communication (Explicit message), UCMM and Class3
	Number of connections	64
	RPI	0.5 to 10000ms (by 0.5ms)
	Cyclic communication allowable bandwidth	6000pps
	Message communication	UCMM and Class3
	Conformance test	Version.A9 compatible
Connection of measuring unit	Connectable units*2	LJ-V7000 series controller LS-9000 series controller
	Number of connectable units	1
Indicators		Link/Activity (LINK/ACT): Green LED Module status (MS): Two-color LED (Green/Red) Network status (NS): Two-color LED (Green/Red)
Power supply voltage		DC24V ± 10%, ripple (P-P) included (supplied from the measuring unit controller)
Maximum current consumption		0.12A or less
Environment resistance	Operating ambient temperature	0 to +50°C
	Operating ambient humidity	20 to 85 % RH (No dew condensation)
Mass		Approx. 470 g

*1: When a switching hub is used, the number of connection stages to be connected has no restriction.
*2: The software of the controller must be Ver.3.00 or later.

PROFINET communication unit specifications

Name		PROFINET communication unit
Model		CB-PN100
Compatible network		PROFINET IO communication
EtherNet	Compatible standard	IEEE 802.3u[*1]
	Transmission rate	100Mbps full duplex (100BASE-TX)
	Transmission medium	STP, or UTP cable in category 5e or higher
	Max. cable length	100m
PROFINET IO	Supported functions	Data I/O communication
		Record data communication
	Number of connectable PROFINET IO controller	1
	Update Time	2ms to 2048ms
	GSDML	Version V2.25
	Conformance class	Conformance Class A compatible
	Conformance test version	V2.2.4 compatible
	Compatible protocols	LLDP, DCP
Connection of measuring unit	Connectable units[*2]	LJ-V7000 series controller LS-9000 series controller
	Number of connectable units	1
Indicators		LINK/ACTIVITY indicator(LINK/ACT): Green LED System Failure indicator(SF): Red LED Bus Failure indicator(BF): Red LED
Power supply voltage		24V ± 10% (supplied from the measuring unit controller)
Maximum current consumption		0.12A or less
Mass		Approx. 470 g

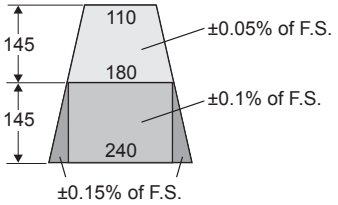
*1: This machine supports IEEE 802.3u, and it is available to establish the 100Mbps full duplex communication with AutoNegotiation function, but the AutoCrossOver function and AutoPolaroty function usually-needed for PROFINET IO specification are not bundled. Select and connect the straight cable and crossing cable to suit to the connecting Ethernet port.

*2: The software of the controller must be Ver.3.00 or later.

Head specifications

Model			LJ-V7020K[*1]	LJ-V7020[*1]	LJ-V7060K	LJ-V7060	LJ-V7080	LJ-V7200	LJ-V7300
Installation condition			Specular reflection	Diffuse reflection	Specular reflection	Diffuse reflection			
Reference distance			24.2 mm	20 mm	54.6 mm	60 mm	80 mm	200 mm	300 mm
Measurement Range	Z axis (Height)		±2.3 mm (F.S. = 4.6 mm)	±2.6 mm (F.S. = 5.2 mm)	±7.6 mm (F.S. = 15.2 mm)	±8 mm (F.S. = 16 mm)	±23 mm (F.S. = 46 mm)	±48 mm (F.S. = 96 mm)	±145 mm (F.S. = 290 mm)
	X axis (Width)	Near side	6.5 mm	6.5 mm	8 mm	13.5 mm	25 mm	51 mm	110 mm
		Reference distance	7 mm	7 mm	14 mm	15 mm	32 mm	62 mm	180 mm
		Far side	7.5 mm	7.5 mm	8 mm	15 mm	39 mm	73 mm	240 mm
Light source			Blue semiconductor laser						
	Wavelength		405 nm (Visible light)						
	Laser class (IEC60825-1, FDA(CDRH) Part 1040.10[*2])		Class 2M[*3]		Class 2	Class 2M[*3]	Class 2	Class 2	Class 2
	Output		10 mW		4.8 mW	10 mW	4.8 mW	4.8 mW	4.8 mW
Spot shape (Reference distance)			Approx. 14 mm × 35 µm		Approx. 21 mm × 45 µm		Approx. 48 mm × 48 µm	Approx. 90 mm × 85 µm	Approx. 240 mm × 610 µm
Repeatability [*4]	Z axis (Height) [*5]		0.2 µm		0.4 µm		0.5 µm	1 µm	5 µm
	X axis (Width) [*6]		2.5 µm		5 µm		10 µm	20 µm	60 µm
Linearity	Z axis (Height) [*7]		±0.1% of F.S.						±0.05% to ±0.15% of F.S.[*8]
Profile data interval	X axis (Width)		10 µm		20 µm		50 µm	100 µm	300 µm
Sampling frequency (Trigger interval)[*9]			Max. 16 µs (High-speed mode) Max. 32 µs (Advanced function mode)						
Temperature characteristics			0.01% of F.S./°C						
Environment resistance	Protection structure[*10]		IP67 (IEC60529)						
	Operating ambient luminance[*11]		Incandescent lamp: 10000 lx or less						
	Operating ambient temperature[*12]		0 to +45 °C						
	Operating ambient humidity		20 to 85% RH (No condensation)						
	Vibration resistance		10 to 57 Hz double amplitude 1.5 mm; 3 hrs in X, Y and Z directions						
	Impact resistance		15 G/6 msec						
Material			Aluminum						
Mass			Approx. 410 g		Approx. 450 g		Approx. 400 g	Approx. 550 g	Approx. 1000 g

*1: The W-polarized function is not available.
*2: The laser classification for FDA(CDRH) is implemented based on IEC60825-1 in accordance with the requirements of Laser Notice No. 50.
*3: Do not view the beam directly with optical instruments (for example, eye loupes, magnifiers, microscopes, telescopes and binoculars). Viewing the laser output with the optical instruments may pose an eye hazard.
*4: This value is from a case in which measurement has been performed with a reference distance at an average frequency of 4096 times.
*5: The measurement target is KEYENCE standard target. The value is applicable when measuring the average height of the initial settings area in the [Height] mode. Others are default settings.
*6: The measurement target is a pin gauge. The value is applicable when the intersecting position of the round surface of the pin gauge and the edge level is measured in the position mode. Others are default settings.
*7: The measurement target is KEYENCE standard target. This profile data is applicable when measuring with smoothing 64 times and averaging 8 times. Others are default settings.
*8: The linearity will vary depending on the measurement area (See right diagram).
*9: High-speed mode: The measurement range is set to [Minimum], the binning is ON, the imaging mode is set to [standard], and parallel imaging is ON. Others are default settings. Advanced function mode: The measurement range is set to [Minimum], the binning is ON, and the imaging mode is set to [Standard]. Others are default settings.
10: This value is applicable when a head cable (CB-B) or extension cable (CB-B*E) is connected.
*11: When measuring white paper, this is the illuminance for the light-receiving surface of the sensor head when light has been shined onto white paper.
*12: The head must be mounted on a metallic plate.

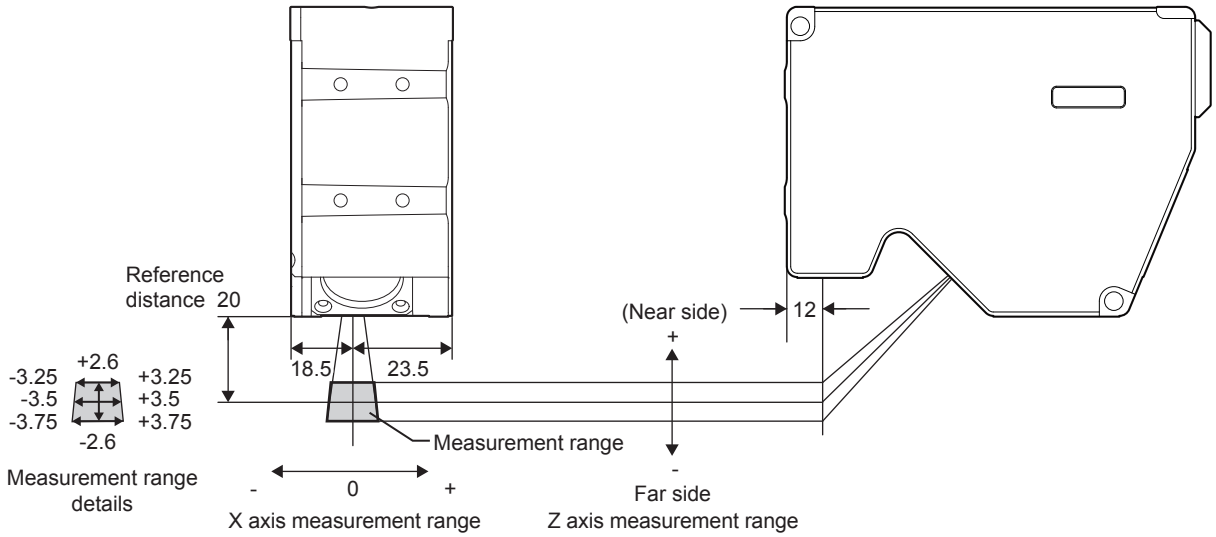


Measurement range

The measurement ranges of this unit are shown below. The shape of the target inside the trapezoid enclosed by the Z axis and X axis measurement areas will be measured.

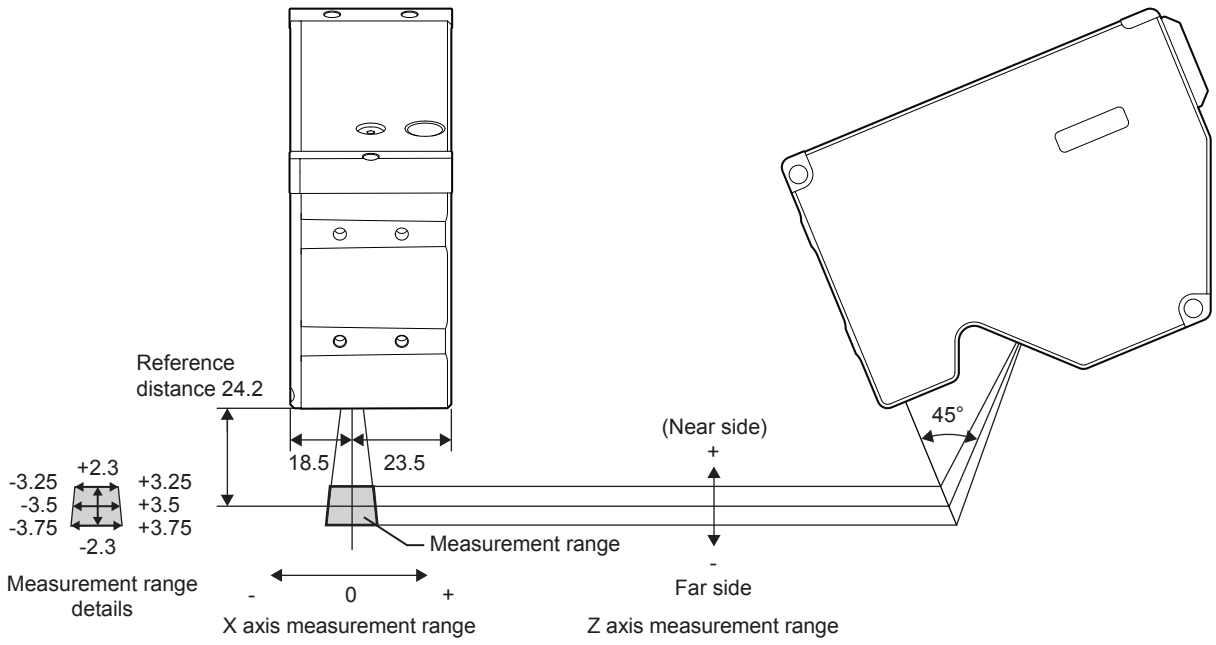
■ LJ-V7020

Unit: mm



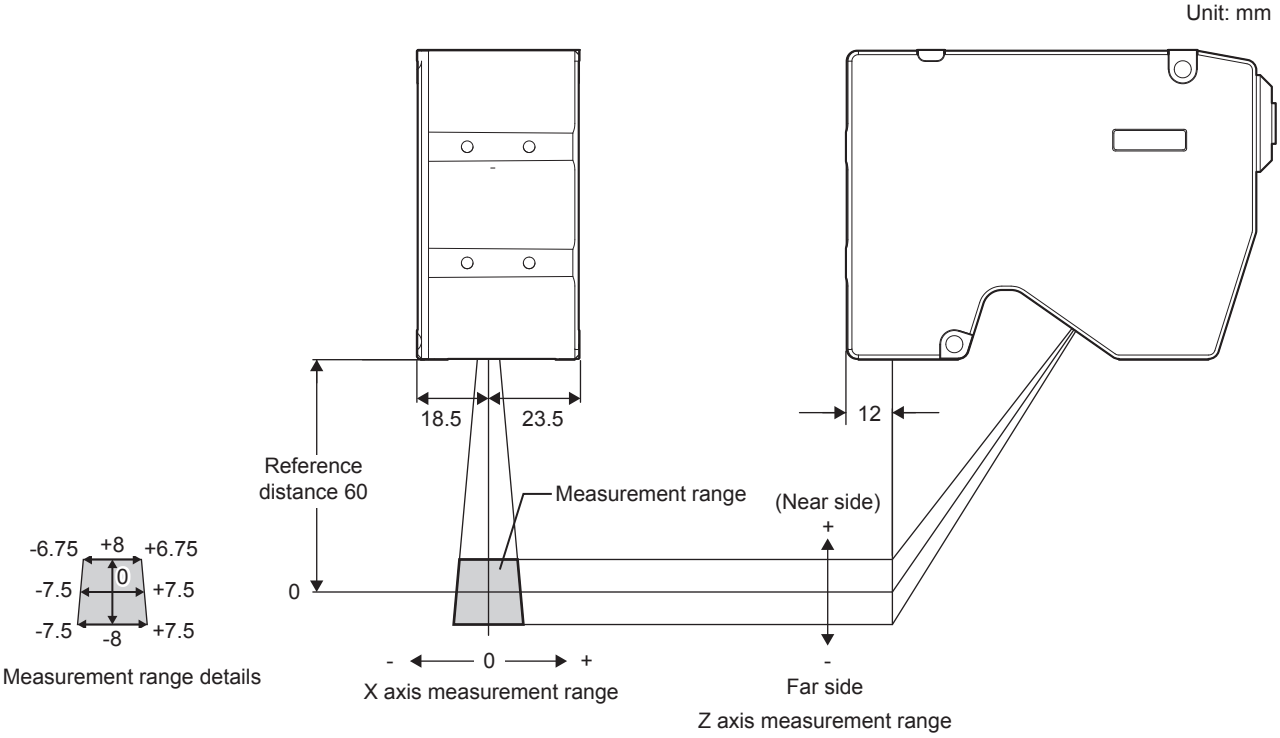
■ LJ-V7020K

Unit: mm



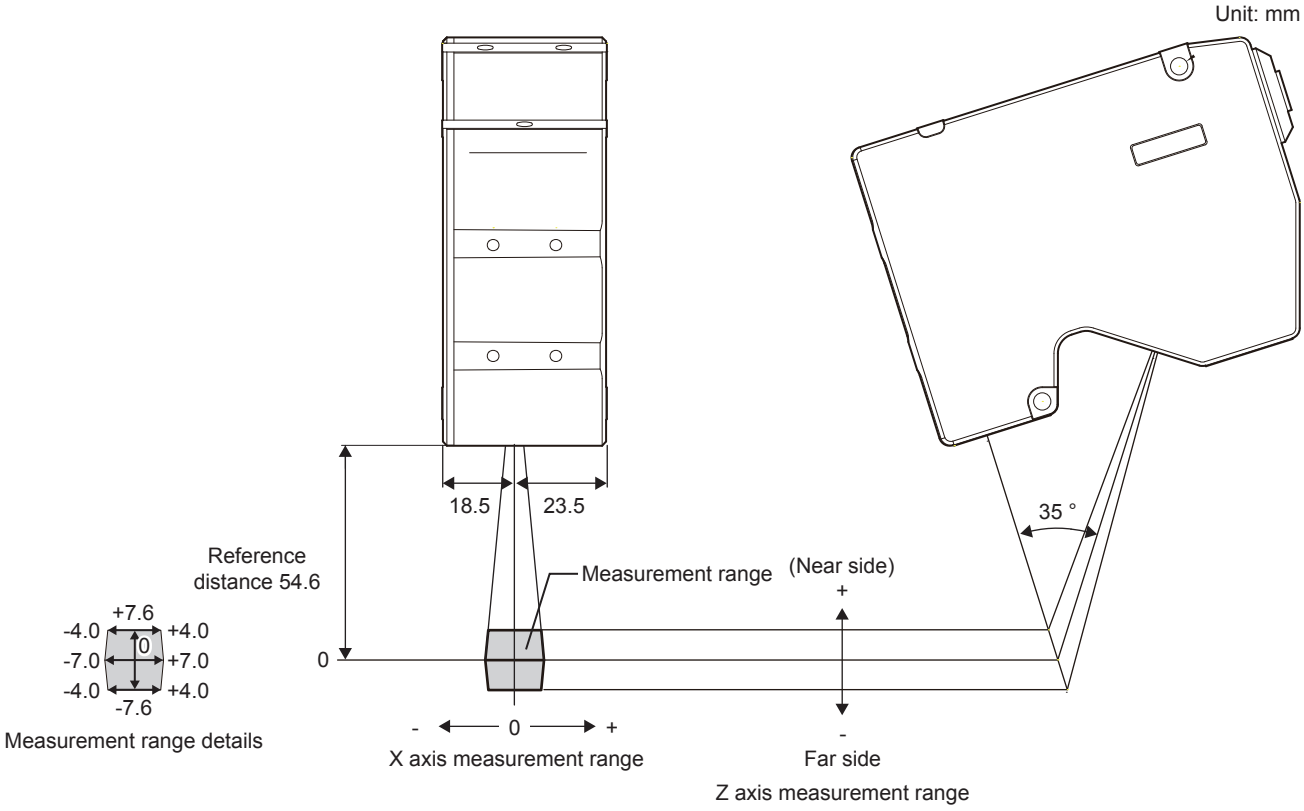
■ LJ-V7060

Unit: mm



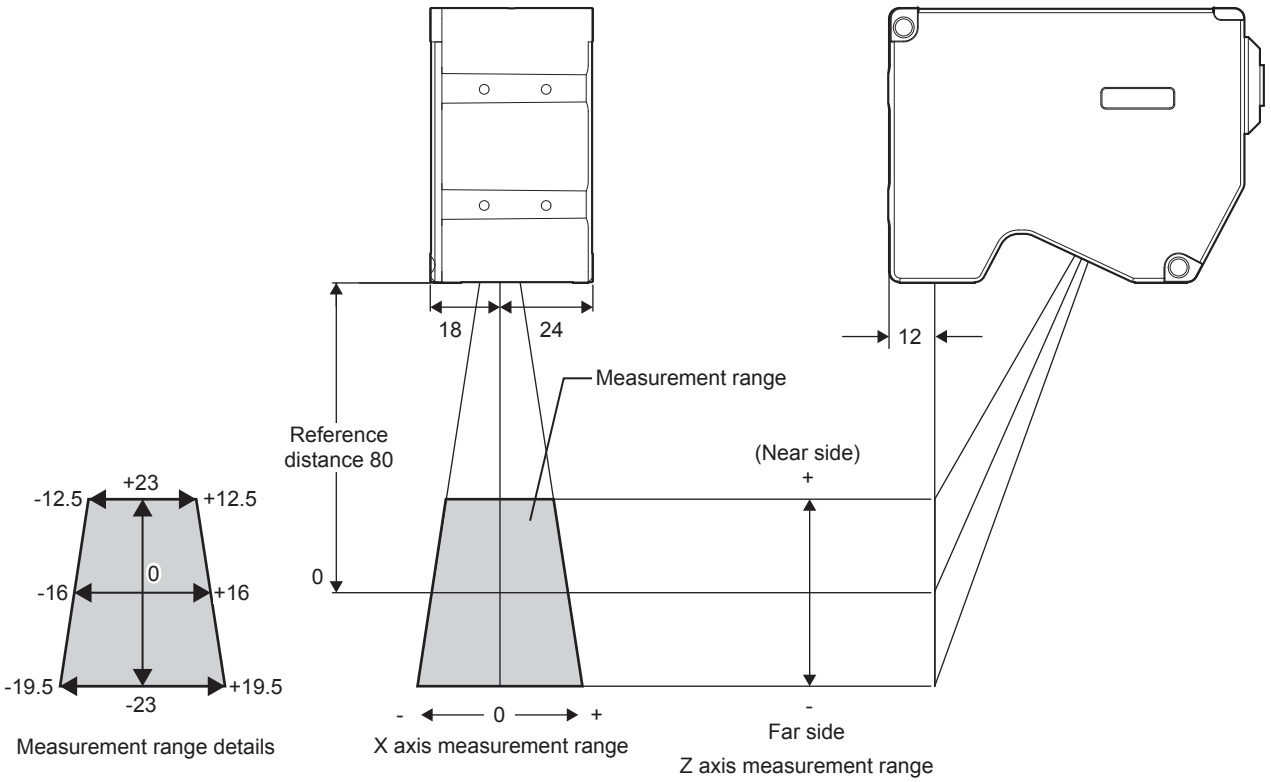
■ LJ-V7060K

Unit: mm



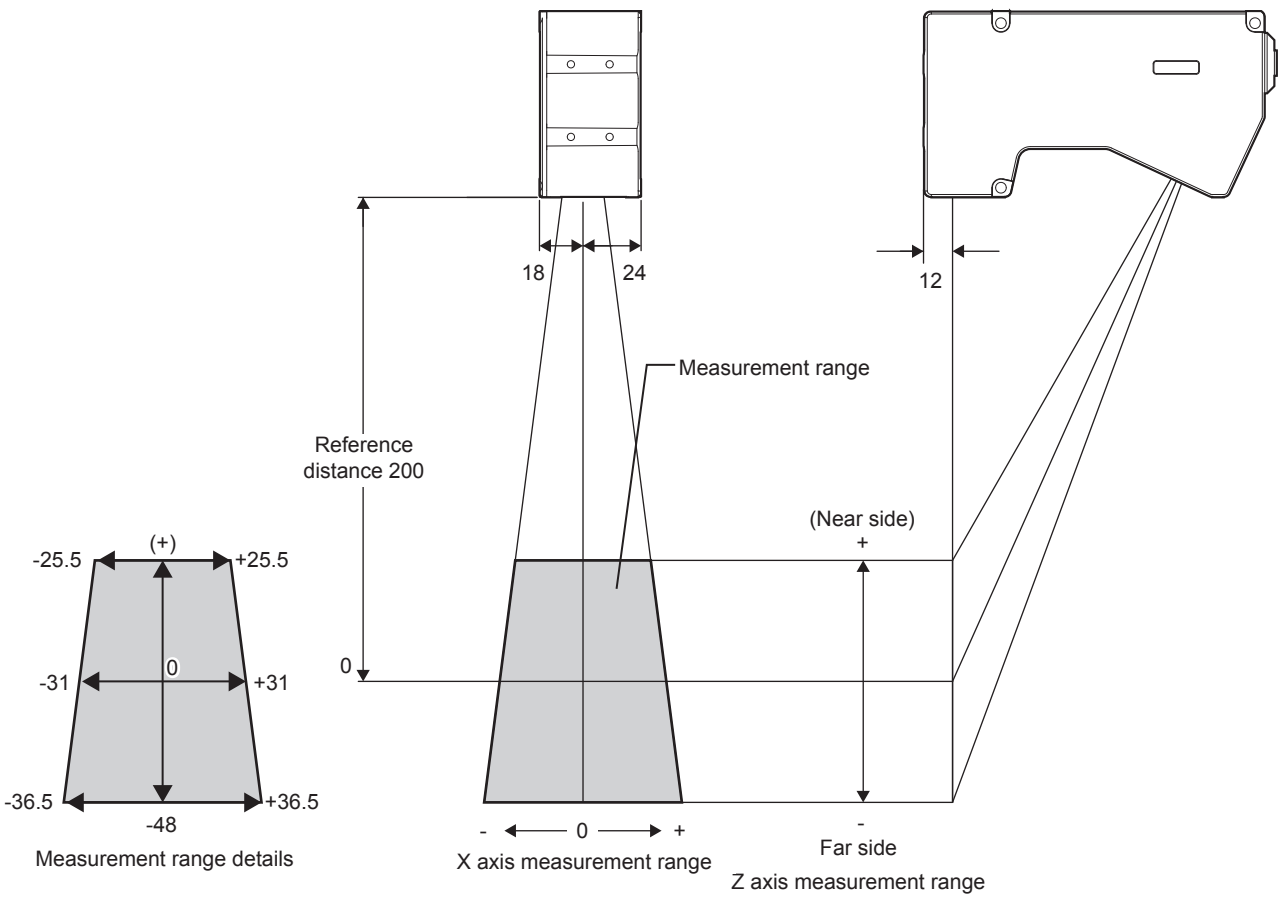
■ LJ-V7080

Unit: mm



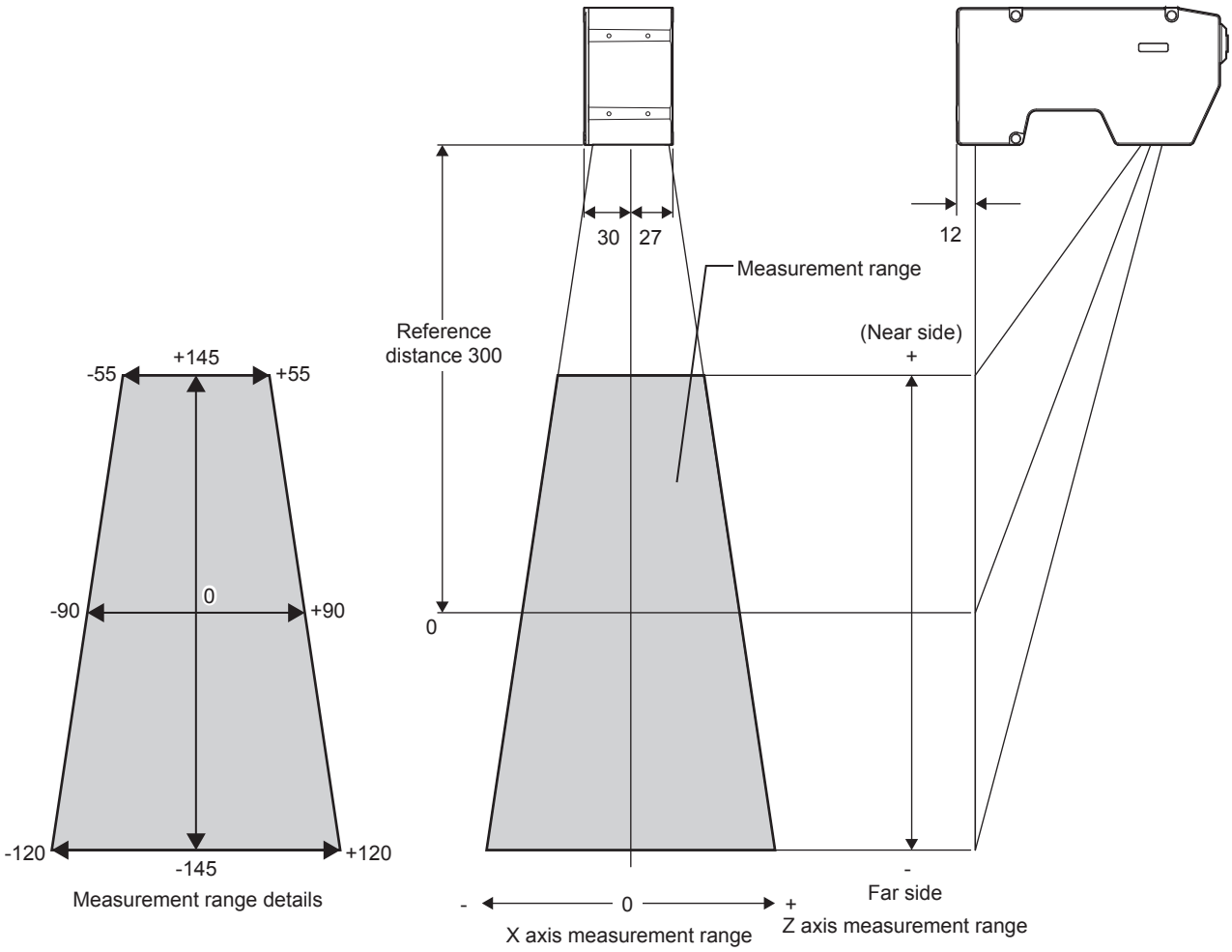
■ LJ-V7200

Unit: mm



■ **LJ-V7300**

Unit: mm



Lighting state of the laser emission LED

The lighting state of the laser emission LED is determined by the average height of the valid profile data within the [LED lighting X axis range].
The LED will light green when the average height is within the [LED lighting Z axis range] and orange when it is within other Z axis measurement ranges. It flashes orange outside the Z axis measurement range.

Unit: mm

Model	LED lighting X axis range	LED lighting Z axis range
LJ-V7020K	Approx. ±0.02	±0.12
LJ-V7020	Approx. ±0.02	±0.13
LJ-V7060K	Approx. ±0.04	±0.38
LJ-V7060	Approx. ±0.04	±0.4
LJ-V7080	Approx. ±0.1	±1.15
LJ-V7200	Approx. ±0.2	±2.25
LJ-V7300	Approx. ±0.6	±7.25

Cable specifications

Model	CB-B3	CB-B10	CB-B5E	CB-B10E	CB-B20E
Cable type	Head cable		Extension cable		
Cable length	3 m	10 m	5 m	10 m	20 m
Minimum bend R	22 mm				
Protection structure*1	IP67 (IEC60529)				
Material (External coat)	PVC				
Weight	Approx. 250 g	Approx. 750 g	Approx. 400 g	Approx. 800 g	Approx. 1500 g

*1: This value is applicable when connected to a sensor head. However, the connector part on the controller side is not included.

• Extension of the head cable: There should be a maximum of two CB-B*E cables, and the total length should be kept under 30 m.

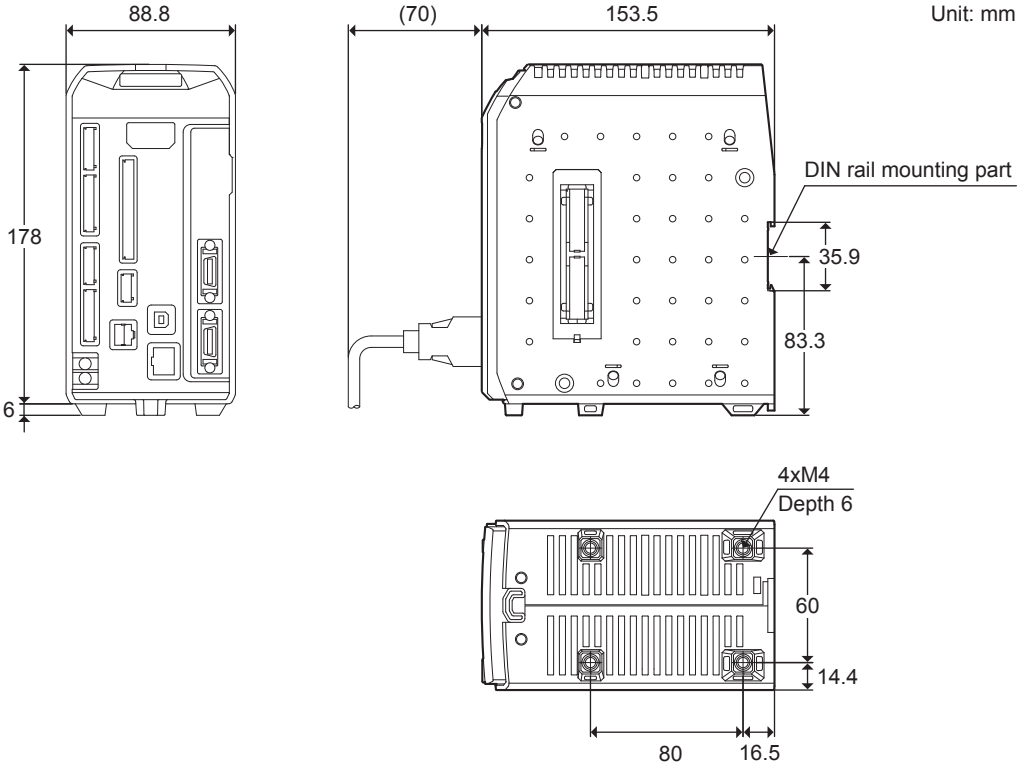
LJ-H3 (LJ-Navigator2) operating system environment

Item		Required environment
PC interface	Ethernet	1000BASE-T/100BASE-TX
	USB *1	USB2.0 HI-SPEED supported (USB1.1 Full-SPEED compatible)
Supported OS		Windows10 (Home, Pro, Enterprise) Windows7 (SP1) (Home Premium, Professional, Ultimate) Windows Vista (SP2) (Home Basic, Home Premium, Business, Ultimate) Windows XP (SP3) (Home Edition, Professional Edition)
Supported languages		Japanese, English, German, French, Chinese (Simplified), Chinese (Traditional)
CPU		Core i3 2.3 GHz or higher
Memory capacity		2GB or more
L2 cache memory		2MB or more
Free hard disk space		10 GB or more
Display resolution		XGA (1024×768) or higher
Weight		Approx. 400 g

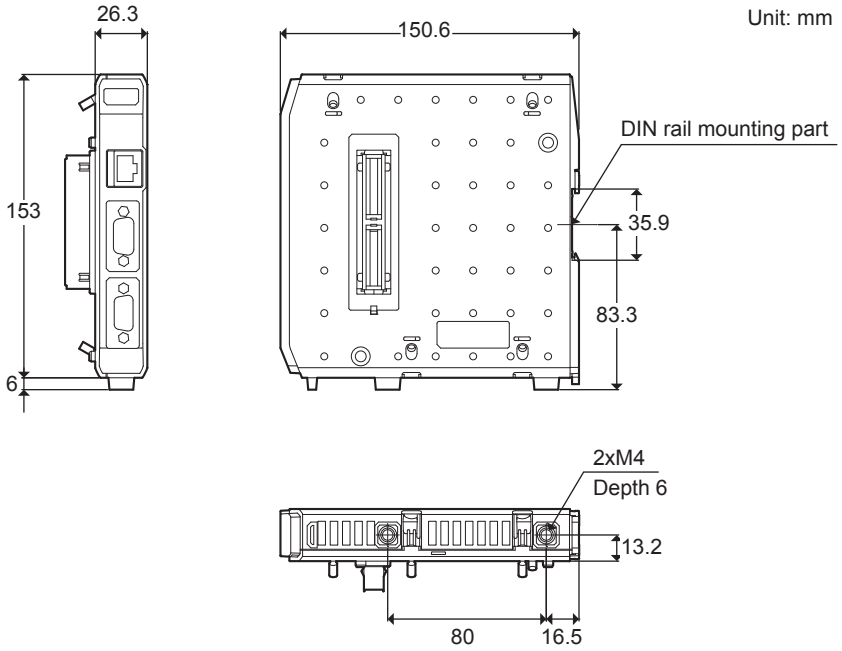
*1: Proper operation is not guaranteed for connections via a hub.

Dimensions

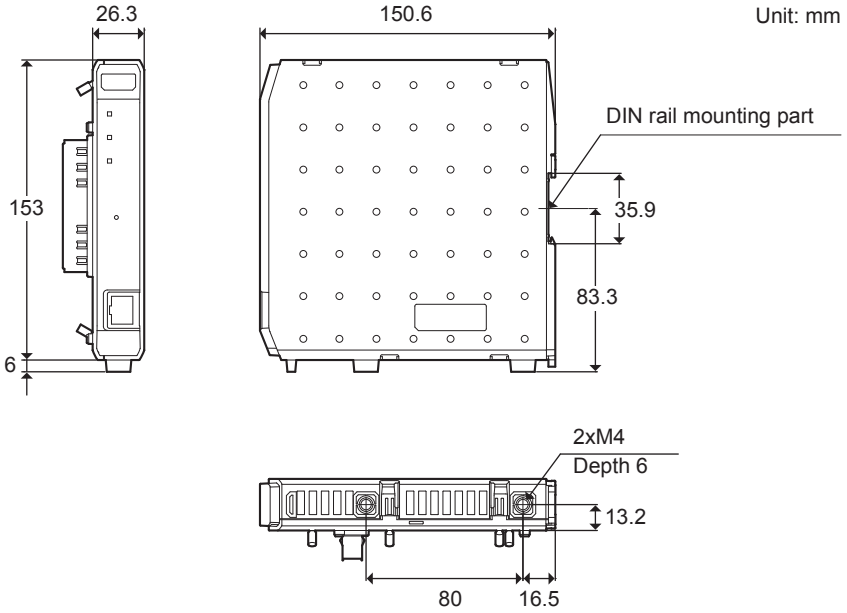
Controller



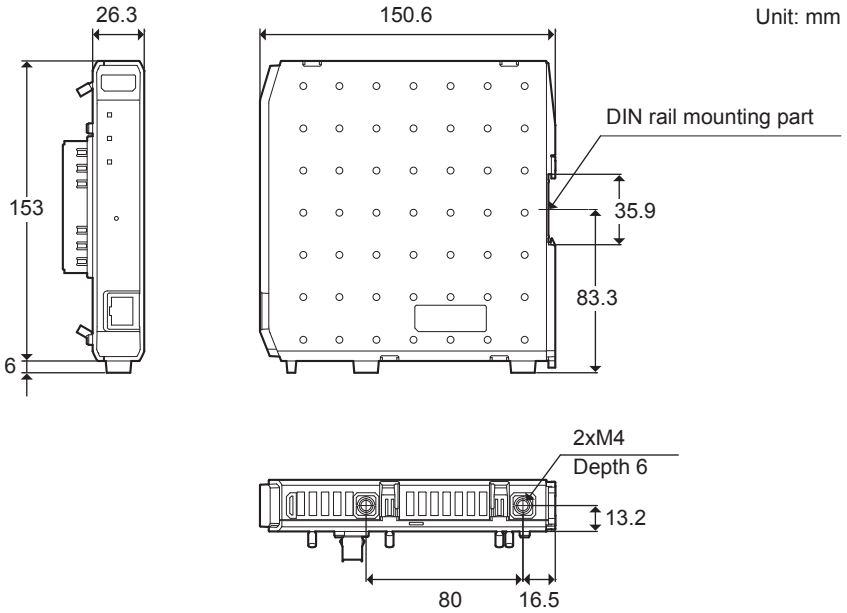
Display unit



EtherNet/IP communication unit



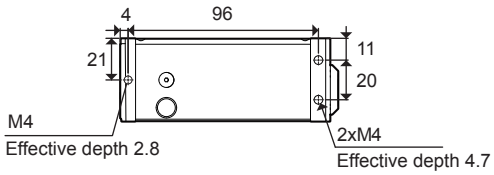
PROFINET communication unit

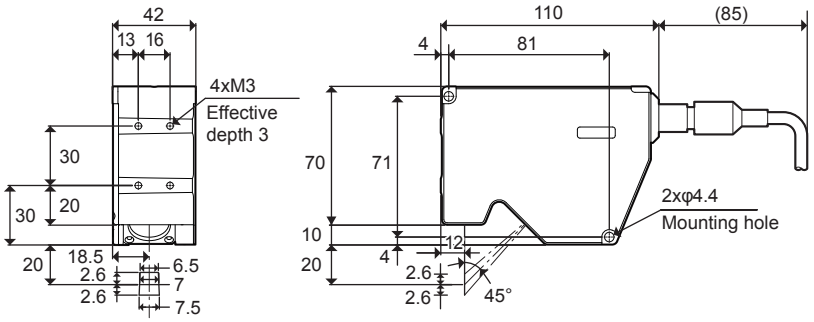


Head

■ LJ-V7020

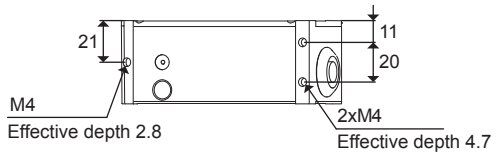
Unit: mm

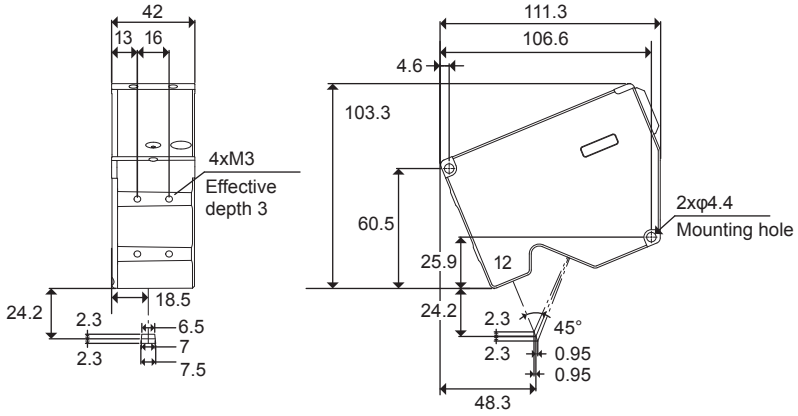




■ LJ-V7020K

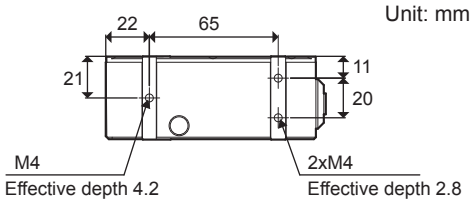
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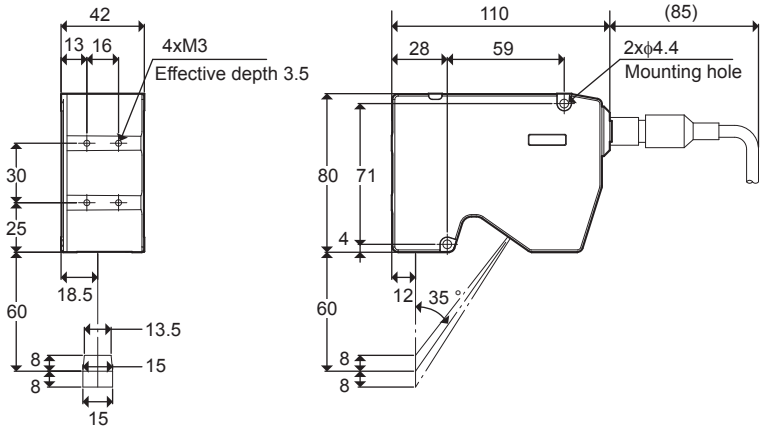




■ LJ-V7060

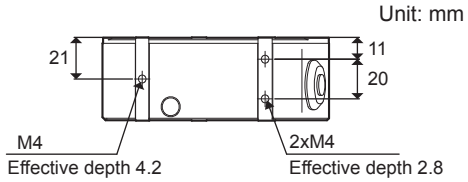
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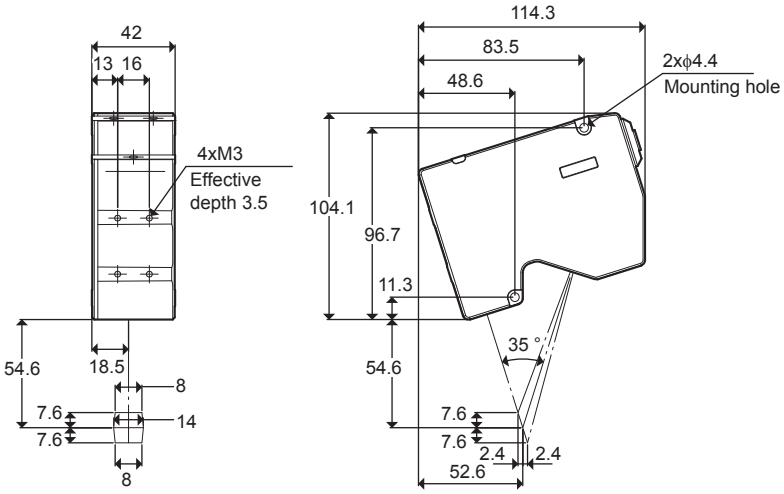




■ LJ-V7060K

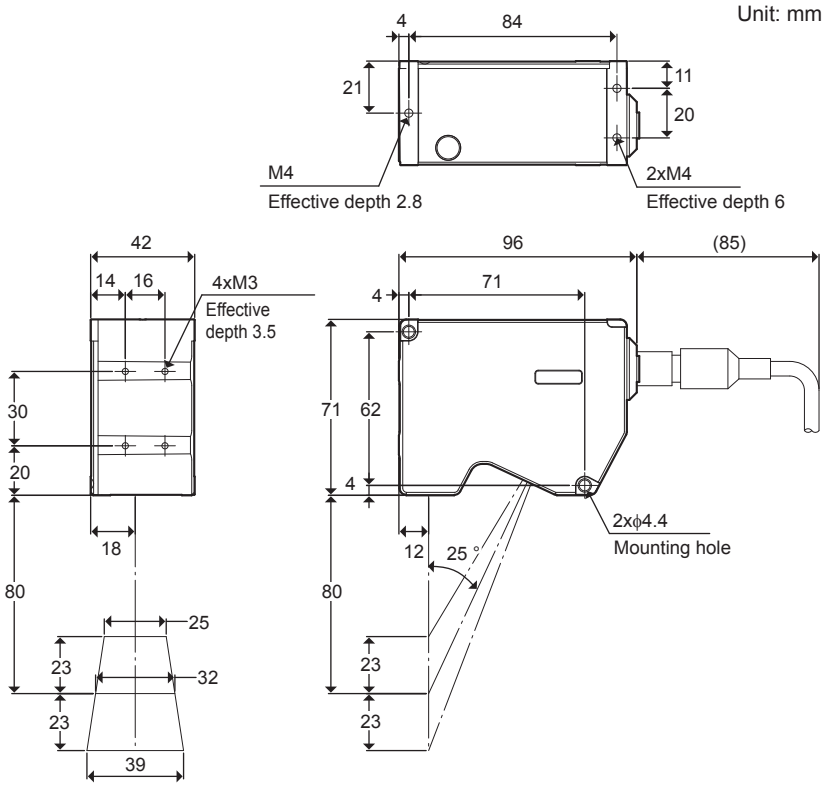
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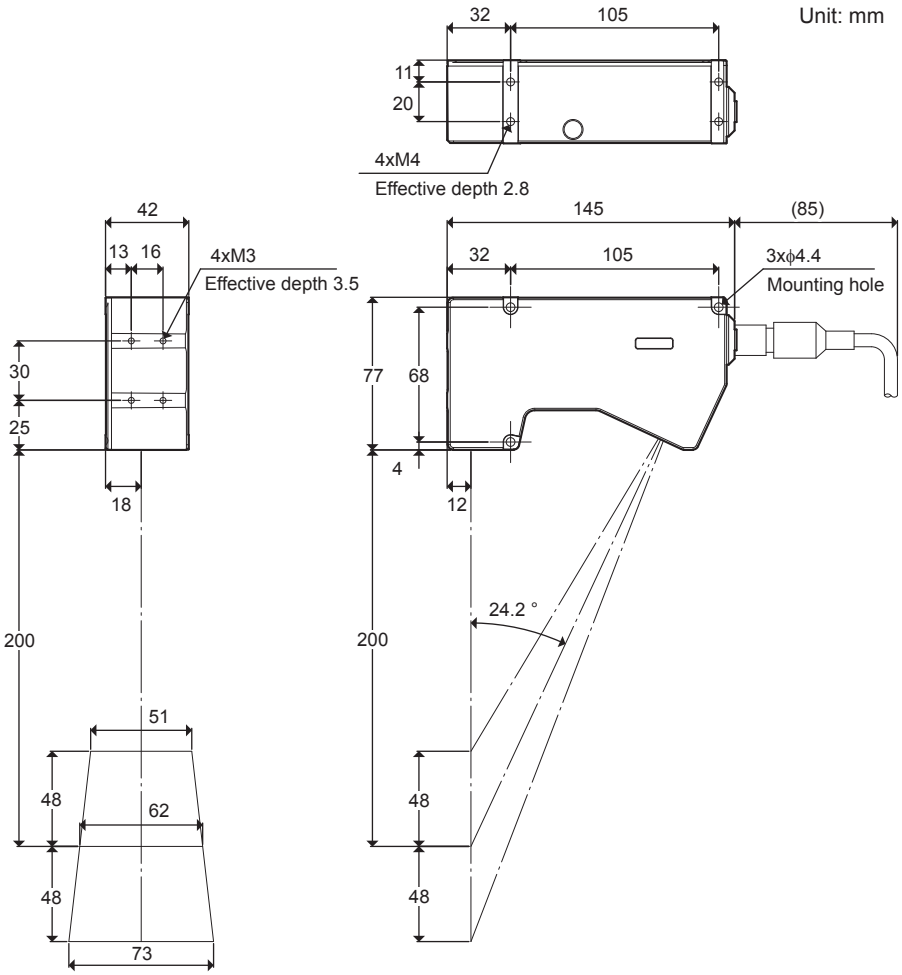


■ LJ-V7080

Unit: mm

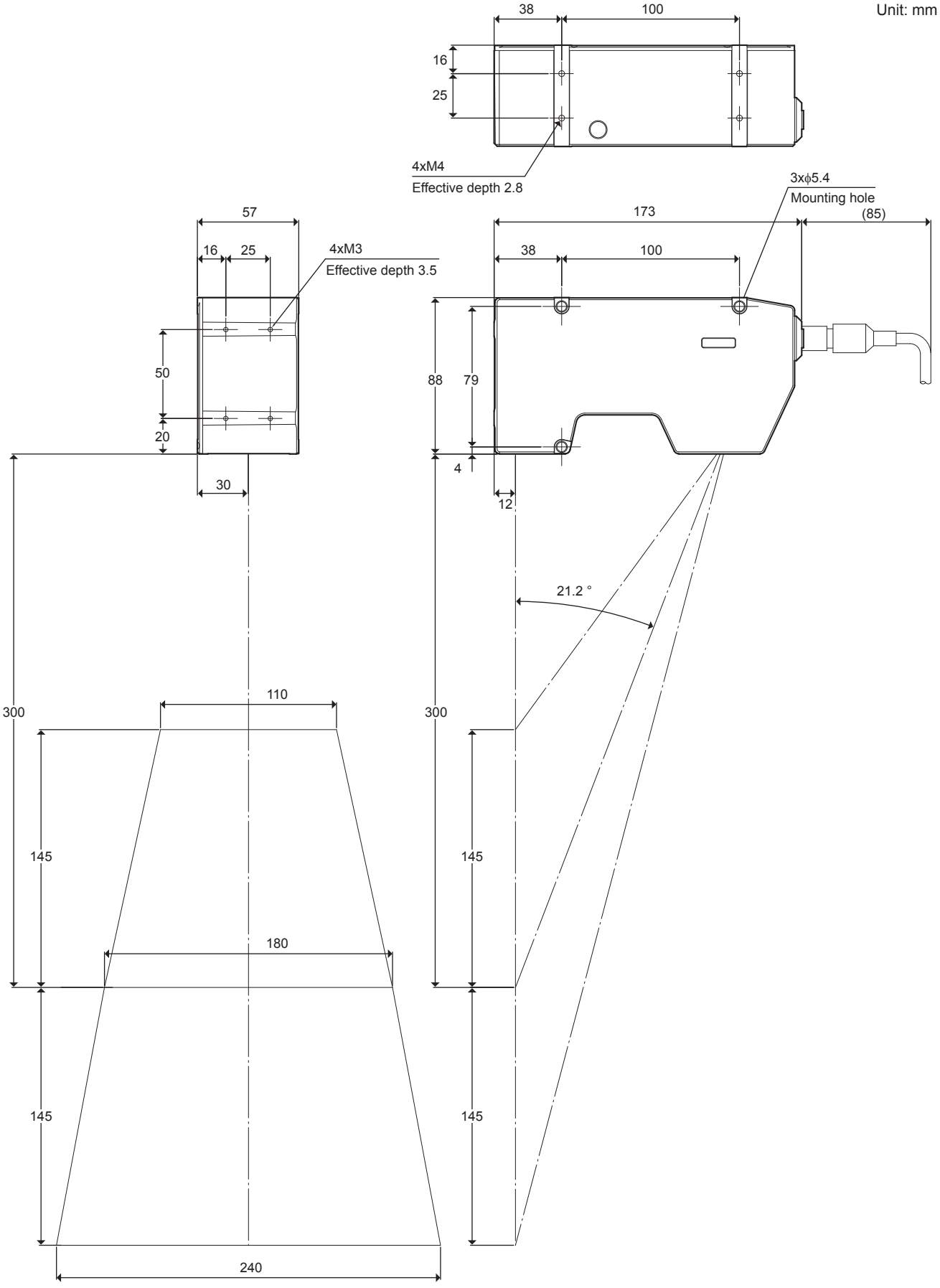


■ LJ-V7200


Unit: mm
32
105
11
20
4xM4
Effective depth 2.8
42
13
16
4xM3
Effective depth 3.5
30
25
18
200
51
48
62
48
73
145
(85)
32
105
3xϕ4.4
Mounting hole
77
68
4
12
24.2 °
200
48
48

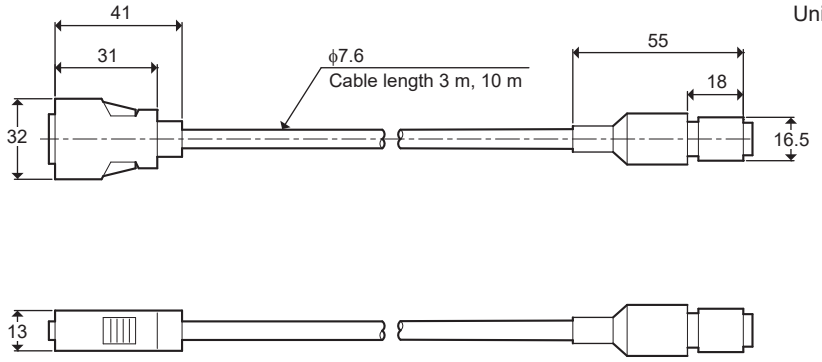
■ LJ-V7300

Unit: mm



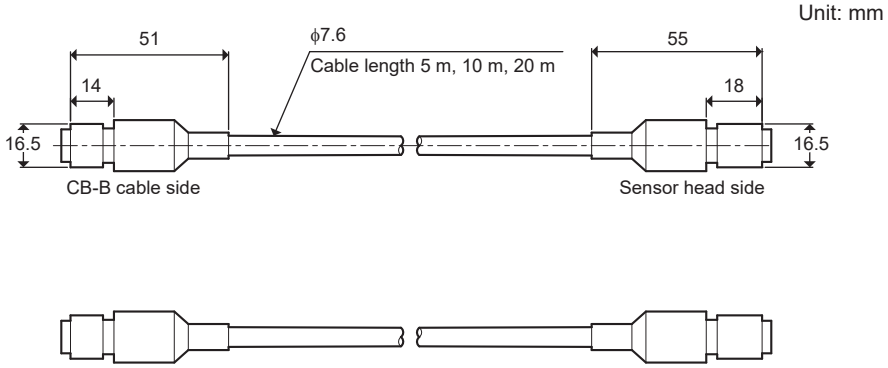
Head cable

Unit: mm



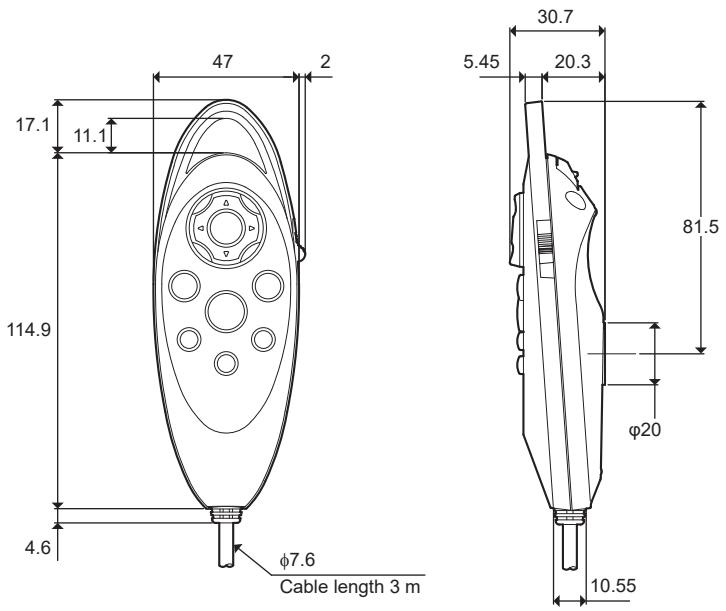
Head extension cable

Unit: mm



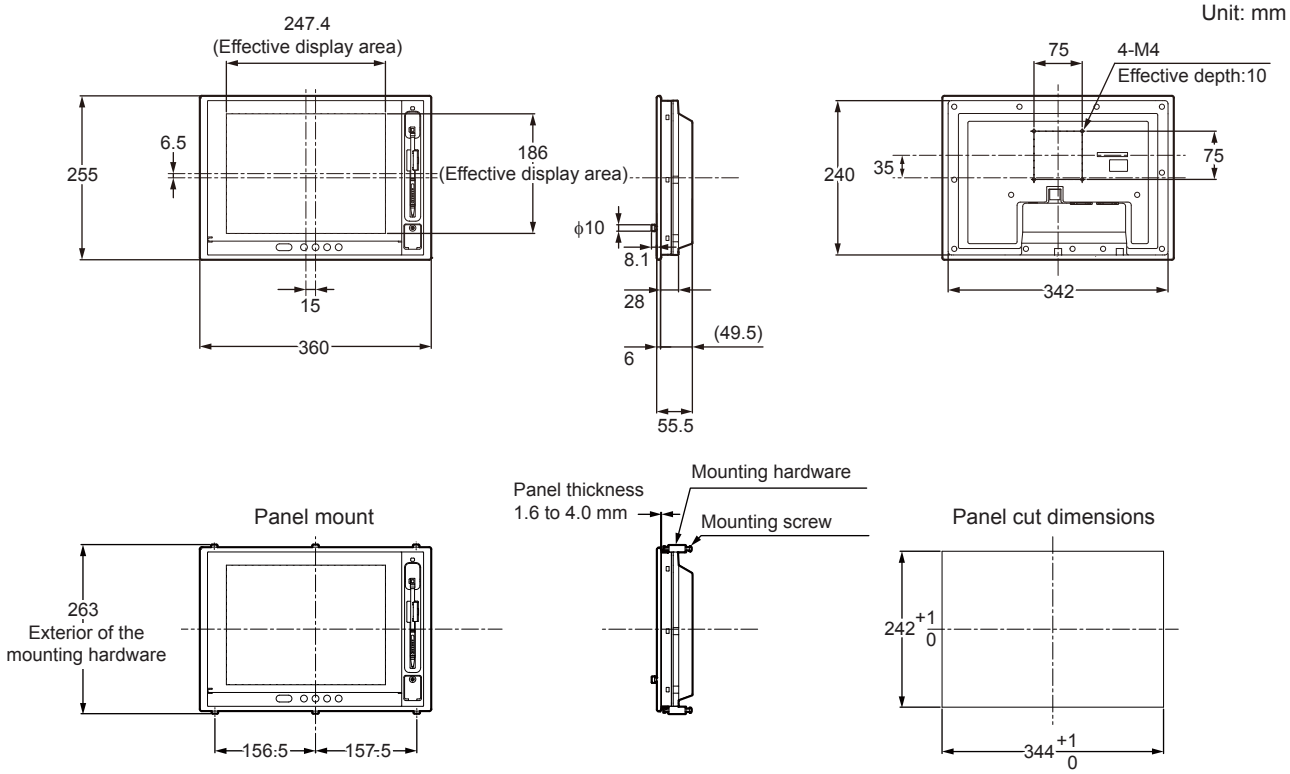
Console

Unit: mm



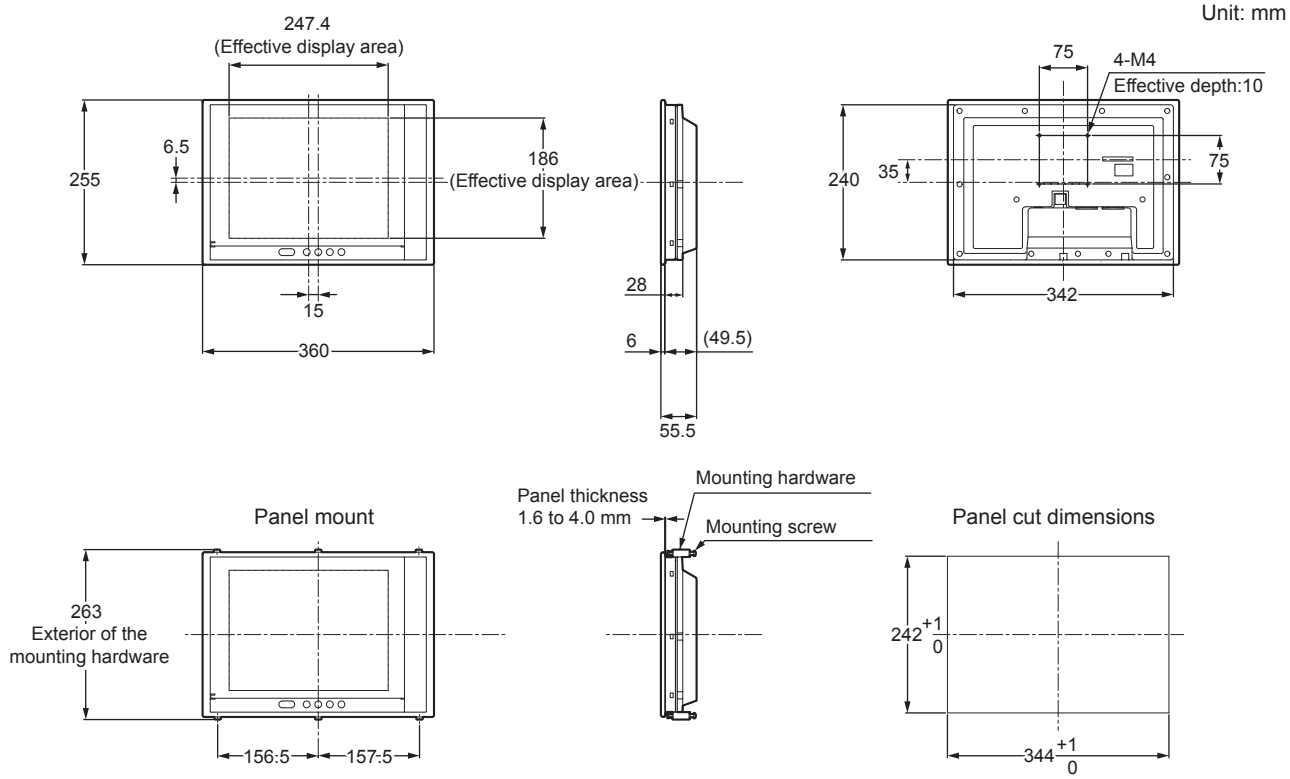
Touch panel monitor

Unit: mm



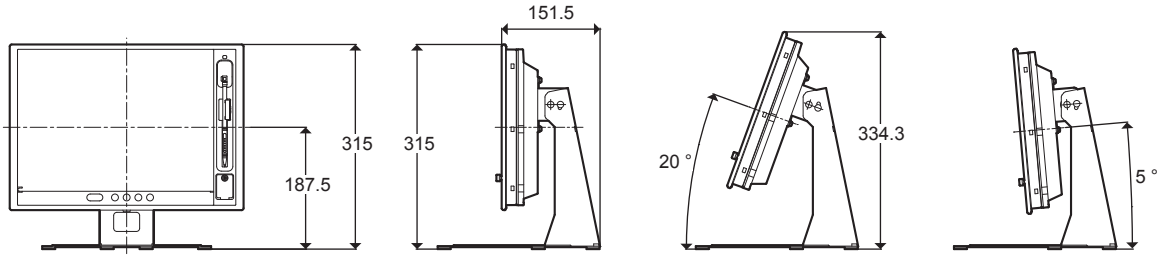
LCD monitor

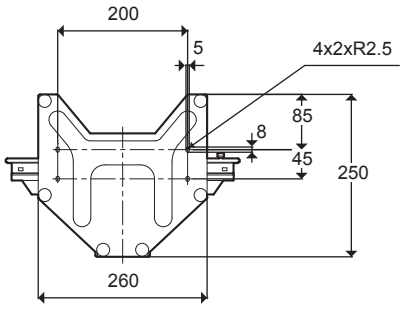
Unit: mm



Touch panel stand

Unit: mm

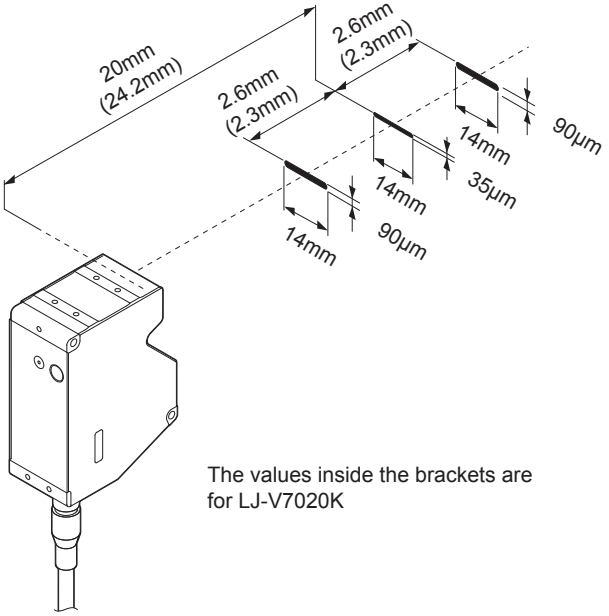




Characteristics

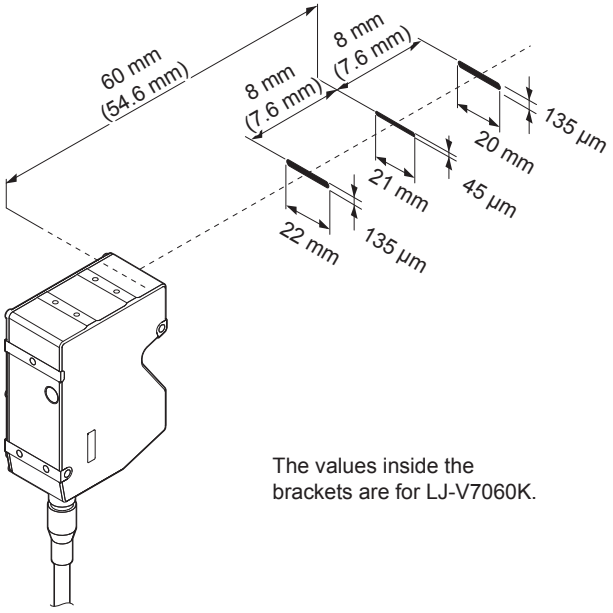
Spot diameter

■ LJ-V7020/LJ-V7020K



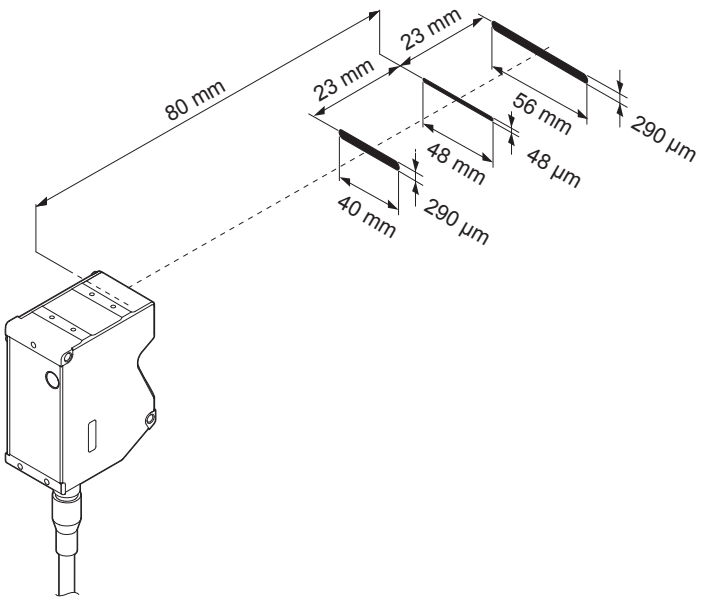
The values inside the brackets are for LJ-V7020K

■ LJ-V7060/LJ-V7060K

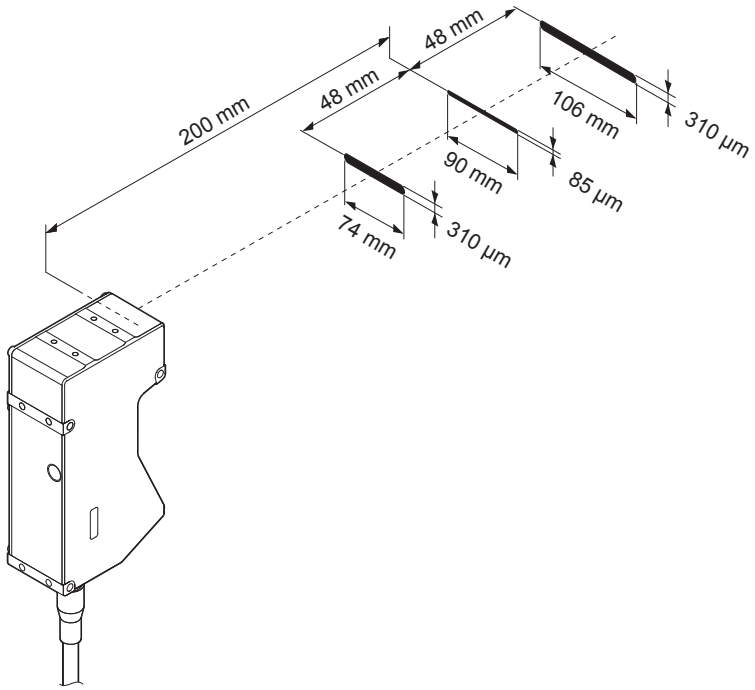


The values inside the brackets are for LJ-V7060K.

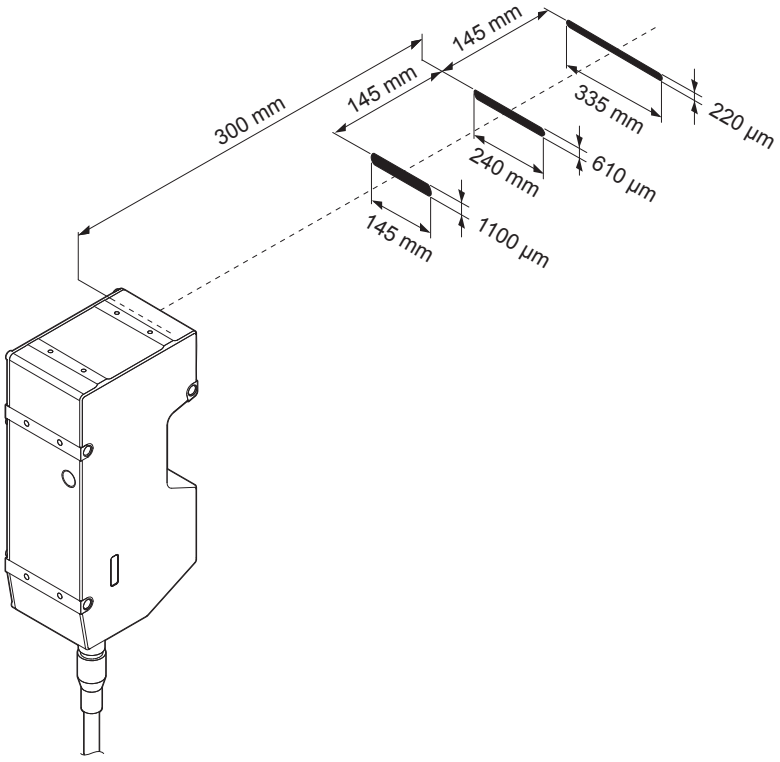
■ **LJ-V7080**



■ **LJ-V7200**



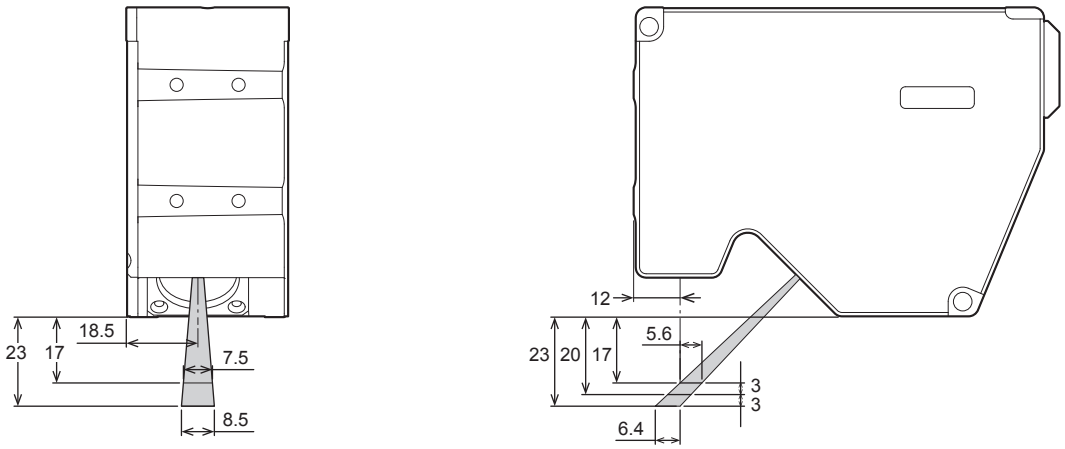
■ **LJ-V7300**


300 mm
145 mm
145 mm
145 mm
335 mm
240 mm
145 mm
220 µm
610 µm
1100 µm

Mutual interference area

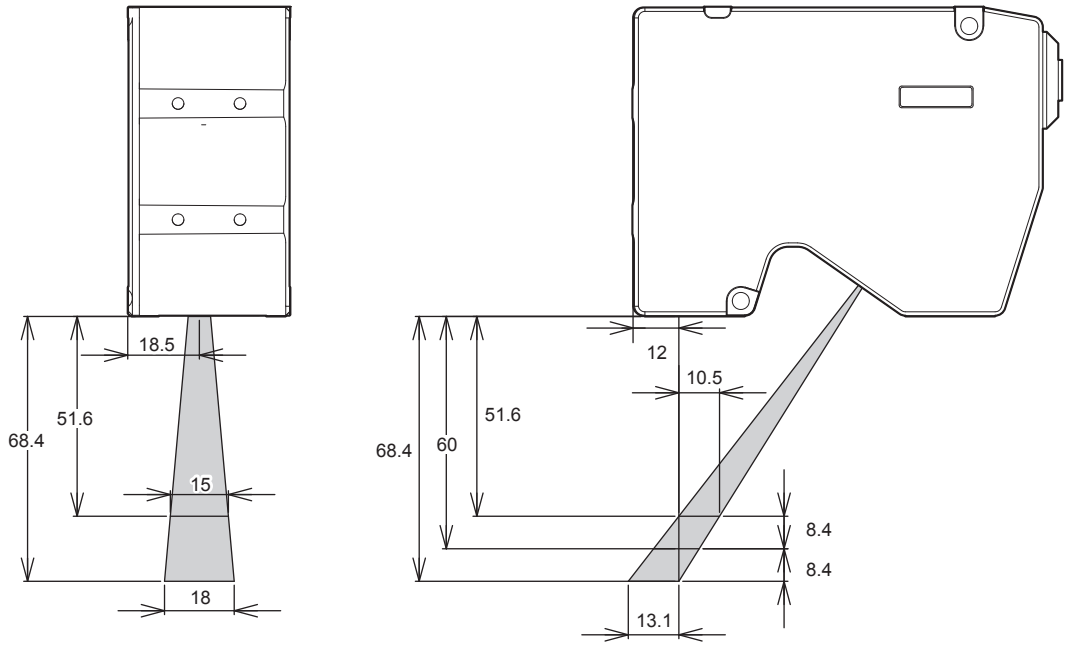
■ LJ-V7020/LJ-V7020K

Unit: mm



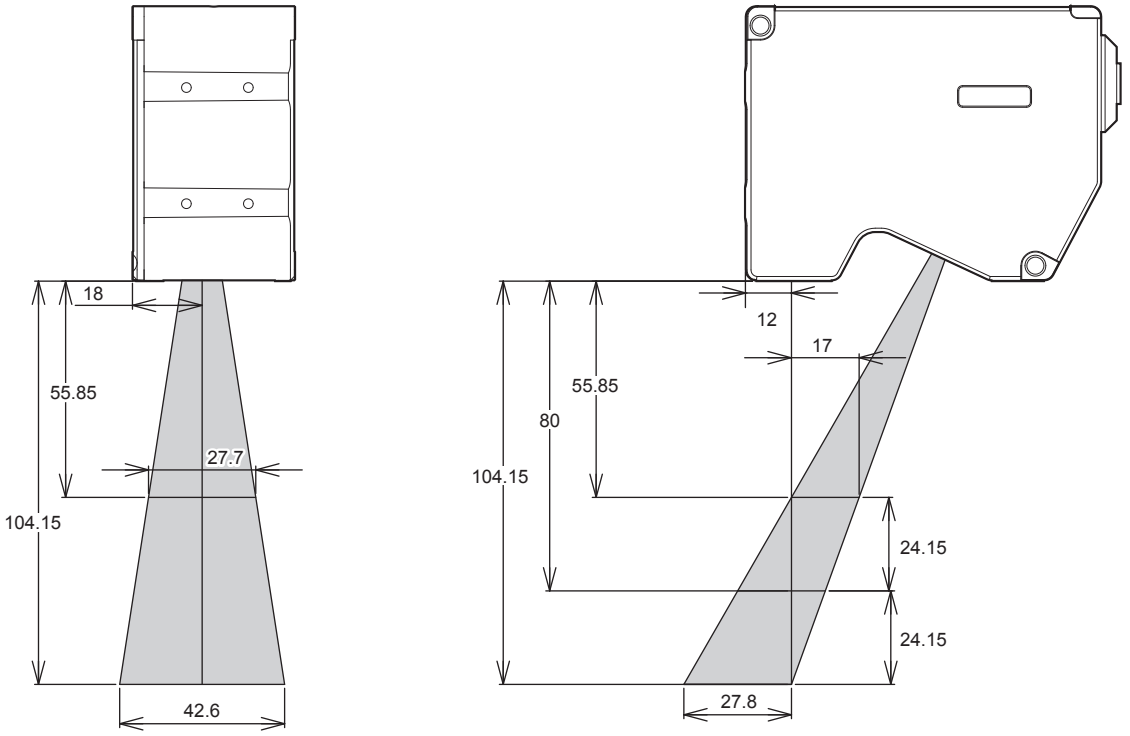
■ LJ-V7060/LJ-V7060K

Unit: mm



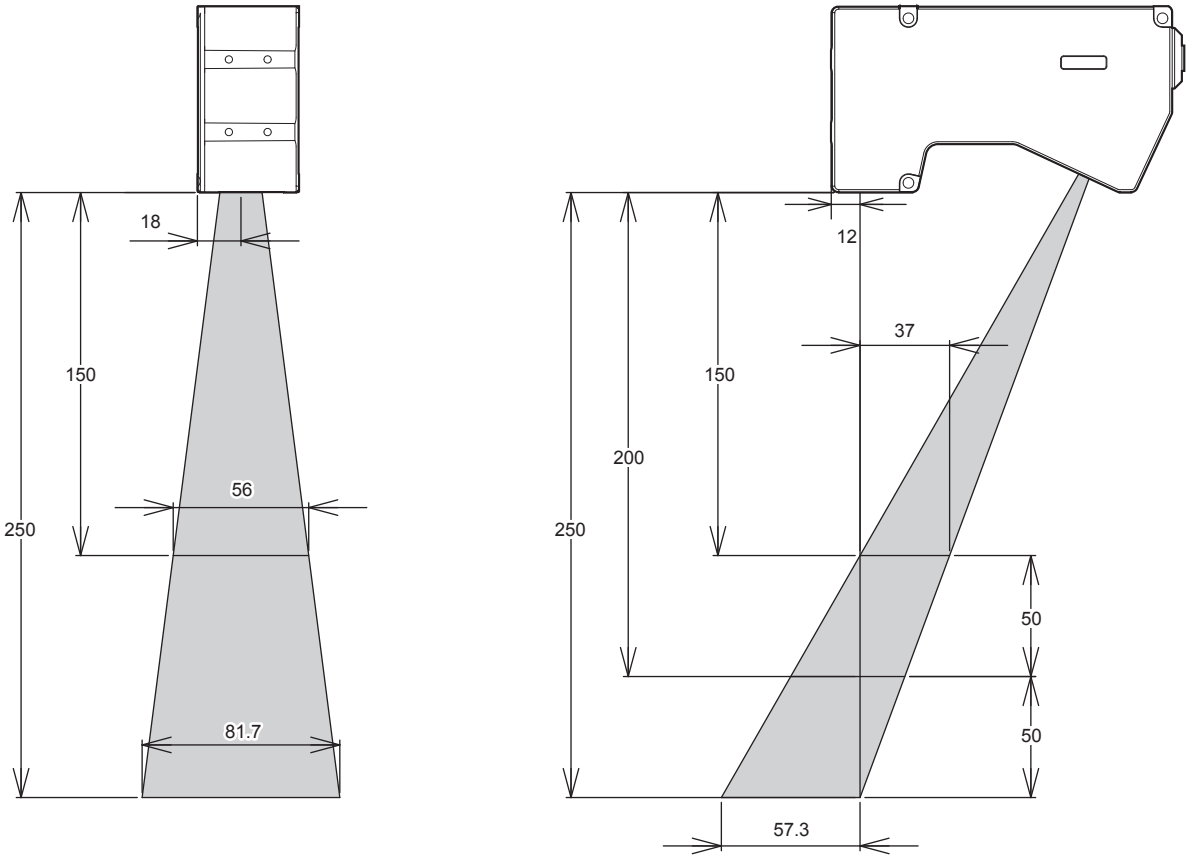
■ LJ-V7080

Unit: mm



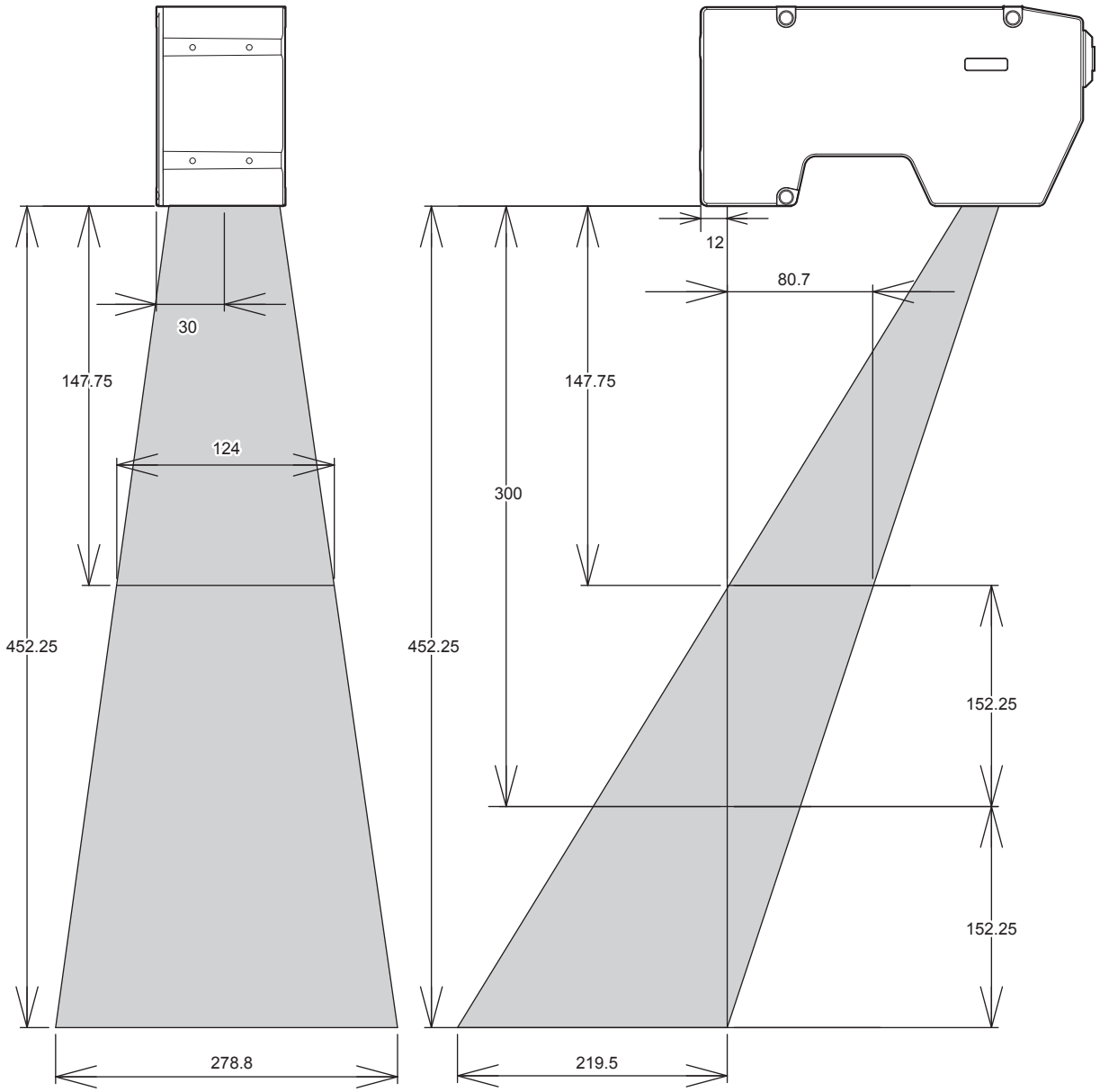
■ LJ-V7200

Unit: mm



■ LJ-V7300

Unit: mm



MEMO

Appendix

Supplementary Function Descriptions..... A-2
RS-232C Interface Commands A-4
Switching Screens
on the Display Monitor/Touch Panel Monitor A-26
Error Messages..... A-39
Troubleshooting A-44
Setting Conditions for Different Purposes..... A-48
Function Restrictions Applicable to
the Combinations of Settings Items A-50
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and Setting Ranges..... A-52
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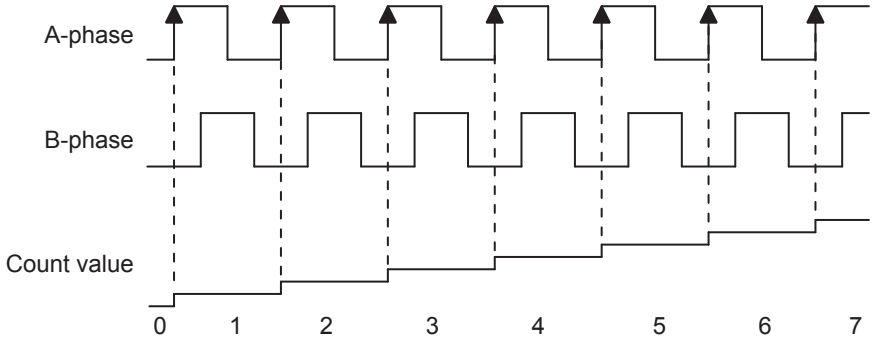
Supplementary Function Descriptions

Encoder trigger input modes

You can select from [1-phase 1 TM (no dir.)], [2-phase 1 time], [2-phase 2 times] or [2-phase 4 times]. The following shows the relationship between the encoder signal input terminal for each setting and the trigger and pulse count values. The trigger will be issued at the rising/falling edges shown by arrows in the diagram.

● 1-phase 1 TM

The trigger will be issued at the rising of A-phase and the pulse count value will be incremented regardless of B-phase.

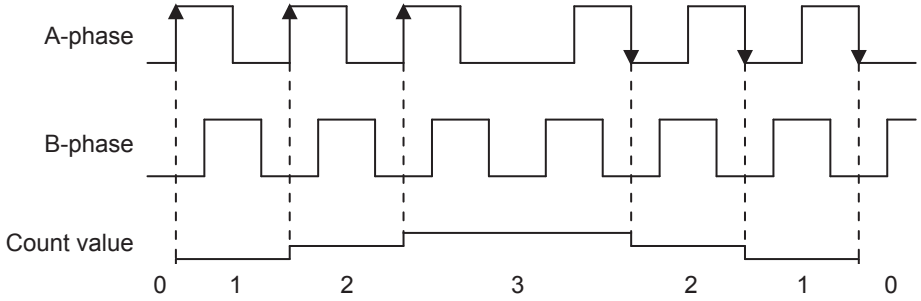


● 2-phase 1 time

The behavior will be as follows when the B-phase is OFF:

- A trigger will be issued at the rising A-phase; and the pulse count value will be incremented.
- A trigger will be issued at the falling A-phase; and the pulse count value will be decremented.

When B-phase is ON, no trigger will be issued and the pulse count value will not be updated.



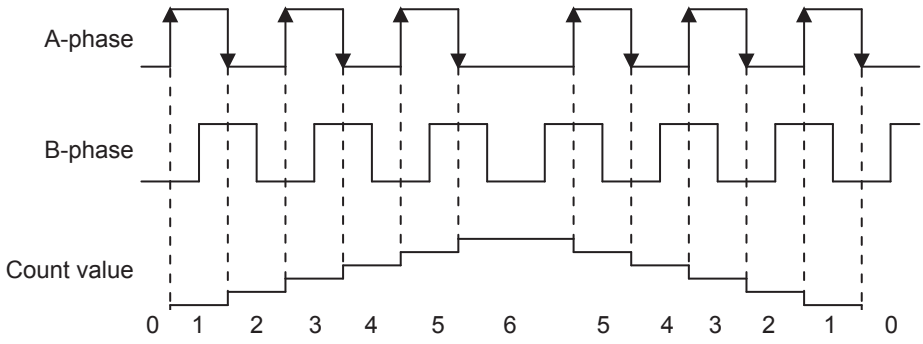
● 2-phase 2 times

The behavior will be as follows when the B-phase is OFF:

- A trigger will be issued at the rising A-phase; and the pulse count value will be incremented.
- A trigger will be issued at the falling A-phase; and the pulse count value will be decremented.

The behavior will be as follows when the B-phase is ON:

- A trigger will be issued at the rising A-phase; and the pulse count value will be decremented.
- A trigger will be issued at the falling A-phase; and the pulse count value will be incremented.



● **2-phase 4 times**

The behavior will be as follows when the B-phase is OFF:

- A trigger will be issued at the rising A-phase; and the pulse count value will be incremented.
- A trigger will be issued at the falling A-phase; and the pulse count value will be decremented.

The behavior will be as follows when the B-phase is ON:

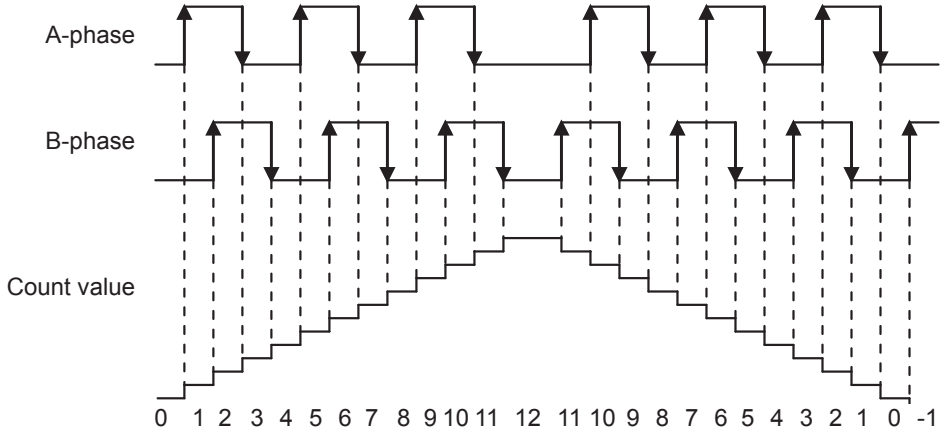
- A trigger will be issued at the rising A-phase; and the pulse count value will be decremented.
- A trigger will be issued at the falling A-phase; and the pulse count value will be incremented.

The behavior will be as follows when the A-phase is OFF:

- A trigger will be issued at the rising B-phase; and the pulse count value will be decremented.
- A trigger will be issued at the falling B-phase; and the pulse count value will be incremented.

The behavior will be as follows when the A-phase is ON:

- A trigger will be issued at the falling B-phase; and the pulse count value will be incremented.
- A trigger will be issued at the rising B-phase; and the pulse count value will be decremented.



A

RS-232C Interface Commands

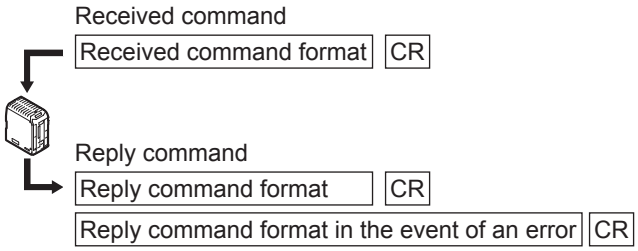
This section explains the commands that may be sent or received on this unit.

Command format

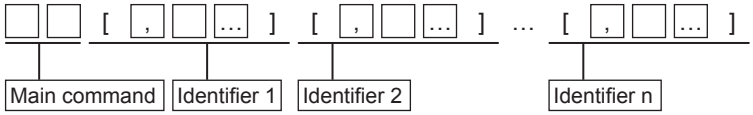
This unit performs the controls specified in the command received from the external instruments, and then returns a reply command to the external instrument.
A CR (carriage return) is used for separating the received and reply command data.

Reference

You can use both uppercase and lowercase alphanumeric characters when entering commands.
The [ ] mark in the command format may or may not be present depending on conditions.
“ASCII code table” (Page A-6)

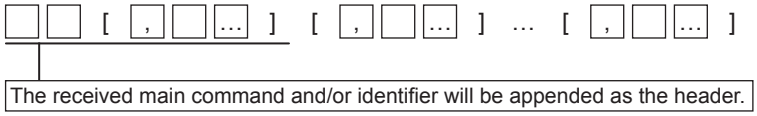


Received command format



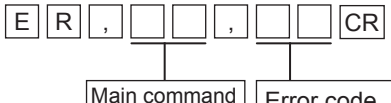
The identifier may contain the setting value formats.
“Settings value change format” (Page A-5)
“Settings value check format” (Page A-5)

Reply command format



The identifier may contain the measurement value formats.
“Measurement value formats” (Page A-5)

Reply command format in the event of an error

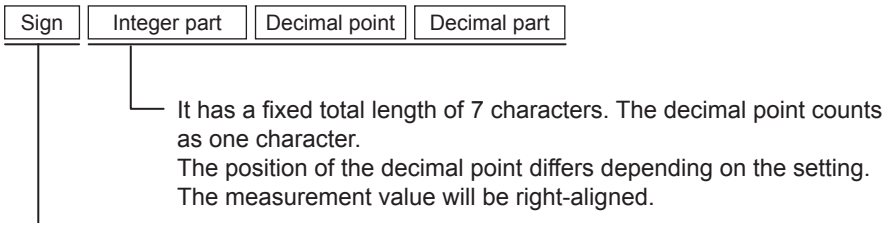


Error code	
11: Timeout error	31: State error
21: Command error	32: Parameter error
22: Command length error	33: Other

A

Measurement value formats (f f f f f f f f)

The measurement value will be output in the following format:

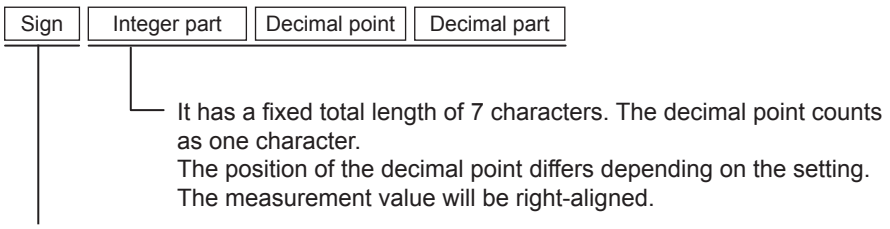


The output format examples are as shown below.

Displayed value	Output format
+123.45	+ 0 1 2 3 . 4 5
-0.120	- 0 0 0 . 1 2 0
+123.456	+ 1 2 3 . 4 5 6
-1.2	- 0 0 0 0 1 . 2
ALARM	- 9 9 9 . 9 9 9
+OVER	+ 9 9 9 . 9 9 9
- OVER	- 9 9 9 . 9 9 9
------	- 9 9 9 . 9 9 8

Setting value formats (s s s s s s s s)

When changing the settings, the setting values will have the format shown below.
“Settings change command list” (Page A-14)



A

ASCII code table

		Upper order 4 bits							
		0	1	2	3	4	5	6	7
Lower order 4 bits	0	NUL	DLE	SP	0	@	P	`	p
	1	SOH	DC1	!	1	A	Q	a	q
	2	STX	DC2	"	2	B	R	b	r
	3	ETX	DC3	#	3	C	S	c	s
	4	EOT	DC4	$	4	D	T	d	t
	5	ENQ	NAK	%	5	E	U	e	u
	6	ACK	SYN	&	6	F	V	f	v
	7	BEL	ETB	'	7	G	W	g	w
	8	BS	CAN	(	8	H	X	h	x
	9	HT	EM	)	9	I	Y	i	y
	A	LF	SUB	*	:	J	Z	j	z
	B	VT	ESC	+	;	K	[	k	{
	C	FF	→	,	<	L	¥	l	|
	D	CR	←	-	=	M	]	m	}
	E	SO	↑	.	>	N	^	n	~
	F	SI	↓	/	?	O	_	o	DEL

Measurement control command list

This section explains the details of the received commands (for controlling the measurement) and the reply commands that are returned when the received commands were processed successfully. These commands are received by this unit (in [Measuring] state).

Control	Received command	Reply command
Trigger	T G CR	T G CR
Batch start	B S CR	B S CR
Batch stop	B P CR	B P CR
Auto zero (Single OUT)	Z S , o , x x CR	Z S CR
Auto zero (Multiple OUT)	Z M , o , x x … x CR	Z M CR
Auto zero (All OUT*1)	Z A , o CR	Z A CR
Timing (Single OUT)	T S , o , x x CR	T S CR
Timing (Multiple OUT)	T M , o , x x … x CR	T M CR
Timing (All OUT*1)	T A , o CR	T A CR
Reset (Single OUT)	R S , x x CR	R S CR
Reset (Multiple OUT)	R M , x x … x CR	R M CR
Reset (All OUT*1)	R A CR	R A CR
Measurement value output (Single OUT)	M S , m , x x CR	M S , Measurement value formats *2 CR
Measurement value output (Multiple OUT)	M M , m , x x … x CR	M M , Measurement value formats *2 , Measurement value formats *2 … CR
Measurement value output (All OUT)	M A , m CR	M A , Measurement value formats *2 , Measurement value formats *2 … CR

*1 [All OUT] refers to all OUTs that are [to be measured].

*2 Measurement value formats will be as follows according to the measurement value acquisition request option:

0: Measurement value only — f f f f f f f f

1: Measurement value + Measurement result information — f f f f f f f f , v

2: Measurement value + Measurement result — f f f f f f f f , j j

3: Measurement value + Measurement result information + Judgement result — f f f f f f f f , v , j j

Symbol	
o	Specify ON/OFF (1: ON, 0: OFF)
x x	Specify the target OUT (01 to 16)
x x … x(16)	Specify the target OUT. OUT1, OUT2, ..., OUT16 from the beginning (0: Do not process, 1: Process) (Example) When processing OUT1, OUT3 and OUT10 1010 0000 0100 0000 (The delimiting spaces are used only for the ease of explanation and are not actually inserted.)
v	Measurement result information (0: Normal data, 1: Alarm data, 2: Judgement standby data)
j j	Judgement result (HI, GO, LO)

A

Symbol	
m	Measurement value acquisition request option (0: Measurement value only, 1: Measurement value + Measurement result information, 2: Measurement value + Measurement result, 3: Measurement value + Measurement result information + Judgement result)
f f f f f f f f	Measurement value “Measurement format” (Page A-5)

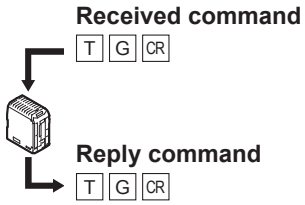
Measurement control command details

This section explains the details of the received commands and the reply commands that are returned when the received commands were processed successfully.

See “Command format” (Page A-4) for the reply commands that are returned in the event of an error.
See “Chapter 12 Timing Chart and Response Time” (Page 12-1) for the response delay time of the returned commands.

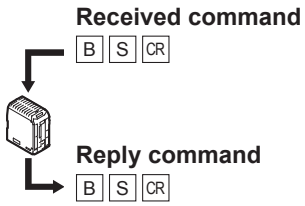
Trigger

“Using the trigger input” (Page 8-28)



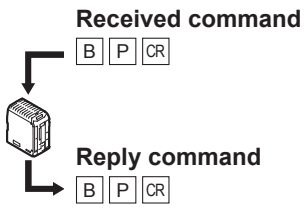
Batch start

“Starting/Stopping the batch measurement” (Page 8-32)



Batch stop

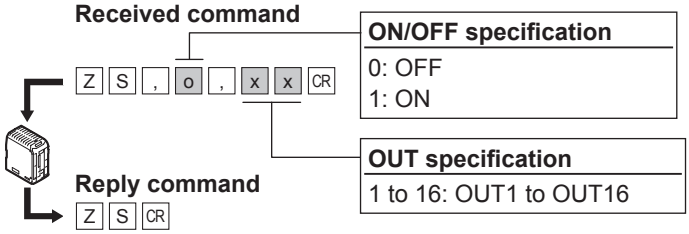
“Starting/Stopping the batch measurement” (Page 8-32)



A

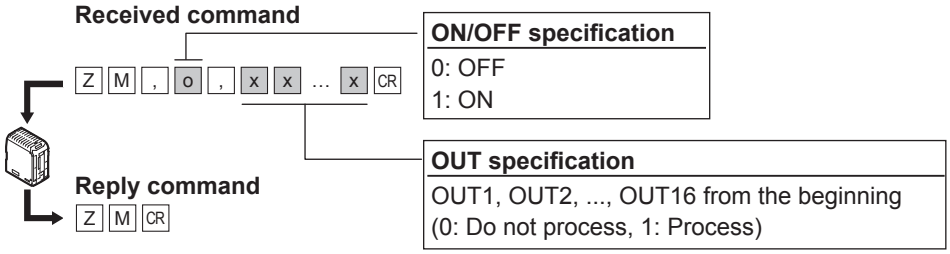
Auto zero (Single OUT)

“Using the ZERO input (Auto-zero function)” (Page 8-30)



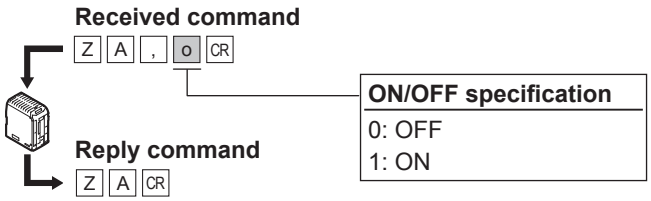
Auto zero (Multiple OUT)

“Using the ZERO input (Auto-zero function)” (Page 8-30)



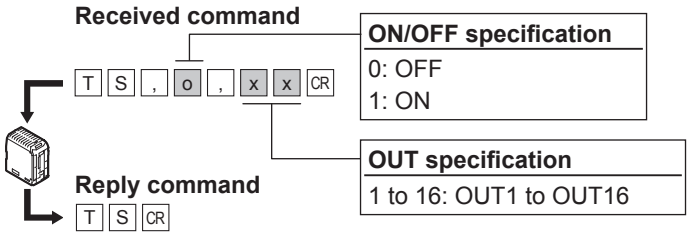
Auto zero (All OUT)

“Using the ZERO input (Auto-zero function)” (Page 8-30)



Timing (Single OUT)

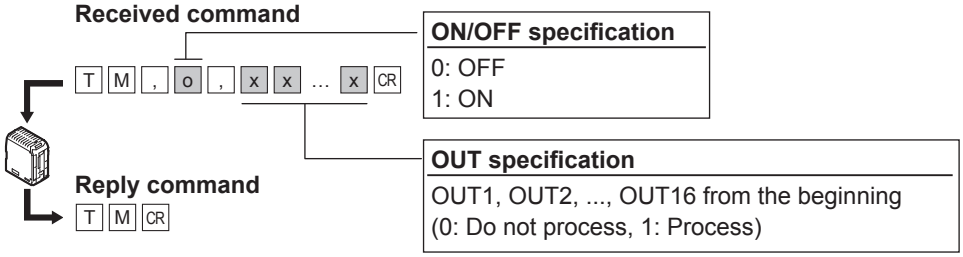
“Using the TIMING input” (Page 8-29)



A

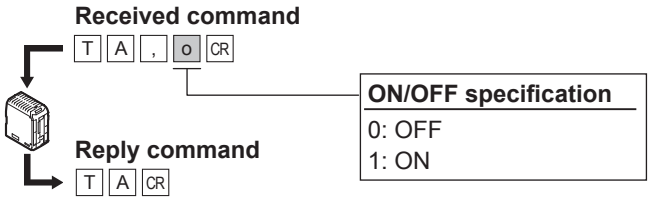
Timing (Multiple OUT)

“Using the TIMING input” (Page 8-29)



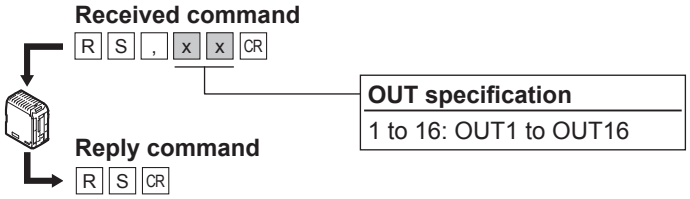
Timing (All OUT)

“Using the TIMING input” (Page 8-29)



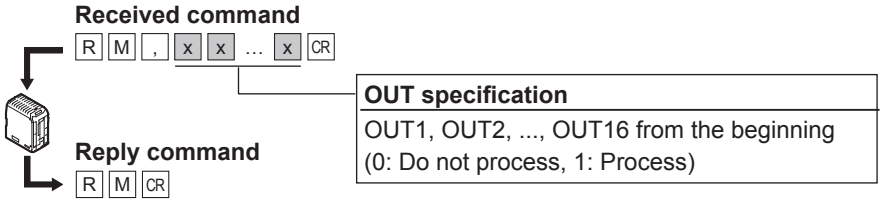
Reset (Single OUT)

“Resetting the measurement value” (Page 8-31)



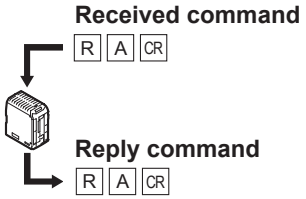
Reset (Multiple OUT)

“Resetting the measurement value” (Page 8-31)



Reset (All OUT)

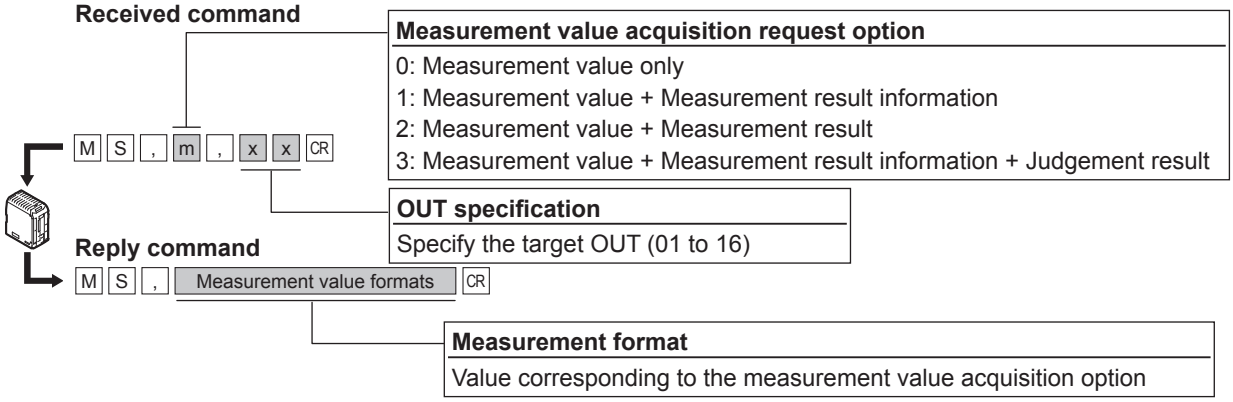
“Resetting the measurement value” (Page 8-31)



A

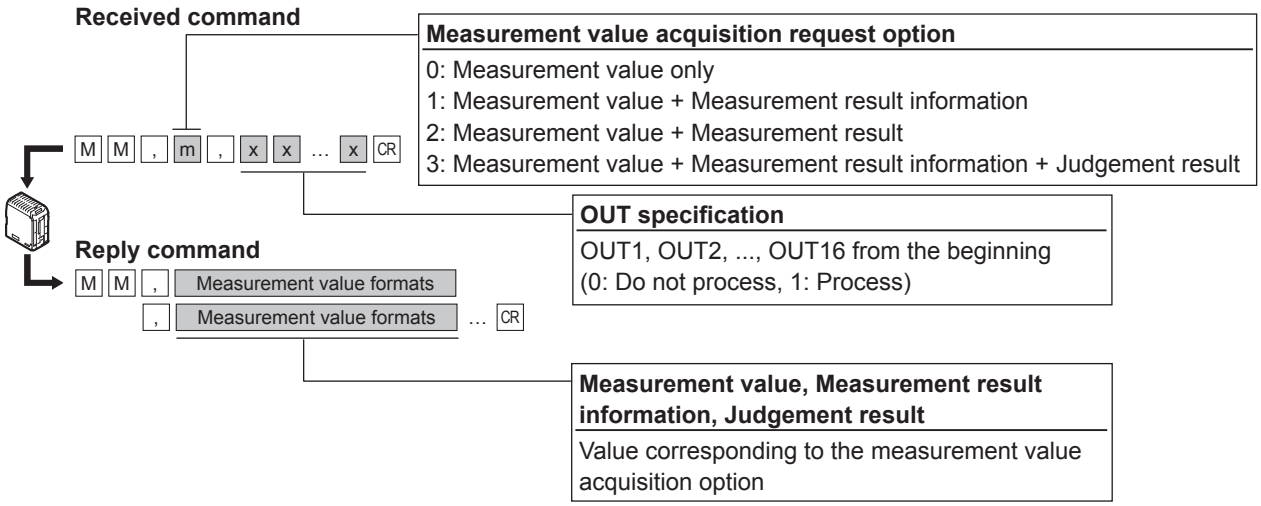
Measurement value output (Single OUT)

“Outputting measurement values and changing settings using commands” (Page 11-7)



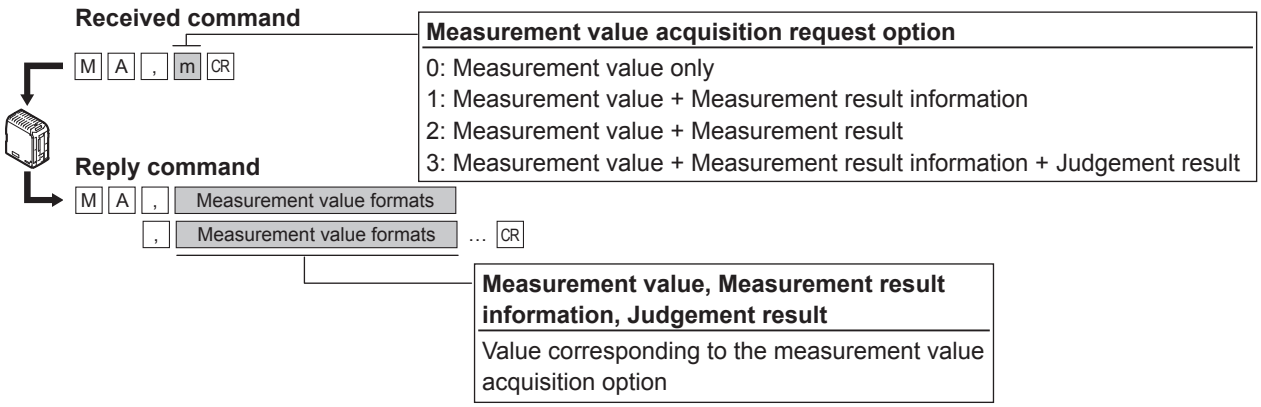
Measurement value output (Multiple OUT)

“Outputting measurement values and changing settings using commands” (Page 11-7)



Measurement value output (All OUT)

“Outputting measurement values and changing settings using commands” (Page 11-7)



A

Setting control command list

This section explains the details of the received commands (for controlling the settings) and the reply commands that are returned when the received commands were processed successfully. These commands are received by this unit on the measurement screen (in [Measuring] state).

Control	Received command	Reply command
Settings save request	S S , b CR	S S CR
Settings save completion check	S C CR	S C , c CR
Program initialization	P I , b , p p CR	P I CR
Read out program No.	P R CR	P R , p p CR
Program switching	P W , p p CR	P W CR

Symbol	
b	Destination of the setting value/Read source of the setting value (0: Settings write area, 1: Active measurement area, 2: Save area)
c	Saving flag (0: Not saving, 1: Saving)
p p	Program No. (00 to 15)

This section explains the operations that are performed after selecting each area.

Settings write area	The setting value in the settings write area will be rewritten. No reset will occur during the rewriting/read-out; and the measurement operation will not be affected.
Active measurement area	After rewriting the setting values in the settings write area, the content of the settings write area will be reflected to the active measurement area. When the new setting takes effect, a reset will occur and the currently active setting will be replaced. No reset will occur during the settings read-out; and the measurement operation will not be affected. The reflected setting values will be erased when the power is switched OFF.
Save area	After rewriting the setting values in the settings write area, the content of the settings write area will be reflected to the active measurement and save areas. When the new setting takes effect, a reset will occur and the currently active setting will be replaced. No reset will occur during the settings read-out; and the measurement operation will not be affected. The reflected setting values will be retained even after the power is switched OFF.

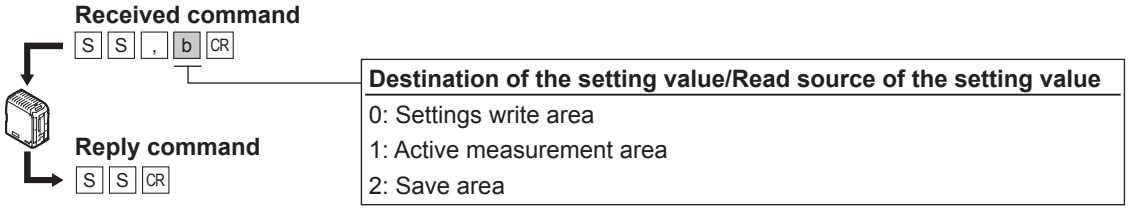
NOTICE	**• Switching the power OFF immediately after the operation settings have been reflected may result in damage to the settings.** **• The memory corruption will be caused after 100,000 overwrite operations.**

Settings control command details

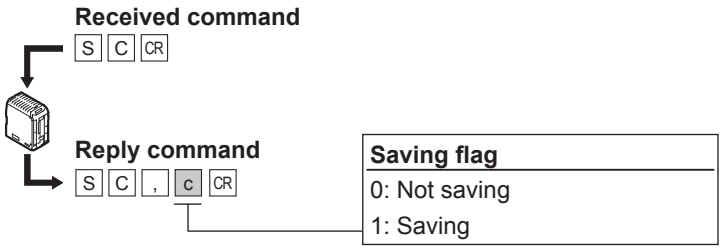
This section explains the details of the received commands and the reply commands that are returned when the received commands were processed successfully.

See "Command format" (Page A-4) for the reply commands that are returned in the event of an error.
See "Chapter 12 Timing Chart and Response Time" (Page 12-1) for the response delay time of the returned commands.

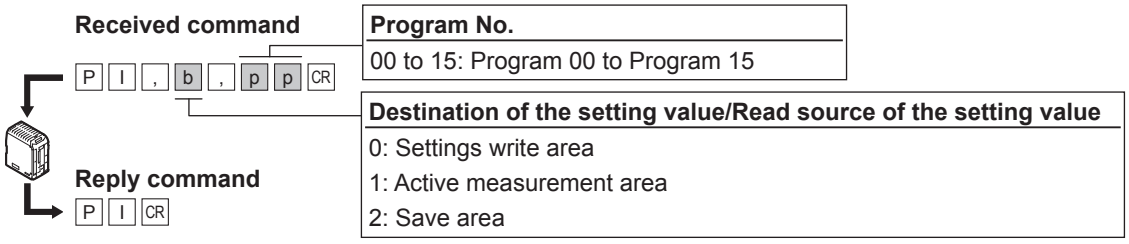
Settings save request



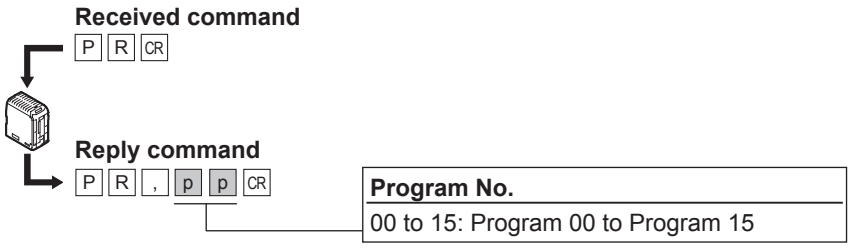
Settings save completion check



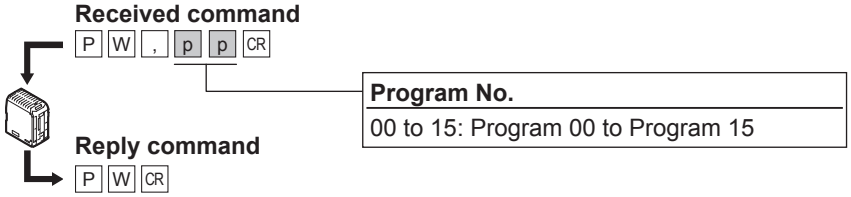
Program initialization



Read out program No.



Program switching



A

Settings change command list

This section explains that command format for changing the settings contents.

Changes	Received command	Reply command
No. of hold measure val	S W , M H , b , x x , n n n CR	S W , M H CR
Measurement value filter	S W , M F , b , x x , t , d CR	S W , M F CR
Hold mode	S W , M M , b , x x , e CR	S W , M M CR
Scaling	S W , S C , b , x x , s s s s s s s s , s s s s s s s s , s s s s s s s s , s s s s s s s s CR	S W , S C CR
Offset	S W , O F , b , x x , s s s s s s s s CR	S W , O F CR
Tolerance	S W , L M , b , x x , s s s s s s s s , s s s s s s s s , s s s s s s s s CR	S W , L M CR
ZERO reference value	S W , Z V , b , x x , s s s s s s s s CR	S W , Z V CR

Symbol	
b	Destination of the setting value/Read source of the setting value (0: Settings write area, 1: Active measurement area, 2: Save area)
x x	Specify the target OUT (01 to 16)
n n n	No. of hold measure val (000 to 999)
t	Measure value filter type (0: OFF, 1: Moving average, 2: Low-pass filter, 3: High-pass filter)
d	Measure value filter details (Moving average 0: 4, 1: 16, 2: 64, 3: 256, 4: 1024, 5: 4096) (Low-pass filter/High-pass filter 0: 0.1 Hz, 1: 0.3 Hz, 2: 1Hz, 3: 3Hz, 4: 10Hz, 5: 30Hz, 6: 100 Hz, 7: 300Hz, 8: 1000 Hz)
e	Hold mode (0: Normal, 1: Peak hold, 2: Bottom hold, 3: Peak to Peak hold, 4: Average hold, 5: Sample hold, 6: Peak, 7: Bottom, 8: Peak to Peak, 9: Average)
s s s s s s s s	Setting value “Settings value formats” (Page A-5)

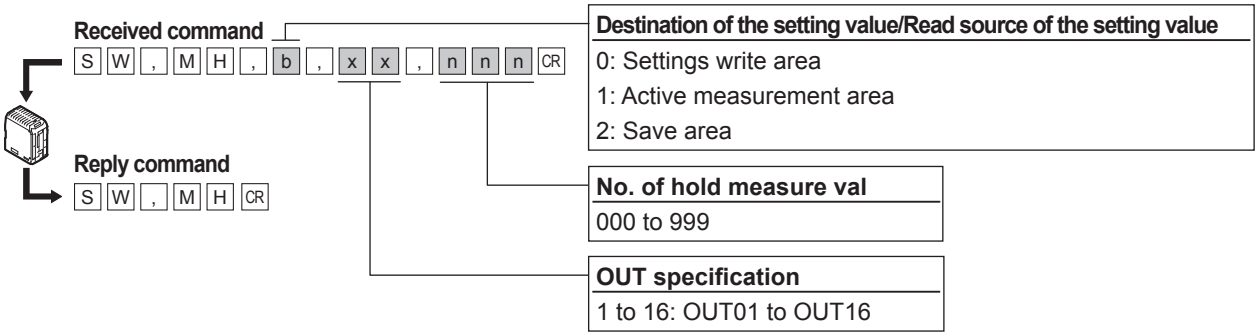
A

Settings change command details

This section explains the details of the received commands and the reply commands that are returned when the received commands were processed successfully.
See "Command format" (Page A-4) for the reply commands that are returned in the event of an error.
See "Chapter 12 Timing Chart and Response Time" (Page 12-1) for the response delay time of the returned commands.

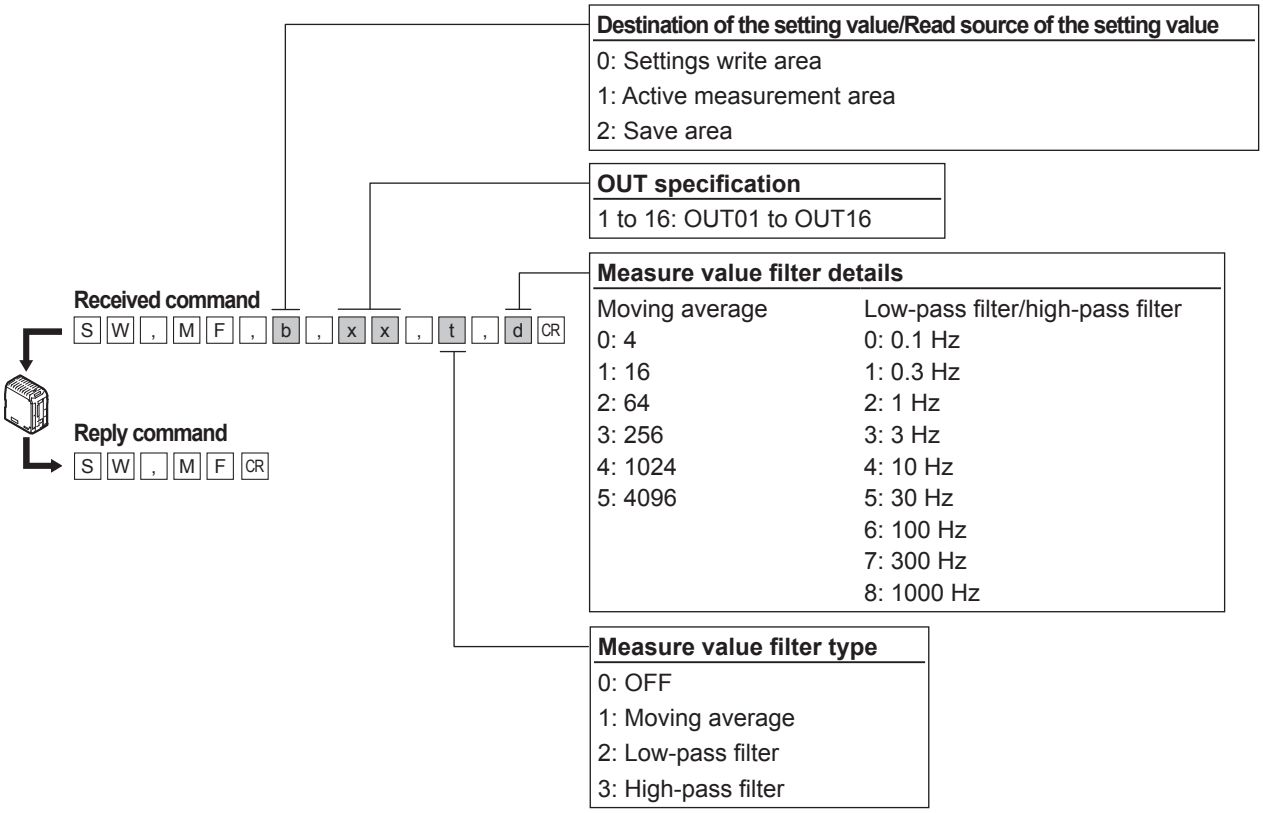
No. of hold measure val

"Setting the Processing setting" (Page 6-76)



Measurement value filter

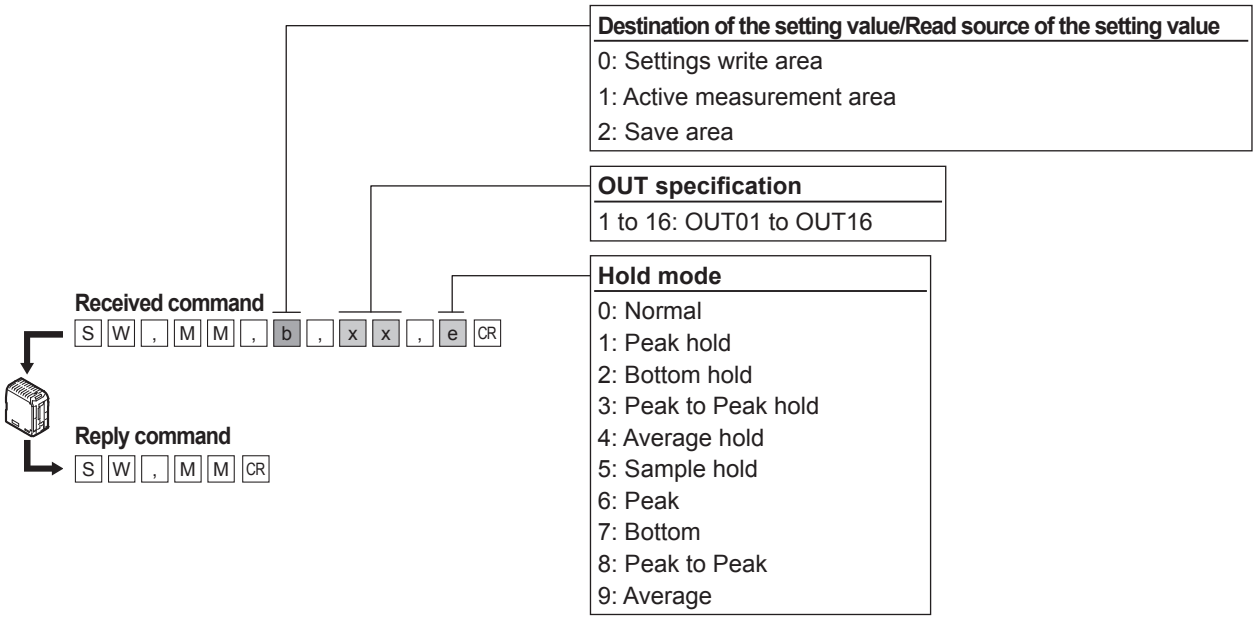
"Measurement value filter" (Page 6-31)



A

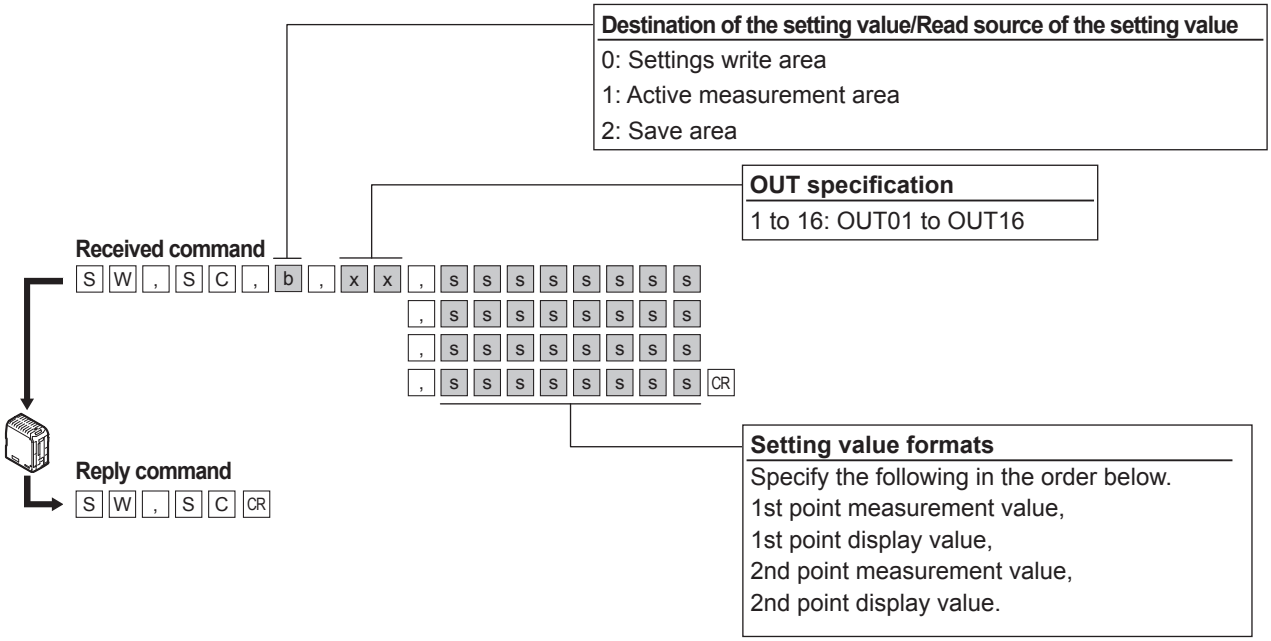
Hold mode

“Measurement mode” (Page 6-27)



Scaling

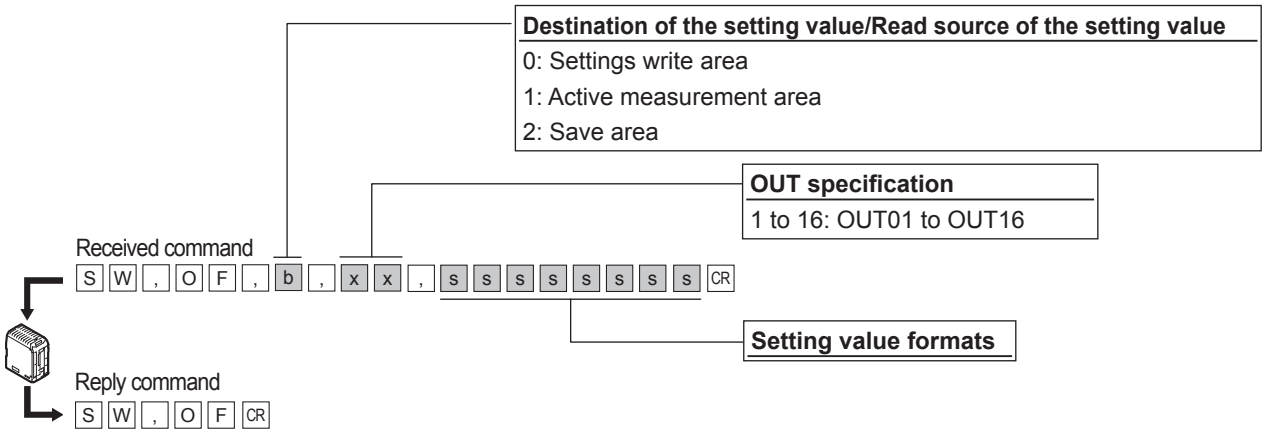
“Scaling processing” (Page 6-31)



A

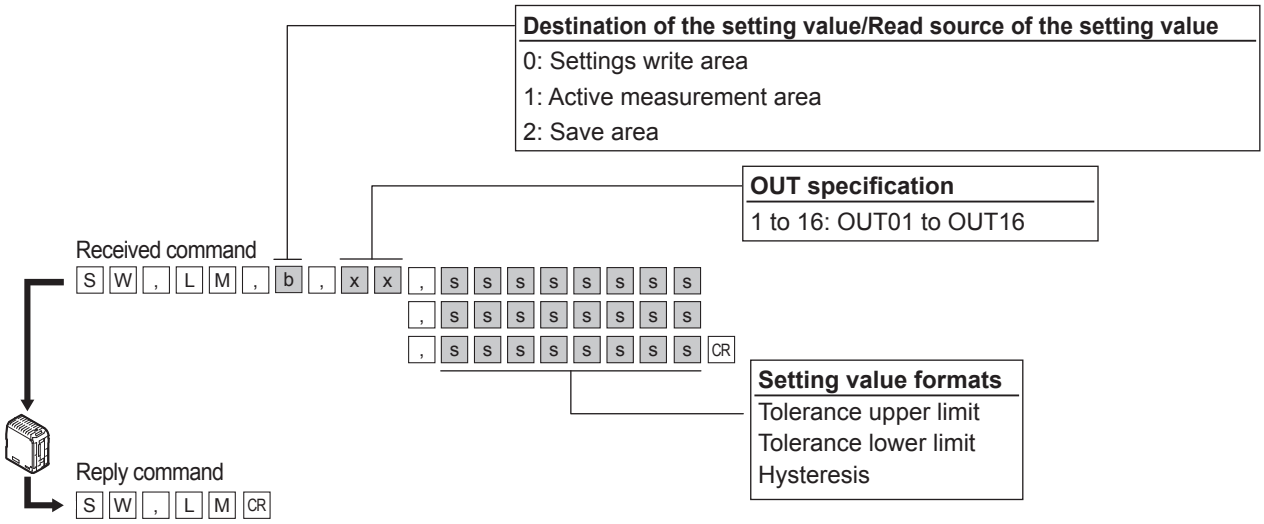
Offset

“Offset processing” (Page 6-31)



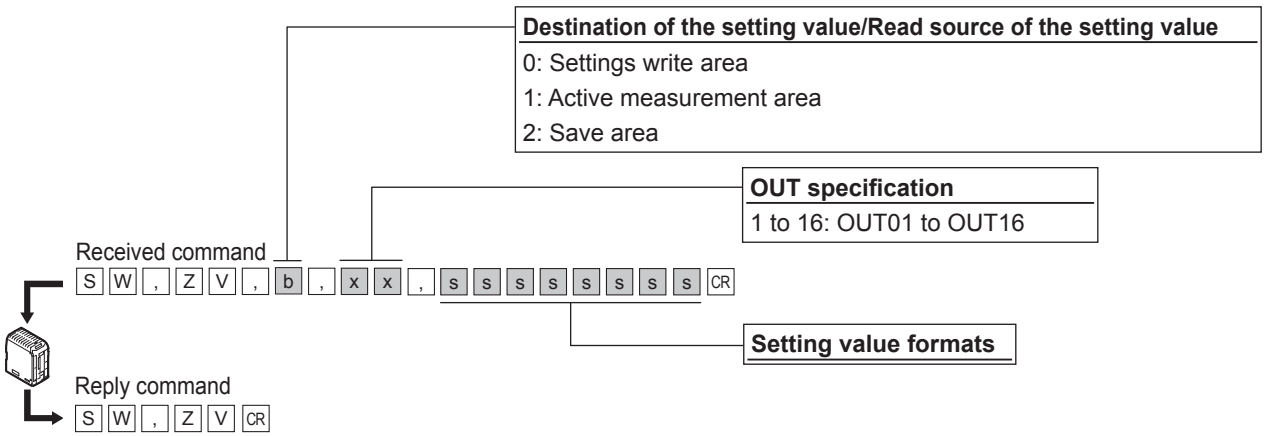
Tolerance

“Tolerance” (Page 6-32)



ZERO reference value

“Auto-zero reference value” (Page 6-32)



A

Settings check command list

This section explains the command format for checking the contents of the settings.

Changes	Received command	Reply command
No. of hold measure val	S R , M H , b , x x CR	S R , M H , x x , n n n CR
Measurement value filter	S R , M F , b , x x CR	S R , M F , x x , t , d CR
Hold mode	S R , M M , b , x x CR	S R , M M , x x , e CR
Scaling	S R , S C , b , x x CR	S R , S C , x x , s s s s s s s s s , s s s s s s s s , s s s s s s s s , s s s s s s s s CR
Offset	S R , O F , b , x x CR	S R , O F , x x , s s s s s s s s s CR
Tolerance	S R , L M , b , x x CR	S R , L M , x x , s s s s s s s s s , s s s s s s s s , s s s s s s s s CR
ZERO reference value	S R , Z V , b , x x CR	S R , Z V , x x , s s s s s s s s CR

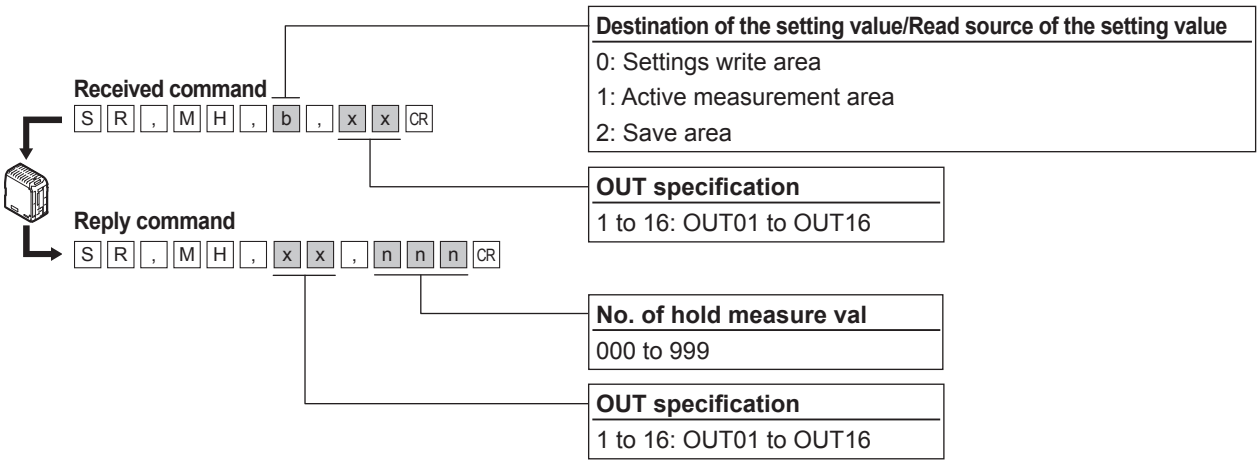
Symbol	
b	Destination of the setting value/Read source of the setting value (0: Settings write area, 1: Active measurement area, 2: Save area)
x x	Specify the target OUT (01 to 16)
n n n	No. of hold measure val (000 to 999)
t	Measurement value filter type (0: OFF, 1: Moving average, 2: Low-pass filter, 3: High-pass filter)
d	Measurement value filter details (Moving average 0: 4, 1: 16, 2: 64, 3: 256, 4: 1024, 5: 4096) (Low-pass filter/High-pass filter 0: 0.1 Hz, 1: 0.3 Hz, 2: 1Hz, 3: 3Hz, 4: 10Hz, 5: 30Hz, 6: 100 Hz, 7: 300Hz, 8: 1000 Hz)
e	Hold mode (0: Normal, 1: Peak hold, 2: Bottom hold, 3: Peak to Peak hold, 4: Average hold, 5: Sample hold, 6: Peak, 7: Bottom, 8: Peak to Peak, 9: Average)
s s s s s s s s	Setting value “Settings value formats” (Page A-5)

Settings check command details

This section explains the details of the received commands and the reply commands that are returned when the received commands were processed successfully.
See “Command format” (Page A-4) for the reply commands that are returned in the event of an error.
See “Chapter 12 Timing Chart and Response Time” (Page 12-1) for the response delay time of the returned commands.

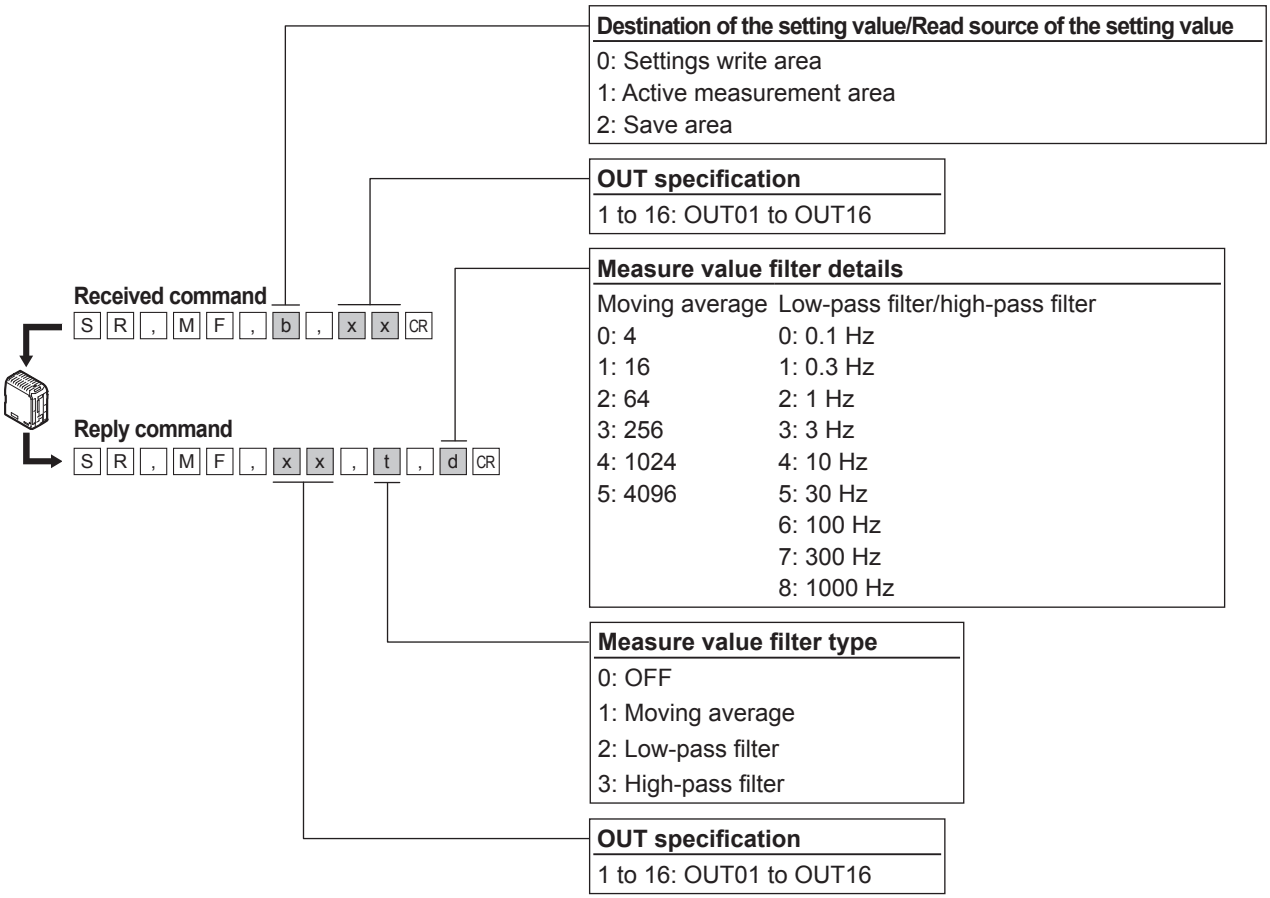
No. of hold measure val

“Outputting measurement values and changing settings using commands” (Page 11-7)



Measurement value filter

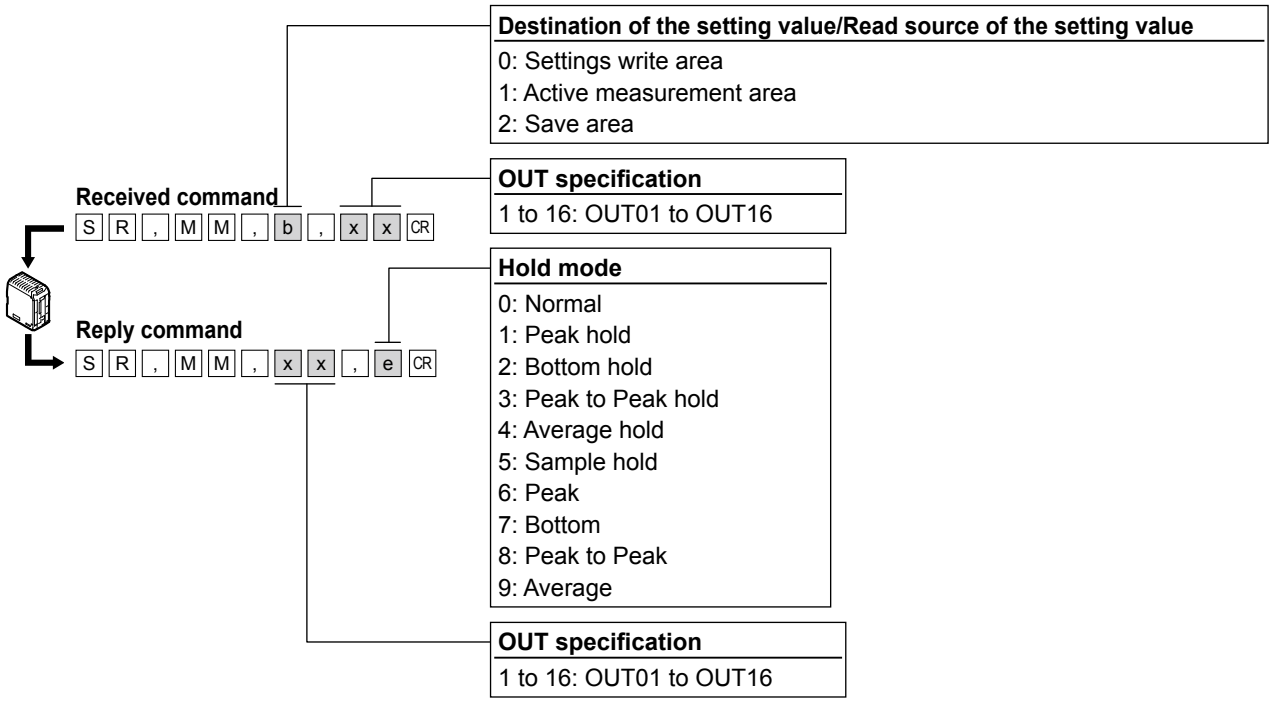
“Measurement value filter” (Page 6-31)



A

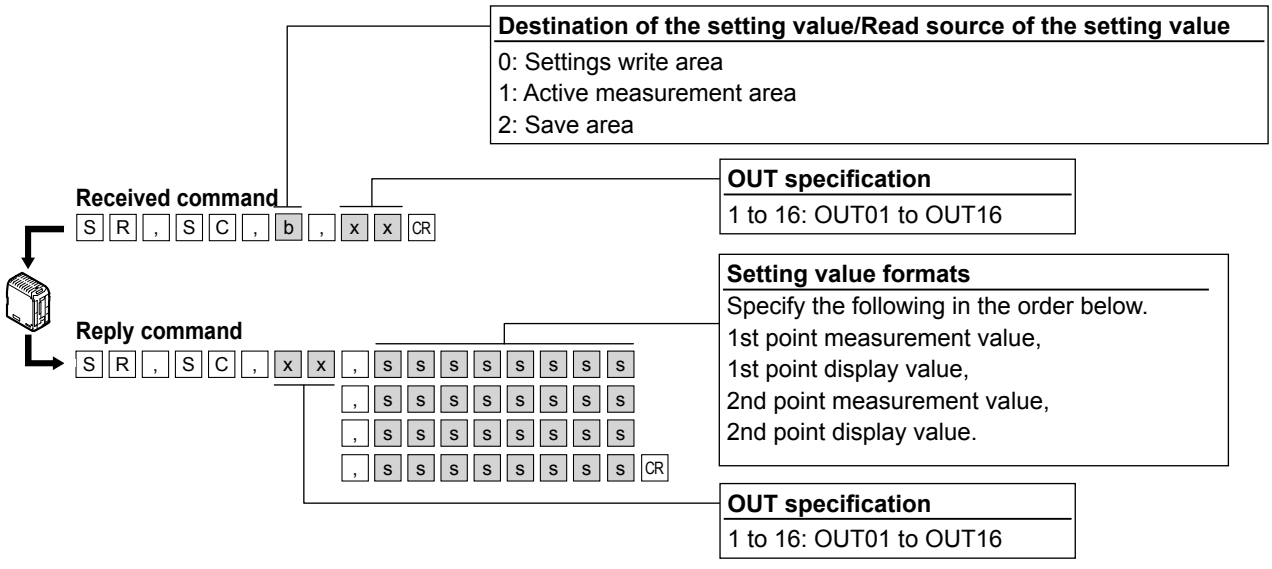
Hold mode

“Hold mode” (Page 6-32)



Scaling

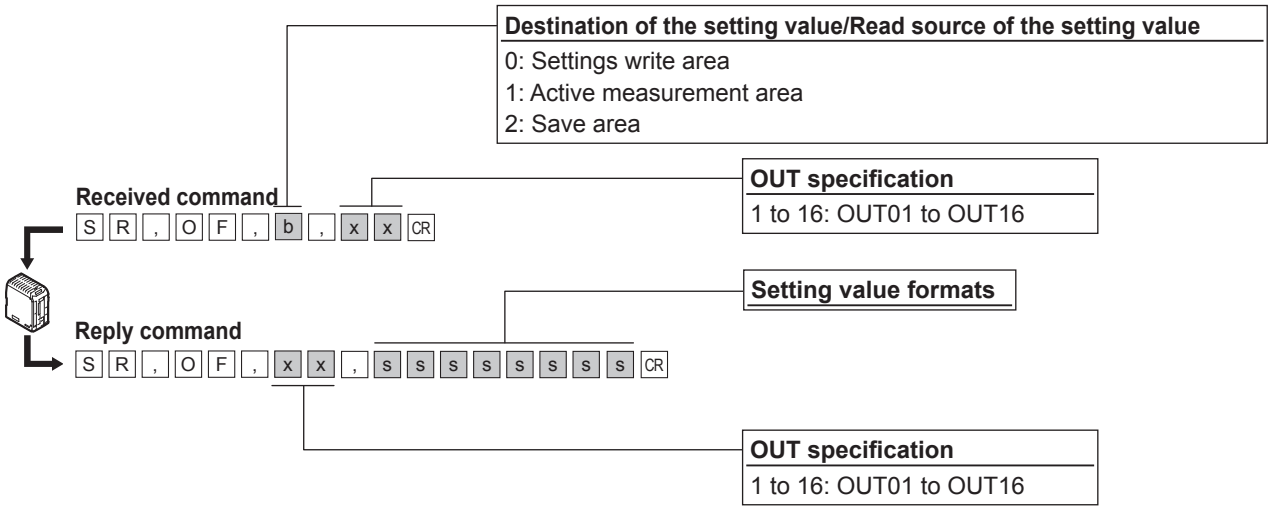
“Scaling processing” (Page 6-31)



A

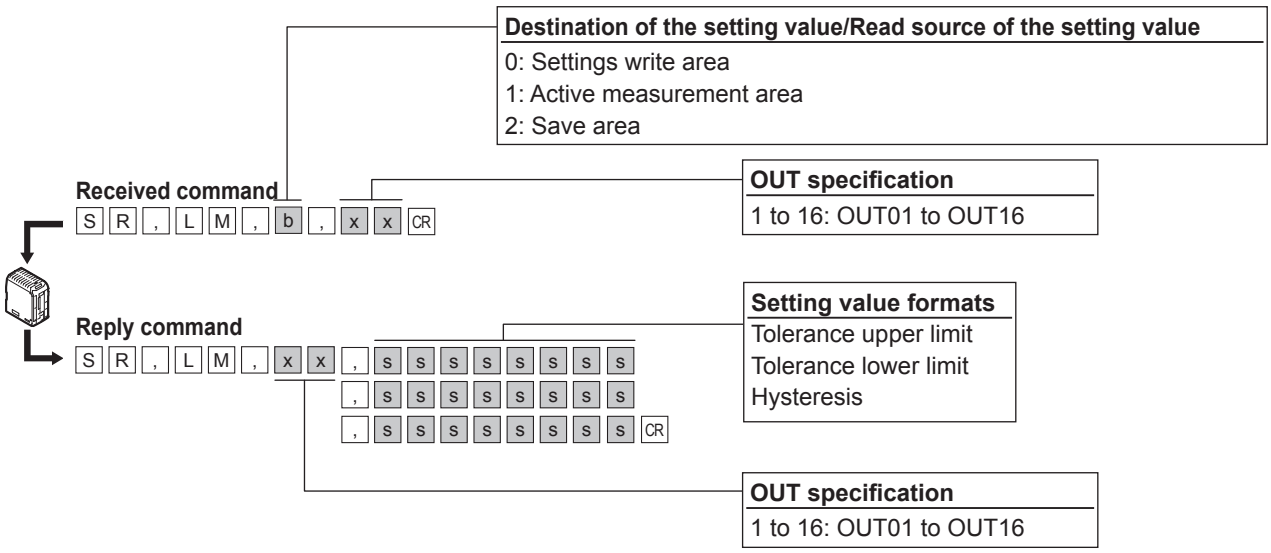
Offset

“Offset processing” (Page 6-31)



Tolerance

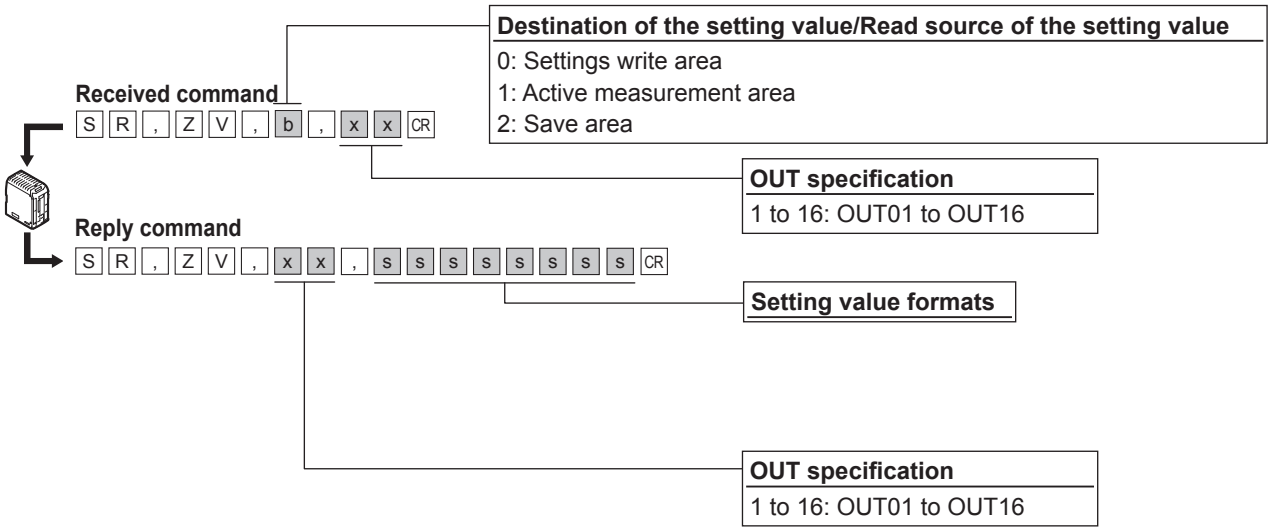
“Tolerance” (Page 6-32)



A

ZERO reference value

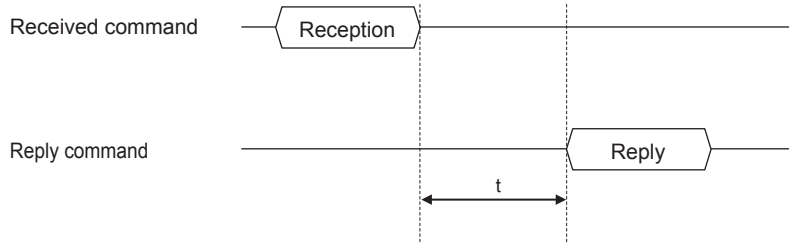
“Auto-zero reference value” (Page 6-32)



A

Response delay when receiving/sending commands

Reply command delay to the received command is as shown below.



Command		Response delay time [t]
Measurement control	Trigger	3 ms or less
	Batch start	
	Batch pause	
	Auto-zero (Single OUT)	
	Auto-zero (Multiple OUT)	
	Auto-zero (All OUT *1)	
	Timing (Single OUT)	
	Timing (Multiple OUT)	
	Timing (All OUT *1)	
	Reset (Single OUT)	
	Reset (Multiple OUT)	
	Reset (All OUT *1)	
	Measurement value output (Single OUT)	3 ms + (sampling frequency) or less
	Measurement value output (Multiple OUT)	
	Measurement value output (All OUT *1)	
Setting control	Setting save requisition	See the next page (*1)
	Setting save completion check	3 ms or less
	Program initialization	See the next page (*1)
	Read out program No.	3 ms or less
	Program switching	The No. of heads x [50 ms + (sampling frequency)] or less
Setting change	No. of hold measure val	See the next page (*1)
	Measurement value filter	
	Hold mode	
	Scaling	
	Offset	
	Tolerance	
	ZERO reference value	

Command		Response delay time [t]
Setting check	No. of hold measure val	3 ms or less
	Measurement value filter	
	Hold mode	
	Scaling	
	Offset	
	Tolerance	
	ZERO reference value	

*1: The response delay time depends on the destination to which the settings are written.

Destination	Response delay time
0: Write area for settings	3 ms or less
1: Setting area during operation / 2: Storage area	The no. of heads x [50 ms + (sampling frequency)] + 60 ms or less

The table above shows the response delay time when the measurement processing time stays within the sampling frequency (under a condition that the TRG_PASS output does not turn on).

When the controller is processing any command (such as communication with LJ-Navigator2), the commands in the table above are processed after the controller finishes processing the command lengthening the response delay time by a maximum of 100 ms.

“Measurement control command list” (Page A-7)
“Setting control command list” (Page A-12)
“Settings change command list” (Page A-14)
“Settings check command list” (Page A-18)

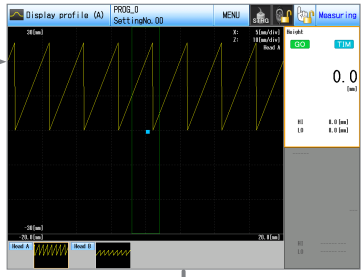
MEMO

Switching Screens on the Display Monitor/ Touch Panel Monitor

In the measurement program settings, you can switch the settings screen for each measurement program to configure the detailed setting items.
This section explains the switching screens on the settings screens of the display monitor/touch panel monitor.
See “How to View the Settings Screen” (Page 4-4) for LJ-Navigator2.

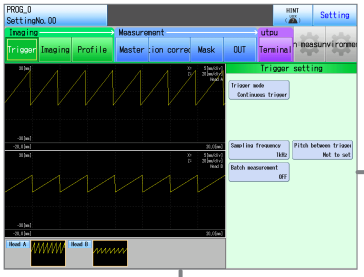
Start-up “Start-up and Termination” (Page 3-8)

Measurement screen



Settings screen display

Settings screen



Program switching

[Change program No.] screen

Switch to the program you wish to set.



Common measurement setting

“Switching Screens during the switching of measurement/settings screens and programs” (Page A-28)

Set the common settings for all measurement programs.

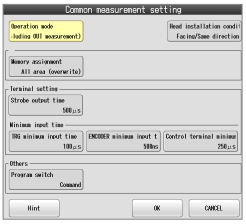
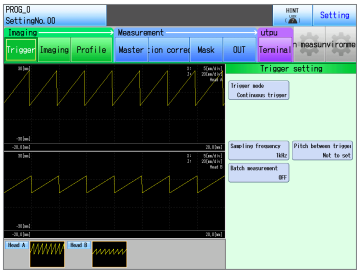


Image setting

“Switching Screens during the image setting” (Page A-30)

[Trigger setting] screen

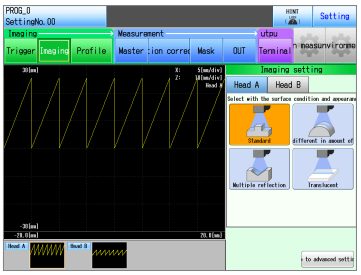
Set the trigger type, sampling frequency and batch processing.



[Imging]

[Imaging setting] screen

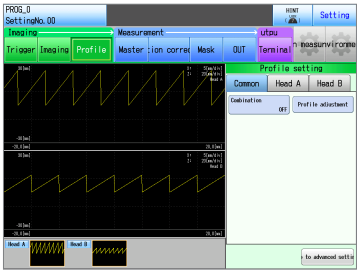
You can set the measurement range, sensitivity characteristics, multiple peak processing, etc.



[Profile]

[Profile setting] screen

Set the installation correction, compression, filter process, etc.



[Master]

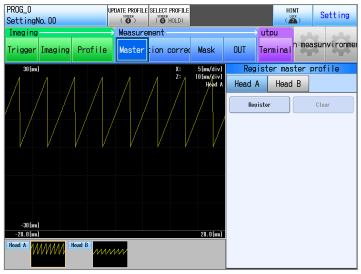
A

Measurement setting

“Switching Screens during the measurement setting” (Page A-33)

[Register master profile] screen

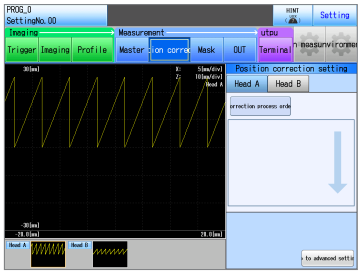
Register/clear the master profile.



[Pos cor.]

[Position correction setting] screen

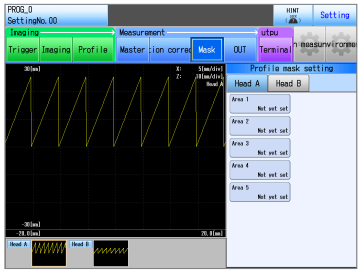
Set the order and condition for the position correction.



[Mask]

[Profile mask setting] screen

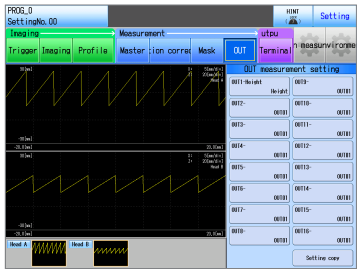
Set/clear the mask area for unwanted stray light profiles.



[OUT]

[OUT measurement setting] screen

Set the measurement details such as the height, angle, sectional area, etc.



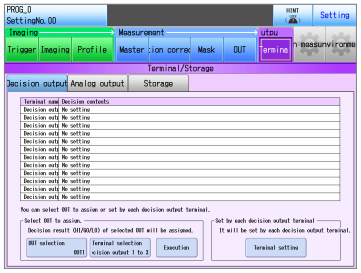
[Term.]

Terminal/Storage

“Switching Screens during the terminal/storage setting” (Page A-38)

[Decision output] screen

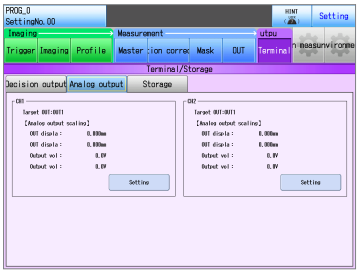
Assign the Judgement result (HI/GO/LO) of OUT for each output terminal.



[Analog output]

[Analog output] screen

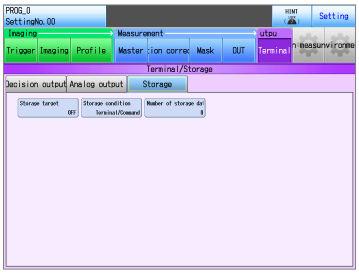
Set the analog output scaling for each output terminal.



[Storage]

[Storage] screen

Set the storage target and condition including the No. of storage data.



Measurement screen display

To the measurement screen

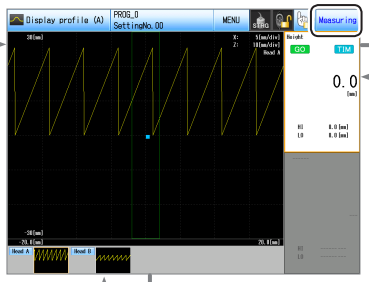
“Chapter 8 Checking the Measurement Results” (Page 8-1)

A

Switching Screens during the switching of measurement/settings screens and programs

Start-up “Start-up and Termination” (Page 3-8)

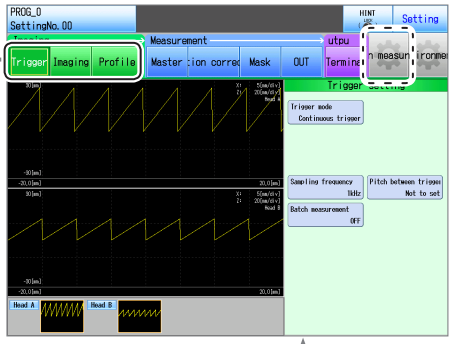
Measurement screen



Sliding down and hold the [PROG/RUN] switch, or hold the [Measuring]

Sliding down the [PROG/RUN] switch, or touch the [Measuring]

Settings screen

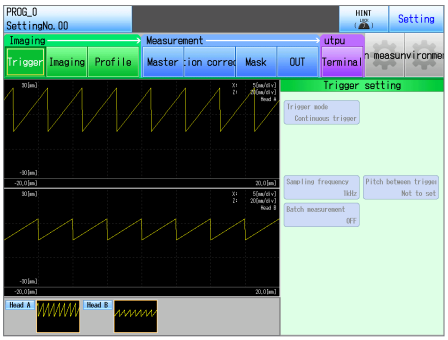


[Common meas.]

Touch the Program No.

[Setting]

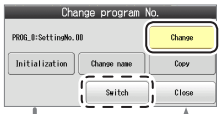
Settings reference screen



[Switch]

[Change program No.] screen

Switch to the program you wish to set.

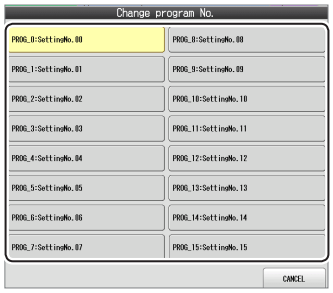


[Change]

Touch the program

[Change program No.] screen

Select the program you wish to set.

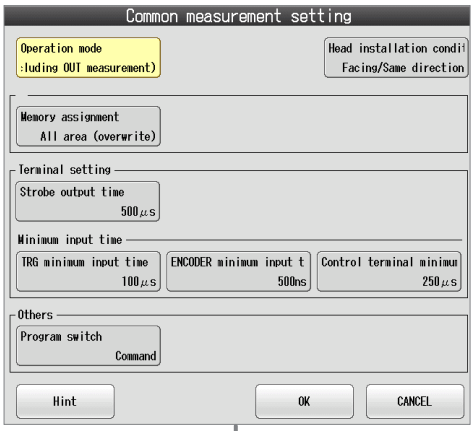


A

Switching Screens during the common measurement settings

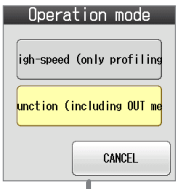
This section explains the switching screens during the common measurement setting on the display monitor/ touch panel monitor.
You can set the common settings for all measurement programs.
First, select the [operation mode].
See “Chapter 9 Measurement Common Setting” (Page 9-1) for LJ-Navigator2.

[Common measurement setting] screen



[Operation mode]

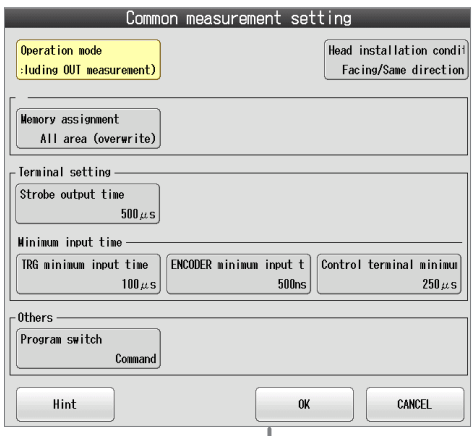
[Operation mode] screen



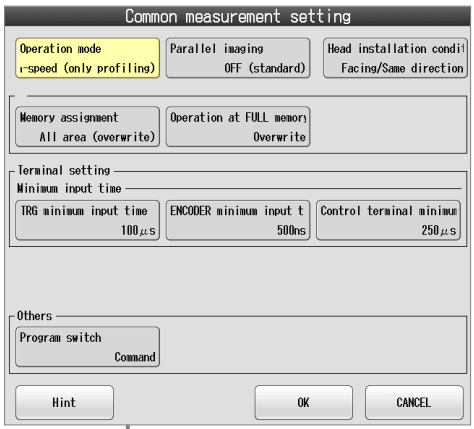
Advanced function

High-speed

[Common measurement setting] screen ([Operation mode]: Advanced function)



[Common measurement setting] screen ([Operation mode]: High-speed)

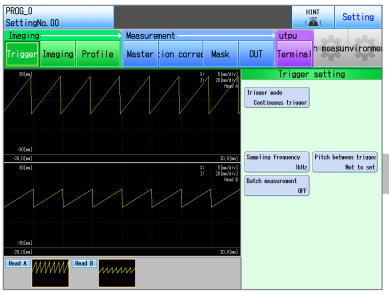


To the image setting
“Switching Screens during the image setting” (Page A-30)

Switching Screens during the image setting

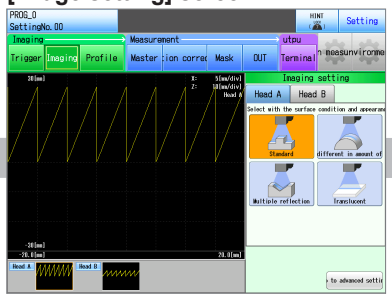
This section explains the switching screens during the imaging setting (i.e. trigger, imaging and profile settings) on the display monitor/touch panel monitor.
See “Chapter 5 Setting Image Conditions” (Page 5-1) for LJ-Navigator2.

[Trigger setting] screen



[Imging]

[Image setting] screen

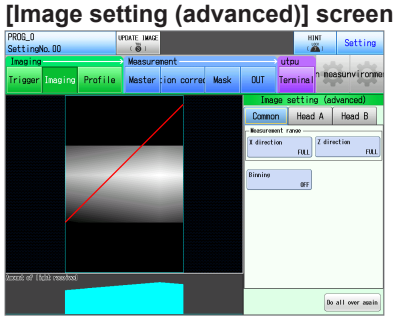


[Profile]

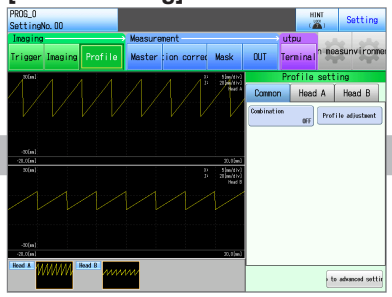
[Go to advanced set]

[Go to standard set]

[Image setting (advanced)] screen



[Profile setting] screen

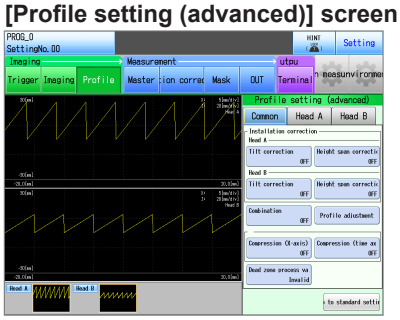


[Master]

[Go to advanced set]

[Go to standard set]

[Profile setting (advanced)] screen



To the measurement setting

“Switching Screens during the measurement setting” (Page A-33)

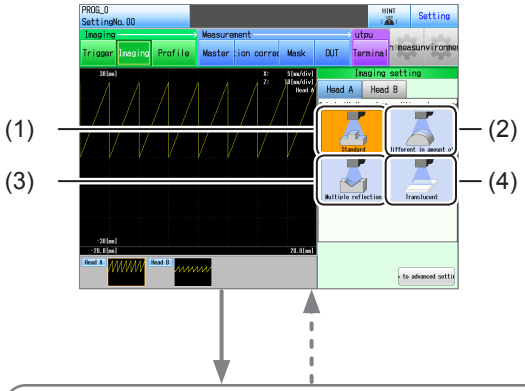
A

Image setting

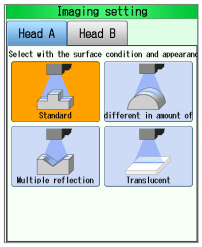
■ Standard setting

This section explains the switching screens during the imaging setting (Standard setting) on the display monitor/ touch panel monitor.
On the [Image setting] screen (Standard setting), you can set the measurement range, sensitivity characteristics, multiple peak processing, etc.
See “Chapter 5 Setting Image Conditions” (Page 5-1) for LJ-Navigator2.

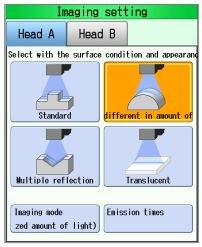
[Imaging setting] screen



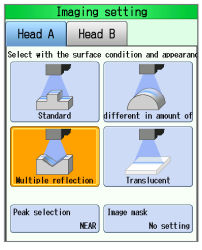
(1) When [Standard] is selected



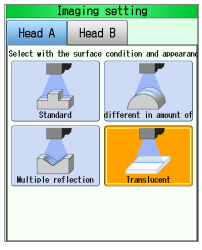
(2) When [Diff. of light intensity] is selected



(3) |When [Multiple reflection] is selected



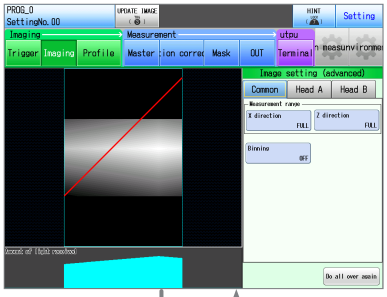
(4) When [Translucent object] is selected



■ Advanced setting

This section explains the switching screens during the imaging setting (Advanced setting) on the display monitor/touch panel monitor.
On the [Image setting] screen (Standard setting), you can set the measurement range, sensitivity characteristics, multiple peak processing, etc.
See “Chapter 5 Setting Image Conditions” (Page 5-1) for LJ-Navigator2.

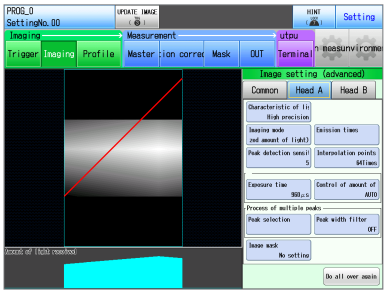
[Imaging setting (advanced)] screen



[Head A (B)]

[Common]

Screen displayed when [Head A] is selected

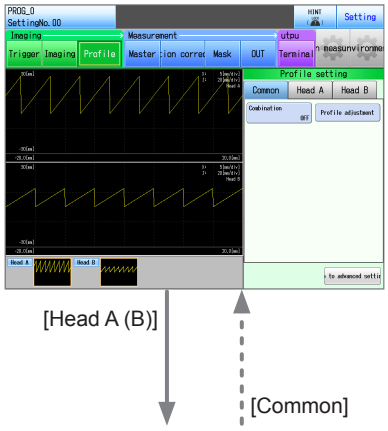


Profile setting

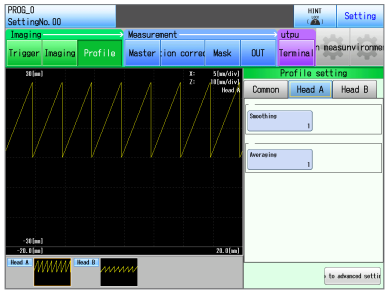
■ Standard setting

This section explains the switching screens during the profile setting (Advanced setting) on the display monitor/touch panel monitor.
On the [Profile setting] screen (Standard setting), you can set the installation correction, compressing, filter processing, etc.
See 🕮 “Chapter 5 Setting Image Conditions” (Page 5-1) for LJ-Navigator2.

[Profile setting] screen:
When the [Common] tab is selected



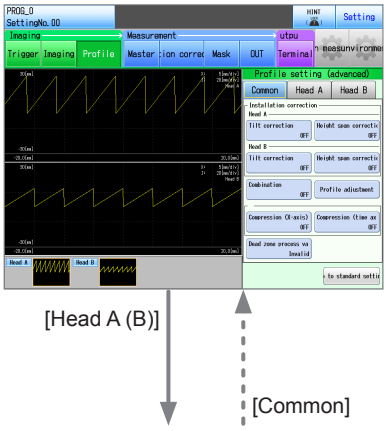
[Profile setting] screen



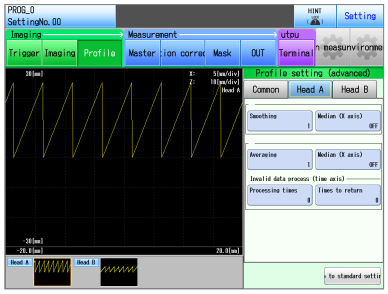
■ Advanced setting

This section explains the switching screens during the profile setting (Advanced setting) on the display monitor/touch panel monitor.
On the [Profile setting (Advanced)] screen, you can set the installation correction, compression, filter processing, etc.
See 🕮 “Chapter 5 Setting Image Conditions” (Page 5-1) for LJ-Navigator2.

[Profile setting (advanced)] screen:
When the [Common] tab is selected



[Profile setting (advanced)] screen

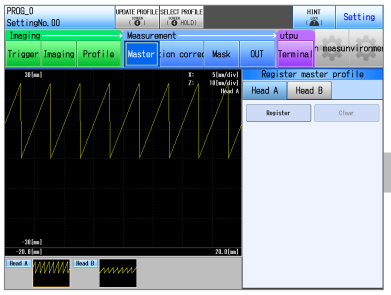


A

Switching Screens during the measurement setting

This section explains the switching screens during the imaging setting (i.e. master profile registration, position correction, profile mask, and OUT measurement settings) on the display monitor/touch panel monitor.
See “Chapter 6 Setting the Measurement Processing Conditions” (Page 6-1) for LJ-Navigator2.

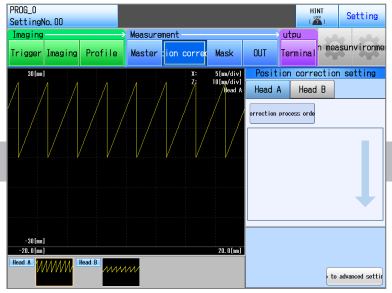
[Register master profile] screen



“Register master profile” (Page A-34)

[Pos cor.]

[Position correction setting] screen



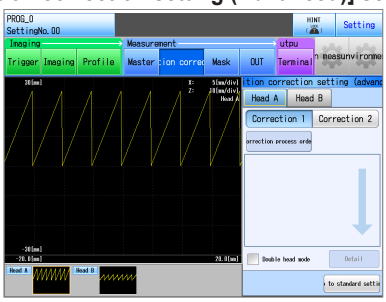
“Position correction setting” (Page A-35)

[Mask]

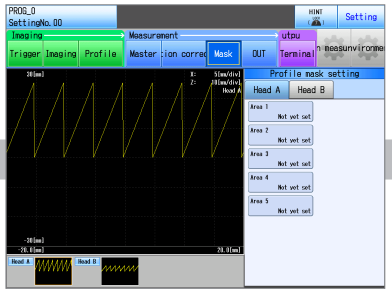
[Go to advanced set]

[Go to standard set]

[Position correction setting (Advanced)] screen



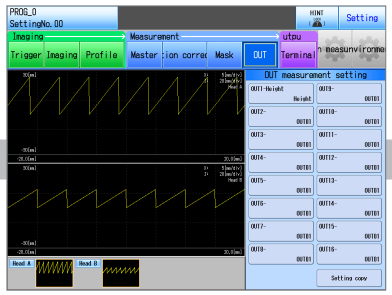
[Profile mask setting] screen



“Profile mask setting” (Page A-36)

[OUT]

[OUT measurement set] screen



“OUT measurement setting” (Page A-37)

[Term.]

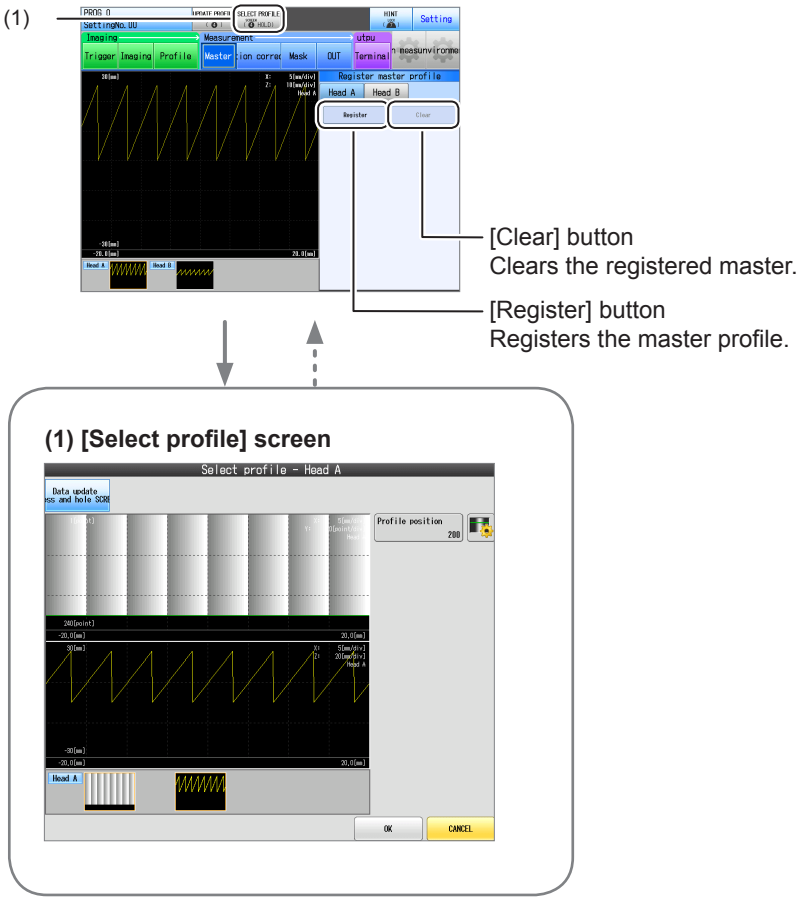
To Terminal/Storage

“Switching Screens during the terminal/storage setting” (Page A-38)

Register master profile

This section explains the switching screens during the master setting on the display monitor/touch panel monitor.
You can register/clear the master profile on the [Register master profile] screen.
See 🕮 “Chapter 6 Setting the Measurement Processing Conditions” (Page 6-1) for LJ-Navigator2.

[Register master profile] screen

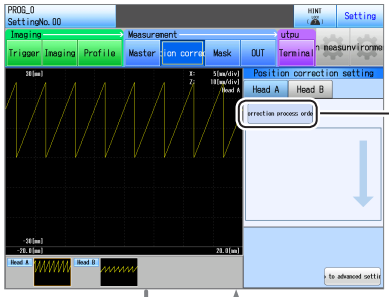


Position correction setting

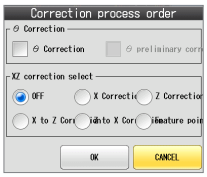
■ Standard setting

This section explains the switching screens during the position correction setting (Standard setting) on the display monitor/touch panel monitor.
On the [Position correction setting] screen (Standard setting), you can set the processing order and correction condition for the position correction.
See 🕮 “Chapter 6 Setting the Measurement Processing Conditions” (Page 6-1) for LJ-Navigator2.

[Position correction setting] screen



(1) [Correction process order] screen

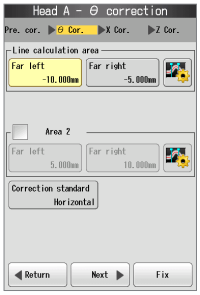


[OK]

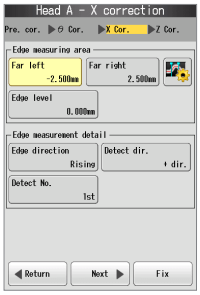
[θ preliminary Cor.]



[θ correction]



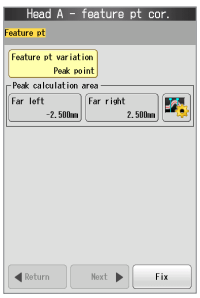
[X correction]



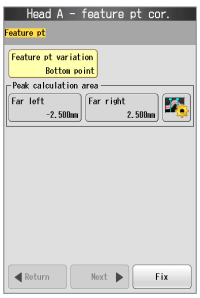
[Z correction]



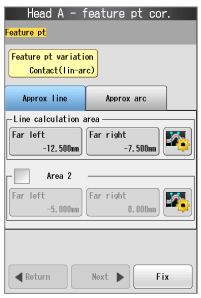
[Feat pt cor.] (Peak point)



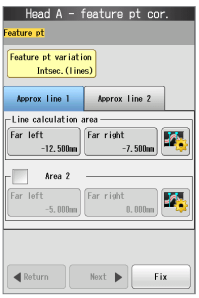
[Feat pt cor.] (Bottom point)



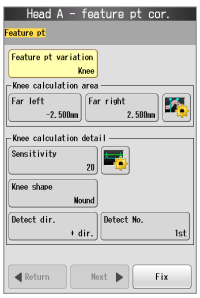
[Feat pt cor.] (Contact (line-arc))



[Feat pt cor.] (Intsec. (lines))



[Feat pt cor.] (Knee)

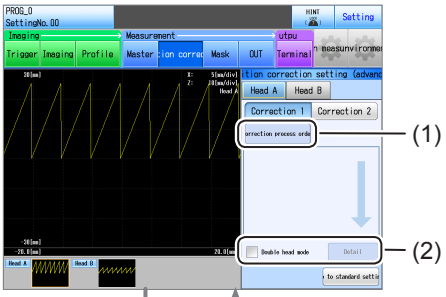


A

■ Advanced setting

This section explains the switching screens during the position correction setting (Advanced setting) on the display monitor/touch panel monitor.
On the [Position cor. (Advanced)] screen (Advanced setting), you can set the processing order and correction condition for the position correction.
See “Chapter 6 Setting the Measurement Processing Conditions” (Page 6-1) for LJ-Navigator2.

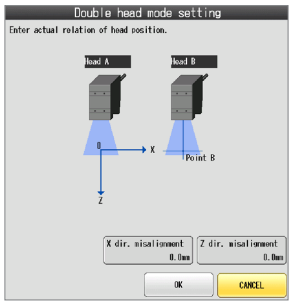
[Position cor. (advanced)] screen



Reference
- (1) is the same as for [Standard setting].
- In [Advanced setting], you can set two correction processes in the [Pos. cor. 1] and [Pos. cor. 2] tabs.

(2) [Dual head mode setting] screen

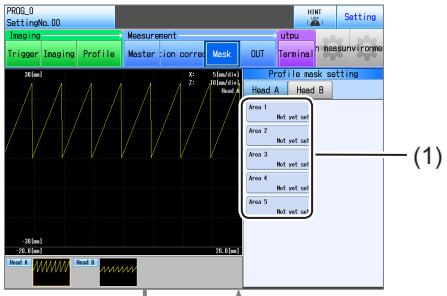
This setting is available if you are using two heads and the head installation is other than [Independent].



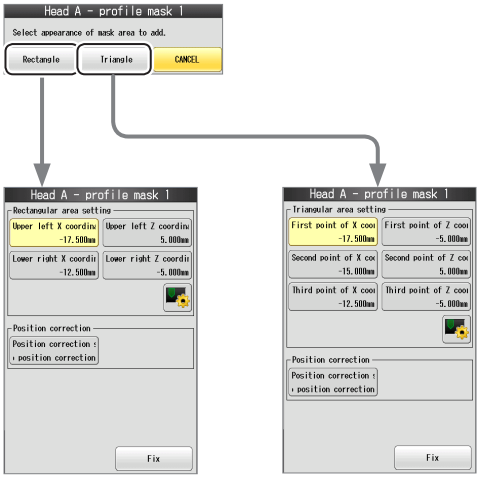
Profile mask setting

This section explains the switching screens during the mask setting on the display monitor/touch panel monitor.
In the [Profile mask setting] screen, you can set/clear the mask area for the unwanted stray light profiles.
See “Chapter 6 Setting the Measurement Processing Conditions” (Page 6-1) for LJ-Navigator2.

[Profile mask setting] screen



(1) [Profile mask] screen

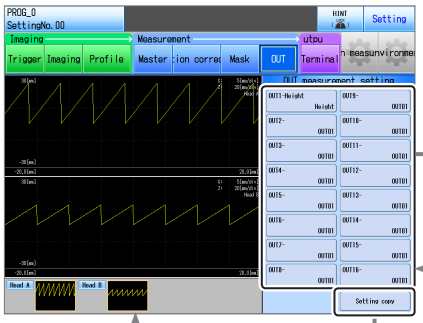


A

OUT measurement setting

This section explains the switching screens during the OUT measurement setting on the display monitor/touch panel monitor.
In the [OUT measurement setting] screen, you can set the measurement and processing contents for each OUT to the profile.
See “Chapter 6 Setting the Measurement Processing Conditions” (Page 6-1) for the details of the setting items and the LJ-Navigator2 operating procedures.

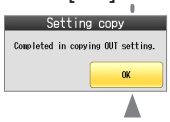
[OUT measurement setting] screen



Select the OUT you wish to set.

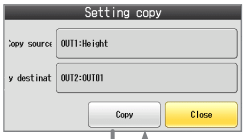
[Setting copy]

[OK]



[Copy]

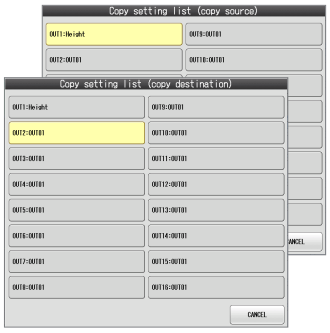
[Setting copy] screen



Select the copy source and destination

Select [OUT].

[Copy setting list] screen

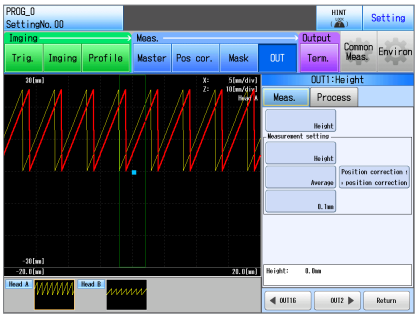


[Return]

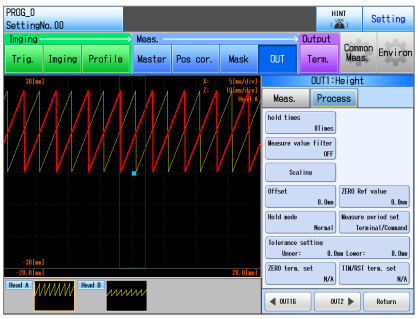
Settings screen for each OUT

Switch the setting items between [Meas.] and [Process] tabs.

[Meas.] tab



[Process] tab



Reference

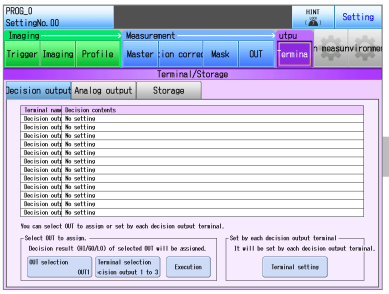
You can switch the OUT to be set using the [◄OUTxx] and [OUTxx►] buttons (xx represents the OUT number).

A

Switching Screens during the terminal/storage setting

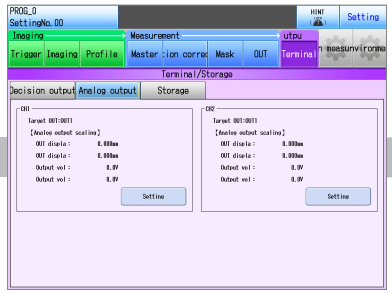
This section explains the switching screens during the terminal/storage setting on the display monitor/touch panel monitor.
See “Chapter 7 Setting the Terminal Output Condition/the Storage Condition” (Page 7-1) for LJ-Navigator2.

[Terminal/Storage] screen
- [Decision output] tab



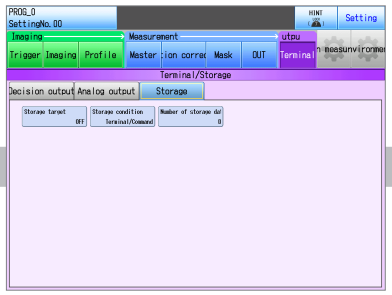
[Analog output] tab

[Terminal/Storage] screen
- [Analog output] tab



[Storage] tab

[Terminal/Storage] screen
- [Storage] tab



Select [Setting] and
hold down the [ENTER] key.

To the measurement screen

“Chapter 8 Checking the Measurement Results” (Page 8-1)

A

Error Messages

System error messages

System error messages appear when an error causing the measurement to stop has occurred.
If a message prompting you to replace the instrument appears or if you do not have spare parts at hand, contact your nearest KEYENCE office.

Error code	Displayed content	Cause	Remedy
0x0020 - 0x0026	There is an abnormality in the internal memory of controller. Replace the controller and cycle power.	The internal memory of the controller may be malfunctioning.	Replace the controller and switch the power back ON. “Mounting the Controller” (Page 2-4) The replaced controller requires an inspection and/or a repair. Contact your nearest KEYENCE office.
0x0027	There is an abnormality in the internal timer. Replace the controller and cycle power.	The internal timer of the controller may be malfunctioning.	Replace the controller and switch the power back ON. “Mounting the Controller” (Page 2-4) The replaced controller requires an inspection and/or a repair. Contact your nearest KEYENCE office.
0x0028	There is an abnormality in RS-232C communication device of controller. Replace the controller and cycle power.	The RS-232C communication device of the controller may be malfunctioning.	Replace the controller and switch the power back ON. “Mounting the Controller” (Page 2-4) The replaced controller requires an inspection and/or a repair. Contact your nearest KEYENCE office.
0x0029	There is an abnormality in USB communication device of controller. Replace the controller and cycle power.	The USB communication device of the controller may be malfunctioning.	Replace the controller and switch the power back ON. “Mounting the Controller” (Page 2-4) The replaced controller requires an inspection and/or a repair. Contact your nearest KEYENCE office.
0x002A	There is an abnormality in Ethernet communication device of controller. Replace the controller and cycle power.	The Ethernet communication device of the controller may be malfunctioning.	Replace the controller and switch the power back ON. “Mounting the Controller” (Page 2-4) The replaced controller requires an inspection and/or a repair. Contact your nearest KEYENCE office.
0x002B	There is an abnormality in the internal device of controller. Replace the controller and cycle power.	The internal device of the controller may be malfunctioning.	Replace the controller and switch the power back ON. “Mounting the Controller” (Page 2-4) The replaced controller requires an inspection and/or a repair. Contact your nearest KEYENCE office.
0x0040 - 0x0045 0x0060 - 0x0061	There is an abnormality in the internal data of controller. Replace the controller and cycle power.	There may be a data abnormality due to noise, or a component inside the controller may be malfunctioning.	Replace the controller and switch the power back ON. “Mounting the Controller” (Page 2-4) The replaced controller requires an inspection and/or a repair. Contact your nearest KEYENCE office.
0x0046 - 0x0047	There is an abnormality in the setting data of controller. Setting data will be initialized to reboot.	There may be settings data abnoemality due to a power-off while writing settings data and/or due to noise.	Follow the message to recover from the error. Once the abnormality has been cleared, the unit will restart in the factory default state.

Error code	Displayed content	Cause	Remedy
0x0080	Cannot recognize connected heads. Confirm the head connection and cycle power.	No head is connected to the unit, or the head cable may be broken.	Switch the power OFF and check the head cable connection. After verifying the connection, switch the power back ON. “Connecting the controller and the head” (Page 2-9) If the abnormality persists, contact your nearest KEYENCE office.
0x0081	A head is connected only to the head connector B. When only one head is used, connect it to the head connector A. Confirm the head connection and cycle power.	A head is connected to the Head B connector only, or the cable connected to the Head A connector may be broken.	Switch the power OFF and check the head cable connection. If you are using only one head, connect it to the Head A connector and switch the power back ON. “Connecting the controller and the head” (Page 2-9) If the error persists, contact your nearest KEYENCE office.
0x0082	There is a difference in models of connected heads of A and B. Connect just one head or two head of the same model and cycle power.	The connected Head A and Head B are different models.	Connect only one head or connect two heads of the same model, and then switch the power back ON. “Connecting the controller and the head” (Page 2-9)
0x0084	Two heads were connected at the previous activation, but only one head can be recognized. Setting data will be initialized on reboot.	The head connection state (the No. of heads connected) is different from the previous start-up.	Follow the message to recover from the error. Once the abnormality has been cleared, the programme settings will return to default, and the unit will restart.
0x0085	The model of the connected head is different from that at the previous activation. Setting data will be initialized on reboot.	The head connection state (the head model) is different from the previous reboot.	Follow the message to recover from the error. Once the abnormality has been cleared, the programme settings will return to default, and the unit will restart.
0x0120 - 0x0122	There is an abnormality in the internal memory of head A. Replace the head A and cycle power.	The internal memory of Head A may be malfunctioning.	Replace the head and switch the power back ON. “Mounting the Head” (Page 2-2) The replaced head requires an inspection and/or a repair. Contact your nearest KEYENCE office.
0x0123 - 0x0124	There is an abnormality in the internal device of head A. Replace the head A and cycle power.	The internal device of Head A may be malfunctioning.	Replace the head and switch the power back ON. “Mounting the Head” (Page 2-2) The replaced head requires an inspection and/or a repair. Contact your nearest KEYENCE office.
0x0140 - 0x0142 0x0160	There is an abnormality in the internal memory of head A. Replace the head A and cycle power.	There may be a data abnormality due to noise, or a component inside Head A may be malfunctioning.	Replace the head and switch the power back ON. “Mounting the Head” (Page 2-2) The replaced head requires an inspection and/or a repair. Contact your nearest KEYENCE office.

Error code	Displayed content	Cause	Remedy
0x0180	Failed in initializing the head A. Confirm the connection or replace the cables, and cycle power. If the replacement of cables do not solve the problem, replace the head A and cycle power.	The head cable connection may be broken or a component inside Head A may be malfunctioning.	Check the connection between the head and the controller, replace the cable, and then switch the power back ON. If the abnormality persists after replacing the cable, replace Head A and then switch the power back ON. “Connecting the controller and the head” (Page 2-9) “Mounting the Head” (Page 2-2) The replaced head requires an inspection and/or a repair. Contact your nearest KEYENCE office.
0x0181 - 0x0182	Failed in communicating with head A. Confirm the connection or replace the cables, and cycle power. If the replacement of cables do not solve the problem, replace the head A and cycle power.	The head cable connection may be broken or a component inside Head A may be malfunctioning.	Check the connection between the head and the controller, replace the cable, and then switch the power back ON. If the abnormality persists after replacing the cable, replace Head A and then switch the power back ON. “Connecting the controller and the head” (Page 2-9) “Mounting the Head” (Page 2-2) The replaced head requires an inspection and/or a repair. Contact your nearest KEYENCE office.
0x0183	Temporary blackout of head A was detected. The system will be rebooted.	Strong noise may have entered Head A.	Take the necessary measures to prevent strong noise from entering the head, and then switch the power back ON.
0x0220 - 0x0222	There is an abnormality in the internal memory of head B. Replace the head B and cycle power.	The internal memory of Head B may be malfunctioning.	Replace the head and switch the power back ON. “Mounting the Head” (Page 2-2) The replaced head requires an inspection and/or a repair. Contact your nearest KEYENCE office.
0x0223 - 0x0224	There is an abnormality in the internal device of head B. Replace the head B and cycle power.	The internal device of Head B may be malfunctioning.	Replace the head and switch the power back ON. “Mounting the Head” (Page 2-2) The replaced head requires an inspection and/or a repair. Contact your nearest KEYENCE office.
0x0240 - 0x0242 0x0260	There is an abnormality in the internal memory of head B. Replace the head B and cycle power.	There may be a data abnormality due to noise, or a component inside Head B may be malfunctioning.	Replace the head and switch the power back ON. “Mounting the Head” (Page 2-2) The replaced head requires an inspection and/or a repair. Contact your nearest KEYENCE office.

Error code	Displayed content	Cause	Remedy
0x0280	Failed in initializing the head B. Confirm the connection or replace the cables, and turn on the power again. If the replacement of cables do not solve the problem, replace the head B and cycle power.	The head cable connection may be broken or a component inside Head B may be malfunctioning.	Check the connection between the head and the controller, replace the cable, and then switch the power back ON. If the abnormality persists after replacing the cable, replace Head B and then switch the power back ON. “Connecting the controller and the head” (Page 2-9) “Mounting the Head” (Page 2-2) The replaced head requires an inspection and/or a repair. Contact your nearest KEYENCE office.
0x0281 - 0x0282	Failed in communicating with head B. Confirm the connection or replace the cables, and cycle power. If the replacement of cables do not solve the problem, replace the head B and cycle power.	The head cable connection may be broken or a component inside Head B may be malfunctioning.	Check the connection between the head and the controller, replace the cable, and then switch the power back ON. If the abnormality persists after replacing the cable, replace Head B and then switch the power back ON. “Connecting the controller and the head” (Page 2-9) “Mounting the Head” (Page 2-2) The replaced head requires an inspection and/or a repair. Contact your nearest KEYENCE office.
0x0283	Temporary blackout of head B was detected. The system will be rebooted.	Strong noise may have entered Head B.	Take the necessary measures to prevent strong noise from entering the head, and then switch the power back ON.

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

Display unit error messages

Error messages only appear on the display monitor. They do not appear on the LJ-Navigator2 screen.
The controller will continue to function normally as these are not system errors of the controller.

Error code	Displayed content	Cause	Remedy
0x9140 - 0x9141 0x9160	There is an abnormality in the internal data of display unit. Replace the display unit and cycle power.	There may be a data abnormality due to noise, or a component inside the display unit may be malfunctioning.	Replace the display unit and switch the power back ON. “Connecting Instruments to the Display Unit” (Page 2-6) The replaced display unit requires an inspection and/or a repair. Contact your nearest KEYENCE office.
0x9180 - 0x9181	Failed in communicating with the display unit. Confirm the connection, and cycle power. If the problem is still not solved, replace the display unit and cycle power.	The cable connection between the connector connecting the display unit and the controller may be broken, or a component inside the display unit may be malfunctioning.	Check the connection between the display unit and the controller, and then switch the power back ON. If the abnormality persists, replace the display unit and switch the power back ON. “Connecting the controller and the display unit or the EtherNet/IP communication unit” (Page 2-10) “Connecting Instruments to the Display Unit” (Page 2-6) The replaced display unit requires an inspection and/or a repair. Contact your nearest KEYENCE office.

- Error messages briefly describe the error contents and countermeasures.
- If an error message other than the above appears, contact your nearest KEYENCE office.

Troubleshooting

Trouble	Check item	Remedy	Reference page
The POWER ON LED and ERROR LED do not light after switching ON the power of the controller.	Is the power cable connected properly?	Connect the power cable properly.	2-11
	Are you using a power supply that meets the specification range?	Be sure to use a power supply that meets the specification range.	13-2
The power to the controller drops suddenly.	Are instantaneous power interruptions occurring?	Use a stable power supply with no instantaneous power interruptions.	-
	Does the capacity of the power supply meet the specification range?	If the capacity of the power supply is insufficient, replace it with a power supply with a greater capacity.	13-2
Nothing appears on the monitor.	Is the monitor switched ON?	Make sure that the monitor is on and use a power supply that meets the specification range of the monitor.	2-8
	Is the monitor cable connected properly?	Connect the monitor cable properly.	2-6
	Is the monitor cable broken?	Try using another monitor cable.	2-6
	Is the monitor adjusted properly?	Adjust the brightness and hue of the monitor.	-
	Are the display unit and the controller connected properly using a cable?	Switch the power OFF, check the connection between the display unit and the controller, and then switch the power back ON.	2-6
	Is it possible that the monitor may be broken?	Check whether the screen appears correctly on another monitor.	2-6
An error is displayed on the screen.	-	Take the necessary measures by following the instructions in the displayed error message.	A-39
The POWER ON LED of the controller does not light, but the ERROR LED is lit.	Does an error message appear when using LJ-Navigator2 for communication? If you are using a display monitor, does an error message appear on the monitor screen?	Take the necessary measures by following the instructions in the displayed error message.	A-39
The laser emitting LED of the head does not light.	Does an error message appear when using LJ-Navigator2 for the communication? If you are using a display monitor, does an error message appear on the monitor screen?	Take the necessary measures by following the instructions in the displayed error message.	A-39
Laser beam is not emitted.	Does an error message appear when using LJ-Navigator2 for the communication? If you are using a display monitor, does an error message appear on the monitor screen?	Take the necessary measures by following the instructions in the displayed error message.	A-39
	Are the laser remote interlock and the laser OFF inputs being input correctly?	Ensure that they are input correctly.	6
	Is the emission being controlled correctly according to the trigger mode setting?	If the trigger mode setting is other than “Continuous trigger”, an external trigger input will be necessary.	5-5

Trouble	Check item	Remedy	Reference page
The console cannot be operated.	Is the console connected properly?	Connect the console properly.	2-6
	Is the console operation in locked state?	Release the console operation lock.	1-10
	Is a PC or a PLC communicating with the controller? If multiple commands are input to the controller, only either of the commands will be accepted. (Console operation may be ignored.)	Try operating the console again after making sure that no commands are being input from other instruments.	-
The PC freezes while using LJ-Navigator2.	Does the system environment of the PC meet the specification range?	Be sure to use it under a system environment that meets the specification range.	1-12
The profile is not displayed correctly.	Is the target object located within the measurement range?	Place the target object in the measurement range.	13-7
	Is the laser beam being emitted?	See “Laser beam is not emitted.” in the Troubleshooting.	A-44
	If the averaging and median (time axis) are set to other than OFF, the profile will not appear until the specified number of triggers has been input.	Enter a greater number of triggers than set for the averaging and median (time axis) counts.	5-5
	Is the measurement being affected by a dead zone?	Install the target object to a different location.	2-4, 2-2
	Is the measurement being affected by stray light caused by the ambient environment?	Install the target object to a different location or different angle.	2-4, 2-2
		Utilize the W polarization function.	5-15
		Adjust the image setting correctly.	5-12
		Utilize the image mask function.	5-14
	Is the image setting adjusted properly?	Adjust the image setting correctly.	5-12
The profile is not displayed correctly.	Are the smoothing, averaging and median set correctly?	Set the smoothing, averaging and median correctly.	5-26
	Is the image mask area set correctly?	Set the image mask area correctly.	5-14
	Is there any dust, dirt, water or oil on the cover glass?	Remove the dust, dirt, water or oil.	3
	Are there water and/or oil droplets in the operating ambient environment?	Remove the droplets using an air purge, etc.	3
	Are there any scratches or cracks on the cover glass?	The glass cover must be replaced. Contact your nearest KEYENCE office for repair.	3
The measurement value display does not change from decision standby data (“------”).	Is trigger control being performed correctly according to the trigger mode setting?	Perform trigger control according to the trigger mode setting.	5-5
	Is timing control being performed correctly according to the hold mode setting?	Perform timing control according to the hold mode setting.	6-32, 12-1
	Are the averaging count and the average number of times set correctly?	Set the averaging count and the average number of times to appropriate values.	5-27, 6-76

Trouble	Check item	Remedy	Reference page
The measurement value is displayed as “ALARM”.	Is the profile displayed correctly?	See “The profile is not displayed correctly.” in the Troubleshooting.	A-45
	Is the measurement mode set correctly?	Set the measurement mode correctly.	6-27
	Is the position correction set correctly?	Set the position correction correctly. If the position correction fails, the measurement values of all related OUTs will be ALARM values.	6-13
The measurement value is not output correctly.	Is the profile displayed correctly?	See “The profile is not displayed correctly.” in the Troubleshooting.	A-45
	Is the position correction set correctly?	Set the position correction correctly.	6-13
	Are the scaling, offset and ZERO standard value set correctly?	Set the scaling, offset and ZERO standard value correctly.	6-31, 6-76
	Is the target object tilted or displaced?	Place the target object in the measurement range.	13-7
		Set the tilt and height corrections.	5-25
		Set the position correction.	5-25, 6-8
Auto zero does not function correctly.	Is the ZERO terminal allocation set correctly?	Allocate the OUT correctly to the used ZERO terminal.	6-76
	Is the auto zero key lock ON?	Set the auto zero key lock to OFF.	10-10
Program No. cannot be changed.	Is the program switching set correctly in the environment setting?	Set it correctly according to the switching method.	9-6, 9-8
	Is the key lock ON?	Switch the key lock to OFF.	1-10
The judgement output is not output correctly.	Is the wiring correct?	On the terminal operation screen, check whether the ON/OFF state is correct. If the ON/OFF state is correct, check the output circuit and the wiring and connect them correctly.	11-13, 11-14
	Are the tolerance and judgement output terminal settings set correctly?	On the terminal operation screen, check whether the ON/OFF state is correct. If the ON/OFF state is incorrect, set the tolerance and judgement output terminal settings correctly.	11-13, 11-14
	Is the import timing correct?	Import it in the correct timing using the strobe output.	12-1
The analog output is not output correctly.	Is the wiring correct?	Check and connect the wiring correctly.	11-13, 11-14
	Has the voltage exceeded +10.8 V or fallen below -10.8 V?	Set the analog scaling correctly according to the measurement value.	7-4
	Are you using an oscilloscope and/or a fast-speed A/D board?	The resolution may be lower for these instruments. Reduce its influence by changing the analog scaling.	-

Trouble	Check item	Remedy	Reference page
RS-232C communication does not work.	Is the communication cord connected correctly?	Connect the communication cord correctly.	11-6
	Are the connection specifications of the communication cord correct?	Check the wiring of the communication cord.	11-6
	Are the communication specifications set correctly?	Configure the settings such that the communication specifications of this unit and the external instrument are the same.	11-5
	Is the communication program correct?	Verify that commands and delimiters can be sent/received correctly.	A-4
		Send the next command after confirming the reply command from this unit.	A-4

Setting Conditions for Different Purposes

If you cannot obtain optimal measurement values, modify the measurement program based on the table below.

Measurement program			Reference page	High-speed mode	Advanced function mode	Minimum required settings	Measuring the profile at high speed	Measuring the OUT measurement value at high speed	Accumulating the profile or OUT measurement value	Stabilizing the profile	Stabilizing the OUT measurement value	Correcting the profile or OUT measurement value	Using I/O terminals
Common measure set	Operation mode		9-6, 9-8	☆	☆	⊙	⊙						
	Parallel imaging		9-8	☆			⊙						
	Memory assignment		9-6, 9-8	☆	☆				⊙				
	Operation at FULL memory		9-8	☆					○				
	Minimum input time	TRG	9-6, 9-8	☆	☆								○
		ENCODER	9-6, 9-8	☆	☆								○
		Control terminal	9-6, 9-8	☆	☆								○
	Strobe output time		9-6		☆								○
	Program switch		9-6, 9-8	☆	☆								○
Trigger setting	Trigger mode		5-10	☆	☆	○	○						○
	Samp freq (fast trigg freq)		5-10	☆	☆	○	○			⊙	⊙		
	Pitch between triggers		5-10	☆	☆								
	Batch measurement		5-10	☆	☆	⊙	○						
	Mutual interference prevention		5-10	☆☆	☆☆		△						
Imaging setting	Common head	Measurement range	5-17	☆	★		⊙	⊙					
		Binning	5-17	☆	★		⊙	⊙		○	○		
	Separate for Head A/B	Select measurement target	5-17	☆	☆	○				⊙	⊙		
		CMOS sensitivity	5-17	☆	★					⊙	⊙		
		Exposure time	5-17	☆	★					○	○		
		Control light intensity	5-17	☆	☆ (*1)					○	○		
		Peak detec. sensitivity	5-17	☆	★					○	○		
		Intrpol pts inval data	5-17	☆	★					○	○		
		Peak selection	5-17	☆	☆ (*1)		△			⊙	⊙		
		Peak width filter	5-17	☆	★					○	○		
		Imaging mode	5-17	☆	☆ (*1)		⊙			⊙	⊙		
		Image mask	5-17	☆	☆ (*1)					○	○		
Profile setting	Common head	Wide	5-16	☆☆	☆☆								
		Compression (X-axis)	5-17	☆	★			○	○				
		Compression (time axis)	5-17	☆	★			⊙	○				
		Dead zone process valid/Invalid	5-17	☆	★					○	○		
	Separate for Head A/B	Profile adjustment	5-16	☆☆	☆☆							○	
		Tilt correction	5-17	☆	★							○	
		Height correction	5-17	☆	★							○	
		Smoothing	5-16	☆	☆					○	○		
		Median (X-axis)	5-17	☆	★					⊙	⊙		
		Averaging	5-16	☆	☆		△			○	○		
		Median (time axis)	5-17	☆	★		△			⊙	⊙		
		Invalid data process (time axis)	5-17	☆	★					○	○		
Master profile regist. (*2)			6-5		☆	⊙							

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Measurement program			Reference page	High-speed mode	Advanced function mode	Minimum required settings	Measuring the profile at high speed	Measuring the OUT measurement value at high speed	Accumulating the profile or OUT measurement value	Stabilizing the profile	Stabilizing the OUT measurement value	Correcting the profile or OUT measurement value	Using I/O terminals
Position correction (*2)	Separate for Head A/B	Correction 1 (θ prelm cor./θ Cor./X Cor./ Z Cor./Feature Cor.)	6-13		☆			△			○	○	
		Correction 2 (θ prelm cor./θ Cor./X Cor./ Z Cor./Feature Cor.)	6-13		★			△			○	○	
	Common head	Dual head mode (*3)	6-18		☆☆							○	
Profile mask setting	Separate for Head A/B		6-20		☆			△					
OUT measure set	Measurement	Measure mode	6-33		☆	⊙		△					
		Measurement target	6-33		☆	○					○		
		Measurement area	6-33		☆	○					○		
		Minimum display unit	6-33		☆								
	Process	No. of hold measure val	6-33		☆						○		
		Measure value filter	6-33		☆			△			⊙		
		Scaling setting	6-33		☆							○	
		Offset	6-33		☆							○	
		ZERO reference value	6-33		☆							○	
		Hold mode	6-33		☆	○							
		Measurement period	6-33		☆	○							○
		Tolerance setting	6-33		☆	○							
		ZERO terminal	6-33		☆								○
Term./ Storage		Judgment output	7-4		☆								○
		Analog output	7-4		☆								○
		Storage	7-8		☆								○

☆ : This item can be set.
☆☆ : You can perform this setting only when two heads are connected.
★ : This setting is only available in the advanced setting mode.
⊙○ : Set these items as appropriate for your purpose. Set the ⊙ items first.
△ : The measurement will take more time if you set this item.

*1 : The settings available in the [Standard setting] will vary depending on the selected measurement target.
*2 : When the compression (time axis) is ON, you do not need to set the master profile registration or the position correction.
*3 : The dual head mode cannot be set when [Wide] is ON.

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Function Restrictions Applicable to the Combinations of Settings Items

Function and setting range restrictions applicable to the combinations of measurement program setting items are as shown below.

■ The settings and function restrictions for the operation modes

		Trigger setting	Imaging setting	Profile setting	Master profile registration	Position correction	Profile mask setting	OUT measurement setting	Terminal/ Storage setting
Operation mode	High-speed	Can be set			Cannot be set				
	Advanced function	Can be set							

■ Parallel imaging settings and the roles of terminals

		Role of output terminal block Pin No. 14 (OUT_PIN12/TRG_ERROR)	Role of input terminal block Pin No. 16 (ZERO1/TRG_ERROR_RESET)
Parallel imaging	OFF (Standard)	OUT_PIN12 (Judgement output)	ZERO1 (Auto zero input)
	ON (with trigger limitation)	TRG_ERROR (Imaging trigger error output)	TRG_ERROR_RESET (Clear input for imaging trigger error)

■ The settings and function restrictions for the head installation condition

		Position correction [Dual head mode]	Measurement mode [Thickness measurement]
Head installation condition	Independent	Cannot be set	Cannot be set
	Adjacent/ Same dir.	Can be set	
	Adjacent/ Reverse dir.		
	Facing/ Same dir.		Can be set
	Facing/ Reverse dir.		

■ The settings and function restrictions for the batch measurement

		Measurement mode that can be set	Hold mode that can be set	Measurement period that can be set
Batch measurement	ON	Simple 3D setting Standard setting	Peak Bottom Peak to Peak Average	Measurement area OUT reference Threshold (edge) Threshold (level)
	OFF	Standard setting	Normal Peak hold Bottom hold Peak to Peak hold Average hold	Terminal/Command OUT reference Threshold (edge) Threshold (level)

■ Possible setting ranges for the high-pass/low-pass filters

		Cut-off frequencies that can be set								
		0.1 Hz	0.3 Hz	1.0 Hz	3.0 Hz	10 Hz	30 Hz	100 Hz	300 Hz	1000 Hz
Sampling frequency (Fastest trigger frequency)	64 kHz	○	○	○	○	○	○	○	○	○
	32 kHz	○	○	○	○	○	○	○	○	○
	16 kHz	○	○	○	○	○	○	○	○	○
	8 kHz	○	○	○	○	○	○	○	○	○
	4.13 kHz	○	○	○	○	○	○	○	○	○
	4 kHz	○	○	○	○	○	○	○	○	○
	2 kHz	○	○	○	○	○	○	○	○	○
	1 kHz	○	○	○	○	○	○	○	○	x
	500 Hz	○	○	○	○	○	○	○	x	x
	200 Hz	○	○	○	○	○	○	○	x	x
	100 Hz	○	○	○	○	○	○	x	x	x
	50 Hz	○	○	○	○	○	x	x	x	x
	20 Hz	○	○	○	○	○	x	x	x	x
	10 Hz	○	○	○	○	x	x	x	x	x

Initial Values (Factory Default) and Setting Ranges

Initial values and setting ranges for the environment setting

When you reset all settings of the destination controller to their factory default state, the setting values will be as shown below.
See 🕮 “Resetting the Instrument Settings to their Factory Default States” (Page 4-14) for the procedure for restoring the factory default state.

When you restore the factory default state, the setting values will be as shown below.

Setting	Initial value	Setting range
Device name	LJ-V7001	Up to 16 two-byte (or 32 one-byte) characters
The next power-on operation	BOOTP → fixed IP address	BOOTP → fixed IP address, BOOTP, Fixed IP address
IP address	192.168.0.1	***. ***. ***. ****** is set to a value in the range between 0 and 255. However, 0.0.0.0 and 224.0.0.0 - 255.255.255.255 will be treated as invalid IP addresses.
Subnet mask	255.255.255.0	***. ***. ***. ****** is set to a value in the range between 0 and 255. However, 0.0.0.0, 255.255.255.255, and setting values that do not start with consecutive “1” bits will be treated as invalid subnet masks.
Gateway	192.168.0.254	***. ***. ***. ****** is set to a value in the range between 0 and 255. However, 0.0.0.0 and 224.0.0.0 - 255.255.255.255 will be treated as invalid gateway.
TCP port number (Command send and receive)	24691	1 to 65535
TCP port number (High-speed communication)	24692	1 to 65535
Band limitation at high-speed communication	OFF	OFF, 500Mbps, 200Mbps, 100Mbps
MTU at high-speed communication	1500	1500 to 9216
Baud rate	9600bps	9600bps, 19200bps, 38400bps, 57600bps, 115200bps
Parity	NONE	NONE, EVEN, ODD
Date/Time	-	You can set the date/time as necessary.
Language	English	Japanese/English
ZERO key invalid	Valid	Valid, Invalid

is a special setting of the display monitor/touch panel monitor.

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Initial values and setting ranges for the common measurement setting

Setting			Initial value	Setting range	Reference Page
Operation mode	Operation mode		Advanced function	Advanced function, High-speed	9-6, 9-8
	Parallel imaging*1		OFF (standard)	OFF (standard), ON (with trigger limitation)	9-8
Head details	Head details		(The model of all heads connected to the controller will be displayed.)		9-6, 9-8
	Head install		Unconfigured	Only then the No. of heads is 2, Unconfigured, Independent, Adjacent/Same dir., Adjacent/ Reverse dir., Facing/Same dir., Facing/Reverse dir.	9-6, 9-8
Memory setting	Memory assignment		All area (overwrite)	Double buffer, All area (overwrite), All area (do not overwrite)	9-6, 9-8
	Operation at FULL memory*1		Overwrite	Overwrite, Stop	9-8
Terminal setting	Minimum input time	TRG	100 µs	7 µs, 10 µs, 20 µs, 50 µs, 100 µs, 200 µs, 500 µs, 1 ms	9-6, 9-8
		ENCODER	500 ns	120 ns, 150 ns, 250 ns, 500 ns, 1 µs, 2 µs, 5 µs, 10 µs, 20 µs	9-6, 9-8
		Control terminal	250 µs	250 µs, 1 ms	9-6, 9-8
	Advanced terminal setting*2	Strobe output time	250 µs	10 µs, 20 µs, 50 µs, 100 µs, 250 µs, 500 µs, 1 ms, 2 ms, 5 ms, 10 ms, 20 ms	9-6
Others	Program switch		Command	Terminal, Command	9-6, 9-8

*1 : For the high-speed mode only
*2 : For the advanced function mode only

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Initial values and setting ranges for the imaging setting

Setting			Initial value	Setting range	Reference Page
Trigger setting	Trigger mode		Continuous trigger	Continuous trigger, External trigger, Encoder trigger	5-10
	Samp freq (fast trigg freq)		1 kHz	10Hz, 20Hz, 50Hz, 100Hz, 200Hz, 500Hz, 1kHz, 2kHz, 4kHz, 4.13kHz, 8kHz, 16kHz, 32kHz, 64kHz	5-10
	Input mode		1-phase 1 TM (no dir.)	1-phase 1 TM (no dir.), 2-phase 1 time, 2-phase 2 times, 2-phase 4 times	5-10
	Skipping		OFF	ON, OFF	5-10
	Points of skipping		50	2 to 1000	5-10
	Batch measurement		OFF	ON, OFF	5-10
	Batch point		1,000 points	50 to 15,000 points	5-10
	Pitch between triggers		Not to set	Not to set, Set	5-10
	Pitch		0.1mm	0.001 to 50.000 mm * Can be set in unit of 0.1 mm	5-10
	Mutual interference prevention		OFF	ON, OFF	5-10
Imaging setting	Binning		OFF	ON, OFF	5-17
	Measurement range		FULL (for X and Z directions)	FULL, MIDDLE, SMALL (for X and Z directions)	5-17
	CMOS sensitivity		High dynamic range 3	High precision, High dynamic range 1, High dynamic range 2, High dynamic range 3	5-17
	Exposure time		960 µs	15 µs, 30 µs, 60 µs, 120 µs, 240 µs, 480 µs, 960 µs, 1920 µs, 5 ms, 10 ms	5-17
	Imaging mode		Multi emis. (opt light)	Standard, Multi emis. (synthesis), Multi emis. (opt light)	5-17
	Emission times		2 times	Multi emis. (synthesis) 3 times, 5 times Multi emis. (opt light) 2 times, 4 times	5-17
	Image mask		Not set	Not set, Rectangle, Triangle The area can be set in the imaging range for each head.	5-17
	Control mode		AUTO	AUTO, MANUAL	5-17
	Control range	Upper limit:	99	1 to 99	5-17
		Lower limit:	1	1 to 99	5-17
	Feedback target area		11 to 630	Can be set in the X direction within the measurement range of each head	5-17
	Peak detec. sensitivity		4	1 (Low) - 5 (High)	5-17
	Intrpol pts inval data		64	0 to 255	5-17
	Peak selection		Standard (maximum peak)	Standard (maximum peak), NEAR, FAR, Remove X multiple reflection, Remove Y multiple reflection, Invalidate data	5-17
	Peak width filter		OFF	ON, OFF	5-17

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Setting			Initial value	Setting range	Reference Page
Profile setting	Wide		OFF	ON, OFF	5-28, 5-29
	Compression (X-axis)		OFF	OFF, 2, 4	5-29
	Compression (time axis)		OFF	ON, OFF	5-29
	Time axis compression points		10	2 to 1000	5-29
	Dead zone process valid/Invalid		Valid	Valid, Invalid	5-29
	Tilt correction (Calculated cor. angle)		0 (no cor.)	-45.0° ≤ Settings value ≤ +45.0° (Can be set in units of 0.01°)	5-29
	Height correction (Calculated cor. Span)		1 (no cor.)	0 < Settings value < x 2	5-29
	Inversion		OFF (for X and Z directions)	ON, OFF (for X and Z directions)	5-28, 5-29
	Shift		0 mm (for X and Z directions)	Within the measurement range of each head (in X and Z directions)	5-28, 5-29
	Median (X-axis)		5	OFF, 3, 5, 7, 9	5-29
	Smoothing		8	1, 2, 4, 8, 16, 32, 64	5-28, 5-29
	Median (time axis)		OFF	OFF, 3, 5, 7, 9	5-29
	Invalid data process (time axis)	Processing times	0	0 to 255	5-29
		Resume times	0	0 to 255	5-29
	Averaging		1	1, 2, 4, 8, 16, 32, 64, 128, 256	5-28, 5-29

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Initial values and setting ranges for the master registration

“Register the Master Profile (Master Registration)” (Page 6-4)

Setting	Initial value	Setting range	Reference Page
Head A	(Not registered)		6-5
Head B	(Not registered)		6-5
Wide	(Not registered)		6-5

Initial values and setting ranges for the position correction

“Correcting the Displacement of the Profile (Position Correction)” (Page 6-8)

Setting				Initial value	Setting range	Reference Page
Correction process order setting*				No pos. cor.	No pos. cor., θ prelim. cor., θ cor., X cor., Z cor., Feat. pt. cor.	6-13
Position correction*	θ prelim cor.	Edge measuring area	Left	-2.500 mm	Can be set in the X direction within the measurement range of each head	6-13
			Right	2.500 mm	Can be set in the X direction within the measurement range of each head	6-13
			Edge level	0.000 mm		6-13
		Edge measurement detail	Edge dir.	Rising	Rising, Falling	6-13
			Detect dir.	+ direction	+ direction, - direction	6-13
			Detect No.	1st	1st to 10th	6-13
	θ Cor.	Line calculation area 1	Left	-10.000 mm	Can be set in the X direction within the measurement range of each head	6-13
			Right	5.000 mm	Can be set in the X direction within the measurement range of each head	6-13
		Line calculation area 2	Area 2 valid	Invalid	Valid, Invalid	6-13
			Left	5.000 mm	Can be set in the X direction within the measurement range of each head	6-13
			Right	10.000 mm	Can be set in the X direction within the measurement range of each head	6-13
		Cor. standard		Horizontal	Horizontal, Master profile	6-13
	X Cor.	Edge measuring area	Left	-2.500 mm	Can be set in the X direction within the measurement range of each head	6-13
			Right	2.500 mm	Can be set in the X direction within the measurement range of each head	6-13
			Edge level	0.000 mm		6-13
		Edge measurement detail	Edge dir.	Rising	Rising, Falling	6-13
			Detect dir.	+ direction	+ direction, - direction	6-13
			Detect No.	1st	1st to 10th	6-13
	Z Cor.	Height measuring area	Left	-2.500 mm	Can be set in the X direction within the measurement range of each head	6-13
			Right	2.500 mm	Can be set in the X direction within the measurement range of each head	6-13
		Height measurement detail	Hgt. type	Average	Peak, Bottom, Average	6-13

Setting						Initial value	Setting range	Reference Page
Position correction	Feature cor.	Feature pt				Peak point	Peak point, Bottom point, Knee, Intsec (lines), Contact (lin-arc)	6-13
		Peak		Peak calculation area	Left	-2.500 mm	Can be set in the X direction within the measurement range of each head	6-13
					Right	2.500 mm	Can be set in the X direction within the measurement range of each head	6-13
		Bottom		Bottom calculation area	Left	-2.500 mm	Can be set in the X direction within the measurement range of each head	6-13
					Right	2.500 mm	Can be set in the X direction within the measurement range of each head	6-13
		Knee		Knee calculation area	Left	-2.500 mm	Can be set in the X direction within the measurement range of each head	6-13
					Right	2.500 mm	Can be set in the X direction within the measurement range of each head	6-13
				Knee calculation detail	Sensitivity	20	20 to 100	6-13
					Knee shape	Peak	Peak, Valley	6-13
					Detect dir.	+ direction	+ direction, - direction	6-13
					Detect No.	1st	1st to 10th	6-13
		Intsec (lines)	Proximate line 1 setting	Line calculation area 1	Left	-2.500 mm	Can be set in the X direction within the measurement range of each head	6-13
					Right	2.500 mm	Can be set in the X direction within the measurement range of each head	6-13
				Line calculation area 2	Area 2 valid	Invalid	Valid, Invalid	6-13
					Left	-2.500 mm	Can be set in the X direction within the measurement range of each head	6-13
					Right	2.500 mm	Can be set in the X direction within the measurement range of each head	6-13
			Proximate line 2 setting	Line calculation area 1	Left	-2.500 mm	Can be set in the X direction within the measurement range of each head	6-13
					Right	2.500 mm	Can be set in the X direction within the measurement range of each head	6-13
				Line calculation area 2	Area 2 valid	Invalid	Valid, Invalid	6-13
					Left	-2.500 mm	Can be set in the X direction within the measurement range of each head	6-13
					Right	2.500 mm	Can be set in the X direction within the measurement range of each head	6-13
		Contact (lin-arc)	Proximate line 1 setting	Line calculation area 1	Left	-2.500 mm	Can be set in the X direction within the measurement range of each head	6-13
					Right	2.500 mm	Can be set in the X direction within the measurement range of each head	6-13
				Line calculation area 2	Area 2 valid	Invalid	Valid, Invalid	6-13
					Left	-2.500 mm	Can be set in the X direction within the measurement range of each head	6-13
					Right	2.500 mm	Can be set in the X direction within the measurement range of each head	6-13

Setting						Initial value	Setting range	Reference Page
Position correction	Feature cor.	Contact (lin-arc)	Proximity arc setting	Arc calculation area 1	Far left	-2.500 mm	Can be set in the X direction within the measurement range of each head	6-13
					Far right	2.500 mm	Can be set in the X direction within the measurement range of each head	6-13
				Arc calculation area 2	Area 2 valid	Invalid	Valid, Invalid	6-13
					Far left	-2.500 mm	Can be set in the X direction within the measurement range of each head	6-13
					Far right	2.500 mm	Can be set in the X direction within the measurement range of each head	6-13
Dual head mode		Dual head mode				Invalid	Valid, Invalid	6-18
					X Misalign	0.0 mm	-10000.0 mm to +10000.0 mm	6-18
					Z Misalign	0.0 mm	-10000.0 mm to +10000.0 mm	6-18

* : If two heads are connected, it can be set separately for Head A and Head B (except when [Wide] is used).

Initial values and setting ranges for the profile mask

“Masking the Unnecessary Parts of the Profile (Profile Mask)” (Page 6-20)

Setting				Initial value	Setting range	Reference Page
Mask area				(Unconfigured)	(Unconfigured), Area 1 to Area 5	6-20
	Shape			(Unconfigured)	(Unconfigured), Rectangle, Triangle	6-20
	Rectangle	Area setting	Upper left X coordinate	-	Can be set within the measurement range of each head	6-20
			Upper left Z coordinate	-	Can be set within the measurement range of each head	6-20
			Lower right X coordinate	-	Can be set within the measurement range of each head	6-20
			Lower right Z coordinate	-	Can be set within the measurement range of each head	6-20
	Triangle	Area setting	1st point X coordinate	-	Can be set within the measurement range of each head	6-20
			1st point Z coordinate	-	Can be set within the measurement range of each head	6-20
			2nd point X coordinate	-	Can be set within the measurement range of each head	6-20
			2nd point Z coordinate	-	Can be set within the measurement range of each head	6-20
			3rd point X coordinate	-	Can be set within the measurement range of each head	6-20
			3rd point Z coordinate	-	Can be set within the measurement range of each head	6-20
Pos. cor. select				Pos. cor. 1	No pos. cor., Pos. cor. 1, Pos. cor. 2	6-20

Initial values and setting ranges for the OUT measurement setting

“Setting the Measurement (OUT Measurement Setting)” (Page 6-22)

Setting		Initial value	Setting range	Reference Page
Measurement setting	Measure mode	Not to measure	Height, Step, Position, Center position, Width, Angle (Angle for horizon), Angle (Angle between lines), Radius measurement, Cross-Sectional area (Ref for 1 line), Cross-Sectional area (Ref for 2 line), Cross-Sectional area (Master reference), Master comparison (Z), Distance (point - point), Distance (point - line), Thickness, Height (simple 3D set), Step (simple 3D set), Position (simple 3D set), Deflection, Calculation, Not to measure	6-34
	Measurement mode detail	-	Depends on the measurement mode and measurement target settings	6-34
	Minimum display unit	-	Depends on the measurement mode and measurement target settings	6-34

Setting				Initial value	Setting range	Reference Page
Process setting	Measurement process Set	No. of hold measure val		0	0 to 999	6-76
		Measure value filter		OFF	Moving average, Low-pass filter, High-pass filter, OFF	6-76
			Averaging times	16	1, 4, 16, 64, 256, 1024, 4096	6-76
			Cutoff frequency	100 Hz	1000 Hz, 300 Hz, 100 Hz, 30 Hz, 10 Hz, 3 Hz, 1 Hz, 0.3 Hz, 0.1 Hz	6-76
		Scaling setting		-	Depends on the unit system of the measurement value	6-76
		Offset		0	Display range of the selected OUT	6-76
		ZERO reference value		0	Display range of the selected OUT	6-76
		Hold mode		[Batch measurement OFF] Normal [Batch measurement ON] Peak	[Batch measurement OFF] Normal, Peak hold, Bottom hold, Peak to Peak hold, Average hold, Sample hold [Batch measurement ON] Peak, Bottom, Peak to Peak, Average	6-76
		Measurement period		[Batch measurement OFF] Terminal/Command [Batch measurement ON] Measurement area	Terminal/Command (* Batch measurement OFF only), Measurement area (*Batch measurement ON only), OUT reference, Threshold (level), Threshold (edge)	6-76
	Tolerance setting	Upper limit		-	Display range of the selected OUT	6-76
		Lower limit		-	Display range of the selected OUT	6-76
		Hysteresis		0	Display range of the selected OUT	6-76
	Terminal assignment	ZERO terminal		ZERO1	None, ZERO1, ZERO2	6-76
		TIMING/RESET terminal		TIMING1/RESET1	None, TIMING1/RESET1, TIMING2/RESET2	6-76

Initial values and setting ranges for the terminal output setting

Setting	Initial value	Setting range	Reference Page
Judgment output OUT_PINx (x is from 1 to 12)	No setting	AND/OR can be specified for each OUT_PINx terminal based on the OUT1 - OUT16 judgement result.	7-4
Analog output Target OUT	None	None, OUT1 to OUT16	7-4
OUT display value 1	Depends on the setting of the allocated OUT*1	Depends on the setting of the allocated OUT*1	7-4
OUT display value 2			7-4
Output voltage 1	-10.0 V	-10.5 to +10.5 V * Can be set in units of 0.1 V	7-4
Output voltage 2	+10.0 V		7-4

*1 : See the table below for the setting ranges and initial values of [OUT display value 1] and [OUT display value 2].

Unit system	Setting	Setting range	Initial value
Length (mm)	OUT measurement value 1	- 999.999 mm to +999.999 mm	-10.000 mm
	OUT measurement value 2		+ 10.000 mm
Area (mm^2)	OUT measurement value 1	-9999.99 mm^2 to +9999.99 mm^2	-100.00 mm^2
	OUT measurement value 2		+ 100.00 mm^2
Angle	OUT measurement value 1	- 9999.99 deg to +9999.99 deg	-100.00 deg
	OUT measurement value 2		+ 100.00 deg

Initial values and setting ranges for the storage setting

■ Batch measurement OFF

Setting		Initial value	Setting range	Reference Page
Storage target		OFF	OFF, OUT data, Profile	7-8
Storage condition		Terminal/Command	Terminal/Command, OUT data (edge), OUT data (level)	7-8
Terminal/ Command Details	Number of storage data	Upper memory size limit	1 to upper memory size limit	7-8
OUT data (edge) detail	Number of storage data	Upper memory size limit	1 to upper memory size limit	7-8
	Target OUT	OUT1	OUT1 to 16	7-8
	Edge threshold value	0	Display range of the selected OUT	7-8
	Hysteresis	0	Display range of the selected OUT	7-8
	Edge dir.	Rising	Rising, Falling	7-8
OUT data (level) detail	Target OUT	OUT1	OUT1 to 16	7-8
	Upper limit	Depends on the setting of the allocated OUT*1	Display range of the selected OUT	7-8
	Lower limit	Depends on the setting of the allocated OUT*1	Display range of the selected OUT	7-8

*1 : See the table below for the initial values.

Unit system	Setting	Initial value
Length (mm)	Upper limit	+5.000 mm
	Lower limit	-5.000 mm
Area (mm^2)	Upper limit	+5.00 mm^2
	Lower limit	-5.00 mm^2
Angle	Upper limit	+ 10.00 deg
	Lower limit	-10.00 deg

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■ Batch measurement ON

Setting		Initial value	Setting range	Reference Page
Storage target		OFF	OFF, OUT data, Profile	7-8
Storage condition		Terminal/Command	Terminal/Command, OUT data (level)	7-8
Terminal/ Command details	Number of storage data	Upper memory size limit	1 to upper memory size limit	7-8
OUT data (level) detail	Target OUT	OUT1	OUT1 to 16	7-8
	Upper limit	Depends on the setting of the allocated OUT*1	Display range of the selected OUT	7-8
	Lower limit	Depends on the setting of the allocated OUT*1	Display range of the selected OUT	7-8

*1 : See the table on the previous page.

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