

# Image Dimension Measuring System

## IM-8000

### User's Manual

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



1	Getting Started
2	Installing the IM-8000
3	Basic Operation
4	Program
5	Integrate Multi Programs
6	Run
7	Statistics/Analysis
8	Single Measurement
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12	Optional Settings and Security Settings
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# Introduction

**Read this manual before using the product in order to achieve maximum performance.**

**Keep this manual in a safe place after reading it so that it can be used at any time.**

## Symbols

The following symbols alert you to important messages.

Be sure to read these messages carefully.

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



Indicates cautions and limitations that must be followed during operation.



Indicates additional information on proper operation.



Indicates tips for better understanding or useful information.



Indicates the reference pages in this manual or the reference pages in separate manuals.

## Cautions

- (1) Unauthorized reproduction of this manual in whole or part is prohibited.
- (2) The contents of this manual may be changed for improvements without prior notice.
- (3) An utmost effort has been made to ensure the contents of this manual are as complete as possible. If there are any mistakes or questions, please contact a KEYENCE office listed in the back of the manual.
- (4) Regardless of item (3), KEYENCE will not be liable for any effect resulting from the use of this unit.
- (5) Any manuals with missing pages or other paging faults will be replaced.

# Safety Information for IM-8000 Series

## General Precautions

 DANGER	<ul style="list-style-type: none"> <li>Do not use this product for the purpose to protect a human body or a part of human body.</li> <li>Do not use this product in a hazardous location and/or potentially explosive atmosphere.</li> <li>Do not use this product in an application that may cause death, serious injury or serious property damage due to a failure with this product should occur, such as nuclear power plants, on aircraft, trains, ships, or vehicles, used within medical equipment, playground equipment, roller coasters and other rides, etc.</li> </ul>
 WARNING	<ul style="list-style-type: none"> <li>If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.</li> <li>You must perform a sufficient risk assessment for the machine where this product is to be installed prior to installing this product. Provide appropriate protective fail-safe measures on the machine independent from this product in case a failure with this product should occur.</li> </ul>
 CAUTION	<p>You must verify that the IM-8000 are operating correctly in terms of functionality and performance before the start and the operation of the IM-8000.</p>
 NOTICE	<ul style="list-style-type: none"> <li>KEYENCE never warrant the function or performance of the IM-8000 if it is used in manner that differs from the IM-8000 specifications contained in this instruction manual or if the IM-8000 are modified by yourself.</li> <li>When the IM-8000 is used in combination with other instruments, functions and performance may be degraded, depending on operating conditions and the surrounding environment.</li> </ul>

## Trademarks

The company names and product names used in this manual are registered trademarks or the trademarks of their respective companies.

## Safety Precautions on LED products

The degree of risk of this product is shown below.

Light source	Risk Group*
Back light	Exempted Group
Ring light	Exempted Group
Multi-angle light	Exempted Group
Slit ring light	Risk Group 1

\* LED product is classified as shown below according to IEC 62471.

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>Exempted Group</li> <li>Risk Group 1 (Low Risk)</li> <li>Risk Group 2 (Medium Risk)</li> <li>Risk Group 3 (High Risk)</li> </ul> | <ul style="list-style-type: none"> <li>Does not pose any photobiological hazard.</li> <li>Does not pose a hazard due to normal behavioral limitations on exposure.</li> <li>Does not pose a hazard due to the aversion response to very bright light sources or due to thermal discomfort.</li> <li>May pose a hazard even for momentary or brief exposure.</li> </ul> |
|---|--|

# Important Instructions

Observe the following precautions to prevent malfunction of the IM-8000 Series and to ensure that it is used properly.

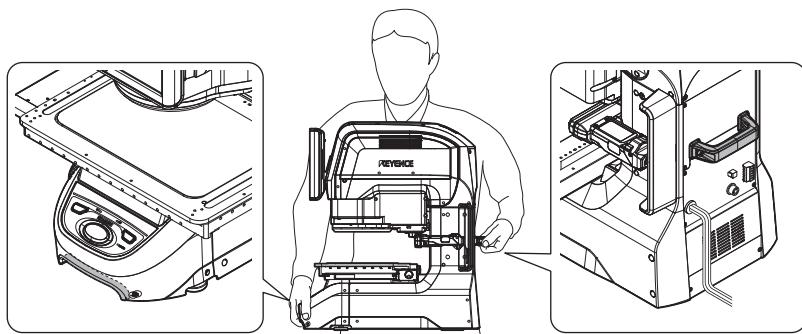
## Precautions on use



- Be sure to turn off the main power before connecting the cable or performing maintenance on it. Failure to do this may cause electric shock.
- Do not forcefully bend or place heavy objects on the AC power cord set. This may damage the cable, causing fire or electric shock. Do not use a damaged cord set.
- The power supply cord set is not provided with the IM-8000. Use the cord set, which complies with the regulations and standards in the country or region in which IM-8000 is to be used.
- Do not mix foreign matters into the internal side of this product, such as metal chips, dust, paper or wood. Failure to do this may cause fire, electric shock, malfunction or accidents.
- Never remove the case cover. Do not touch the inside by your hands. Failure to do this may cause electric shock.
- Do not disassemble, remodel or repair the IM-8000. Failure to do this may cause fire, electric shock or malfunction.



- Do not put your hand between the stage. You may have your hand caught between them and get injured.
- Do not put your hand between the stage and the variable illumination unit. You may have your hand caught between them and get injured.
- Do not touch the rotation unit and the measurement target while the device is in operation. You may get injured.
- When carrying the head, disconnect the cables from the controller and hold the base and the handle on the rear. Otherwise, injury to the human body may result when the IM-8000 falls. Holding other sections when carrying the head may cause product damage.



<span style="background-color: #0070C0; color: white; padding: 2px 5px; font-weight: bold;">NOTICE</span>	<ul style="list-style-type: none"> <li>• Use the IM-8000 in the correct supply voltage. Otherwise, the IM-8000 may be damaged.</li> <li>• Do not wipe the IM-8000 with thinner or organic solvent. Doing so may damage the IM-8000. If the IM-8000 has any dirt on it, wipe it with lens paper or a dry cloth.</li> <li>• Do not step on the IM-8000. Doing so may damage the IM-8000.</li> <li>• Do not place any object on the IM-8000. Otherwise, the IM-8000 may be damaged.</li> <li>• Before connecting or disconnecting the AC power cord set, be sure to turn off the main power. Otherwise, the IM-8000 may be damaged.</li> <li>• The IM-8000 uses precise optical components, do not apply vibration or shock. Doing so may damage the IM-8000.</li> <li>• Do not remove the case cover of the IM-8000 or remodel the IM-8000.</li> <li>• Do not place an object heavier than 5 kg on the stage of IM-8005/8020. Do not place an object heavier than 7.5 kg on the stage of IM-8030/8030T. Doing so may damage the IM-8000.</li> <li>• Do not place a measurement target on any section other than the stage glass surface of IM-8020/8030/8030T. Otherwise, the IM-8000 may be damaged.</li> <li>• Do not turn off the power during measurement. Otherwise, all or part of the setting data may be lost. Before turning off the power, be sure to return to the main menu screen.</li> <li>• Remove the stage glass before carrying the head.</li> <li>• The light probe is a precision component. Do not touch it with your hands. Doing so may damage the IM-8000.</li> </ul>
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- Point
- The IM-8000 uses a hard disk drive (HDD) to store data. If the HDD fails, the data stored in the HDD may be lost. Make a backup of data in the HDD periodically. We recommend that important data be backed up immediately.
  - During measurement, keep the ambient temperature constant.
  - After turning on the power, a warm-up time of 30 minutes or more is required before starting measurement.
  - If the lens has any dirt on it, blow it off with a blower for lenses or gently wipe off dirt with lens paper moistened with commercially available lens cleaner.
  - If the light probe has any dirt on it, blow it off with a blower for lenses.

## Measures to be taken when an abnormality occurs



In the following cases, remove the AC power cable from the appliance inlet immediately. Using the IM-8000 in an abnormal condition could cause fire, electric shock, or malfunction. Contact our office for repair.

- If water or debris enters the IM-8000.
- If the IM-8000 is dropped or the case is damaged.
- If abnormal smoke or odor emanates from the IM-8000.



At the time of repair, the data stored in the hard disk drive (HDD) cannot be guaranteed. Before sending the IM-8000 for repair, make a back up of the data.

## Precautions on installation

 <b>WARNING</b>	IM-8000 is designed as a Class I equipment. Be sure to connect the protective earthing terminal on the AC power cable to the protective earthing conductor in the building installation. Otherwise, it may cause electric shock or product damage.
 <b>CAUTION</b>	Do not touch the tip of the stylus. You may get injured.
<b>NOTICE</b>	<ul style="list-style-type: none"><li>• Install the IM-8000 on a horizontal surface.</li><li>• Do not install the IM-8000 to the landscape orientation. Otherwise, the IM-8000 may be damaged.</li><li>• Do not block the ventilation slots or the ventilation fans of the IM-8000. Blocking the ventilation slots or ventilation fans may cause heat to build up inside the IM-8000, resulting in product damage.</li><li>• Avoid installing the IM-8000 in the following locations. Otherwise, the IM-8000 may be damaged.<ul style="list-style-type: none"><li>• Locations where a vibration or a mechanical shock is directly applied</li><li>• Locations where the ambient temperature is out of the range of +10 to 35 degrees Celsius</li><li>• Locations where the ambient humidity is out of the range of 20% to 80% RH (no condensation)</li><li>• Locations where sudden temperature change occurs</li><li>• Locations where the IM-8000 is directly exposed to wind from an air conditioner, etc.</li><li>• Locations where volatile flammable material or corrosive gas exists</li><li>• Locations where a lot of dust, salt, iron, or oil smoke exists</li><li>• Locations where water, oil, or chemicals are sprayed</li><li>• Locations where strong magnetic or electric fields are generated</li><li>• Location where there is a large fluctuation of power supply voltage</li></ul></li><li>• After installing IM-8005, remove the stopper installed on the Z axis.</li><li>• After installing IM-8020/8030, remove the stopper installed on the right front side of the electric XY stage, Z axis and light probe. Keep the removed stopper in a safe place for the time of transportation.</li><li>• After installing IM-8030T, remove the fixtures attached on the right front side of the electric XY stage, Z axis, light probe, and the height probe. Keep the removed stopper in a safe place to reinstall if you will ever need to transport the system.</li></ul>

## Precautions on storage

## NOTICE

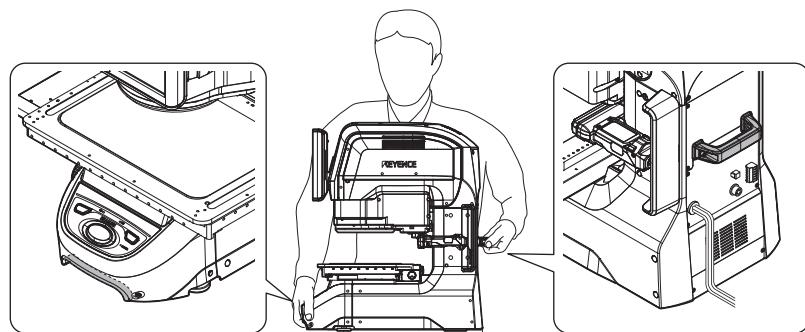
Avoid storing the IM-8000 in the following locations.

- Locations where the ambient temperature is out of the range of +10 to 35 degrees Celsius
- Locations where the ambient humidity is out of the range of 20% to 80% RH (no condensation)
- Locations where sudden temperature change occurs
- Locations where the IM-8000 may be exposed to the sunlight, wind, or rain directly
- Near volatile flammable material or corrosive chemicals
- Locations where water, oil, or chemicals are sprayed
- Unstable locations where the IM-8000 may fall

## Precautions on transportation

## CAUTION

When carrying the head, disconnect the cables from the controller and hold the base and the handle on the rear. Otherwise, injury to the human body may result when the IM-8000 falls. Holding other sections when carrying the head may cause product damage.



## NOTICE

- If the cable must be disconnected for transportation, be sure to turn off the main power.
- The IM-8000 uses precise optical components, do not apply vibration or shock. Doing so may damage the IM-8000.
- Be sure to remove the stage glass before transportation. Not doing so may damage the IM-8000.
- During transportation, be sure to use the packing material specified by Keyence and to pack the product in the same way as the time of delivery. Not doing so may damage the IM-8000.
- When transporting (carrying) IM-8005, install the stopper on the Z axis.
- When transporting (carrying) IM-8020/8030, install the stopper on the right front side of the electric XY stage, Z axis and light probe.
- When transporting or carrying the IM-8030T, install the fixture (stopper) on the right front side of the electric XY stage, Z axis, light probe, and height probe.

# Precautions on Regulations and Standards

## Controller/Head/Rotation unit

### CE and UKCA Marking

Keyence Corporation has confirmed that the IM-8000 complies with the essential requirements of the applicable EU Directive(s) and UK regulations, based on the following specifications.

Be sure to consider the following specifications when using the IM-8000 in the Member States of European Union and United Kingdom.

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

- Applicable standard EMI : (BS) EN61326-1, Class A  
EMS : (BS) EN61326-1
- Use the shield-type cable for the LAN cable.
- The length of cable (power lead and I/O leads) must be less than or equal to 30 m.
- This product is intended to be used in an industrial electromagnetic environment.

Remarks:

These specifications do not give any guarantee that the end-product with the IM-8000 incorporated complies with the essential requirements of EMC Directive and Electromagnetic Compatibility Regulations. The manufacturer of the end-product is solely responsible for the compliance on the end-product itself according to EMC Directive and Electromagnetic Compatibility Regulations.

#### ● Machinery Directive (CE) and Supply of Machinery (Safety) Regulations (UKCA)

- Applicable Standard: (BS) EN ISO12100  
(BS) EN61010-1  
(BS) EN IEC 61010-2-120  
(BS) EN62471
- Overvoltage category II
- Use this product under pollution degree 2.
- Use this product at the altitude of 2000 m or less.
- Indoor use only.
- IM-8000 is designed as a Class I equipment. Be sure to connect the protective earthing terminal on the AC power cable to the protective earthing conductor in the building installation.
- The Appliance inlet is designed as a disconnecting device. Install the IM-8000 so that the AC power cable can be removed immediately from the appliance inlet when an abnormality occurs.

## CSA Certificate

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

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

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

- Overvoltage category II
- Use this product under pollution degree 2.
- Use this product at the altitude of 2000 m or less.
- Indoor use only.
- IM-8000 is designed as a Class I equipment. Be sure to connect the protective earthing terminal on the AC power cable to the protective earthing conductor in the building installation.
- The Appliance inlet is designed as a disconnecting device. Install the IM-8000 so that the AC power cable can be removed immediately from the appliance inlet when an abnormality occurs.

## Best Management Practice for Perchlorate Materials - California only

This product uses components containing perchlorate material.

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

"Perchlorate Material – special handling may apply, See [www.dtsc.ca.gov/hazardouswaste/perchlorate](http://www.dtsc.ca.gov/hazardouswaste/perchlorate)."

## North American Regulations

This product complies with the following North American regulations.

- Applicable regulation    FCC Part15 Subpart B, Class A Digital Device  
ICES-003, Class A Digital Apparatus

Note:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

- FCC CAUTION

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

## Hardware Key

### CE and UKCA Marking

Keyence Corporation has confirmed that the hardware key complies with the essential requirements of the applicable EU Directive(s) and UK regulations, based on the following specifications.

Be sure to consider the following specifications when using the hardware key in the Member States of European Union and United Kingdom.

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

- Applicable standard    EMI    : (BS) EN 55032 :2015  
EMS    : (BS) EN 55035 :2017

Remarks:

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

# Software License Agreement

NOTICE TO USER: PLEASE READ THIS SOFTWARE LICENSE AGREEMENT (THIS "AGREEMENT") CAREFULLY. BY USING ALL OR ANY PORTION OF THE [IM Statistics Viewer 3] (THIS "SOFTWARE"), YOU ARE AGREEING TO BE BOUND BY ALL THE TERMS AND CONDITIONS OF THIS AGREEMENT. IF YOU DO NOT AGREE TO ANY TERMS OF THIS AGREEMENT, DO NOT USE THIS SOFTWARE.

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- 7.1 This Agreement will be governed by and construed in accordance with the substantive laws of Japan without regards to the principles of conflicts of law.
- 7.2 If any part of this Agreement is found void and unenforceable, it will not affect the validity of the balance of this Agreement, which shall remain valid and enforceable according to its terms and conditions.

# Software information

This product incorporates the software files developed independently by or for Keyence Corporation, software files owned and licensed by a third party, and software files subject to certain open source license agreements.

- For the target software components of the open source, refer to the license information displayed by selecting “About Head controller” from the “Help” menu.
- Such open source software files are provided on an “AS IS” basis to the maximum extent permitted by applicable law.
- If there is any discrepancy between the terms and conditions of the applicable open source license agreement and the “License”, the terms and conditions of the applicable open source license agreement prevail with respect to the applicable open source software.
- You may obtain a copy of the source code corresponding to the binaries for GPL/LGPL-licensed file by refer to the contents of the license information mentioned above.

## **MEMO**

# Structure of This Manual

<b>1</b>	<b>Getting Started</b>	This chapter explains the contents of the package and the names and functions of individual parts.
<b>2</b>	<b>Installing the IM-8000</b>	This chapter explains the installation and connection of the IM-8000 Series.
<b>3</b>	<b>Basic Operation</b>	This chapter explains the basic usage of the IM-8000 Series and its operation flow.
<b>4</b>	<b>Program</b>	This chapter explains the operation procedures and functions of the [Program] mode.
<b>5</b>	<b>Integrate Multi Programs</b>	This chapter explains the operation procedures and functions of the [Integrate Multi Programs] mode.
<b>6</b>	<b>Run</b>	This chapter explains the operation procedures and functions of the [Run] mode.
<b>7</b>	<b>Statistics/Analysis</b>	This chapter explains the procedures of the statistics/analysis functions using the results of the multi measurement.
<b>8</b>	<b>Single Measurement</b>	This chapter explains the operation procedures and functions of the [Single Measurement] mode.
<b>9</b>	<b>Automatic Measurement</b>	This chapter explains the operation procedures and functions of the [Automatic Measuring] mode.
<b>10</b>	<b>Menu</b>	This chapter explains the functions of the menu bar.
<b>11</b>	<b>PC Connection</b>	This chapter explains how to connect the IM-8000 Series to a personal computer.
<b>12</b>	<b>Optional Settings and Security Settings</b>	This chapter explains the setting details and functions of [Optional Settings] and [Security Settings].
<b>A</b>	<b>Appendices</b>	

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# 1

## Getting Started

This chapter explains the contents of the package and the names and functions of individual parts.

1

Getting Started

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# Checking the Package

## List of packed items

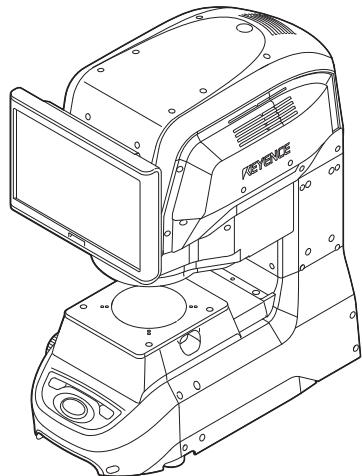
1

Getting Started

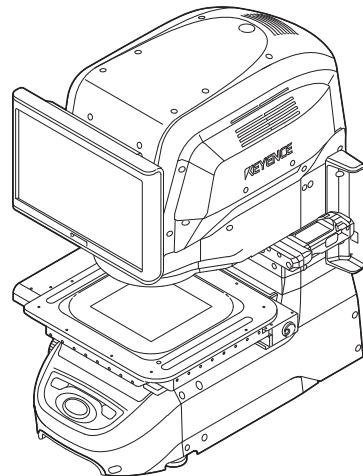
Take out the IM-8000 from the package and check that the following items are included. Keyence ships each package with the utmost care and attention. Should there be any missing or damaged items, contact your Keyence representative.

### ■ IM-8005/8020/8030/8030T (Head)

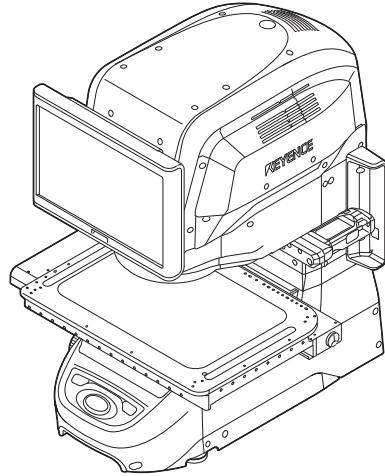
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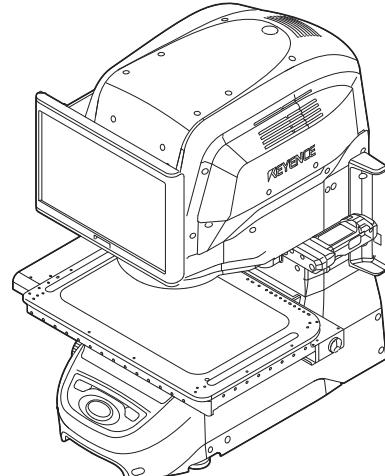
&lt;IM-8020&gt;



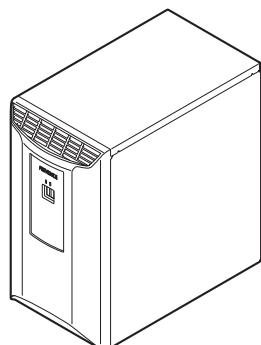
&lt;IM-8030&gt;



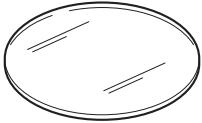
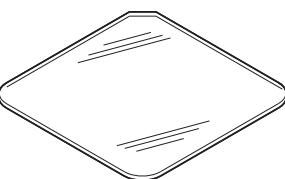
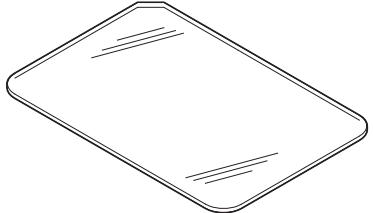
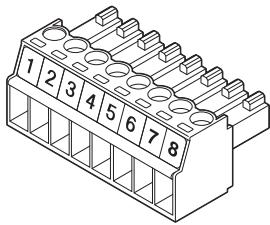
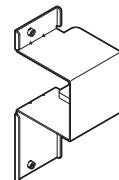
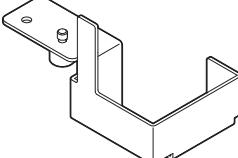
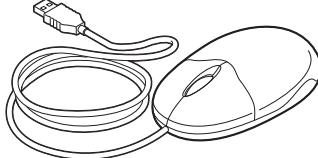
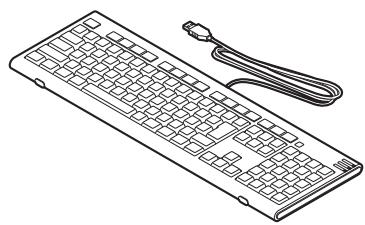
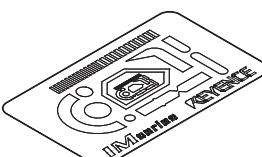
&lt;IM-8030T&gt;



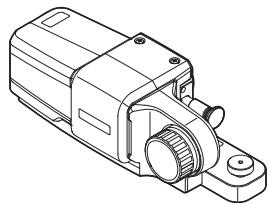
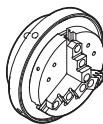
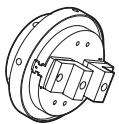
### ■ IM-8000 (Controller)



## ■ Accessories

- |  |   |   |
|--|---|---|
| <input type="checkbox"/> Stage glass<br>(supplied with the IM-8005) .....  | <input type="checkbox"/> Stage glass<br>(supplied with the IM-8020) .....           | <input type="checkbox"/> Stage glass<br>(supplied with the IM-8030/8030T) .....       |
|   |    |    |
| <input type="checkbox"/> Connector for tolerance evaluation output. .1<br>* Attached to the IM-8005/8020/8030/8030T<br>within the package. | <input type="checkbox"/> Electric XY stage stopper .....                            | <input type="checkbox"/> Stopper for light probe unit .....                           |
|   |    |    |
| <input type="checkbox"/> Stopper for contact height measurement unit. .1<br>* Enclosed when being fixed on the IM-<br>8030T                | <input type="checkbox"/> Stylus (supplied with the IM-8030T) .....                  | <input type="checkbox"/> Mouse with a scroll wheel 1                                  |
|   |  |  |
| <input type="checkbox"/> Keyboard .....  | <input type="checkbox"/> Training stencil 1   | <input type="checkbox"/> Hexagon wrench .....   |
|   |  |   |
| <input type="checkbox"/> IM-8000 User's Manual<br>(this manual) .....  | <input type="checkbox"/> IM-8000 Series Operation Guide .....                       |   |

## ■ IM-RU1 rotation unit (optional accessories)

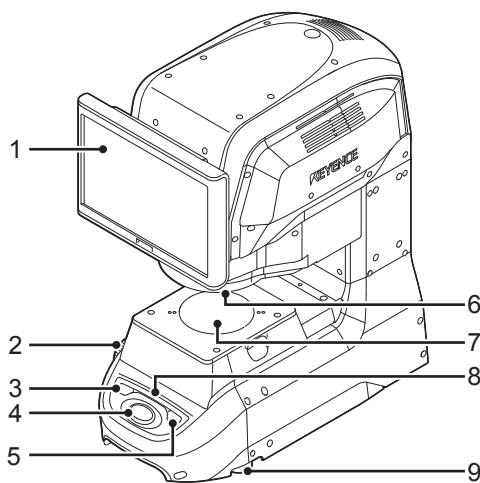
- |   |   |   |
|---|---|---|
| <input type="checkbox"/> IM-RU1 .....   | <input type="checkbox"/> 3-jaw power chuck.....                                     | <input type="checkbox"/> 2-jaw power chuck.....                                       |
|  |  |  |
| <input type="checkbox"/> USB cable .....  | <input type="checkbox"/> Target for measurement practice.....                       | <input type="checkbox"/> Hexagon wrench .....   |

# System Configuration

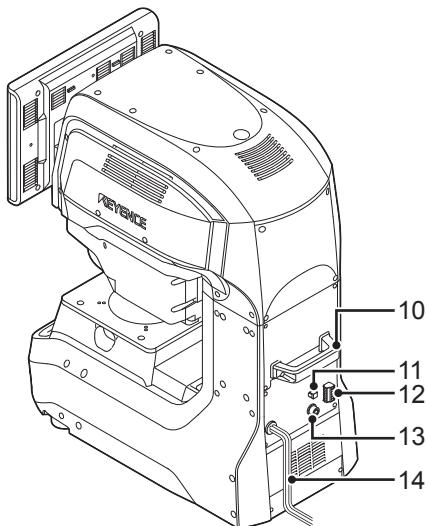
## Names of parts

### ■ Head (IM-8005)

#### [Front view]



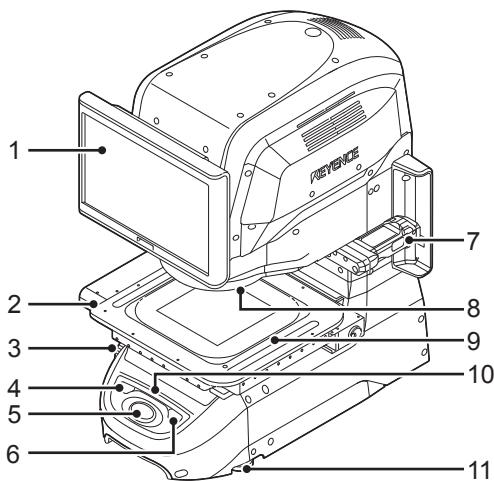
#### [Rear view]



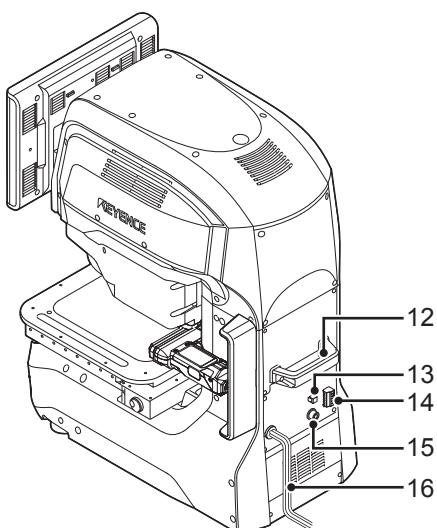
- 1 **LCD monitor**  
12.1" WXGA (1280 x 800 pixel) LCD monitor.  
The angle can be adjusted within the range of 12 degrees downwards and 15 degrees upwards.
- 2 **Z stage up/down handle**  
Used to adjust the position of the Z stage.  
It can move 75 mm upwards from the -5mm position.
- 3 **PRINT button**  
Used to perform printing.
- 4 **MEASURE button**  
Used to start measurement.
- 5 **POWER button**  
Used to power ON the controller and head.
- 6 **Ring light**  
An epi-illumination unit that illuminates the target obliquely downward.
- 7 **Stage glass**  
The plate on which the target is to be placed
- 8 **Indicator LED**  
Displays the result of a tolerance evaluation.  
There are two lamps: OK lamp and NG lamp.
- 9 **Adjuster**  
Adjusts the height of head.
- 10 **Handle**  
Used to carry the head.
- 11 **LIGHT connector**  
Used to connect the connector for exterior lights (LED light).
- 12 **Connector for tolerance evaluation output**  
Used to connect a cable to output the evaluation result (OK, NG, Fail) and measuring status (MEAS.) to an external unit such as an indicator lamp.
- 13 **REMOTE connector**  
Used to connect the REMOTE connector to perform remote operation for measurement.
- 14 **Connection cable**  
A cable to connect to the controller.

## ■ Head (IM-8020)

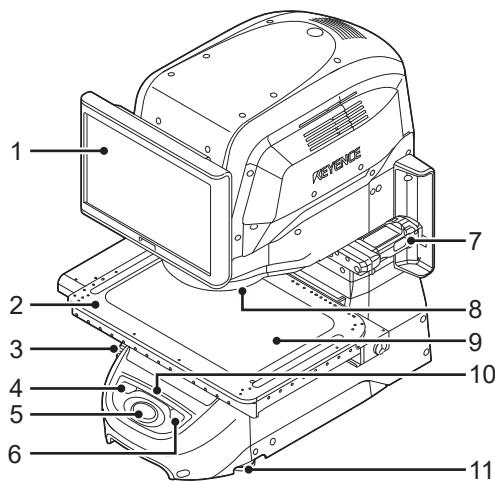
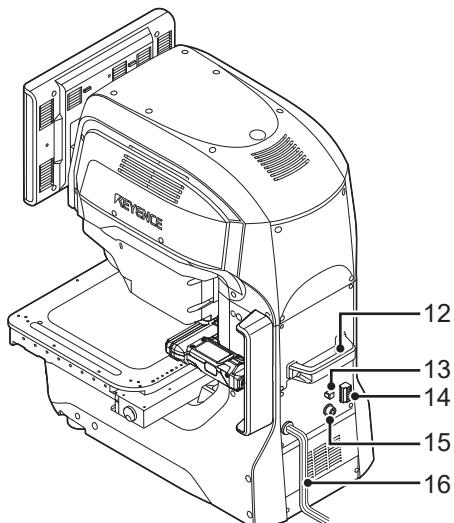
### [Front view]



### [Rear view]



- 1 **LCD monitor**  
12.1" WXGA (1280 x 800 pixel) LCD monitor.  
The angle can be adjusted within the range of 12 degrees downwards and 15 degrees upwards.
- 2 **Electric XY stage**  
Moves left and right and around.
- 3 **Z stage up/down handle**  
Used to adjust the position of the Z stage.  
It can move 75 mm upwards from the -5mm position.
- 4 **PRINT button**  
Used to perform printing.
- 5 **MEASURE button**  
Used to start measurement.
- 6 **POWER button**  
Used to power ON the controller and head.
- 7 **Light probe unit**  
This is a probe which emits light for light probe measurement.
- 8 **Variable illumination unit**  
An epi-illumination unit that illuminates the target obliquely downward and horizontally.
- 9 **Stage glass**  
The plate on which the target is to be placed
- 10 **Indicator LED**  
Displays the result of a tolerance evaluation.  
There are two lamps: OK lamp and NG lamp.
- 11 **Adjuster**  
Adjusts the height of head.
- 12 **Handle**  
Used to carry the head.
- 13 **LIGHT connector**  
Used to connect the connector for exterior lights (LED light).
- 14 **Connector for tolerance evaluation output**  
Used to connect a cable to output the evaluation result (OK, NG, Fail) and measuring status (MEAS.) to an external unit such as an indicator lamp.
- 15 **REMOTE connector**  
Used to connect the REMOTE connector to perform remote operation for measurement.
- 16 **Connection cable**  
A cable to connect to the controller.

**■ Head (IM-8030)****[Front view]****[Rear view]****1 LCD monitor**

12.1" WXGA (1280 x 800 pixel) LCD monitor.  
The angle can be adjusted within the range of 12 degrees downwards and 15 degrees upwards.

**2 Electric XY stage**

Moves left and right and around.

**3 Z stage up/down handle**

Used to adjust the position of the Z stage.  
It can move 75 mm upwards from the -5mm position.

**4 PRINT button**

Used to perform printing.

**5 MEASURE button**

Used to start measurement.

**6 POWER button**

Used to power ON the controller and head.

**7 Light probe unit**

This is a probe which emits light for light probe measurement.

**8 Variable illumination unit**

An epi-illumination unit that illuminates the target obliquely downward and horizontally.

**9 Stage glass**

The plate on which the target is to be placed

**10 Indicator LED**

Displays the result of a tolerance evaluation.  
There are two lamps: OK lamp and NG lamp.

**11 Adjuster**

Adjusts the height of head.

**12 Handle**

Used to carry the head.

**13 LIGHT connector**

Used to connect the connector for exterior lights (LED light).

**14 Connector for tolerance evaluation output**

Used to connect a cable to output the evaluation result (OK, NG, Fail) and measuring status (MEAS.) to an external unit such as an indicator lamp.

**15 REMOTE connector**

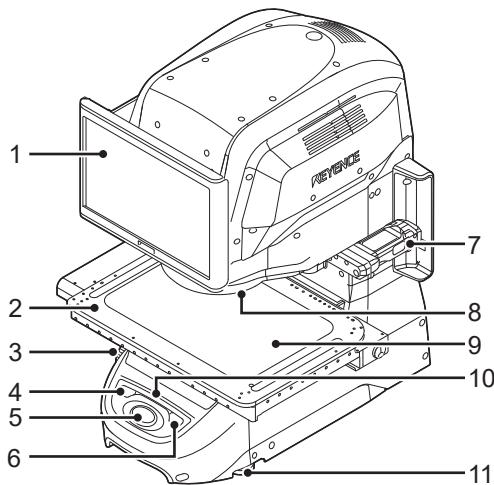
Used to connect the REMOTE connector to perform remote operation for measurement.

**16 Connection cable**

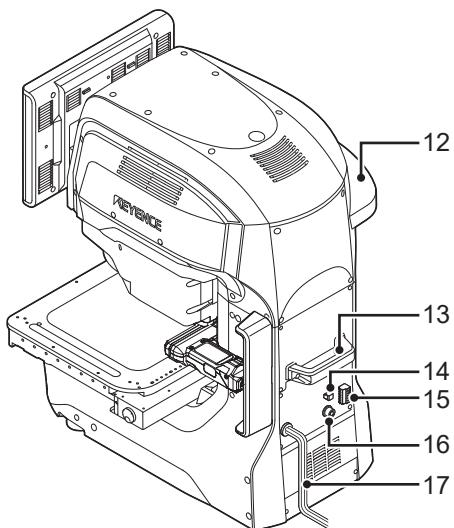
A cable to connect to the controller.

## ■ Head (IM-8030T)

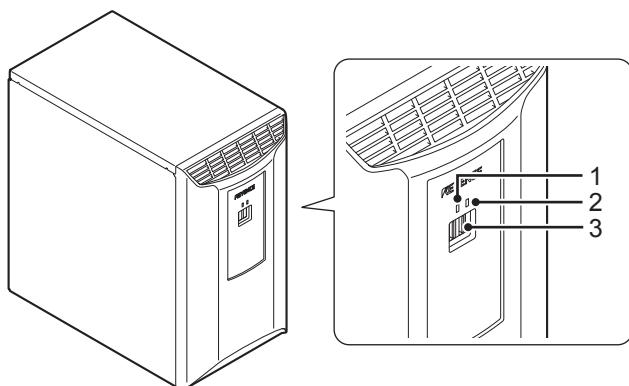
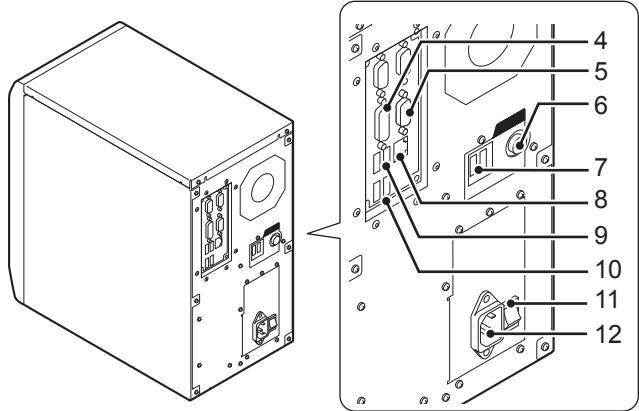
### [Front view]



### [Rear view]

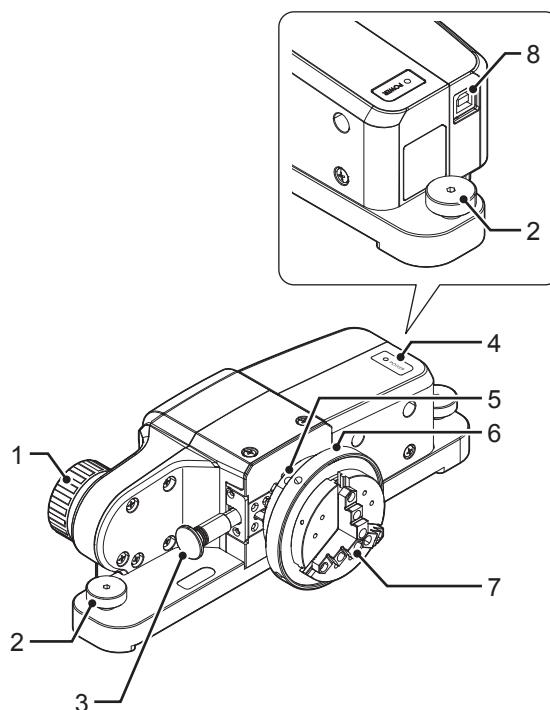


- 1 **LCD monitor**  
12.1" WXGA (1280 x 800 pixel) LCD monitor.  
The angle can be adjusted within the range of 12 degrees downwards and 15 degrees upwards.
- 2 **Electric XY stage**  
Moves left and right and around.
- 3 **Z stage up/down handle**  
Used to adjust the position of the Z stage.  
It can move 75 mm upwards from the -5mm position.
- 4 **PRINT button**  
Used to perform printing.
- 5 **MEASURE button**  
Used to start measurement.
- 6 **POWER button**  
Used to power ON the controller and head.
- 7 **Light probe unit**  
This is a probe which emits light for light probe measurement.
- 8 **Variable illumination unit**  
An epi-illumination unit that illuminates the target obliquely downward and horizontally.
- 9 **Stage glass**  
The plate on which the target is to be placed
- 10 **Indicator LED**  
Displays the result of a tolerance evaluation.  
There are two lamps: OK lamp and NG lamp.
- 11 **Adjuster**  
Adjusts the height of head.
- 12 **Contact height measurement unit**  
It is the height measurement unit for measuring height of target.
- 13 **Handle**  
Used to carry the head.
- 14 **LIGHT connector**  
Used to connect the connector for exterior lights (LED light).
- 15 **Connector for tolerance evaluation output**  
Used to connect a cable to output the evaluation result (OK, NG, Fail) and measuring status (MEAS.) to an external unit such as an indicator lamp.
- 16 **REMOTE connector**  
Used to connect the REMOTE connector to perform remote operation for measurement.
- 17 **Connection cable**  
A cable to connect to the controller.

**■ Controller****[Front view]****[Rear view]**

- 1 Power status indicator LED**  
Lights when the power is turned on.
- 2 HDD access lamp**  
Lights when accessing the built-in hard disk.
- 3 USB port (x 2 on the front)**  
Used to connect USB memory device.
- 4 DVI connector**  
Used to connect to a monitor cable when connecting to an external monitor using a DVI connection.
- 5 MONITOR connector**  
Used to connect to the analog RGB cable of the head or to an external LCD monitor cable.
- 6 POWER connector**  
Used to connect the power cable of the head.
- 7 Rotation unit control port (2 ports)**  
Used to connect the cable of the rotation unit.
- 8 LAN port**  
Used to connect the LAN cable.
- 9 USB port (x 4 on the rear)**  
Used to connect the USB cable of a keyboard, mouse or commercially available printer.
- 10 CAMERA CONTROL port (2 ports)**  
Used to connect the camera cable of the head.
- 11 Main power switch**  
Used to turn the main power ON and OFF. When the main power is turned off, the POWER button of the head cannot be used.
- 12 Appliance inlet**  
Used to connect the AC power cord set.

## ■ Rotation unit



- 1 Power chuck adjustment handle**  
Rotates the power chuck.
- 2 Fixing screws (x2)**  
Fix the rotation unit to the XY stage on the main unit.
- 3 Lock pin**  
Pushing in the lock pin locks the power chuck rotation.
- 4 POWER LED**  
Lights when the power is turned on.
- 5 Power chuck attachment ring**  
Rotate the ring to attach or detach the power chuck.
- 6 Target attachment ring**  
Rotate the ring to attach or detach a measurement target.
- 7 Power chuck**  
Holds the measurement target.
- 8 USB port**  
Used to connect the USB cable that connects to the controller.

## MEMO

# 2

## Installing the IM-8000

This chapter explains the installation, connection, and initial settings of the IM-8000 Series.

2

Installing the IM-8000

Before Installation .....	2-2
Preparation and Connection of IM-8000 series .....	2-4
Installing the Input/output Cables .....	2-10
Connecting the External Light.....	2-12
Connecting and Setting the External Monitor .....	2-13
Connecting a Printer .....	2-14
Initial Settings.....	2-15

# Before Installation

## Installation environment

The installation environment should meet the following conditions.

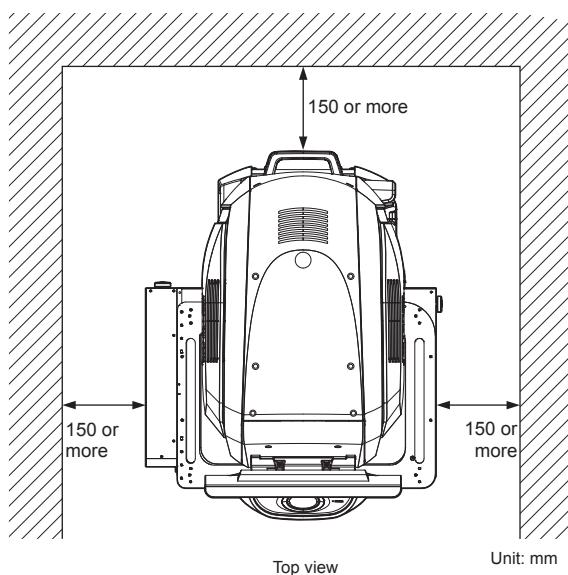
Temperature	10°C to 35°C
Humidity	20% to 80% RH (no condensation)

2

### ■ Installation location

Install the head in a location where the following conditions are met.

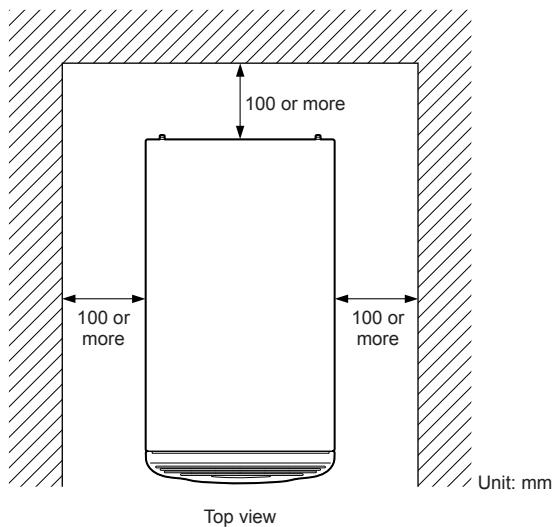
- Level and horizontal surface that is free of vibration.
- Distance of 150 mm or more from the outer wall.



### ■ Installation location of the controller

Install the controller in a location where the following conditions are met.

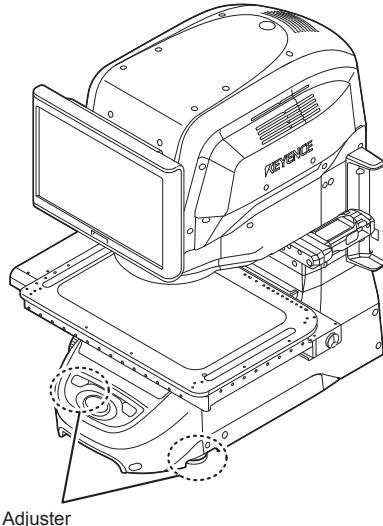
- Level and horizontal surface that is free of vibration.
- Distance of 100 mm or more from the outer wall.



## Adjusting the Adjuster

### 1 Adjust the adjuster.

Adjust the horizontal adjuster height so that the head is not loose.

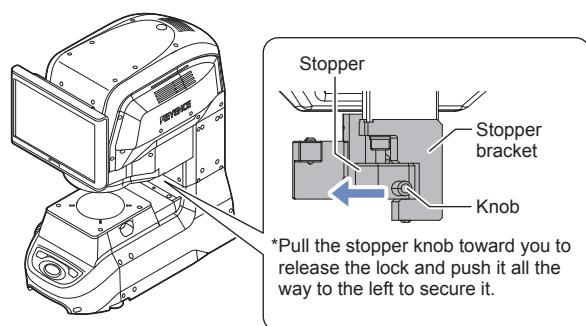


## Removing and Installing the Stopper

### ■ For the IM-8005

#### NOTICE

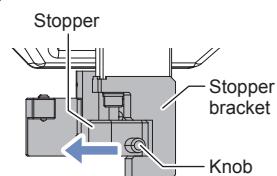
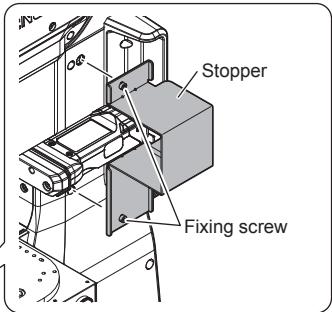
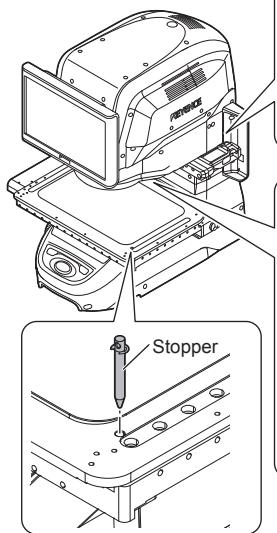
- After installing the IM-8005 and before turning the power on, remove the stopper installed on the Z axis.
- When transporting or carrying the device, install the stopper on the Z axis.



### ■ For the IM-8020/8030



- After installing IM-8020/8030, remove the stopper installed on the right front side of the electric XY stage, Z axis and light probe before tuning on the power.
- When transporting or carrying the device, install the stoppers on the right front side of the electric XY stage, Z axis, and light probe.

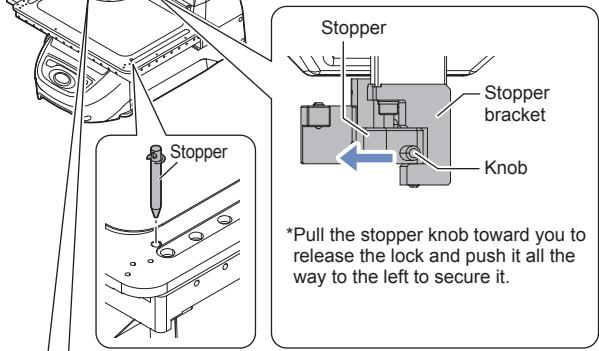
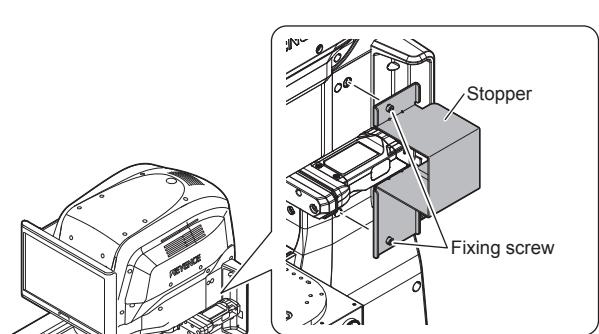


\*Pull the stopper knob toward you to release the lock and push it all the way to the left to secure it.

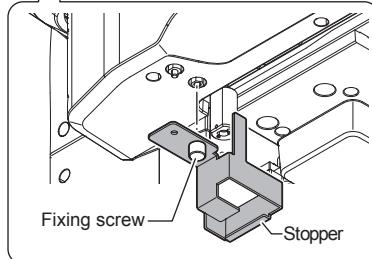
### ■ For the IM-8030T



- After installing IM-8030T, remove the stopper installed on the right front side of the electric XY stage, Z axis, light probe and contact height measurement unit before tuning on the power.
- When transporting (carrying) IM-8030T, install the stopper on the right front side of the electric XY stage, Z axis, light probe and contact height measurement unit.



\*Pull the stopper knob toward you to release the lock and push it all the way to the left to secure it.

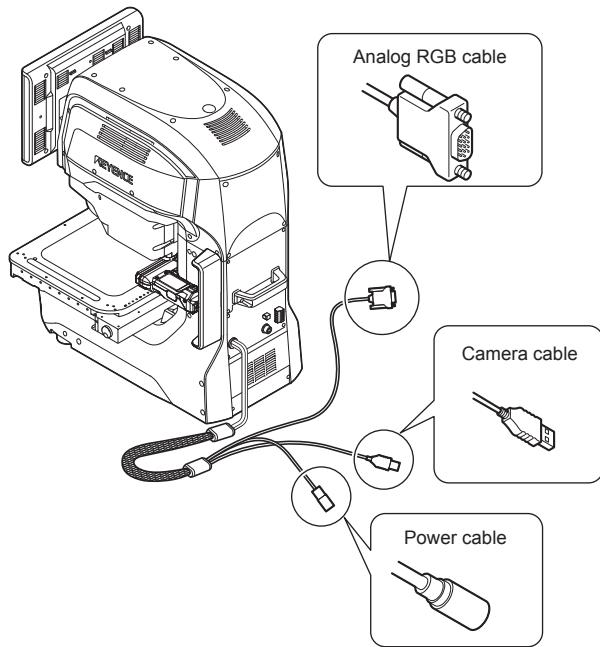


# Preparation and Connection of IM-8000 series

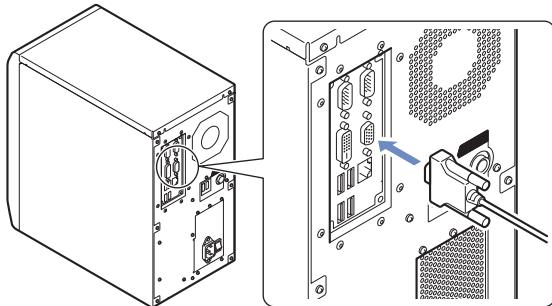
## Connecting the head and the controller

### ■ Connecting the head and the controller

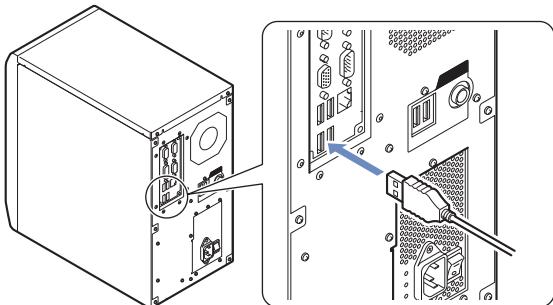
Connect the cable of the head to the controller.



### 1 Connect the analog RGB cable to the MONITOR connector of the controller.



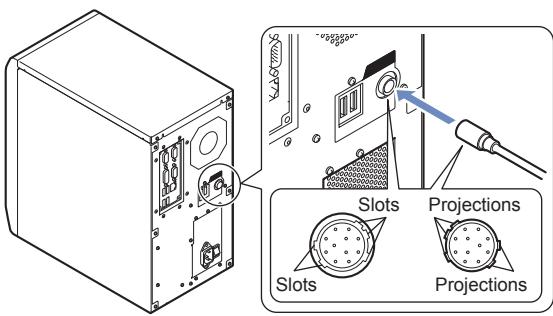
### 2 Connect the camera cable(s) to the CAMERA CONTROL port(s) of the controller.



▶ Important

Be sure to connect the camera cable to the CAMERA CONTROL port on the rear of the controller.  
If the camera cable is connected to a port other than the specified one, the camera will not work properly.

### 3 Connect the power cable to the POWER connector of the controller.



▶ Important

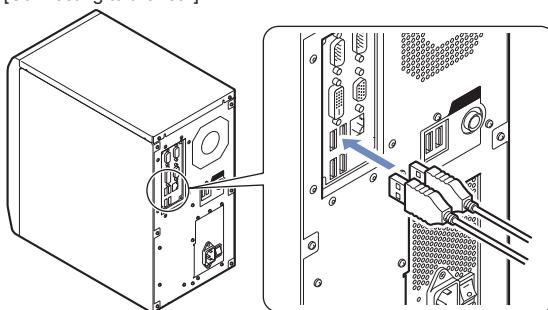
When connecting the power cable, fit the projections on the connector into the slots in the POWER connector.

## ■ Connecting the mouse and the keyboard

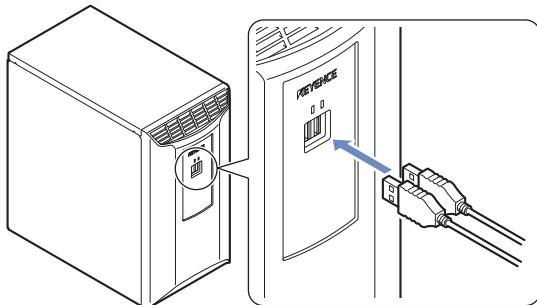
### 1 Connect the mouse and the keyboard to the USB ports on the controller.

Connect the mouse and the keyboard to any of the two USB ports on the rear of the controller or to the two USB ports on the front of the controller.

[Connecting to the rear]



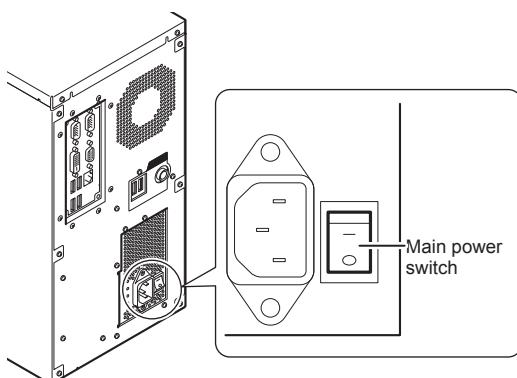
[Connecting to the front]



## ■ Connecting the AC power cord set

Connect the AC power cord set to the controller.

### 1 Check that the main power switch on the rear of the controller is turned off.

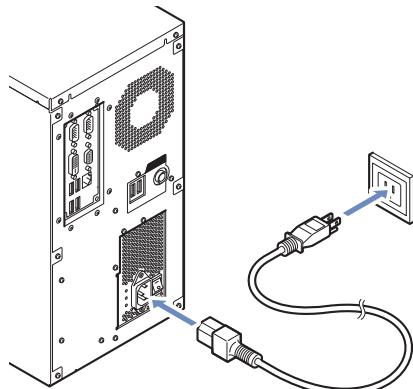


**NOTICE**

When connecting or disconnecting the AC power cord set, be sure to turn off the main power switch on the IM-8000. Connecting or disconnecting the AC power cord set with the main power turned on may cause a product damage.

### 2 Connect the Appliance inlet on the rear of the controller to the AC power cord set.

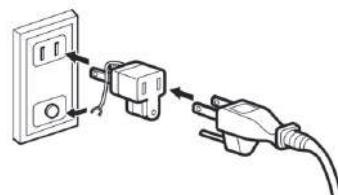
### 3 Connect the AC power cord set to the AC power supply.



- The IM-8000 is Class I equipment. When installing this device, connect the protective grounding terminal of the power supply cord set to the protective grounding conductor of the installation location. Otherwise, it may cause electric shock or product damage.
- The power supply cord set is not provided with the IM-8000. If you are using the product with a different voltage, prepare a cable that meets the specified specifications. Use the cord set which is in accordance with the rating of IM-8000 series and complies with the regulations and standards in the country or region in which IM-8000 series is to be used. Use the cord set which is in accordance with the rating of IM-8000 series and complies with the regulations and standards in the country or region in which IM-8000 series is to be used.

**► Important**

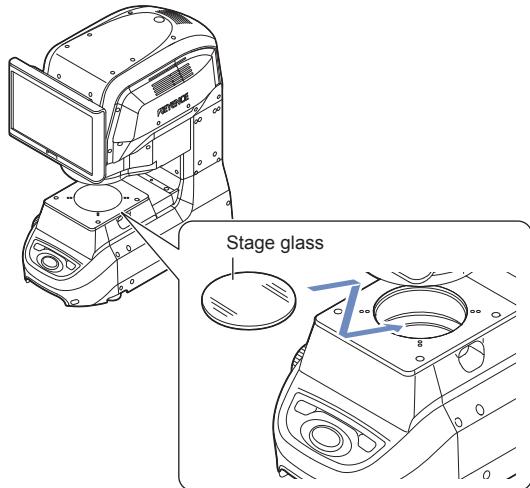
If the connector of the AC power supply has two slots, connect it by using the three-to-two slot conversion adapter. In this case, be sure to ground the earth cable.



## Installing the Stage Glass

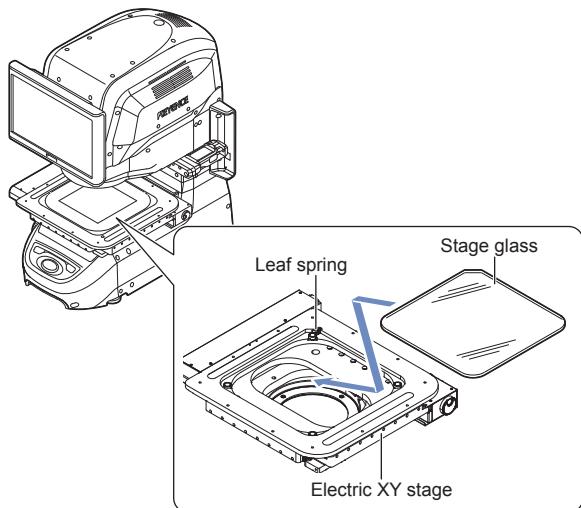
### For the IM-8005

- Install the stage glass on the stage.



### For the IM-8020/8030/8030T

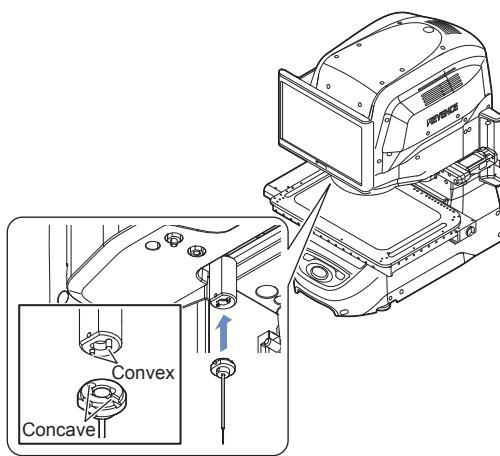
- Install the stage glass on the electric XY stage.



Install the the chamfer of stage glass by pressing it against the leaf spring on the upper left of the electric XY stage.

## Inserting the Stylus (IM-8030T Only)

- Align the concave of stylus and the convex of probe to insert the stylus.

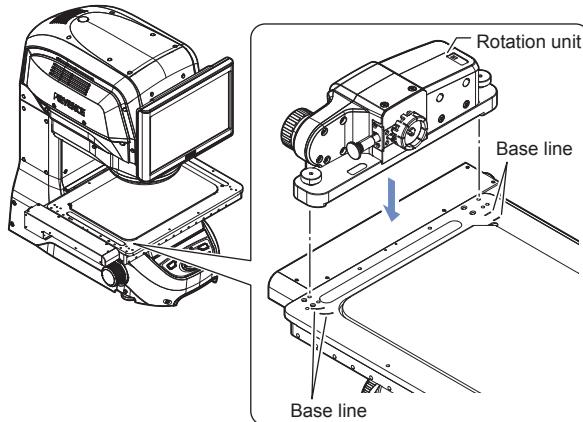


**CAUTION** Do not touch the tip of the stylus. You may get injured.

## Installing the Rotation Unit

Install the IM-RU1 rotation unit (sold separately) on the XY stage.

- Align the rotation unit with the XY stage base line and insert the positioning pin on the rotation unit into the positioning slots on the XY stage.



**Important** There are two types of installation positions on the rotation unit.

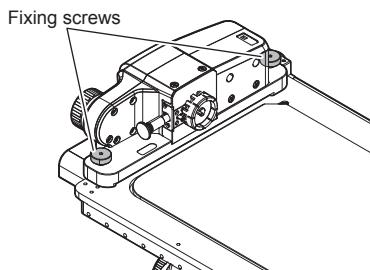
- Standard position (left)
- Offset position (right)

You can capture the entire measurement target in wide-field measurement mode if you use the offset position.

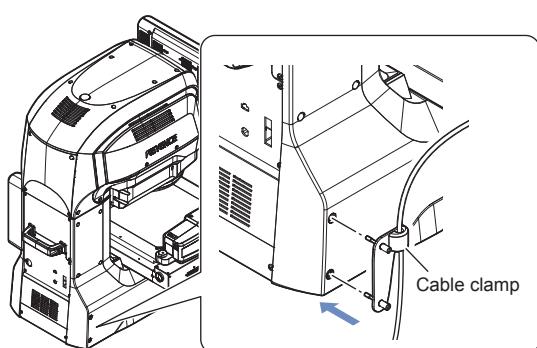
The length of targets that can be measured in the offset position must be 12 mm shorter than the standard position.

The IM-8030T height measurement feature is not available in the offset position.

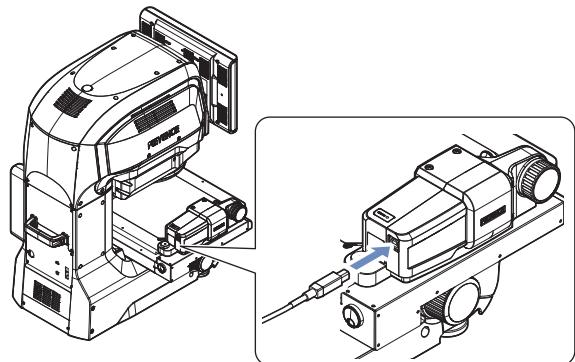
- Tighten the fixing screws using the supplied hexagon wrench.



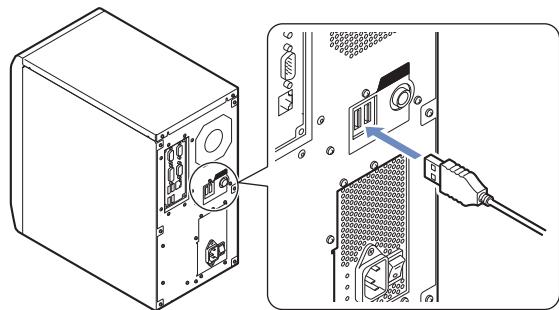
- Secure the cable clamp to the left side of the head.



- Connect the USB cable to the rotation unit.



- Connect the USB cable to the controller.



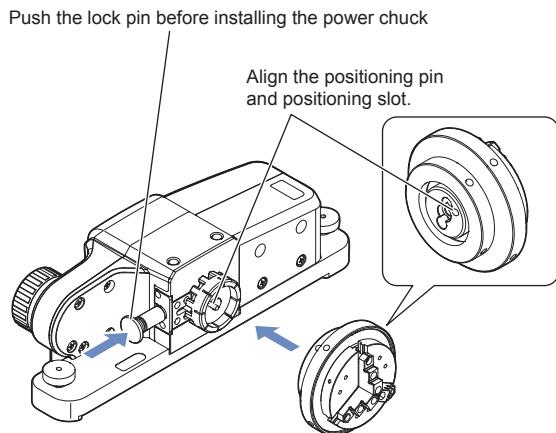
**Important** Be sure to connect the rotation unit USB cable to the ROTATION UNIT CONTROL port on the rear of the controller.

If the camera cable is connected to a port other than the specified one, the camera will not work properly.

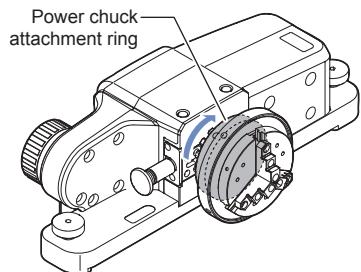
## Installing the Power Chuck

Install the power chuck on the rotation unit.

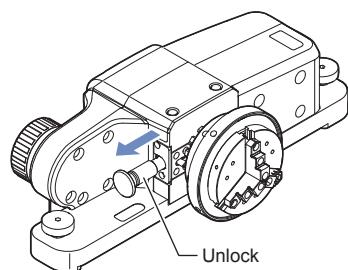
- 1 Push in the lock pin, and then insert the power chuck aligning the positioning pin on the rotation unit with the power chuck positioning slot.**



- 2 Tighten the power chuck attachment ring.**



- 3 Pull the lock pin to unlock.**

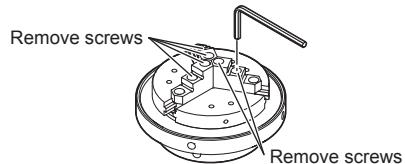


## Installing and removing the power chuck

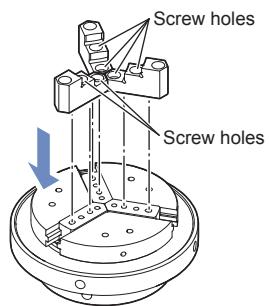
- Changing the direction of the 3-jaw power chuck**

Changing the direction of the chuck jaws enables you to attach targets that have a large diameter.

- 1 Unscrew the six set screws with the supplied hexagon wrench and remove the chuck jaws.**



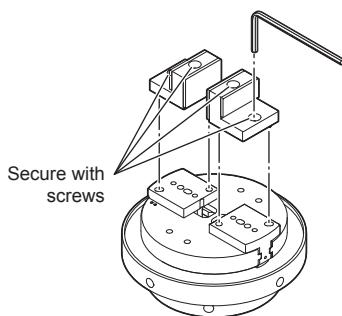
- 2 Insert the chuck jaws by aligning the positioning pin and tighten the set screws.**



## ■ Installing the 2-jaw chuck on the power chuck

Installing the supplied chuck jaws enables a target to be held with a rubber sheet.

- 1 Insert the chuck jaws by aligning the positioning pin and tighten the four set screws with the supplied hexagon wrench.**



**Reference** You can also install the chuck jaws in the opposite direction.

## Connection with a Personal Computer

▶ Important

You must set the IP address, subnet mask, and default gateway before connecting the IM-8000 Series with a PC.

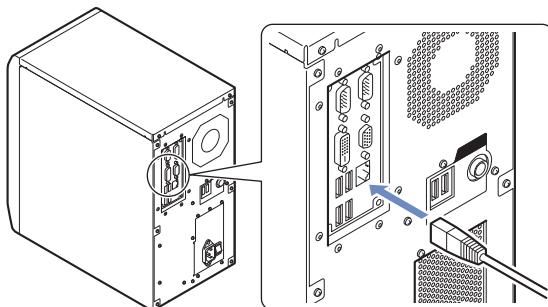
□ "Network Communication Settings" (page 11-2)

### 1 Connect a LAN cable to the IM-8000.

▶ Important

- To connect the IM-8000 to the LAN in a group via a hub, use a straight cable. To connect the IM-8000 Series directly to a PC (one-to-one connection), use a crossover cable.
- Use a LAN cable of category 5 or higher for 10BASE-T/100BASE-TX, and a cable of category 5e or higher for 1000BASE-T.

Connect the LAN cable to the LAN port on the rear of the controller.



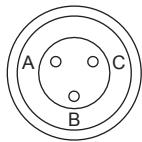
### 2 Connect the LAN cable to the PC and configure the network settings of the PC.

For details, refer to the instruction manual of the PC.

2

# Installing the Input/output Cables

## REMOTE input

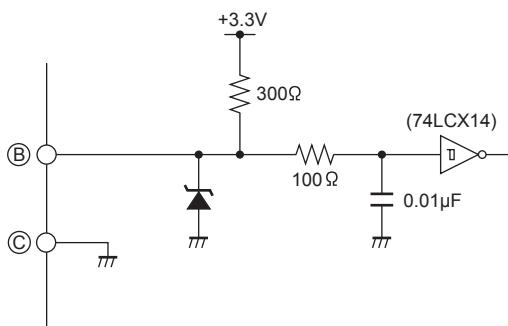


Connector for tolerance evaluation output (Head side)

Pin number	Pin
A	NC
B	Measurement remote
C	COM

Specifications	No-voltage input (with and without contact)
----------------	---

Internal circuit

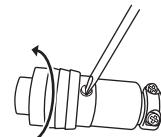


## Connecting the REMOTE input

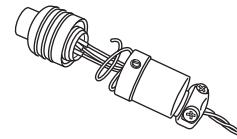
Connect an input device such as a foot switch to the REMOTE connector of the controller.

**Important** The REMOTE connector is sold separately (OP-88847).

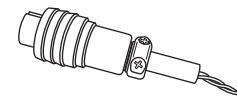
- 1 Loosen the set screw of the REMOTE connector. Rotate the connector tip counterclockwise to remove the connector pin.



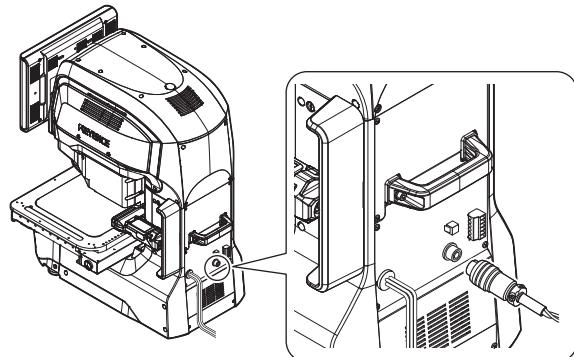
- 2 Connect the cable to the remote connector.



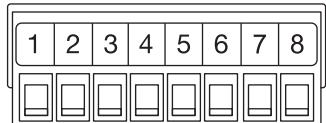
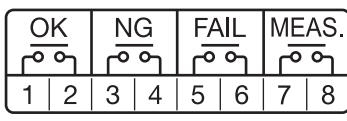
- 3 Set the connector pin to its original position and tighten the set screw.



- 4 Connect the connector to the REMOTE connector on the rear panel of the head.

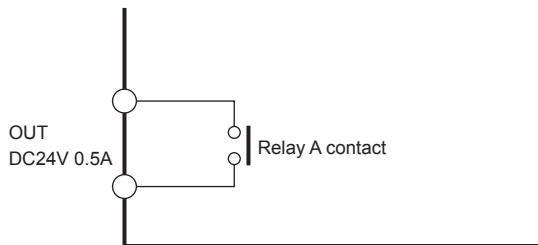


## Judgment Value Output



Number	Display	Function	Specifications
1	OK	Output when the value is within the tolerance range.	
2			
3	NG	Output when the value is outside the tolerance range.	PhotoMOS output
4			
5	FAIL	Output when a measurement error occurs.	DC24V 0.5A (Class 2) ON resistance 50 mΩ or lower
6			
7			
8	MEAS.	Output during measurement (measurement target cannot be moved).	

Internal circuit



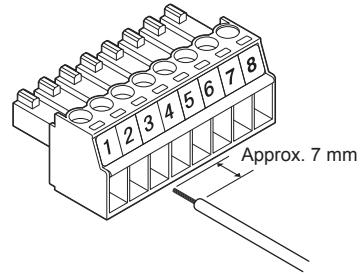
## Method of Connecting Tolerance Evaluation Output

Connect the tolerance evaluation output cable.

- 1 Remove the terminal block from the rear panel of the head by pulling it straight.

- 2 Insert the cable into the terminal block.

The stripped length of the cable is approximately 7 mm.  
Connection cable: AWG 28-16

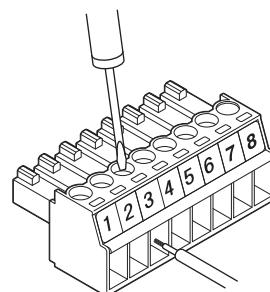


- 3 Tighten the screw on the terminal block with a flathead screwdriver.

After tightening the screw, pull the cable gently to check that the cable is fastened.

**NOTICE**

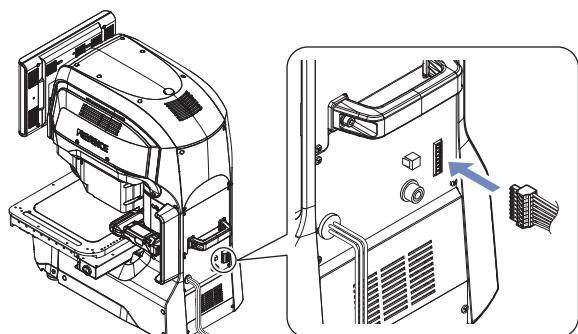
The tightening torque should be 0.22 to 0.25Nm.



- 4 Install the terminal block on the rear panel of the head.

**NOTICE**

- When connecting the terminal block, be sure to turn off the main power.
- Do not apply a voltage exceeding the rated voltage.



# Connecting the External Light

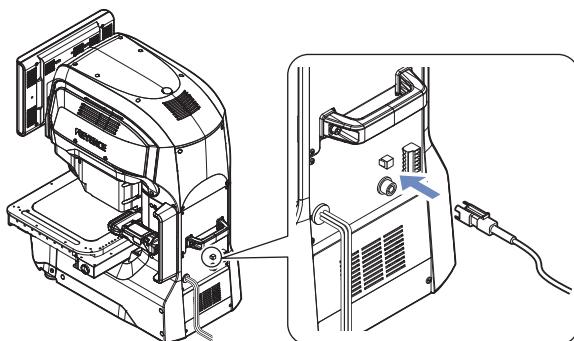
## Connecting the LED Light

2

Installing the IM-8000

NOTICE	<ul style="list-style-type: none"><li>• Connectable LED lights are as follows:<ul style="list-style-type: none"><li>- IM-DXW12N</li><li>- IM-DXW12NT</li><li>- CA-DLR12</li><li>- CA-DLR10</li></ul></li><li>• Do not use a combination other than the LED lights above. Doing so may damage the device.</li><li>• When connecting or disconnecting the cable, be sure to turn off the main power switch on the IM-8000. Connecting or disconnecting the AC power cord set with the main power turned on may cause a product damage.</li></ul>
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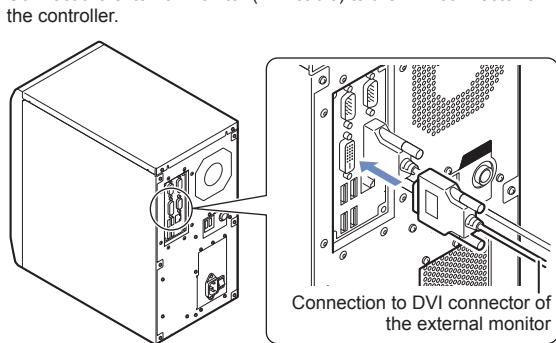
- 1 Connect the cable of the LED light to the LIGHT connector on the rear panel of the head.



# Connecting and Setting the External Monitor

## Connecting the external monitor

- 1** Check that the IM-8000 power is turned off.
- 2** Connect the external monitor to the controller.



# Connecting a Printer

## Connecting a commercially-available printer

Connect a commercially-available printer to print the single object report or other results.

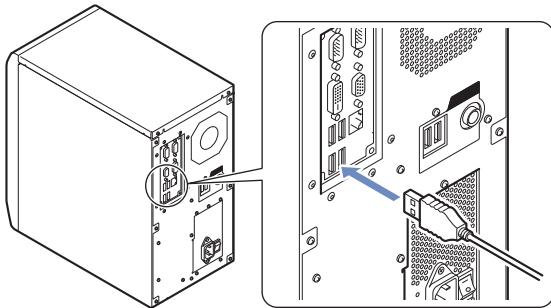
### 1 Connect a USB cable to the printer.



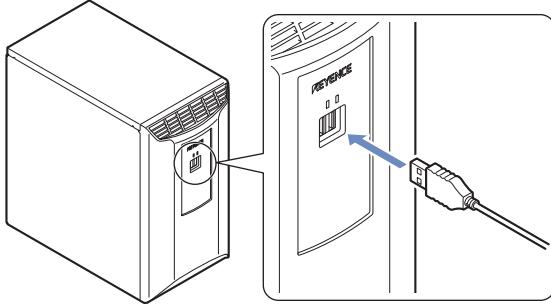
For the handling of the printer, refer to the instruction manual supplied with the printer.

### 2 Connect the other end of the USB cable to the USB port of the controller.

[Connecting to the rear]



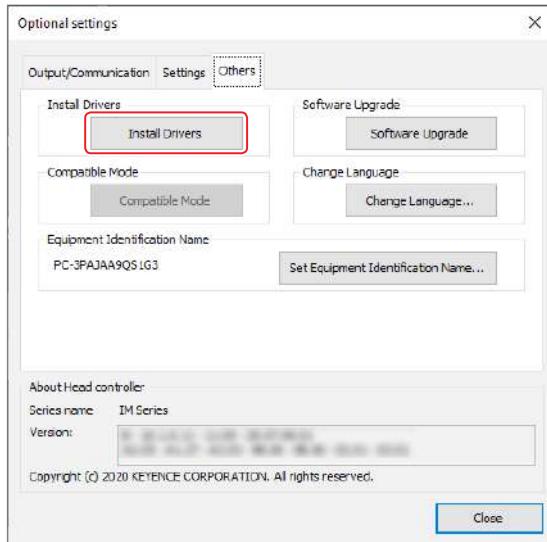
[Connecting to the front]



### 3 Install the printer driver.

Click [Optional Settings] on the menu screen and install the printer driver by clicking [Install Drivers] under the [Others] tab in the [Optional Settings] dialog box.

For details, refer to "Install Drivers" (page 12-20).



# Initial Settings

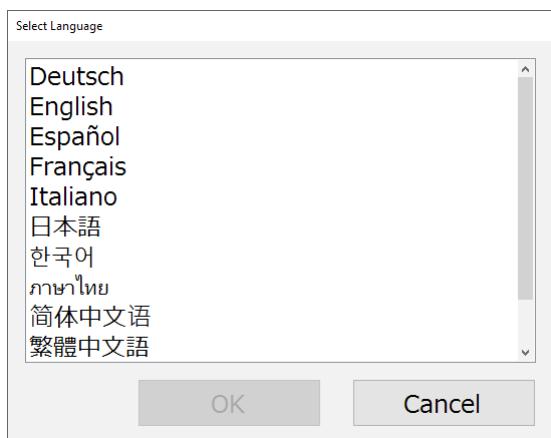
Set the display language, date and time and identification name as initial settings.

## 1 Start the IM-8000.

□ “Powering Up the System” (page 3-2)

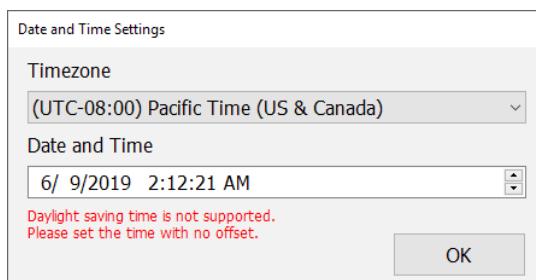
After the start screen is displayed on the monitor, [Select Language] dialog box is displayed.

## 2 Select a display language and click [OK].



The [Date and Time Settings] dialog box appears.

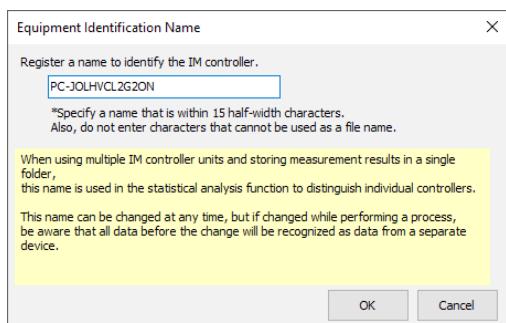
## 3 Set the time zone, date, and time.



The controller will automatically restart. Once it restarts, the [Equipment Identification Name] dialog box will appear.

## 4 Set the controller's identification name.

□ “Equipment Identification Name” (page 12-21)



The menu screen is displayed.

## MEMO

# 3

## Basic Operation

This chapter explains the basic usage of the IM-8000 Series and its operation flow.

3

Basic Operation

<b>Powering Up and Shutting Down the System .....</b>	<b>3-2</b>
<b>Basic Operations.....</b>	<b>3-4</b>
<b>Measurement Mode and Operation Flow.....</b>	<b>3-21</b>

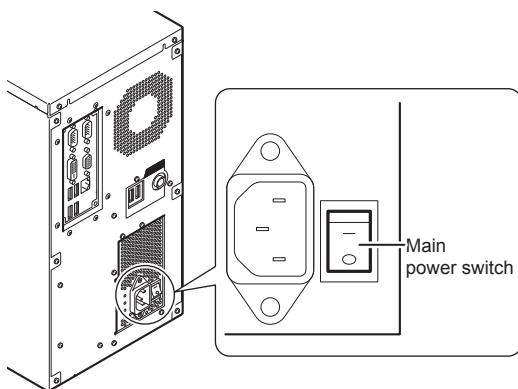
# Powering Up and Shutting Down the System

## Powering Up the System

**Important**

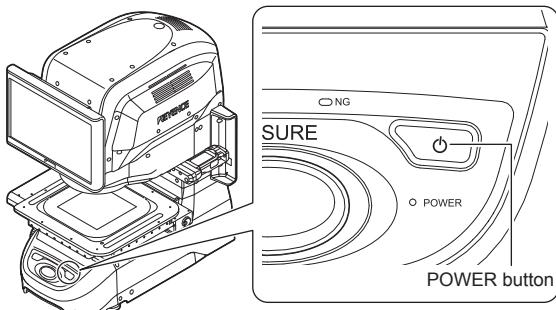
Before powering up the system, check that the measurement head and the controller are connected properly.  
 □ “Preparation and Connection of IM-8000 series”  
 (Page 2-4)

**1 Turn on the main power switch of the controller.**



**2 Press the POWER button of the measurement head.**

The LED next to the POWER button lights in green and the system boots up.



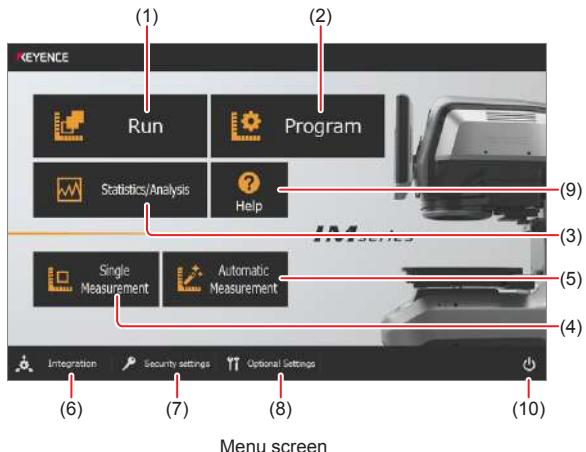
When a message is displayed, confirm the contents and click [OK]. After the start screen is displayed on the monitor, the menu screen appears.

**NOTICE**

After the power is turned on, do not turn off the power until the menu screen appears.

**Important**

Initial settings are necessary only when starting up the IM-8000 for the first time.  
 □ “Initial Settings” (Page 2-15)



Menu screen

- (1)..... □ “Chapter 6 Run Mode” (Page 6-1)
- (2)..... □ “Chapter 4 Program” (Page 4-1)
- (3)..... □ “Chapter 7 Statistics/Analysis” (Page 7-1)
- (4)..... □ “Chapter 8 Single Measurement” (Page 8-1)
- (5)..... □ “Chapter 9 Automatic Measurement” (Page 9-1)
- (6)..... □ “Chapter 5 Integrate Multi Programs” (Page 5-1)
- (7)..... □ “Security Settings” (Page 12-22)
- (8)..... □ “Optional Settings” (Page 12-2)
- (9)..... A dialog box pops up to describe the operation flow up to Run mode.
- (10).... [POWER OFF]  
Click this button to turn off the power of head and controller.

## Shutting Down the System

### Exiting from the Menu Screen

- Click [POWER OFF] on the menu screen.



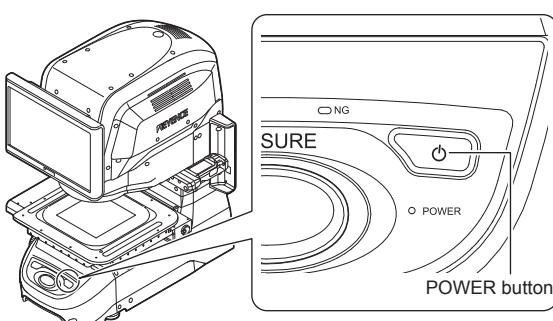
After the end screen is displayed on the monitor, the power of the head and the controller is turned off.

**NOTICE** Until the power display lamp goes out, do not turn OFF the main power switch or the power supply.

**Reference** When the rotation unit IM-RU1 is connected, a message box appears. Confirm the message and click [OK].

### Exiting from the Head Button

- Point** Exiting from the head button is only available when the main menu screen is displayed.
- Press the POWER button of the measurement head.



After the end screen is displayed on the monitor, the power of the head and the controller is turned off.

**NOTICE** Until the power display lamp goes out, do not turn OFF the main power switch or the power supply.

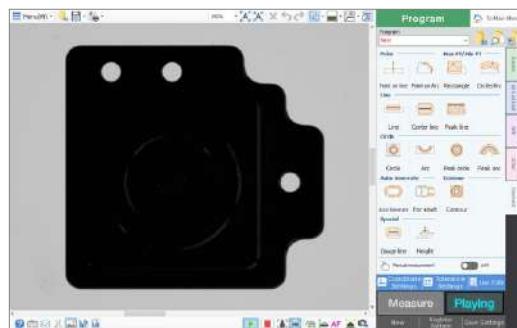
**Reference** When the rotation unit IM-RU1 is connected, a message box appears. Confirm the message and click [OK].

**Basic Operations**

# Basic Operations

## Switching the Camera Mode

Two types of camera modes are available: "Wide-field measurement mode" and "High-precision measurement mode".  
 In "Wide-field measurement mode", a target is captured in a large range using the wide-field camera.  
 In "High-precision measurement mode", a target is captured in a small range using the high-precision camera.  
 The camera mode can be switched by the button of the lower bar on the toolbar.



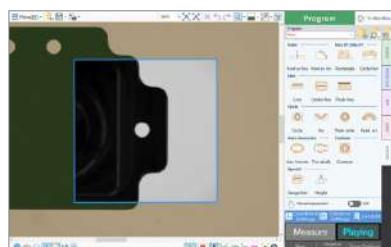
Mode name/Button	High-precision measurement mode
Operation	Show the image in the preview display at high magnification.
Field of view	<ul style="list-style-type: none"> <li>• 25 mm x 25 mm (IM-8005)</li> <li>• 125 mm x 125 mm (IM-8020)</li> <li>• 225 mm x 125 mm (IM-8030/8030T)</li> </ul>
Mode name/Button	Wide-field measurement mode
Operation	Shows the image in the preview display at low magnification.
Field of view	<ul style="list-style-type: none"> <li>• φ100mm (IM-8005)</li> <li>• 200 mm x 200 mm (quadangle R50) (IM-8020)</li> <li>• 300 mm x 200 mm (quadangle R50) (IM-8030/8030T)</li> </ul>



**The IM-8005 cannot save Program data for which the wide-field measurement mode is used together with the high-precision measurement mode.**

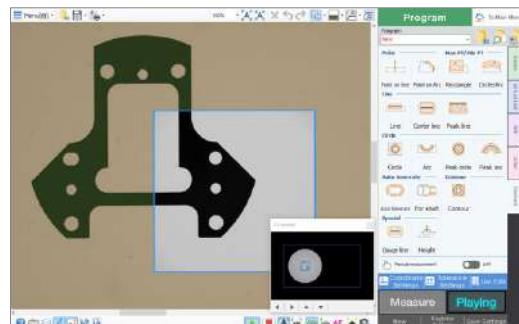


When [Simultaneous real-time display with wide field of view] is ON in the high-precision measurement mode, the range of view in the wide-field measurement mode is also displayed simultaneously as a video.  
 Even in this case, only the view range of the high-precision measurement mode is used for the measurement.



## Preview Screen Configuration

The preview screen is configured by three hierarchies in the following list.



The preview image, layer image, and background image will be displayed in combination depending on its situation.

Name	Display color	Description
Preview image	Grayscale	The preview image displays the range where a video is displayed using the current camera. The measurement can be done on the preview image.
Layer image		The layer image is a grayscale image of connected multiple images just after capturing. In addition, the layer image is displayed when it is called from the layer control. The measurement can be done on the layer image. When the Z height and illumination conditions are changed with the layer image displayed, images other than the preview image will turn to sepia color and change into background images.
Background image		Link captured images and display it as a background image. The measurement cannot be done on the background image. When setting the edge detection range on the background image, the measurement will be done by performing new capturing with the current condition. The background image is basically a still image, however, it will be a video in the case of "Simultaneous real-time display with wide field of view".

Each image is displayed by three hierarchies in the following list.

Hierarchy	Image	
First hierarchy	Video preview frame	Display the frame of the video preview by blue solid line.
Second hierarchy	Active layer image	<ul style="list-style-type: none"> <li>Display a layer image with the same condition as the video, or an active layer image.</li> <li>Display an edging frame (light blue dotted line) for a layer image.</li> </ul>
Third hierarchy	Background image	Connect captured images and display it (displayed in sepia color).

## Stage Control

### Adjusting the Height of the Electric Z Stage

It can bring the target into focus by adjusting the height of the electric Z stage using the [Z-Control] dialog box.

**Reference** In the Run mode, the height of the electric Z stage is automatically adjusted when [Measure] is clicked, in accordance with the Program data.

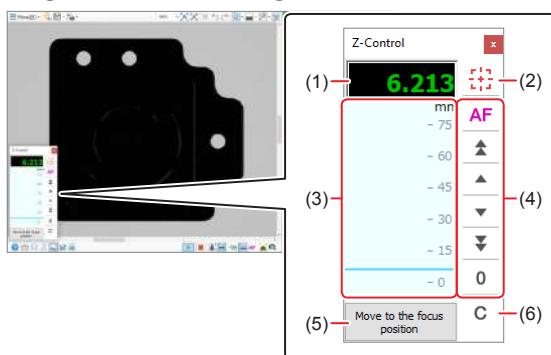
**1** Click [Start preview].

**2** Click [Z-Control].

The [Z-Control] dialog box appears.

**Reference** The [Z-Control] dialog box is also displayed by select [Menu] → [Illumination/Camera/Stage control] → [Z control].

**3** Bring the target into focus by adjusting the height of electric Z stage.



Number	Description
(1)	Display the height of the electric Z stage in numerical value. Click it so that the height of electric Z stage can be input. Press Enter after the input to move the electric Z stage to the height you input.
(2)	Click it to display the focus area (auto focus target range) on the preview screen in a red frame. The size and position of the focus area can be changed by dragging.
(3)	Display the height of the electric Z stage and focus graph. By clicking it, the height of the electric Z stage can be specified.  <b>Point</b> The focus graph can be created only within the range where the electric Z stage moves.

Number	Description
	Bring the specified focus area into focus by adjusting the height of the electric Z stage automatically. <b>AF</b> <ul style="list-style-type: none"> <li>The Inside of the focus area will be a specified area.</li> <li>When an edge detection range is selected, the selected edge detection range becomes the specified area.</li> </ul>
(4)	Move the electric Z stage to the upward direction. The movement range becomes larger than .
	Move the electric Z stage to the upward direction.
	Move the electric Z stage to the downward direction.
	Move the electric Z stage to the downward direction. The movement range becomes larger than .
	Move the electric Z stage to the position of 0mm.
(5)	Move the Z stage height to the peak position of the focus graph.
(6)	Clear the focus graph.

**Reference** • The traveling distance of the electric Z stage when each button is clicked is as follows.

button	Camera	
	Wide-field	High-precision
	Approx. 2mm	Approx. 0.5mm
	Approx. 0.5mm	Approx. 0.1mm

- Selecting [AF execution] from the context menu displayed by the right-clicking on the preview screen performs the auto focus on the right-clicked point.
- Double-clicking by pressing the Ctrl key on the keyboard performs the auto focus on the double-clicked point.

## Adjusting Position of Electric XY Stage

Adjust the position of electric XY stage in the [XY Control] dialog box.

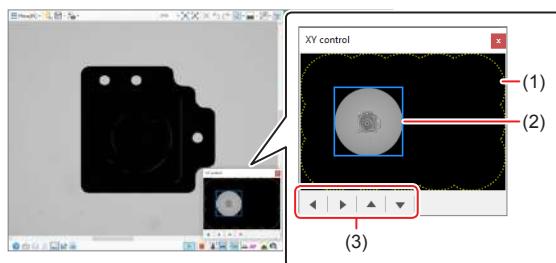
**1 Click [Start preview].**

**2 Click [XY control].**

The [XY control] dialog box appears.

The [XY control] dialog box is also displayed by selecting [Menu] → [Illumination/Camera/Stage control] → [XY control].

**3 Change the position of the electric XY stage.**



Number	Description
(1)	Show the entire preview window. Click it to move the electric XY stage to the highlighted video playback area at the cursor position.
(2)	It is a frame line corresponding to the video playback area of the preview display.
(3)	<input alt="Up arrow icon"/> Move the electric XY stage to the field of view in the upward direction of the preview display. <input alt="Left arrow icon"/> Move the electric XY stage to the field of view in the leftward direction of the preview display. <input alt="Down arrow icon"/> Move the electric XY stage to the field of view in the downward direction of the preview display. <input alt="Right arrow icon"/> Move the electric XY stage to the field of view in the rightward direction of the preview display.

• Selecting [XY movement] from the context menu displayed by the right-clicking on the preview screen moves the electric XY stage, so that the right-clicked point or near there becomes the center of the field of view.  
 • Double-clicking the preview screen with pressing the Shift key on the key board moves the electric XY stage, so that the double-clicked point or near there becomes the center of the field of view.  
 • Dragging the mouse wheel with pressing the Ctrl key on the key board moves the electric XY stage.

## Adjusting the Angle of the θ Stage (Only When the Rotation Unit IM-RU1 is Used)

Adjust the capture angle of the target in the [θ control] dialog box during the rotation measurement.

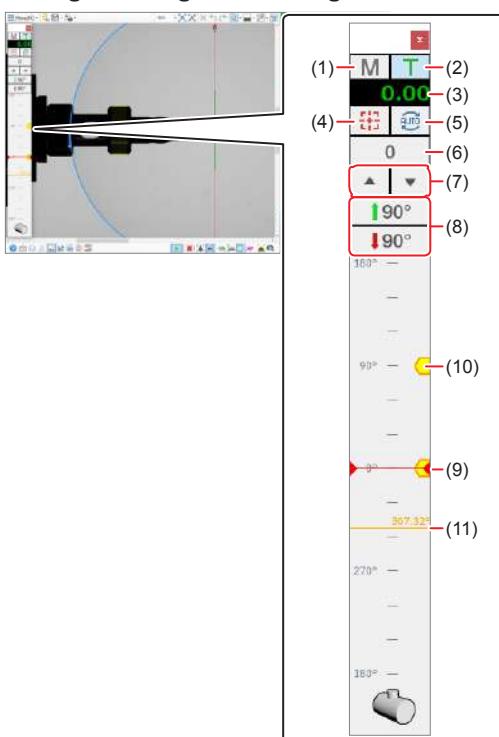
**1 Click [Start preview].**

**2 Click [θ control].**

The [θ control] dialog box appears.

The [θ control] dialog box is also displayed by selecting [Menu] → [Illumination/Camera/Stage control] → [θ control].

**3 Change the angle of the target.**



Number	Description
(1)	Click this to display the angle of the target based on "Machine reference" in the following field (3).  The machine reference is the angle origin of the inside of the device.
(2)	Click this to display the angle of the target based on "Angle reference" set in "Angle Reference Settings" in the following field (3).
(3)	The current angle of the target is displayed. Entering the value rotates the target to that degree.
(4)	Click this to display a rectangle by red dotted line to the preview screen. When changing "Angle reference", the shape to be made to face can be specified newly by surrounding the target in a rectangle.
(5)	Auto angle execution Click this to display the menu of the shape to be made to face. Selecting the shape specified at (4) sets a new "Angle reference".

Number	Description
(6)	Click this to return the target to "Angle reference" of 0 degrees.
(7)	Click this to rotate the target by angles of 0.1 degrees.
(8)	Click this to rotate the target by angles of 90 degrees.
(9)	Display the current angle by red bar.
(10)	Display the angle where the layer image (measurement element) exists. Click it to rotate the target to that degree. Clicking the measurement element on the preview screen shows the orange frame for the angle. Clicking the measurement result displays the light blue frame for the angle where the measurement element of the reference destination exists.
(11)	Displayed when the mouse cursor is in the angle display area. Click it to rotate the target to that degree.

## Capture

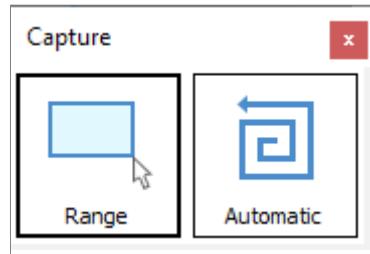
Capture linked images (layer image) to be used for the measurement.

### 1 Click [Capture].

The [Capture] dialog box appears.

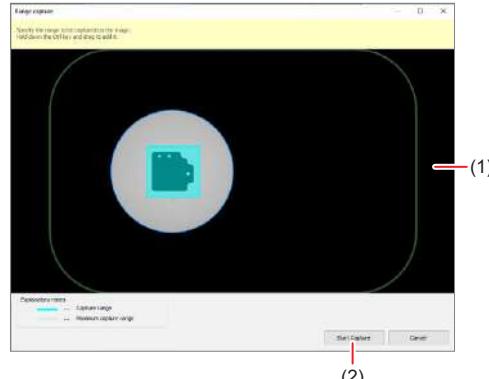
The [Capture] dialog box is also displayed by selecting [Menu] → [Illumination/Camera/Stage control] → [Capture].

### 2 Select the capture method and perform capturing.



Click [Range] to display the [Range capture] dialog box. When [Automatic] is clicked, the entire measurement target is captured.

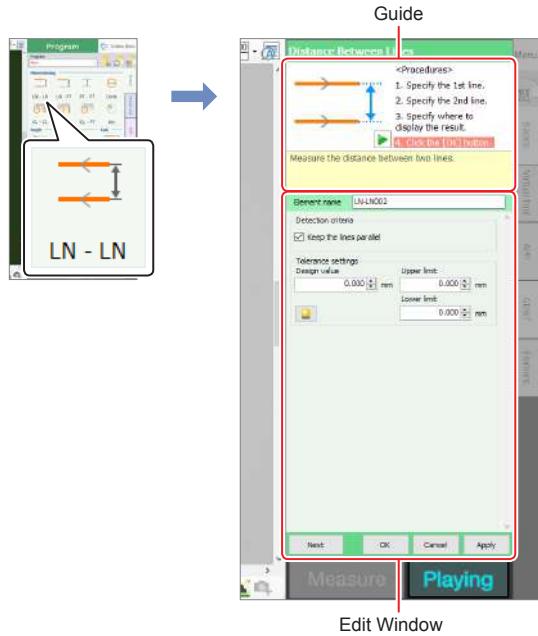
#### ● Range capture



Number	Description
(1)	Display the background image. Drag the image to specify the capture range.
(2)	Capture the specified capture range.

## Guide and Edit Window

When each of the measurement item is being created, the guide and edit window are displayed in the measurement operation area.



## Operation in the Preview Screen

### Magnifying/Reducing/Moving Images in the Preview Screen

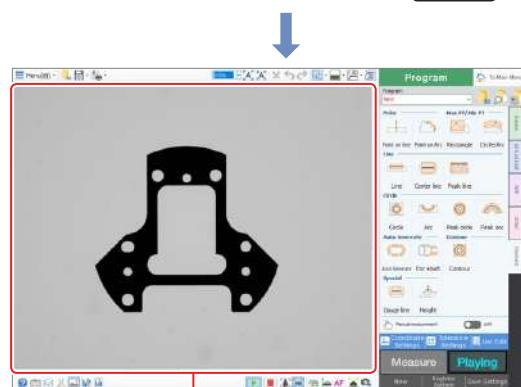
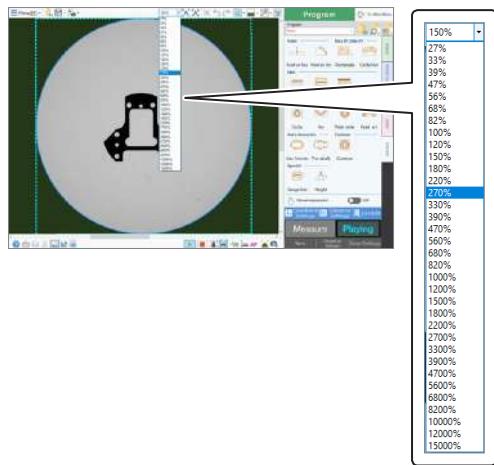
This section explains the operations of magnifying/reducing/moving images in the preview display, which is displayed when [Program], [Run], [Single Measurement] or [Automatic Measurement] is selected in the menu screen.

The measurement item is created easily by magnifying/reducing/moving preview images if necessary.

#### ■ Magnifying/Reducing Images in the Preview Screen

##### ● Operations by toolbar

Select a display magnification ratio from the [Zoom ratio] box on the toolbar to magnify/reduce images in the preview display.



Display magnification ratio of the preview display is changed.

##### ● Operations by mouse

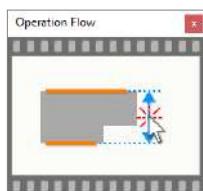
When you turn the mouse wheel forward, images in the preview display are magnified with the cursor position being at the center.

When you turn the mouse wheel backward, images in the preview display are reduced with the cursor position being at the center.

## Guide Function

### ■ Checking Operation Method through Animation

When [Play] is clicked, the [Operation Flow] window plays back animated sample operation. The [Operation Flow] window automatically closes when the sample is played back 10 times.



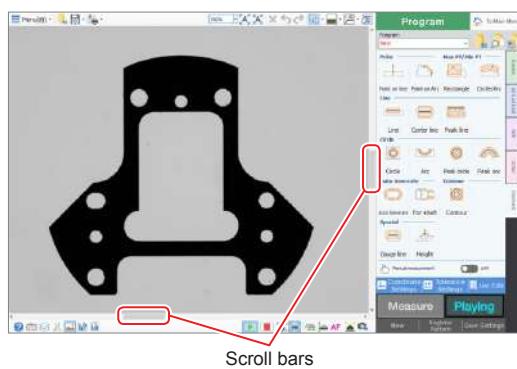
### ■ Checking Functions through Help

In each screen, there is a screen with [Help] displayed. Click this button to display the window which describes the function.

## ■ Moving Images in the Preview Screen

### ● Operations by scroll bar

Slide the scroll bar to move images in the preview display to the desired position.



### ● Operations by mouse

Operate the mouse to move images in the preview display to the desired position.

While holding the mouse wheel, the cursor changes to . By pressing the mouse wheel and dragging it, you can also move images displayed in the preview screen to the desired position.

## Creating/Editing a Region

It describes how to create and edit the region used to measure the objects. The types of ranges are edge detection range, scanning line and rectangle range (extraction range).

### Reference

- The edge detection range is the range in which the edge (rim, periphery) of the target is detected.
- The scanning line is a line on which the edge (rim, periphery) of the target is detected.
- The rectangle range (extraction range) is the range in which the entire edge (rim, periphery) of the target is detected (extracted).

For details of the Program mode, refer to "Chapter 4 Program" (Page 4-1).

## ■ Range of Lines

In this section, explanations are given with an example of [Line] of the element tool.

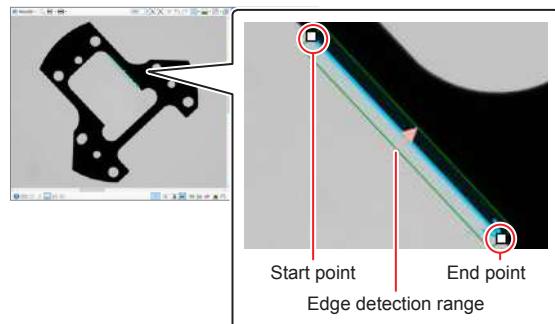
### 1 Click [Line] under the [Element] tab.



### 2 Specify the start and end points of the edge detection range along the target line and determine the line.

Create the edge detection range by the following methods.

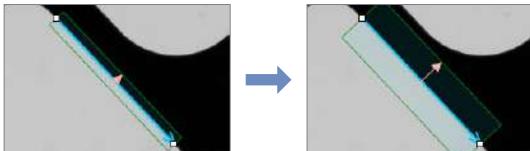
- Click start point and end point.
- Drag from start point to end point.



### 3 Edit the edge detection range as necessary.

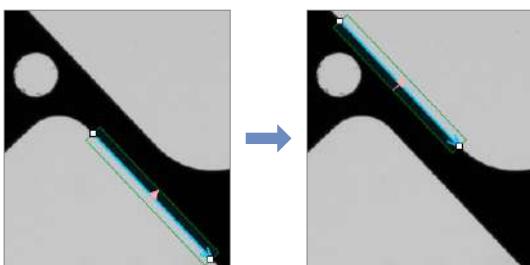
#### ● Changing the width of the edge detection range

After clicking to select the edge detection range, when you bring the mouse cursor over its frame, the mouse cursor changes to or . Adjust the width of the edge detection range by dragging the mouse.



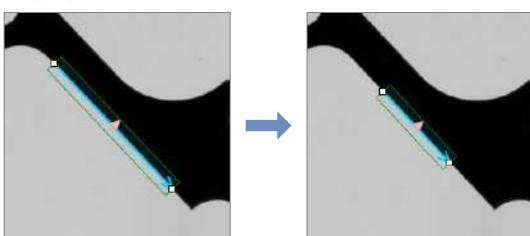
#### ● Changing the position of the edge detection range

When you bring the mouse cursor over the edge detection range, the mouse cursor changes to . Adjust the position of the edge detection range by dragging the mouse.

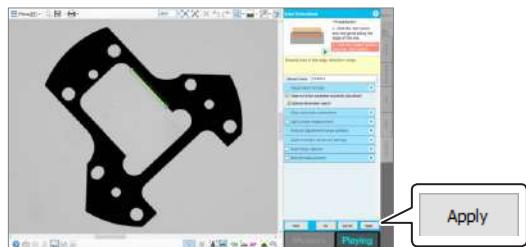


#### ● Changing the angle and length of the edge detection range

When you bring the mouse cursor to the handle on the start/end point of the edge detection range, the mouse cursor changes to . Adjust the angle and length of the edge detection range by dragging the mouse.

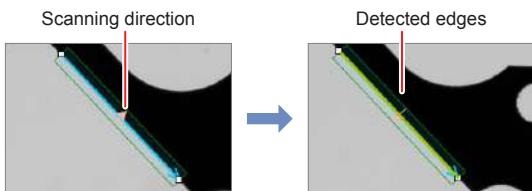


### 4 Click [Apply].



#### Technical Hint

Scan the edge detection range in the direction of the arrow, and detect the edge.



When more than one edge is detected, the guide displays a dropdown list. The edges are listed from the one closest to the center line that connects the start and end points of the edge detection area.

Multiple edges are detected.  
Edges can be selected via dropdown list.

1st 1:LINE001

Select the edge to be used for the measurement by clicking the blue text portion or selecting one from the list. The selected edge is reflected in the preview screen.  
When [X] is clicked, the measurement result by the selected edge is displayed, and the guide display returns to its original state.

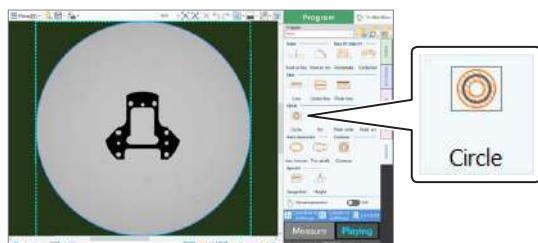
### 5 Click [OK].

The setting of the lines measurement is confirmed and the screen returns to the initial screen of the [Program] mode.

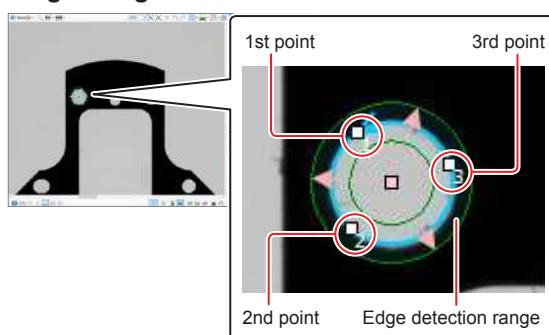
## ■ Range of Circles

In this section, explanations are given with an example of [Circle] of the element tool.

### 1 Click [Circle] under the [Element] tab.



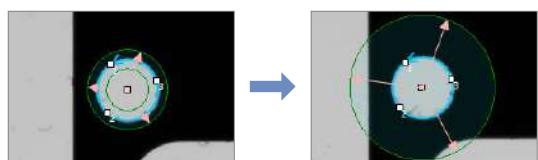
### 2 Specify three points of the edge detection range along the circle to be measured.



### 3 Edit the edge detection range as necessary.

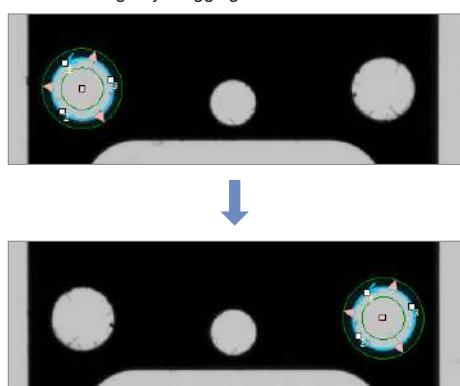
#### ● Changing the width of the edge detection range

When you bring the mouse cursor over the frame of edge detection range, the mouse cursor changes to  $\leftrightarrow$  or  $\uparrow\downarrow$ . Adjust the width of the edge detection range by dragging the mouse.



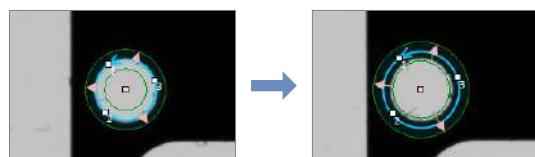
#### ● Changing the position of the edge detection range

When you bring the mouse cursor over the edge detection range, the mouse cursor changes to  $\leftrightarrow\downarrow\uparrow$ . Adjust the position of the edge detection range by dragging the mouse.



### ● Changing the size of the edge detection range

When you bring the mouse cursor on a handle  $\square$  on the 3 points specifying the edge detection range, the mouse cursor changes to  $+$ . Adjust the size of the edge detection range by dragging the mouse.

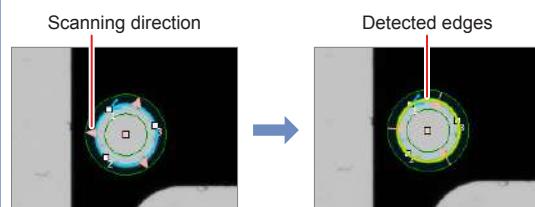


### 4 Click [Apply].



#### Technical Hint

Scan the edge detection range in the direction of the arrow, and detect the edge.



When more than one edge is detected, the guide displays a dropdown list. The edges are listed from the one closest to the center line that connects the three points of the edge detection area.



Select the edge to be used for the measurement by clicking the blue text portion or selecting one from the list. The selected edge is reflected in the preview screen.

When [x] is clicked, the measurement result by the selected edge is displayed, and the guide display returns to its original state.

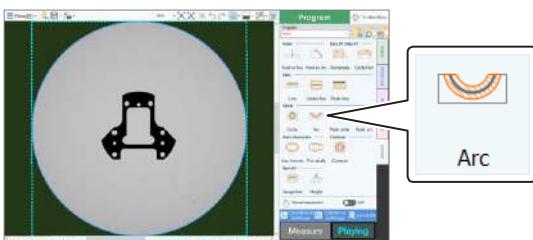
### 5 Click [OK].

The setting of the circle measurement is confirmed and the screen returns to the initial screen of the [Program] mode.

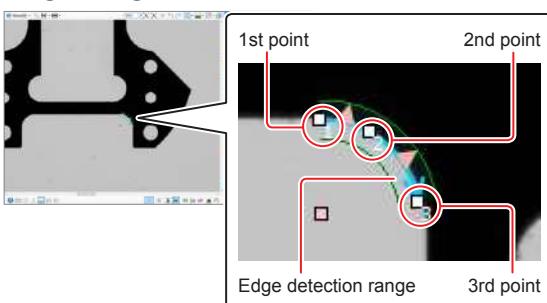
## ■ Range of Arcs

In this section, explanations are given with [Arc], an option on the [Element] tab.

### 1 Click [Arc] under the [Element] tab.



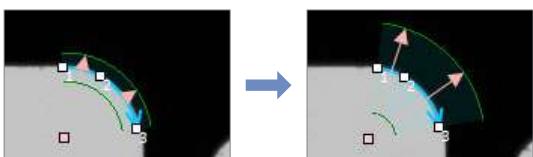
### 2 Specify three points of the edge detection range along the arc to be measured.



### 3 Edit the edge detection range as necessary.

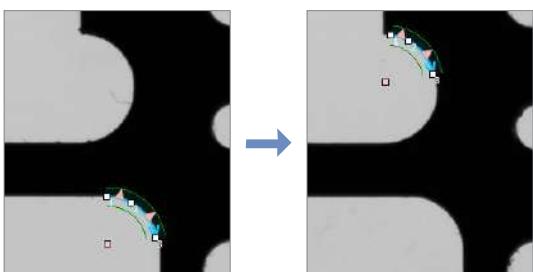
#### ● Changing the width of the edge detection range

When you bring the mouse cursor over the frame of edge detection range, the mouse cursor changes to  $\leftrightarrow$  or  $\downarrow\uparrow$ . Adjust the width of the edge detection range by dragging the mouse.



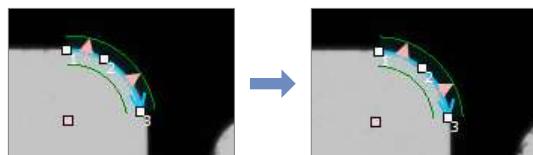
#### ● Changing the position of the edge detection range

When you bring the mouse cursor over the edge detection range, the mouse cursor changes to  $\nabla\nabla$ . Adjust the position of the edge detection range by dragging the mouse.

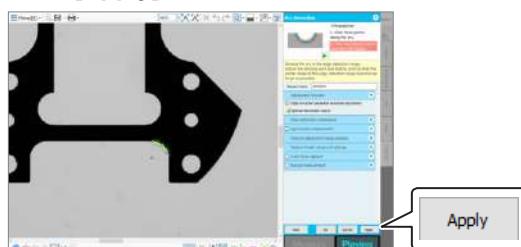


#### ● Changing the shape of the edge detection range

When you bring the mouse cursor on a handle  $\square$  on the 3 points specifying the edge detection range, the mouse cursor changes to  $+$ . Adjust the shape of the edge detection range by dragging the mouse.

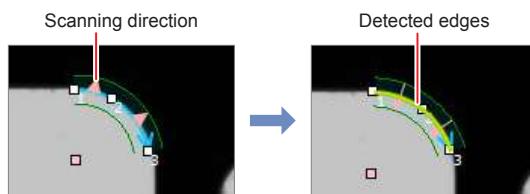


### 4 Click [Apply].



#### Technical Hint

Scan the edge detection range in the direction of the arrow, and detect the edge.



When more than one edge is detected, the guide displays a dropdown list. The edges are listed from the one closest to the center line that connects the three points of the edge detection area.

Multiple edges are detected.  
Edges can be selected via dropdown list.

1st 1:ARCE001

Select the edge to be used for the measurement by clicking the blue text portion or selecting one from the list. The selected edge is reflected in the preview screen.

When [x] is clicked, the measurement result by the selected edge is displayed, and the guide display returns to its original state.

### 5 Click [OK].

The setting of the arc measurement is confirmed and the screen returns to the initial screen of the [Program] mode.

## ■ Point on Line

In this section, explanations are given with an example of [Point on line] of the element tool.

### 1 Click [Point on line] under the [Element] tab.

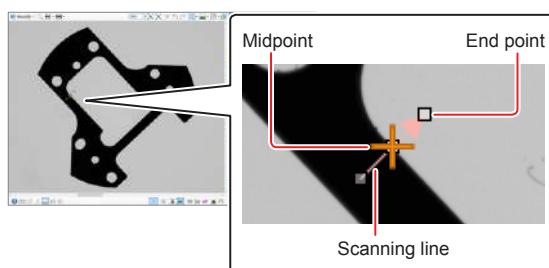


### 2 Specify the midpoint and end point for the scanning line on the part of the point to be measured.

Create the scanning line so that the point to be measured becomes the midpoint.

Create the scanning line by the following methods.

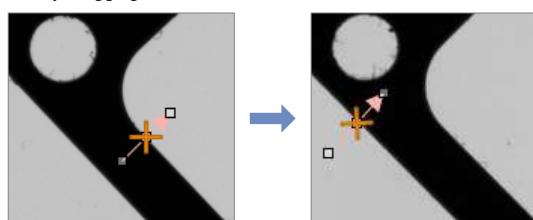
- Click midpoint and end point.
- Drag from midpoint to end point.



### 3 Edit the scanning line as necessary.

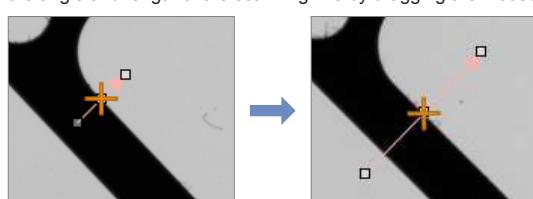
#### ● Changing the scanning line position

When you bring the mouse cursor over the scanning line, the mouse cursor changes to . Adjust the position of the scanning line by dragging the mouse.

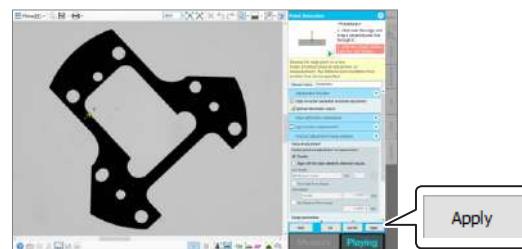


#### ● Changing the angle and length of the scanning line

When you bring the mouse cursor to the handle on the start/end point of the scanning line, the mouse cursor changes to . Adjust the angle and length of the scanning line by dragging the mouse.

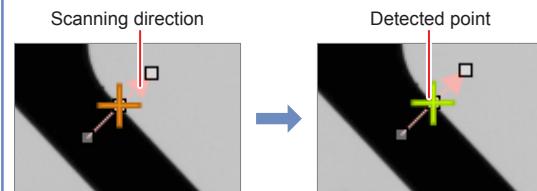


### 4 Click [Apply].

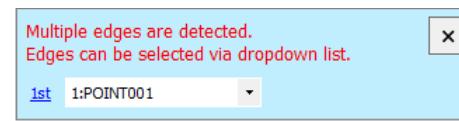


#### Technical Hint

The scanning line is scanned in the direction of the arrow to detect points.



When more than one point is detected, the guide displays a dropdown list. The points are listed from the one closest to the midpoint of the scanning line.



Select the point to be used for the measurement by clicking the blue text portion or selecting one from the list. The selected point is reflected in the preview screen.

When [x] is clicked, the measurement result by the selected point is displayed, and the guide display returns to its original state.

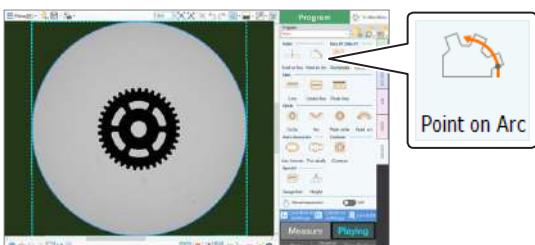
### 5 Click [OK].

The setting of the point is confirmed and the screen returns to the initial screen of the [Program] mode.

## ■ Point on Arc

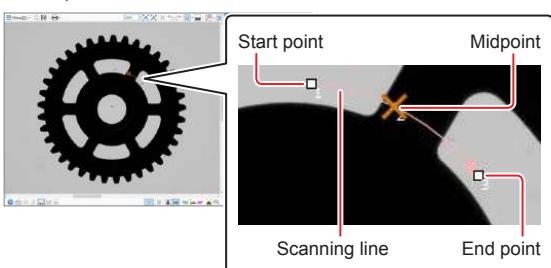
In this section, explanations are given with [Point on Arc], an option on the [Element] tab.

### 1 Click [Point on Arc] under the [Element] tab.

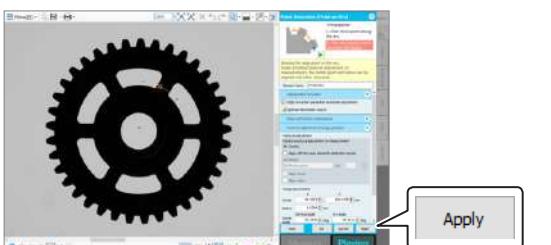


### 2 Specify the start point, midpoint and end point for the scanning line on the part of the point to be measured.

Create the scanning line so that the point to be measured becomes the midpoint.

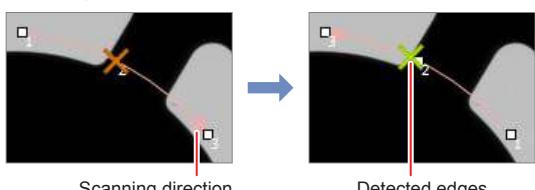


### 3 Click [Apply].



#### Technical Hint

The scanning line is scanned in the direction of the arrow to detect edges.



When more than one edge is detected, the guide displays a dropdown list. The edges are listed from the one closest to the midpoint of the scanning line.



Select the edge to be used for the measurement by clicking the blue text portion or selecting one from the list. The selected edge is reflected in the preview screen. When [x] is clicked, the measurement result by the selected edge is displayed, and the guide display returns to its original state.

### 4 Edit the scanning line and click [Apply] as necessary.

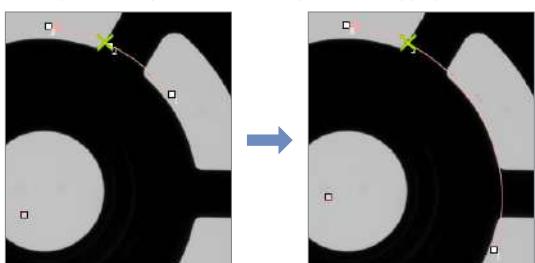
#### ● Changing the scanning line position

When you bring the mouse cursor over the scanning line, the mouse cursor changes to . Adjust the position of the scanning line by dragging the mouse.



#### ● Changing the shape of scanning line

When you bring the mouse cursor to the handle on the start/end point of the scanning line, the mouse cursor changes to . Adjust the angle and length of the scanning line by dragging the mouse.



### 5 Click [OK].

The setting of the point (on the arc) element is confirmed and the screen returns to the initial screen of the [Program] mode.

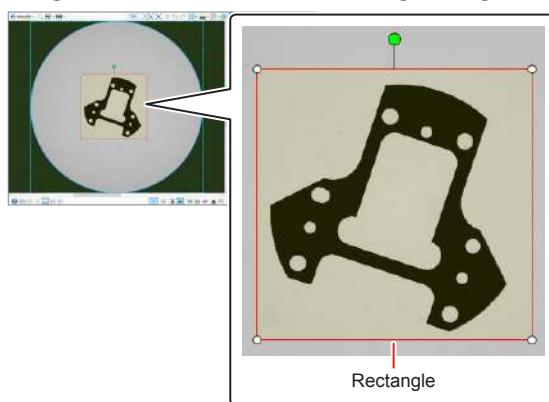
## ■ Rectangle Range

In this section, explanations are given with [Contour], an option on the [Element] tab.

### 1 Click the [Contour] under the [Element] tab.



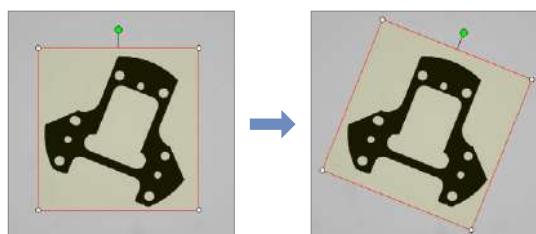
### 2 Drag the mouse to draw a rectangle range.



### 3 Edit the rectangle range as necessary.

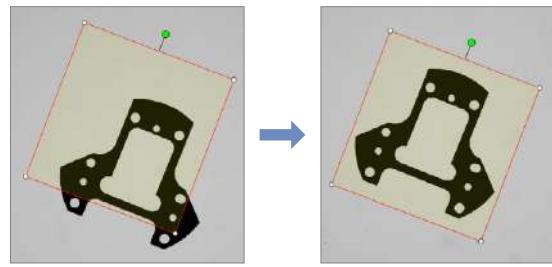
#### ● Changing the angle of the rectangle range

When you bring the mouse cursor to the handle (green dot) on the rectangle range, the mouse cursor changes to a circular arrow. Adjust the angle of the rectangle range by dragging the mouse.



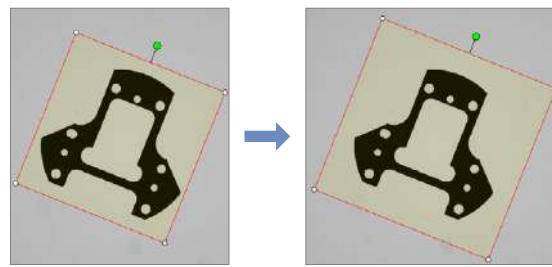
#### ● Changing the position of the rectangle range

When you bring the mouse cursor over the rectangle range, the mouse cursor changes to a double-headed arrow. Adjust the position of the rectangle range by dragging the mouse.

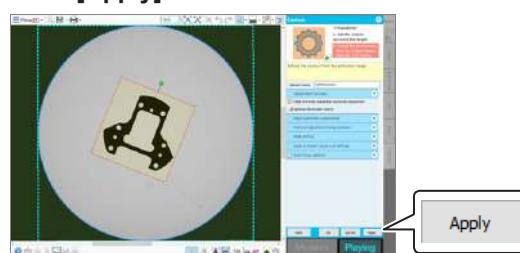


#### ● Changing the width and height of the rectangle range

When you bring the mouse cursor to the frame of the rectangle range, the mouse cursor changes to a horizontal double-headed arrow or a vertical double-headed arrow. Adjust the width and height of the rectangle range by dragging the mouse.



### 4 Click [Apply].

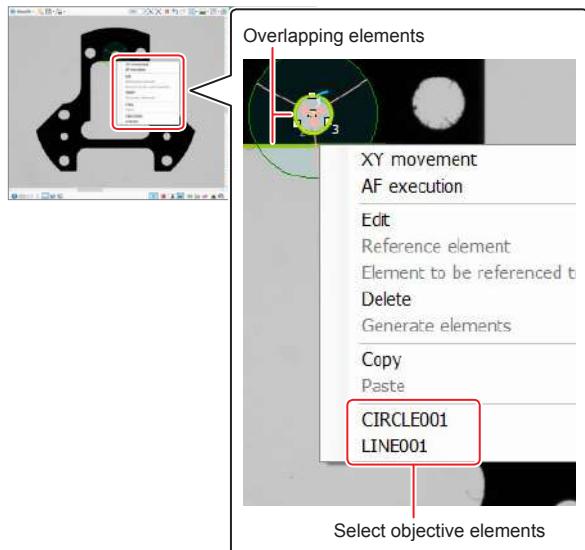


### 5 Click [OK].

The setting of the contour extraction is confirmed and the screen returns to the initial screen of the [Program] mode.

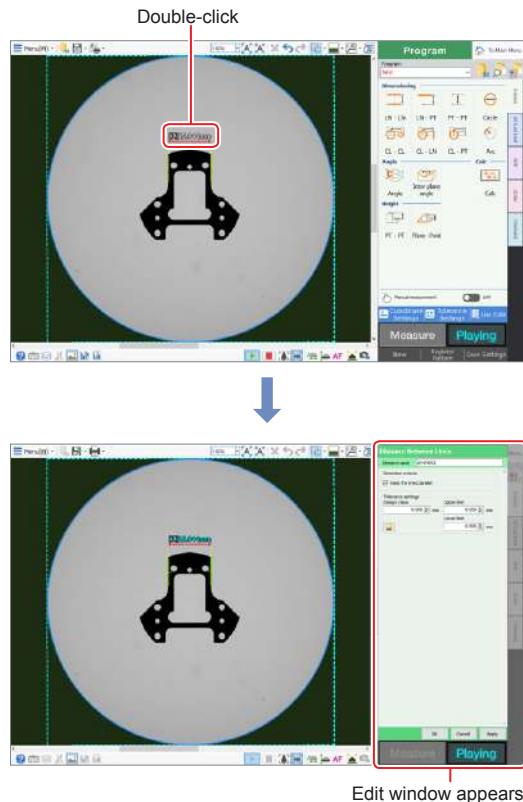
## Selecting Elements

When the measurement item is to be created, the elements which already existed in the preview display can be used without newly creating elements.  
To choose an element that already existed in the preview screen, click that element. When multiple elements are overlapped and it is difficult to select the objective element, right-click the top of those elements. The objective element can be selected from the elements displayed in the context menu.



## Editing Measurement Item

The created measurement items can be edited. Double-click a measurement item you wish to edit in the preview screen, and edit the items when the edit window is displayed.  
Double-click the measurement result or the virtual line to display the edit window of that measurement item. Double-click an element such as a line to display the edit window of that element.



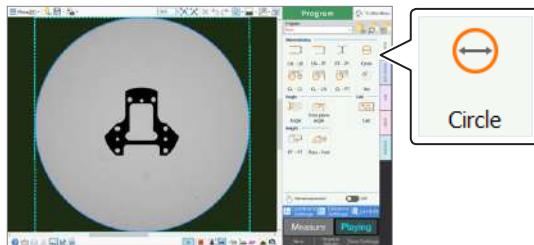
Measurement items can also be edited by selecting [Edit] from the context menu.

## Copying and Moving the Measurement Result

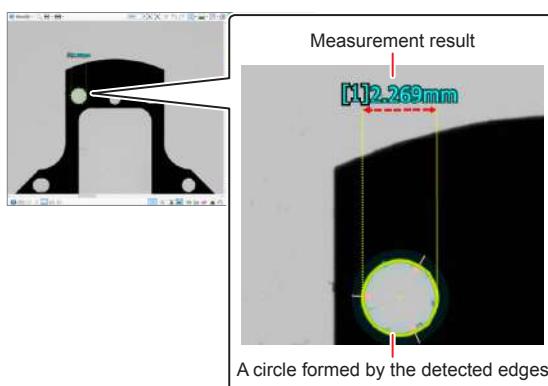
You can measure another item with the same settings by copying a measurement result or a range that has already been set. In this section, explanations are given with [Circle] (diameter/radius of a circle), an option on the [Basics] tab.

For details of the Program mode, refer to "Chapter 4 Program" (Page 4-1).

### 1 Click [Circle] in the [Basics] tab.

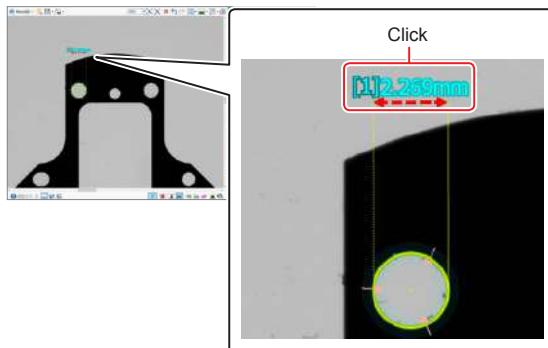


### 2 Specify the 3 points for the edge detection range along the circle to be measured, and then specify the location to insert the measurement result.



### 3 Click [OK].

### 4 Click the measurement result to be copied.



**Reference** You can copy only the edge detection range if you select an edge detection range instead of the measurement results.

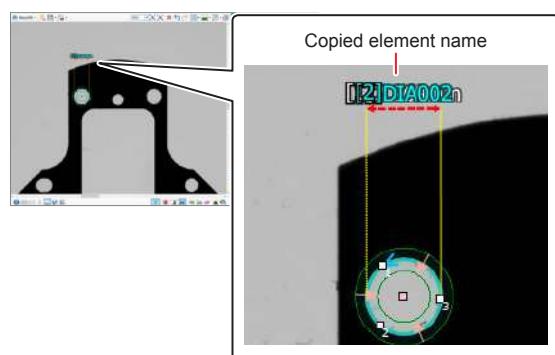
### 5 Select [Menu] → [Edit] → [Copy].

**Reference** You can also copy the measurement result by selecting [Copy] in the context menu of the preview display.

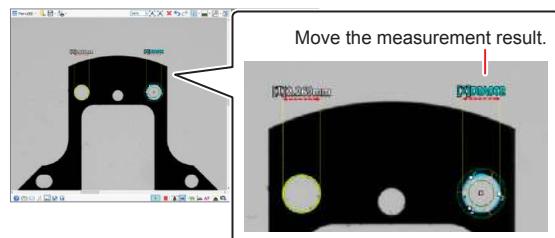
### 6 Select [Menu] → [Edit] → [Paste].

**Reference** You can also paste the measurement result by selecting [Paste] in the context menu of the preview display.

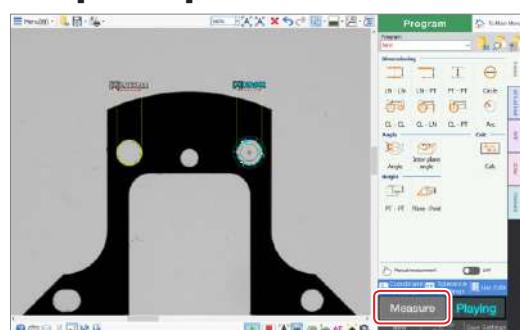
The measurement result will be copied. The element name will be displayed in the copied measurement result instead of the measured value.



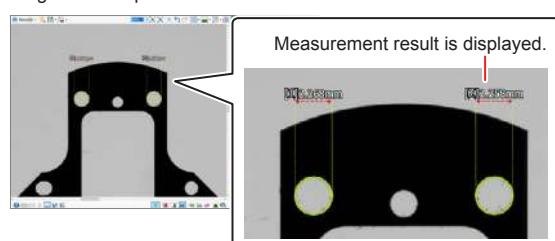
### 7 Drag the copied measurement result with the mouse to move it to the new position.



### 8 Click [Measure].



A new measurement result is displayed according to the detection range of the copied measurement result.



## Operation from the Context Menu During Editing the Element

Right-clicking on the preview screen shows the context menu. This context menu includes operations available from the edit window and the following operations.

- [Return to beginning]

You can re-start the setting of the scanning line by selecting [Return to beginning].

- [Return to previous]

Select [Return to previous] to return to the display previous to the edge detection and measurement result.

## Layer Control

Programs data containing multiple measurement elements is composed of multiple overlaid images (layers) which are automatically generated based on the conditions (light, exposure, height of the Z stage) at the time each measurement element was created.  
Using [Layer Control] editing of the Programs data, not using the target object, but using the image displayed in the preview display.

▶ Important

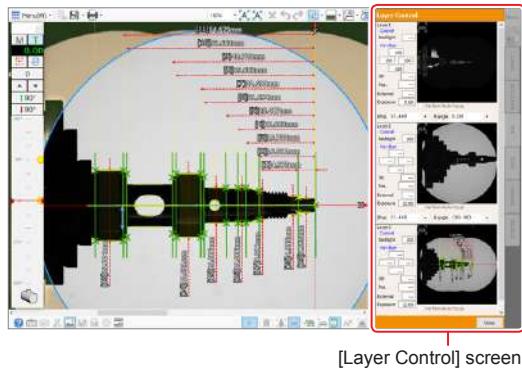
- Change the settings of "Light, exposure" and/or "Height of the Z stage" and create the elements. Layers are automatically generated each time when the changes are applied.
- The layer control can be operated with the Programs data in which an edge detection range has been already set.

### 1 Open the Program data.

□ "Editing Existing Program Data" (Page 4-12)

### 2 Click [Layer Control].

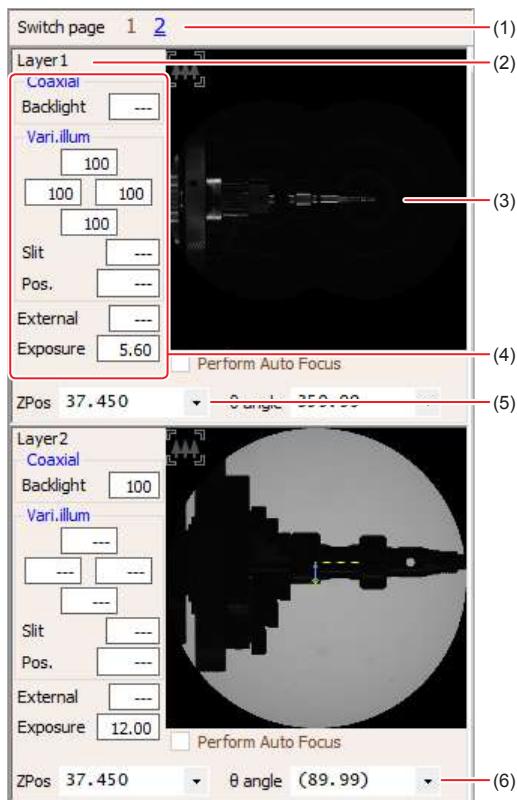
[Layer Control] screen is displayed.



Reference

The [Layer Control] screen is also displayed by selecting [Menu] → [Illumination/Camera/Stage control] → [Layer Control].

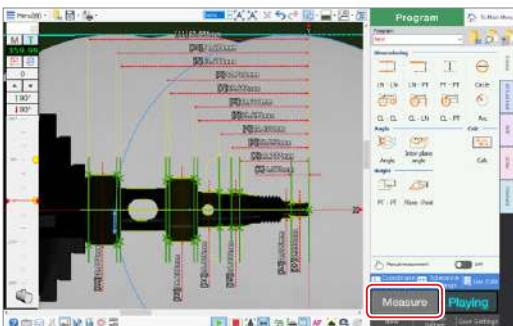
### ● [Layer Control] screen



Number	Description
(1)	Displayed when the number of layers exceeds 100. A page will be added each time the number of layers exceeds 100 sheets. Four pages is the maximum. Click the number to go to the corresponding page.
(2)	Display the name of the layer. <ul style="list-style-type: none"> <li>All Layers</li> <li>The layer to display all the elements.</li> <li>Layer * (* indicates a number)</li> </ul> This layer is created in accordance with the conditions at the time of creating each measurement element.
(3)	Thumbnail image of the corresponding layer. Click the thumbnail image to display the images on the corresponding layer in the preview display.
(4)	Display the light and exposure at the time each layer was created. These values cannot be edited.
(5)	Display the height of the electric Z stage at the time each layer was created. These values cannot be edited.
(6)	Display the θ angle at the time each layer is created. These values cannot be edited. (only when the rotation unit IM-RU1 is used)

**3 Edit the Program data.**

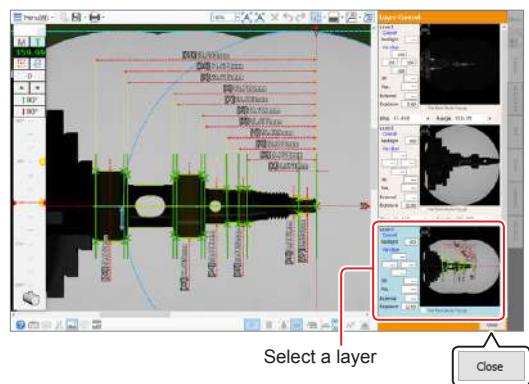
For details about editing the Program data in [Layer Control] screen, refer to the following references.  
□ “Adding a Measurement Element Based on the Measurement Condition for the Layer” (Page 3-20)

**4 Click [Measure].****5 Click [Save Settings].**

The edited Program data is saved.

**■ Adding a Measurement Element Based on the Measurement Condition for the Layer**

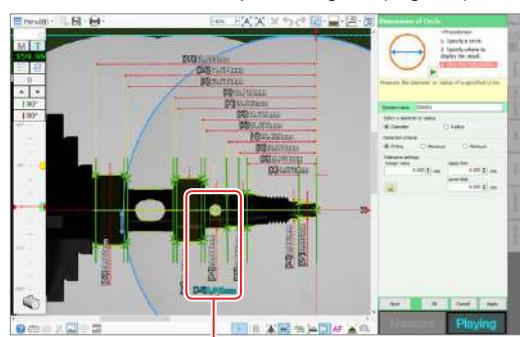
You can add a measurement element based on the measurement condition at the time each layer was created.

**1 Select a layer to which you are going to add a measurement element and click [Close].**

The preview display in accordance with the layer condition is displayed.

**2 Add a measurement element.**

For details, refer to □ “Chapter 4 Program” (Page 4-1).

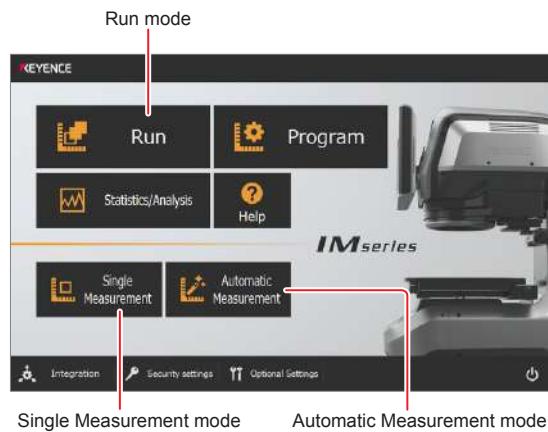


Add a measurement element.

# Measurement Mode and Operation Flow

## Measurement Mode

There are three measurement modes in the IM-8000 Series. The displayed screens differ according to the measurement mode selected on the menu screen and the Program data being used.



Single Measurement mode

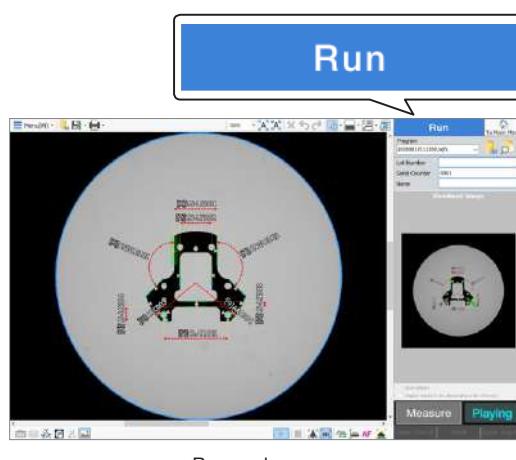
Automatic Measurement mode

## Run Mode

When clicking [Run] on the menu screen, the Run mode screen is displayed.



To use the Run mode, it is necessary to create Program data in the [Program] mode in advance.  
“Operation Flow” (Page 3-23)



&lt;Run mode screen&gt;

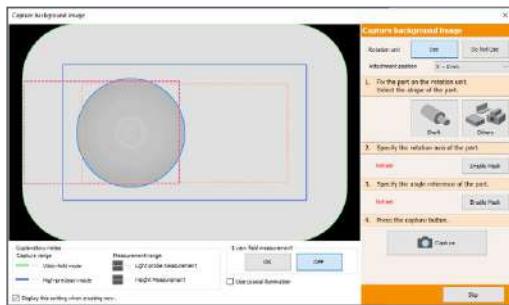
For details on the Run mode, refer to “Chapter 6 Run Mode” (Page 6-1).

Measurement mode	Function
Run	This measurement mode is used in processes where targets are measured repeatedly, as in an inspection process.
Single Measurement	This measurement mode is used to measure single objects, such as measuring prototypes individually.
Automatic Measurement	This measuring mode is for conveniently measuring some basic targets. There is no need to create Program data.

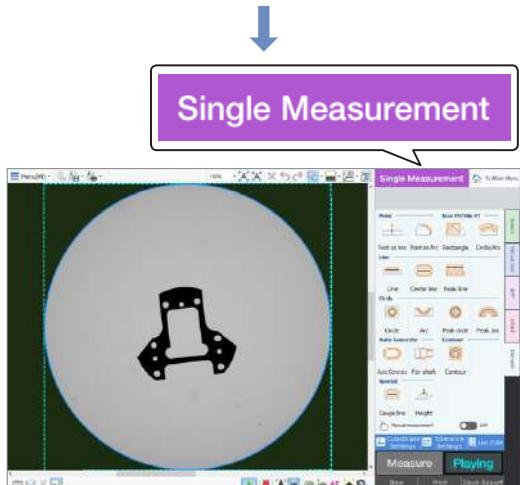
## Measurement Mode and Operation Flow

### ■ Single Measurement Mode

When [Single Measurement] on the menu screen is clicked, the [Capture background image] screen is displayed.  
Set the capture method and click [Capture] to display the single measurement mode screen.



<[Capture background image] screen>

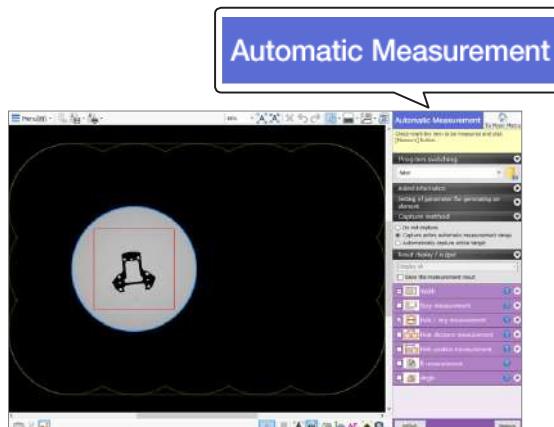


<Single measurement mode screen>

For details on the single measurement mode, refer to □ "Chapter 6 Run Mode" (Page 6-1).

### ■ Automatic Measurement Mode

When clicking [Automatic Measurement] on the menu screen, the automatic measurement mode screen is displayed.



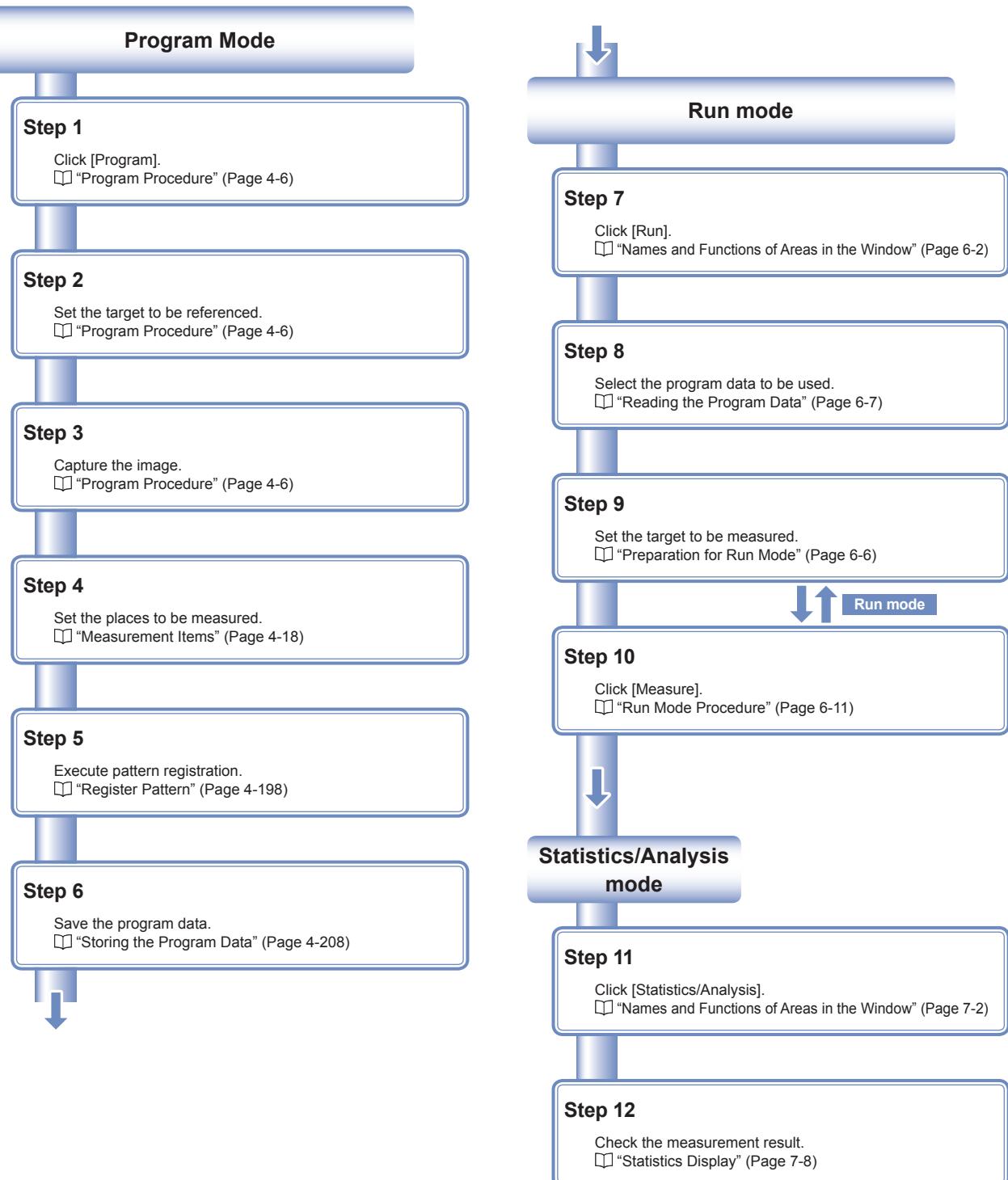
<Automatic measurement mode screen>

For details on the automatic measurement mode, refer to □ "Chapter 9 Automatic Measurement" (Page 9-1).

## Operation Flow

This section explains the operation flow of the IM-8000 Series.  
For details on each operation, see the reference page.

### Run Mode



**■ Single Measurement Mode****Single measurement mode****Step 1**

Click [Single Measurement].  
☞ "Names and Functions of Areas in the Window" (Page 8-2)

**Step 2**

Set the target to be measured.  
☞ "Single Measurement Procedure" (Page 8-6)

**Step 3**

Capture the image.  
☞ "Single Measurement Procedure" (Page 8-6)

**Step 4**

Set the places to be measured.  
☞ "Measurement Items" (Page 8-12)

**Step 5**

Click [Measure].  
☞ "Measure" (Page 8-18)

**Step 6**

Click [Print].  
☞ "Print" (Page 8-19)  
Or  
Click [Save Report].  
☞ "Saving the Single Object Report" (Page 8-21)

# 4

## Program

This chapter explains the operation procedures and functions of the [Program] mode.

4

Program

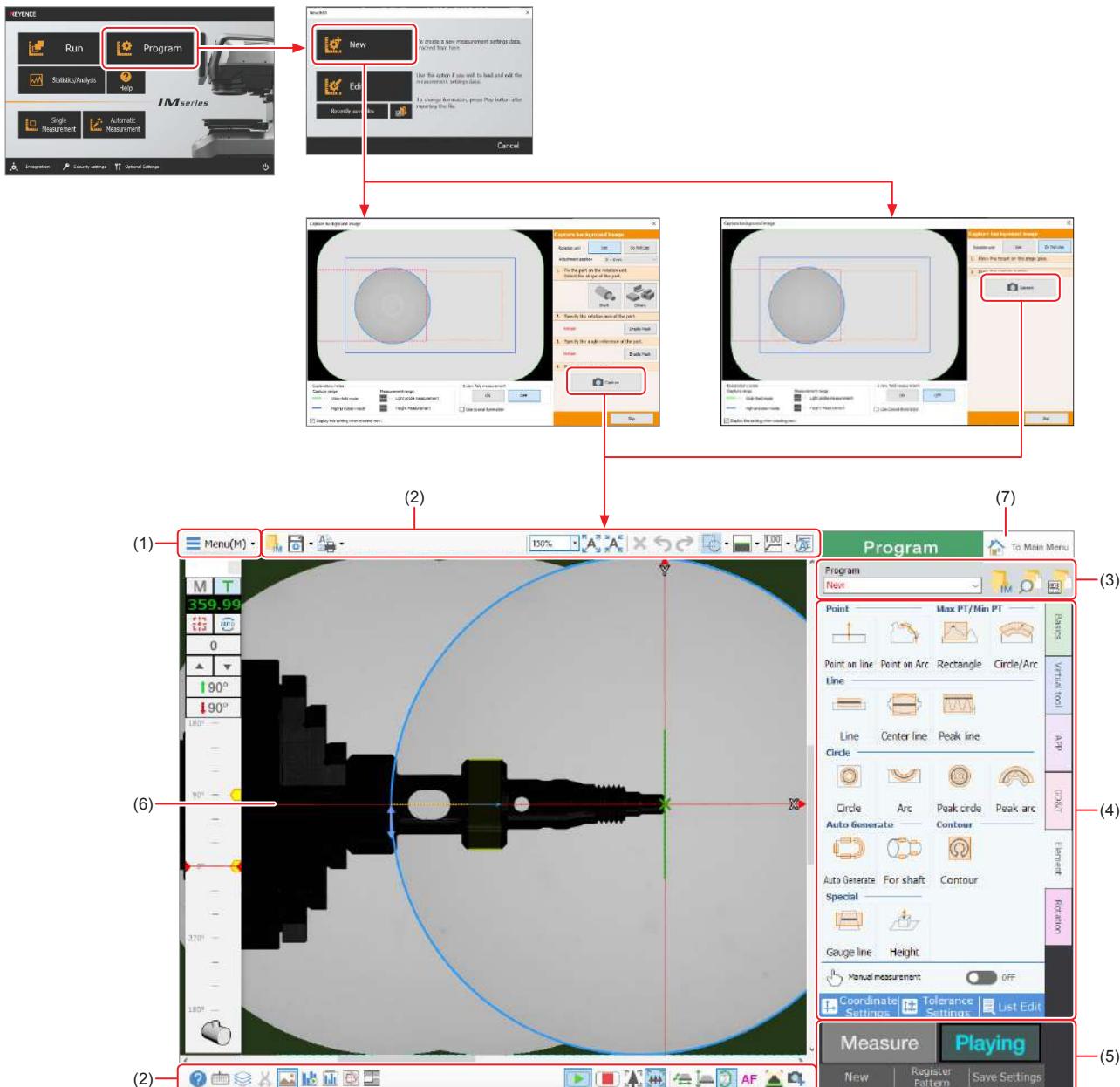
Names and Functions of Areas in the Window .....	4-2
Program Procedure.....	4-6
Measurement Items.....	4-18
Common Control Area .....	4-196
Register Pattern .....	4-198
Light Settings .....	4-200
Storing the Program Data.....	4-208

# Names and Functions of Areas in the Window

This section describes the names and functions of the areas in the window when [Program] is selected.

4

Program



Name	Description
(1) [Menu] dropdown list	Menu options for various functions are displayed in dropdown list. For details of each menu, refer to □ "Chapter 10 Menu" (Page 10-1).
(2) Toolbar	This bar contains buttons for frequently used functions. □ "Toolbar" (Page 4-4)
(3) Program data specification area	Used to set the program data. □ "Editing Existing Program Data" (Page 4-12)

Name	Description																		
(4) Measurement operation area	<p>This area contains buttons related to the measurement operation. By selecting tabs, you can select various measurement operation methods. During measurement, a measurement guide is displayed here.</p> <table border="1"> <tr> <td>[Basics] tab</td><td>Used to conduct basic measurement of the target, such as "Dimensioning" or "Angle" measurement. For details of the [Basics] tab, refer to <a href="#">"Basics"</a> (Page 4-24).</td></tr> <tr> <td>[Virtual tool] tab</td><td>Used to draw a virtual line/point such as a midpoint or intersection based on the points or lines detected using the options on the [Basics] or [Element] tab. For details of the [Virtual tool] tab, refer to <a href="#">"Virtual Tool"</a> (Page 4-41).</td></tr> <tr> <td>[APP] tab</td><td>Used to conduct application measurement, such as "Pitch Distance" or "Thickness Measurement". For details of the [APP] tab, refer to <a href="#">"Application"</a> (Page 4-57).</td></tr> <tr> <td>[GD&amp;T] tab</td><td>Used to measure geometric dimension and tolerance such as "Straightness" or "Roundness". For details of the [GD&amp;T] tab, refer to <a href="#">"GD&amp;T"</a> (Page 4-109).</td></tr> <tr> <td>[Element] tab</td><td>Used to detect measurement elements such as points or lines. Using these elements together with virtual lines and points allows various measurements. For details of the [Element] tab, refer to <a href="#">"Element"</a> (Page 4-123).</td></tr> <tr> <td>[Rotation] tab</td><td>Used to measure a target by rotating it such as "Degrees of Rotation" or "Coaxiality". (only when the rotation unit IM-RU1 is used) For details of the [Rotation] tab, refer to <a href="#">"Rotation Measurement"</a> (Page 4-166).</td></tr> <tr> <td>[Coordinate Settings]</td><td>Used to set the coordinates used as the base for dimensioning. When base coordinates are set, the distances from the X- and Y-coordinates can be measured as well as normal dimensions. For details of the coordinate settings, refer to <a href="#">"Coordinate Settings"</a> (Page 4-182).</td></tr> <tr> <td>[Tolerance Settings]</td><td>This button is used to set the tolerance for all items in the measurement result. When you set the tolerance and click [OK], the evaluation is reflected in the measurement result. For details of the batch tolerance setting, refer to <a href="#">"Batch Tolerance Settings"</a> (Page 4-189).</td></tr> <tr> <td>[List Edit]</td><td>This button is used to sort or show/hide measurement results displayed on the screen. For details of the list edit, refer to <a href="#">"Edit Element List"</a> (Page 4-194).</td></tr> </table>	[Basics] tab	Used to conduct basic measurement of the target, such as "Dimensioning" or "Angle" measurement. For details of the [Basics] tab, refer to <a href="#">"Basics"</a> (Page 4-24).	[Virtual tool] tab	Used to draw a virtual line/point such as a midpoint or intersection based on the points or lines detected using the options on the [Basics] or [Element] tab. For details of the [Virtual tool] tab, refer to <a href="#">"Virtual Tool"</a> (Page 4-41).	[APP] tab	Used to conduct application measurement, such as "Pitch Distance" or "Thickness Measurement". For details of the [APP] tab, refer to <a href="#">"Application"</a> (Page 4-57).	[GD&T] tab	Used to measure geometric dimension and tolerance such as "Straightness" or "Roundness". For details of the [GD&T] tab, refer to <a href="#">"GD&amp;T"</a> (Page 4-109).	[Element] tab	Used to detect measurement elements such as points or lines. Using these elements together with virtual lines and points allows various measurements. For details of the [Element] tab, refer to <a href="#">"Element"</a> (Page 4-123).	[Rotation] tab	Used to measure a target by rotating it such as "Degrees of Rotation" or "Coaxiality". (only when the rotation unit IM-RU1 is used) For details of the [Rotation] tab, refer to <a href="#">"Rotation Measurement"</a> (Page 4-166).	[Coordinate Settings]	Used to set the coordinates used as the base for dimensioning. When base coordinates are set, the distances from the X- and Y-coordinates can be measured as well as normal dimensions. For details of the coordinate settings, refer to <a href="#">"Coordinate Settings"</a> (Page 4-182).	[Tolerance Settings]	This button is used to set the tolerance for all items in the measurement result. When you set the tolerance and click [OK], the evaluation is reflected in the measurement result. For details of the batch tolerance setting, refer to <a href="#">"Batch Tolerance Settings"</a> (Page 4-189).	[List Edit]	This button is used to sort or show/hide measurement results displayed on the screen. For details of the list edit, refer to <a href="#">"Edit Element List"</a> (Page 4-194).
[Basics] tab	Used to conduct basic measurement of the target, such as "Dimensioning" or "Angle" measurement. For details of the [Basics] tab, refer to <a href="#">"Basics"</a> (Page 4-24).																		
[Virtual tool] tab	Used to draw a virtual line/point such as a midpoint or intersection based on the points or lines detected using the options on the [Basics] or [Element] tab. For details of the [Virtual tool] tab, refer to <a href="#">"Virtual Tool"</a> (Page 4-41).																		
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[List Edit]	This button is used to sort or show/hide measurement results displayed on the screen. For details of the list edit, refer to <a href="#">"Edit Element List"</a> (Page 4-194).																		
(5) Common control area	<p>This area contains buttons for common functions. <a href="#">"Common Control Area"</a> (Page 4-196)</p> <table border="1"> <tr> <td>[Measure]</td><td>Used to start measurement. <a href="#">"Measure"</a> (Page 4-196)</td></tr> <tr> <td>Status/evaluation display area</td><td>This area indicates the operation status of the head or the evaluation result when [Measure] is pressed. <a href="#">"Status/Evaluation Display Area"</a> (Page 6-20)</td></tr> <tr> <td>[New]</td><td>Create new program data.</td></tr> <tr> <td>[Register Pattern]</td><td>Used to register the target shown in the preview screen as a pattern. Such pattern image registration is required to perform a pattern search. <a href="#">"Register Pattern"</a> (Page 4-198)</td></tr> <tr> <td>[Save Settings]</td><td>Used to save the Program data to the controller's hard drive as a file (*.sqfx). <a href="#">"Storing the Program Data"</a> (Page 4-208)</td></tr> </table>	[Measure]	Used to start measurement. <a href="#">"Measure"</a> (Page 4-196)	Status/evaluation display area	This area indicates the operation status of the head or the evaluation result when [Measure] is pressed. <a href="#">"Status/Evaluation Display Area"</a> (Page 6-20)	[New]	Create new program data.	[Register Pattern]	Used to register the target shown in the preview screen as a pattern. Such pattern image registration is required to perform a pattern search. <a href="#">"Register Pattern"</a> (Page 4-198)	[Save Settings]	Used to save the Program data to the controller's hard drive as a file (*.sqfx). <a href="#">"Storing the Program Data"</a> (Page 4-208)								
[Measure]	Used to start measurement. <a href="#">"Measure"</a> (Page 4-196)																		
Status/evaluation display area	This area indicates the operation status of the head or the evaluation result when [Measure] is pressed. <a href="#">"Status/Evaluation Display Area"</a> (Page 6-20)																		
[New]	Create new program data.																		
[Register Pattern]	Used to register the target shown in the preview screen as a pattern. Such pattern image registration is required to perform a pattern search. <a href="#">"Register Pattern"</a> (Page 4-198)																		
[Save Settings]	Used to save the Program data to the controller's hard drive as a file (*.sqfx). <a href="#">"Storing the Program Data"</a> (Page 4-208)																		
(6) Preview display	The image of the target on the stage is displayed as a preview. When [Start preview] is selected, the preview display is refreshed in real time.																		
(7) [To Main Menu]	Used to exit the [Program] mode and return to the main menu.																		

## Toolbar

The toolbar contains the buttons for the functions frequently used during measurement.

This section describes the functions of the toolbar.

### Upper Bar



#### [Open Program]

Open the previously created program data.



#### [Save As]

Click ▼ and select a format for saving.

"Save As" (Page 10-14)

: Save Program As

: Save single object report

: Save preview image

: Save screen Image

: Save captured image



#### [Print]

Click ▼ and select print parameters.

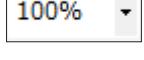
"Print" (Page 10-18)

: Single Object Report

: Preview Image

: Screen Image

: Captured Image



#### [Zoom ratio]

Select the display magnification ratio for the preview display from the dropdown list.



#### [Entire fit display]

Show the entire capture range on the preview display.



#### [Live fit display] (only when playing)

Show the entire field of view that is in play on the preview display.



#### [Delete]

Delete the selected element.



#### [Undo]

Cancel the last operation and reset to the previous status.



#### [Redo]

Cancel the "Undo" operation and repeat the undone operation.



#### [Switch element display]

Click ▼ and switch the element to be displayed in the preview screen.

"Switch element display" (Page 10-61)

: Force Show All Elements

: Show All Elements

: Show Elements Without CAD

: Show CAD Elements and Base Coordinates

: Hide All Elements

: Show all angle elements



#### [Switch Edge Point Trail Display]

Click ▼ and switch the edge point trail to be displayed in the preview screen.

"Switch Edge Point Trail Display" (Page 10-59)

: Show Edge Point Trail

: Show Fitting Lines

: Show Fitting Line + Edge Point Trail

: Hide Fitting Line + Edge Point Trail



#### [Display Result]

Click ▼ and switch the measurement result to be displayed in the preview screen.

"Switching result display" (Page 10-60)

: Display Name

: Display Measurement Value

: Display Difference Value

: Display Design Value/Tolerance



#### [Magnifying glass]

Magnify the area around the mouse cursor.

"Magnifying glass" (Page 10-57)

## ■ Lower Bar

-  **[Help]**  
Displays the help screen.
-  **[On-Screen keyboard]**  
Display On-Screen keyboard.
-  **[Layer Control]**  
Display Layer Control window.  
□ "Layer Control" (Page 3-19)
-  **[Simultaneous real-time display with wide field of view]**  
Display the video preview of the wide-field image on the background in the high-precision measurement mode.
-  **[Display background image]**  
Display the background image.
-  **[Start diagnosis]**  
Check the variance in measurement by the measurement diagnostic mode.  
Displaying/Hiding can be switched from the edit menu.
-  **[Display diagnostic result]**  
The diagnostic result of the measurement diagnostic mode is displayed.  
Displaying/Hiding can be switched from the edit menu.
-  **[Roundness graph]**  
Display in a graph the shift amount distribution from a perfect circle.  
This is displayed only when the rotation unit IM-RU1 is used.
-  **[Image by angle]**  
Display the [Image by angle] dialog box.  
This is displayed only when the rotation unit IM-RU1 is used.
-  **[Start preview]**  
Refresh the displayed contents of the preview display in real time.
-  **[Stop preview]**  
Stop refreshing the preview display.
-  **[High-precision measurement mode]**  
Show the image in the preview display at high magnification.
-  **[Wide-field measurement mode]**  
Shows the image in the preview display at low magnification.
-  **[XY control]**  
Display the [XY control] dialog box.  
□ "Adjusting Position of Electric XY Stage" (Page 3-6)
-  **[Z-Control]**  
Display the [Z-Control] dialog box.  
□ "Adjusting the Height of the Electric Z Stage" (Page 3-5)
-  **[θ control]**  
Display the [θ control] dialog box.  
This is displayed only when the rotation unit IM-RU1 is used.  
□ "Adjusting the Angle of the θ Stage (Only When the Rotation Unit IM-RU1 is Used)" (Page 3-6)
-  **[Autofocus]**  
Perform Auto Focus.
-  **[Change illumination]**  
The [Illumination setting] dialog box appears.  
This is hidden when stopped.  
□ "Light Settings" (Page 4-200)
-  **[Capture]**  
Display the [Capture] dialog box.  
This is hidden when stopped.

# Program Procedure

## Creating New Program Data

### Measure by Placing the Target on the Stage Glass

To perform measurement by placing a target on the stage glass, create Program data by following the procedure below after placing the target on the stage glass.

#### 1 Click [Program] in the main menu.

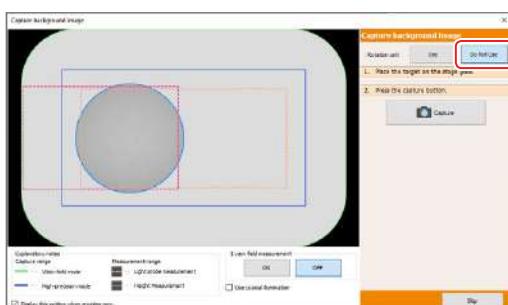


**Reference** New Program data can also be created by clicking [New] from the [Program] screen.  
See "New" (Page 4-196)

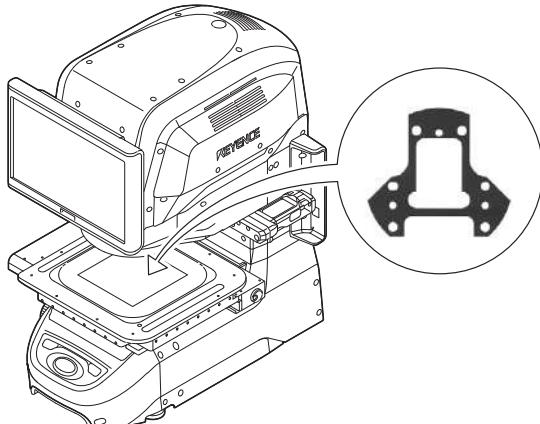
#### 2 Click [New].



#### 3 Click [Do Not Use] "Rotation unit" when the rotation unit IM-RU1 is connected.

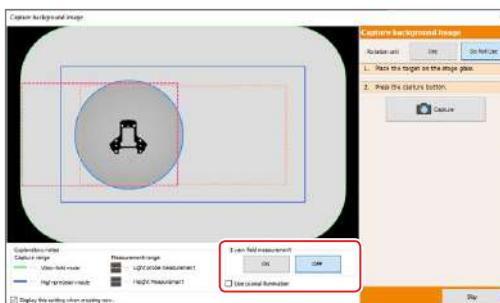


#### 4 Place the target to be measured on the stage glass.



**Important** If the stage glass or lens is dirty, a measurement error may result. Remove dust with compressed air.  
If the stage glass is dirty, clean it by wiping with a dry cloth.

#### 5 Perform the settings if necessary.



##### ○ view field measurement

Click [ON] retains the stage position at the time of closing the [Capture background image] dialog box.  
The stage is fixed on this position during the Run mode.

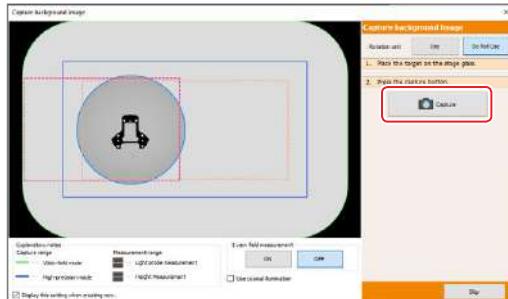
**Point** The position to be fixed can be set only when new Program data is created.

##### ○ Use coaxial illumination

When using coaxial illumination, select the check box.  
If the check box is selected, the pitch of the horizontal orientation inside the capture size will become finer.

**Point** The coaxial illumination IM-DXW12\* and rotation unit IM-RU1 cannot be used at the same time.

## 6 Click [Capture].



Detect automatically the form of the target, and capture a range needed.

The [Program] screen appears after the capturing is completed.

## 7 Set the measurement item.

"Measurement Items" (Page 4-18)

## 8 Register the pattern image.

"Register Pattern" (Page 4-198)

## 9 Save the program data.

"Storing the Program Data" (Page 4-208)



The IM-8005 cannot save Program data for which the wide-field measurement mode is used together with the high-precision measurement mode.

## Program Procedure

### Measure a Target with Shaft Shape by Rotating

When performing the rotation measurement for a target with a shaft shape, cylinder shape, or columnar shape, follow the procedure below to create Program data.

#### 1 Click [Program] in the main menu.

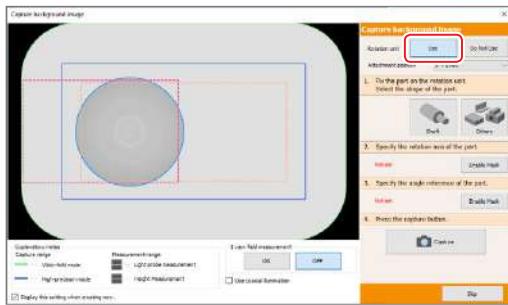


**Reference** New Program data can also be created by clicking [New] from the [Program] screen.  
□ "New" (Page 4-196)

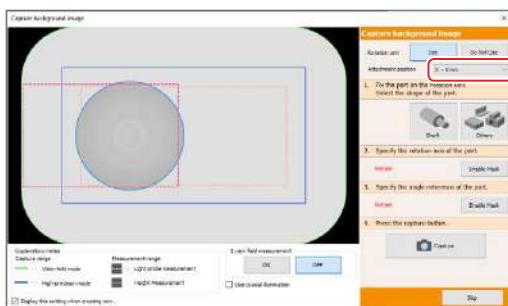
#### 2 Click [New].



#### 3 Click [Use] of "Rotation unit".



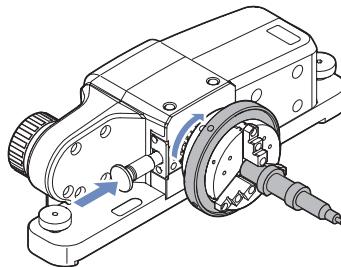
#### 4 Select "Attachment position" depending on the position where the rotation unit IM-RU1 is attached.



□ "Installing the Rotation Unit" (Page 2-7)

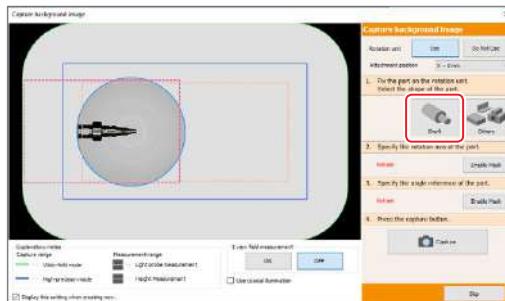
### 5 Attach the chuck and target on the rotation unit IM-RU1.

Fix the power chuck by inserting the lock pin.  
Attach the target by rotating the target attachment ring.  
For details about how to attach the power chuck, refer to □ "Installing the Power Chuck" (Page 2-8).

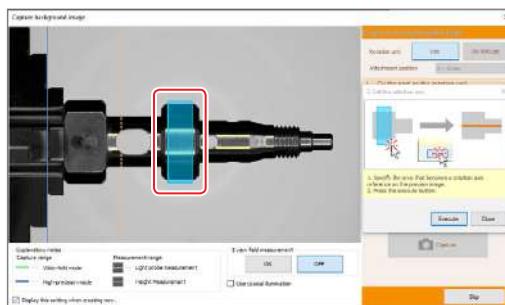


**Point** After attaching is completed, unlock the rotation unit. The measurement cannot be done with the rotation unit locked.

#### 6 Click [Shaft].



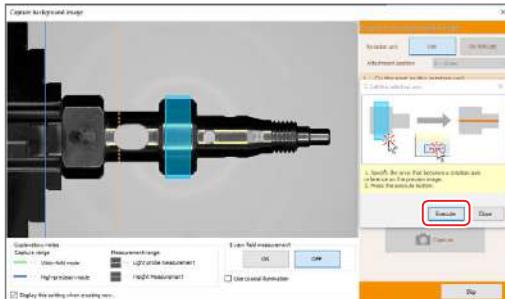
#### 7 Specify by dragging the area to become the reference of the rotation axis on the preview screen



The specified area is displayed with the blue rectangle. The center of the target to be rotated in this area will be registered as a rotation axis.

**Reference** Right-click the position in the capture range to be a center on the preview screen, and select "XY movement" from the displayed menu, then the capture range (blue circle) moves.

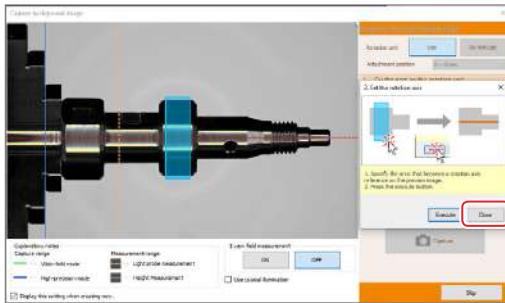
## 8 Click [Execute].



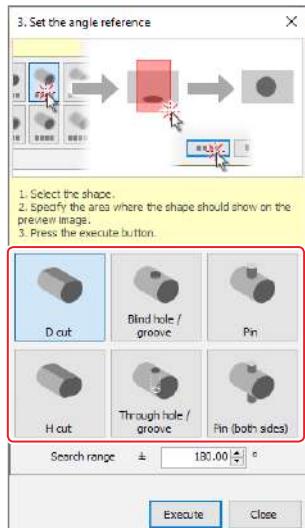
The rotation axis will be the red dotted line on the preview screen after the target is rotated.  
The confirmation dialog box appears.

## 9 Click [OK].

## 10 Click [Close].



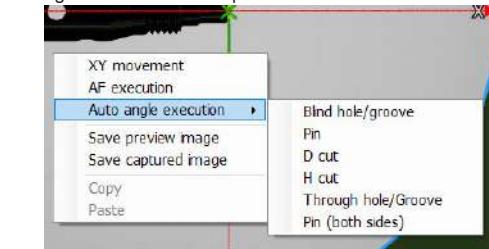
## 11 Select the shape to be made to face the target.



### Reference

The shape to be made to face can be changed when editing Program data.

Select a shape form [Auto angle execution] in the right-click menu of the preview screen.



## 12 Specify by dragging the area including a shape to be made to face on the preview screen.

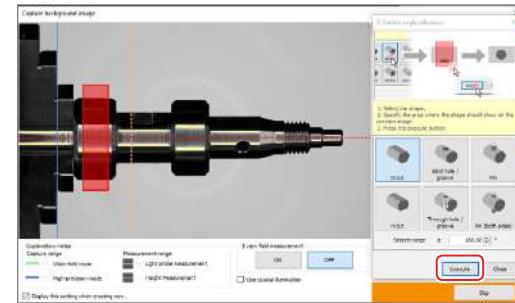


The specified area is displayed with the red rectangle. The angle reference is determined by the shape detected in this area.

### Reference

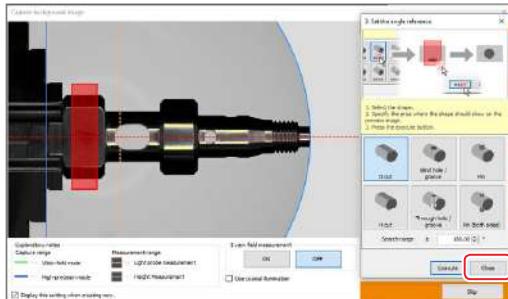
You can change the range where the angle reference is to be searched using [Search range].

## 13 Click [Execute].



The target stops at the position of the angle reference after rotating.  
The confirmation dialog box appears.

## 14 Click [OK].

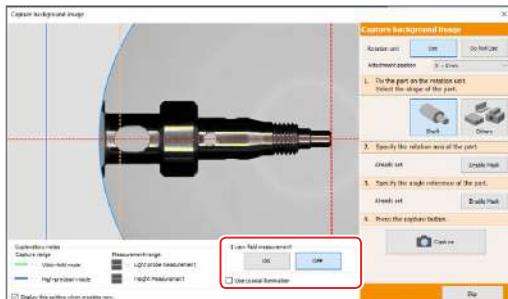
**15 Click [Close].**

The confirmation dialog box appears.

**16 Click [Yes].**

The tip of the target is detected automatically, and the origin of the rotation measurement is set.

- Reference** When clicking [No], the origin is not set at this point. You can set it using [Origin Setting (axis and line)] or [Origin Setting (axis and point)] on the [Rotation] tab of the [Base Coordination Settings] dialog box.

**17 Perform the settings if necessary.****○ view field measurement**

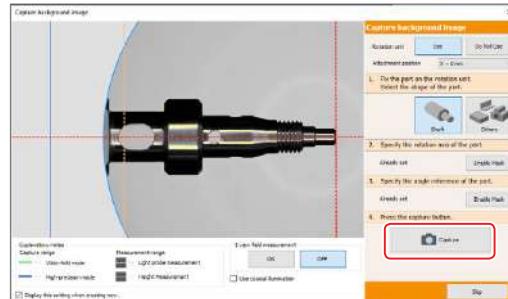
Click [ON] retains the stage position at the time of closing the [Capture background image] dialog box.  
The stage is fixed on this position during the Run mode.

- Point** **The position to be fixed can be set only when new Program data is created.**

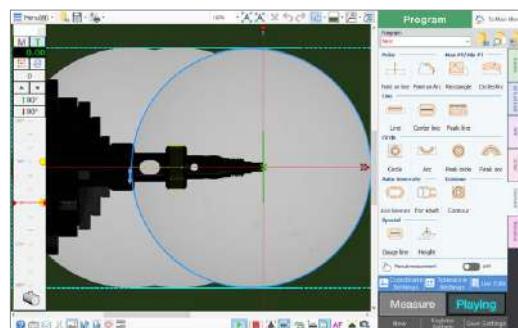
**○ Use coaxial illumination**

When using coaxial illumination, select the check box.  
If the check box is selected, the pitch of the horizontal orientation inside the capture size will become finer.

- Point** **The coaxial illumination IM-DXW12\* and rotation unit IM-RU1 cannot be used at the same time.**

**18 Click [Capture].**

The [Program] screen appears after the capturing is completed. The red dotted lines intersecting perpendicularly shows the X axis (rotation axis) and Y axis. "x" in green color at the intersection shows the origin.

**19 Set the measurement item.**

- "Measurement Items" (Page 4-18)

**20 Register the pattern image.**

- "Register Pattern" (Page 4-198)

**21 Save the program data.**

- "Storing the Program Data" (Page 4-208)

## Measuring a Target with Plate Shape by Rotating

When performing the rotation measurement for a target with a plate shape or box shape like metal cutting or sheet metal, follow the procedure below to create Program data.

### 1 Click [Program] in the main menu.

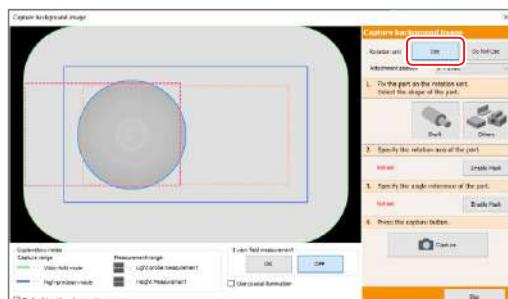


**Reference** A new Program data can also be created by clicking [New] from the [Program] screen.  
□ "New" (Page 4-196)

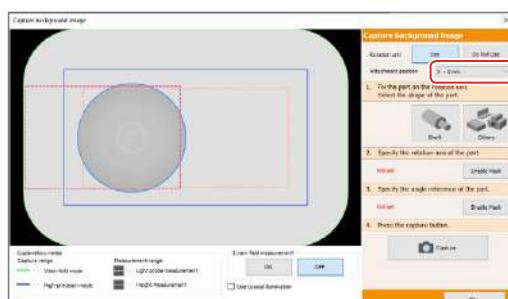
### 2 Click [New].



### 3 Click [Use] of "Rotation unit".



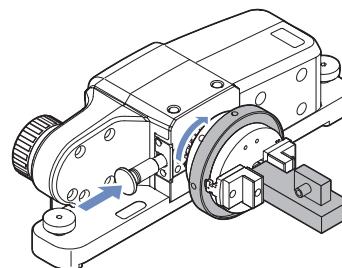
### 4 Select "Attachment position" depending on the position where the rotation unit IM-RU1 is attached.



□ "Installing the Rotation Unit" (Page 2-7)

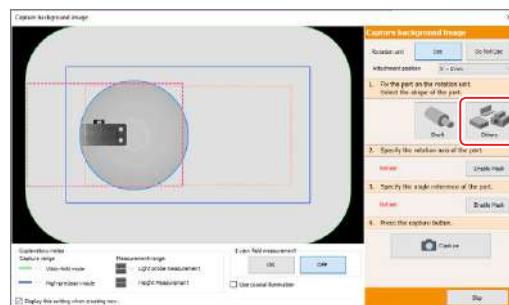
## 5 Attach the 2-jaws chuck and target on the rotation unit IM-RU1.

Fix the power chuck by inserting the lock pin. Attach the target by rotating the target attachment ring. For details about how to attach the power chuck, refer to □ "Installing the Power Chuck" (Page 2-8).



- Point • Attach the target by butting it to the power chuck.
- After attaching is completed, unlock the rotation unit. The measurement cannot be done with the rotation unit locked.

### 6 Click [Others].

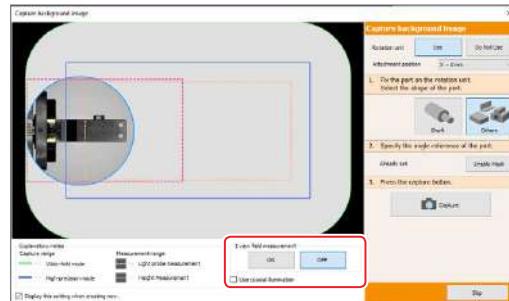


The confirmation dialog box appears.

### 7 Click [Yes].

The target stops at the position of the angle reference after rotating.

### 8 Perform the settings if necessary.



#### ○ 1 view field measurement

Click [ON] retains the stage position at the time of closing the [Capture background image] dialog box. The stage is fixed on this position during the Run mode.

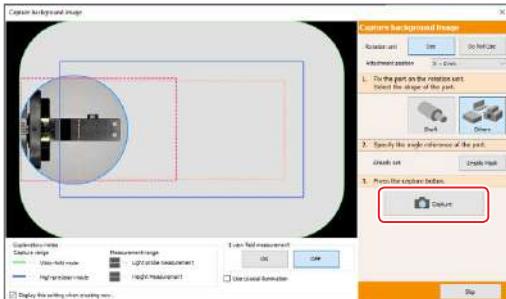
- Point • The position to be fixed can be set only when new Program data is created.

#### ○ Use coaxial illumination

When using coaxial illumination, select the check box. If the check box is selected, the pitch of the horizontal orientation inside the capture size will become finer.

- Point • The coaxial illumination IM-DWX12\* and rotation unit IM-RU1 cannot be used at the same time.

## 9 Click [Capture].

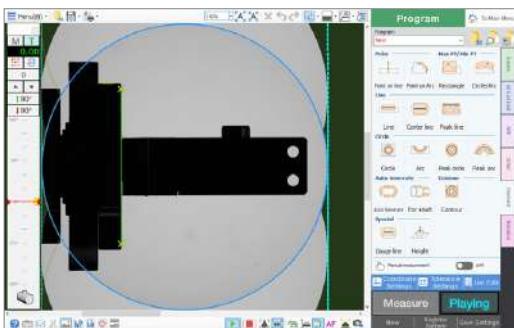


The confirmation dialog box appears.

## 10 Click [Yes].

The [Program] screen appears after the capturing is completed. The reference line is displayed on the end surface of the chuck.

- Reference The reference line can be used as a reference when entire length of the target is measured.



## 11 Set the measurement item.

- "Measurement Items" (Page 4-18)

## 12 Register the pattern image.

- "Register Pattern" (Page 4-198)

## 13 Save the program data.

- "Storing the Program Data" (Page 4-208)

## Editing Existing Program Data

Read the stored Program data.

The read data can be used to add measurement items or for another measurement.

### 1 Open the Program data to be edited.

Open the Program data by one of the following methods.

#### ● Open from main menu screen

- "Opening from the List of Saved Files" (Page 4-13)
- "Opening Recently Used Files" (Page 4-13)

#### ● Open from [Program] screen

- "Opening Recently Used Files" (Page 4-14)
- "Opening from the List of Saved Files" (Page 4-15)
- "Searching for Data Based on a Target (Image)" (Page 4-15)

### 2 Set the measurement item.

- "Measurement Items" (Page 4-18)



The program data is opened with state of [Paused]. In the following cases, click [Start preview] to display the [Overlapping guide] screen, and the operations are required on this screen.

- When changing or adding lighting conditions, exposure time and Z stage height. Correct the position of the measurement target.
- When changing the position of the capture range. Change the capture condition.

- "Overlapping guide" (Page 10-50)

### 3 Update the pattern image as necessary.

- "Register Pattern" (Page 4-198)

### 4 Overwrite and save the Program data or save it under another name.

- "Storing the Program Data" (Page 4-208)
- "Save As" (Page 10-14)

## Read from Main Menu Screen

### ■ Opening from the List of Saved Files

**1** Click [Program] in the main menu.



**2** Click [Edit].



**3** Select the desired file (\*.sqfx, \*.lqfx) and click [Open].



The Program data is open.

## ■ Opening Recently Used Files

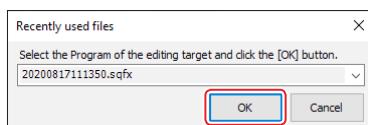
**1** Click [Program] in the main menu.



**2** Click [Recently used files].



**3** Select Program data from the dropdown list and click [OK].



The Program data is open.

## ■ Scanning 2D codes on reports

- 1 Click [Program] in the main menu.



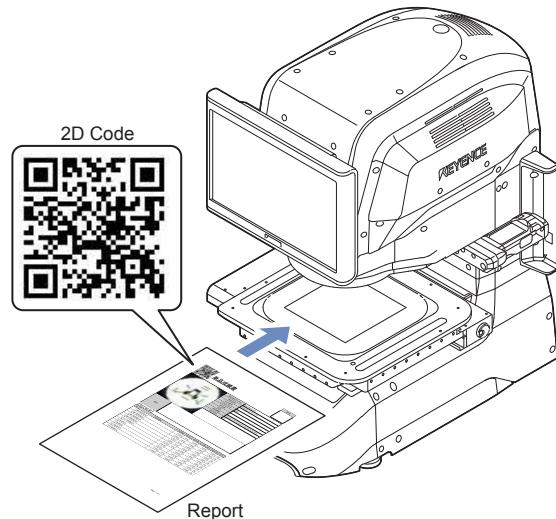
- 2 Click [2D code reading].



The [2D code reading] dialog box appears.



- 3 Scan the 2D code on the printed report with the wide-field camera.

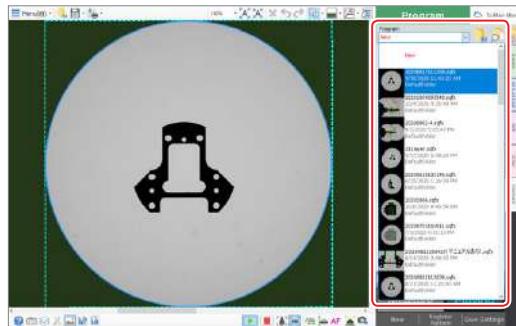


The Program data is open.

## Reading from [Program] Screen

### ■ Opening Recently Used Files

- 1 Specify a Program data from the dropdown list in its specification area.



#### Reference

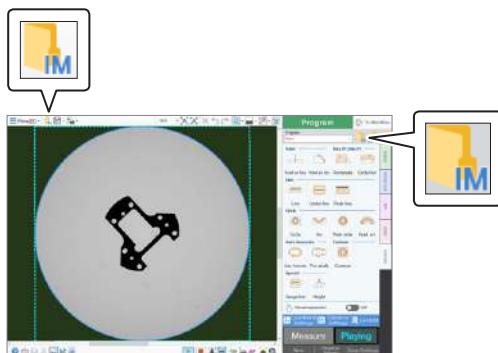
- This dropdown list of the Program data shows up to 50 recently used Program data files. If your desired data is not shown in the dropdown list, search for the data based on the target, or click [Open Program] and find the data.
- You can also open a file by entering the file name of the Program data in the dropdown list.

The Program data is open.

## ■ Opening from the List of Saved Files

### 1 Click [Open Program].

Click either the button on the toolbar or the one in the Program data specification area.



The [Open Program] dialog box appears.

### 2 Select the desired file (\*.sqfx) and click [Open].



**Reference** Click [Search for Program from target image] to search from target image.  
□ "Searching for Data Based on a Target (Image)"  
 (Page 4-15)

The Program data is open.

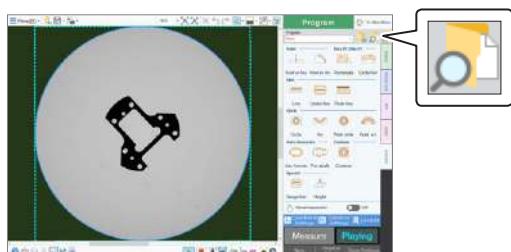
## ■ Searching for Data Based on a Target (Image)

### 1 Place the target to be measured on the stage glass.

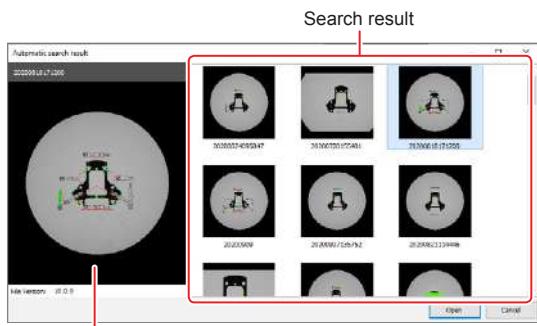
#### ► Important

- To search for the Program data based on a target (image), turn on  [Start preview] on the toolbar.
- Adjust the height of the Z stage.

### 2 In the Program data specification area, click [Auto search].



The Program data which possesses a similar pattern in the image of the captured measurement targets will be searched for, and displayed in the [Automatic search result] screen. The Program data is displayed on the [Automatic search result] screen in a sequence which resembles the images.



Thumbnail image of the selected search result

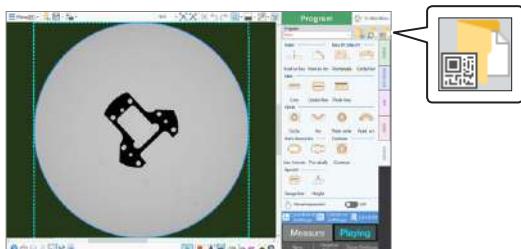
### 3 Select a Program data file and click [Open].



The Program data is open.

**■ Scanning 2D Codes on Reports**

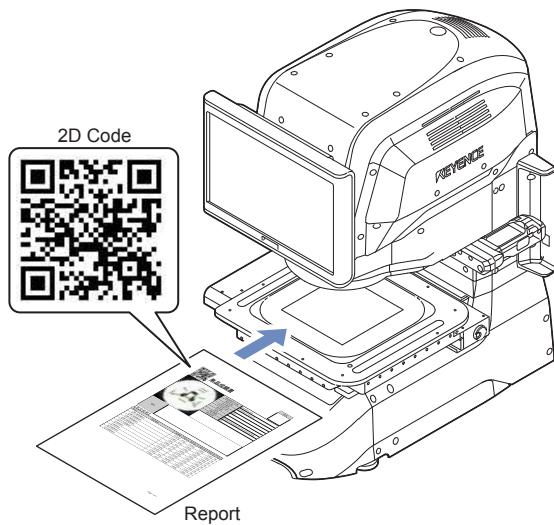
- 1** Click [2D code reading].



The [2D code reading] dialog box appears.



- 2** Scan the 2D code on the printed report with the wide-field camera.



The Program data is open.

## MEMO

4

Program

# Measurement Items

Measurement of the target is performed using the buttons in the [Measurement operation area].

## List of Options in the [Basics] Tab

The [Basics] tab offers options which can be set by following the specified operation flow from the edge (element) detection setting required for measurement to the measurement value display.  
These options are also used for setting measurement locations using previously detected edges.

Tab	Icon	Category	Name	Description	Reference page
Basics		Dimensioning	LN-LN	Measure the distance between two lines.	4-25
			LN-PT	Measure the distance between a line and a point.	4-26
			PT-PT	Measure the distance between two points.	4-27
			Circle	Measure the diameter or radius of a circle.	4-29
			CL-CL	Measure the distance between circles/arcs.	4-30
			CL-LN	Measure the distance between a circle/arc and a line.	4-31
			CL-PT	Measure the distance between a circle/arc and a point.	4-32
			Arc	Measure the radius of an arc.	4-33
		Angle	Angle	Measure the angle between two lines.	4-34
			Inter-plane angle	Measure the angle between two planes.	4-35
		Calc	Calc	Calculate the measurement results.	4-36
		Height	PT-PT	Measure the difference in height of two points.	4-38
			Plane - Point	Measure the difference in height between [Height flat surface] created using the virtual tool and the point.	4-40

## List of Options in the [Virtual tool] Tab

This tab offers options to create virtual tool based on the edges detected by the [Basics] or [Element] tab options.  
To set the measurement details, use the [Basics] tab options.

**► Important** **Virtual tools cannot be created if no line (straight line, circle, or arc) or point is shown on the preview display.**  
Before creating a virtual tool, you need to create a line(s) or a point(s) on the preview display by conducting measurement using the [Basics] tab options or by using the tools on the [Element] tab.

Tab	Icon	Category	Name	Description	Reference page
Virtual tool		Point	Midpoint	Draw a midpoint between two selected points.	4-42
			Intersection	Draw an intersection of two selected lines (straight line, circle, or arc).	4-43
		Connection	ConnectLN	Draw a line which connects two or more selected lines.	4-44
			ConnectArc	Draw a circle which connects two or more selected arcs.	4-45
		Line	Bisector	Draw a bisector between two selected lines or points.	4-46
			Perpendicular	Draw a perpendicular, which passes through a selected point to a selected line.	4-47
			Parallel	Draw a line parallel to a selected line, which passes through a selected point or which is a specified distance away from the selected line.	4-48
			Tangent	Draw a tangent of two selected circles (arcs), or of a circle (arc) and a point.	4-49
			LN via PT	Draw a line with a specified angle, which passes through a selected point.	4-50
			OLS-LN	Draw an OLS line which approximately passes through two or more selected points.	4-51
			MedianCL	Draw a median circle of two selected circles or arcs.	4-52
		Circle	OLS-CL	Draw an OLS circle which approximately passes through two or more selected points.	4-53
			Circle	Draw a circle with a selected point at the center, which passes through another selected point or whose radius is a specified size.	4-54
			Tangent circle	Draw a circle connecting to two selected lines.	4-55
		Plane	Height flat surface	Create a flat surface from two or more selected height elements.	4-56

## List of Options in the [APP] Tab

This tab includes various tools which facilitate complicated measurement such as pitch, maximum/minimum size, and thickness.

Tab	Icon	Category	Name	Description	Reference page
APP		Pitch dis.	Linear pitch	Measure the pitch distance (line distance) between the edges along a straight line.	4-58
			Circular pitch	Measure the pitch distance (curve distance) between the edges along a circumference.	4-63
		Pitch angle	Linear pitch	Measure the pitch angle of the edges along a straight line.	4-68
			Circular pitch	Measure the pitch angle of the edges along a circumference.	4-71
		Thickness	Stick	Measure the maximum/minimum thickness of a cylindrical target.	4-75
			Ring	Measure the maximum/minimum differences in the inner/outer diameters of a doughnut-shaped target.	4-77
		Width	Width	Detect the edges of a target with a complicated shape and measure the width between the edges.	4-79
		Special Measurement	Corner Arc	Measure the corner arc based on the two lines which form a corner.	4-81
			Chamfer	Measure a chamfer based on the two lines which form a chamfer.	4-82
			Slotted Hole	Measure the dimensions of a slot.	4-83
			Reticle	Measure the distance between the edges along the line which passes through the center of a circle.	4-84
			Point Position	Measure the horizontal and vertical distance from the base point.	4-85
			Perimeter	Measure the perimeter of the target.	4-87
			Area	Measure the area of the target.	4-89
			Thread	Measure the major diameter, minor diameter, and pitch diameter of the target.	4-91
		Auto Measurement	Automatic Measurement	This function automatically recognizes the lines, circles, and arcs in the rectangular area and creates elements, and then automatically creates measurement items from these elements for measurement.	4-95
			For shaft	This function automatically recognizes the lines, circles, arcs, and points in the rectangular area and creates elements, and then automatically creates measurement items from these elements for measurement.	4-99
		Shaft	Measure major diameter	Measure the major diameter of the shaft shape from the edge within the rectangle range.	4-102

## List of Options in the [GD&T] Tab

This tab includes options for the measurement of straightness or perpendicularity.

Tab	Icon	Category	Name	Description	Reference page
GD&T		Form	Straightness	Measure the straightness of a straight line segment.	4-110
			Roundness	Measure the roundness of a circle or an arc.	4-111
			Profile	Measure the profile of the specified target range.	4-112
			Flatness	Measure the flatness of the specified plane.	4-114
GD&T		Orientation	Perpendicularity	Measure the perpendicularity of a specified straight line segment to the reference line.	4-115
			Parallelism	Measure the parallelism of a specified straight line segment to the reference line.	4-116
GD&T		Location	Position	Measure the position tolerance of a specified point.	4-117
			Concentricity	Measure the concentricity between two circles or arcs.	4-119
			Symmetry	Measure the symmetry from the reference line.	4-121

## List of Options in the [Element] Tab

This tab includes options to detect elements to be used for measurement such as points or lines. To set the measurement details, use the [Basics] tab options.

Tab	Icon	Category	Name	Description	Reference page
Element		Point	Point on line	Detect a point on the set line.	4-124
			Point on Arc	Detect a point on the set arc.	4-126
		Max PT/Min PT	Rectangle	Detect the maximum or minimum point in the rectangle.	4-128
			Circle/Arc	Detect the maximum or minimum point in the circle or the arc.	4-130
		Line	Line	Detect lines.	4-132
			Center line	Detect the center line between edges.	4-133
			Peak line	Detect the peak line which passes through the peak point detected from the rectangle you specified.	4-135
		Circle	Circle	Detect circles.	4-136
			Arc	Detect arcs.	4-138
			Peak circle	Detect the peak circle which passes through the peak point detected from the circle you specified.	4-140
			Peak arc	Detect the peak arc which passes through the peak point detected from the arc you specified.	4-142
		Auto Generate	Auto Generate	Automatically recognize the line, circle and arc within the rectangle, and create elements	4-143
			For shaft	Automatically recognize the line, circle, arc, and point within the rectangle, and create elements.	4-144
		Contour	Contour	Extract the contour line of the target within the rectangle range.	4-145
		Special Measurement	Gauge line	Draw a line parallel to the rectangle you specified to be a line of the dark width or light width you specified.	4-146
			Height	Create the height element to measure the height from that point.	4-148

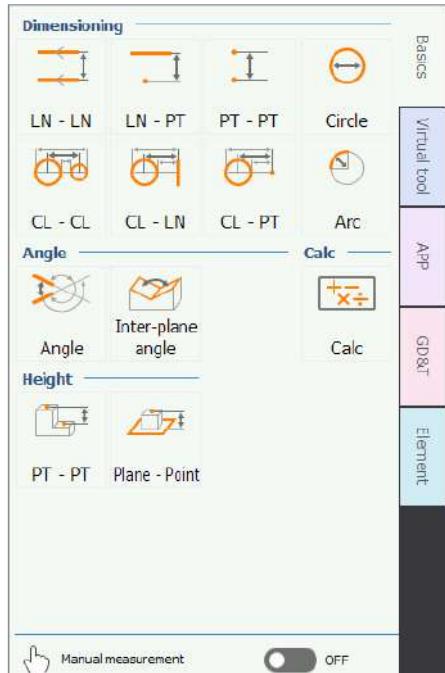
## List of Options in the [Rotation] Tab

This is displayed when the rotation unit IM-RU1 is used. Tools are prepared to be used when measurement is performed by rotating a target.

Tab	Icon	Category	Name	Description	Reference page
Rotation		Measure	Degrees of Rotation	Measure two selected angles, with rotation axis as a center.	4-167
			Roundness	Measure the roundness of the specified cylinder.	4-168
			Cylindricity	Measure the cylindricity of the specified target range.	4-169
			Coaxiality	Measure the coaxiality of the two specified cylinders.	4-170
			Circular run-out	Measure the circumference waving, based on the axis of the specified cylinder.	4-172
			Total run-out	Measure the total run-out, based on the axis of the specified cylinder.	4-173
		Surface	Cylinder	Measure the external edge of the specified target range.	4-174
			Cylinder integration	Create a center axis which connects two or more selected cylinders.	4-176
		Orientation	Length	Detect the angle where the specified line and point distance becomes the max./min.	4-177
			Pin	Detect the angle where a pin included in the specified area is directed downwards.	4-179
			Auto Generate	Generate automatically "Orientation element" which detects the shape to be made to face the target.	4-181

## Basics

Select the [Basics] tab in the [Measurement operation area] to display the basic measurement options.



### ● Dimensioning

These options are used to measure the distance of a specific section of the target.

["Dimensioning" \(Page 4-25\)](#)

### ● Angle

This option is used to measure the angle of two lines, and angle of two flat surfaces of the target.

["Angle" \(Page 4-34\)](#)

### ● Height

This option is used to measure the difference in height of the target.

["Height" \(Page 4-38\)](#)

### ● Calc

This option is used to calculate the measurement results and specific values and show the result on the preview display.

["Calc" \(Page 4-36\)](#)

### ● Manual measurement

"Manual measurement" When the switch on the right is clicked to be turned [ON], the color of icons for tools which can perform the manual measurement will change.

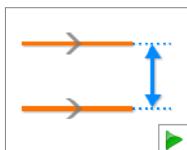
When a new element is created and measured with this state, "Manual measurement" ([Perform manual measurement without extracting edges]) turns [ON] for the created element tools.



- In the edit window of the basic measurement tool, the parameter for the manual measurement is not displayed.
- Even if "Manual measurement" is selected, when selecting and measuring the already created element, the parameter of the selected element is not changed (The manual measurement will not be selected when the selected element is not for the manual measurement).

## Dimensioning

### LN-LN (Distance between Lines)

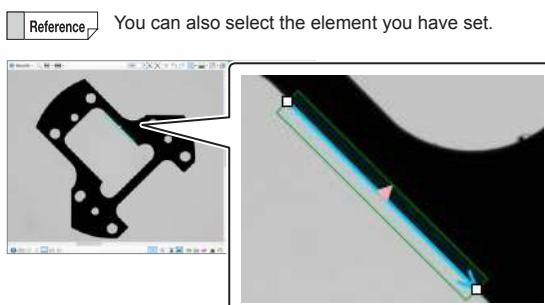


Measure the distance between two lines.

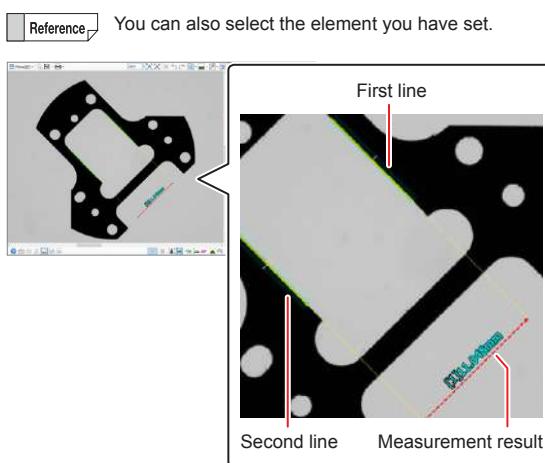
#### 1 Click [LN-LN].



#### 2 Specify the start and end points of the edge detection range along the target line and create the first line.



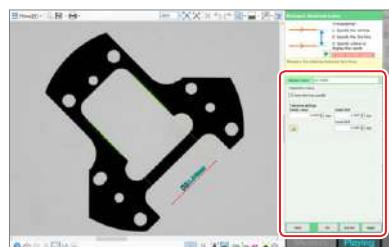
#### 3 Create the edge detection range for the second line in the same way, and then click the location to insert the measurement result.



The measurement result is displayed on the preview display.

**Reference** If no edge was detected in the edge detection range, "Fail" is shown in the common control area and the element name is displayed instead of the measurement result.

#### 4 Set the items related to the measurement.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

##### ○ Element name

Edit the name of the measurement result.

##### ○ Detection criteria

If [Keep the lines parallel] is selected, two lines are detected on the assumption that they are in parallel and the distance between them is measured.

If [Keep the lines parallel] is not selected, the first line is used as the basis and the distance to the midpoint of the second line is measured.

##### ○ Tolerance settings

Input the design value and its tolerance value. This value is used to evaluate whether the measurement value remains within the tolerance range.

☞ "Chapter 6 Run Mode" (Page 6-1)

**Reference** If the upper tolerance is entered when the lower tolerance is 0, "value with minus sign (-) put to the upper tolerance" will be entered automatically for the lower tolerance.



[Alert Settings] dialog box appears.

☞ "Alert Settings" (Page 4-192)

##### ○ Auto angle capture (only when the rotation unit IM-RU1 is used)

- Output pattern

Select this from "Maximum" or "Minimum".

- Specify search range

When this check box is selected, the following can be set.

Link target	Set the reference element of the auto angle capture. Reference angle, Machine reference, Arbitrary element
Angle from the reference	The angle which rotates by the amount of the specified angle from the angle set as the reference is made to be the starting angle of the auto angle capture. Enter a value with + sign when it is larger than the reference element, with - sign when it is smaller than that.
Range	Set the angle range to perform the auto angle capture.
[Set Current Angle]	Click this to set the difference between the current angle and the angle of the reference element as the angle from the reference.

- Specify the angle pitch

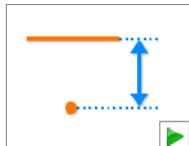
When this check box is selected, the distance of the angle of measurement can be set.

#### 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

**Reference** By clicking [Next], you can continue to use the same tool.

## ■ LN-PT (Distance from Line to Point)

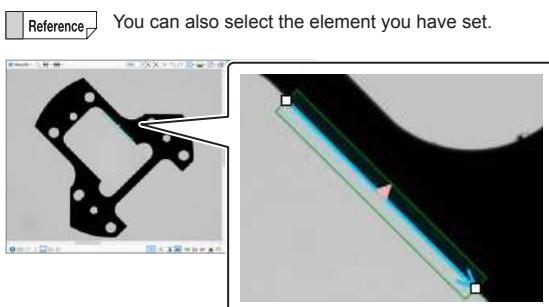


Measure the distance between a line and a point you specified.

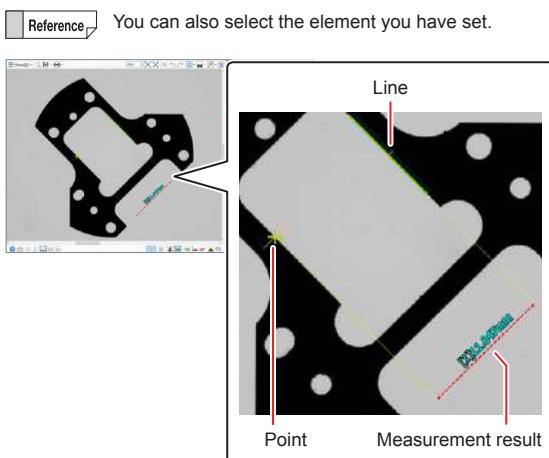
### 1 Click [LN-PT].



### 2 Specify the start and end points of the edge detection range along the line to be measured.



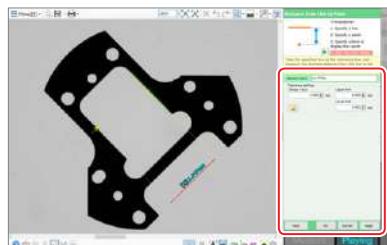
### 3 Create the scanning line which detects points, and then click the location to insert the measurement result.



The measurement result is displayed on the preview display.

If no edge was detected in the edge detection range, "Fail" is shown in the common control area and the element name is displayed instead of the measurement result.

### 4 Set the items related to the measurement.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

#### ○ Element name

Edit the name of the measurement result.

#### ○ Tolerance settings

Input the design value and its tolerance value. This value is used to evaluate whether the measurement value remains within the tolerance range.

□ "Chapter 6 Run Mode" (Page 6-1)

#### □ Reference

If the upper tolerance is entered when the lower tolerance is 0, "value with minus sign (-) put to the upper tolerance" will be entered automatically for the lower tolerance.

#### □ Alert

[Alert Settings] dialog box appears.  
□ "Alert Settings" (Page 4-192)

#### ○ Auto angle capture (only when the rotation unit IM-RU1 is used)

- Output pattern

Select this from "Maximum" or "Minimum".

- Specify search range

When this check box is selected, the following can be set.

Link target	Set the reference element of the auto angle capture. Reference angle, Machine reference, Arbitrary element
Angle from the reference	The angle which rotates by the amount of the specified angle from the angle set as the reference is made to be the starting angle of the auto angle capture. Enter a value with + sign when it is larger than the reference element, with - sign when it is smaller than that.
Range	Set the angle range to perform the auto angle capture.
[Set Current Angle]	Click this to set the difference between the current angle and the angle of the reference element as the angle from the reference.

- Specify the angle pitch

When this check box is selected, the distance of the angle of measurement can be set.

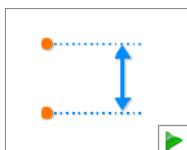
### 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

#### □ Reference

By clicking [Next], you can continue to use the same tool.

## ■ PT-PT (Distance between Points)

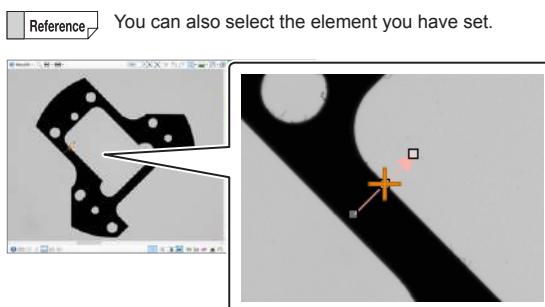


Measure the distance between two points.

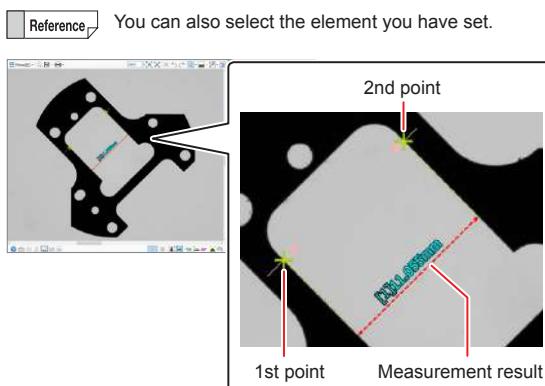
### 1 Click [PT-PT].



### 2 Create the scanning line which detects the first point.



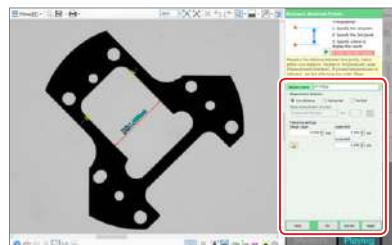
### 3 Create the scanning line which detects the second point, and then click the location to insert the measurement result.



The measurement result is displayed on the preview display.

**Reference** If no edge was detected in the edge detection range, "Fail" is shown in the common control area and the element name is displayed instead of the measurement result.

## 4 Set the items related to the measurement.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

### ○ Element name

Edit the name of the measurement result.

### ○ Measurement direction

Specify the measurement direction using the reference coordinate axis or an arbitrary line as a reference. When selecting items other than [Line distance], [Base measurement direction] can be selected.

- Horizontal of Screen  
Use the horizontal direction on the screen as a reference.
- Reference X axis  
Use the X axis set in the base coordinate as a reference line.
- Reference Y axis  
Use the Y axis set in the base coordinate as a reference line.
- Rotation axis  
Use the rotation axis set in the base coordinate as a reference line. (only when the rotation unit IM-RU1 is used)
- (Other)  
Use a line created during measurement or created with the tools on the [Element] tab as a reference line. The element names of all lines (including virtual lines) are displayed.



You can select a reference line from the lines shown on the preview screen.

### ○ Tolerance settings

Input the design value and its tolerance value. This value is used to evaluate whether the measurement value remains within the tolerance range.

"Chapter 6 Run Mode" (Page 6-1)

**Reference** If the upper tolerance is entered when the lower tolerance is 0, "value with minus sign (-) put to the upper tolerance" will be entered automatically for the lower tolerance.



[Alert Settings] dialog box appears.

"Alert Settings" (Page 4-192)

**Auto angle capture (only when the rotation unit IM-RU1 is used)**

- Output pattern  
Select this from "Maximum" or "Minimum".

- Specify search range  
When this check box is selected, the following can be set.

Link target	Set the reference element of the auto angle capture. Reference angle, Machine reference, Arbitrary element
Angle from the reference	The angle which rotates by the amount of the specified angle from the angle set as the reference is made to be the starting angle of the auto angle capture. Enter a value with + sign when it is larger than the reference element, with - sign when it is smaller than that.
Range	Set the angle range to perform the auto angle capture.
[Set Current Angle]	Click this to set the difference between the current angle and the angle of the reference element as the angle from the reference.

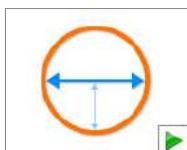
- Specify the angle pitch  
When this check box is selected, the distance of the angle of measurement can be set.

## 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

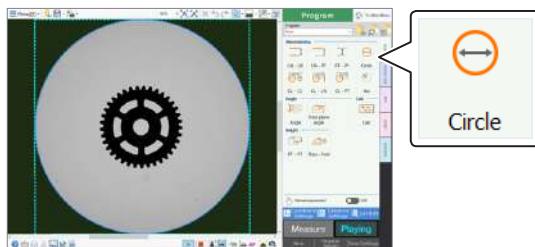
 By clicking [Next], you can continue to use the same tool.

## ■ Circle (Circle Diameter/Radius)

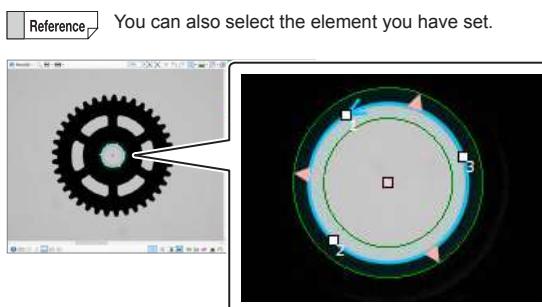


Measure the diameter or radius of a circle.

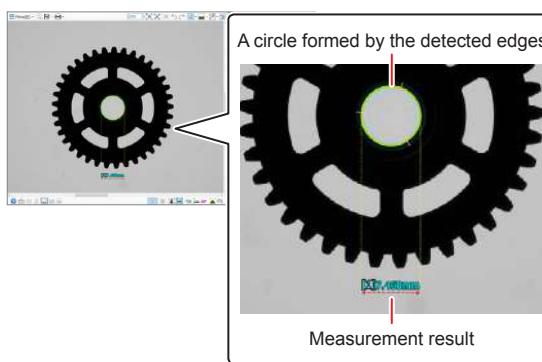
### 1 Click [Circle].



### 2 Specify three points of the edge detection range along the circle to be measured.



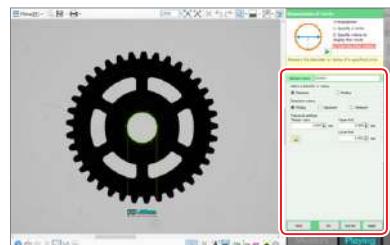
### 3 Click the location to insert the measurement result.



The measurement result is displayed on the preview display.

**[Reference]** If no edge was detected in the edge detection range, "Fail" is shown in the common control area and the element name is displayed instead of the measurement result.

### 4 Set the items related to the measurement.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

#### ○ Element name

Edit the name of the measurement result.

#### ○ Select a diameter or radius

Specify the type of the circle measurement (diameter or radius).

#### ○ Detection criteria

Select the detection criteria for the circle to be measured.

- Fitting  
The OLS-CL based on the detected edge will be measured.
- Maximum  
The outer tangent circle based on the detected edge will be measured.
- Minimum  
The inner tangent circle based on the detected edge will be measured.

#### ○ Tolerance settings

Input the design value and its tolerance value. This value is used to evaluate whether the measurement value remains within the tolerance range.

"Chapter 6 Run Mode" (Page 6-1)

**[Reference]** If the upper tolerance is entered when the lower tolerance is 0, "value with minus sign (-) put to the upper tolerance" will be entered automatically for the lower tolerance.



[Alert Settings] dialog box appears.

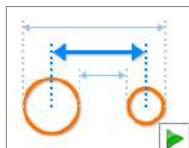
"Alert Settings" (Page 4-192)

### 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

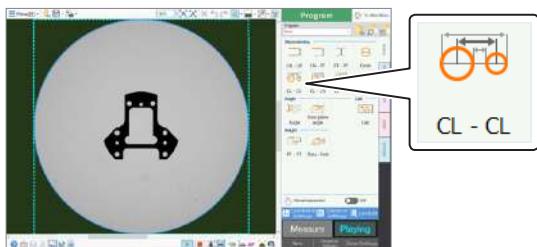
**[Reference]** By clicking [Next], you can continue to use the same tool.

## ■ CL-CL (Distance between Circles)



Measure the distance between circles/arcs you specified.

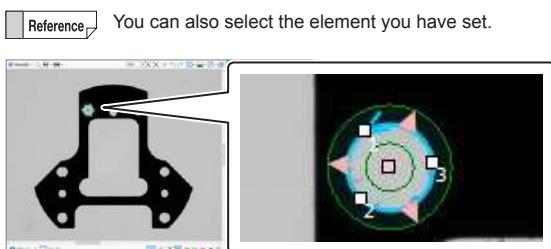
### 1 Click [CL-CL].



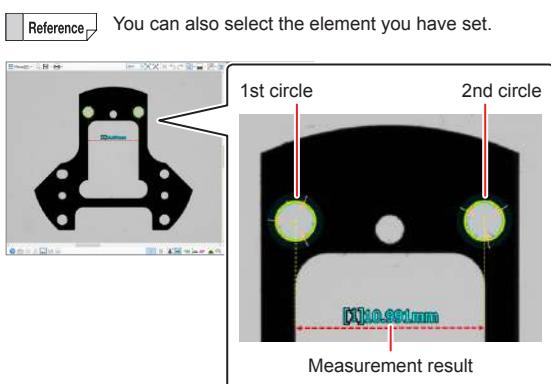
### 2 Select the shape of the circle to be the target of the measurement.



### 3 Specify three points of the edge detection range along the circle (or arc) to be measured.



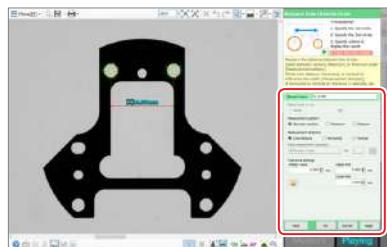
### 4 Create the edge detection range for the second circle (or arc) in the same way, and then click the location to insert the measurement result.



The measurement result is displayed on the preview display.

If no edge was detected in the edge detection range, "Fail" is shown in the common control area and the element name is displayed instead of the measurement result.

## 5 Set the items related to the measurement.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

### ○ Element name

Edit the name of the measurement result.

### ○ Select circle or arc

Select the shape of the circle to be the target of the measurement. This must be set before you specify the target circle (arc).

### ○ Measurement pattern

Specify the measurement pattern between circles (arcs). When one of the patterns is selected, the image of the drawn line is shown in the VirtualFig guide, and the measurement value is refreshed on the preview area. The measurement pattern can be changed any time before [OK] or [Next] is clicked.

### ○ Measurement direction

Specify the measurement direction using the reference coordinate axis or an arbitrary line as a reference. When selecting items other than [Line distance], [Base measurement direction] can be selected.

- Horizontal of Screen

Use the horizontal direction on the screen as a reference.

- Reference X axis

Use the X axis set in the base coordinate as a reference line.

- Reference Y axis

Use the Y axis set in the base coordinate as a reference line.

- Rotation axis

Use the rotation axis set in the base coordinate as a reference line. (only when the rotation unit IM-RU1 is used)

- (Other)

Use a line created during measurement or created with the tools on the [Element] tab as a reference line. The element names of all lines (including virtual lines) are displayed.



You can select a reference line from the lines shown on the preview screen.

### ○ Tolerance settings

Input the design value and its tolerance value. This value is used to evaluate whether the measurement value remains within the tolerance range.

□ "Chapter 6 Run Mode" (Page 6-1)



If the upper tolerance is entered when the lower tolerance is 0, "value with minus sign (-) put to the upper tolerance" will be entered automatically for the lower tolerance.



[Alert Settings] dialog box appears.

□ "Alert Settings" (Page 4-192)

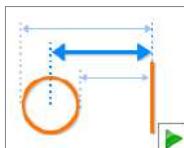
## 6 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.



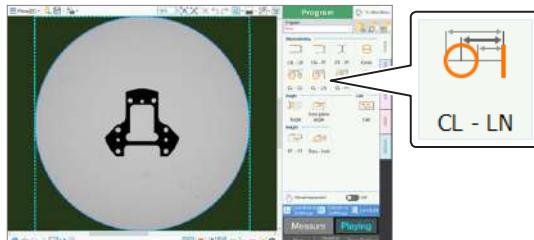
By clicking [Next], you can continue to use the same tool.

## ■ CL-LN (Distance from Circle to Line)



Measure the distance between a circle/arc and a line you specified.

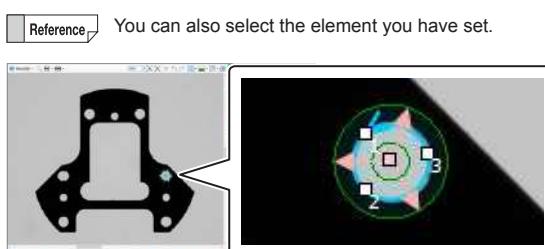
### 1 Click [CL-LN].



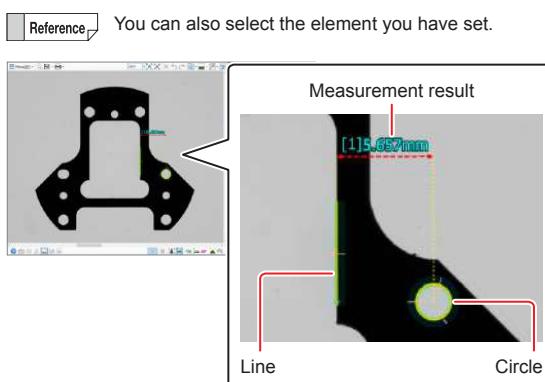
### 2 Select the shape of the circle used as the target of the measurement.



### 3 Specify three points of the edge detection range along the circle (or arc) to be measured.



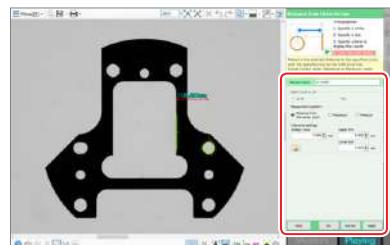
### 4 Specify the start and end points of the edge detection range along the line to be measured, and then click the location to insert the measurement result.



The measurement result is displayed on the preview display.

If no edge was detected in the edge detection range, "Fail" is shown in the common control area and the element name is displayed instead of the measurement result.

### 5 Set the items related to the measurement.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

#### ○ Element name

Edit the name of the measurement result.

#### ○ Select circle or arc

Select the shape of the circle used as the target of the measurement. This must be set before you specify the target circle (arc).

#### ○ Measurement pattern

Specify the measurement pattern for the circle (arc) and line. When one of the patterns is selected, the image of the drawn line is shown in the VirtualFig guide, and the measurement value is refreshed on the preview area. The measurement pattern can be changed any time before [OK] or [Next] is clicked.

#### ○ Tolerance settings

Input the design value and its tolerance value. This value is used to evaluate whether the measurement value remains within the tolerance range.

□ "Chapter 6 Run Mode" (Page 6-1)

□ Reference If the upper tolerance is entered when the lower tolerance is 0, "value with minus sign (-) put to the upper tolerance" will be entered automatically for the lower tolerance.



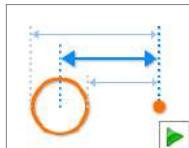
[Alert Settings] dialog box appears.  
"Alert Settings" (Page 4-192)

### 6 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

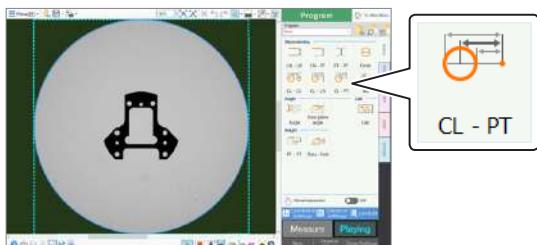
□ Reference By clicking [Next], you can continue to use the same tool.

## ■ CL-PT (Distance from Circle to Point)



Measure the distance between a circle/arc and a point you specified.

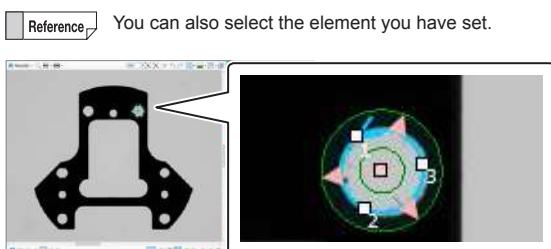
### 1 Click [CL-PT].



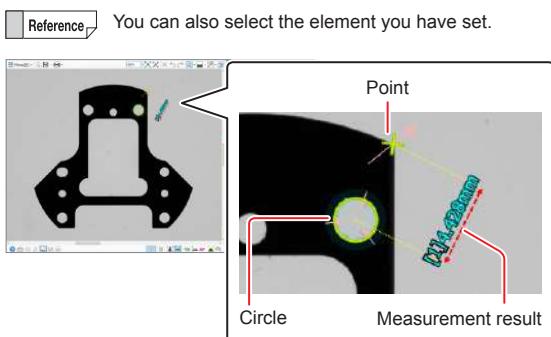
### 2 Select the shape of the circle used as the target of the measurement.



### 3 Specify three points of the edge detection range along the circle (or arc) to be measured.



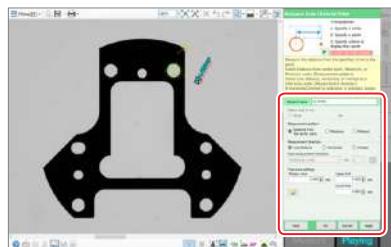
### 4 Create the scanning line which detects points, and then click the location to insert the measurement result.



The measurement result is displayed on the preview display.

If no edge was detected in the edge detection range, "Fail" is shown in the common control area and the element name is displayed instead of the measurement result.

## 5 Set the items related to the measurement.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

### ○ Element name

Edit the name of the measurement result.

### ○ Select circle or arc

Select the shape of the circle used as the target of the measurement.

This must be set before you specify the target circle (arc).

### ○ Measurement pattern

Specify the measurement pattern for the circle (arc) and point. When one of the patterns is selected, the image of the drawn line is shown in the VirtualFig guide, and the measurement value is refreshed on the preview area. The measurement pattern can be changed any time before [OK] or [Next] is clicked.

### ○ Measurement direction

Specify the measurement direction using the reference coordinate axis or an arbitrary line as a reference. When selecting items other than [Line distance], [Base measurement direction] can be selected.

- Horizontal of Screen

Use the horizontal direction on the screen as a reference.

- Reference X axis

Use the X axis set in the base coordinate as a reference line.

- Reference Y axis

Use the Y axis set in the base coordinate as a reference line.

- Rotation axis

Use the rotation axis set in the base coordinate as a reference line. (only when the rotation unit IM-RU1 is used)

- (Other)

Use a line created during measurement or created with the tools on the [Element] tab as a reference line. The element names of all lines (including virtual lines) are displayed.



You can select a reference line from the lines shown on the preview screen.

### ○ Tolerance settings

Input the design value and its tolerance value. This value is used to evaluate whether the measurement value remains within the tolerance range.

"Chapter 6 Run Mode" (Page 6-1)



If the upper tolerance is entered when the lower tolerance is 0, "value with minus sign (-) put to the upper tolerance" will be entered automatically for the lower tolerance.



[Alert Settings] dialog box appears.

"Alert Settings" (Page 4-192)

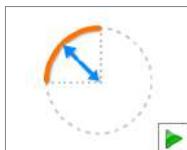
## 6 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.



By clicking [Next], you can continue to use the same tool.

## ■ Arc (Radius of Arc)

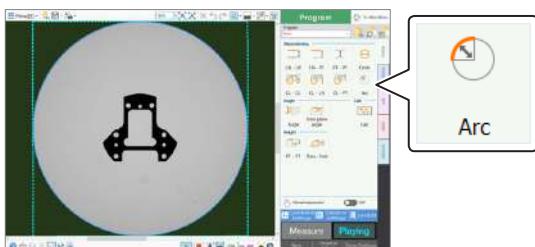


Measure the radius of an arc.



When you want to measure an R (Radius) that is too small to properly set the edge detection range, use "Corner Arc" in the [APP] tab.  
"Corner Arc" (Page 4-81)

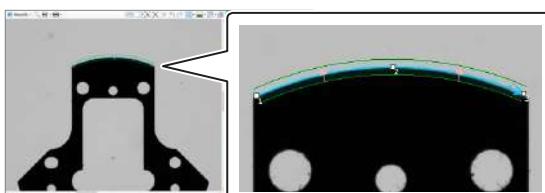
### 1 Click [Arc].



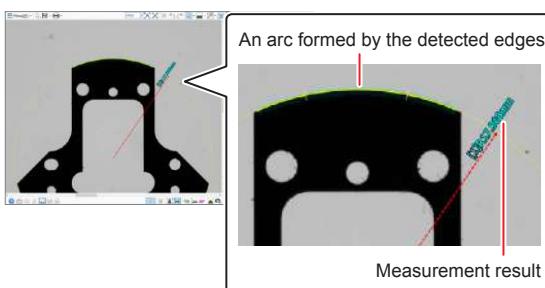
### 2 Specify three points of the edge detection range along the arc to be measured.



You can also select the element you have set.



### 3 Click the location to insert the measurement result.

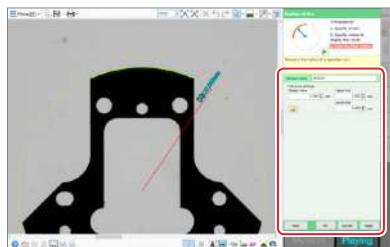


The measurement result is displayed on the preview display.



If no edge was detected in the edge detection range, "Fail" is shown in the common control area and the element name is displayed instead of the measurement result.

## 4 Set the items related to the measurement.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

### ○ Element name

Edit the name of the measurement result.

### ○ Tolerance settings

Input the design value and its tolerance value. This value is used to evaluate whether the measurement value remains within the tolerance range.

"Chapter 6 Run Mode" (Page 6-1)



If the upper tolerance is entered when the lower tolerance is 0, "value with minus sign (-) put to the upper tolerance" will be entered automatically for the lower tolerance.



[Alert Settings] dialog box appears.

"Alert Settings" (Page 4-192)

### 5 Click [OK].

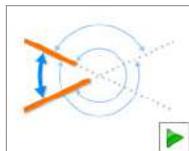
The setting is confirmed and the screen returns to the initial screen of the [Program] mode.



By clicking [Next], you can continue to use the same tool.

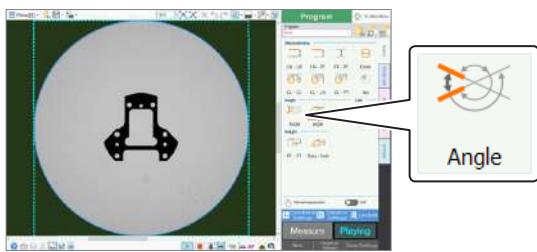
## Angle

### ■ Angle (Angle between Two Lines)



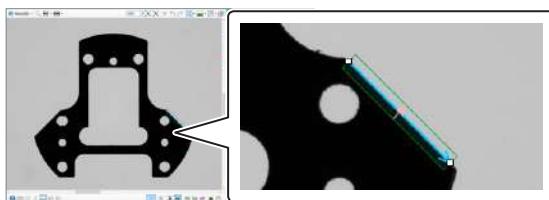
Measure the angle between two lines.

#### 1 Click [Angle].



#### 2 Specify the start and end points of the edge detection range along the target line, and create the first line.

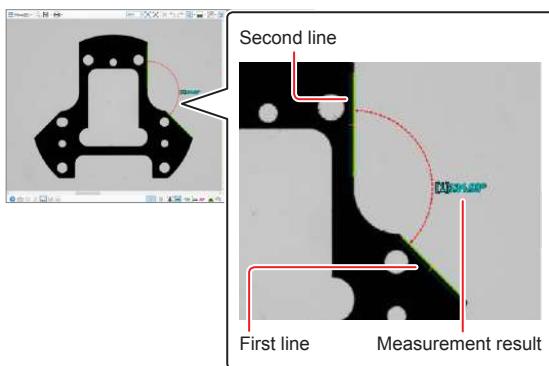
You can also select the element you have set.



You can re-start the setting of the edge detection range by selecting [Return to beginning] in the context menu of the preview display.

#### 3 Create the edge detection range for the second line in the same way, and then click the location to insert the measurement result.

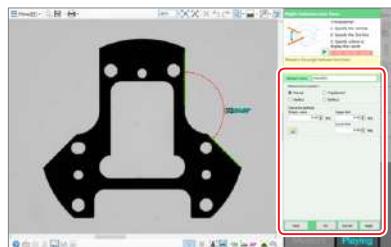
You can also select the element you have set.



The measurement result is displayed on the preview display.

If no edge was detected in the edge detection range, "Fail" is shown in the common control area and the element name is displayed instead of the measurement result.

#### 4 Set the items related to the measurement.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

##### ○ Element name

Edit the name of the measurement result.

##### ○ Measurement pattern

Select the pattern to measure the angle between two lines. When one of the patterns is selected, the image of the drawn line is shown in the VirtualFig guide, and the measurement value is refreshed on the preview area.

The measurement pattern can be changed any time before [OK] or [Next] is clicked.

##### ○ Tolerance settings

Input the design value and its tolerance value. This value is used to evaluate whether the measurement value remains within the tolerance range.

"Chapter 6 Run Mode" (Page 6-1)

If the upper tolerance is entered when the lower tolerance is 0, "value with minus sign (-) put to the upper tolerance" will be entered automatically for the lower tolerance.



[Alert Settings] dialog box appears.

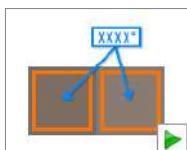
"Alert Settings" (Page 4-192)

#### 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

By clicking [Next], you can continue to use the same tool.

## ■ Inter-Plane Angle (Plane intersection angle)



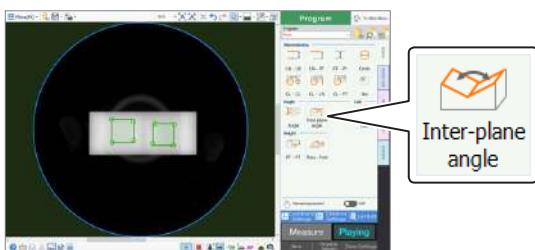
Measure the angle between two flat surfaces.



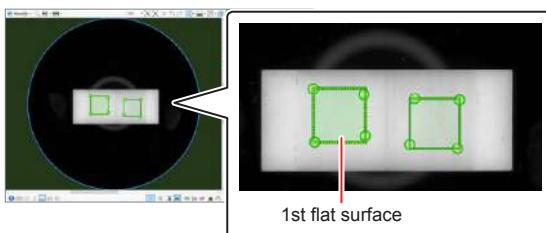
To create the inter-plane degree, the height flat surface element is necessary. Create [Height flat surface] of the virtual tool beforehand.

- "Height Flat Surface" (Page 4-56)
- "Height" (Page 4-148)

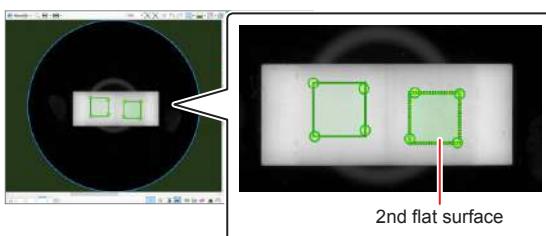
### 1 Click [Inter-plane angle].



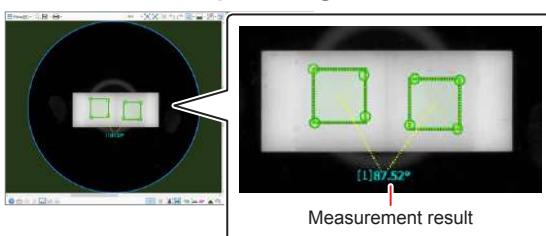
### 2 Click the first flat surface to specify from the preview screen.



### 3 Click the second flat surface to specify

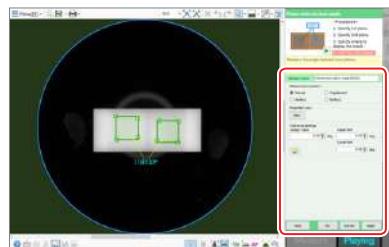


### 4 Click the location to display the measurement result of the inter-plane degree.



The measurement result is displayed on the preview display.

## 5 Set the items related to the measurement.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

### ○ Element name

Edit the name of the measurement result.

### ○ Measurement pattern

Select the pattern to measure the inter-plane degree of the two. When one of the patterns is selected, the measurement value is refreshed on the preview area.

### ○ Projection view

Click [View] to show the [Display projection view] dialog box. The measurement pattern can be selected in the [Display projection view] dialog box.

### ○ Tolerance settings

Input the design value and its tolerance value. This value is used when evaluating whether the measurement value remains within the tolerance range.

- "Chapter 6 Run Mode" (Page 6-1)

Reference If the upper tolerance is entered when the lower tolerance is 0, "value with minus sign (-) put to the upper tolerance" will be entered automatically for the lower tolerance.



[Alert Settings] dialog box appears.  
 "Alert Settings" (Page 4-192)

### 6 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

Reference By clicking [Next], you can continue to use the same tool.

## Measurement Items

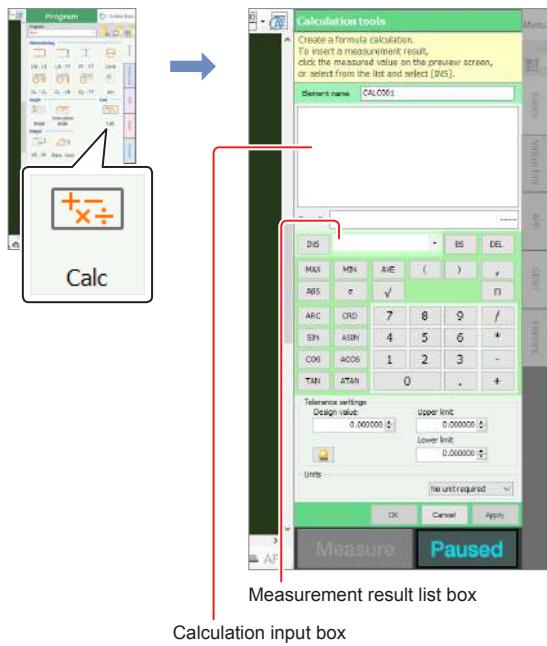
### Calc

#### Calc

Create your desired calculation formula.

To use a measurement result, select it from the preview screen or from the list and click [INS].

##### 1 Click the [Calc].



##### 2 Set the items related to the calculation.

After changing the setting, click [Apply], and the change is reflected on the preview screen.

###### ○ Element name

Edit the name of the measurement result.

###### ○ Calculation input box

Enter the calculation formula. The formula can be entered either from the keyboard or from the on-screen keyboard.

###### ○ Result

The result of the calculation formula entered in the [Calculation input box] is displayed.

###### ○ Measurement result list box

When using a measurement result in the calculation, select the measurement result (element name) from the dropdown list box. After the selection, click [INS], and the "Element name" is entered in the [Calculation input box].

###### ○ Tolerance settings

Input the design value and its tolerance value. This value is used to evaluate whether the measurement value remains within the tolerance range.

"Chapter 6 Run Mode" (Page 6-1)

Reference If the upper tolerance is entered when the lower tolerance is 0, "value with minus sign (-) put to the upper tolerance" will be entered automatically for the lower tolerance.



[Alert Settings] dialog box appears.

"Alert Settings" (Page 4-192)

### ○ Units

Select the unit for the calculation result. The selected unit is displayed in calculation result.

- mm  
Displays distance unit in calculation result.
- deg  
Displays angle unit in calculation result.
- mm<sup>2</sup>  
Displays area unit in calculation result.
- No unit required  
Displays unit in calculation result.

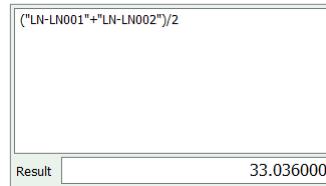


If the unit is selected, the displayed digits following the decimal point will change into the digits which were set in the unit.

"Display Settings" (Page 10-37)

##### 3 Enter the calculation formula in the calculation input box.

Even if the entry is not finished, the calculation result is automatically shown in the [Result] box as soon as the calculation is possible with the current formula. (While calculation is impossible, "ERROR" is displayed.)



### ● Calculation input

Use these buttons to enter a calculation formula in the [Calculation input box].

When one of the functions is inserted in the formula, a tooltip appears to explain the usage of the function.



.... Insert the measurement result (element name) selected in the [Measurement result list box] into the [Calculation input box].



.... Delete the character (numerical value) to the left of the cursor in the [Calculation input box].



.... Delete the character (numerical value) to the right of the cursor in [Calculation input box]. When two or more characters (numerical values) are selected, all of them are deleted.



.... Insert the Max function. It outputs the maximum value of the specified values separated by "," (commas) in parentheses as the calculation result.



.... Insert the Min function. It outputs the minimum value of the specified values separated by "," (commas) in parentheses as the calculation result.



.... Insert the Ave function. It outputs the average of the specified values separated by "," (commas) in parentheses as the calculation result.



.... Insert a "(" (left parenthesis).



.... Insert a ")" (right parenthesis).



.... Insert a "," (comma).



.... Insert the Abs function. It outputs the absolute value of the value specified in parentheses as the calculation result.



.... Insert the StDev function. It outputs the standard deviation of the specified values separated by "," (commas) in parentheses as the calculation result.

-  .... Insert the Sqr function. It outputs the square root of the value specified in parentheses as the calculation result.
-  .... Enter the pi (3.141593).
-  .... Insert the Arc function. It outputs the length of the arc based on the specified radius and angle separated by "," (commas) in parentheses.
-  .... Insert the Chord function. It outputs the length of the chord based on the specified radius and angle separated by "," (commas) in parentheses.
-  .... Insert the Sin function. It outputs the Sin of the value (in degrees) specified in parentheses as the calculation result.
-  .... Insert the ASin function. It outputs the ArcSin of the value specified in parentheses as the calculation result (degree).
-  .... Insert the Cos function. It outputs the Cos of the value (in degrees) specified in parentheses as the calculation result.
-  .... Insert the ACos function. It outputs the ArcCos of the value specified in parentheses as the calculation result (degree).
-  .... Insert the Tan function. It outputs the Tan of the value (in degrees) specified in parentheses as the calculation result.
-  .... Insert the ATan function. It outputs the ArcTan of the value specified in parentheses as the calculation result (degree).
- Other buttons .... The other buttons are used to input the operators for the four normal arithmetic operations and numerical values.

#### 4 After completing the entering of the calculation formula, click [OK].

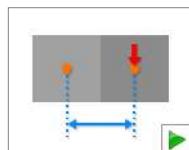
The calculation result is displayed on the preview display.



## Measurement Items

### Height

#### ■ PT-PT (Height Between Points)



Measure the difference in height of two points.

**Important**

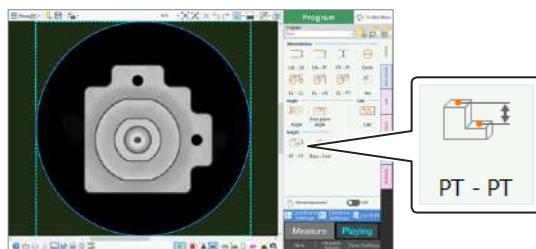
Every time when running the IM-8000, it is recommended that you align the reference plane on the height measurement unit.

"Reference Plane Alignment" (Page 10-25)

**Point**

At times other than measuring, if the measurement target touched the stylus of height measurement unit, remove the measurement target from the stage glass. After the electric XY stage returns to the initial place, put the measurement target on the stage glass again.

#### 1 Click [PT-PT].



**Reference**

- The [Set maximum height of the object] dialog box appears automatically when maximum height has not been set in the program data that is being edited.
- The maximum height of target can be set beforehand.

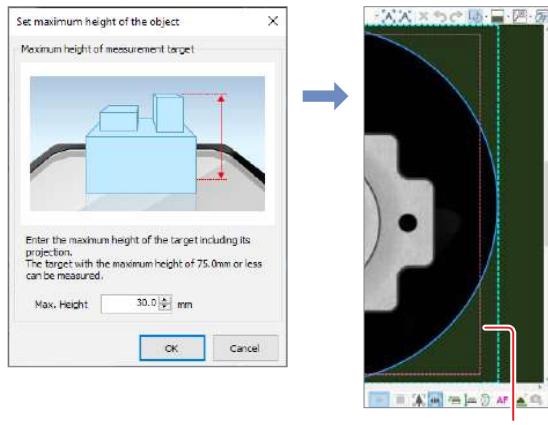
"Set maximum height of the object" (Page 10-26)

#### 2 Enter the maximum height in [Max. Height] for the measurement target, and click [OK].

**Point**

If the maximum height of more than 30.0 mm is set, measurement accuracy degrades.

The measurable height range is displayed on the preview display.

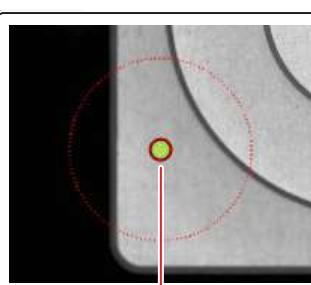
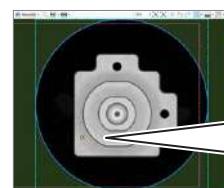


#### 3 Click the 1st point.

The clicked position is centered in the height measurement area that is displayed.

**Reference**

You can also select the element you have set.



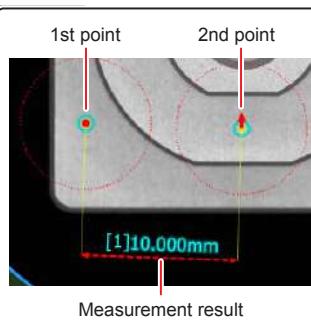
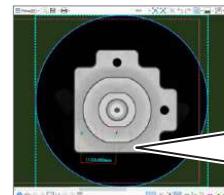
**Point**

In height measurement area, specify a flat horizontal plane which is wider than the circle of 1 mm diameter. When a "Wall" exists due to unevenness in the height measurement area, or when the measuring place is a protrusion which is smaller than the measurable area of height, measuring might fail during the multi measurement.

#### 4 Specify the 2nd point in the same way and click the place to insert the measurement result.

**Reference**

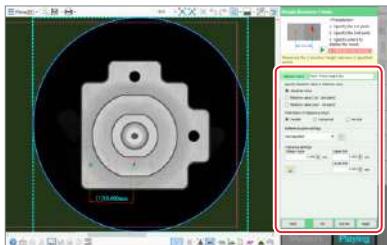
You can also select the element you have set.



Height measurement is executed and the measurement result is displayed on the preview display.

When the height of the 2nd point is lower than the 1st, down-pointing arrow is displayed, and when it is higher, up-pointing arrow is displayed.

## 5 Set the items related to the measurement.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

### ○ Element name

Edit the name of the measurement result.

### ○ Specify Absolute Value or Relative Value

Select the format to display the measurement result. The measurement result is displayed on the preview display in the selected display format.

### ○ Orientation of displaying result

Specify the direction to show the measurement results. Selecting [Parallel] displays the measurement result of a line connecting two points in the perpendicular direction.

### ○ Reference plane settings

Specify the plane to be used as the base for height measurement.

- Not specified  
The base plane is not set.

- 

By clicking this button, you can select a base plane from the plane shown on the preview screen.

### ○ Tolerance settings

Input the design value and its tolerance value. This value is used to evaluate whether the measurement value remains within the tolerance range.

“Chapter 6 Run Mode” (Page 6-1)

Reference

If the upper tolerance is entered when the lower tolerance is 0, “value with minus sign (-) put to the upper tolerance” will be entered automatically for the lower tolerance.

- 

[Alert Settings] dialog box appears.  
 “Alert Settings” (Page 4-192)

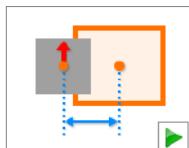
## 6 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

Reference

By clicking [Next], you can continue to use the same tool.

## ■ Plane-Point (Height Between Plane and Point)



Measure the height between a plane and a point.

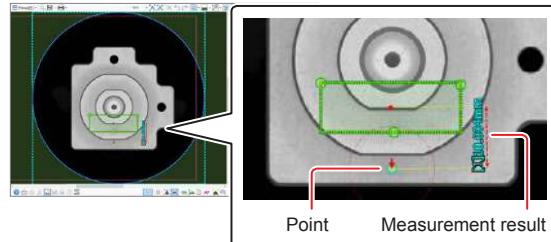
**Important**

- Every time when running the IM-8000 Series, it is recommended that you align the reference plane on the height measurement.  
    (book icon) "Reference Plane Alignment" (Page 10-25)
- To create the height between a plane and point, the height flat surface element is necessary.  
Create [Height flat surface] of the virtual tool beforehand.  
    (book icon) "Height Flat Surface" (Page 4-56)  
    (book icon) "Height" (Page 4-148)

## 3 Click a point to specify, and click the location to insert the measurement result.

**Reference**

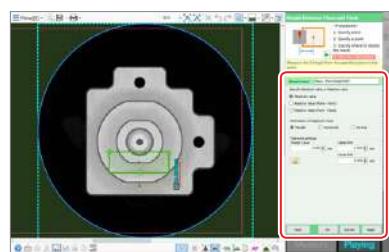
You can also select the element you have set.



Height measurement is executed and the measurement result is displayed on the preview display.

When the height of the point is lower than the flat surface, down-pointing arrow is displayed, and when it is higher, up-pointing arrow is displayed.

## 4 Set the items related to the measurement.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

**○ Element name**

Edit the name of the measurement result.

**○ Specify Absolute value or Relative value**

Select the format to display the measurement result. The measurement result is displayed on the preview display in the selected display format.

**○ Orientation of displayed result**

Specify the direction to show the measurement results. Selecting [Parallel] displays the measurement result of a line connecting two points in the perpendicular direction.

**○ Tolerance settings**

Input the design value and its tolerance value. This value is used when evaluating whether the measurement value remains within the tolerance range.

(book icon) "Chapter 6 Run Mode" (Page 6-1)

**Reference**

If the upper tolerance is entered when the lower tolerance is 0, "value with minus sign (-) put to the upper tolerance" will be entered automatically for the lower tolerance.



The [Alert Settings] dialog box appears.

(book icon) "Alert Settings" (Page 4-192)

## 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

**Reference**

By clicking [Next], you can continue to use the same tool.

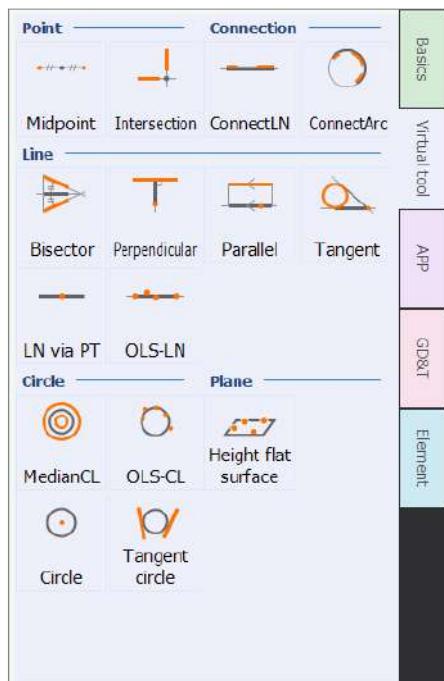
## Virtual Tool

Select the [Virtual tool] tab in the measurement operation area to display the virtual tool options. You can use the lines or points used for the basic measurement to draw virtual points or virtual lines on the preview screen.

**Important**

Virtual lines (points) cannot be drawn if no line (straight line, circle, or arc) or point is shown on the preview display.

Before drawing virtual lines, you need to create a line(s) or a point(s) on the preview display by conducting measurement using the [Basics] tab options or by using the tools on the [Element] tab.



### ● Point

These options are used to draw a midpoint between two points or an intersection of two lines.

["Point" \(Page 4-42\)](#)

### ● Connection

These options are used to draw one virtual line (straight line or arc) by connecting two or more lines (straight line or circle).

["Connection" \(Page 4-44\)](#)

### ● Line

These options are used to draw a virtual line such as a bisector or a perpendicular based on lines or points.

["Line" \(Page 4-46\)](#)

### ● Circle

These options are used to draw a virtual circle such as a median circle or an OLS circle based on lines or points.

["Circle" \(Page 4-52\)](#)

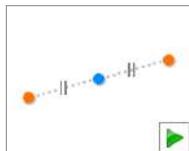
### ● Plane

Create a flat surface from two or more specified height elements.

["Plane" \(Page 4-56\)](#)

## Point

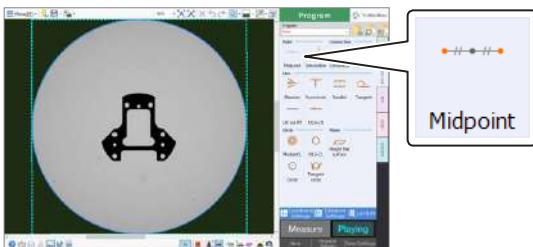
### ■ Midpoint



Draw a midpoint between two selected points.

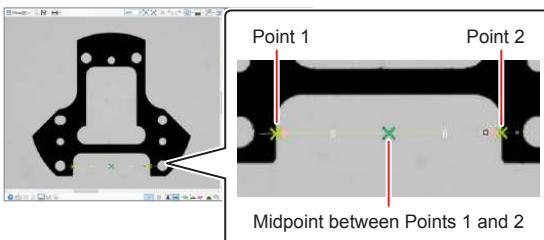
Reference If you select a circle or arc, a midpoint between center points can be created.

#### 1 Click [Midpoint].

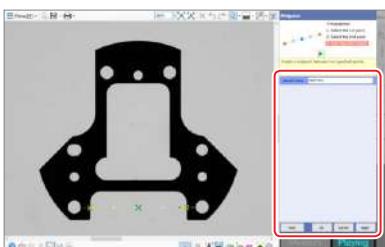


#### 2 Select two points in the preview screen.

The midpoint of the selected two points is automatically calculated and displayed as a virtual point on the preview display.



#### 3 Set the items related to the tool.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

Element name

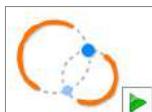
Edit the name of the tool.

#### 4 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

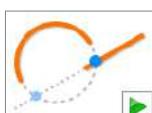
Reference By clicking [Next], you can continue to use the same tool.

## ■ Intersection

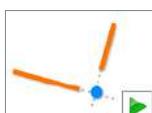


Draw an intersection of two selected lines (straight line, circle, or arc).

**Intersection of two circles**

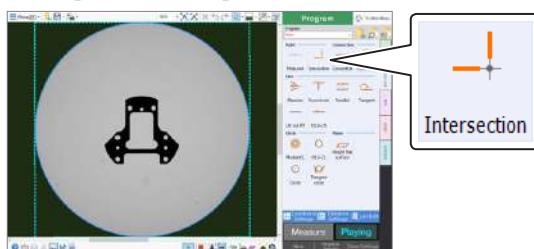


**Intersection of a circle and a line**



**Intersection of two lines**

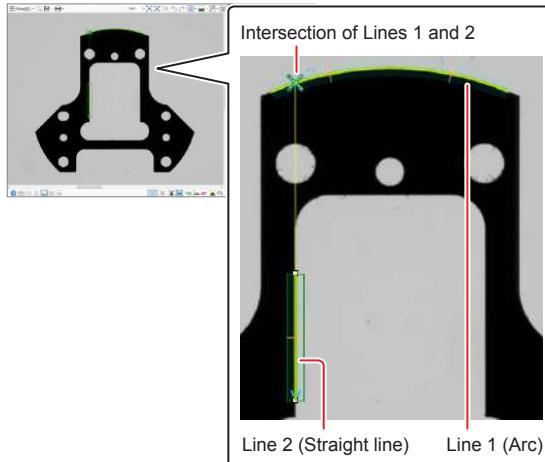
### 1 Click [Intersection].



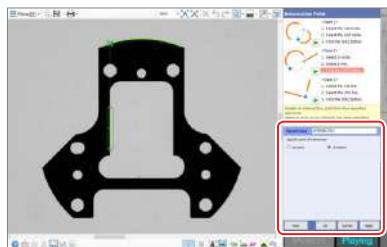
### 2 Select two lines in the preview screen.

**Important** To draw an intersection of a circle (arc) and a line, you must select a circle (arc) first.

The intersection is detected on the extensions of the selected two lines and displayed as a virtual point on the preview display.



### 3 Set the items related to the tool.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

#### ○ Element name

Edit the name of the tool.

#### ○ Specify point of intersection

Select the pattern to draw the intersection.

When one of the created patterns is selected, the measurement image is shown in the measurement guide, and the measurement value is refreshed in the preview area.

The created pattern can be changed any time before [OK] or [Next] is clicked.

### 4 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

**Reference** By clicking [Next], you can continue to use the same tool.

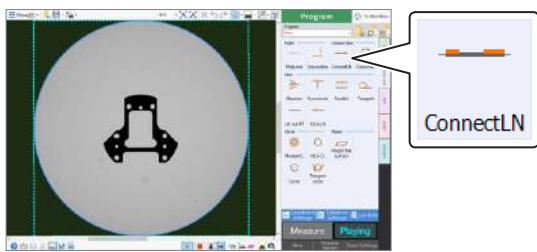
## Connection

### ■ ConnectLN

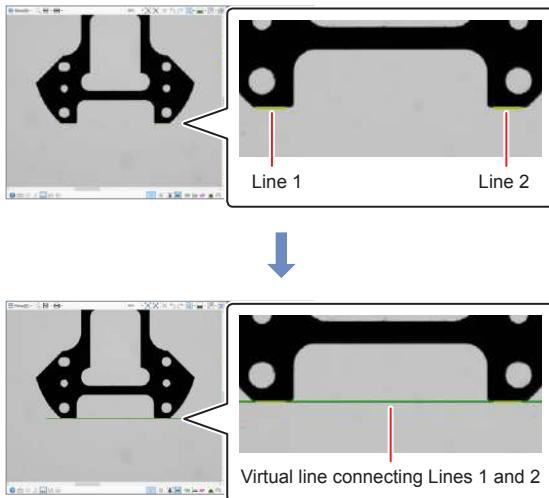


Draw a virtual line which connects two or more selected lines.

#### 1 Click [ConnectLN].

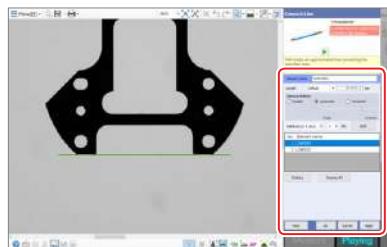


#### 2 Select two (or more) lines in the preview screen.



The system draws a line (straight line) through the ordinary least squares approximation using all edges of the selected lines (straight lines).

#### 3 Set the items related to the tool.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

##### ○ Element name

Edit the name of the tool.

##### ○ Length

Specify the length of the virtual line to be drawn.

- Default

The connecting line whose length is determined by the size of the field of view is created.

- Infinite

Draw a virtual line of infinite length.

- Input value

Specify the length of the line in mm.

##### ○ Remove defects

Edges recognized as abnormal are removed and the virtual line is created.

- Disable

Abnormal points are not removed.

- Automatic

Abnormal edges are judged automatically.

- Threshold

Abnormal points are judged based on the threshold specified with the slider.

##### ○ Reference element list

The element to be referred creating a connected line can be added or deleted.

- When selecting elements to be referred and their order and click [Add], they are added to the list.

- When selecting elements in the list and click [Delete], they will be removed from the target of the reference.

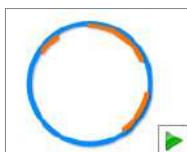
- Clicking [Delete All] will remove all elements from the target of the reference.

#### 4 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

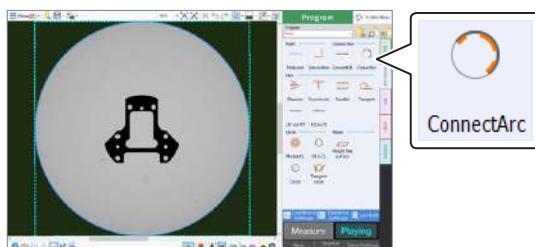
By clicking [Next], you can continue to use the same tool.

## ■ ConnectArc

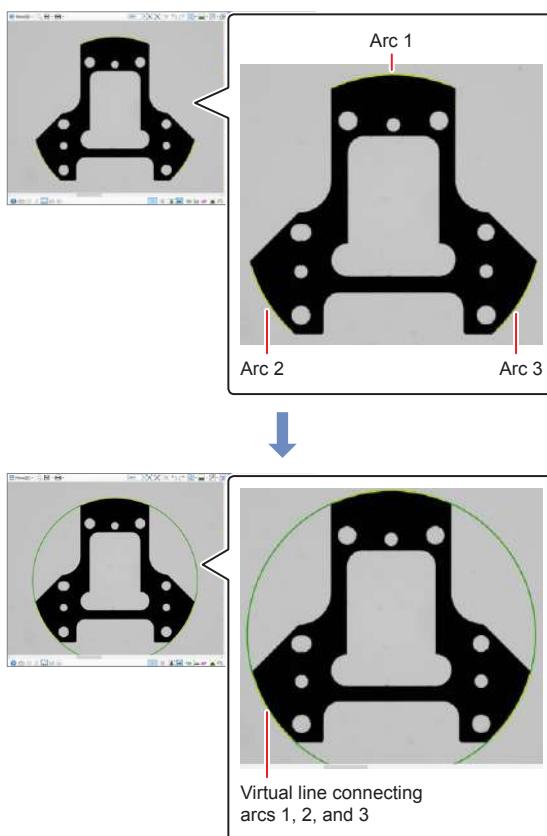


Draw a circle which connects two or more selected arcs.

### 1 Click [ConnectArc].



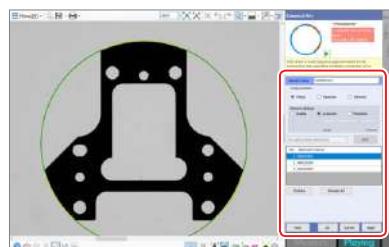
### 2 Select two (or more) arcs in the preview screen.



The system draws a circle through the ordinary least squares approximation using all edges of the selected arcs.

When the fourth arc is specified, the system draws a connecting circle based on the four arcs.

### 3 Set the items related to the tool.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

#### ○ Element name

Edit the name of the tool.

#### ○ Output pattern

Specify the method to detect circles.

- Fitting  
The approximate circle is detected from the detected edge.
- Maximum  
The outer tangent circle is detected from the detected edges.
- Minimum  
The inner tangent circle is detected from the detected edges.

#### ○ Remove defects

Edges recognized as abnormal are removed and a virtual circle is created.

- Disable  
Abnormal points are not removed.
- Automatic  
Abnormal edges are judged automatically.
- Threshold  
Abnormal points are judged based on the threshold specified with the slider.

#### ○ Reference element list

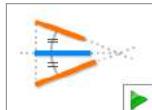
The element to be referred for creating a connected circle can be added or deleted.

- When selecting elements to be referred and their order and click [Add], they are added to the list.
- When selecting elements in the list and click [Delete], they will be removed from the target of the reference.
- Clicking [Delete All] will remove all elements from the target of the reference.

### 4 Click [OK].

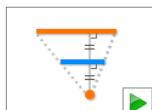
The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

By clicking [Next], you can continue to use the same tool.

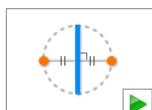
**Line****■ Bisector**

Draw a bisector between two selected lines or points.

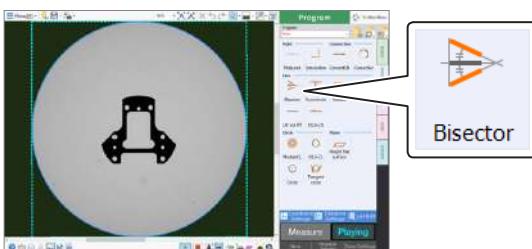
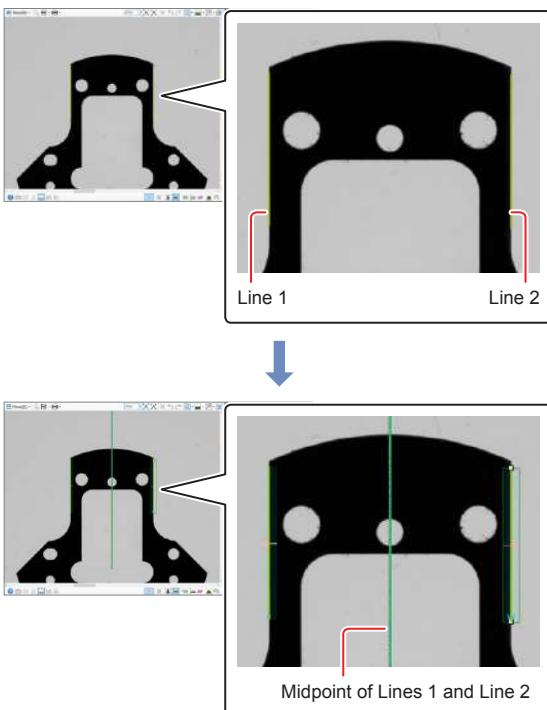
**Bisector between two lines**



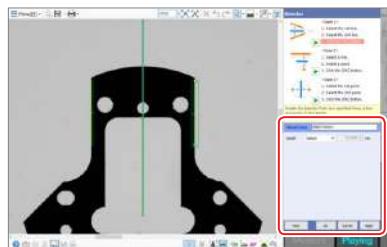
**Bisector between a line and a point**



**Bisector between two points**

**1 Click [Bisector].****2 Select two lines/points in the preview screen.**

The system draws a bisector based on the selected lines/points.

**3 Set the items related to the tool.**

After changing the setting, click [Apply], and the change is reflected on the preview screen.

 **Element name**

Edit the name of the tool.

 **Length**

Specify the length of the virtual line to be drawn.

- Default

The center line whose length is determined by the size of the field of view is created.

- Infinite

Draw a virtual line of infinite length.

- Input value

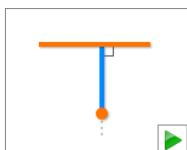
Specify the length of the line in mm.

**4 Click [OK].**

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

**Reference** By clicking [Next], you can continue to use the same tool.

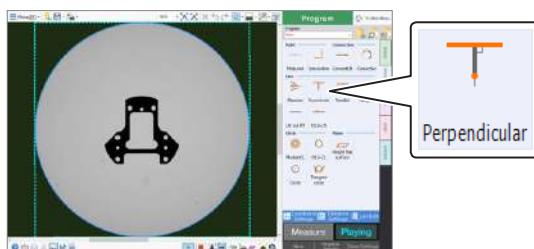
## ■ Perpendicular



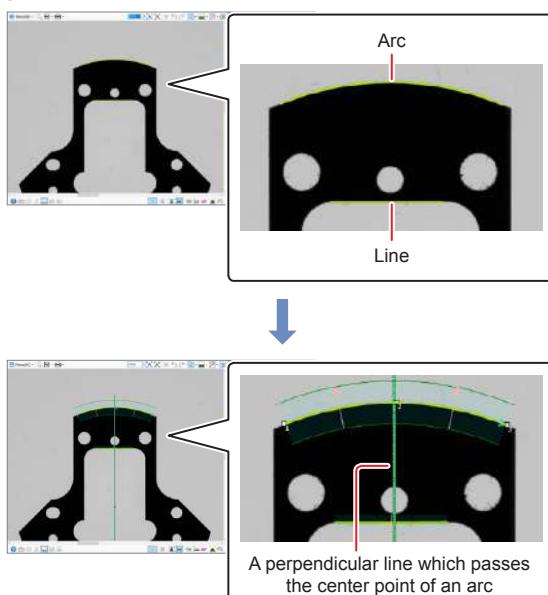
Draw a perpendicular, which passes through a selected point to a selected line.

If you select a circle or arc, a perpendicular line which passes through its center can be created.

### 1 Click [Perpendicular].

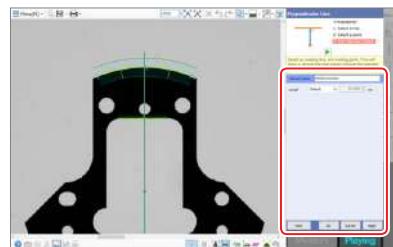


### 2 Select a line and a point (or circle/arc) in the preview screen.



The system draws a perpendicular line based on the selected line and point (or circle/arc).

### 3 Set the items related to the tool.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

#### ○ Element name

Edit the name of the tool.

#### ○ Length

Specify the length of the virtual line to be drawn.

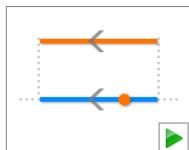
- Default  
The perpendicular line whose length is determined by the size of the field of view is created.
- Infinite  
Draw a virtual line of infinite length.
- Input value  
Specify the length of the line in mm.

### 4 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

By clicking [Next], you can continue to use the same tool.

## ■ Parallel

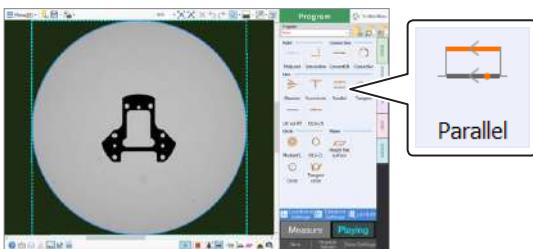


Draw a line parallel to a selected line, which passes through a selected point or which is a specified distance away from the selected line.



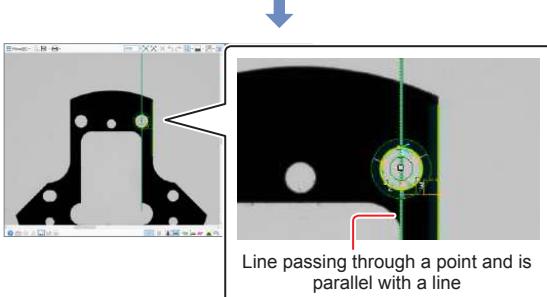
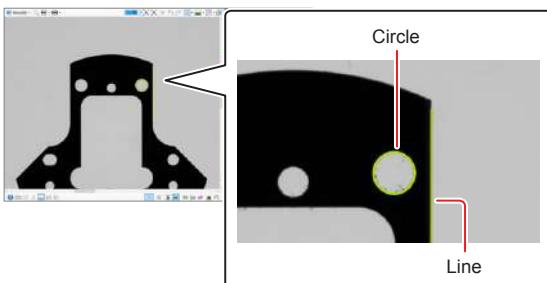
If you select a circle or arc, a parallel line which passes through its center can be created.

### 1 Click [Parallel].



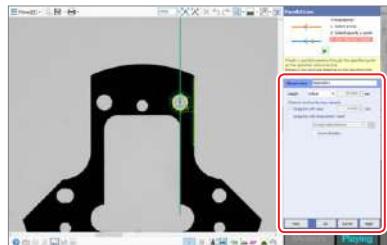
### 2 Select a line and a point (or circle/arc) in the preview screen.

If you draw the parallel line by specifying the distance from the specified line (base element) instead of specifying a point, click anywhere other than the existing points after selecting the line. When the input box for "Distance from the base element" becomes active, enter the value into the [Designate with value] input box, or select [Designate with measurement result] and specify the measurement result.



The system draws a parallel line based on the selected line and point (or circle/arc).

### 3 Set the items related to the tool.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

#### ○ Element name

Edit the name of the tool.

#### ○ Length

Specify the length of the virtual line to be drawn.

- Default

The parallel line whose length is determined by the size of the field view is created.

- Infinite

Draw a virtual line of infinite length.

- Input value

Specify the length of the line in mm.

#### ○ Distance from the base element

When you do not specify the point through which the parallel line passes (when you specify an arbitrary position), specify the position of the parallel line (distance from the base line).

- Designate with value

Specify the position of a parallel line (distance from the reference line).

- Designate with measurement result

Specify other measure results including a calculation result as a distance from the reference line.



You can select a measurement result shown on the preview screen.

Invert direction

When this check box is selected, the display position of the parallel line is mirrored over the reference line.

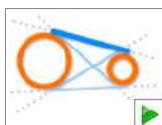
### 4 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.



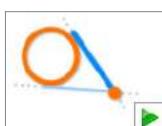
By clicking [Next], you can continue to use the same tool.

## ■ Tangent



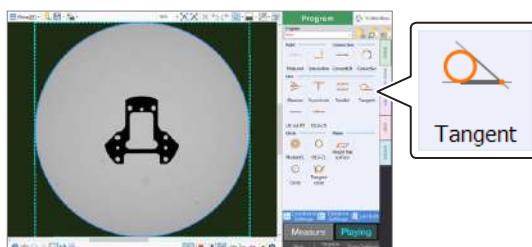
Draw a tangent of two selected circles (arcs), or of a circle (arc) and a point.

Tangent of two circles

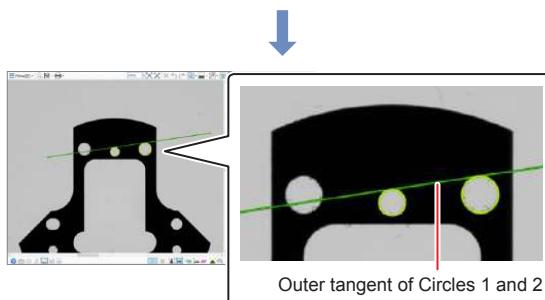
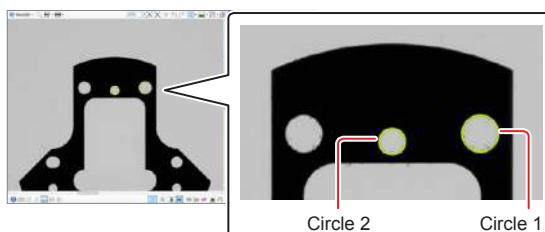


Tangent of a circle and a line

### 1 Click [Tangent].

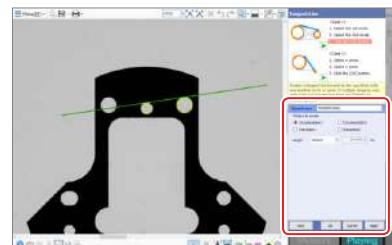


### 2 Select two circles/arcs or a circle/arc and a point in the preview screen.



The system draws a tangent based on the selected circles and point.

### 3 Set the items related to the tool.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

#### ○ Element name

Edit the name of the tool.

#### ○ Pattern to create

Select the pattern to draw the tangent.

When one of the created patterns is selected, the operation image is shown in the guide, and the measurement value is refreshed in the preview area. The created pattern can be changed any time before [OK] or [Next] is clicked.

#### ○ Length

Specify the length of the virtual line to be drawn.

- Default

The connecting line whose length is determined by the size of the field of view is created.

- Infinite

Draw a virtual line of infinite length.

- Input value

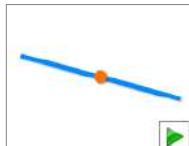
Specify the length of the line in mm.

### 4 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

Reference By clicking [Next], you can continue to use the same tool.

## ■ LN via PT



Draw a line which passes through a selected point.

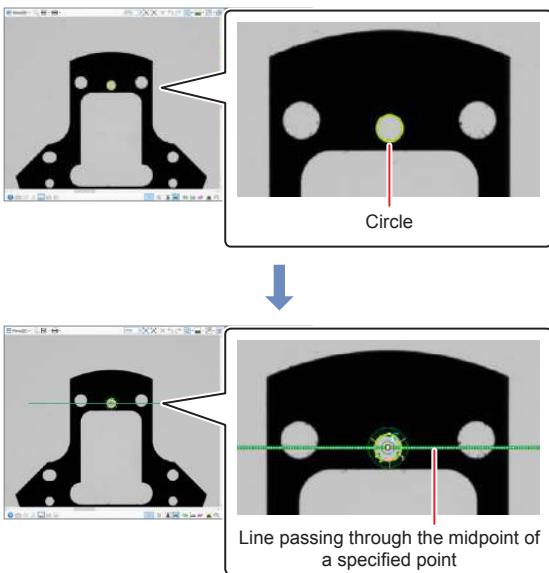


If you select a circle or arc, a line which passes through its center can be created.

### 1 Click [LN via PT].



### 2 Select a point (or circle/arc) in the preview screen.

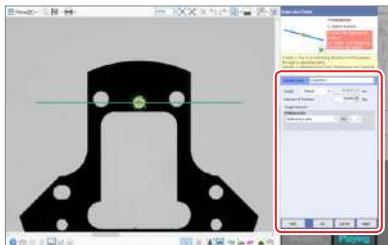


The system draws a line based on the selected point (or circle/arc).



Drag the virtual line to change its angle arbitrarily. The setting can be changed any number of times before [OK] or [Next] is clicked.

### 3 Set the items related to the tool.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

#### ○ Element name

Edit the name of the tool.

#### ○ Length

Specify the length of the virtual line to be drawn.

- Default

The straight line whose length is determined by the size of the field of view is created.

- Infinite

Draw a virtual line of infinite length.

- Input value

Specify the length of the line in mm.

#### ○ Degrees of Rotation

Specify the angle of the line passing through the point in degrees.



When you rotate the line by dragging it in the preview display, the current rotation angle is displayed in this box.

#### ○ Reference line

- Horizontal of Screen

Use the horizontal direction on the screen as a reference.

- Reference X axis

Use the X axis set in the base coordinate as a reference line.

- Reference Y axis

Use the Y axis set in the base coordinate as a reference line.

- (Other)

Use a line created during measurement or created with the tools on the [Element] tab as a reference line. The element names of all lines (including virtual lines) are displayed.



By clicking this button, you can select a reference line from the lines shown on the preview display.

#### Technical Hint

The angle of the line via a point increases in the counterclockwise direction from the reference line assumed to be 0°.

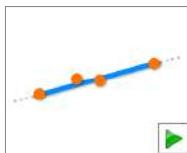
### 4 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.



By clicking [Next], you can continue to use the same tool.

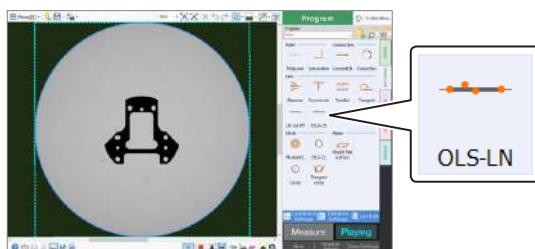
## ■ OLS-LN



Draw an OLS line which approximately passes through two or more selected points.

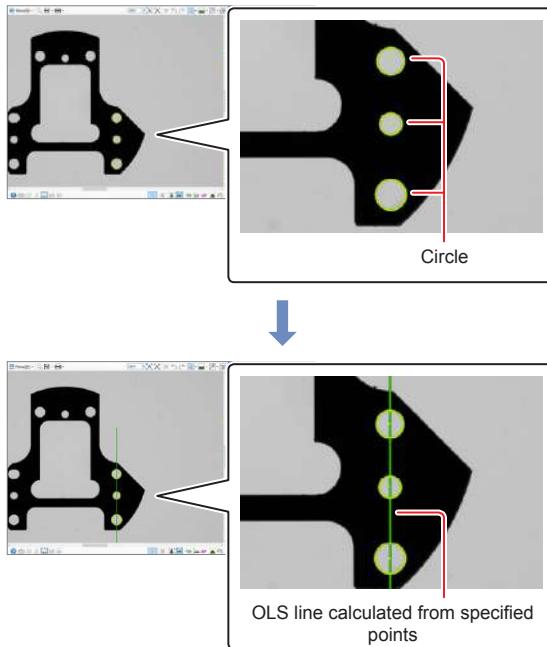
If you select a circle or arc, an OLS line which passes through its center can be created.

### 1 Click [OLS-LN].



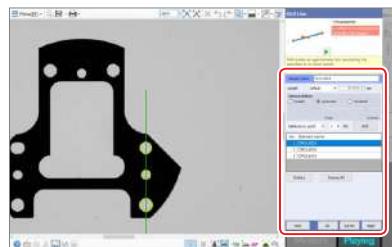
### 2 Select more than two points (or circles/arcs) in the preview screen.

Select all points (or circles/arcs) to be used to draw the OLS line.



The system draws a line through the ordinary least squares (OLS) approximation using all of the selected points (or circles/arcs).

### 3 Set the items related to the tool.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

#### ○ Element name

Edit the name of the tool.

#### ○ Length

Specify the length of the virtual line to be drawn.

- Default  
The line which is determined by the size of the field of view is created.
- Infinite  
Draw a virtual line of infinite length.
- Input value  
Specify the length of the line in mm.

#### ○ Remove defects

Points recognized as abnormal are removed and the virtual line is created.

- Disable  
Abnormal points are not removed.
- Automatic  
Abnormal edges are judged automatically.
- Threshold  
Abnormal points are judged based on the threshold specified with the slider.

#### ○ Reference element list

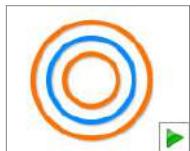
The element to be referred for creating an ordinary least squares line can be added or deleted.

- When selecting elements to be referred and their order and click [Add], they are added to the list.
- When selecting elements in the list and click [Delete], they will be removed from the target of the reference.
- Clicking [Delete All] will remove all elements from the target of the reference.

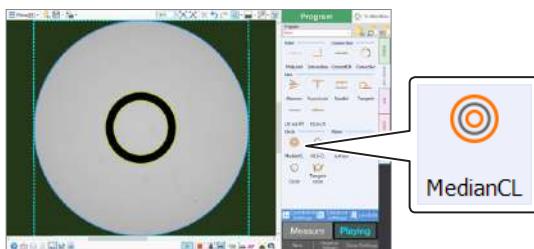
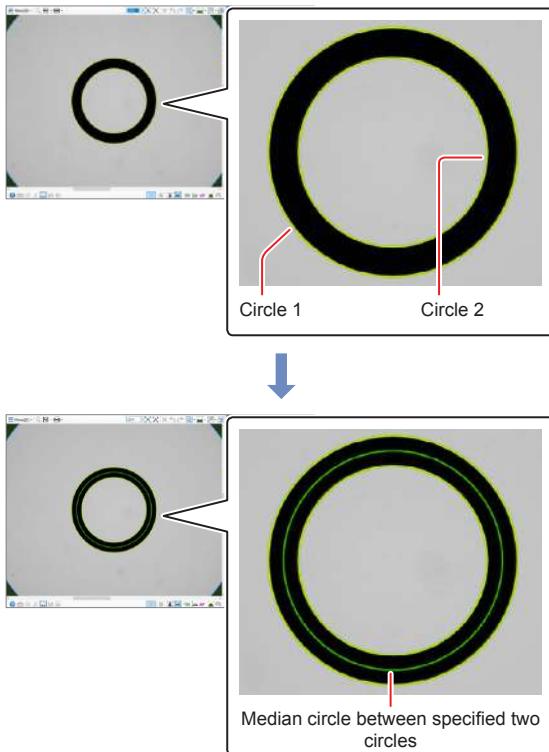
### 4 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

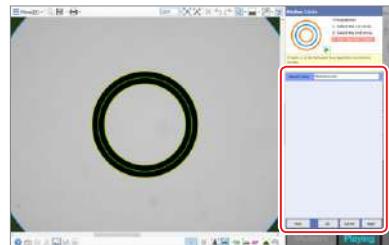
By clicking [Next], you can continue to use the same tool.

**Circle****■ MedianCL**

Draw a median circle of two selected circles or arcs.

**1 Click [MedianCL].****2 Select two (or more) circles on the preview screen.**

The system draws a median circle between the selected two circles (or arcs).

**3 Set the items related to the tool.**

After changing the setting, click [Apply], and the change is reflected on the preview screen.

 **Element name**

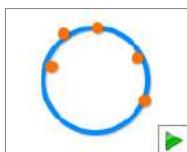
Edit the name of the tool.

**4 Click [OK].**

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

**Reference** By clicking [Next], you can continue to use the same tool.

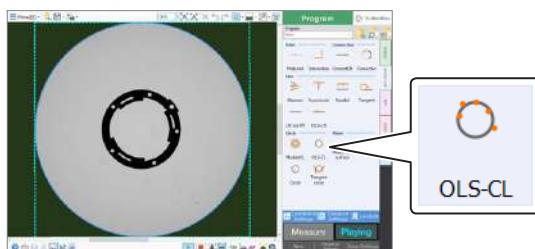
## ■ OLS-CL



Draw an OLS circle which approximately passes through two or more selected points.

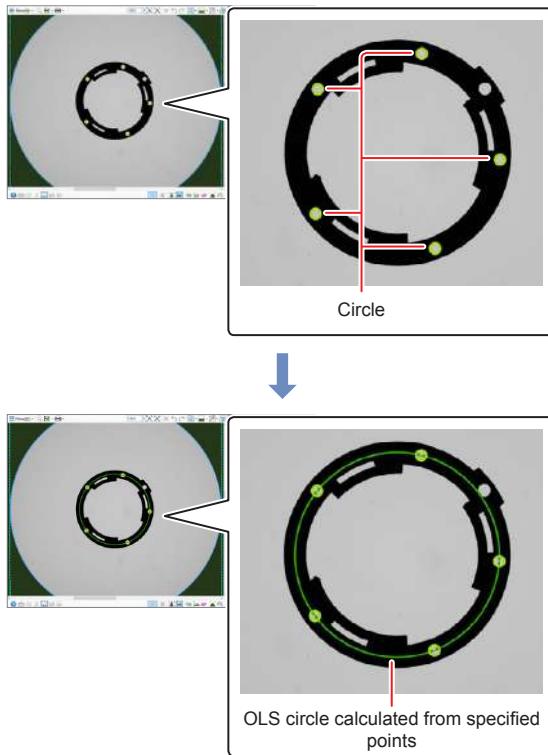
**Reference** If you select a circle or arc, an OLS circle which passes through its center can be created.

### 1 Click [OLS-CL].



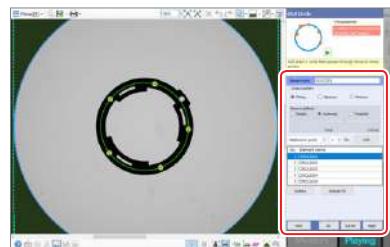
### 2 Select points (three or more) on the preview screen.

Select all points to be used to draw the OLS circle.



The system draws a circle through the ordinary least squares (OLS) approximation using all of the selected points.

### 3 Set the items related to the tool.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

#### ○ Element name

Edit the name of the tool.

#### ○ Output pattern

Specify the method to detect circles.

- Fitting  
The OLS circle is detected from the detected point.
- Maximum  
The outer tangent circle is detected from the detected points.
- Minimum  
The inner tangent circle is detected from the detected points.

#### ○ Remove defects

Points recognized as abnormal are removed and the virtual line is created.

- Disable  
Abnormal points are not removed.
- Automatic  
Abnormal edges are judged automatically.
- Threshold  
Abnormal points are judged based on the threshold specified with the slider.

#### ○ Reference element list

The element to be referred for creating an ordinary least squares circle can be added or deleted.

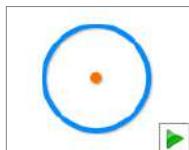
- When selecting elements to be referred and their order and click [Add], they are added to the list.
- When selecting elements in the list and click [Delete], they will be removed from the target of the reference.
- Clicking [Delete All] will remove all elements from the target of the reference.

### 4 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.



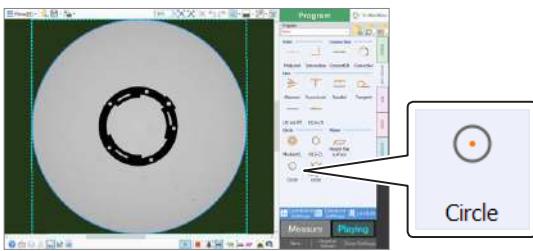
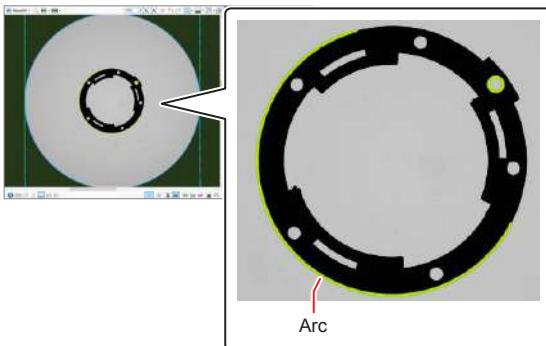
By clicking [Next], you can continue to use the same tool.

**Measurement Items****■ Circle**

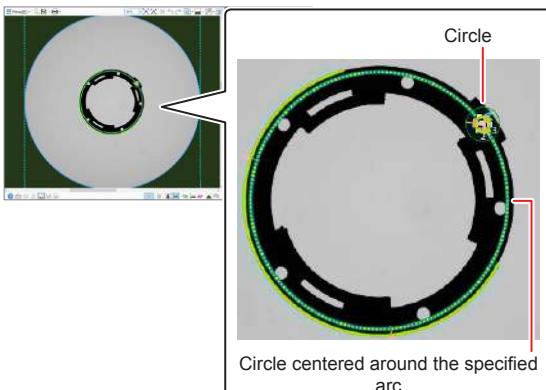
Draw a circle whose center is a selected point.

**[Reference]**

If you select circles or arcs, a circle which passes through the center of the secondarily selected circle or arc, with the primarily selected circle or arc being at the center, can be created.

**1 Click [Circle].****2 Select a point (or circle/arc) to be a center of the circle on the preview screen.****3 Select a point (or circle/arc) to be a basis of radius on the preview screen.**

When you specify the radius from the center without selecting a point and draw the circle, select the center, click where there is no point and enter the radius in the value input box of [Radius].



The system draws a circle which passes through the specified point (or circle/arc).

**4 Set the items related to the tool.**

After changing the setting, click [Apply], and the change is reflected on the preview screen.

**○ Element name**

Edit the name of the tool.

**○ Output pattern**

Specify the calculating method according to the center point when determining the radius of the circle.

- Designate absolute value  
Specified radius or measurement result value becomes the radius value for the virtual circle.
- Designate relative value  
Value that is the sum of the radius of an element specified as a center point and the specified radius (or measurement result) becomes the radius of the virtual circle. If the element selected to be the center point is a point, the radius is the same as the one when "Designate absolute value" is selected.

**○ Radius**

When you do not specify the point through which the circle passes (when you specify an arbitrary position), specify the the radius of the circle.

- Designate with value  
Specify the radius of a virtual circle (distance from the center point).
- Designate with measurement result  
Specify the measure results including a calculation result as the radius of the circle.



You can select a measurement result shown on the preview screen.

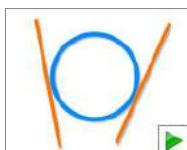
**5 Click [OK].**

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

**[Reference]**

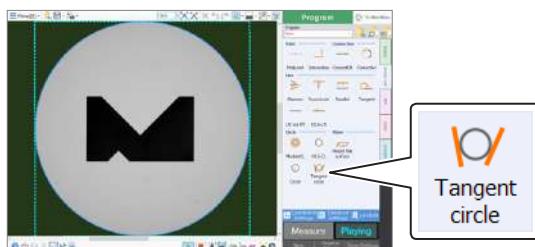
By clicking [Next], you can continue to use the same tool.

## ■ Tangent Circle

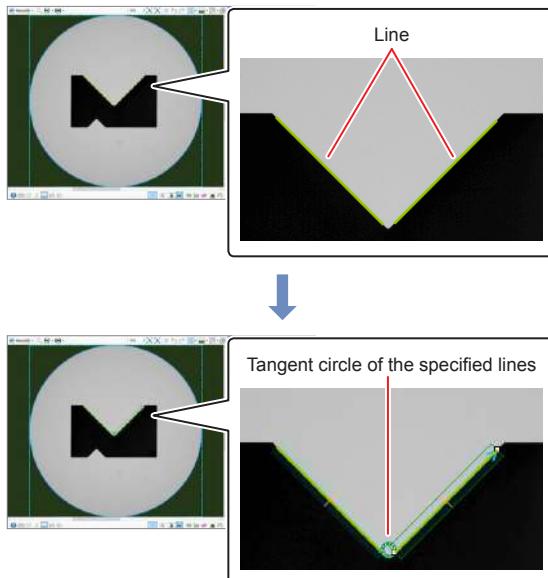


Draw a circle connecting to two selected lines.

### 1 Click [Tangent circle].

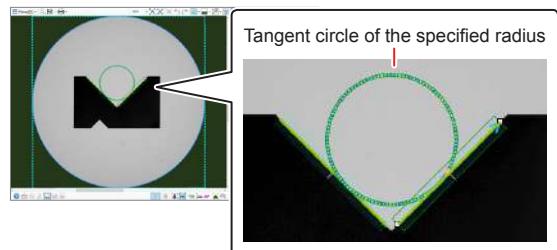


### 2 Select two lines on the preview screen.

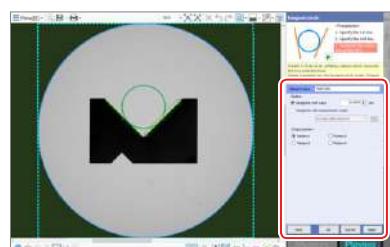


The system draws a circle contacting to two specified lines.

### 3 Specify the radius from the value or measurement results.



### 4 Set the items related to the tool.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

#### ○ Element name

Edit the name of the tool.

#### ○ Radius

Specify the radius of the tangent circle.

- Designate with value

Specify the circle radius by mm.

- Designate with measurement result

Specify the results including a calculation result as the radius of the tangent circle.



You can select a measurement result shown on the preview screen.

#### ○ Output pattern

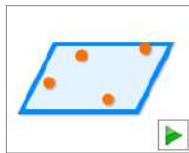
Select the position to draw the tangent circle.

### 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.



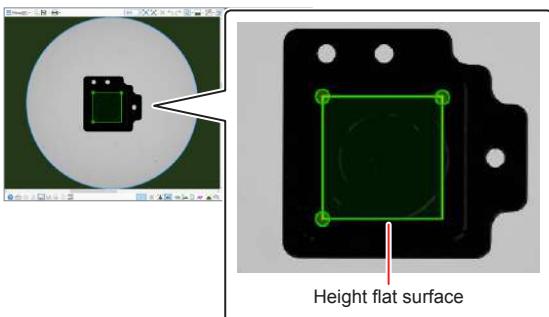
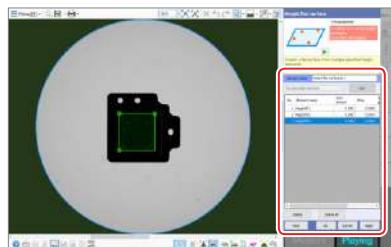
By clicking [Next], you can continue to use the same tool.

**Plane****■ Height Flat Surface**

Create a flat surface from two or more specified height elements.

**1 Click [Height flat surface].****2 Select height elements (three or more) on the preview screen.**

A height flat surface is created from all the selected height elements.

**3 Set the items related to the tool.**

After changing the setting, click [Apply], and the change is reflected on the preview screen.

 **Element name**

Edit the name of the tool.

 **Reference element list**

The element to be referred for creating a height flat surface can be added or deleted.

- When selecting elements to be referred and their order and click [Add], they are added to the list.
- When selecting elements in the list and click [Delete], they will be removed from the target of the reference.
- Clicking [Delete All] will remove all elements from the target of the reference.

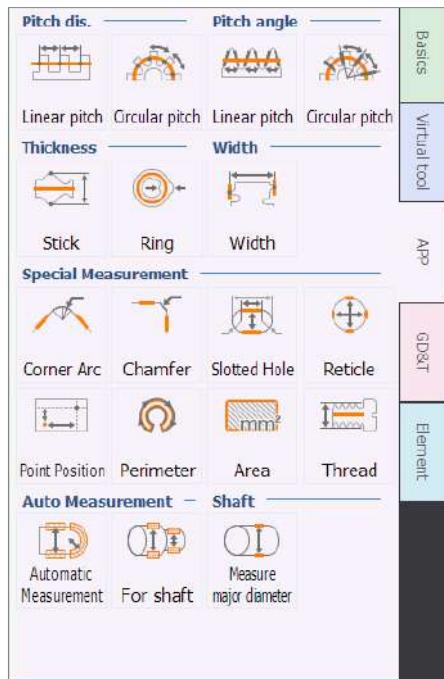
**4 Click [OK].**

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

By clicking [Next], you can continue to use the same tool.

## Application

Select the [APP] tab in the [Measurement operation area] to display the APP (application tools) options.  
You can measure pitch, width, thickness, and other items and display the result on the preview display.



### ● Pitch dis.

These options are used to measure the pitch distance between the edges along a line or a circle.  
["Pitch Distance" \(Page 4-58\)](#)

### ● Pitch angle

These options are used to measure the pitch angle of the edges along a line or a circle.  
["Pitch Angle" \(Page 4-68\)](#)

### ● Thickness

These options are used to measure the thickness of rod-like targets such as shafts or doughnut-like targets such as O-rings.  
["Thickness" \(Page 4-75\)](#)

### ● Width

This option is used to measure the maximum and minimum width.  
["Width" \(Page 4-79\)](#)

### ● Special Measurement

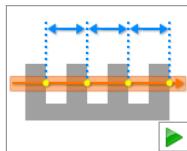
These options are used to measure various dimensions such as corner shapes (rounded, chamfered) and slots, or the diameter in a certain direction of a specified circle.  
["Special Measurement" \(Page 4-81\)](#)

### ● Auto Measurement

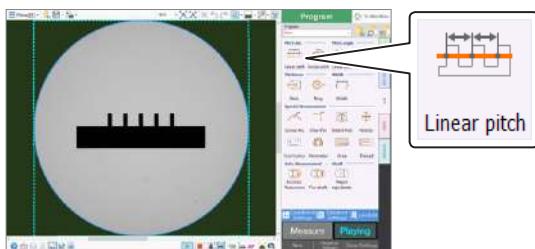
Create/measure each element automatically from the measurement results within the specified measurement area.  
["Auto Measurement" \(Page 4-95\)](#)

### ● Shaft

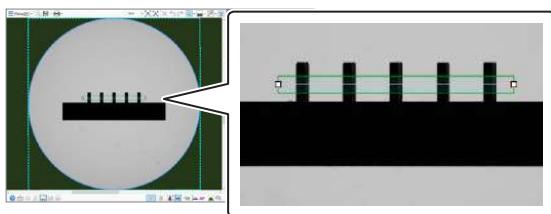
Measure the major diameter of the measurement target.  
["Shaft" \(Page 4-102\)](#)

**Measurement Items****Pitch Distance****■ Linear Pitch (Pitch Width of Line)**

Measure the pitch (linear distance) between the edges along a straight line.

**1 Click [Linear pitch].****2 Specify a scanning line to cover the target edges for the pitch measurement.**

Specify a scanning line (two points) so that it perpendicularly intersects the target edges for the pitch measurement.

**3 Specify the measurement conditions in the edit window.**

For details about the edit window, refer to □ "Edit Window" (Page 4-59).

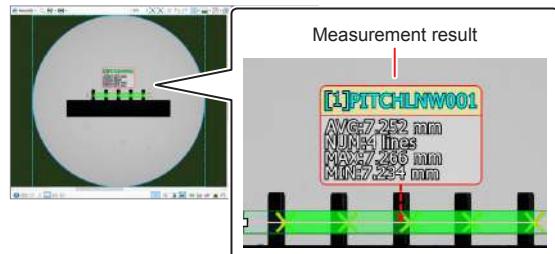
**4 Click [Apply].**

The result of the measurement specified in the edit window is displayed in the preview display.

The measurement result is displayed also under [Measurement result] in the edit window.

If the result is undesirable, change the setting in the edit window and click [Apply] again.

The setting can be changed any number of times before [OK] or [Next] is clicked.

 **AVG**

The average of pitches of the edges detected along the scanning line.

 **NUM**

The number of pitches of the edges detected along the scanning line.

 **MAX**

The maximum value of the measured pitches.

 **MIN**

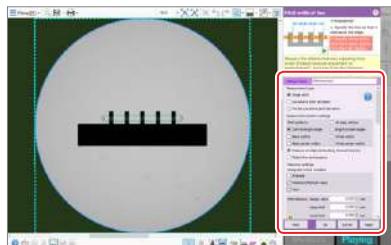
The minimum value of the measured pitches.

**5 Click [OK].**

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

By clicking [Next], you can continue to use the same tool.

## ● Edit Window



After changing the setting, click [Apply], and the change is reflected on the preview screen.

### ● Element name

Edit the name of the measurement result.

### ● Measurement type

#### ○ Single pitch

Measure the single pitch.

#### ○ Cumulative pitch deviation

Measure the cumulative pitch deviation.

#### ○ Partial cumulative pitch deviation

Measure the partial cumulative pitch deviation.



The detailed description regarding measurement type is displayed.



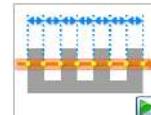
**The tolerance settings contents change according to the selected measurement type.**

## ● Measurement pattern settings

### ○ Pitch patterns

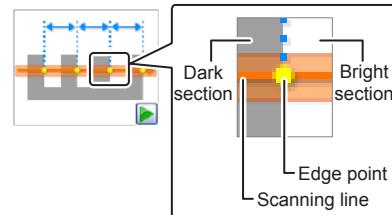
Specify the pattern of the pitch measurement.

- All edge pitches



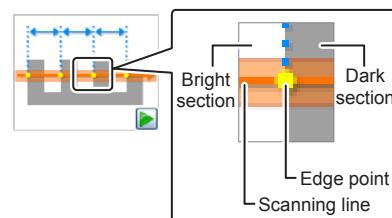
Measure the pitches of all edges detected along the scanning line.

- Dark-to-bright edges



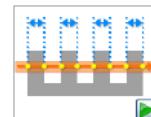
Scan the target along the scanning line in the direction of the arrow and measure the pitches by setting the edge points on the boundaries from dark to bright.

- Bright-to-dark edges



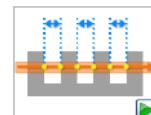
Scan the target along the scanning line in the direction of the arrow and measure the pitches by setting the edge points on the boundaries from bright to dark.

- Black widths



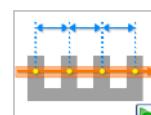
Scan the target along the scanning line in the direction of the arrow and measure the width of black (dark) sections by setting the edge points on the boundaries from bright to dark and from dark to bright.

- White widths



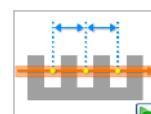
Scan the target along the scanning line in the direction of the arrow and measure the width of white (bright) sections by setting the edge points on the boundaries from dark to bright and from bright to dark.

- Black center widths



Scan the target along the scanning line in the direction of the arrow, measure the width of black (dark) sections by setting the edge points on the boundaries from dark to bright and from bright to dark, and then measure the distance between the centers of the black (dark) sections.

- White center widths

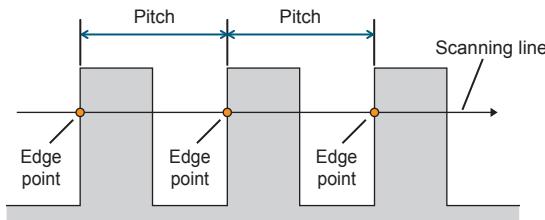


Scan the target along the scanning line in the direction of the arrow, measure the width of white (bright) sections by setting the edge points on the boundaries from dark to bright and from bright to dark, and then measure the distance between the centers of the white (bright) sections.

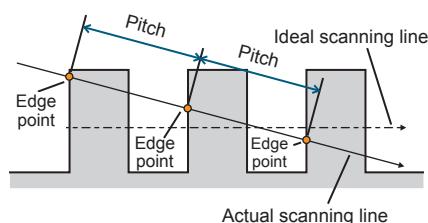
## Measurement Items

### ○ Measure at edge points along the scanning line

Measure the pitch between the edge points along the scanning line specified in Step 2.



**[Reference]** If the scanning line was specified in an angled direction to the target edges for the pitch measurement, the measurement error increases.

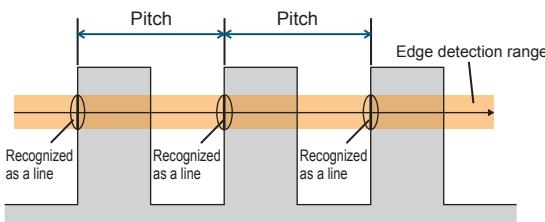


When it is difficult to specify the scanning line which perpendicularly intersects the target edges, or when precise measurement is required, use the following technique:

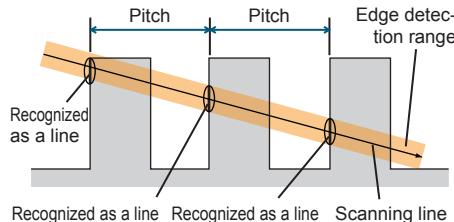
- Under [Position/postural adjustment on measurement], select "Set angle from target."  "Set angle from target." (Page 4-106)
- Under [Measurement pattern settings], select "Detect line and measure".

### ○ Detect line and measure

Recognize the edges in the edge detection range specified in Step 2 as lines, and measure the pitches between the lines.



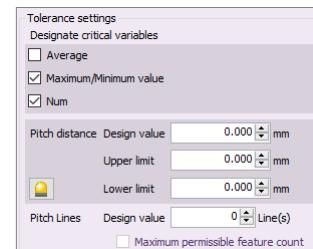
**[Reference]** Since edges are recognized as lines, measurement error decreases even when the scanning line was specified in an angled direction to the target edges.



### ● Tolerance settings (when you select [Single pitch] for "Measurement type")

Select the target of tolerance evaluation. Enter the design value and the tolerance values (upper limit and lower limit) for the design value. These values are used to evaluate whether the measurement value remains within the tolerance range.

"Chapter 6 Run Mode" (Page 6-1)



#### ○ Average

Set the average value as the target of tolerance evaluation.

#### ○ Maximum/Minimum value

Set the maximum and minimum values as the target of tolerance evaluation.

#### ○ Num

Set the number of pitch lines as the target of tolerance evaluation.



**The items of measurement results which are not the target of tolerance evaluation are not saved.**

#### ○ Pitch distance

- Design value  
Enter the design value of the pitch distance in mm.
- Upper limit  
Enter the upper tolerance limit of the pitch distance in mm.
- Lower limit  
Enter the lower tolerance limit of the pitch distance in mm.



If the upper tolerance is entered when the lower tolerance is 0, "value with minus sign (-) put to the upper tolerance" will be entered automatically for the lower tolerance.



[Alert Settings] dialog box appears.  
 "Alert Settings" (Page 4-192)

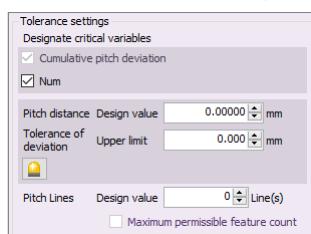
#### ○ Pitch Lines

- Design value  
Enter the design value of the number of pitch lines.
- Maximum permissible feature count  
When this check box is selected, the pitch distances of the pitch lines only for the number entered in [Design value] counting from the leading pitch are detected.

## ● Tolerance settings (when you select [Cumulative pitch deviation] for “Measurement type”)

Select the target of tolerance evaluation. Enter the design value and the tolerance values (upper limit) for the design value. These values are used to evaluate whether the measurement value remains within the tolerance range.

“Chapter 6 Run Mode” (Page 6-1)



### ○ Cumulative pitch deviation

Set the cumulative pitch deviation as the target of tolerance evaluation.

### ○ Num

Set the number of pitch lines as the target of tolerance evaluation.

Point The items of measurement results which are not the target of tolerance evaluation are not saved.

### ○ Pitch distance

- Design value

Enter the design value of the pitch distance in mm.

### ○ Tolerance of deviation

- Upper limit

Enter the upper tolerance limit of the Cumulative pitch deviation in mm.



[Alert Settings] dialog box appears.  
 “Alert Settings” (Page 4-192)

### ○ Pitch Lines

- Design value

Enter the design value of the number of pitch lines.

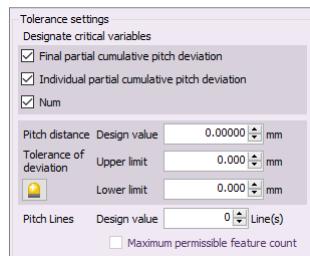
- Maximum permissible feature count

When this check box is selected, the pitch distances of the pitch lines only for the number entered in [Design value] counting from the leading pitch are detected.

## ● Tolerance settings (when you select [Partial cumulative pitch deviation] for “Measurement type”)

Select the target of tolerance evaluation. Enter the design value and the tolerance values (upper limit and lower limit) for the design value. These values are used to evaluate whether the measurement value remains within the tolerance range.

“Chapter 6 Run Mode” (Page 6-1)



### ○ Final partial cumulative pitch deviation

Set the final partial cumulative pitch deviation as the target of tolerance evaluation.

### ○ Individual partial cumulative pitch deviation

Set the individual partial cumulative pitch deviation as the target of tolerance evaluation.

### ○ Num

Set the number of pitch lines as the target of tolerance evaluation.

Point The items of measurement results which are not the target of tolerance evaluation are not saved.

### ○ Pitch distance

- Design value

Enter the design value of the pitch distance in mm.

### ○ Tolerance of deviation

- Upper limit

Enter the upper tolerance limit of the partial cumulative pitch deviation in mm.

- Lower limit

Enter the lower tolerance limit of the partial cumulative pitch deviation in mm.

Reference If the upper tolerance is entered when the lower tolerance is 0, “value with minus sign (-) put to the upper tolerance” will be entered automatically for the lower tolerance.



[Alert Settings] dialog box appears.  
 “Alert Settings” (Page 4-192)

### ○ Pitch Lines

- Design value

Enter the design value of the number of pitch lines.

- Maximum permissible feature count

When this check box is selected, the pitch distances of the pitch lines only for the number entered in [Design value] counting from the leading pitch are detected.

### ● Edge extraction parameters

Refer to □ “Advanced Parameters of Application Tool” (Page 4-104).

### ● Postural adjustment

Refer to □ “Advanced Parameters of Application Tool” (Page 4-104).

### ● Range parameters

Refer to □ “Advanced Parameters of Application Tool” (Page 4-104).

### ● Capture height advanced settings

Refer to □ “Advanced Parameters of Application Tool” (Page 4-104).

### ● Autofocus capture

Refer to □ “Advanced Parameters of Application Tool” (Page 4-104).

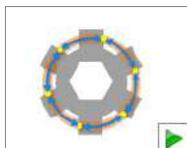
### ● Measurement result

The measurement result is displayed. The measurement value and evaluation result are displayed for each linear pitch.



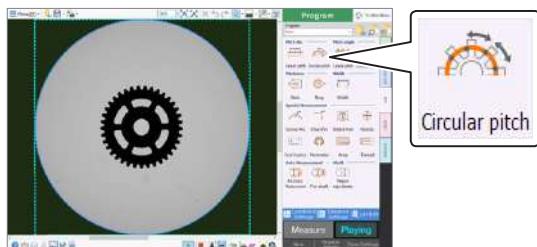
Point If [Average Number Settings] is set as multiple times, the measurement result is not displayed.

## ■ Circular Pitch (Pitch Width of Circular Angle)



Measure the pitch (curve distance) between the edges along a circumference.

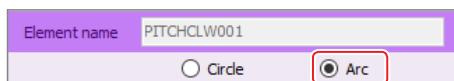
### 1 Click [Circular pitch].



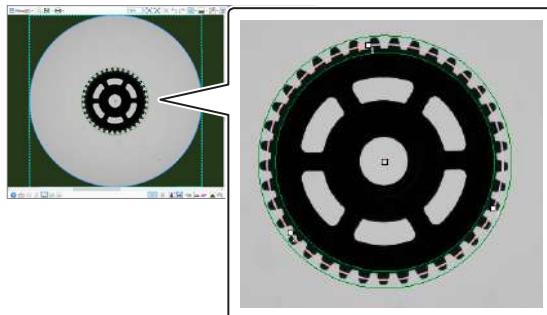
### 2 Specify a scanning line to cover the target edges for the pitch measurement.

Click three points along the circle or arc so that the target edges of the pitch measurement (scanning line) is concentric with the target circle.

To measure the pitch along an arc (width), you need to select [Arc] in the application tool edit window before specifying the scanning line in this step.



**Point** In pitch width of circular angle, curve distances along the scanning line are measured. Select [Align with the base element's detection results.] under "Postural adjustment" on the edit window to adjust the radius to match the center.  
 "Postural adjustment (Circle or Arc Range)" (Page 4-107)



### 3 Specify the measurement conditions in the edit window.

For details about the edit window, refer to  "Edit Window" (Page 4-64).

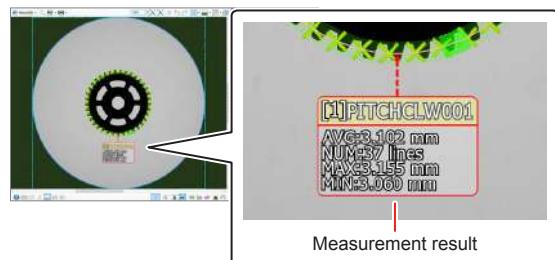
### 4 Click [Apply].

The result of the measurement specified in the edit window is displayed in the preview display.

The measurement result is displayed also under [Measurement result] in the edit window.

If the result is undesirable, change the setting in the edit window and click [Apply] again.

The setting can be changed any number of times before [OK] or [Next] is clicked.



#### ○ AVG

The average of pitches of the edges detected along the scanning line.

#### ○ NUM

The number of pitches of the edges detected along the scanning line.

#### ○ MAX

The maximum value of the measured pitches.

#### ○ MIN

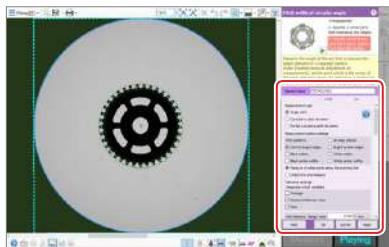
The minimum value of the measured pitches.

### 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

Reference By clicking [Next], you can continue to use the same tool.

## ● Edit Window



After changing the setting, click [Apply], and the change is reflected on the preview screen.

## ● Element name

Edit the name of the measurement result.

## ● Circle/Arc setting

Select the shape of the target area (scanning line) to measure the pitches along a circumference.

### ○ Circle

Set the scanning line as a circle which passes through the specified three points.

### ○ Arc

Set the scanning line as an arc which passes through the specified three points (First point: Start point, Second point: Intermediate point, Third point: End point).

## ● Measurement type

### ○ Single pitch

Measure the single pitch.

### ○ Cumulative pitch deviation

Measure the cumulative pitch deviation.

### ○ Partial cumulative pitch deviation

Measure the partial cumulative pitch deviation.

### ○

The detailed description regarding measurement type is displayed.



**The tolerance settings contents change according to the selected measurement type.**

## ● Measurement pattern settings

### ○ Pitch patterns

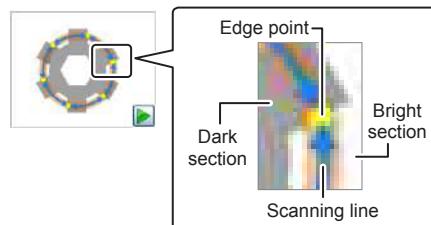
Specify the pattern of the pitch measurement.

- All edge pitches



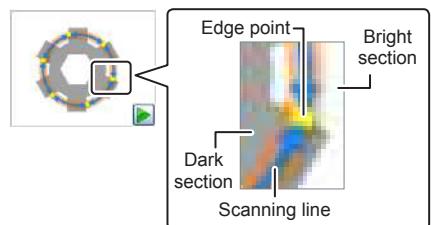
Measure the distance between all the edges detected along the scanning line.

- Dark-to-bright edges



Scan the target along the scanning line in a clockwise direction and measure the distances by setting the edge points on the boundaries from dark to bright.

- Bright-to-dark edges



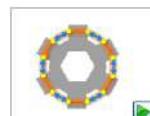
Scan the target along the scanning line in a clockwise direction and measure the distances by setting the edge points on the boundaries from bright to dark.

- Black widths



Scan the target along the scanning line in a clockwise direction and measure the distances of black (dark) sections by setting the edge points on the boundaries from bright to dark and from dark to bright.

- White widths



Scan the target along the scanning line in a clockwise direction and measure the distances of white (bright) sections by setting the edge points on the boundaries from dark to bright and from bright to dark.

- Black center widths



Scan the target along the scanning line in a clockwise direction and measure the black (dark) sections by setting the edge points on the boundaries from dark to bright and from bright to dark, and then measure the distances between the centers of the black (dark) sections.

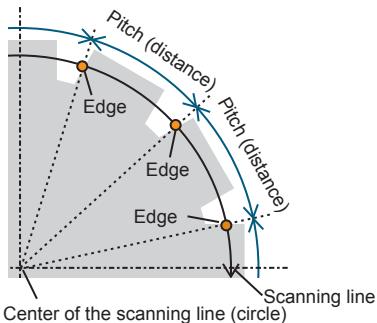
- White center widths



Scan the target along the scanning line in a clockwise direction and measure the white (bright) sections by setting the edge points on the boundaries from dark to bright and from bright to dark, and then measure the distances between the centers of the white (bright) sections.

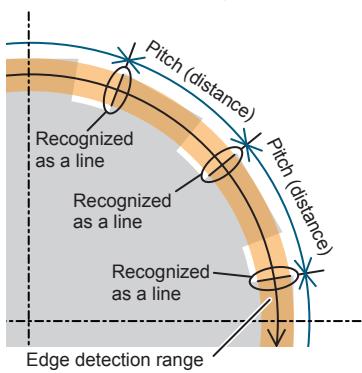
○ Measure at edge points along the scanning line

Measure the distances between the edge points along the scanning line specified in Step 2.



○ Detect line and measure

Recognize the edges in the edge detection range specified in Step 2 as lines, and measure the angles between the lines.



● Tolerance settings (when you select [Single pitch] for “Measurement type”)

Select the target of tolerance evaluation. Enter the design value and the tolerance values (upper limit and lower limit) for the design value. These values are used to evaluate whether the measurement value remains within the tolerance range.

“Chapter 6 Run Mode” (Page 6-1)

Tolerance settings	
Designate critical variables	
<input type="checkbox"/>	Average
<input checked="" type="checkbox"/>	Maximum/Minimum value
<input checked="" type="checkbox"/>	Num
Pitch distance Design value 0.000 mm	
Upper limit 0.000 mm	
Lower limit 0.000 mm	
Pitch Lines Design value 0 Line(s)	
<input type="checkbox"/> Maximum permissible feature count	

○ Average

Set the average value as the target of tolerance evaluation.

○ Maximum/Minimum value

Set the maximum and minimum values as the target of tolerance evaluation.

○ Num

Set the number of pitch lines as the target of tolerance evaluation.



The items of measurement results which are not the target of tolerance evaluation are not saved.

○ Pitch distance

- Design value

Enter the design value of the pitch distance in mm.

- Upper limit

Enter the upper tolerance limit of the pitch distance in mm.

- Lower limit

Enter the lower tolerance limit of the pitch distance in mm.



If the upper tolerance is entered when the lower tolerance is 0, “value with minus sign (-) put to the upper tolerance” will be entered automatically for the lower tolerance.



[Alert Settings] dialog box appears.

“Alert Settings” (Page 4-192)

○ Pitch Lines

- Design value

Enter the design value of the number of pitch lines.

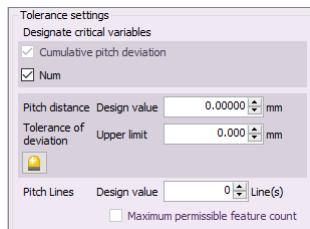
- Maximum permissible feature count

When this check box is selected, the pitch distances of the pitch lines only for the number entered in [Design value] counting from the leading pitch are detected.

### ● Tolerance settings (when you select [Cumulative pitch deviation] for “Measurement type”)

Select the target of tolerance evaluation. Enter the design value and the tolerance values (upper limit) for the design value. These values are used to evaluate whether the measurement value remains within the tolerance range.

“Chapter 6 Run Mode” (Page 6-1)



#### ○ Cumulative pitch deviation

Set the cumulative pitch deviation as the target of tolerance evaluation.

#### ○ Num

Set the number of pitch lines as the target of tolerance evaluation.



The items of measurement results which are not the target of tolerance evaluation are not saved.

#### ○ Pitch distance

- Design value

Enter the design value of the pitch distance in mm.

#### ○ Tolerance of deviation

- Upper limit

Enter the upper tolerance limit of the Cumulative pitch deviation in mm.



[Alert Settings] dialog box appears.  
 “Alert Settings” (Page 4-192)

#### ○ Pitch Lines

- Design value

Enter the design value of the number of pitch lines.

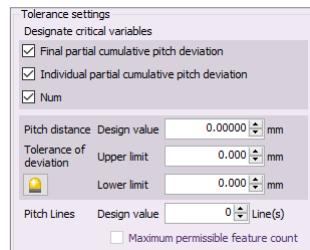
- Maximum permissible feature count

When this check box is selected, the pitch distances of the pitch lines only for the number entered in [Design value] counting from the leading pitch are detected.

### ● Tolerance settings (when you select [Partial cumulative pitch deviation] for “Measurement type”)

Select the target of tolerance evaluation. Enter the design value and the tolerance values (upper limit and lower limit) for the design value. These values are used to evaluate whether the measurement value remains within the tolerance range.

“Chapter 6 Run Mode” (Page 6-1)



#### ○ Final partial cumulative pitch deviation

Set the final partial cumulative pitch deviation as the target of tolerance evaluation.

#### ○ Individual partial cumulative pitch deviation

Set the individual partial cumulative pitch deviation as the target of tolerance evaluation.

#### ○ Num

Set the number of pitch lines as the target of tolerance evaluation.



The items of measurement results which are not the target of tolerance evaluation are not saved.

#### ○ Pitch distance

- Design value

Enter the design value of the pitch distance in mm.

#### ○ Tolerance of deviation

- Upper limit

Enter the upper tolerance limit of the partial cumulative pitch deviation in mm.

- Lower limit

Enter the lower tolerance limit of the partial cumulative pitch deviation in mm.



If the upper tolerance is entered when the lower tolerance is 0, “value with minus sign (-) put to the upper tolerance” will be entered automatically for the lower tolerance.



[Alert Settings] dialog box appears.  
 “Alert Settings” (Page 4-192)

#### ○ Pitch Lines

- Design value

Enter the design value of the number of pitch lines.

- Maximum permissible feature count

When this check box is selected, the pitch distances of the pitch lines only for the number entered in [Design value] counting from the leading pitch are detected.

### ● Edge extraction parameters

Refer to □ "Advanced Parameters of Application Tool" (Page 4-104).

### ● Postural adjustment

Refer to □ "Advanced Parameters of Application Tool" (Page 4-104).

### ● Range parameters

Refer to □ "Advanced Parameters of Application Tool" (Page 4-104).

### ● Capture height advanced settings

Refer to □ "Advanced Parameters of Application Tool" (Page 4-104).

### ● Autofocus capture

Refer to □ "Advanced Parameters of Application Tool" (Page 4-104).

### ● Measurement result

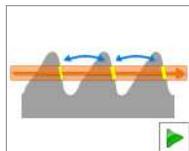
The measurement result is displayed. The measurement value and evaluation result are displayed for each circular pitch.



If [Average Number Settings] is set as multiple times, the measurement result is not displayed.

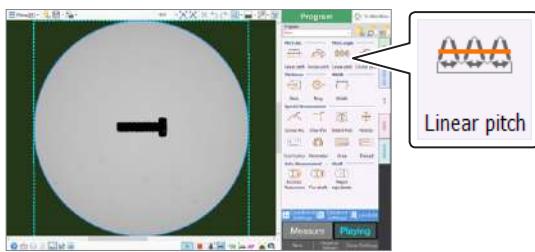
## Pitch Angle

### ■ Linear Pitch (Tilt Angle of Line Pitch)



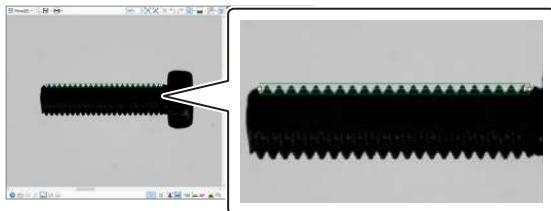
Measure the pitch (tilt angle) between the edges along a line.

#### 1 Click [Linear pitch].



#### 2 Specify a scanning line to cover the target edges for the pitch measurement.

Specify a scanning line (two points) so that it perpendicularly intersects the target edges for the pitch measurement.



#### 3 Specify the measurement conditions in the edit window.

For details about the edit window, refer to □ "Edit Window" (Page 4-69).

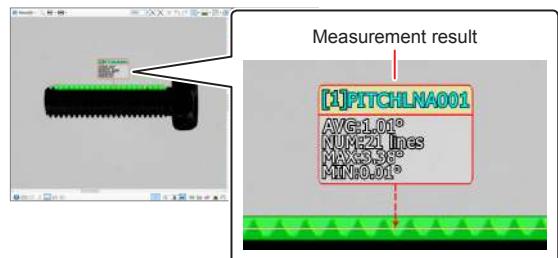
#### 4 Click [Apply].

The result of the measurement specified in the edit window is displayed in the preview display.

The measurement result is displayed also under [Measurement result] in the edit window.

If the result is undesirable, change the setting in the edit window and click [Apply] again.

The setting can be changed any number of times before [OK] or [Next] is clicked.



##### ○AVG

The average of pitch angles of the edges detected along the scanning line.

##### ○NUM

The number of pitches of the edges detected along the scanning line.

##### ○MAX

The maximum value of the measured pitches.

##### ○MIN

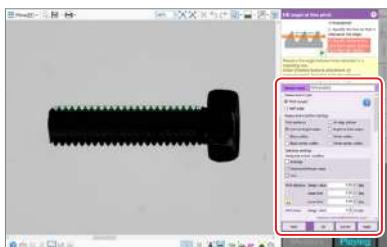
The minimum value of the measured pitches.

#### 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

By clicking [Next], you can continue to use the same tool.

## ● Edit Window



After changing the setting, click [Apply], and the change is reflected on the preview screen.

### ● Element name

Edit the name of the measurement result.

### ● Measurement type

#### Pitch (angle)

Measure the single pitch (angle).

#### Half angle

Measure the half angle.

#### ?

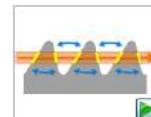
The detailed description regarding measurement type is displayed.

## ● Measurement pattern settings

#### Pitch patterns

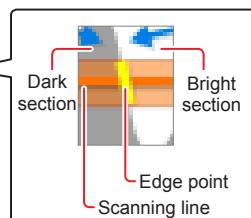
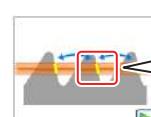
Specify the pattern of the pitch measurement.

- All edge pitches



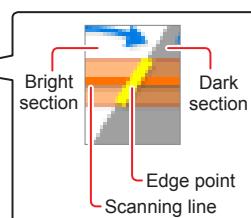
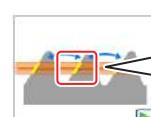
Measure the pitches of all edges detected along the scanning line.

- Dark-to-bright edges



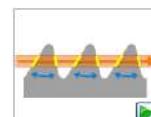
Scan the target along the scanning line in the direction of the arrow and measure the pitches by setting the edge points on the boundaries from dark to bright.

- Bright-to-dark edges



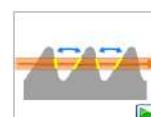
Scan the target along the scanning line in the direction of the arrow and measure the pitches by setting the edge points on the boundaries from bright to dark.

- Black widths



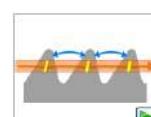
Scan the target along the scanning line in the direction of the arrow and measure the width of black (dark) sections by setting the edge points on the boundaries from bright to dark and from dark to bright.

- White widths



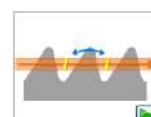
Scan the target along the scanning line in the direction of the arrow and measure the width of white (bright) sections by setting the edge points on the boundaries from dark to bright and from bright to dark.

- Black center widths



Scan the target along the scanning line in the direction of the arrow, measure the width of black (dark) sections by setting the edge points on the boundaries from dark to bright and from bright to dark, and then measure the distance between the centers of the black (dark) sections.

- White center widths



Scan the target along the scanning line in the direction of the arrow, measure the width of white (bright) sections by setting the edge points on the boundaries from dark to bright and from bright to dark, and then measure the distance between the centers of the white (bright) sections.

### ● Tolerance settings

Select the target of tolerance evaluation. Enter the design value and the tolerance values (upper limit and lower limit) for the design value. These values are used to evaluate whether the measurement value remains within the tolerance range.

"Chapter 6 Run Mode" (Page 6-1)

Average

Set the average value as the target of tolerance evaluation.

Maximum/Minimum value

Set the maximum and minimum values as the target of tolerance evaluation.

Num

Set the number of pitch lines as the target of tolerance evaluation.



The items of measurement results which are not the target of tolerance evaluation are not saved.

Pitch distance

- Design value

Enter the design value of the pitch distance in degree.

- Upper limit

Enter the upper tolerance limit of the pitch distance in degree.

- Lower limit

Enter the lower tolerance limit of the pitch distance in degree.



If the upper tolerance is entered when the lower tolerance is 0, "value with minus sign (-) put to the upper tolerance" will be entered automatically for the lower tolerance.



[Alert Settings] dialog box appears.  
 "Alert Settings" (Page 4-192)

Pitch Lines

- Design value

Enter the design value of the number of pitch lines.

- Maximum permissible feature count

When this check box is selected, the pitch distances of the pitch lines only for the number entered in [Design value] counting from the leading pitch are detected.

### ● Edge extraction parameters

Refer to  "Advanced Parameters of Application Tool" (Page 4-104).

### ● Postural adjustment

Refer to  "Advanced Parameters of Application Tool" (Page 4-104).

### ● Range parameters

Refer to  "Advanced Parameters of Application Tool" (Page 4-104).

### ● Capture height advanced settings

Refer to  "Advanced Parameters of Application Tool" (Page 4-104).

### ● Autofocus capture

Refer to  "Advanced Parameters of Application Tool" (Page 4-104).

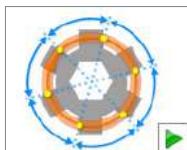
### ● Measurement result

The measurement result is displayed. The measurement value and evaluation result are displayed for each linear pitch.



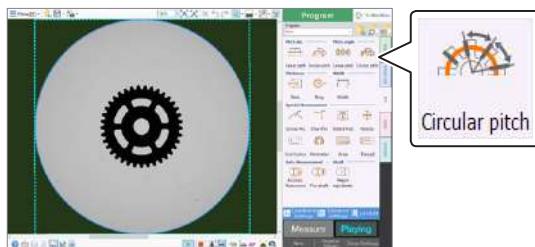
If [Average Number Settings] is set as multiple times, the measurement result is not displayed.

## ■ Circular Pitch (Center Angle of Circular Pitch)



Measure the pitch (angle) between the edges along a circumference.

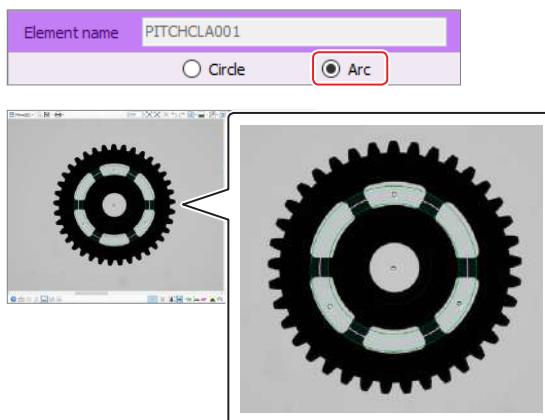
### 1 Click [Circular pitch].



### 2 Specify a scanning line to cover the target edges for the pitch measurement.

Click three points along the circle or arc so that the target edges of the pitch measurement (scanning line) is concentric with the target circle.

To measure the pitch along an arc (angle), you need to select [Arc] in the application tool edit window before specifying the scanning line in this step.



### 3 Specify the measurement conditions in the edit window.

For details about the edit window, refer to □ "Edit Window" (Page 4-72).

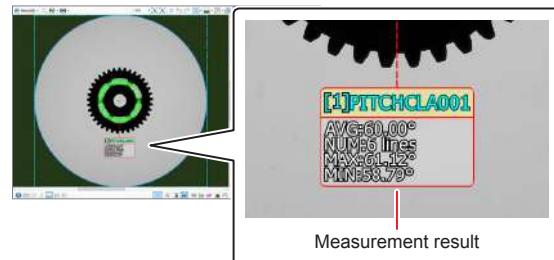
### 4 Click [Apply].

The result of the measurement specified in the edit window is displayed in the preview display.

The measurement result is displayed also under [Measurement result] in the edit window.

If the result is undesirable, change the setting in the edit window and click [Apply] again.

The setting can be changed any number of times before [OK] or [Next] is clicked.



#### ○ AVG

The average of pitches of the edges detected along the scanning line.

#### ○ NUM

The number of pitches of the edges detected along the scanning line.

#### ○ MAX

The maximum value of the measured pitches.

#### ○ MIN

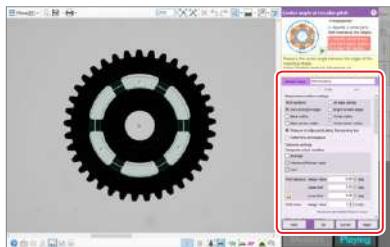
The minimum value of the measured pitches.

### 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

Reference By clicking [Next], you can continue to use the same tool.

## ● Edit Window



After changing the setting, click [Apply], and the change is reflected on the preview screen.

## ● Element name

Edit the name of the measurement result.

## ● Circle/Arc setting

Select the shape of the target area (scanning line) to measure the pitches along a circumference.

### ○ Circle

Set the scanning line as a circle which passes through the specified three points.

### ○ Arc

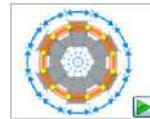
Set the scanning line as an arc which passes through the specified three points (First point: Start point, Second point: Intermediate point, Third point: End point).

## ● Measurement pattern settings

### ○ Pitch patterns

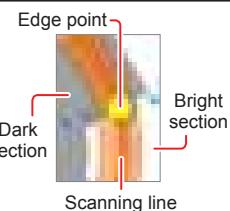
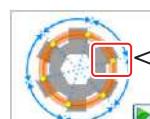
Specify the pattern of the pitch measurement.

- All edge pitches



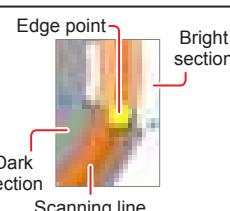
Measure the angle between all the edges detected along the scanning line.

- Dark-to-bright edges



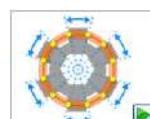
Scan the target along the scanning line in a clockwise direction and measure the angles by setting the edge points on the boundaries from dark to bright.

- Bright-to-dark edges



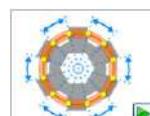
Scan the target along the scanning line in a clockwise direction and measure the angles by setting the edge points on the boundaries from bright to dark.

- Black widths



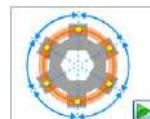
Scan the target along the scanning line in a clockwise direction and measure the angles of black (dark) sections by setting the edge points on the boundaries from bright to dark and from dark to bright.

- White widths



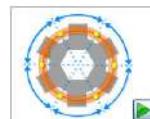
Scan the target along the scanning line in a clockwise direction and measure the angles of white (bright) sections by setting the edge points on the boundaries from dark to bright and from bright to dark.

- Black center widths



Scan the target along the scanning line in a clockwise direction and measure the black (dark) sections by setting the edge points on the boundaries from dark to bright and from bright to dark, and then measure the angles between the centers of the black (dark) sections.

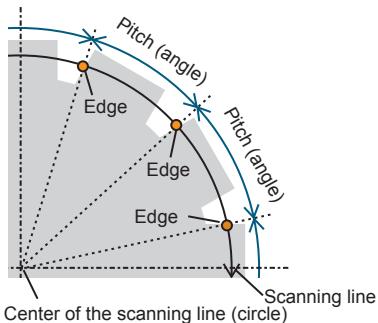
- White center widths



Scan the target along the scanning line in a clockwise direction and measure the white (bright) sections by setting the edge points on the boundaries from dark to bright and from bright to dark, and then measure the angles between the centers of the white (bright) sections.

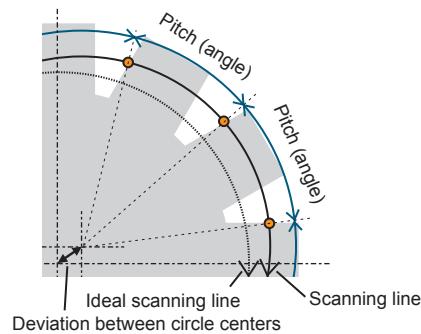
### ○ Measure at edge points along the scanning line

Measure the angles between the edge points along the scanning line specified in Step 2.



Reference

If the center of the specified scanning line and the center of the target circle deviate greatly, the measurement error (angle) increases.



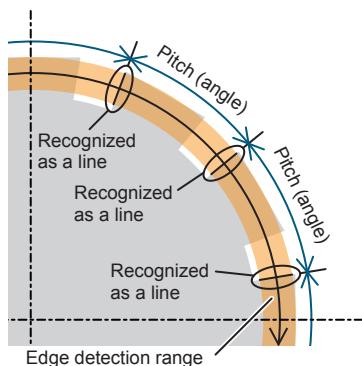
When it is difficult to specify a concentric circle, or when precise measurement is required, use the following technique:

- Draw a reference circle in advance, and set the scanning line concentrically with the reference circle.

"Align center" (Page 4-107)

### ○ Detect line and measure

Recognize the edges in the edge detection range specified in Step 2 as lines, and measure the angle between the midpoints of a line.



### ● Tolerance settings

Select the target of tolerance evaluation. Enter the design value and the tolerance values (upper limit and lower limit) for the design value. These values are used to evaluate whether the measurement value remains within the tolerance range.

"Chapter 6 Run Mode" (Page 6-1)

#### ○ Average

Set the average value as the target of tolerance evaluation.

#### ○ Maximum/Minimum value

Set the maximum and minimum values as the target of tolerance evaluation.

#### ○ Num

Set the number of pitch lines as the target of tolerance evaluation.

Point

The items of measurement results which are not the target of tolerance evaluation are not saved.

### ○ Pitch distance

- Design value  
Enter the design value of the pitch distance in degree.
- Upper limit  
Enter the upper tolerance limit of the pitch distance in degree.
- Lower limit  
Enter the lower tolerance limit of the pitch distance in degree.

Reference

If the upper tolerance is entered when the lower tolerance is 0, "value with minus sign (-) put to the upper tolerance" will be entered automatically for the lower tolerance.

Alert Settings

[Alert Settings] dialog box appears.

"Alert Settings" (Page 4-192)

### ○ Pitch Lines

- Design value  
Enter the design value of the number of pitch lines.
- Maximum permissible feature count  
When this check box is selected, the pitch distances of the pitch lines only for the number entered in [Design value] counting from the leading pitch are detected.

### ● Edge extraction parameters

Refer to □ “Advanced Parameters of Application Tool” (Page 4-104).

### ● Postural adjustment

Refer to □ “Advanced Parameters of Application Tool” (Page 4-104).

### ● Range parameters

Refer to □ “Advanced Parameters of Application Tool” (Page 4-104).

### ● Capture height advanced settings

Refer to □ “Advanced Parameters of Application Tool” (Page 4-104).

### ● Autofocus capture

Refer to □ “Advanced Parameters of Application Tool” (Page 4-104).

### ● Measurement result

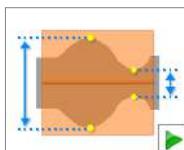
The measurement result is displayed. The measurement value and evaluation result are displayed for each circular pitch.



Point If [Average Number Settings] is set as multiple times, the measurement result is not displayed.

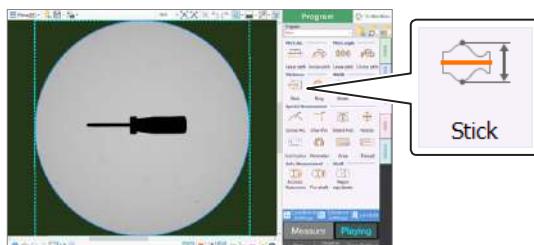
## Thickness

### ■ Stick



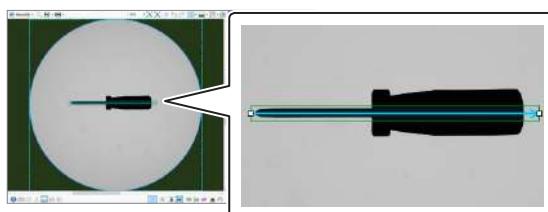
Measure the maximum/minimum thickness of a cylindrical target.

#### 1 Click [Stick].

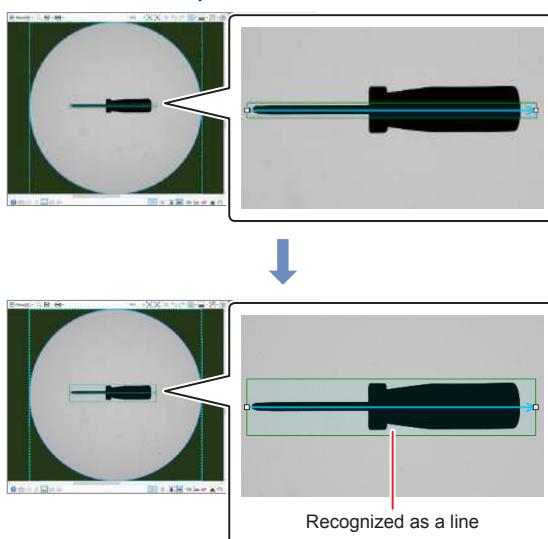


#### 2 Specify the start and end points of the edge detection range of the part to be measured.

Specify the edge detection range so that it passes through the center of the target.



#### 3 Adjust the size and position of the edge detection range so that it includes all sections you want to measure (thickest section, thinnest section).



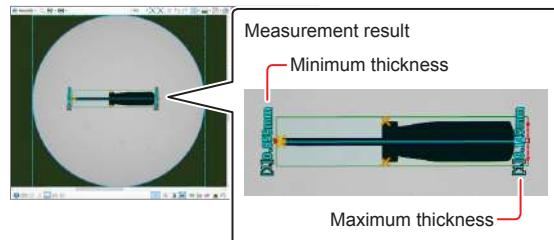
**[Reference]** When [Advanced settings] is selected, the edge detection range can be specified with numerical values.  
□ "Range parameters" (Page 4-76)

#### 4 Specify the measurement conditions in the edit window.

For details about the edit window, refer to □ "Edit Window" (Page 4-76).

#### 5 Click [Apply].

The result of the measurement specified in the edit window is displayed in the preview display.  
If the result is undesirable, change the setting in the edit window and click [Apply] again.  
The setting can be changed any number of times before [OK] or [Next] is clicked.

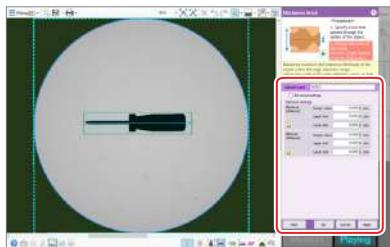


#### 6 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

**[Reference]** By clicking [Next], you can continue to use the same tool.

## ● Edit Window



After changing the setting, click [Apply], and the change is reflected on the preview screen.

### ○ Element name

Edit the name of the measurement result.

### ○ Advanced settings

Selecting this check box enables to configure settings of "Edge extraction parameters", "Postural adjustment", "Range parameters", "Capture height advanced settings", and "Autofocus capture".

### ○ Tolerance settings

Enter the design values for the maximum and minimum thicknesses and the tolerance values (upper limit and lower limit) for the design values. This value is used to evaluate whether the measurement value remains within the tolerance range.

Refer to "Chapter 6 Run Mode" (Page 6-1)

Reference If the upper tolerance is entered when the lower tolerance is 0, "value with minus sign (-) put to the upper tolerance" will be entered automatically for the lower tolerance.



[Alert Settings] dialog box appears.  
Refer to "Alert Settings" (Page 4-192)

### ○ Edge extraction parameters

Displayed when [Advanced settings] is selected.

Refer to "Advanced Parameters of Application Tool" (Page 4-104).

### ○ Postural adjustment

Displayed when [Advanced settings] is selected.

Refer to "Advanced Parameters of Application Tool" (Page 4-104).

### ○ Range parameters

Displayed when [Advanced settings] is selected.

Refer to "Advanced Parameters of Application Tool" (Page 4-104).

### ○ Capture height advanced settings

Displayed when [Advanced settings] is selected.

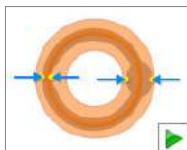
Refer to "Advanced Parameters of Application Tool" (Page 4-104).

### ○ Autofocus capture

Displayed when [Advanced settings] is selected.

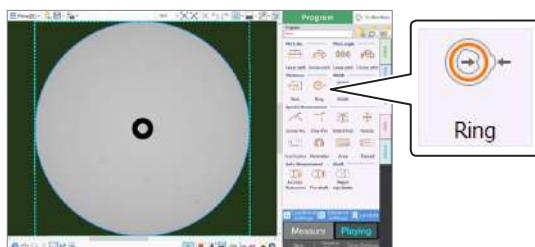
Refer to "Advanced Parameters of Application Tool" (Page 4-104).

## ■ Ring



Measure the maximum/minimum differences in the inner/outer diameters of a doughnut-shaped target.

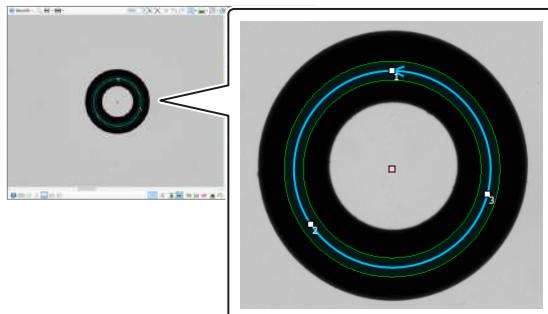
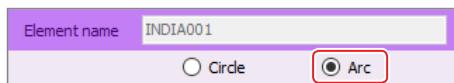
### 1 Click [Ring].



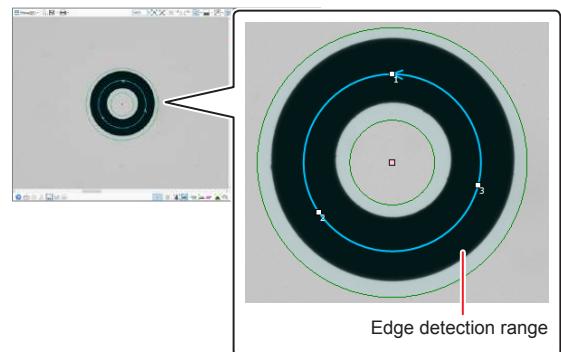
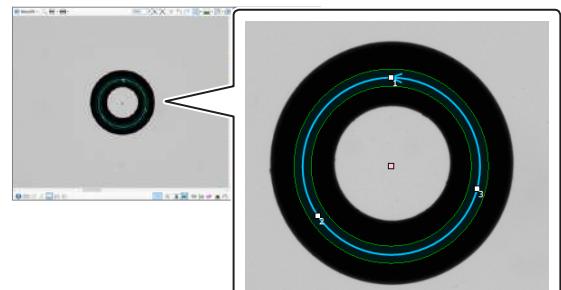
### 2 Specify a circle (edge detection range) which passes through the middle of the inner and outer diameters to be measured.

Click three points on a circle or an arc to specify the edge detection range so that the scanning line passes through the middle of the measurement area.

To measure the inner/outer diameters difference with an arch, you need to select [Arc] in the edit window before specifying a circle in step 2.



### 3 Adjust the size and position of the edge detection range so that it includes all sections you want to measure (thickest section, thinnest section).



When [Advanced settings] is selected, the edge detection range can be specified with numerical values.

"Range parameters" (Page 4-78)

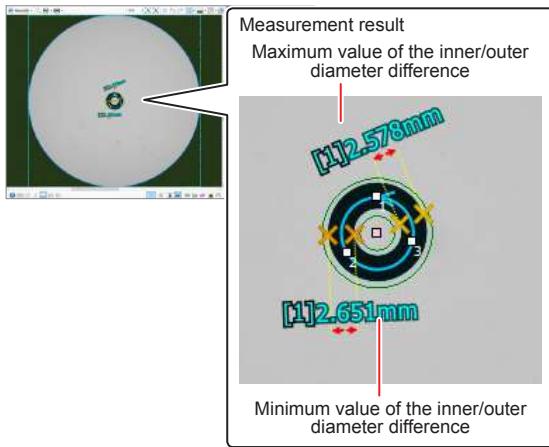
### 4 Specify the measurement conditions in the edit window.

For details about the edit window, refer to "Edit Window" (Page 4-78).

## Measurement Items

### 5 Click [Apply].

The result of the measurement specified in the edit window is displayed in the preview display.  
If the result is undesirable, change the setting in the edit window and click [Apply] again.  
The setting can be changed any number of times before [OK] or [Next] is clicked.

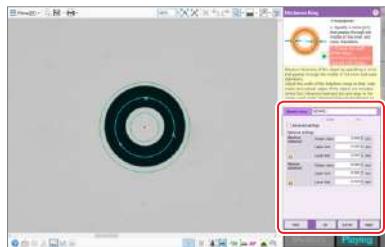


### 6 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

By clicking [Next], you can continue to use the same tool.

### ● Edit Window



After changing the setting, click [Apply], and the change is reflected on the preview screen.

#### ○ Element name

Edit the name of the measurement result.

#### ○ Circle/Arc setting

Select the shape of the measurement target (scanning line) to measure the difference in the inner/outer diameters.

- Circle

Set the scanning line as a circle which passes through the specified three points.

- Arc

Set the scanning line as an arc which passes through the specified three points (First point: Start point, Second point: Intermediate point, Third point: End point).

#### ○ Advanced settings

Selecting this check box enables to configure settings of "Edge extraction parameters", "Postural adjustment", "Range parameters", "Capture height advanced settings", and "Autofocus capture".

#### ○ Tolerance settings

Enter the design values for the maximum diameter difference and minimum diameter difference and the tolerance values (upper limit and lower limit) for the design values. This value is used to evaluate whether the measurement value remains within the tolerance range.

"Chapter 6 Run Mode" (Page 6-1)

If the upper tolerance is entered when the lower tolerance is 0, "value with minus sign (-) put to the upper tolerance" will be entered automatically for the lower tolerance.



[Alert Settings] dialog box appears.

"Alert Settings" (Page 4-192)

#### ○ Edge extraction parameters

Displayed when [Advanced settings] is selected.

Refer to "Advanced Parameters of Application Tool" (Page 4-104).

#### ○ Postural adjustment

Displayed when [Advanced settings] is selected.

Refer to "Advanced Parameters of Application Tool" (Page 4-104).

#### ○ Range parameters

Displayed when [Advanced settings] is selected.

Refer to "Advanced Parameters of Application Tool" (Page 4-104).

#### ○ Capture height advanced settings

Displayed when [Advanced settings] is selected.

Refer to "Advanced Parameters of Application Tool" (Page 4-104).

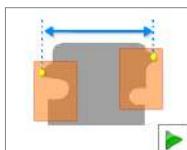
#### ○ Autofocus capture

Displayed when [Advanced settings] is selected.

Refer to "Advanced Parameters of Application Tool" (Page 4-104).

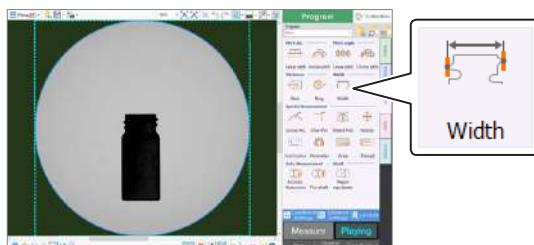
## Width

### Width



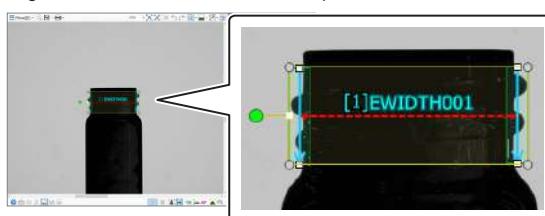
Detect the edges of a target with a complicated shape and measure the width between the edges.

#### 1 Click [Width].



#### 2 Specify the two edge detection ranges around the target edges.

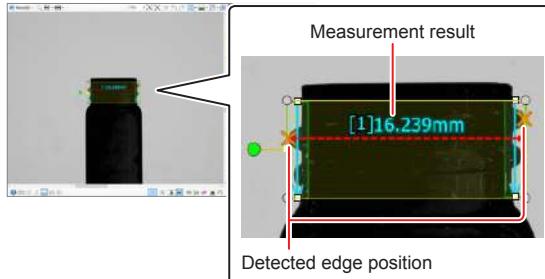
Specify the edge detection ranges at the positions where the target edge show the maximum or minimum point.



#### 3 Specify the measurement conditions in the edit window.

#### 4 Click [Apply].

The result of the measurement specified in the edit window is displayed in the preview display.  
If the result is undesirable, change the setting in the edit window and click [Apply] again.  
The setting can be changed any number of times before [OK] or [Next] is clicked.

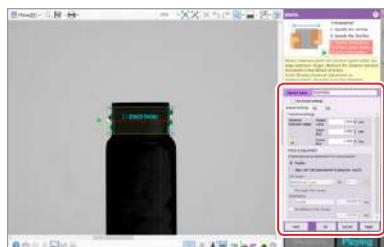


#### 5 Click [OK].

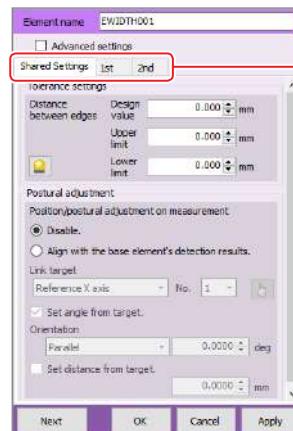
The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

By clicking [Next], you can continue to use the same tool.

### ● Edit Window



Specify the appropriate tab and specify the measurement conditions.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

#### ● Element name

Edit the name of the measurement result.

#### ● Advanced settings

Selecting [Advanced settings] allows the setting of "Edge extraction parameters" in the [Shared Settings], [1st], and [2nd] tabs.

## Measurement Items

### ● [Shared Settings] tab

#### ○ Tolerance settings

Enter the design value and the tolerance values (upper limit and lower limit) for the design value. These values are used to evaluate whether the measurement value remains within the tolerance range.

 “Chapter 6 Run Mode” (Page 6-1)

- Distance between edges

Design value	Enter the design value of the distance between the edges in mm.
Upper limit	Enter the upper tolerance limit of the distance between the edges in mm.
Lower limit	Enter the lower tolerance limit of the distance between the edges in mm.
	[Alert Settings] dialog box appears.  “Alert Settings” (Page 4-192)

 If the upper tolerance is entered when the lower tolerance is 0, “value with minus sign (-) put to the upper tolerance” will be entered automatically for the lower tolerance.

#### ○ Postural adjustment

Refer to  “Advanced Parameters of Application Tool” (Page 4-104).

#### ○ Edge extraction parameters

“Edge extraction parameters” in the [Shared Settings] tab is displayed when [Advanced settings] is selected.

Refer to  “Advanced Parameters of Application Tool” (Page 4-104).

#### ○ Capture height advanced settings

Displayed when [Advanced settings] is selected.

Refer to  “Advanced Parameters of Application Tool” (Page 4-104).

#### ○ Autofocus capture

Displayed when [Advanced settings] is selected.

Refer to  “Advanced Parameters of Application Tool” (Page 4-104).

### ● [1st] tab

Set the items related to the first edge detection range.



The “first” refers to the edge detection range specified earlier.

#### ○ Measurement pattern settings

Select the pattern of the edge measurement in the first edge detection range.

- Maximum

Detect the maximum point within the edge detection range (the farthest edge from the center of the large frame) as an edge.

- Minimum

Detect the minimum point within the edge detection range (the nearest edge from the center of the large frame) as an edge.

#### ○ Edge extraction parameters

Displayed when [Advanced settings] is selected.

Refer to  “Advanced Parameters of Application Tool” (Page 4-104).

#### ○ Range parameters

Displayed when [Advanced settings] is selected.

Refer to  “Advanced Parameters of Application Tool” (Page 4-104).

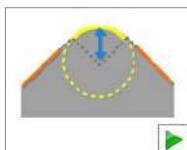
### ● [2nd] tab

Set the items related to the second edge detection range.

The setting items are the same as those in the [1st] tab.

## Special Measurement

### Corner Arc

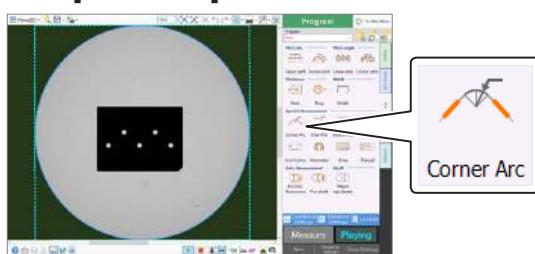


Measure the R (radius) of a corner.



Use this option to measure R (radius) which is too small to set the edge detection range properly with the [Arc] measurement in the [Basics] tab.

#### 1 Click [Corner Arc].

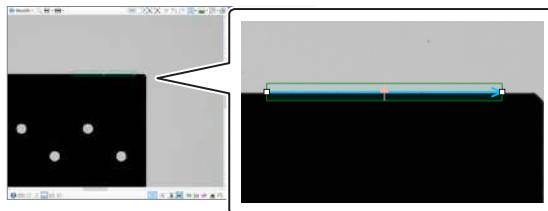


#### 2 Specify the start and end points of the edge detection range for one of the lines of the corner arc to create the first line.

Click two points along the line to be detected to specify the edge detection range.



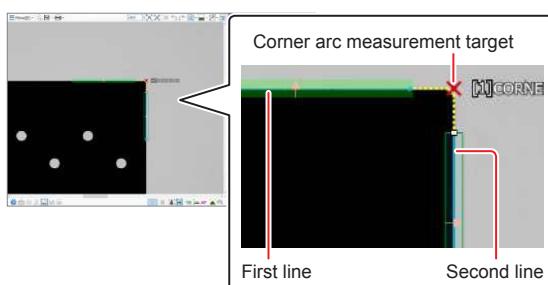
You can also select the element you have set.



#### 3 Specify the edge detection range for the second line in the same way.



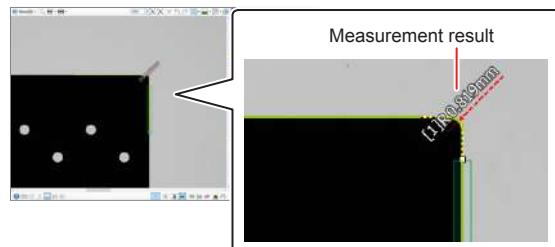
You can also select the element you have set.



#### 4 Specify the measurement conditions in the edit window.

### 5 Click [Apply].

The measurement result of the corner arc consisting of the lines specified in Steps 2 and 3 is displayed in the preview display.



The measurement result can be moved by dragging with the mouse.

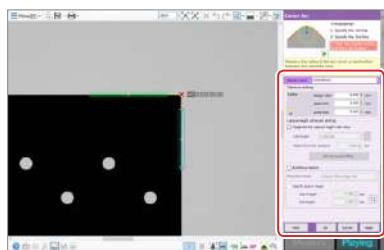
### 6 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.



By clicking [Next], you can continue to use the same tool.

### ● Edit Window



Set the items related to the tool.

After changing the setting, click [Apply], and the change is reflected on the preview screen.

#### ○ Element name

Edit the name of the measurement result.

#### ○ Tolerance settings

Enter the design value of the corner arc and the tolerance values (upper limit and lower limit) for the design value of the corner arc. This value is used to evaluate whether the measurement value remains within the tolerance range.

"Chapter 6 Run Mode" (Page 6-1)



If the upper tolerance is entered when the lower tolerance is 0, "value with minus sign (-) put to the upper tolerance" will be entered automatically for the lower tolerance.



[Alert Settings] dialog box appears.

"Alert Settings" (Page 4-192)

#### ○ Capture height advanced settings

Refer to "Advanced Parameters of Application Tool" (Page 4-104).

#### ○ Autofocus capture

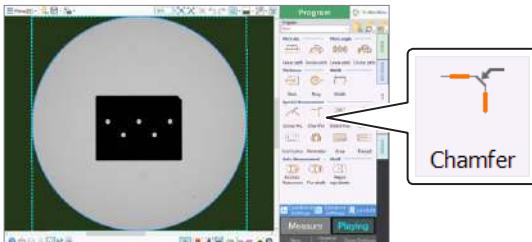
Refer to "Advanced Parameters of Application Tool" (Page 4-104).

## ■ Chamfer



Measure the chamfer of a corner.

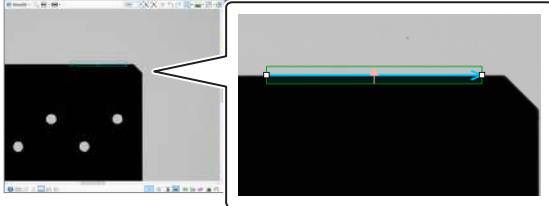
### 1 Click [Chamfer].



### 2 Specify the start and end points of the edge detection range for one of the lines of the chamfer to create the first line.

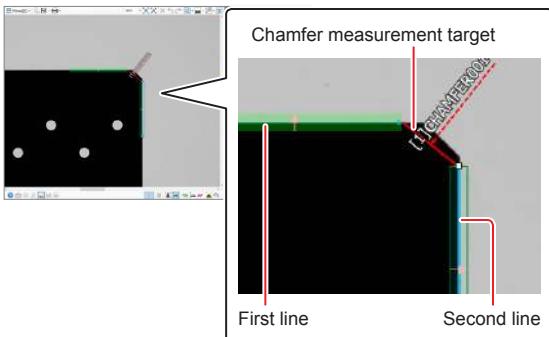
Click two points along the line to be detected to specify the edge detection range.

Reference You can also select the element you have set.



### 3 Specify the edge detection range for the second line in the same way.

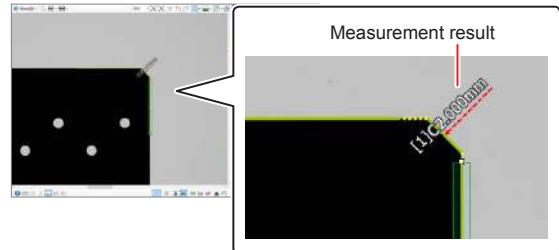
Reference You can also select the element you have set.



### 4 Specify the measurement conditions in the edit window.

## 5 Click [Apply].

The measurement result of the chamfer consisting of the lines specified in Steps 2 and 3 is displayed in the preview display.



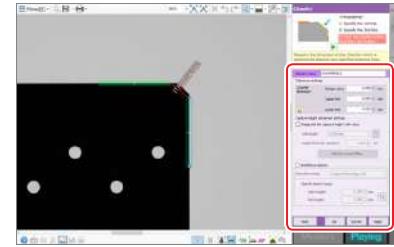
Reference The measurement result can be moved by dragging with the mouse.

## 6 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

Reference By clicking [Next], you can continue to use the same tool.

## ● Edit Window



Set the items related to the tool.

After changing the setting, click [Apply], and the change is reflected on the preview screen.

### ○ Element name

Edit the name of the measurement result.

### ○ Tolerance settings

Enter the design value of the chamfer (dimensions) and the tolerance values (upper limit and lower limit) for the design value. This value is used to evaluate whether the measurement value remains within the tolerance range.

Refer to □ "Chapter 6 Run Mode" (Page 6-1)

Reference If the upper tolerance is entered when the lower tolerance is 0, "value with minus sign (-) put to the upper tolerance" will be entered automatically for the lower tolerance.



[Alert Settings] dialog box appears.

Refer to □ "Alert Settings" (Page 4-192).

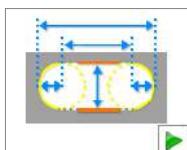
### ○ Capture height advanced settings

Refer to □ "Advanced Parameters of Application Tool" (Page 4-104).

### ○ Autofocus capture

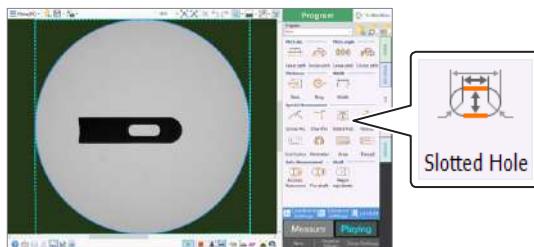
Refer to □ "Advanced Parameters of Application Tool" (Page 4-104).

## ■ Slotted Hole



Measure the dimensions of a slotted hole.

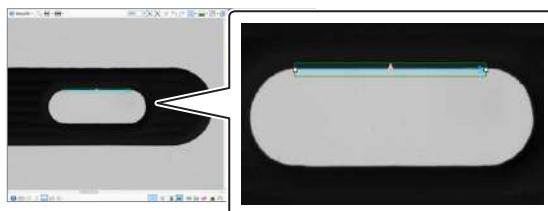
### 1 Click [Slotted Hole].



### 2 Specify the start and end points of the edge detection range along one of the line segments of the slotted hole to create the first line.

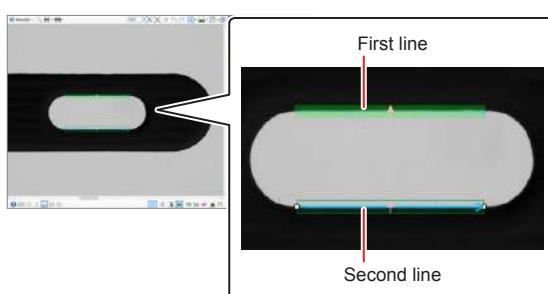
Click two points along the line to be detected to specify the edge detection range.

You can also select the element you have set.



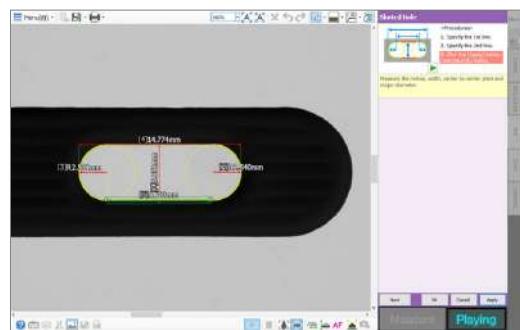
### 3 Specify the edge detection range for the second line in the same way.

You can also select the element you have set.



### 4 Click [Apply].

The measurement result of the slotted hole consisting of the lines specified in Steps 2 and 3 is displayed in the preview display.



Reference

- The measurement result for the slotted hole is shown as five values for different measurements depending on the measurement position:

[1] Line-to-line distance	Distance between the two parallel lines
[2] [3] Arc radius	Radii of the arcs on both ends of the slotted hole
[4] Circle-to-circle distance (Maximum distance)	Maximum distance between the arcs at both ends of the slotted hole
[5] Circle-to-circle distance (Between centers)	Distance between the centers of the arcs at both ends of the slotted hole

- Editing and tolerance settings are possible for these measurement result values individually. To edit the value, after clicking [OK] in Step 5, double-click the measurement result value you want to edit.

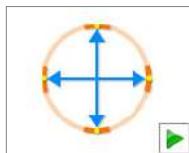
### 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

Reference

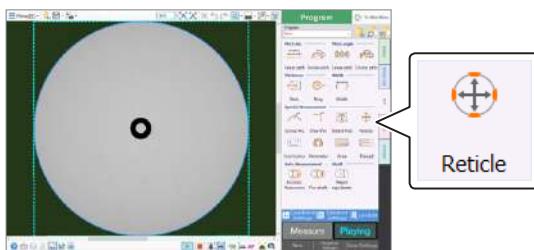
By clicking [Next], you can continue to use the same tool.

## ■ Reticle



Measure the diameter of a circle you specified.  
The diameter is determined based on the intersections of the line which passes the circle center with the circumference. The intersections on the circumference are determined by setting the edge detection ranges around them (an arc of arbitrary angle).

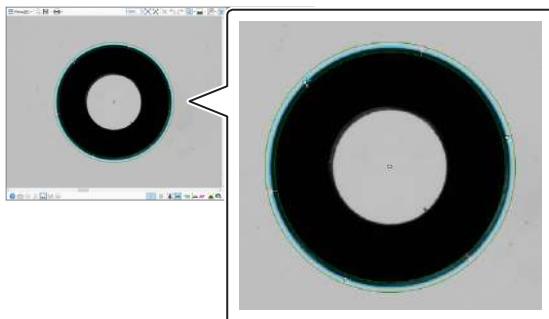
### 1 Click [Reticle].



### 2 Specify three points of the edge detection range along the circle to be measured.

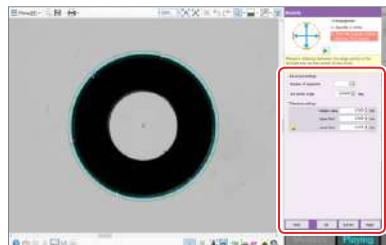
Click three points along the circle to be detected to specify the edge detection range. Set the edge detection range so that it includes the entire edge of the circle.

You can also select the element you have set.



### 3 Specify the measurement conditions in the edit window.

## ● Edit Window



Set the items related to the tool.  
After changing the setting, click [Apply], and the change is reflected on the preview screen.

#### ○ Advanced settings

Each item is reflected in the measurement result when you click [Apply] in Step 3.

- Number of segments

Specify the number of lines (which pass through the circle center) to be measured between the edges (the number of sections to be measured). The setting range is "1 to 32".

- Arc center angle

Set the center angle of the arc edge which is used for the measurement and positioned at the intersection of the line passing through the circle center and the circumference. The setting range is "1 to 45" degrees.

When the center angle of the arc is set, the diameter is determined based on the midpoint of the edge (arc) detected within the specified range and the line which passes through the circle center, resulting in less influence from burrs or chips.

#### ○ Tolerance settings

Enter the design value of the circle diameter and the tolerance values (upper limit and lower limit) for the design value. This value is used to evaluate whether the measurement value remains within the tolerance range.

"Chapter 6 Run Mode" (Page 6-1)

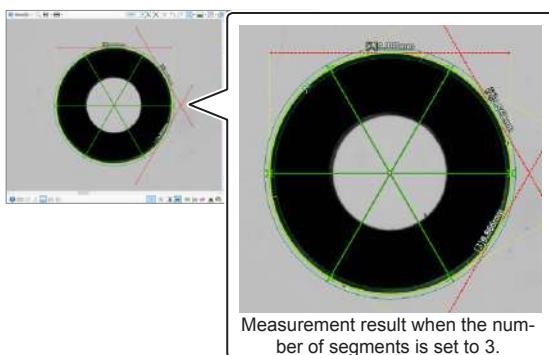
If the upper tolerance is entered when the lower tolerance is 0, "value with minus sign (-) put to the upper tolerance" will be entered automatically for the lower tolerance.



[Alert Settings] dialog box appears.

"Alert Settings" (Page 4-192)

### 4 Click [Apply].

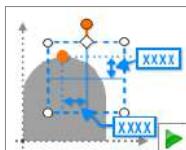


### 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

By clicking [Next], you can continue to use the same tool.

## ■ Point Position

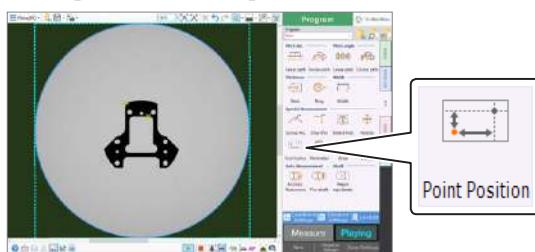


Measure the horizontal and vertical distance from the selected point to the measurement base point.

**Important**

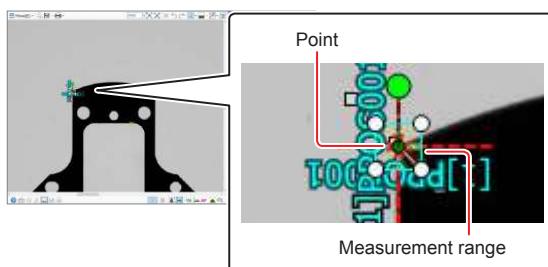
Point position cannot be measured if no point (point, circle, or arc) is shown on the preview display.  
Before measuring a point position, conduct measurement using [Basics] or create a line(s) or point(s) on the preview screen with an element tool etc.

### 1 Click [Point Position].



### 2 Specify the point to measure on the preview screen.

Select the point created during measurement (or created with the tools on the [Element] tab). You can also select the center of the circle/arc.



The measurement range is displayed around the selected point.

### 3 Specify the measurement conditions in the edit window.

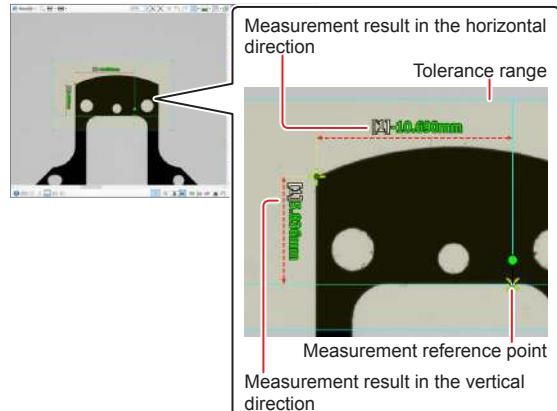
For details about the edit window, refer to □ "Edit Window" (Page 4-86).

### 4 Click [Apply].

The result of the measurement specified in the edit window is displayed in the preview display.

If the result is undesirable, change the setting in the edit window and click [Apply] again.

The setting can be changed any number of times before [OK] or [Next] is clicked.



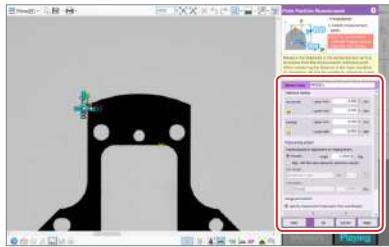
### 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

**Reference** By clicking [Next], you can continue to use the same tool.

## Measurement Items

### ● Edit Window



After changing the setting, click [Apply], and the change is reflected on the preview screen.

### ● Element name

Edit the name of the measurement result.

### ● Tolerance Settings

Enter the vertical and horizontal tolerance values (upper limit and lower limit) from the reference point to the measurement base point.

These values are used to evaluate whether the measurement value remains within the tolerance range.

"Chapter 6 Run Mode" (Page 6-1)

Reference If the upper tolerance is entered when the lower tolerance is 0, "value with minus sign (-) put to the upper tolerance" will be entered automatically for the lower tolerance.



[Alert Settings] dialog box appears.

"Alert Settings" (Page 4-192)

### ● Postural adjustment

#### Disable.

Do not perform position/postural adjustment on measurement.

#### Align with the base element's detection results.

Specify a reference for the measurement.

- Link target

Specify the reference line for measuring the point position.

Reference X axis	Use the X axis set in the base coordinate as a reference line.
------------------	--

Reference Y axis	Use the Y axis set in the base coordinate as a reference line.
------------------	--

Rotation axis	Use the rotation axis set in the base coordinate as a reference line. (only when the rotation unit IM-RU1 is used)
---------------	--

(Other)	Use a line created during measurement or created with the tools on the [Element] tab as a reference line. The element names of all lines (including virtual lines) are displayed.
---------	---

	By clicking this button, you can select a reference line from the lines shown on the preview display.
--	---

<input checked="" type="checkbox"/> Reference	When base coordinate is not specified, the coordinate origin (0,0) is on the bottom left of the capture range.
---	--

- Orientation

Select the slope (orientation) of the measurement range based on the reference line.

Parallel	Set the measurement range in parallel to the reference line.
----------	--

Perpendicular	Set the measurement range perpendicular to the reference line.
---------------	--

Arbitrary	Set the measurement range at a desired angle to the reference line.
-----------	---

### ● Range parameters

Select a method to specify the measurement base point.

#### Specify measurement base point from coordinates

Enter the coordinates (Absolute coordinates: X, Y) of measurement base point in mm.

#### Specify measurement base point from element

Select the point created during measurement (or created with the tools on the [Element] tab) as measurement base point.

- Reference point

Specify the origin point (Absolute coordinates: 0,0) as the measurement base point.

- (Other)

Use a circle, arc, or point created during measurement or created with the tools on the [Element] tab as a reference point. The element names of all circles, arcs, or points (including virtual lines) are displayed.



By clicking this button, you can select a measurement base point from the circles, arcs, or points shown on the preview display.

<input checked="" type="checkbox"/> Reference	When base coordinate is not specified, the coordinate origin (0,0) is on the bottom left of the capture range.
---	--

## ■ Perimeter



Measure the perimeter of the target within the rectangle range.

**Dark periphery**



Measure the perimeter of the target within the rectangle range.

**Bright periphery**



Measure the perimeter of the target within the rectangle range.

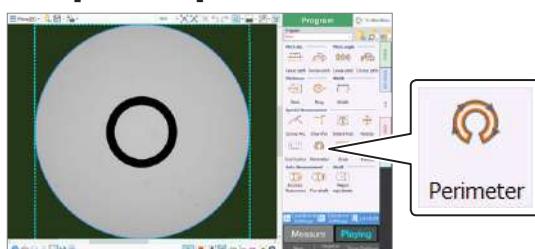
**Both**



**Important** The contour line to be the measurement target must be a closed figure.

When there are multiple contour lines within the measurement range, the total of the perimeter will be measured.

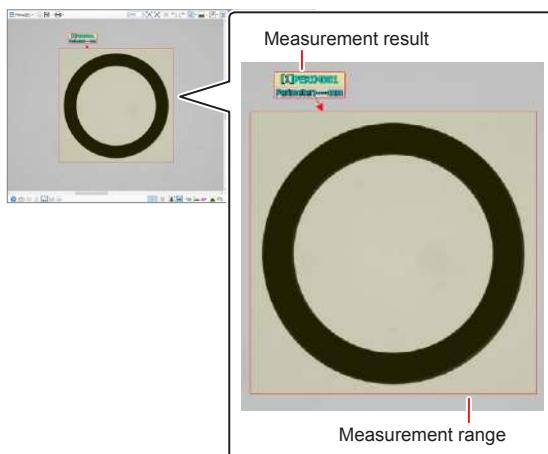
### 1 Click [Perimeter].



### 2 Draw a measurement range around the target by dragging the mouse in the preview screen, and specify the location to insert the measurement result.



You can also select the element you have set.

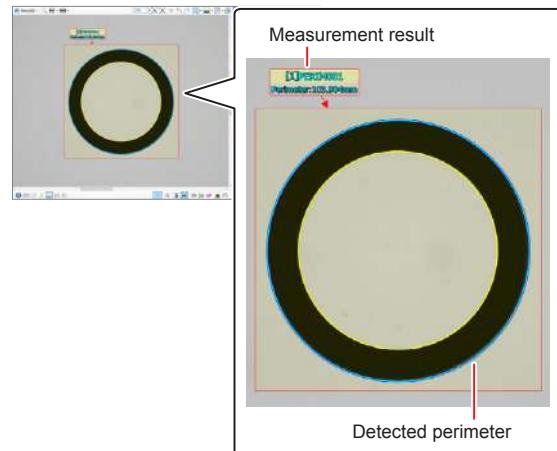


### 3 Specify the measurement conditions in the edit window.

For details about the edit window, refer to □ "Edit Window" (Page 4-88).

### 4 Click [Apply].

The measurement result of the target within the rectangle range drawn in Steps 2 is displayed in the preview display. If the result is undesirable, change the setting in the application tool edit window and in the preview screen, and click [Apply] again. The setting can be changed any number of times before [OK] or [Next] is clicked.



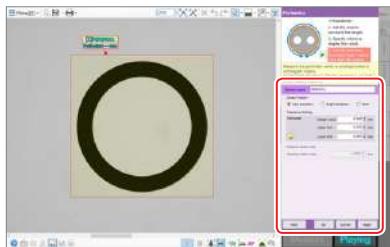
### 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.



By clicking [Next], you can continue to use the same tool.

## ● Edit Window



Set the items related to the tool.  
After changing the setting, click [Apply], and the change is reflected on the preview screen.

### ○ Element name

Edit the name of the measurement result.

### ○ Detect Pattern

Specify the detect pattern for perimeter.

- Dark periphery  
Measure the closed contour with dark interior.
- Bright periphery  
Measure the closed contour with bright interior.
- Both  
Measure both dark periphery and bright periphery.

### ○ Tolerance Setting

Enter the design value of the perimeter and the tolerance values (upper limit and lower limit) for the design value.

These values are used to evaluate whether the measurement value remains within the tolerance range.

"Chapter 6 Run Mode" (Page 6-1)

Reference If the upper tolerance is entered when the lower tolerance is 0, "value with minus sign (-) put to the upper tolerance" will be entered automatically for the lower tolerance.



[Alert Settings] dialog box appears.

"Alert Settings" (Page 4-192)

### ○ Minimum detect size

Enter the minimum detect size of the part which is to be judged as an edge in mm. Small clots whose perimeter is shorter than the set value are ignored.

Reference When the minimum detection size value has been changed, the minimum detect sizes of the element tools which are referring to this value also change.

## ■ Area



Measure the dimension of the target within the rectangle range.

### Dimension of dark area



Measure the dimension of the target within the rectangle range.

### Dimension of light area



Measure the dimension of the target within the rectangle range.

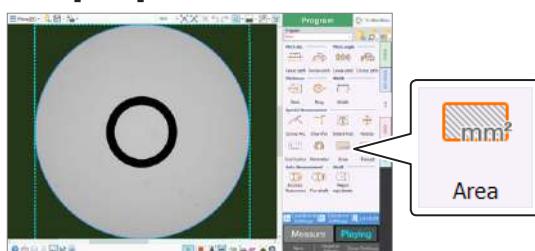
### Sum dimension of light and dark areas



**Important** The contour line to be the measurement target must be a closed figure.

When there are multiple contour lines within the measurement range, the total of the dimension will be measured.

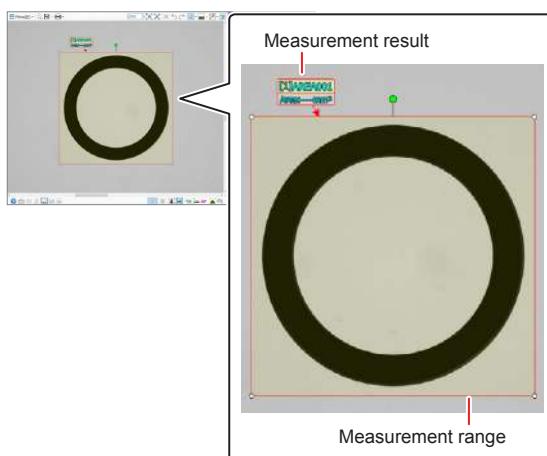
## 1 Click [Area].



## 2 Draw a measurement range around the target by dragging the mouse in the preview screen, and specify the location to insert the measurement result.



You can also select the element you have set.

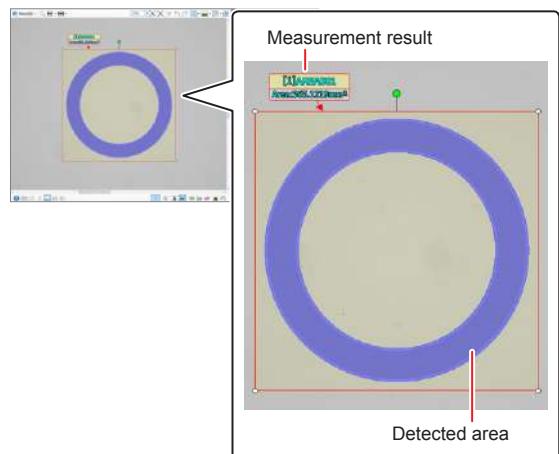


## 3 Specify the measurement conditions in the edit window.

For details about the edit window, refer to □ "Edit Window" (Page 4-90).

## 4 Click [Apply].

The measurement result of the target within the rectangle range drawn in Steps 2 is displayed in the preview display. The area which is a measurement target turns to blue. If the result is undesirable, change the setting in the application tool edit window and in the preview screen, and click [Apply] again. The setting can be changed any number of times before [OK] or [Next] is clicked.



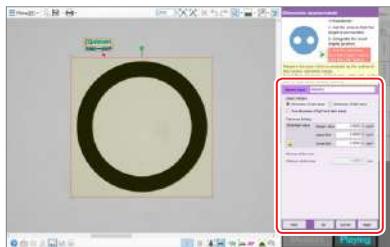
## 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.



By clicking [Next], you can continue to use the same tool.

## ● Edit Window



Set the items related to the tool.  
After changing the setting, click [Apply], and the change is reflected on the preview screen.

### ○ Element name

Edit the name of the measurement result.

### ○ Detect Pattern

Specify the detect pattern for dimension.

- Dimension of dark area  
Measure the area of the closed surface with light area.
- Dimension of light area  
Measure the area of the closed surface with dark area.
- Sum dimension of light and dark areas  
Measure the area of both the closed surface with dark area and the closed surface with light area.

### ○ Tolerance Setting

Enter the design value of the area and the tolerance values (upper limit and lower limit) for the design value.

These values are used to evaluate whether the measurement value remains within the tolerance range.

"Chapter 6 Run Mode" (Page 6-1)

If the upper tolerance is entered when the lower tolerance is 0, "value with minus sign (-) put to the upper tolerance" will be entered automatically for the lower tolerance.



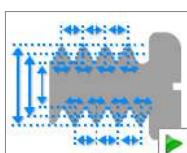
[Alert Settings] dialog box appears.  
 "Alert Settings" (Page 4-192)

### ○ Minimum detect size

Enter the minimum detect size of the part which is to be judged as an edge in mm. Small clots whose perimeter is shorter than the set value are ignored.

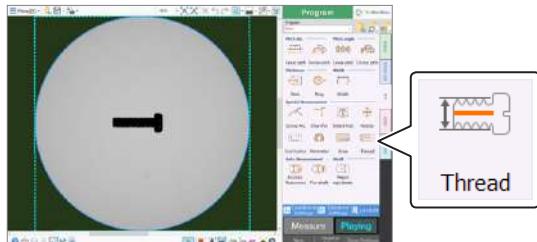
When the minimum detection size value has been changed, the minimum detect sizes of the element tools which are referring to this value also change.

## ■ Thread



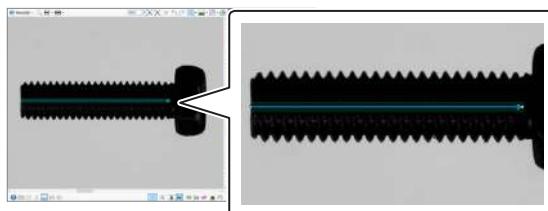
Measure the thread.

### 1 Click [Thread].

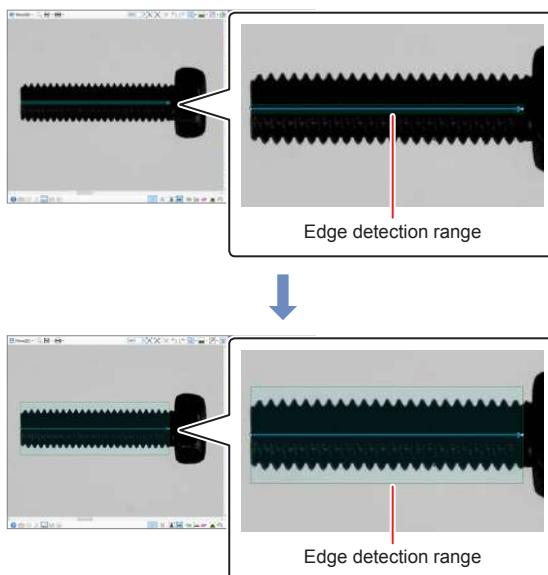


### 2 Specify the start and end points of the edge detection range passing through the center of the threaded position of the part.

Click two points along the line to be detected to specify the linear edge detection range.



### 3 Adjust the size and position of the edge detection range to cover the outer diameter of the threaded position of the part.



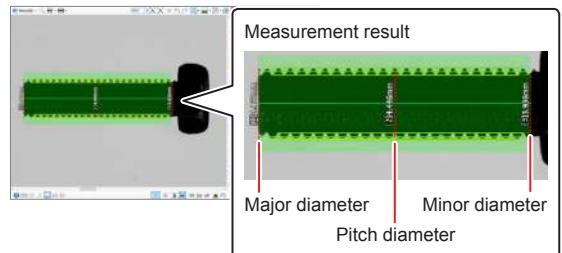
### 4 Specify the detection criteria in the edit window.

For details about the edit window, refer to □ "Edit Window" (Page 4-92).

### 5 Click [Apply].

The measurement result of the thread specified in Steps 2 and 3 is displayed on the preview display.

If the result is undesirable, change the setting in the application tool edit window and in the preview screen, and click [Apply] again. The setting can be changed any number of times before [OK] or [Next] is clicked.



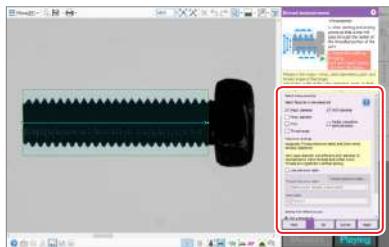
### 6 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

Reference By clicking [Next], you can continue to use the same tool.

## Measurement Items

### ● Edit Window



After changing the setting, click [Apply] or [Next], and the change is reflected on the preview screen.

### ● Select measurements

Set the items of the thread to be measured.

#### Major diameter

Measure the major diameter of the thread.

#### Pitch diameter

Measure the pitch diameter of the thread.

#### Minor diameter

Measure the minor diameter of the thread.

#### Pitch

Measure the pitch distance of the thread.

#### Partial cumulative pitch deviation

Measure the partial cumulative deviation of pitch intervals of the thread.

#### Thread angle

Measure the thread angle of the thread.

#### ?

The detailed description regarding the measurement item is displayed.

### ● Tolerance settings

When [Use tolerance table] is selected, you can use the thread tolerance table set in advance.

These values are used to evaluate whether the measurement value remains within the tolerance range.

□ "Chapter 6 Run Mode" (Page 6-1)

#### Thread tolerance table

Select the thread tolerance table from the dropdown list.

- [Thread tolerance table]

By clicking this button, the dialog box for editing the thread tolerance table selected at the dropdown list is displayed.

□ "Thread Tolerance Table" (Page 4-93)

#### Item name

Select the items which have been registered to the thread tolerance table from the dropdown list.

### ● Setting the reference axis

Set the reference axis of the thread.

#### Set automatically

Automatically set the reference axis.

#### Do not set

Do not set the central axis.

#### Designate reference axis

Designate the line to be the base of the tilt of the edge detection area as the reference axis.

- Reference X axis

Use the X axis set in the base coordinate as reference axis.

- Reference Y axis

Use the Y axis set in the base coordinate as reference axis.

- (Other)

Use a line created during measurement or created with the tools on the [Element] tab as a reference axis. Each element of all lines (including virtual lines) is displayed.



You can select a measurement result shown on the preview screen.

## ■ Thread Tolerance Table

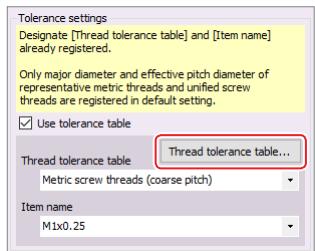
Set the thread tolerance table.

### ● Setting and Saving the Thread Tolerance Table

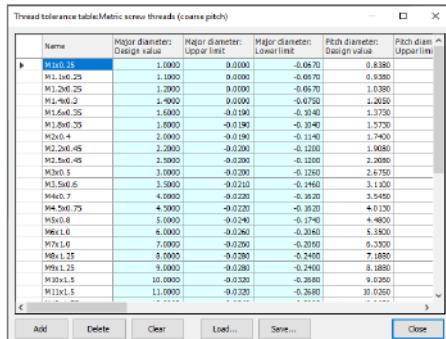
You can register your desired thread tolerance tables to the thread tolerance table and save them in the controller.

- 1 Select the tolerance table to be edited from the [Thread tolerance table] dropdown list in the edit window of the thread measurement.**

## 2 Click [Thread tolerance table].



## 3 Set thread tolerance values.



### ● Adding lines

When you click [Add], the new line is added where ▶ has been displayed.

### ● Deleting lines

When you click [Delete], the line of the selected cell is deleted.

### ● Changing the cell contents

Click the target cell to change the content.

### ● Copying and pasting cell contents

Right-click the cell which you would like to copy the content, and then select [Copy] from the right-click menu.

Right-click the cell which you would like to paste the content, and then select [Paste] from the right-click menu.

### ● Clearing cell contents

To clear the name or value, click the target cell to highlight it, and then click [Clear].

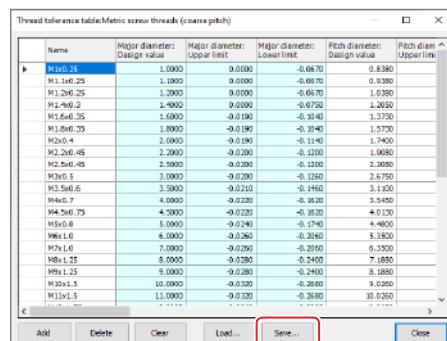
Click [Yes] in the confirmation message box which appears.

Reference When the cell content has been cleared, [Name] becomes a blank cell, and the value becomes [0.0000].

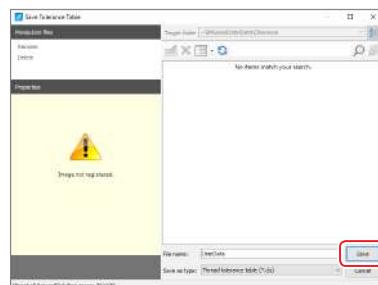
### ● Arranging lines

You can arrange lines by dragging and dropping the cell of the line where ▶ is displayed.

- 4 Click [Save] of the [Thread tolerance table] dialog box.**

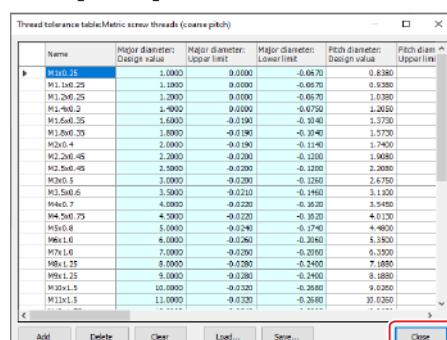


- 5 Specify the file name of the thread tolerance table to save and click [Save].**



The thread tolerance table is saved in the controller.

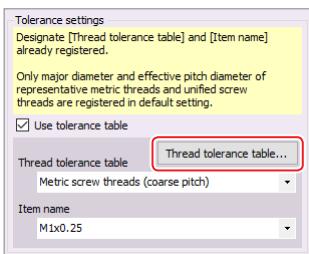
- 6 Click [Close].**



### ● Reading the thread tolerance table

Read a thread tolerance table file (\*.cls) stored in the controller.

### 1 Click [Thread tolerance table] in the edit window of the thread measurement.

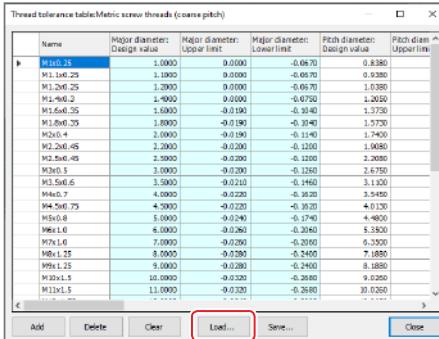


### 5 Click [Close].

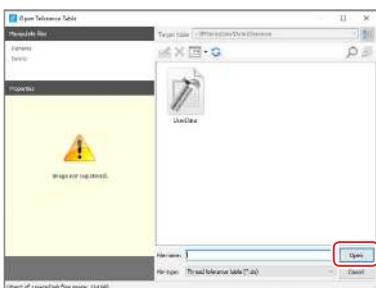
Thread tolerance table[Metric screw threads (coarse pitch)]					
Name	Major diameter: Design value	Major diameter: Upper limit	Major diameter: Lower limit	Pitch diameter: Design value	Pitch diam: Upper limit
M1x0.25	1.0000	0.0000	-0.0070	0.8500	0.8500
M1.5x0.25	1.0000	0.0000	-0.0070	0.8500	0.8500
M1.5x0.25	1.0000	0.0000	-0.0070	1.0380	1.0380
M1.5x0.2	1.0000	0.0000	-0.0750	1.0380	1.0380
M1.5x0.35	1.0000	-0.0190	-0.1040	1.3730	1.3730
M1.5x0.35	1.0000	-0.0190	-0.1040	1.3730	1.3730
M2x0.4	2.0000	-0.0190	-0.1140	1.7400	1.7400
M2.5x0.45	2.0000	-0.0200	-0.1200	1.6080	1.6080
M2.5x0.45	2.0000	-0.0200	-0.1200	2.2680	2.2680
M3x0.5	3.0000	-0.0200	-0.1240	2.4750	2.4750
M3.5x0.6	3.5000	-0.0210	-0.1460	3.1100	3.1100
M4x0.7	4.0000	-0.0220	-0.1620	3.5450	3.5450
M4.5x0.75	4.5000	-0.0220	-0.1920	4.0130	4.0130
M5x0.8	5.0000	-0.0240	-0.1940	4.4000	4.4000
M6x1.0	6.0000	-0.0260	-0.2060	5.3300	5.3300
M7x1.0	7.0000	-0.0270	-0.2160	6.3000	6.3000
M8x1.25	8.0000	-0.0290	-0.2400	7.0880	7.0880
M8x1.25	8.0000	-0.0290	-0.2400	8.1880	8.1880
M10x1.5	10.0000	-0.0320	-0.2680	9.0250	9.0250
M11x1.5	11.0000	-0.0320	-0.2680	10.0750	10.0750

### 2 Click [Load] in the [Thread tolerance table] dialog box.

In the [Thread tolerance table] dialog box, top 100 files of the thread tolerance table files which have been registered are displayed.



### 3 Select the desired thread tolerance table file (\*.cls) and click [Open].



The thread tolerance tables stored in the controller are displayed.

### 4 Set the thread tolerance table.

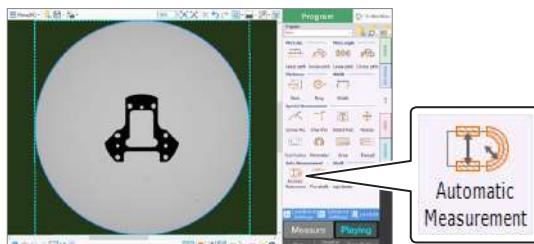
"Setting and Saving the Thread Tolerance Table" (Page 4-93)

## Auto Measurement

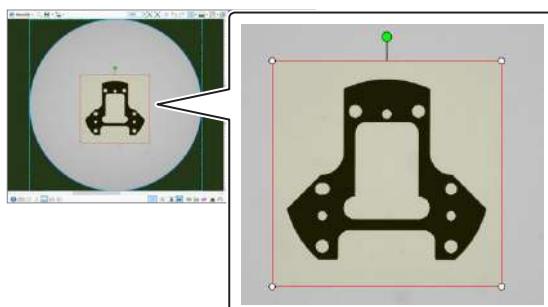
### ■ Automatic Measurement

Automatically recognize the line, circle, and arc of the target within the measurement area, and create and measure elements. The distance using the created multiple elements is also automatically measured.

#### 1 Click [Automatic Measurement].



#### 2 On the preview screen, edit the measurement range so that it encloses the target.



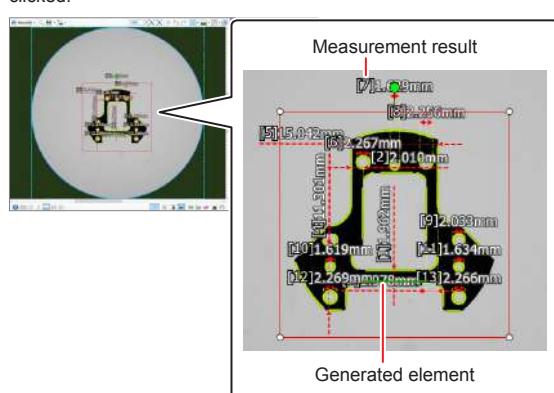
The automatic measurement can measure the target within the measurement range; the whole target does not need to be enclosed.

#### 3 Specify the measurement items and the measurement conditions in the edit window.

For details about the edit window, refer to □ "Edit Window" (Page 4-96).

#### 4 Click [Apply].

The target in the measurement range is automatically measured and the measurement items specified in the edit window are displayed on the preview display. If the result is undesirable, change the setting in the application tool edit window and in the preview screen, and click [Apply] again. The setting can be changed any number of times before [OK] is clicked.



#### Technical Hint

##### Displaying/Hiding the measurement result

When [Apply] is clicked, the target within the measurement range is measured for all the measurement items under all the measurement conditions. This enables you to change the measurement item and condition to show the measurement result on the preview screen without clicking [Apply] again.



- If [Setting of parameter for generating an element] is changed, click [Apply] again.

- If the measurement area is changed, click [Apply] again. At this time, the elements that are moved outside the measurement area from the inside of the area and the measurement result using these elements are deleted.

#### 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

## Measurement Items

### ● Edit Window

 Clicking [Default] returns the settings specified on the edit window to the default settings.

### ● Added information

This item is not used in the Program mode.

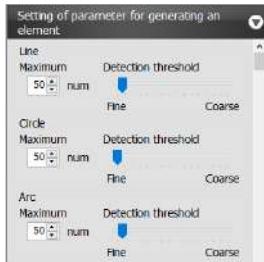


**Added information may be required to input depending on the settings of the [Added information] dialog box.**

 "Entering Added Information" (Page 6-10)

### ● Setting of parameter for generating an element

Clicking the triangular button on the right end enables to fold or expand the setting items.



A value between 0 and 99 can be entered in [Maximum] each parameter.

#### ○ Line

Set parameters for generating lines.

- Maximum  
Enter the maximum number of lines to generate.
- Detection threshold  
The threshold (length) for detecting lines to be generated is specified with the slider.

#### ○ Circle

Set parameters for generating circles.

- Maximum  
Enter the maximum number of circles to generate.
- Detection threshold  
The threshold (perimeter) for detecting circles to be generated is specified with the slider.

#### ○ Arc

Set parameters for generating arcs.

- Maximum  
Enter the maximum number of arcs to generate.
- Detection threshold  
The threshold (arc length) for detecting arcs to be generated is specified with the slider.

### ● Capture method

Clicking the triangular button on the right end enables to fold or expand the setting items.



- Do not capture  
Perform measurement by the current preview screen or layer image.
- Capture the entire automatic measurement range  
Perform measurement by capturing the entire automatic measurement range.
- Automatically capture entire target  
Perform measurement by capturing the entire target automatically.

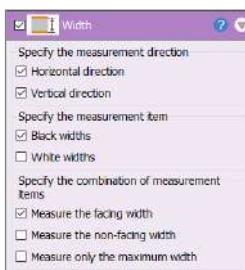
### ● Result display / output

This item is not used in the Program mode.

### ● Width

When this check box is selected, the distance between lines facing each other is measured. The measurement direction, measurement point, and the combination of the measurement points can be specified.

Clicking the triangular button on the right end enables to fold or expand the setting items.



#### ○ Specify the measurement direction

- Horizontal direction  
When this check box is selected, the distance between two horizontal lines is measured.
- Vertical direction  
When this check box is selected, the distance between two vertical lines is measured.

#### ○ Specify the measurement item

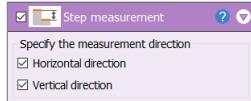
- Black widths  
When this check box is selected, the width in the dark section is measured.
- White widths  
When this check box is selected, the width in the bright section is measured.

#### ○ Specify the combination of measurement items

- Measure the facing width  
When this check box is selected, the distance between lines facing each other is measured.
- Measure the non-facing width  
When this check box is selected, the distance between lines not facing each other is measured.
- Measure only the maximum width  
When this check box is selected, only the maximum distance between two lines is measured.

## ● Step measurement

When this check box is selected, the distance between two lines facing in the same direction is measured. The measurement direction can be specified.  
Clicking the triangular button on the right end enables to fold or expand the setting items.

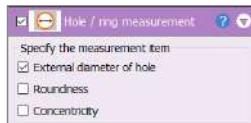


### ○ Specify the measurement direction

- Horizontal direction  
When this check box is selected, the distance between two horizontal lines is measured.
- Vertical direction  
When this check box is selected, the distance between two vertical lines is measured.

## ● Hole / ring measurement

When this check box is selected, the diameter of the circle is measured. The places to be measured can be specified.  
Clicking the triangular button on the right end enables to fold or expand the setting items.

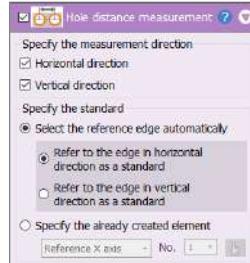


### ○ Specify the measurement point

- External diameter of hole  
When this check box is selected, the diameter of the circle is measured.
- Roundness  
When this check box is selected, the roundness of the circle is measured.
- Concentricity  
When this check box is selected, the concentricity of the concentric circle is measured.

## ● Hole distance measurement

When this check box is selected, the distance between the centers of two circles is measured. You can specify the measurement direction and the link target of the measurement direction.  
Clicking the triangular button on the right end enables to fold or expand the setting items.



### ○ Specify the measurement direction

- Horizontal direction  
When this check box is selected, the distance between the centers of two circles in the horizontal direction of the screen can be measured.
- Vertical direction  
When this check box is selected, the distance between the centers of two circles in the vertical direction of the screen can be measured.

### ○ Specify the standard

- Select the reference edge automatically  
A reference line is automatically selected.

Refer to the edge in horizontal direction as a standard	Use the edge in the horizontal direction as the reference line.
Refer to the edge in vertical direction as a standard	Use the edge in the vertical direction as the reference line.



The reference line is automatically selected from the lines within the range of  $\pm 30$  degrees in the horizontal or vertical direction on the window. If a reference line cannot be selected, the line distance between the centers of two circles is measured.



The reference line is shown in dark green.

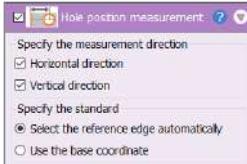
- Specify the already created element  
The created element is specified as the reference line in the measurement direction.

Reference X axis	Use the X axis set in the base coordinate as reference line.
Reference Y axis	Use the Y axis set in the base coordinate as reference line.
(Other)	Use a line created during measurement or created with the tools on the [Element] tab as a reference line. The element names of all lines (including virtual lines) are displayed.
	You can select a reference line from the lines shown on the preview screen.

## Measurement Items

### ● Hole position measurement

When this check box is selected, the distance from the reference line to the center of a circle is measured. The measurement direction and reference line can be specified.  
Clicking the triangular button on the right end enables to fold or expand the setting items.



#### ○ Specify the measurement direction

- Horizontal direction

When this check box is selected, the distance from the reference line in the horizontal direction on the screen to the center of a circle is measured.

- Vertical direction

When this check box is selected, the distance from the reference line in the vertical direction on the screen to the center of a circle is measured.

#### ○ Specify the standard

- Select the reference edge automatically  
A reference line is automatically selected.



**The reference line is automatically selected from the lines within the range of ±30 degrees in the horizontal or vertical direction on the window. If a reference line cannot be selected, no measurement result is displayed.**

- Use the base coordinate

Use the X and Y axes set in the base coordinates as reference lines.

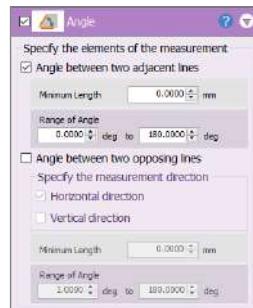
### ● R measurement

When this check box is selected, the radius of the arc is measured.



### ● Angle

When this check box is selected, the angle of lines which are neighboring or facing each other is measured. The measurement point, measurement direction, and measurement parameter can be specified.  
Clicking the triangular button on the right end enables to fold or expand the setting items.



#### ○ Specify the elements of the measurement

- Angle between two adjacent lines

When this check box is selected, the angle of the two neighboring lines is measured.

Minimum Length	Input the lower limit for the length of the line used when measuring an angle.
----------------	--

Range of Angle	Input the measuring range for an angle.
----------------	---

Reference	The angle can be input from 0 to 180 degrees.
-----------	---

- Angle between two opposing lines

When this check box is selected, the angle of the two lines which are facing each other is measured.

Horizontal direction	When this check box is selected, the angle of the two lines which are horizontal to the screen is measured.
----------------------	---

Vertical direction	When this check box is selected, the angle of the two lines which are vertical to the screen is measured.
--------------------	---

Minimum Length	Input the lower limit for the length of the line used when measuring an angle.
----------------	--

Range of Angle	Input the measuring range for an angle.
----------------	---

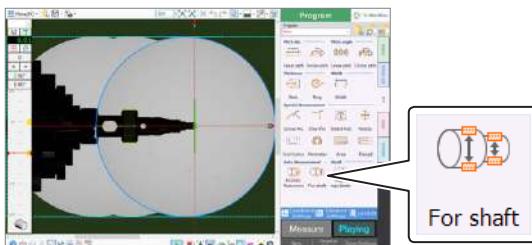
Reference	The angle can be input from 0 to 180 degrees.
-----------	---

## ■ For Shaft

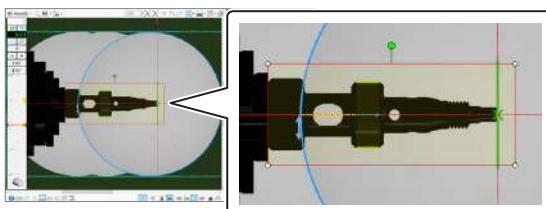
Automatically recognize the line, circle, and arc of the target for the rotation measurement within the measurement area, and create and measure elements. The distance using the created multiple elements is also automatically measured.

**Important** When performing setting for shaft, place the axis of the target to be the horizontal direction on the screen.

### 1 Click [For shaft].



### 2 On the preview screen, edit the measurement range so that it encloses the target.



The automatic measurement can measure the target within the measurement range; the whole target does not need to be enclosed.

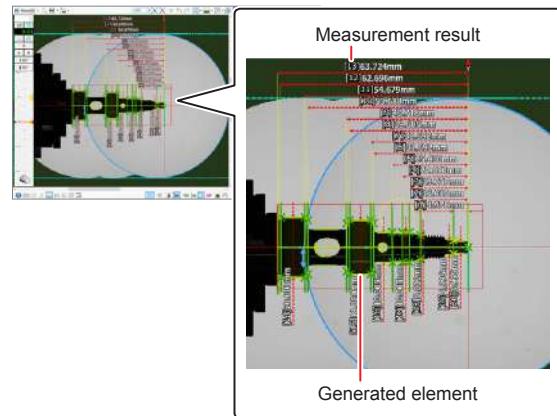
### 3 Specify the measurement items and the measurement conditions in the edit window.

For details about the edit window, refer to □ "Edit Window" (Page 4-100).

### 4 Click [Apply].

The target in the measurement range is automatically measured and the measurement items specified in the edit window are displayed on the preview display.

If the result is undesirable, change the setting in the application tool edit window and in the preview screen, and click [Apply] again. The setting can be changed any number of times before [OK] is clicked.



#### Technical Hint

##### Displaying/Hiding the measurement result

When [Apply] is clicked, the target within the measurement range is measured for all the measurement items under all the measurement conditions. This enables you to change the measurement item and condition to show the measurement result on the preview screen without clicking [Apply] again.



- If [Setting of parameter for generating an element] is changed, click [Apply] again.
- If the measurement area is changed, click [Apply] again. At this time, the elements that are moved outside the measurement area from the inside of the area and the measurement result using these elements are deleted.

### 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

## Measurement Items

### ● Edit Window

 Clicking [Default] returns the settings specified on the edit window to the default settings.

### ● Added information

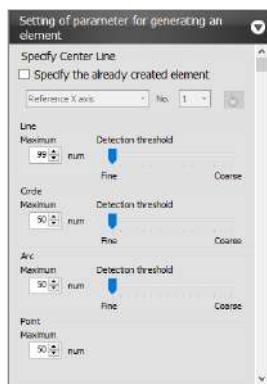
This item is not used in the Program mode.



**Added information may be required to input depending on the settings of the [Added information] dialog box.**  
 "Entering Added Information" (Page 6-10)

### ● Setting of parameter for generating an element

Clicking the triangular button on the right end enables to fold or expand the setting items.



 A value between 0 and 99 can be entered in [Maximum] each parameter.

#### ○ Specify Center Line

- Specify the already created element

When this check box is selected, the already created line can be specified as the center line.

#### ○ Line

Set parameters for generating lines.

- Maximum

Enter the maximum number of lines to generate.

- Detection threshold

The threshold (length) for detecting lines to be generated is specified with the slider.

#### ○ Circle

Set parameters for generating circles.

- Maximum

Enter the maximum number of circles to generate.

- Detection threshold

The threshold (perimeter) for detecting circles to be generated is specified with the slider.

#### ○ Arc

Set parameters for generating arcs.

- Maximum

Enter the maximum number of arcs to generate.

- Detection threshold

The threshold (arc length) for detecting arcs to be generated is specified with the slider.

#### ○ Point

Set parameters for generating points.

- Maximum

Enter the maximum number of points to generate.

### ● Capture method

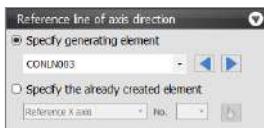
Clicking the triangular button on the right end enables to fold or expand the setting items.



- Do not capture  
Perform measurement by the current preview screen or layer image.
- Capture entire automatic measurement range  
Perform measurement by capturing the entire automatic measurement range.
- Automatically capture entire target  
Perform measurement by capturing the entire target automatically.

### ● Reference line of axis direction

Clicking the triangular button on the right end enables to fold or expand the setting items.



- Specify generating element  
Specify the element generated by the automatic measurement as the reference line.  
You can switch by selecting an item from the dropdown list, or clicking  or .
- Specify the already created element  
The created element is specified as the reference line.

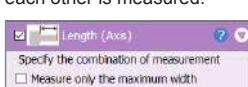
### ● Result display / output

This item is not used in the Program mode.

### ● Length (Axis)

Clicking the triangular button on the right end enables to fold or expand the setting items.

When this check box is selected, the distance between lines facing each other is measured.



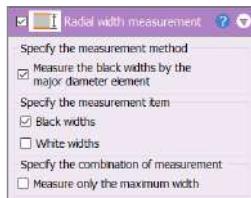
#### ○ Specify the combination of measurement items

- Measure only the maximum width

When this check box is selected, only the maximum distance between two lines is measured.

## ● Radial width measurement

Clicking the triangular button on the right end enables to fold or expand the setting items.  
When this check box is selected, the distance between two lines facing in the same direction is measured. The measurement direction, measurement point, and the combination of the measurement points can be specified.



### ○ Specify the measurement method

- Measure the black widths by the major diameter element  
When this check box is selected, measurement can be made by specifying the major diameter as an element at the measurement for the width of the black sections.

### ○ Specify the measurement item

- Black widths  
When this check box is selected, the width in the dark section is measured.
- White widths  
When this check box is selected, the width in the bright section is measured.

### ○ Specify the combination of measurement items

- Measure only the maximum width  
When this check box is selected, only the maximum distance between two lines is measured.

## ● Hole / ring measurement

When this check box is selected, the diameter of the circle is measured.



## ● Hole distance measurement

When this check box is selected, the distance between the centers of two circles is measured.



## ● Hole position measurement

When this check box is selected, the distance from the reference line to the center of a circle is measured.



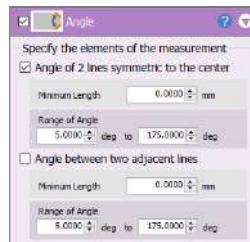
## ● R measurement

When this check box is selected, the radius of the arc is measured.



## ● Angle

Clicking the triangular button on the right end enables to fold or expand the setting items.  
When this check box is selected, the angle of lines which are neighboring or facing each other is measured. The measurement point, measurement direction, and measurement parameter can be specified.



### ○ Specify the elements of the measurement

- Angle of 2 lines symmetric to the center axis  
When this check box is selected, the angle of the two lines which are axially symmetric to the center axis is measured.

Minimum Length	Input the lower limit for the length of the line used when measuring an angle.
Range of Angle	Input the measuring range for an angle.

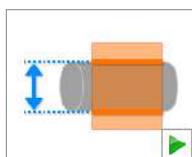
The angle can be input from 0 to 180 degrees.

- Angle between two adjacent lines

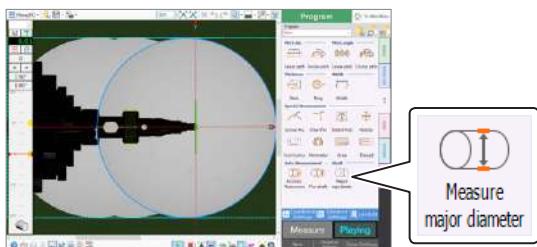
When this check box is selected, the angle of the two neighboring lines is measured.

Minimum Length	Input the lower limit for the length of the line used when measuring an angle.
Range of Angle	Input the measuring range for an angle.

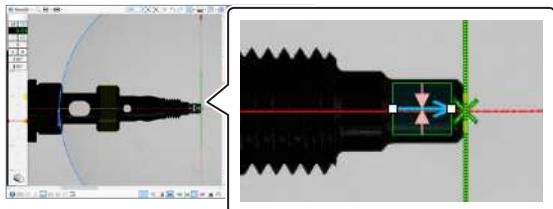
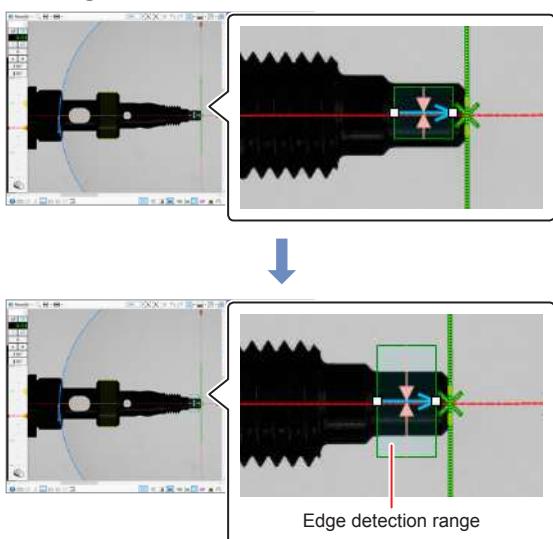
The angle can be input from 0 to 180 degrees.

**Measurement Items****Shaft****■ Measure Major Diameter**

Measure the major diameter of the target based on the rotation axis.

**1 Click [Measure major diameter].****2 Specify the start and end points of the edge detection range passing through the center of the target.**

Click two points along the line to be detected to specify the edge detection range.

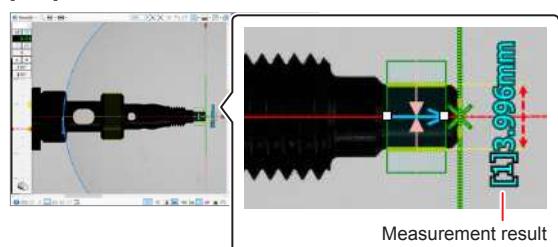
**3 Adjust the size and position of the edge detection range to cover the outer diameter of the target.****4 Specify the detection criteria in the edit window.**

For details about the edit window, refer to □ "Edit Window" (Page 4-103).

**5 Click [Apply].**

The measurement result of the target specified in Steps 2 and 3 is displayed on the preview screen.

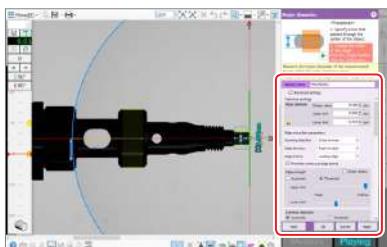
If the result is undesirable, change the setting in the application tool edit window and in the preview screen, and click [Apply] again. The setting can be changed any number of times before [OK] or [Next] is clicked.

**6 Click [OK].**

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

By clicking [Next], you can continue to use the same tool.

## ● Edit Window



After changing the setting, click [Apply], and the change is reflected on the preview screen.

### ● Element name

Edit the name of the measurement result.

### ● Advanced settings

Selecting this check box enables to configure setting of “Edge extraction parameters”, “Postural adjustment”, and “Range parameters”.

### ● Tolerance settings

Enter the design value for the outer diameter and the tolerance values (upper limit and lower limit) for the design value. This value is used to evaluate whether the measurement value remains within the tolerance range.

□ “Chapter 6 Run Mode” (Page 6-1)

Reference If the upper tolerance is entered when the lower tolerance is 0, “value with minus sign (-) put to the upper tolerance” will be entered automatically for the lower tolerance.



[Alert Settings] dialog box appears.  
□ “Alert Settings” (Page 4-192)

### ● Edge extraction parameters

Refer to □ “Advanced Parameters of Application Tool” (Page 4-104).

### ● Postural adjustment

Refer to □ “Advanced Parameters of Application Tool” (Page 4-104).

### ● Range parameters

Refer to □ “Advanced Parameters of Application Tool” (Page 4-104).

### ● Capture height advanced settings

Refer to □ “Advanced Parameters of Application Tool” (Page 4-104).

### ● Autofocus capture

Refer to □ “Advanced Parameters of Application Tool” (Page 4-104).

## Advanced Parameters of Application Tool

This section describes the advanced parameters of the application tool.

### ■ Advanced Parameter List (1/2)

Advanced parameter name		Tool								
										
Edge extraction parameters	Scanning direction					✓	✓	✓		4-105
	Edge direction					✓	✓	✓		4-105
	Edge priority					✓	✓	✓		4-105
	Prioritize continuous edge points					✓	✓	✓		4-105
	Edge strength	✓	✓	✓	✓	✓	✓	✓		4-105
	Remove defects									4-105
	Remove isolated point					✓	✓	✓		4-105
	Scanning resolution					✓	✓			4-105
	Scan width	✓	✓			✓	✓			4-105
Postural adjustment (Line or Rectangle range)		✓		✓		✓		✓		4-106
Postural adjustment (Circle or Arc range)			✓		✓		✓			4-107
Range parameters (Line/Rectangle range)		✓		✓		✓		✓		4-107
Range parameters (Circle/Arc range)			✓		✓		✓			4-107
Capture height advanced settings		✓	✓	✓	✓	✓	✓	✓	✓	4-108
Autofocus capture		✓	✓	✓	✓	✓	✓	✓	✓	4-108
Minimum detect size										4-108

### ■ Advanced Parameter List (2/2)

Advanced parameter name		Tool									
											
Edge extraction parameters	Scanning direction									✓	4-105
	Edge direction									✓	4-105
	Edge priority									✓	4-105
	Prioritize continuous edge points									✓	4-105
	Edge strength									✓	4-105
	Remove defects									✓	4-105
	Remove isolated point										4-105
	Scanning resolution									✓	4-105
	Scan width									✓	4-105
Postural adjustment (Line or Rectangle range)			✓							✓	4-106
Postural adjustment (Circle or Arc range)											4-107
Range parameters (Line/Rectangle range)										✓	4-107
Range parameters (Circle/Arc range)											4-107
Capture height advanced settings										✓	4-108
Autofocus capture										✓	4-108
Minimum detect size					✓	✓					4-108

## Edge Extraction Parameters

### Scanning direction

This option can be set when [Auto] is not selected. Specify the scanning direction within the range.

**Inner to outer**

The range is scanned outward from the center.

**Outer to inner**

The range is scanned inward to the center.

### Edge direction

This option can be set when [Auto] is not selected. Set the direction to detect edges in the range.

**Not specified**

Both of the borders from "Bright to dark" and "Dark to bright" are detected as edges.

**Bright to dark**

Only the borders from bright to dark are detected as edges.

**Dark to bright**

Only the borders from dark to bright are detected as edges.

### Edge priority

Specify the priority of the edges to be detected in the edge detection range.

**Leading edge**

The edge which is first recognized as an edge from the start point of the scanning is determined to be the edge point.

If [Auto] is selected for [Scanning direction], the target is scanned outward from the center of the range.

**Maximum edge intensity**

The edge which has the highest intensity (maximum contrast value) within the edge detection range is determined to be the edge point.

### Prioritize continuous edge points

When this check box is selected, the point at the continuous position will be detected as an edge point. This excludes edge points that are away from the continuous ones, so error is less likely to occur due to stains or scratches on the surface of the stage or the measurement target.

### Edge strength

Select the detection sensitivity (contrast value judgment) to detect the edges of the target.

**Automatic**

Edges are judged automatically.

**Threshold**

Edges are judged based on the upper and lower limits of the threshold (contrast value) specified with the sliders. Changes smaller than the lower limit or greater than the upper limit are not recognized as edges.

**Graph display**

Selecting the check box displays the edge intensity graph in the preview screen. Edge intensity is displayed in edge intensity graph with a pink arrow in the edge detection range (scanning line). You can change the display position and size of the edge intensity graph.

- Point**
  - When [Threshold] has been selected, the upper and lower limit will be displayed.
  - When the upper limit or lower limit is changed with [Automatic] selected, the [Threshold] will be selected.

### Remove defects

When the fitting line is calculated, the edge point(s) separated from the edge point trail will be removed as error points. Errors will be hard to generate due to the effects such as burrs or dirt on the measurement target.

**Disable**

Abnormal points are not removed.

**Automatic**

Automatically set the threshold value based on the extracted edge point trail.

**Threshold**

Set threshold by slider. If it is set to the [Intense] side, then the irregular points will be determined to be minor intervals.

### Remove isolated point

Set the threshold for outlier edge points (isolated points) not to be included in the edge position calculation.

**Disable**

Isolated points are included as edge points.

**Automatic**

The isolated points are automatically evaluated as outliers via statistical analysis.

**Threshold**

Isolated points are judged based on the threshold (the number of continuous edge points) specified with the slider.

### Scanning resolution

Specify the interval for the edge points to be extracted. Set scanning resolution by slider.

**High speed search**

Selecting the check box performs the speeding up process when the edge points exceed 5,000 points.



**Point**  
If the scanning resolution is set to rough, the measurement time becomes shorter, however, fine unevenness may not be detected.

### Scan width

Set the width of the line to be scanned when detecting the edge.

**Narrow**

Create the line with a small pixel number.

**Thick**

Increase the pixel number to make the line wider.



**Point**  
Even though increasing the scan width stabilizes the repetition accuracy, fine unevenness will not be detected.

**Measurement Items**

## Postural adjustment (Line or Rectangle Range)

### Disable.

Do not perform position/postural adjustment on measurement.

### Adjust to own result. (Editing mode only)

The axis line of the target is detected within the edge detection range and the angle of the axis line is used to automatically adjust the angle of the edge detection range.

 **Important** This function is effective only when the target shape is symmetrical in the edge detection range.

### Align with the base element's detection results.

Specify the reference line for edge detection range (scanning line), the angle with the reference, and distance from that reference.

- Link target

Specify a line used as the reference for the edge detection range (scanning line).

Reference X axis	Use the X axis set in the base coordinate as a reference line.
Reference Y axis	Use the Y axis set in the base coordinate as a reference line.
Rotation axis	Use the rotation axis set in the base coordinate as a reference line. (only when the rotation unit IM-RU1 is used)
(Other)	Use a line created during measurement or created with the tools on the [Element] tab as a reference line. The element names of all lines (including virtual lines) are displayed.
	You can select a reference line from the lines shown on the preview screen.

 When base coordinate is not specified, the coordinate origin (0,0) is on the bottom left of the capture range.

- Set angle from target.

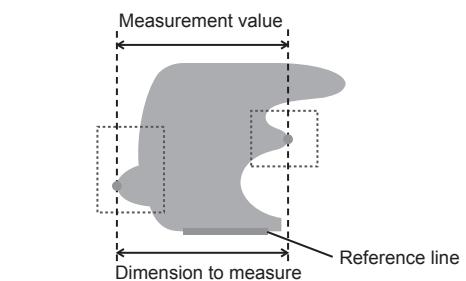
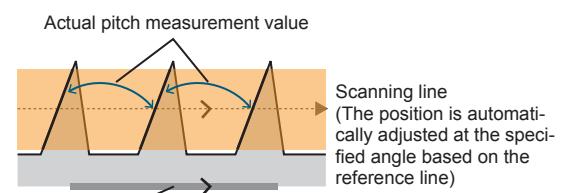
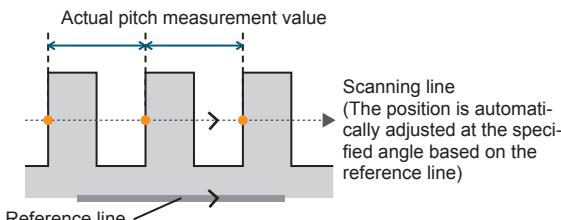
When this check box is selected, the slope (orientation) of the edge detection range (scanning line) can be set based on the reference line.

Parallel	Set the edge detection range (scanning line) in parallel to the reference line.
Perpendicular	Set the edge detection range (scanning line) perpendicular to the reference line.
Arbitrary	Set the edge detection range (scanning line) at a desired angle to the reference line.

### Technical Hint

#### Adjusting the slope of the edge detection range (scanning line) based on the reference line

The position of the edge detection range (scanning line) is adjusted based on the line specified in advance (reference line), and then the pitch or edge width is measured.



- Set distance from target.

When this check box is selected, the center of the edge detection range (scanning line) can be specified with the distance in mm from the reference line.

## Postural adjustment (Circle or Arc Range)

**Disable.**

Do not perform position/postural adjustment on measurement.

**Align with the base element's detection results.**

Specify a reference for the edge detection range (scanning line).

- Link target

Specify a circle, an arc, or points used as the reference for the edge detection range (scanning line).

Reference point	Specify the origin point (Absolute coordinates: 0,0) as the measurement base point.
(Other)	Use a circle, arc, or point created during measurement or created with the tools on the [Element] tab as a reference circle. The element names of all circles or arcs, or points (including virtual lines) are displayed.
	You can select a reference line from the lines shown on the preview screen.



When base coordinate is not specified, the coordinate origin (0,0) is on the bottom left of the capture range.

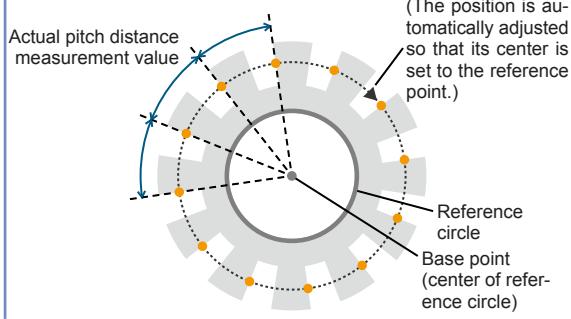
- Align center

When this check box is selected, the center of the edge detection range (scanning line) is set on the reference point.

**Technical Hint**

### Adjusting the position of the edge detection range (scanning line) based on the reference circle

The position of the edge detection range (scanning line) is adjusted based on the center point of the reference circle specified in advance, and then the pitch is measured.



- Align radius

This check box is enabled when a circle or arc is selected for [Link target].

When this check box is selected, the radius of the edge detection range (scanning line) is set to the same value as that of the reference circle.

## Range parameters (Line/Rectangle Range)

**Start**

Enter the coordinates (Absolute coordinates: X, Y) of the start point of the edge detection range (scanning line) in mm.

**End**

Enter the coordinates (Absolute coordinates: X, Y) of the end of the edge detection range (scanning line) in mm.

**Width**

Enter the width of the edge detection range (scanning line) in mm.

**Length**

Enter the length of the edge detection range (scanning line) in mm.

## Range parameters (Circle/Arc Range)

**Center**

Enter the coordinates (Absolute coordinates: X, Y) of the center of the edge detection range (scanning line) in mm.

**Radius**

Enter the radius of the edge detection range (scanning line) in mm.

**Width**

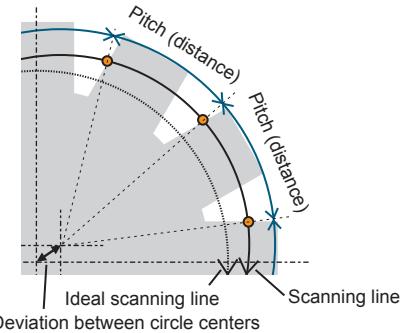
Enter the width of the edge detection range (scanning line) in mm.

**Center angle (for arc only)**

Enter the angles (Starting angle, Arc angle) of the edge detection range (scanning line) in degrees.



- If the center of the specified scanning line and the center of the target circle deviate greatly, the measurement error increases.

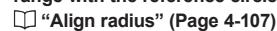


To perform an accurate measurement, draw a reference circle in advance, and set the edge detection range concentrically with the reference circle.



"Align center" (Page 4-107)

- Since the curve distance is measured along the scanning line, the measurement value is determined according to the radius of the edge detection range. Specify the radius in mm for [Radius] of range parameters or align the radius of the edge detection range with the reference circle.



"Align radius" (Page 4-107)

## Capture height advanced settings

### ○ Designate the capture height with value

Set the capture height beforehand.

- Link target

You can select an element to be referred as the height for capturing from the dropdown list.



**Point** Only the element with the Z position information (element tool with auto focus performed) can be selected.



You can also select a reference element on the preview screen.

- Height from the standard

Enter the relative difference in the Z position to the reference element.



**Point** Enter a value with + sign when it is higher than the reference element, with - sign when it is lower than that.

- Set the current ZPos.

Set the difference between the current Z position and the Z position of the reference element as the height from the reference.



**Point** When the auto focus capturing is used together with this, the Z position to start the auto focus will be determined.



**Reference** By setting the reference element and height from the reference, the Z position for capturing will change depending on the variation of the Z position of the reference element, even if the height of the target varies during Run mode.

## Autofocus capture

### ○ Autofocus capture

Perform auto focus capturing.

### ○ Execution timing

Select the execution timing from [Capture first image only.] or [Execute for capturing all images] in the dropdown list.



**Point** This is enabled only when the edge detection range extends over multiple fields of view. Select [Execute for capturing all images] when the height of the target within the edge detection range is not parallel to the stage glass.

### ○ Specify search range

Specify the search range for the auto focus capturing.

- Start height

Enter the start height for the auto focus capturing.

- End height

Enter the end height for the auto focus capturing.



Replace the value of the start height with the end height.



**Point** The wider the search range is, the longer the measurement time becomes.

## Minimum detect size

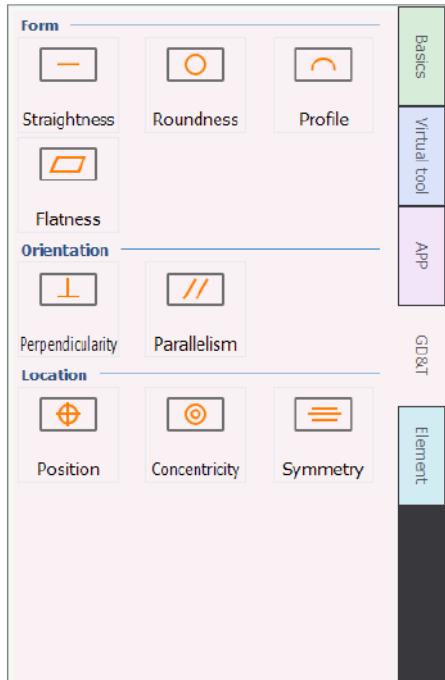
Enter the minimum detect size of the part which is to be judged as an edge in mm. Small clots whose perimeter is shorter than the set value are ignored.



**Reference** When the minimum detection size value has been changed, the minimum detect sizes of the element tools which are referring to this value also change.

## GD&T

Select the [GD&T] tab in the [Measurement operation area] to display the GD&T (geometric dimension and tolerance) options.



### ● Form

These options are used to measure the geometric dimension and tolerance regarding the form of the target.

"Form" (Page 4-110)

### ● Orientation

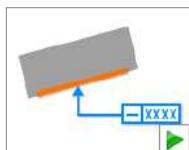
These options are used to measure the geometric dimension and tolerance regarding the orientation of the target.

"Orientation" (Page 4-115)

### ● Location

These options are used to measure the geometric dimension and tolerance regarding the location of the target.

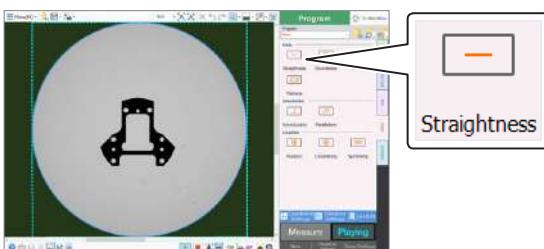
"Location" (Page 4-117)

**Form****■ Straightness**

Measure the straightness of a straight line segment.

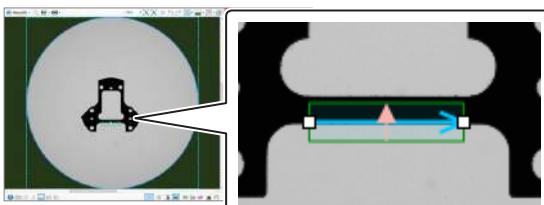
**Important**

MMC/LLC cannot be specified if no measurement element to be a target of MMC/LMC is shown on the preview display.  
Before measuring the straightness, you need to conduct measurement using the [Basics] tab options or create a formula with the Calculator.

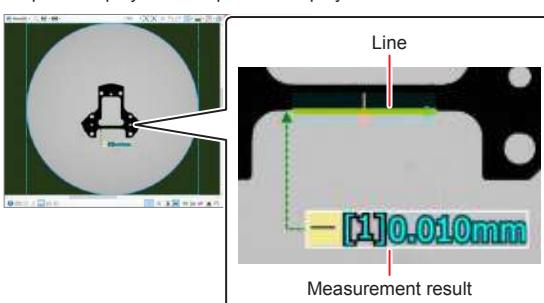
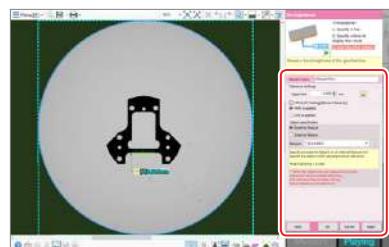
**1 Click [Straightness].****2 Specify the start and end points of the edge detection range along the line to measure straightness.**

Click two points along the line to be detected to specify the edge detection range.

**[Reference]** You can also select the element you have set.

**3 Specify the location to show the result of the straightness measurement.**

The result of the straightness measurement of the line specified in Step 2 is displayed in the preview display.

**4 Set the items related to the GD&T measurement.**

After changing the setting, click [Apply], and the change is reflected on the preview screen.

**○ Element name**

Edit the name of the measurement result.

**○ Tolerance settings**

Enter the upper limit for the straightness. This value is used to evaluate whether the measurement value remains within the tolerance range.

"Chapter 6 Run Mode" (Page 6-1)



[Alert Settings] dialog box appears.

"Alert Settings" (Page 4-192)

**○ MMC/LMC Settings (Bonus Tolerance)**

When the check box is selected, the details of MMC/LMC can be specified.

- MMC is applied.  
Apply the MMC.
- LMC is applied.  
Apply the LMC.
- Object specification

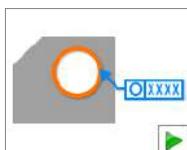
External feature	Select when the target of MMC/LMC is external feature.
Internal feature	Select when the target of MMC/LMC is Internal feature.
Element	Select the target element for bonus tolerance calculation from the dropdown list.
	You can select a measurement element shown on the preview screen.

**5 Click [OK].**

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

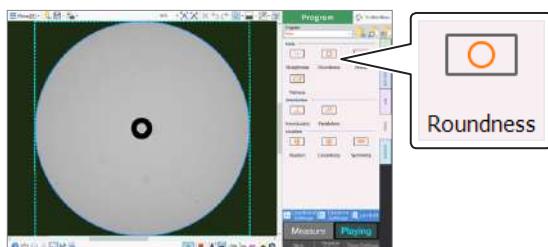
**[Reference]** By clicking [Next], you can continue to use the same tool.

## ■ Roundness



Measure the roundness of a circle or an arc.

### 1 Click [Roundness].



### 2 Specify three points of the edge detection range along the circle (or arc) to measure roundness.

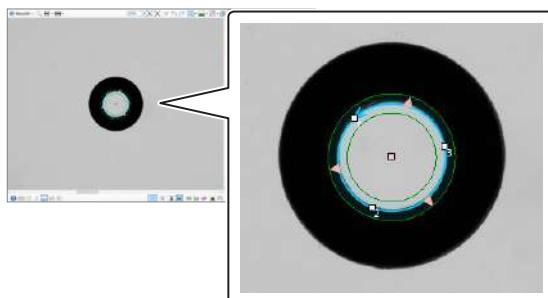
Click three points along the circle to specify the edge detection range.

Set the edge detection range so that it includes the entire edge of the circle.

To measure the roundness along an arc, you need to select [Arc] in the edit window before specifying the arc.

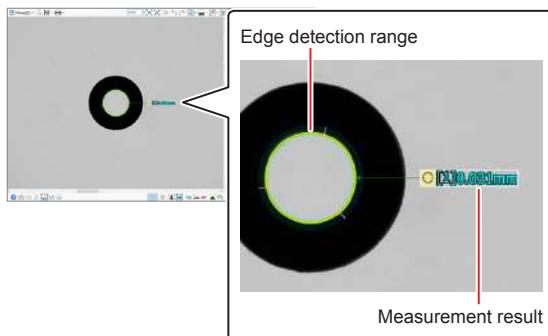


You can also select the element you have set.

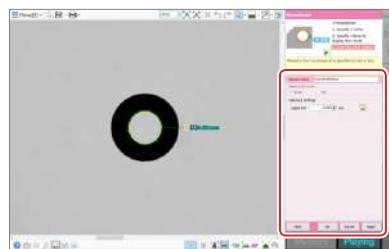


### 3 Specify the location to show the result of the roundness measurement.

The result of the roundness measurement of the circle or arc specified in Step 2 is displayed in the preview display.



### 4 Set the items related to the GD&T measurement.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

#### ○ Element name

Edit the name of the measurement result.

#### ○ Select circle or arc

Select the shape of the measurement target (scanning line) to measure the roundness.

- Circle

Set the scanning line as a circle which passes through the specified three points.

- Arc

Set the scanning line as an arc which passes through the specified three points (First point: Start point, Second point: Intermediate point, Third point: End point).

#### ○ Tolerance settings

Enter the upper limit for the roundness. This value is used to evaluate whether the measurement value remains within the tolerance range.

"Chapter 6 Run Mode" (Page 6-1)



[Alert Settings] dialog box appears.

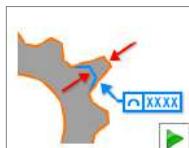
"Alert Settings" (Page 4-192)

### 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

By clicking [Next], you can continue to use the same tool.

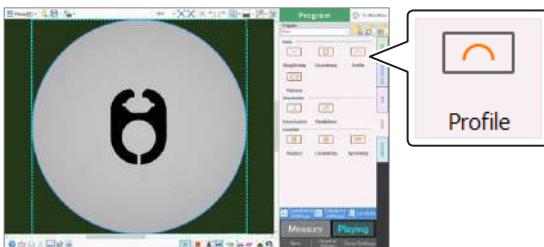
## ■ Profile



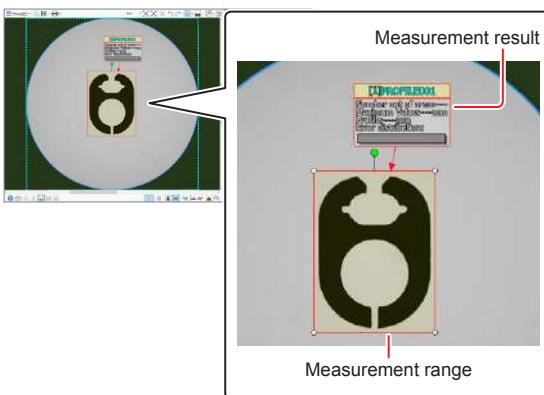
Measure the profile of the target within the measurement range.

If [Average Number Settings] is set as multiple times, the measurement result is not displayed.

### 1 Click [Profile].



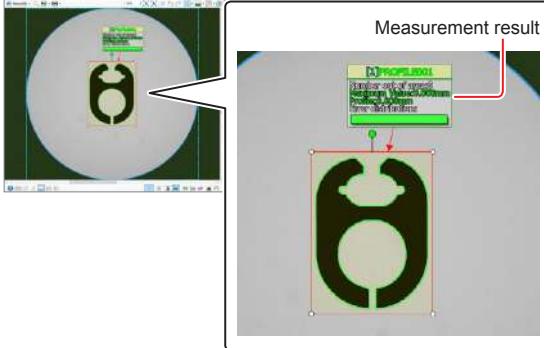
### 2 Draw a measurement range around the target by dragging the mouse in the preview screen, and specify the location to insert the measurement result.



### 3 Specify the measurement conditions in the edit window.

### 4 Click [Apply].

The result of the measurement specified in the edit window is displayed in the preview display.  
If the result is undesirable, change the setting in the edit window and click [Apply] again.  
The setting can be changed any number of times before [OK] or [Next] is clicked.

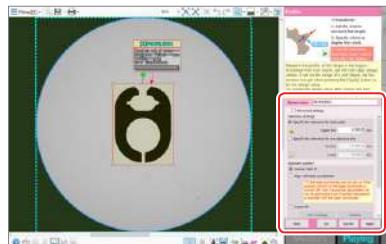


## 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

By clicking [Next], you can continue to use the same tool.

## ● Edit Window



After changing the setting, click [Apply], and the change is reflected on the preview screen.

### ● Element name

Edit the name of the measurement result.

### ● Advanced settings

Selecting [Advanced settings] allows the setting of "Out-of-tolerance judgment allowance", "Minimum detect size", and "Settings for result display".

### ● Tolerance settings

This value is used to evaluate whether the measurement value remains within the tolerance range.

"Chapter 6 Run Mode" (Page 6-1)

#### ○ Specify the tolerance for both sides

Enter the upper limit for the contour profile.

#### ○ Specify the tolerance for one side at a time

Enter the distance tolerance from the reference contour separately for the outside and the inside.

For the interior tolerance, a minus sign (-) is required.



[Alert Settings] dialog box appears.  
 "Alert Settings" (Page 4-192)

## ● Alignment pattern

Select an "alignment pattern".

### ○ Contour best fit

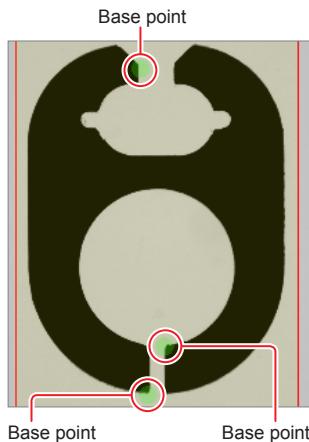
Perform alignment based on the contour of the target.

### ○ Align with base coordinates

Perform alignment using the base origin point set for the base coordinates as a base point

### ○ 3-point fit

Click [Start settings], and set the 3 green points displayed in the preview screen as base points for alignment. Perform alignment based on the set reference point.



Base points can be moved by dragging with the mouse.

## ● Out-of-tolerance judgment allowance

Displayed when [Advanced settings] is selected.

The value of the acceptable range can be specified in mm. The profile is not judged as NG when the length beyond the tolerance range is shorter than the specified length.

## ● Minimum detect size

Displayed when [Advanced settings] is selected.

Enter the minimum detect size of the part which is to be judged as an edge in mm. Small clots whose perimeter is shorter than the set value are ignored.

When the minimum detection size value has been changed, the minimum detect sizes of the element tools which are referring to this value also change.

## ● Settings for result display

Displayed when [Advanced settings] is selected.

### ○ Display the place that has the greatest error

Select the check box to display the places with the greatest errors (maximum of one place that is OK and five that are NG) on the preview screen during the Run mode.

### ○ Register point

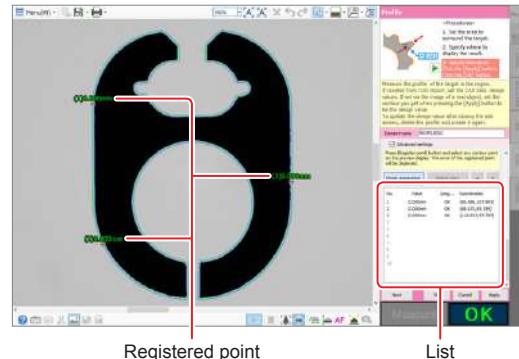
Registering the points (contour points) that you want to check displays the measured value (error) for that point during the multi measurement.

To register points, you need to click [Apply] first and then extract the contours of the target object.

- [Register point]

Clicking [Register point] enables points to be registered. When you click [Register point], it changes to [Finish registration]. Click a contour point on the preview screen to register a point that you want to check. The registered point is displayed on the Edit window list and Preview screen. Up to 10 checkpoints can be registered.

Once you have registered all the points that you want to check, click [Finish registration].



Registered point

List

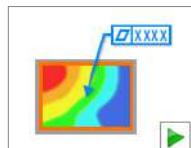
- [Delete point]

To delete registered points, select the point that you want to delete on the Edit window list and click [Delete point].

- /

To change the order of registered points, select the point that you want to move on the Edit window list and click or .

## ■ Flatness



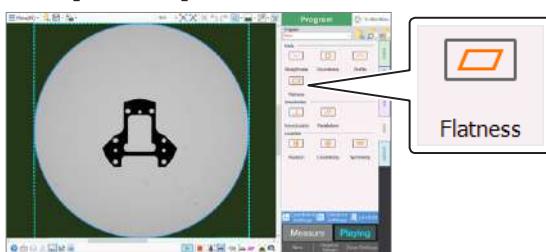
Measure the flatness of the specified plane.



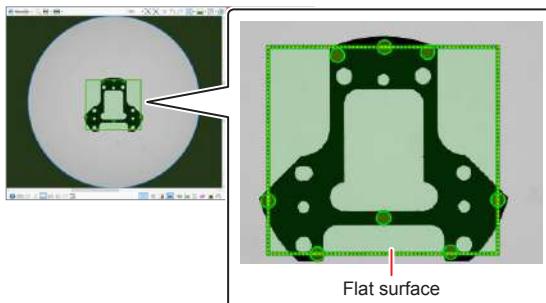
To measure the flatness, the height flat surface element is necessary. Create [Height flat surface] of the virtual tool beforehand.

- "Height Flat Surface" (Page 4-56)
- "Height" (Page 4-148)

### 1 Click [Flatness].



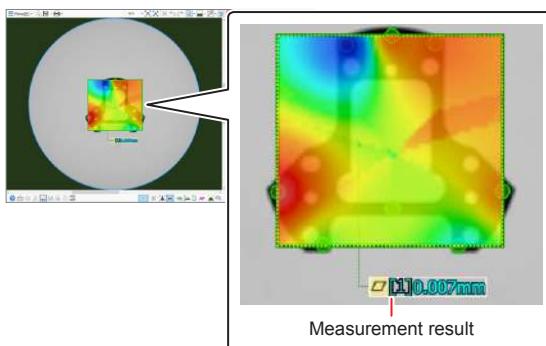
### 2 Click the flat surface to be measured to specify.



### 3 Click to specify the location to show the result of the flatness measurement.

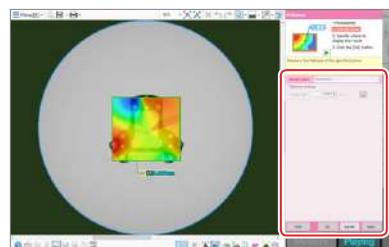
The result of the flatness measurement of the flat surface specified in Step 2 is displayed in the preview screen.

The measured flat surface is displayed with color mapping applied according to the plane value.



- The center value of the flat surface is shown in green, and the upper/lower value is shown in blue.
- Setting the tolerance specifies the tolerance range with the upper limit (or lower limit) of the color map range.

### 4 Set the items related to the GD&T measurement.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

#### ○ Element name

Edit the name of the measurement result.

#### ○ Tolerance settings

Enter the upper limit for the tolerance of the flatness. This value is used when evaluating whether the measurement value remains within the tolerance range.

- "Chapter 6 Run Mode" (Page 6-1)



[Alert Settings] dialog box appears.

- "Alert Settings" (Page 4-192)

### 5 Click [OK].

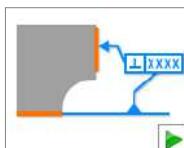
The setting is confirmed and the screen returns to the initial screen of the [Program] mode.



By clicking [Next], you can continue to use the same tool.

## Orientation

### ■ Perpendicularity



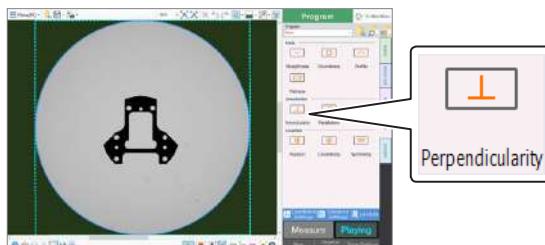
Measure the perpendicularity of a specified straight line segment to the reference line.



**MMC/LLC** cannot be specified if no measurement element to be a target of **MMC/LMC** is shown on the preview display.

Before measuring the perpendicularity, you need to conduct measurement using the [Basics] tab options or create a formula with the Calculator.

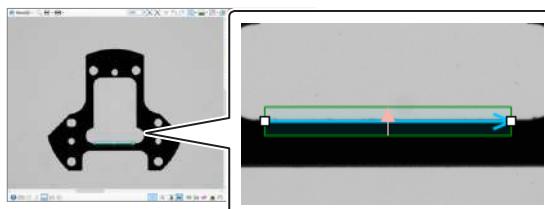
### 1 Click [Perpendicularity].



### 2 Specify the start and end points of the edge detection range for one of the lines of the target right angle and create it as the reference line for the perpendicularity measurement.

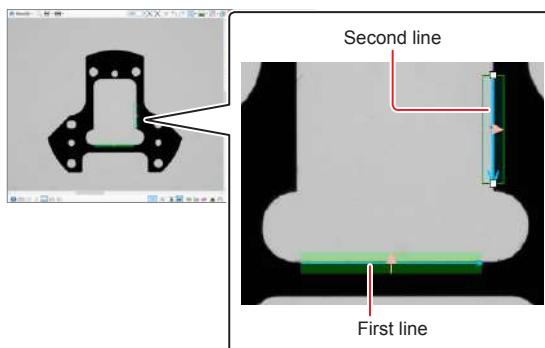
Click two points along the line to be detected and used as the reference line to specify the edge detection range.

You can also select the element you have set.



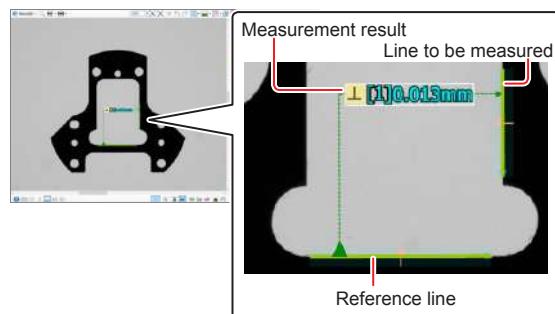
### 3 Specify the edge detection range for the other target line for the perpendicularity measurement in the same way.

You can also select the element you have set.

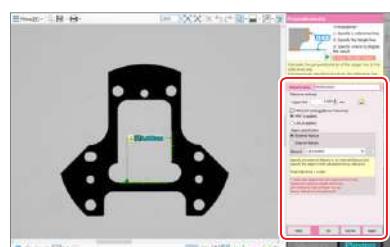


### 4 Specify the location to show the result of the perpendicularity measurement.

The result of the perpendicularity measurement of the lines specified in Steps 2 and 3 is displayed in the preview display.



### 5 Set the items related to the GD&T measurement.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

#### ○ Element name

Edit the name of the measurement result.

#### ○ Tolerance settings

Enter the upper limit for the tolerance of the perpendicularity. This value is used to evaluate whether the measurement value remains within the tolerance range.

"Chapter 6 Run Mode" (Page 6-1)



[Alert Settings] dialog box appears.  
 "Alert Settings" (Page 4-192)

#### ○ MMC/LMC Settings (Bonus Tolerance)

When the check box is selected, the details of MMC/LMC can be specified.

- MMC is applied.  
Apply the MMC.

- LMC is applied.  
Apply the LMC.

- Object specification

External feature	Select when the target of MMC/LMC is external feature.
Internal feature	Select when the target of MMC/LMC is Internal feature.
Element	Select the target element for bonus tolerance calculation from the dropdown list.
	You can select a measurement element shown on the preview screen.

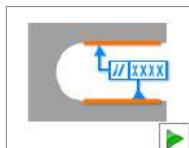
### 6 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.



By clicking [Next], you can continue to use the same tool.

## ■ Parallelism

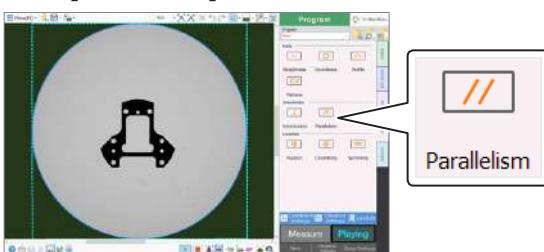


Measure the parallelism of a specified straight line segment to the reference line.



**MMC/LCC** cannot be specified if no measurement element to be a target of MMC/LMC is shown on the preview display.  
Before measuring the parallelism, you need to conduct measurement using the [Basics] tab options or create a formula with the Calculator.

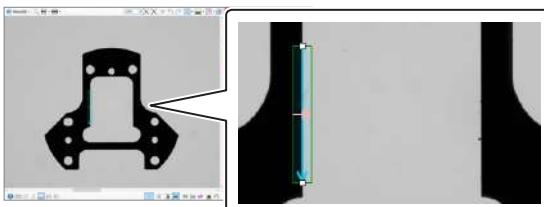
### 1 Click [Parallelism].



### 2 Specify the start and end points of the edge detection range for one of the lines and create it as the reference line for the parallelism measurement.

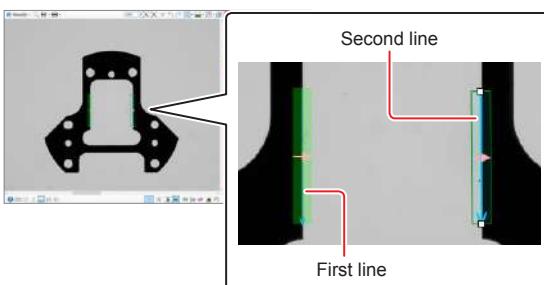
Click two points along the line to be detected and used as the reference line to specify the edge detection range.

You can also select the element you have set.



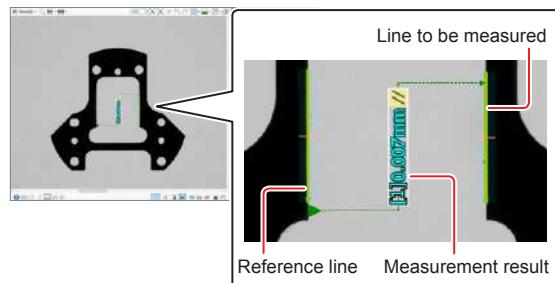
### 3 Specify the edge detection range for the other target line for the parallelism measurement in the same way.

You can also select the element you have set.

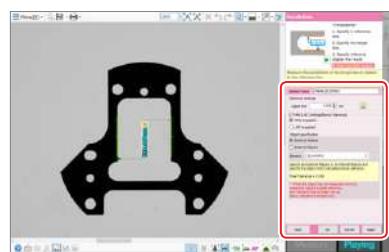


### 4 Specify the location to show the result of the parallelism measurement.

The result of the parallelism measurement of the lines specified in Steps 2 and 3 is displayed in the preview display.



### 5 Set the items related to the GD&T measurement.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

#### ○ Element name

Edit the name of the measurement result.

#### ○ Tolerance settings

Enter the upper limit for the tolerance of the parallelism. This value is used to evaluate whether the measurement value remains within the tolerance range.

"Chapter 6 Run Mode" (Page 6-1)



[Alert Settings] dialog box appears.

"Alert Settings" (Page 4-192)

#### ○ MMC/LMC Settings (Bonus Tolerance)

When the check box is selected, the details of MMC/LMC can be specified.

- MMC is applied.  
Apply the MMC.
- LMC is applied.  
Apply the LMC.
- Object specification

External feature	Select when the target of MMC/LMC is external feature.
Internal feature	Select when the target of MMC/LMC is Internal feature.
Element	Select the target element for bonus tolerance calculation from the dropdown list.
	You can select a measurement element shown on the preview screen.

### 6 Click [OK].

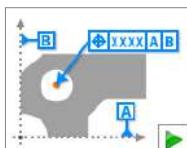
The setting is confirmed and the screen returns to the initial screen of the [Program] mode.



By clicking [Next], you can continue to use the same tool.

## Location

### ■ Position

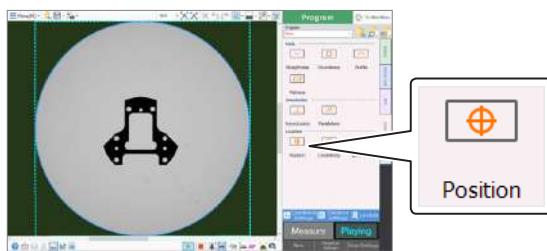


Measure the position tolerance of a specified point element.

▶ Important

- To measure the position tolerance of a point, you need to set the “base coordinates” in advance.  
“Coordinate Settings” (Page 4-182)
- MMC/LMC cannot be specified if no measurement element to be a target of MMC/LMC is shown on the preview display.  
Before measuring the point position tolerance, conduct measurement using the [Basics] tab options or create a formula with the Calculator.
- To measure the position tolerance of a point, you need to enter the design value.

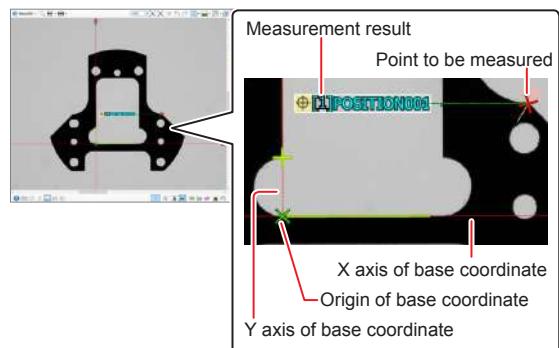
### 1 Click [Position].



### 2 Specify a scanning line which detects the point that measure the position tolerance.

Reference You can also select the element you have set.

### 3 Specify the location to display the measurement result of the position tolerance of the point.



The dialog box to prompt you to enter the design value appears.

### 4 Click [Yes].

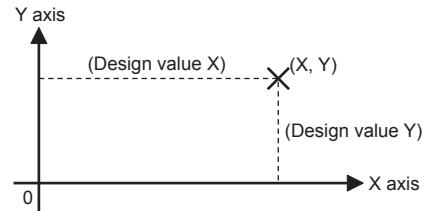
Reference

The measurement value displayed at the time of clicking [No] is the one whose design value is the origin of the base coordinates (X coordinate: 0, Y coordinate: 0).

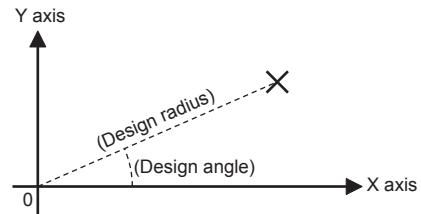
### 5 Enter the distance of the point from the base coordinates (design value).

Enter the coordinates or the radius and angle of the design value in “Design value (distance from base point)” in the edit window.

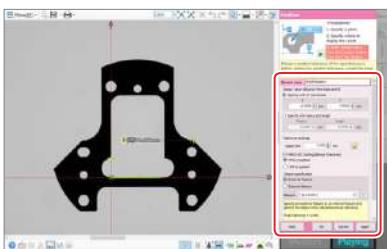
○ Entering coordinates



○ Entering the radius and angle



## 6 Set the items related to the GD&T measurement.



Set the items related to the GD&T measurement.  
After changing the setting, click [Apply], and the change is reflected on the preview screen.

### ○ Element name

Edit the name of the measurement result.

### ○ Design value (distance from base point)

Enter the design value of the position of the target point (distance from the base point).

- Specify with XY coordinate  
Enter the design value as XY coordinates.
- Specify with radius and angle  
Enter the design value as radius and angle.

### ○ Tolerance settings

Enter the upper limit for the tolerance of the position. This value is used to evaluate whether the measurement value remains within the tolerance range.

□ "Chapter 6 Run Mode" (Page 6-1)



[Alert Settings] dialog box appears.

□ "Alert Settings" (Page 4-192)

### ○ MMC/LMC Settings (Bonus Tolerance)

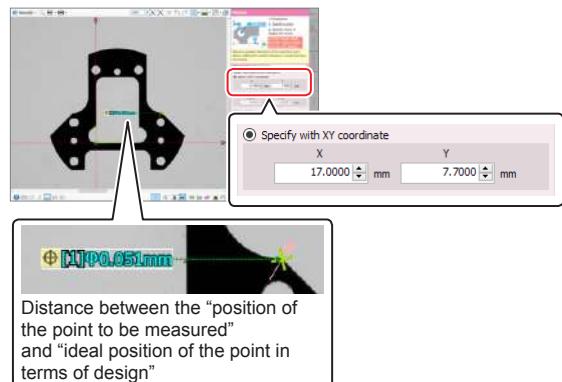
When the check box is selected, the details of MMC/LMC can be specified.

- MMC is applied.  
Apply the MMC.
- LMC is applied.  
Apply the LMC.
- Object specification

External feature	Select when the target of MMC/LMC is external feature.
Internal feature	Select when the target of MMC/LMC is Internal feature.
Element	Select the target element for bonus tolerance calculation from the dropdown list.
	You can select a measurement element shown on the preview screen.

## 7 Click [Apply].

Distance between the "position of the point to be measured" and the "ideal position of the point in terms of design"



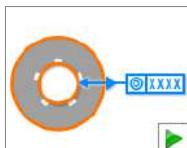
## 8 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.



By clicking [Next], you can continue to use the same tool.

## Concentricity



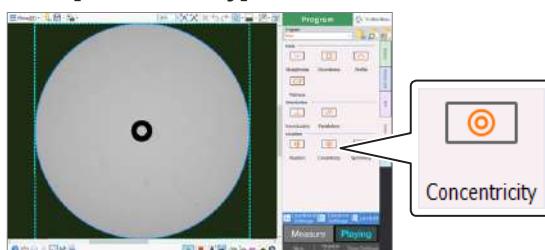
Measure the concentricity between two circles or arcs.

▶ Important

MMC/LLC cannot be specified if no measurement element to be a target of MMC/LMC is shown on the preview display.

Before measuring the concentricity, conduct measurement using the [Basics] tab options or create a formula with the Calculator.

### 1 Click [Concentricity].



### 2 Specify three points of the edge detection range along the circle (or arc) to be measured to create the reference circle.

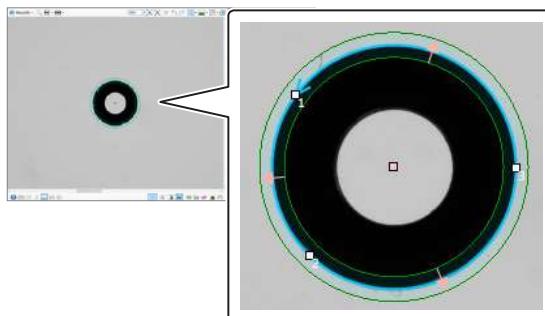
Click three points along the circle to specify the edge detection range.

Set the edge detection range so that it includes the entire edge of the circle.

To measure the concentricity along an arc, you need to select [Arc] in the edit window before specifying the arc.



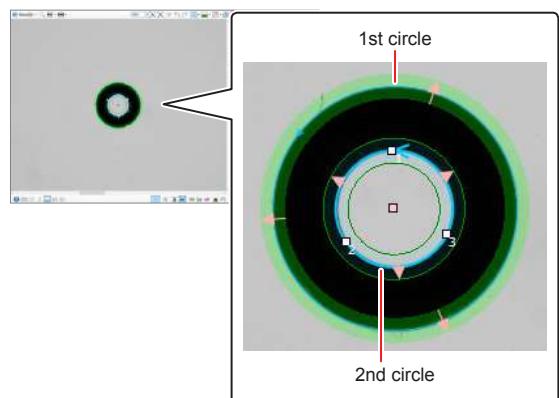
Reference You can also select the element you have set.



### 3 Specify the edge detection range for the circle (or arc) to measure the concentricity in the same way.

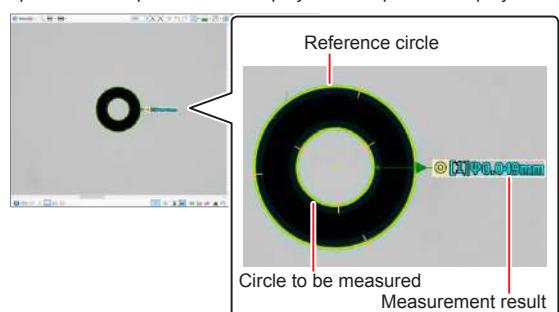
Reference

You can also select the element you have set.

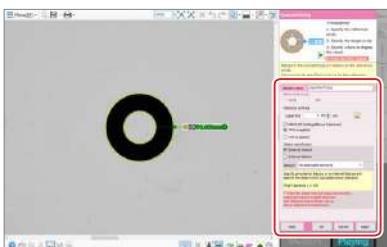


### 4 Specify the location to show the result of the concentricity measurement.

The result of the concentricity measurement of the circle or arc specified in Steps 2 and 3 is displayed in the preview display.



## 5 Set the items related to the GD&T measurement.



Set the items related to the GD&T measurement.  
After changing the setting, click [Apply], and the change is reflected on the preview screen.

### Element name

Edit the name of the measurement result.

### Select circle or arc

Select the shape of the measurement target (scanning line) to measure concentricity.

- Circle

Set the scanning line as a circle which passes through the specified three points.

- Arc

Set the scanning line as an arc which passes through the specified three points (First point: Start point, Second point: Intermediate point, Third point: End point).

### Tolerance settings

Enter the upper limit for the concentricity. This value is used to evaluate whether the measurement value remains within the tolerance range.

"Chapter 6 Run Mode" (Page 6-1)



[Alert Settings] dialog box appears.

"Alert Settings" (Page 4-192)

### MMC/LMC Settings (Bonus Tolerance)

When the check box is selected, the details of MMC/LMC can be specified.

- MMC is applied.

Apply the MMC.

- LMC is applied.

Apply the LMC.

- Object specification

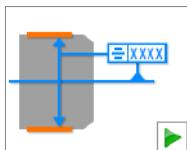
External feature	Select when the target of MMC/LMC is external feature.
Internal feature	Select when the target of MMC/LMC is Internal feature.
Element	Select the target element for bonus tolerance calculation from the dropdown list.
	You can select a measurement element shown on the preview screen.

## 6 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

 By clicking [Next], you can continue to use the same tool.

## ■ Symmetry

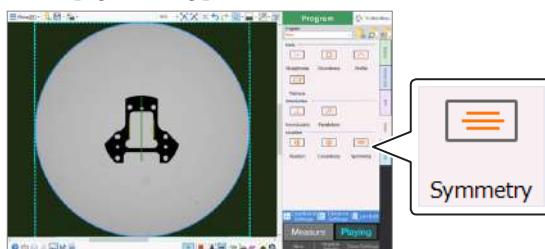


Measure the symmetry from the reference line.  
Use a line firstly specified as a reference line (datum line).

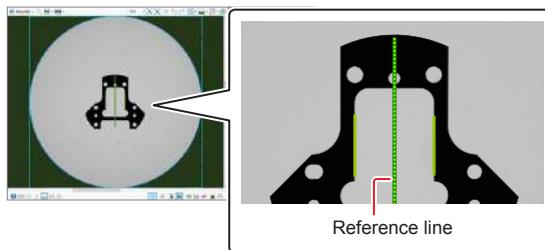
▶ Important

- To specify a virtual line (center line etc.) as the reference line, create it using the virtual tool in advance.
- MMC/LMC cannot be specified if no measurement element to be a target of MMC/LMC is shown on the preview display. Before measuring the symmetry, conduct measurement using the [Basics] tab options or create a formula with the Calculator.

### 1 Click [Symmetry].

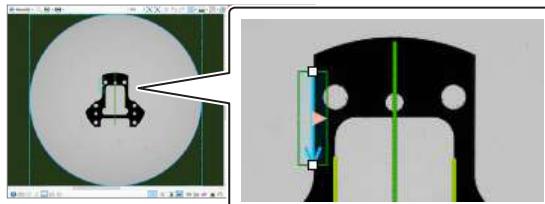


### 2 Click the line to be referred to specify.



### 3 Click to specify the start and end points of the edge detection range for the first target line for the symmetry measurement.

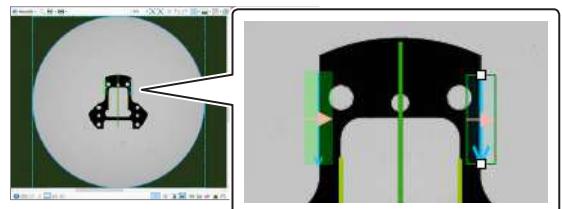
Reference You can also select the element you have set.



### 4 Click to specify the second line for the symmetry measurement in the same way.

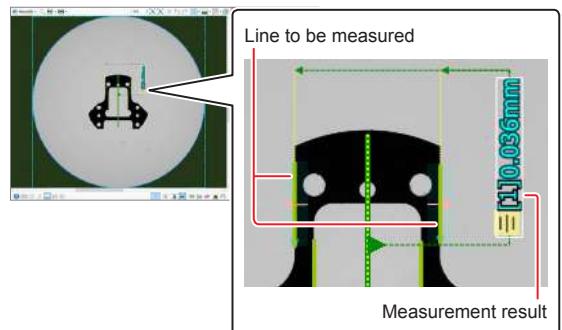
Reference

You can also select the element you have set.

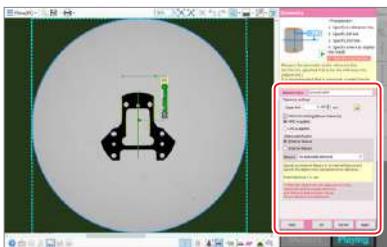


### 5 Click the location to display the measurement result of the symmetry measurement.

The result of the flatness measurement specified from Steps 2 to 4 is displayed in the preview screen.



## 6 Set the items related to the GD&T measurement.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

### ○ Element name

Edit the name of the measurement result.

### ○ Tolerance settings

Enter the upper limit for the symmetry. This value is used when evaluating whether the measurement value remains within the tolerance range.

□ "Chapter 6 Run Mode" (Page 6-1)



[Alert Settings] dialog box appears.

□ "Alert Settings" (Page 4-192)

### ○ MMC/LMC Settings (Bonus Tolerance)

When the check box is selected, the details of MMC/LMC can be specified.

- MMC is applied.  
Apply the MMC.

- LMC is applied.  
Apply the LMC.

- Object specification

External feature	Select when the target of MMC/LMC is external feature.
Internal feature	Select when the target of MMC/LMC is Internal feature.
Element	Select the target element for bonus tolerance calculation from the dropdown list.
	You can select a measurement element shown on the preview screen.

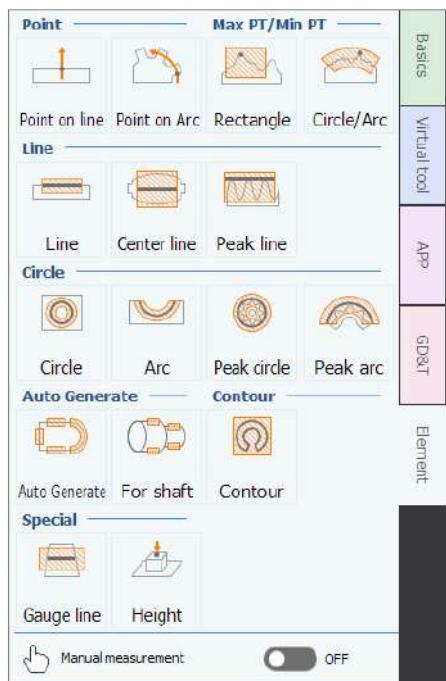
## 7 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

□ Reference By clicking [Next], you can continue to use the same tool.

## Element

Select the [Element] tab in the [Measurement operation area] to display the Element (element tools) options.



### ● Point

These options are used to detect a point on the edge of the target.  
[Book icon] "Point" (Page 4-124)

### ● Max PT/Min PT

These options are used to detect the maximum/minimum point in the specified range.  
[Book icon] "Max PT/Min PT" (Page 4-128)

### ● Line

These options are used to detect a line along the edge of the target.  
[Book icon] "Line" (Page 4-132)

### ● Circle

These options are used to detect a circle (arc) along the edge of the target.  
[Book icon] "Circle" (Page 4-136)

### ● Auto Generate

Automatically recognize the line, circle and arc within the rectangle, and create elements  
[Book icon] "Auto Generate" (Page 4-143)

### ● Contour

Extract the contour line of the target within the rectangle range.  
[Book icon] "Contour" (Page 4-145)

### ● Special Measurement

Detect the gauge line, or create the height element.  
[Book icon] "Special" (Page 4-146)

### ● Manual measurement

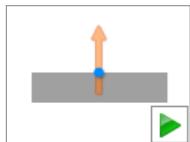
"Manual measurement" When the switch on the right is clicked to be turned [ON], the color of icons for tools which can perform the manual measurement will change.  
When a new element is created and measured with this state, "Manual measurement" ([Perform manual measurement without extracting edges]) turns [ON] for the created element tools.

#### Reference

- For the elements that were already created before turning [ON], the "Manual measurement" parameters do not change.
- Only tools with the [Perform manual measurement without extracting edges] parameters change in their icon colors.
- Among tools of which icons do not change in colors and which have the "Manual measurement" parameters, the "Manual measurement" parameters turn [ON]. In the Program mode, the operation is as the same as that when the manual measurement is [OFF]. In the Run mode, it turns to the manual measurement element.

## Point

### ■ Point on Line



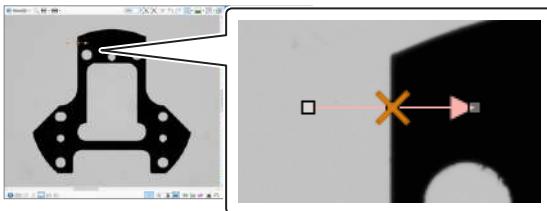
Draw a point by detecting the edge on the scanning line.

#### 1 Click [Point on line].



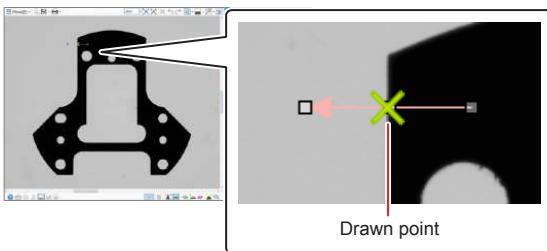
#### 2 Draw the scanning line over the edge to be detected.

Draw the scanning line so that it perpendicularly intersects the part of the target where its edge extraction will be performed. The scanning line can be drawn by dragging the mouse.



#### 3 Click [Apply].

A point on the edge of scanning line is detected.



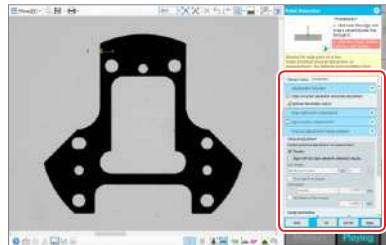
#### 4 Specify the measurement conditions in the edit window.

#### 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

By clicking [Next], you can continue to use the same tool.

### ● Edit Window



After changing the setting, click [Apply], and the change is reflected on the preview screen.

#### ● Element name

Edit the name of the element.

#### ● Adjustment function

##### ○ Edge extraction parameter automatic adjustment

Automatically adjust the edge extraction parameter. When this check box is deselected, the "Edge extraction parameters" can be set manually.

##### ○ Optimum illumination search (Except for IM-8005)

When [Optimum illumination search] is clicked, the pictures of the target is automatically taken with multiple illumination settings. Among the images taken with multiple illumination settings, you can select an image of the target with the edge suitable for measurement extracted.

"Optimal Illumination Search (IM-8020/8030/8030T)" (Page 4-206)

#### ● Edge extraction parameters

For details of the edge extraction parameters setting, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

#### ● Light probe measurement (Except for IM-8005)

The light probe is used in edge detection.

When the check box is selected, edges can be detected by using the light probe.

"Light probe measurement" (Page 4-160)

## ● Postural adjustment/range position

### ○ Postural adjustment

If you select [Align with the base element's detection results.], you can specify the reference line, angle from the target, and distance from the target.

- Link target

Specify a line used as the reference for the scanning line.

Reference X axis	Use the X axis set in the base coordinate as a reference line.
Reference Y axis	Use the Y axis set in the base coordinate as a reference line.
Rotation axis	Use the rotation axis set in the base coordinate as a reference line. (only when the rotation unit IM-RU1 is used)
(Other)	Use a line created during measurement or created with the tools on the [Element] tab as a reference line. The element names of all lines (including virtual lines) are displayed.
	You can select a reference line from the lines shown on the preview screen.

Reference When base coordinate is not specified, the coordinate origin (0,0) is on the bottom left of the capture range.

- Set angle from target.

When this check box is selected, the slope of the scanning line (orientation) can be set based on the reference line.

Parallel	Set the scanning line in parallel to the reference line.
Perpendicular	Set the scanning line perpendicular to the reference line.
Arbitrary	Set the scanning line at a desired angle to the reference line.

- Set distance from target.

When this check box is selected, the center of the scanning line can be specified with the distance in mm from the reference line.

### ○ Range parameters

- Start

Enter the coordinates (Absolute coordinates: X, Y) of the start point of the scanning line in mm.

- End

Enter the coordinates (Absolute coordinates: X, Y) of the end point of the scanning line in mm.

- Length

Enter the length of the scanning line in mm.

## ● Capture angle advanced settings (only when the rotation unit IM-RU1 is used)

For details of the capture angle advanced settings, refer to  "Advanced Parameters of the Element Tool" (Page 4-150).

## ● Capture height advanced settings

For details of the capture height advanced settings, refer to  "Advanced Parameters of the Element Tool" (Page 4-150).

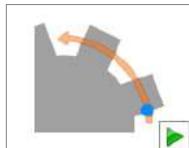
## ● Auto focus capture

For details of the auto focus capturing, refer to  "Advanced Parameters of the Element Tool" (Page 4-150).

## ● Manual measurement

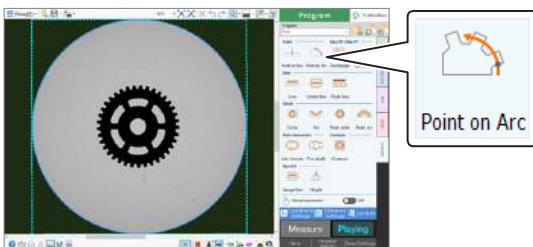
For details of the manual measurement, refer to  "Advanced Parameters of the Element Tool" (Page 4-150).

## ■ Point on Arc



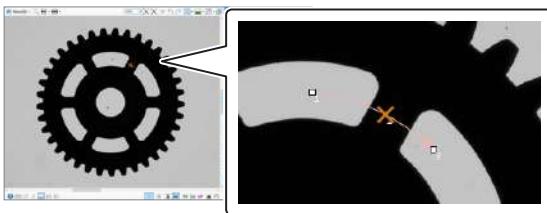
A point will be drawn on the specified edge on the arc.

### 1 Click [Point on arc].



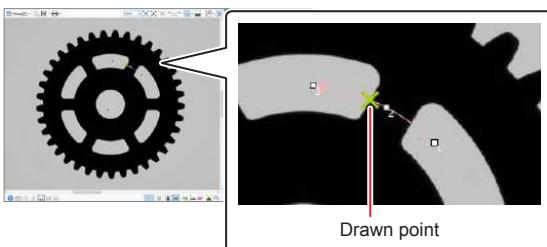
### 2 Draw the scanning line over the edge to be detected.

Click three points on the arc and draw the scanning line so that it perpendicularly intersects the edge of the target to be detected.



### 3 Click [Apply].

A point on the edge of scanning line is detected.



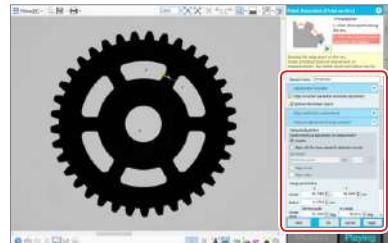
### 4 Specify the measurement conditions in the edit window.

### 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

By clicking [Next], you can continue to use the same tool.

## ● Edit Window



After changing the setting, click [Apply], and the change is reflected on the preview screen.

### ● Element name

Edit the name of the element.

### ● Adjustment function

#### ○ Edge extraction parameter automatic adjustment

Automatically adjust the edge extraction parameter. When this check box is deselected, the "Edge extraction parameters" can be set manually.

#### ○ Optimum illumination search (Except for IM-8005)

When [Optimum illumination search] is clicked, the pictures of the target is automatically taken with multiple illumination settings. Among the images taken with multiple illumination settings, you can select an image of the target with the edge suitable for measurement extracted.

"Optimal Illumination Search (IM-8020/8030/8030T)" (Page 4-206)

### ● Edge extraction parameters

For details of the edge extraction parameters setting, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

## ● Postural adjustment/range position

### ○ Postural adjustment

If you select [Align with the base element's detection results.], you can specify the reference of the edge detection range (scanning line).

- Link target

Specify a circle, an arc, or points used as the reference for the edge detection range (scanning line).

Reference point	Use the reference origin point set for the base coordinates as a reference point.
(Other)	Use a circle, arc, or point created during measurement or created with the tools on the [Element] tab as a reference circle. The element names of all circles or arcs, or points (including virtual lines) are displayed.
	You can select a reference point from the points, circles, or arcs shown on the preview screen.
<input type="checkbox"/> Reference	When base coordinate is not specified, the coordinate origin (0,0) is on the bottom left of the capture range.

- Align center

When this check box is selected, the center of the scanning line is set on the reference point.

- Align radius

This check box is enabled when a circle or arc is selected for [Link target.]. When this check box is selected, the radius of the scanning line is set to the same value as that of the reference element.

### ○ Range parameters

- Center

Enter the coordinates (Absolute coordinates: X, Y) of the center point of the scanning line in mm.

- Radius

Enter the radius of the scanning line in mm.

- Center angle

Enter the angles of the scanning line (Starting angle, Arc angle) in degrees.

## ● Capture angle advanced settings (only when the rotation unit IM-RU1 is used)

For details of the capture angle advanced settings, refer to  "Advanced Parameters of the Element Tool" (Page 4-150).

## ● Capture height advanced settings

For details of the capture height advanced settings, refer to  "Advanced Parameters of the Element Tool" (Page 4-150).

## ● Auto focus capture

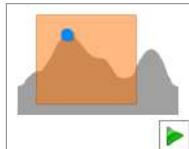
For details of the auto focus capturing, refer to  "Advanced Parameters of the Element Tool" (Page 4-150).

## ● Manual measurement

For details of the manual measurement, refer to  "Advanced Parameters of the Element Tool" (Page 4-150).

## Max PT/Min PT

### ■ Max/Min Point (Rectangle)



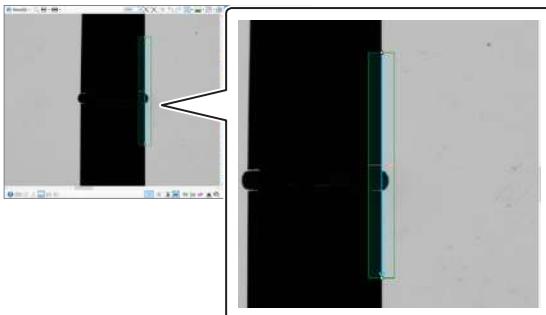
Detect the maximum or minimum point of the target within the rectangle and create points.

#### 1 Click [Rectangle].



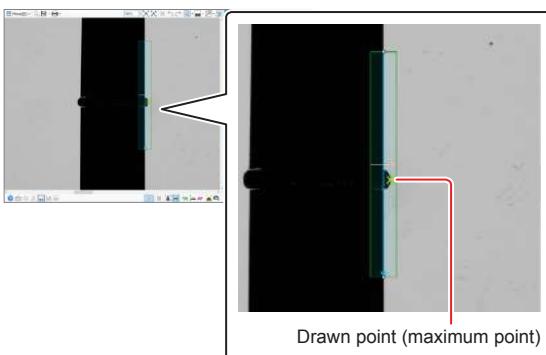
#### 2 Specify the edge detection range so that it passes through the edge to detect the maximum/minimum point.

Specify the edge detection range (two points) so that it includes the edges to be detected.



#### 3 Click [Apply].

A point is detected at the maximum or minimum point in the edge detection range.



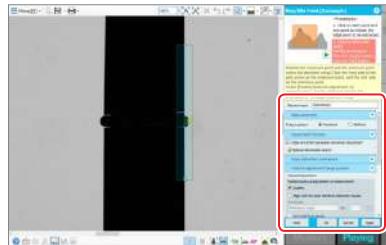
#### 4 Specify the measurement conditions in the edit window.

#### 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

By clicking [Next], you can continue to use the same tool.

### ● Edit Window



After changing the setting, click [Apply], and the change is reflected on the preview screen.

#### ● Element name

Edit the name of the element.

#### ● Basic parameter

##### ○ Output pattern

Specify the pattern of the edges to be detected in the edge detection range. When one of the output patterns is selected, the output image is shown in the guide, and the output state is refreshed on the preview area.

The output pattern can be changed any time before [OK] or [Next] is clicked.

- MaxPoint

Detect the farthest edge from the start point of the scanning in the edge detection range.

- MinPoint

Detect the nearest edge from the start point of the scanning in the edge detection range.

#### ● Adjustment function

##### ○ Edge extraction parameter automatic adjustment

Automatically adjust the edge extraction parameter. When this check box is deselected, the "Edge extraction parameters" can be set manually.

##### ○ Optimum illumination search (Except for IM-8005)

When [Optimum illumination search] is clicked, the pictures of the target are automatically taken with multiple illumination settings. Among the images taken with multiple illumination settings, you can select an image of the target with the edge suitable for measurement extracted.

"Optimal Illumination Search (IM-8020/8030/8030T)" (Page 4-206)

#### ● Edge extraction parameters

For details of the edge extraction parameters setting, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

## ● Postural adjustment/range position

### ○ Postural adjustment

If you select [Align with the base element's detection results.], you can specify the reference line, angle from the target, and distance from the target.

- Link target

Specify a reference line for scanning line.

Reference X axis	Use the X axis set in the base coordinate as a reference line.
Reference Y axis	Use the Y axis set in the base coordinate as a reference line.
Rotation axis	Use the rotation axis set in the base coordinate as a reference line. (only when the rotation unit IM-RU1 is used)
(Other)	Use a line created during measurement or created with the tools on the [Element] tab as a reference line. The element names of all lines (including virtual lines) are displayed.
	You can select a reference line from the lines shown on the preview screen.

Reference When base coordinate is not specified, the coordinate origin (0,0) is on the bottom left of the capture range.

- Set angle from target.

When this check box is selected, the slope of the scanning line (orientation) can be set based on the reference line.

Parallel	Set the scanning line in parallel to the reference line.
Perpendicular	Set the scanning line perpendicular to the reference line.
Arbitrary	Set the scanning line at a desired angle to the reference line.

- Set distance from target.

When this check box is selected, the center of the scanning line can be specified with the distance in mm from the reference line.

### ○ Range parameters

- Start

Enter the coordinates (Absolute coordinates: X, Y) of the start point of the edge detection range in mm.

- End

Enter the coordinates (Absolute coordinates: X, Y) of the end point of the edge detection range in mm.

- Width

Enter the width of the edge detection range in mm.

- Length

Enter the length of the edge detection range in mm.

## ● Capture angle advanced settings (only when the rotation unit IM-RU1 is used)

For details of the capture angle advanced settings, refer to □ "Advanced Parameters of the Element Tool" (Page 4-150).

## ● Capture height advanced settings

For details of the capture height advanced settings, refer to □ "Advanced Parameters of the Element Tool" (Page 4-150).

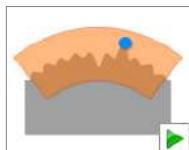
## ● Autofocus capture

For details of the auto focus capturing, refer to □ "Advanced Parameters of the Element Tool" (Page 4-150).

## ● Manual measurement

For details of the manual measurement, refer to □ "Advanced Parameters of the Element Tool" (Page 4-150).

## ■ Max/Min Point (Circle/Arc)



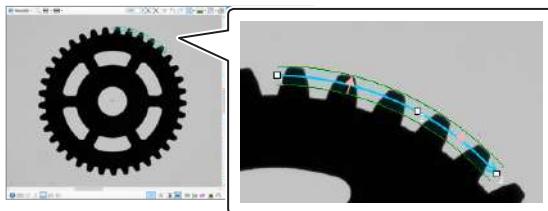
Detect the maximum or minimum point of the target within the circle or the arc range, and create points.

### 1 Click [Circle/Arc].



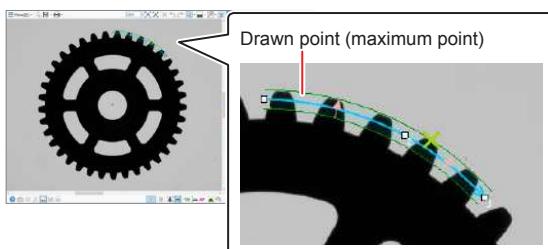
### 2 Specify three points of the edge detection range so that it passes through the edge to detect the maximum/minimum value.

Specify the edge detection range so that it includes the edges to be detected.



### 3 Click [Apply].

A point is detected at the maximum or minimum point in the edge detection range.



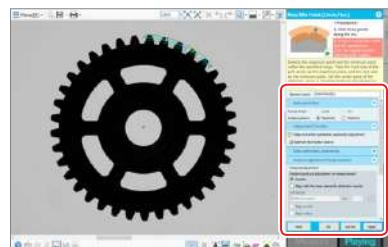
### 4 Specify the measurement conditions in the edit window.

### 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

By clicking [Next], you can continue to use the same tool.

## ● Edit Window



After changing the setting, click [Apply], and the change is reflected on the preview screen.

### ● Element name

Edit the name of the element.

### ● Basic parameter

#### ○ Range shape

Select the shape of the range.  
This must be set before you specify the target circle (arc).

#### ○ Output pattern

Specify the pattern of the edges to be detected in the edge detection range. When one of the output patterns is selected, the output image is shown in the guide, and the output state is refreshed on the preview area.  
The output pattern can be changed any time before [OK] or [Next] is clicked.

- MaxPoint  
Detect the farthest edge from the start point of the scanning in the edge detection range.
- MinPoint  
Detect the nearest edge from the start point of the scanning in the edge detection range.

### ● Adjustment function

#### ○ Edge extraction parameter automatic adjustment

Automatically adjust the edge extraction parameter.  
When this check box is deselected, the "Edge extraction parameters" can be set manually.

#### ○ Optimum illumination search (Except for IM-8005)

When [Optimum illumination search] is clicked, the pictures of the target are automatically taken with multiple illumination settings.  
Among the images taken with multiple illumination settings, you can select an image of the target with the edge suitable for measurement extracted.

"Optimal Illumination Search (IM-8020/8030/8030T)" (Page 4-206)

### ● Edge extraction parameters

For details of the edge extraction parameters setting, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

## ● Postural adjustment/range position

### ○ Postural adjustment

If you select [Align with the base element's detection results.], you can specify the reference of the edge detection range (scanning line).

- Link target

Specify a circle, an arc, or a point used as the reference for the edge detection range.

Reference point	Use the reference origin point set for the base coordinates as a reference point.
(Other)	Use a circle, arc, or point created during measurement or created with the tools on the [Element] tab as a reference circle. The element names of all circles or arcs, or points (including virtual lines) are displayed.
	You can select a reference line from the points, circles, or arcs shown on the preview screen.

 When base coordinate is not specified, the coordinate origin (0,0) is on the bottom left of the capture range.

- Align center

When this check box is selected, the center of the edge detection range is set on the reference point.

- Align radius

This check box is enabled when a circle or arc is selected for [Link target]. When this check box is selected, the radius of the edge detection range is set to the same value as that of the reference element.

### ○ Range parameters

- Center

Enter the coordinates of the center of the edge detection range (scanning line) in mm.

- Radius

Enter the radius of the edge detection range in mm.

- Width

Enter the width of the edge detection range in mm.

- Center angle (for arc only)

Enter the angles of the arc edge detection range (Starting angle, Arc angle) in degrees.

## ● Capture angle advanced settings (only when the rotation unit IM-RU1 is used)

For details of the capture angle advanced settings, refer to  "Advanced Parameters of the Element Tool" (Page 4-150).

## ● Capture height advanced settings

For details of the capture height advanced settings, refer to  "Advanced Parameters of the Element Tool" (Page 4-150).

## ● Auto focus capture

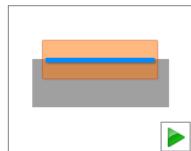
For details of the auto focus capturing, refer to  "Advanced Parameters of the Element Tool" (Page 4-150).

## ● Manual measurement

For details of the manual measurement, refer to  "Advanced Parameters of the Element Tool" (Page 4-150).

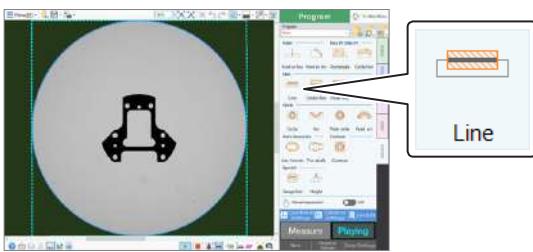
## Line

### ■ Line



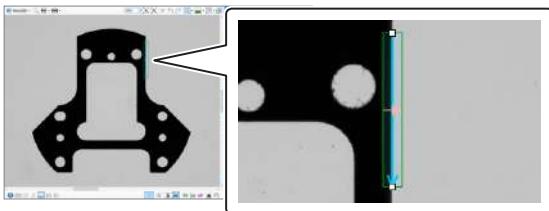
Draw a line by detecting the line edge of the target.

#### 1 Click [Line].



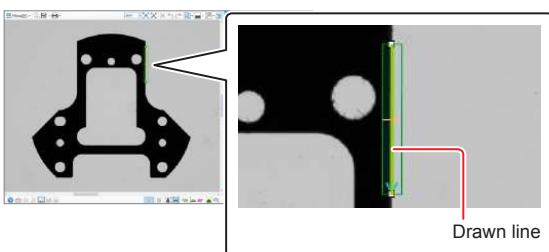
#### 2 Specify the start and end points of the edge detection range along the line to be detected.

Click two points along the line to be detected to specify the linear edge detection range.



#### 3 Click [Apply].

The line is detected.



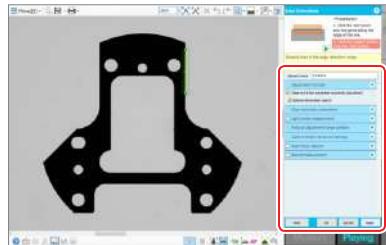
#### 4 Specify the measurement conditions in the edit window.

#### 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

By clicking [Next], you can continue to use the same tool.

### ● Edit Window



After changing the setting, click [Apply], and the change is reflected on the preview screen.

#### ● Element name

Edit the name of the element.

#### ● Adjustment function

##### ○ Edge extraction parameter automatic adjustment

Automatically adjust the edge extraction parameter. When this check box is deselected, the "Edge extraction parameters" can be set manually.

##### ○ Optimum illumination search (Except for IM-8005)

When [Optimum illumination search] is clicked, the pictures of the target is automatically taken with multiple illumination settings. Among the images taken with multiple illumination settings, you can select an image of the target with the edge suitable for measurement extracted.

"Optimal Illumination Search (IM-8020/8030/8030T)" (Page 4-206)

#### ● Edge extraction parameters

For details of the edge extraction parameters setting, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

#### ● Light probe measurement (Except for IM-8005)

The light probe is used in edge detection.

When the check box is selected, edges can be detected by using the light probe.

"Light probe measurement" (Page 4-160)

#### ● Postural adjustment/range position

For details of the postural adjustment/range position, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

#### ● Capture angle advanced settings (only when the rotation unit IM-RU1 is used)

For details of the capture angle advanced settings, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

#### ● Capture height advanced settings

For details of the capture height advanced settings, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

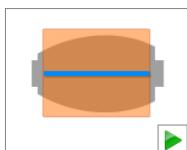
#### ● Auto focus capture

For details of the auto focus capturing, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

#### ● Manual measurement

For details of the manual measurement, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

## ■ Center Line (Center Line between Edges)



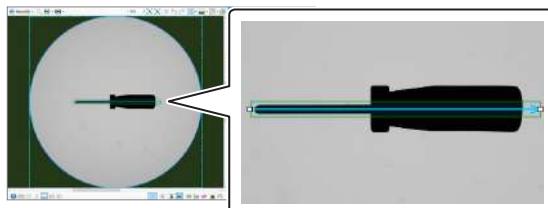
Draw the center line of a target such as a cylindrical object by detecting the edges of the target.

### 1 Click [Center line].

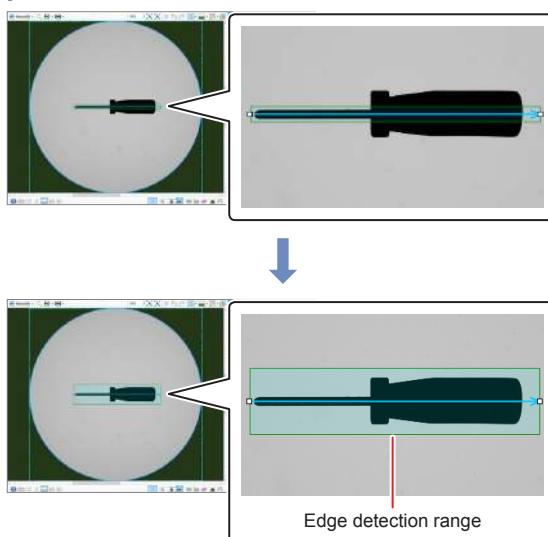


### 2 Specify the start and end points of the edge detection range of the part to be measured.

Specify the edge detection range so that it passes through the center of the target.

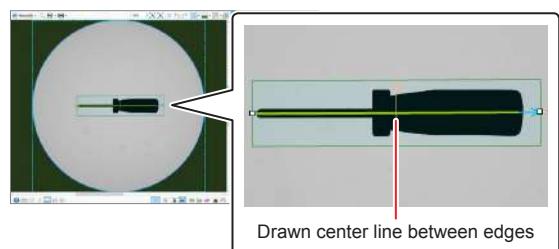


### 3 Adjust the size and position of the edge detection range so that it includes all sections you want to measure.



### 4 Click [Apply].

The center line is detected.



### 5 Specify the measurement conditions in the edit window.

### 6 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

By clicking [Next], you can continue to use the same tool.

### ● Edit Window

After changing the setting, click [Apply], and the change is reflected on the preview screen.

#### ● Element name

Edit the name of the element.

#### ● Adjustment function

##### ○ Edge extraction parameter automatic adjustment

Automatically adjust the edge extraction parameter. When this check box is deselected, the "Edge extraction parameters" can be set manually.

##### ○ Optimum illumination search (Except for IM-8005)

When [Optimum illumination search] is clicked, the pictures of the target are automatically taken with multiple illumination settings. Among the images taken with multiple illumination settings, you can select an image of the target with the edge suitable for measurement extracted.

"Optimal Illumination Search (IM-8020/8030/8030T)" (Page 4-206)

#### ● Edge extraction parameters

For details of the edge extraction parameters setting, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

● **Postural adjustment/range position**

For details of the postural adjustment/range position, refer to □ "Advanced Parameters of the Element Tool" (Page 4-150).

● **Capture angle advanced settings (only when the rotation unit IM-RU1 is used)**

For details of the capture angle advanced settings, refer to □ "Advanced Parameters of the Element Tool" (Page 4-150).

● **Capture height advanced settings**

For details of the capture height advanced settings, refer to □ "Advanced Parameters of the Element Tool" (Page 4-150).

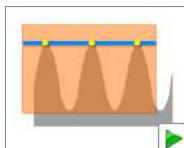
● **Auto focus capture**

For details of the auto focus capturing, refer to □ "Advanced Parameters of the Element Tool" (Page 4-150).

● **Manual measurement**

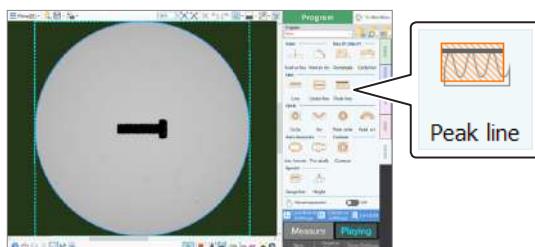
For details of the manual measurement, refer to □ "Advanced Parameters of the Element Tool" (Page 4-150).

## ■ Peak Line



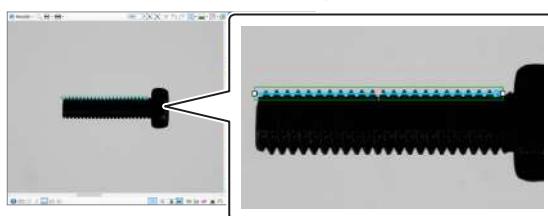
Draw a peak line by detecting edge points of the target including peaks and bottoms.

### 1 Click [Peak line].



### 2 Specify the start and end points of the edge detection range of the part to be measured.

Specify the edge detection range so that it passes through the center of peaks and bottoms of the target to be measured.



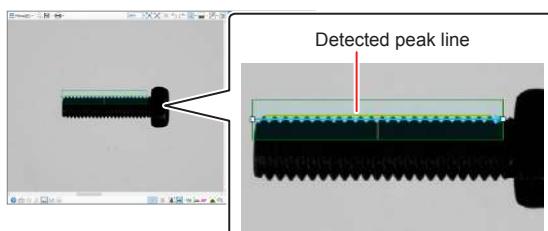
### 3 Adjust the size and position of the edge detection range so that it includes all sections including peaks and troughs you want to measure.

### 4 Click [Apply].

The detection result of the settings specified in the edit window is displayed in the preview display.

If the result is undesirable, change the setting in the edit window and click [Apply] again.

The setting can be changed any number of times before [OK] or [Next] is clicked.



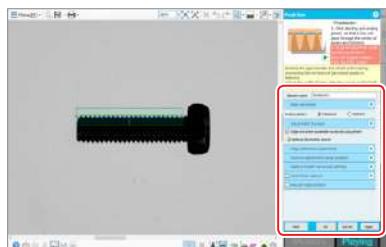
### 5 Specify the measurement conditions in the edit window.

### 6 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

By clicking [Next], you can continue to use the same tool.

## ● Edit Window



After changing the setting, click [Apply], and the change is reflected on the preview screen.

### ● Element name

Edit the name of the element.

### ● Basic parameter

#### ○ Output pattern

Specify the method to draw peak lines.

- MaxPoint

The maximum edges are detected as peak points in a scanning direction and the peak line which passes through those points are drawn.

- MinPoint

The minimum edges are detected as peak points in a scanning direction and the peak line which passes through those points are drawn.

### ● Adjustment function

#### ○ Edge extraction parameter automatic adjustment

Automatically adjust the edge extraction parameter.

When this check box is deselected, the "Edge extraction parameters" can be set manually.

#### ○ Optimum illumination search (Except for IM-8005)

When [Optimum illumination search] is clicked, the pictures of the target is automatically taken with multiple illumination settings. Among the images taken with multiple illumination settings, you can select an image of the target with the edge suitable for measurement extracted.

Optimal Illumination Search (IM-8020/8030/8030T) (Page 4-206)

### ● Edge extraction parameters

For details of the edge extraction parameters setting, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

### ● Postural adjustment/range position

For details of the postural adjustment/range position, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

### ● Capture angle advanced settings (only when the rotation unit IM-RU1 is used)

For details of the capture angle advanced settings, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

### ● Capture height advanced settings

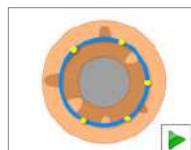
For details of the capture height advanced settings, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

### ● Auto focus capture

For details of the auto focus capturing, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

### ● Manual measurement

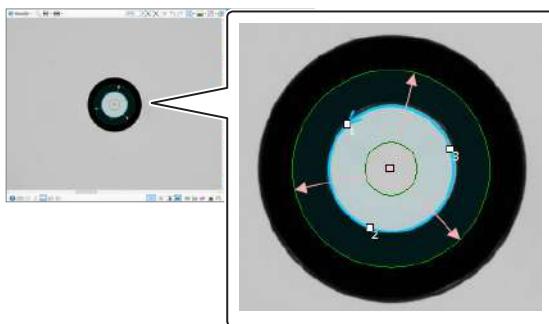
For details of the manual measurement, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

**Circle****■ Circle**

Draw a circle by detecting the edge of the target.

**1 Click [Circle].****2 Specify three points of the edge detection range along the circle to be detected.**

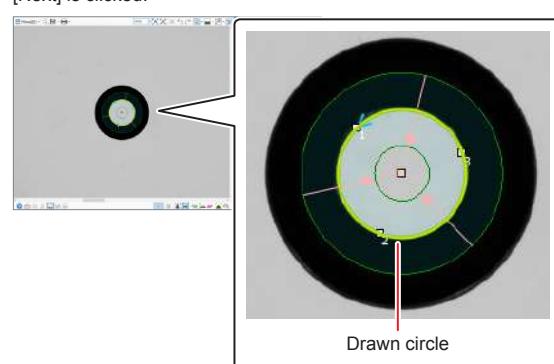
Click three points along the circle to specify the edge detection range.  
Set the edge detection range so that it includes the entire edge of the circle.

**3 Click [Apply].**

The detection result of the settings specified in the edit window is displayed in the preview display.

If the result is undesirable, change the setting in the edit window and click [Apply] again.

The setting can be changed any number of times before [OK] or [Next] is clicked.

**4 Specify the measurement conditions in the edit window.**

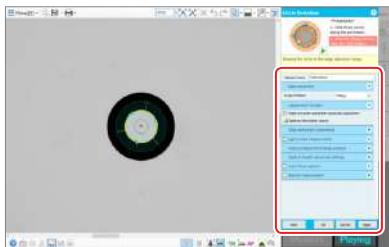
For details of the edit window, refer to □ "Edit Window" (Page 4-137).

**5 Click [OK].**

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

By clicking [Next], you can continue to use the same tool.

## ● Edit Window



After changing the setting, click [Apply], and the change is reflected on the preview screen.

### ● Element name

Edit the name of the element.

### ● Basic parameter

#### ○ Output pattern

Specify the method to detect circles.

- Fitting  
The approximate circle is detected from the detected edge.
- Maximum  
The outer tangent circle is detected from the detected edges.  
When an item other than "None" is selected for "Fitting condition", the circle passing through the furthest edge from the center is detected.
- Minimum  
The inner tangent circle is detected from the detected edges.  
When an item other than "None" is selected for "Fitting condition", the circle passing through the nearest edge from the center is detected.

### ● Adjustment function

#### ○ Edge extraction parameter automatic adjustment

Automatically adjust the edge extraction parameter.  
When this check box is deselected, the "Edge extraction parameters" can be set manually.

#### ○ Optimum illumination search (Except for IM-8005)

When [Optimum illumination search] is clicked, the pictures of the target is automatically taken with multiple illumination settings.  
Among the images taken with multiple illumination settings, you can select an image of the target with the edge suitable for measurement extracted.

"Optimal Illumination Search (IM-8020/8030/8030T)" (Page 4-206)

### ● Edge extraction parameters

For details of the edge extraction parameters setting, refer to  "Advanced Parameters of the Element Tool" (Page 4-150).

### ● Light probe measurement (Except for IM-8005)

The light probe is used in edge detection.  
When the check box is selected, edges can be detected by using the light probe.

"Light probe measurement" (Page 4-160)

## ● Postural adjustment/range position

For details of the postural adjustment/range position, refer to  "Advanced Parameters of the Element Tool" (Page 4-150).

### ● Capture angle advanced settings (only when the rotation unit IM-RU1 is used)

For details of the capture angle advanced settings, refer to  "Advanced Parameters of the Element Tool" (Page 4-150).

### ● Capture height advanced settings

For details of the capture height advanced settings, refer to  "Advanced Parameters of the Element Tool" (Page 4-150).

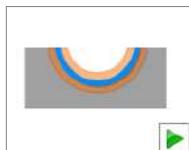
### ● Auto focus capture

For details of the auto focus capturing, refer to  "Advanced Parameters of the Element Tool" (Page 4-150).

### ● Manual measurement

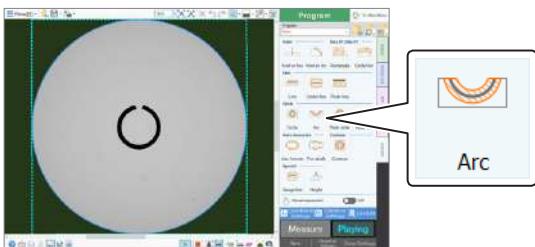
For details of the manual measurement, refer to  "Advanced Parameters of the Element Tool" (Page 4-150).

## ■ Arc



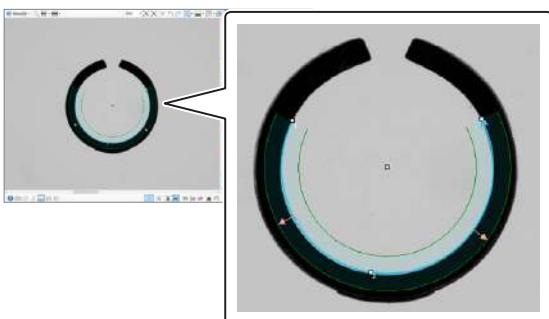
Draw an arc by detecting the edge of the target.

### 1 Click [Arc].



### 2 Specify three points of the edge detection range along the arc to be detected.

Click three points along the arc to specify the edge detection range. Set the edge detection range so that it includes the entire edge of the arc.

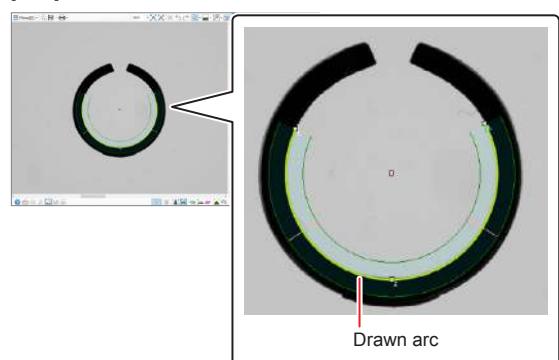


### 3 Click [Apply].

The detection result of the settings specified in the edit window is displayed in the preview display.

If the result is undesirable, change the setting in the edit window and click [Apply] again.

The setting can be changed any number of times before [OK] or [Next] is clicked.



### 4 Specify the measurement conditions in the edit window.

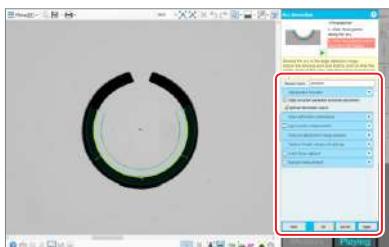
For details of the edit window, refer to □ "Edit Window" (Page 4-139).

### 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

By clicking [Next], you can continue to use the same tool.

## ● Edit Window



After changing the setting, click [Apply], and the change is reflected on the preview screen.

### ● Element name

Edit the name of the element.

### ● Adjustment function

#### ○ Edge extraction parameter automatic adjustment

Automatically adjust the edge extraction parameter.  
When this check box is deselected, the "Edge extraction parameters" can be set manually.

#### ○ Optimum illumination search (Except for IM-8005)

When [Optimum illumination search] is clicked, the pictures of the target is automatically taken with multiple illumination settings.  
Among the images taken with multiple illumination settings, you can select an image of the target with the edge suitable for measurement extracted.  
□ "Optimal Illumination Search (IM-8020/8030/8030T)" (Page 4-206)

### ● Edge extraction parameters

For details of the edge extraction parameters setting, refer to □ "Advanced Parameters of the Element Tool" (Page 4-150).

### ● Light probe measurement (Except for IM-8005)

The light probe is used in edge detection.  
When the check box is selected, edges can be detected by using the light probe.  
□ "Light probe measurement" (Page 4-160)

### ● Postural adjustment/range position

For details of the postural adjustment/range position, refer to □ "Advanced Parameters of the Element Tool" (Page 4-150).

## ● Capture angle advanced settings (only when the rotation unit IM-RU1 is used)

For details of the capture angle advanced settings, refer to □ "Advanced Parameters of the Element Tool" (Page 4-150).

## ● Capture height advanced settings

For details of the capture height advanced settings, refer to □ "Advanced Parameters of the Element Tool" (Page 4-150).

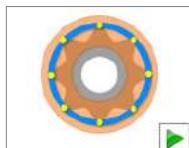
## ● Auto focus capture

For details of the auto focus capturing, refer to □ "Advanced Parameters of the Element Tool" (Page 4-150).

## ● Manual measurement

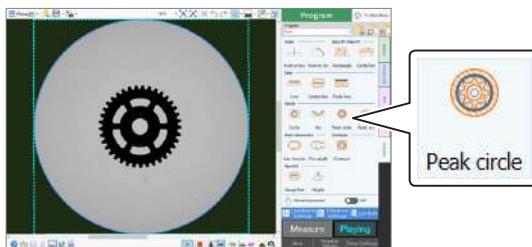
For details of the manual measurement, refer to □ "Advanced Parameters of the Element Tool" (Page 4-150).

## ■ Peak Circle



Draw a peak circle by detecting edge points of the target including peaks and bottoms.

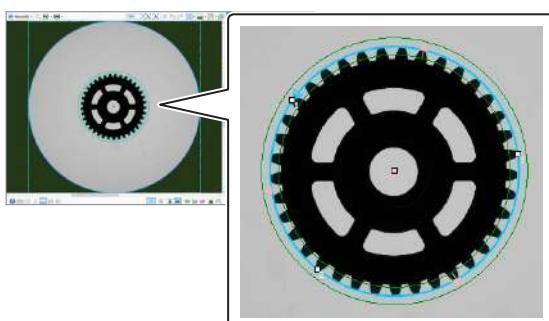
### 1 Click [Peak circle].



### 2 Specify three points of the edge detection range along the circle to be detected.

Click three points along the circle to specify the edge detection range.

Set the edge detection range so that it covers the entire edge of peaks and troughs.

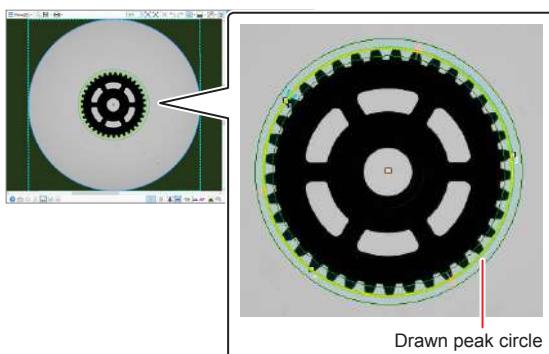


### 3 Click [Apply].

The detection result of the settings specified in the edit window is displayed in the preview display.

If the result is undesirable, change the setting in the edit window and click [Apply] again.

The setting can be changed any number of times before [OK] or [Next] is clicked.



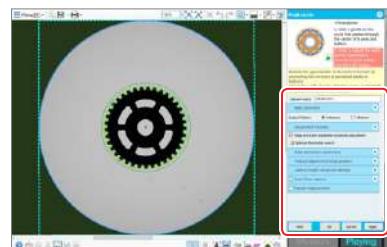
### 4 Specify the measurement conditions in the edit window.

#### 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

By clicking [Next], you can continue to use the same tool.

## ● Edit Window



After changing the setting, click [Apply], and the change is reflected on the preview screen.

### ● Element name

Edit the name of the peak circle.

### ● Basic parameter

#### ○ Output pattern

Specify the method to draw peak circles.

##### • Maximum

The maximum edges are detected as peak points in a scanning direction and the peak circle which passes through those points is drawn.

##### • Minimum

The minimum edges are detected as peak points in a scanning direction and the peak circle which passes through those points is drawn.

### ● Adjustment function

#### ○ Edge extraction parameter automatic adjustment

Automatically adjust the edge extraction parameter. When this check box is deselected, the "Edge extraction parameters" can be set manually.

#### ○ Optimum illumination search (Except for IM-8005)

When [Optimum illumination search] is clicked, the pictures of the target are automatically taken with multiple illumination settings. Among the images taken with multiple illumination settings, you can select an image of the target with the edge suitable for measurement extracted.

"Optimal Illumination Search (IM-8020/8030/8030T)" (Page 4-206)

### ● Edge extraction parameters

For details of the edge extraction parameters setting, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

### ● Postural adjustment/range position

For details of the postural adjustment/range position, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

● **Capture angle advanced settings (only when the rotation unit IM-RU1 is used)**

For details of the capture angle advanced settings, refer to □ "Advanced Parameters of the Element Tool" (Page 4-150).

● **Capture height advanced settings**

For details of the capture height advanced settings, refer to □ "Advanced Parameters of the Element Tool" (Page 4-150).

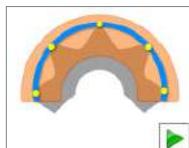
● **Auto focus capture**

For details of the auto focus capturing, refer to □ "Advanced Parameters of the Element Tool" (Page 4-150).

● **Manual measurement**

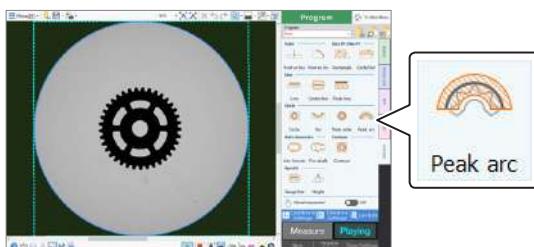
For details of the manual measurement, refer to □ "Advanced Parameters of the Element Tool" (Page 4-150).

## ■ Peak Arc



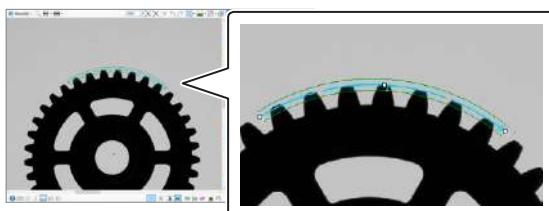
Draw a peak arc by detecting edge points of the target including peaks and bottoms.

### 1 Click [Peak arc].



### 2 Specify three points of the edge detection range along the arc to be detected.

Click three points along the arc to specify the edge detection range. Set the edge detection range so that it covers the entire edge of peaks and troughs.

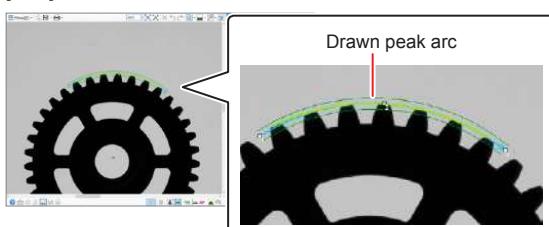


### 3 Click [Apply].

The detection result of the settings specified in the edit window is displayed in the preview display.

If the result is undesirable, change the setting in the edit window and click [Apply] again.

The setting can be changed any number of times before [OK] or [Next] is clicked.



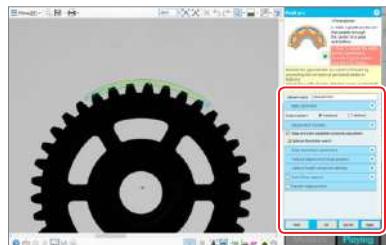
### 4 Specify the measurement conditions in the edit window.

### 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

By clicking [Next], you can continue to use the same tool.

## ● Edit Window



After changing the setting, click [Apply], and the change is reflected on the preview screen.

### ● Element name

Edit the name of the element.

### ● Basic parameter

#### ○ Output pattern

Specify the method to draw peak arc.

- MaxPoint

The maximum edges are detected as peak points in a scanning direction and the peak arc which passes through those points is drawn.

- MinPoint

The minimum edges are detected as peak points in a scanning direction and the peak arc which passes through those points is drawn.

### ● Adjustment function

#### ○ Edge extraction parameter automatic adjustment

Automatically adjust the edge extraction parameter.

When this check box is deselected, the "Edge extraction parameters" can be set manually.

#### ○ Optimum illumination search (Except for IM-8005)

When [Optimum illumination search] is clicked, the pictures of the target are automatically taken with multiple illumination settings. Among the images taken with multiple illumination settings, you can select an image of the target with the edge suitable for measurement extracted.

"Optimal Illumination Search (IM-8020/8030/8030T)" (Page 4-206)

### ● Edge extraction parameters

For details of the edge extraction parameters setting, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

### ● Postural adjustment/range position

For details of the postural adjustment/range position, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

### ● Capture angle advanced settings (only when the rotation unit IM-RU1 is used)

For details of the capture angle advanced settings, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

### ● Capture height advanced settings

For details of the capture height advanced settings, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

### ● Auto focus capture

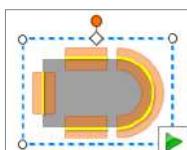
For details of the auto focus capturing, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

### ● Manual measurement

For details of the manual measurement, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

## Auto Generate

### ■ Auto Generate

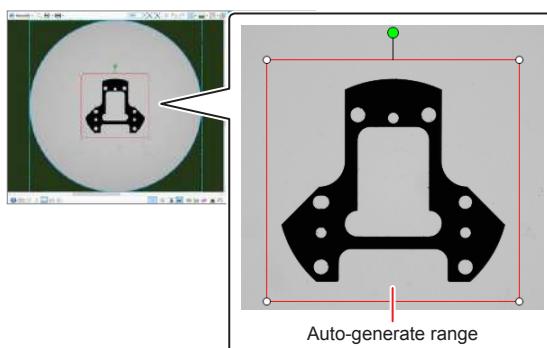


Automatically recognize the line, circle and arc within the rectangle, and create elements

#### 1 Click [Auto Generate].

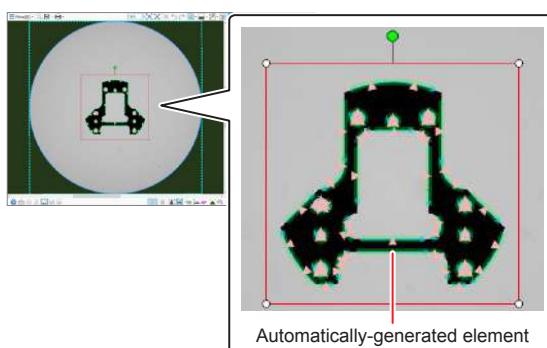


#### 2 Set an auto-generation range around the target by dragging the mouse in the preview screen.



#### 3 Click [Apply].

The result of the measurement specified in the edit window is displayed in the preview display.  
If the result is undesirable, change the setting in the edit window and click [Apply] again.  
The setting can be changed any number of times before [OK] or [Next] is clicked.



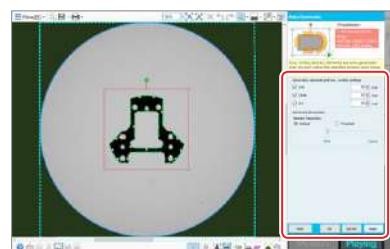
#### 4 Specify the measurement conditions in the edit window.

#### 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

By clicking [Next], you can continue to use the same tool.

#### ● Edit Window



After changing the setting, click [Apply], and the change is reflected on the preview screen.

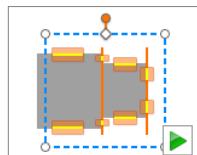
##### ○ Generation elements and max. number settings

For elements (Line, Circle, or Arc) whose check box is selected, set the max. number of elements to be generated automatically.

##### ○ Advanced parameters

Set the resolution (target size of elements) for detecting elements to be generated automatically.

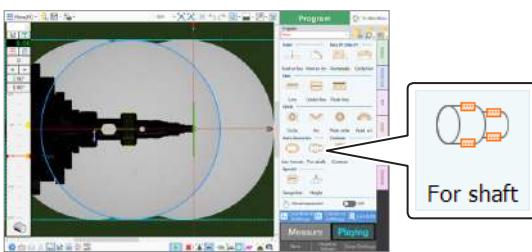
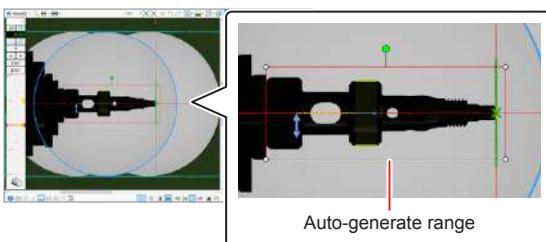
- Default  
Elements are generated automatically in accordance with the default resolution settings.
- Threshold  
Elements are generated automatically based on the threshold specified with the slider.

**Measurement Items****■ For Shaft**

Automatically recognize the line, circle, arc, and point within the rectangle, and create and measure elements. The distance using the created multiple elements is also automatically measured.



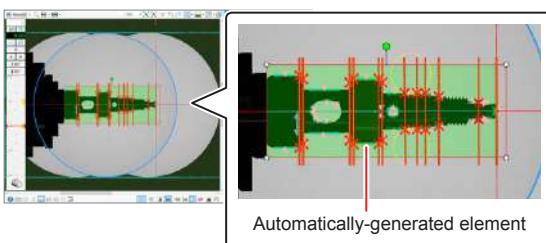
**When performing setting for shaft, place the axis of the target to be the horizontal direction on the screen.**

**1 Click [For shaft].****2 Set an auto-generation range around the target by dragging the mouse in the preview screen.****3 Click [Apply].**

The result of the measurement specified in the edit window is displayed in the preview display.

If the result is undesirable, change the setting in the edit window and click [Apply] again.

The setting can be changed any number of times before [OK] or [Next] is clicked.

**4 Specify the measurement conditions in the edit window.****5 Click [OK].**

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.



By clicking [Next], you can continue to use the same tool.

**● Edit Window**

After changing the setting, click [Apply], and the change is reflected on the preview screen.

**○ Generation elements and max. number settings**

For elements (Line, Circle, Arc, or Point) whose check box is selected, set the max. number of elements to be generated automatically.

**○ Advanced parameters**

Set the resolution (target size of elements) for detecting elements to be generated automatically.

**• Default**

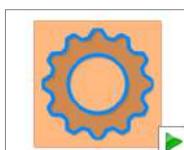
Elements are generated automatically in accordance with the default resolution settings.

**• Threshold**

Elements are generated automatically based on the threshold specified with the slider.

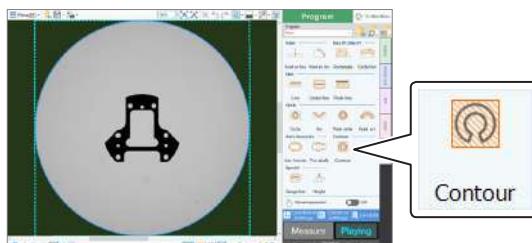
## Contour

### ■ Contour

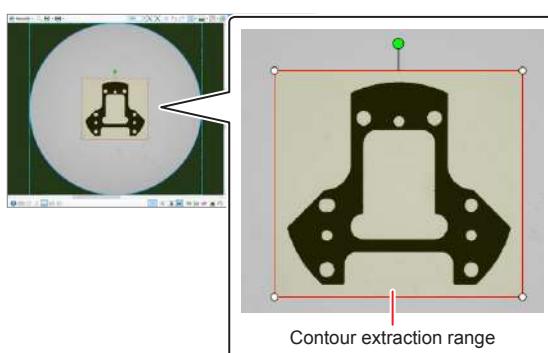


Create contour lines by detecting the edge of the target.

#### 1 Click [Contour].

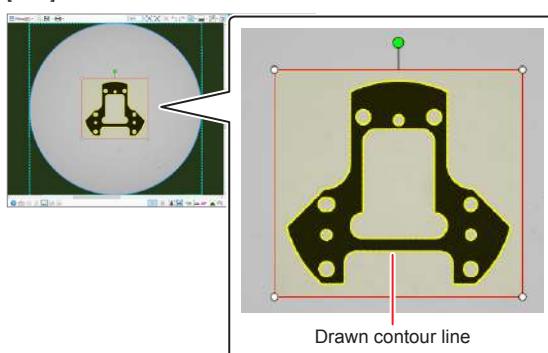


#### 2 Set a contour extraction range around the target by dragging the mouse in the preview screen.



#### 3 Click [Apply].

The result of the measurement specified in the edit window is displayed in the preview display.  
If the result is undesirable, change the setting in the edit window and click [Apply] again.  
The setting can be changed any number of times before [OK] or [Next] is clicked.



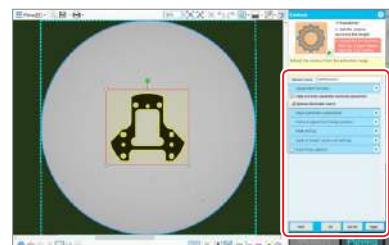
#### 4 Specify the measurement conditions in the edit window.

### 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

By clicking [Next], you can continue to use the same tool.

#### ● Edit Window



After changing the setting, click [Apply], and the change is reflected on the preview screen.

#### ● Element name

Edit the name of the element extraction.

#### ● Adjustment function

##### ○ Edge extraction parameter automatic adjustment

Automatically adjust the edge extraction parameter.  
When this check box is deselected, the "Edge extraction parameters" can be set manually.

##### ○ Optimum illumination search (Except for IM-8005)

When [Optimum illumination search] is clicked, the pictures of the target is automatically taken with multiple illumination settings.  
Among the images taken with multiple illumination settings, you can select an image of the target with the edge suitable for measurement extracted.

"Optimal Illumination Search (IM-8020/8030/8030T)" (Page 4-206)

#### ● Edge extraction parameters

For details of the edge extraction parameters setting, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

#### ● Postural adjustment/range position

For details of the postural adjustment/range position, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

#### ● Mask setting

For details about mask setting, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

#### ● Capture angle advanced settings (only when the rotation unit IM-RU1 is used)

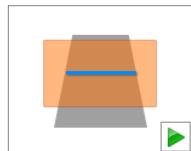
For details of the capture angle advanced settings, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

#### ● Capture height advanced settings

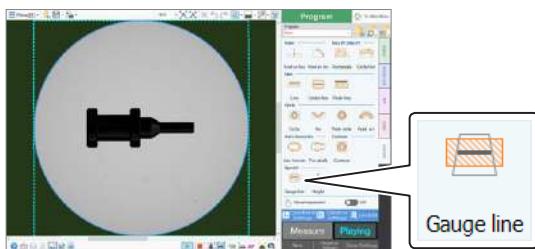
For details of the capture height advanced settings, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

#### ● Auto focus capture

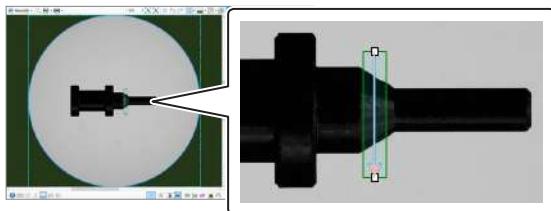
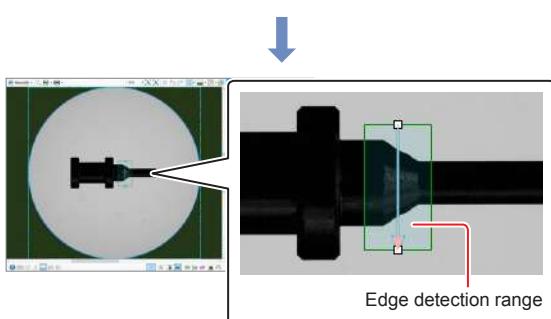
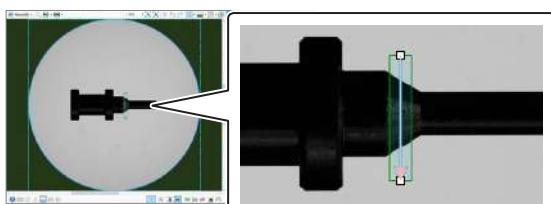
For details of the auto focus capturing, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

**Special****Gauge Line**

Draw a gauge line of specified length or ratio by detecting edge points of the target.

**1 Click [Gauge line].****2 Specify the start and end points of the edge detection range of the part to be measured.**

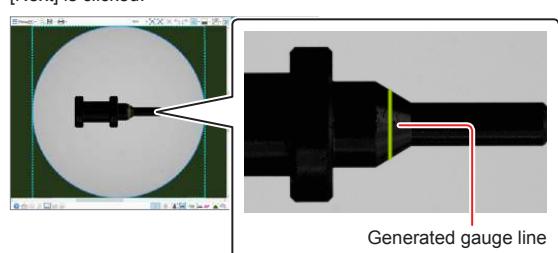
Specify the edge detection range so that edges of the target to be measured are inside the range.

**3 Adjust the size and position of the edge detection range so that it includes all sections you want to measure.****4 Click [Apply].**

The detection result of the settings specified in the edit window is displayed in the preview display.

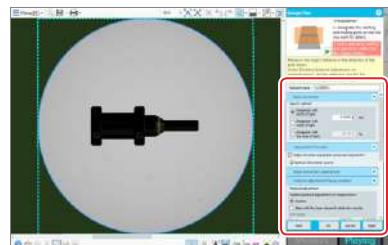
If the result is undesirable, change the setting in the edit window and click [Apply] again.

The setting can be changed any number of times before [OK] or [Next] is clicked.

**5 Specify the measurement conditions in the edit window.****6 Click [OK].**

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

By clicking [Next], you can continue to use the same tool.

**Edit Window**

After changing the setting, click [Apply], and the change is reflected on the preview screen.

**● Element name**

Edit the name of the element.

**● Basic parameter****○ Search method**

Select a method to detect the gauge line from the edge detection range.

- Designate with width of dark  
Enter the length of the dark width to be detected as a gauge line in mm.
- Designate with width of light  
Enter the length of the light width to be detected as a gauge line in mm.
- Designate with the ratio of dark  
Enter the ratio of the dark width to be detected as a gauge line in %.  
One or more pairs of dark and light widths are required inside the edge detection range.  
The ratio of a dark width is "Dark width / (Dark width + Light width)".

The gauge line is detected with an average value if multiple dark widths (light widths) exist inside the edge detection range.

## ● Adjustment function

### ○ Edge extraction parameter automatic adjustment

Automatically adjust the edge extraction parameter. When this check box is deselected, the "Edge extraction parameters" can be set manually.

### ○ Optimum illumination search (Except for IM-8005)

When [Optimum illumination search] is clicked, the pictures of the target is automatically taken with multiple illumination settings. Among the images taken with multiple illumination settings, you can select an image of the target with the edge suitable for measurement extracted.

"Optimal Illumination Search (IM-8020/8030/8030T)" (Page 4-206)

## ● Edge extraction parameters

For details of the edge extraction parameters setting, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

## ● Postural adjustment/range position

### ○ Postural adjustment

If you select [Align with the base element's detection results.], you can specify the line used as the reference line, angle from the target, and distance from the target.

- Link target

Specify a line used as the reference for the edge detection range.

Reference X axis	Use the X axis set in the base coordinate as a reference line.
Reference Y axis	Use the Y axis set in the base coordinate as a reference line.
Rotation axis	Use the rotation axis set in the base coordinate as a reference line. (only when the rotation unit IM-RU1 is used)
(Other)	Use a line created during measurement or created with the tools on the [Element] tab as a reference line. The element names of all lines (including virtual lines) are displayed.
	You can select a reference line from the lines shown on the preview screen.

Reference When base coordinate is not specified, the coordinate origin (0,0) is on the bottom left of the capture range.

- Set angle from target.

When this check box is selected, the slope of the edge detection range (orientation) can be set based on the reference line.

Parallel	Set the edge detection range in parallel to the reference line.
Perpendicular	Set the edge detection range perpendicular to the reference line.
Arbitrary	Set the edge detection range at a desired angle to the reference line.

- Set distance from target.

When this check box is selected, the center point of the edge detection range can be specified in mm with the distance from the reference line.

### ○ Range parameters

- Start

Enter the coordinates (Absolute coordinates: X, Y) of the start point of the edge detection range in mm.

- End

Enter the coordinates (Absolute coordinates: X, Y) of the end point of the edge detection range in mm.

- Width

Enter the width of the edge detection range in mm.

- Length

Enter the length of the edge detection range in mm.

## ● Capture angle advanced settings (only when the rotation unit IM-RU1 is used)

For details of the capture angle advanced settings, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

## ● Capture height advanced settings

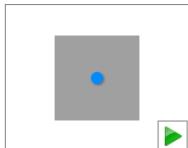
For details of the capture height advanced settings, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

## ● Auto focus capture

For details of the auto focus capturing, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

## ● Manual measurement

For details of the manual measurement, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

**Measurement Items****■ Height**

Create the height element to measure the height from that point.

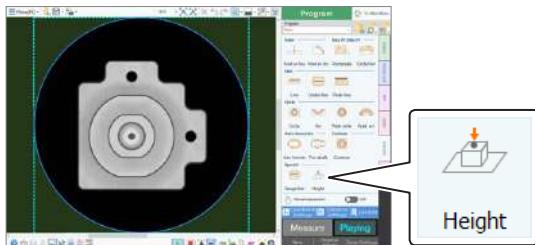


**Every time when running the IM-8000, it is recommended that you align the reference plane on the height measurement unit.**

"Reference Plane Alignment" (Page 10-25)



At times other than measuring, if the measurement target touched the stylus of height measurement unit, remove the measurement target from the stage glass. After the electric XY stage returns to the initial place, put the measurement target on the stage glass again.

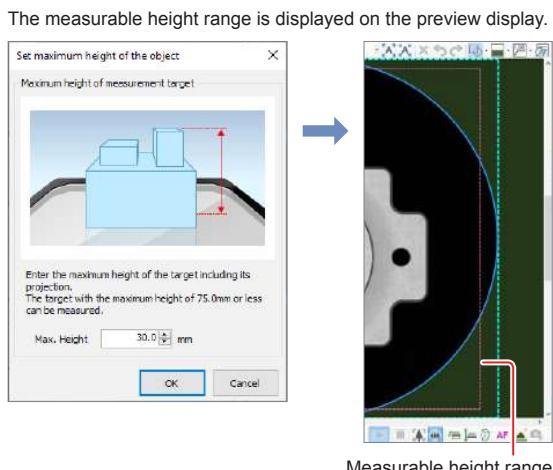
**1 Click [Height].**

- The [Set maximum height of the object] dialog box appears automatically when maximum height has not been set in the program data that is being edited.
- The maximum height of target can be set beforehand.

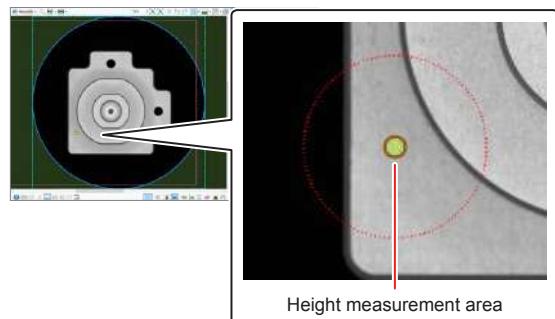
"Set maximum height of the object" (Page 10-26)

**2 Enter the maximum height in [Max. Height] for the measurement target, and click [OK].**

If the maximum height of more than 30.0 mm is set, measurement accuracy degrades.

**3 Click the position you want to measure the height.**

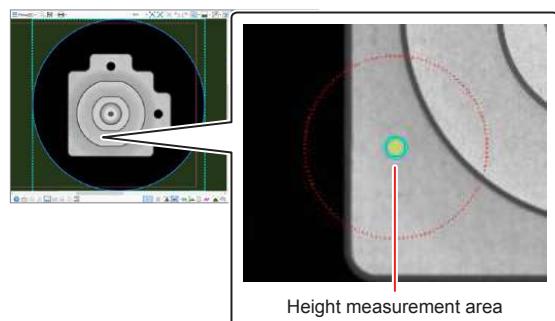
The clicked position is centered in the height measurement area that is displayed.



In height measurement area, specify a flat horizontal plane which is wider than the circle of 1 mm diameter. When a "Wall" exists due to unevenness in the height measurement area, or when the measuring place is a protrusion which is smaller than the measurable area of height, measuring might fail during the multi measurement.

**4 Click [Apply].**

The measurement is executed and the height measurement area is created.

**5 Specify the measurement conditions in the edit window.**

For details about the edit window, refer to  "Edit Window" (Page 4-149).

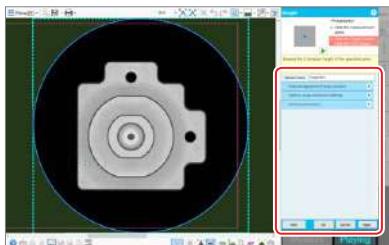
**6 Click [OK].**

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.



By clicking [Next], you can continue to use the same tool.

## ● Edit Window



After changing the setting, click [Apply], and the change is reflected on the preview screen.

### ● Element name

Edit the name of height element

### ● Postural adjustment/range position

For details of the postural adjustment/range position, refer to ["Advanced Parameters of the Element Tool"](#) (Page 4-150).

### ● Capture angle advanced settings (only when the rotation unit IM-RU1 is used)

For details of the capture angle advanced settings, refer to ["Advanced Parameters of the Element Tool"](#) (Page 4-150).

### ● Control parameters

#### ○ Stylus descent speed

Specify the descending speed of the stylus toward the measurement target via slider.

## Advanced Parameters of the Element Tool

The advanced parameters available for the following tools.  
Click  to demonstrate the advanced parameters.

### ■ Advanced Parameter List (1/2)

Advanced parameter name	Tool							
								
Edge extraction parameters	Default	✓	✓	✓	✓	✓	✓	4-152
	Scanning direction (Line range other than Center line)			✓		✓		✓
	Scanning direction (Center line)						✓	4-152
	Scanning direction (Circle or Arc range)				✓			4-152
	Edge direction	✓	✓	✓	✓	✓	✓	4-152
	Edge priority	✓	✓	✓	✓	✓	✓	4-152
	Prioritize continuous edge points			✓	✓	✓	✓	4-153
	Edge strength	✓	✓	✓	✓	✓	✓	4-153
	Remove isolated point			✓	✓			4-154
	Scanning resolution (Line, Circle, or Arc)					✓	✓	4-154
	Scanning resolution (Max/Min, Peak, or Gauge line)			✓	✓			✓
	Scanning resolution (Contour)							4-154
	Scan width	✓	✓	✓	✓	✓	✓	4-154
	Fitting condition (Line)					✓		4-154
	Fitting condition (Circle or Arc)							4-155
	Remove defects					✓	✓	4-155
	Inspect sink marks and flash					✓		4-155
Postural adjustment/range position	Narrow line detection	✓	✓	✓	✓	✓	✓	4-155
	Binary Threshold							4-155
	Minimum detect size							4-155
	Light probe measurement	✓				✓		4-160
	Postural adjustment (Line or Rectangle range)	✓		✓		✓	✓	4-156
	Postural adjustment (Circle or Arc range)		✓		✓			4-156
	Postural adjustment (Height range)							4-157
Capture angle advanced settings	Range parameters (Line range)			✓		✓	✓	4-157
	Range parameters (Circle range)				✓			4-157
	Range parameters (Arc range)				✓			4-158
	Range parameters (Rectangle range)							4-158
	Capture angle advanced settings	✓	✓	✓	✓	✓	✓	4-158
Capture height advanced settings	Capture height advanced settings	✓	✓	✓	✓	✓	✓	4-159
	Auto focus capture	✓	✓	✓	✓	✓	✓	4-159
Manual measurement	Manual measurement	✓	✓	✓	✓	✓	✓	4-159
	Mask setting	Mask Setting						4-160
Control parameters								4-160

## ■ Advanced Parameter List (2/2)

Advanced parameter name		Tool								
										
Edge extraction parameters	Default	✓	✓	✓	✓			✓	✓	4-152
	Scanning direction (Line range other than Center line)									4-152
	Scanning direction (Center line)									4-152
	Scanning direction (Circle or Arc range)	✓	✓	✓	✓					4-152
	Edge direction	✓	✓	✓	✓					4-152
	Edge priority	✓	✓	✓	✓					4-152
	Prioritize continuous edge points	✓	✓	✓	✓					4-153
	Edge strength	✓	✓	✓	✓			✓	✓	4-153
	Remove isolated point									4-154
	Scanning resolution (Line, Circle, or Arc)	✓	✓							4-154
	Scanning resolution (Max/Min, Peak, or Gauge line)				✓	✓			✓	4-154
	Scanning resolution (Contour)							✓		4-154
	Scan width	✓	✓	✓	✓					4-154
	Fitting condition (Line)									4-154
	Fitting condition (Circle or Arc)	✓	✓							4-155
	Remove defects	✓	✓	✓	✓				✓	4-155
	Inspect sink marks and flash	✓	✓							4-155
	Narrow line detection	✓	✓	✓	✓					4-155
	Binary Threshold							✓		4-155
	Minimum detect size							✓		4-155
Light probe measurement		✓	✓							4-160
Postural adjustment/range position	Postural adjustment (Line or Rectangle range)							✓	✓	4-156
	Postural adjustment (Circle or Arc range)	✓	✓	✓	✓					4-156
	Postural adjustment (Height range)								✓	4-157
	Range parameters (Line range)							✓		4-157
	Range parameters (Circle range)	✓		✓						4-157
	Range parameters (Arc range)		✓		✓					4-158
	Range parameters (Rectangle range)							✓		4-158
Capture angle advanced settings		✓	✓	✓	✓			✓	✓	4-158
Capture height advanced settings		✓	✓	✓	✓			✓	✓	4-159
Auto focus capture		✓	✓	✓	✓			✓	✓	4-159
Manual measurement		✓	✓	✓	✓			✓		4-159
Mask setting	Mask Setting							✓		4-160
Control parameters									✓	4-160

## Edge extraction parameters

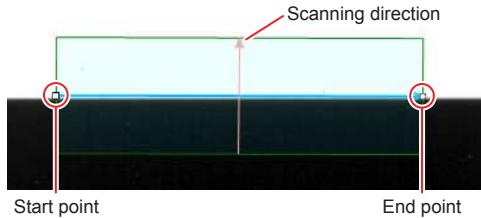
### ■ Default

Click the button to initialized the edge extraction parameter.

### ■ Scanning direction (Line Range Other Than Center Line)

Select the direction to scan the edge detection range.  
The scanning direction is the reference for edge direction.

 The scanning direction is displayed by the pink arrow in the edge detection area of the preview display.



**Left facing forward**

The edge detection range is scanned to the left when viewed with its start point at the top.

**Right facing forward**

The edge detection range is scanned to the right when viewed with its start point at the top.

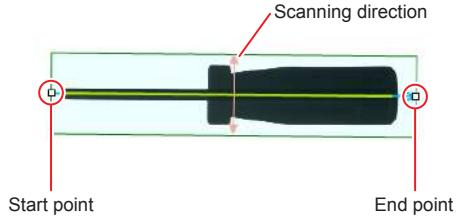
### ■ Scanning direction (Center Line)

This option can be set when [Auto] is not selected.

Select the direction to scan the edge detection range.

The scanning direction is the reference for edge direction.

 The scanning direction is displayed by the pink arrow in the edge detection area of the preview display.



**Inner to outer**

The edge detection range is scanned outward from the center.

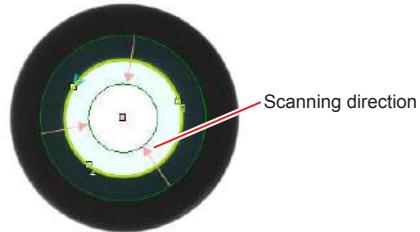
**Outer to inner**

The edge detection range is scanned inward to the center.

### ■ Scanning direction (Circle or Arc Range)

Select the direction to scan the edge detection range.  
The scanning direction is the reference for edge direction.

 The scanning direction is displayed by the pink arrow in the edge detection area of the preview display.



**Inner to outer**

The edge detection range is scanned outward from the center.

**Outer to inner**

The edge detection range is scanned inward to the center.

### ■ Edge direction

Select a direction of brightness change for the edge to be extracted based on the scanning direction.

**Not specified**

Both changing points of "Bright to dark" and "Dark to bright" are extracted as edges.

**Bright to dark**

Only the edges from bright to dark are extracted towards the scanning direction.

**Dark to bright**

Only the edges from dark to bright are extracted towards the scanning direction.

**White centers (point (on the line), point (on the arc), line, circle, arc only)**

Centers of the initial "Dark to bright" and "Bright to dark" are extracted as edges towards the scanning direction.

**Black centers (point (on the line), point (on the arc), line, circle, arc only)**

Centers of the initial "Bright to dark" and "Dark to bright" are extracted as edges towards the scanning direction.

### ■ Edge priority

When multiple edges align with the extraction condition, select which edge to prioritize extraction.

**Leading edge**

The edge which is first extracted will be determined as edge point.

**Maximum edge intensity**

The edge which has the highest intensity (contrast value) is determined as edge point.

**Proximity of center line**

The edge which is nearest to the center line of the edge detection range is determined as edge point.

## ■ Prioritize continuous edge points

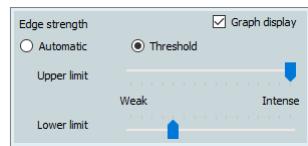
When this check box is selected, the edge point at the continuous position will be extracted as a priority. This excludes edge points that are away from the continuous ones, so error is less likely to occur due to stains or scratches on the surface of the stage or the measurement target.



**When the conditions of "Edge direction" and "Edge strength" are satisfied, the edge point is extracted excluding the condition of "Edge priority".**

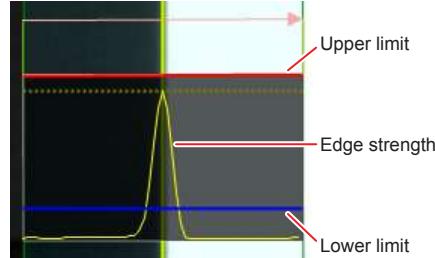
## ■ Edge strength

Set sensitivity for extracting edges (threshold of the contrast value to be extracted).



### ○ Graph display

Selecting the check box displays the edge intensity graph in the preview screen. Edge intensity is displayed in edge intensity graph with a pink arrow in the edge detection range. You can change the display position and size of the edge intensity graph.



- When [Threshold] has been selected, the upper and lower limit will be displayed.
- When the upper limit or lower limit is changed with [Automatic] selected, the [Threshold] will be selected.

### ○ Automatic

Set threshold as default.

### ○ Threshold

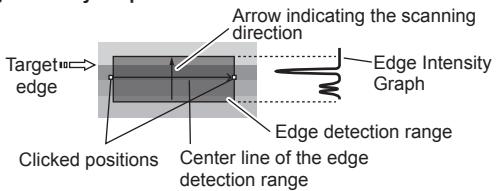
Set threshold by sliders of [Upper limit] and [Lower limit]. You can also drag the lines of upper limit and lower limit on the edge intensity graph to set threshold.

The edge that has a vertex between the lines of upper limit and lower limit on the edge intensity graph is the extraction target. Edges that do not exceed the lower limit, or those that exceed the upper limit will not be extracted.

### Technical Hint

With the options in the [Element] tab, you can display the edge intensity graph of each element and set the upper and lower limits.

### Edge Intensity Graph

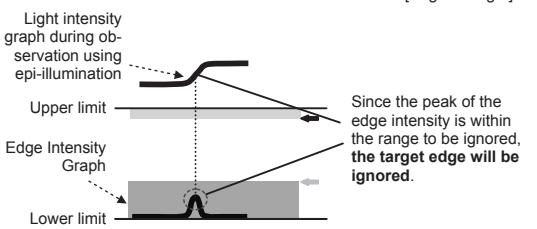
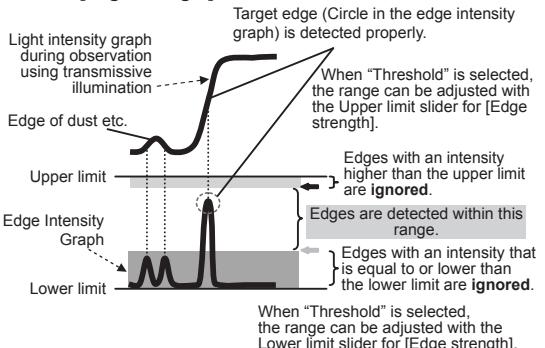


### [Edge strength]

When [Edge strength] is set to Automatic, the system detects only edges with a certain intensity in order to prevent the influence of external disturbances such as dust. During the observation using transmissive illumination, the edge intensity is strong enough to allow the Automatic setting to work effectively.

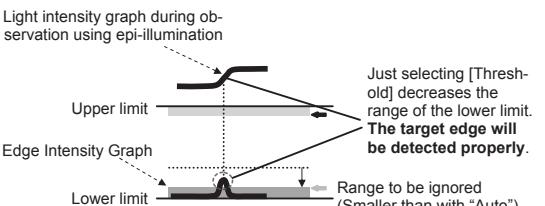
During the observation using epi-illumination, however, the contrast of the edge is often extremely weak and the Automatic setting may not be able to detect the edge. To avoid this problem, select "Threshold" to limit the range and ignore weak-contrast edges.

#### • When [Edge strength] is set to "Automatic"

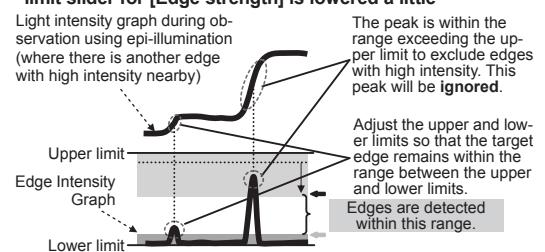


#### • When [Edge strength] is set to "Threshold"

- \* Just by selecting "Threshold" for [Edge strength], the lower limit drops.



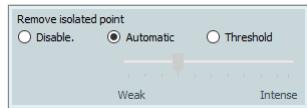
#### • When [Edge strength] is set to "Threshold", and the upper limit slider for [Edge strength] is lowered a little



## Measurement Items

### ■ Remove isolated point

Set the threshold which excludes the edge points that are isolated from the edge extraction.



○ **Disable.**

Isolated points are also extracted as edge.

○ **Automatic**

The isolated points are automatically evaluated as outliers via statistical analysis.

○ **Threshold**

Isolated points are judged based on the threshold (the number of continuous edge points) set by slider.

### ■ Scanning resolution (Line, Circle, or Arc)

Specify the interval for the edge points to be extracted.



**Reference** Display the edge point trail and confirm the interval for the extracted edge points.

□ "Switch Edge Point Trail Display" (Page 10-59)

○ **Automatic**

Set scanning resolution as default.

○ **Threshold**

Set scanning resolution by slider.

### ■ Scanning resolution (Max/Min, Peak, or Gauge Line)

Specify the interval for the edge points to be extracted.

Set scanning resolution by slider.



○ **High speed search**

Selecting the check box performs the speeding up process when the edge points exceed 5,000 points.

**Point** If the scanning resolution is set to rough, the measurement time becomes shorter, however, fine unevenness may not be detected.

### ■ Scanning resolution (Contour)

Specify the interval for the edge points to be detected.



**Point** [Fine] is used normally. When the number of extracted edge points exceeded the upper limit, change it to [Coarse].

**Reference** Display the edge point trail and confirm the interval for the extracted edge points.

□ "Switch Edge Point Trail Display" (Page 10-59)

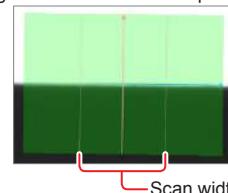
### ■ Scan width

Set the width on the scan line that detects the edge points.



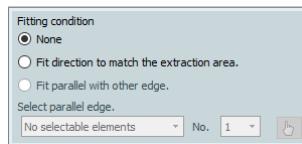
**Reference**

The scan width is displayed by the pink dotted line in the edge detection area of the preview display.



### ■ Fitting condition (Line)

Set calculation conditions for fitting line.



○ **None**

The fitting line is calculated from the extracted edges.

○ **Fit direction to match the extraction area**

Calculate the fitting line so that slope is parallel to the center line of edge detection range.

○ **Fit parallel with other edge.**

Calculate the fitting line so that the slope is parallel to the element selected from [Select parallel edge.]



This option can be selected only when there is a line created with the options on the [Basics] or [Element] tab.

- Select parallel edge.

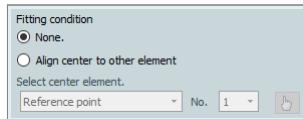
Select a line element name (including a virtual line) from the dropdown list.



Select parallel edges from the preview screen.

## ■ Fitting condition (Circle or Arc)

Set calculation conditions for fitting line.



### ○ None.

The fitting line is calculated from the extracted edges.

### ○ Align center to other element

Will calculate the fitting line so that the center becomes the element selected in [Select center element].

- Select center element.  
Select the center element from the dropdown list.

Reference point	Use the reference origin point set for the base coordinates as the center.
(Other)	Elements of points (including virtual lines), (center of) circles (including virtual lines), and (center of) arcs created in [Basics] or [Element] are displayed. Set the selected element as the center.
	You can select an element as the center from the preview screen.

When base coordinate is not specified, the reference origin point moves to the bottom left of the capture range.

## ■ Remove defects

When the fitting line is calculated, the edge point(s) separated from the edge point trail will be removed as error points. Errors will be hard to generate due to the effects such as burrs or dirt on the measurement target.



### ○ Disable

Abnormal points are not removed.

### ○ Automatic

Automatically set the threshold value based on the extracted edge point trail.

### ○ Threshold

Set threshold by slider. If it is set to the [Intense] side, then the irregular points will be determined to be minor intervals.

## ■ Inspect sink marks and flash

During multi measurement, when edge points to be extracted decrease or when edge point trail is disorganized due to edge abnormalities such as burrs and chips, it is judged as Fail without running edge detection.



**Inspect sink marks and flash only works in Run mode.**

### ○ Disable

Sink marks and flash are not inspected.

### ○ Automatic

Automatically set the threshold value based on the extracted edge point trail in Program mode.

### ○ Threshold

Set threshold by slider. If it is set to the [Intense] side, it will be determined to have failed due to the minor changes.

## ■ Narrow line detection

If the check box is selected, the accuracy when the narrow line contour is detected improves.



**When this check box is selected, the measurement variance becomes larger.**

## ■ Binary Threshold

Select a sensitivity (threshold of the extracting contrast value) for the dark part or bright part of the target.

### ○ Automatic

Automatically set the threshold value for binary.

### ○ Threshold

Set the threshold value for binary with the slider.

## ■ Minimum detect size

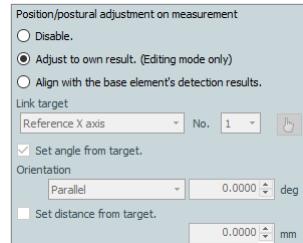
Enter the minimum detect size of the part which is to be judged as an edge in mm. Small clots whose perimeter is shorter than the set value are ignored.

## Measurement Items

### Postural adjustment/range position

#### ■ Postural adjustment (Line or Rectangle Range)

Set the conditions that adjust the orientation of edge detection range while running a measurement.



##### Disable.

Detect the edges at the position drawn in the preview display.

##### Adjust to own result. (Editing mode only) (Line and center line only)

If it is measured in Program mode, adjust the edge detection range so that the calculated fitting line becomes its center line.

##### Align with the base element's detection results.

Specify the angle and distance with the reference line, and adjust the edge detection range for each measurement run.

- Link target

From the dropdown list select the element name for reference line.

Reference X axis	Use the X axis set in the base coordinate as a reference line.
Reference Y axis	Use the Y axis set in the base coordinate as a reference line.
Rotation axis	Use the rotation axis set in the base coordinate as a reference line. (only when the rotation unit IM-RU1 is used)
(Other)	Each element of lines (including virtual lines) is displayed. Set the selected line as reference.
	You can select a line from the preview screen.

When base coordinate is not specified, the reference origin point moves to the bottom left of the capture range.

- Set angle from target.

When this check box is selected, the angle of the edge detection range can be set based on the line selected in [Link target].

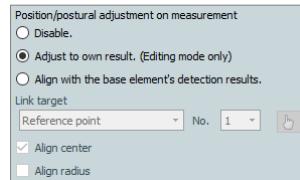
Parallel	Set the edge detection range in parallel to the reference line.
Perpendicular	Set the edge detection range perpendicular to the reference line.
Arbitrary	Set the edge detection range at a desired angle to the reference line.

- Set distance from target.

When this check box is selected, the distance from the line selected in [Link target.] to the center point of edge detection range can be set.

### ■ Postural adjustment (Circle or Arc Range)

Set the conditions that adjust the orientation of edge detection range while running a measurement.



##### Disable.

Detect the edges at the position drawn in the preview display.

##### Adjust to own result. (Editing mode only) (Circle and arc only)

If it is measured in Program mode, adjust the edge detection range so that the calculated fitting line becomes its center line.

##### Align with the base element's detection results.

Specify reference elements and adjust the edge detection range for each measurement run.

- Link target

From the dropdown list select an element name for the reference element.

Reference point	Use the reference origin point set for the base coordinates as a reference point.
(Other)	Elements of points (including virtual lines), circles (including virtual lines), and arcs created in [Basics] or [Element] are displayed. Set the selected element as reference.
	You can select an element from the preview screen.

When base coordinate is not specified, the reference origin point moves to the bottom left of the capture range.

- Align center

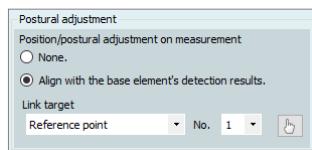
When this check box is selected, the center of edge detection range can be aligned with the reference element.

- Align radius

This check box is enabled when a circle or arc is selected for [Link target]. When this check box is selected, the radius of the edge detection range is set to the same value as that of the reference element.

## ■ Postural adjustment (Height Range)

Set the conditions that adjust the orientation of edge detection range while running a measurement.



### ○ None.

Detect the edges at the position drawn in the preview display.

### ○ Align with the base element's detection results.

Specify reference elements and adjust the edge detection range for each measurement run.

- Link target

From the dropdown list select an element name for the reference element.

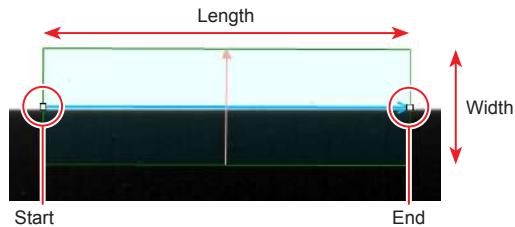
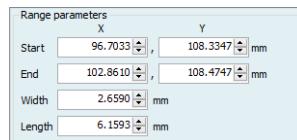
Reference point	Use the reference origin point set for the base coordinates as a reference point.
(Other)	Elements of points (including virtual lines), circles (including virtual lines), and arcs created in [Basics] or [Element] are displayed. Set the selected element as reference.
	You can select an element from the preview screen.

When base coordinate is not specified, the reference origin point moves to the bottom left of the capture range.

## ■ Range parameters (Line Range)

The start point, end point, width and length of edge detection range are displayed.

They can also be changed by entering values.



### ○ Start

It is XY coordinate of the start point on edge detection range.

### ○ End

It is XY coordinate of the end point on edge detection range.

### ○ Width

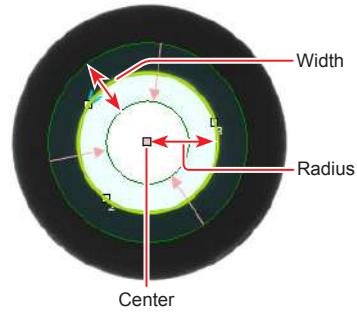
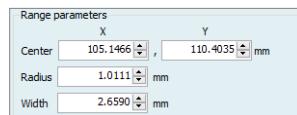
It is the width of edge detection range.

### ○ Length

It is the length from start point to end point on the edge detection range.

## ■ Range parameters (Circle Range)

The center, radius and width of edge detection range are displayed. They can also be changed by entering values.



### ○ Center

It is XY coordinate of the center of the edge detection range.

### ○ Radius

It is the radius of edge detection range.

### ○ Width

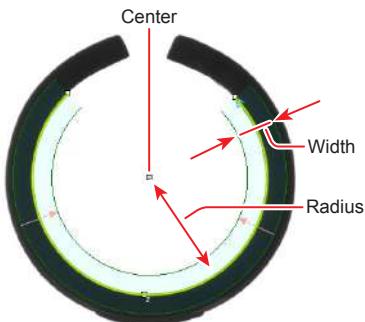
It is the width of edge detection range.

## Measurement Items

### ■ Range parameters (Arc Range)

The center, radius, width and center angle of edge detection range are displayed.  
They can also be changed by entering values.

Range parameters	
X	Y
Center 99.5723	93.8153 mm
Radius 21.9395	mm
Width 2.6590	mm
Starting angle 108.4061	deg
Arc angle -36.8121	deg



#### ○ Center

It is XY coordinate of the center of the edge detection range.

#### ○ Radius

It is the radius of edge detection range.

#### ○ Width

It is the width of edge detection range.

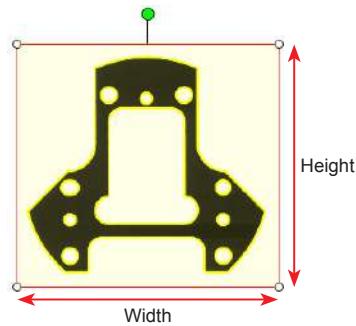
#### ○ Center angle

It is the center angle of the edge detection range (Starting angle, Arc angle).

### ■ Range parameters (Rectangle Range)

The center, width, height and angle of the edge detection range are displayed.  
They can also be changed by entering values.

Range parameters	
X	Y
Center 99.7122	100.7776 mm
Width 37.3658	mm
Height 35.8264	mm
Angle 90.0000	deg



#### ○ Center

It is XY coordinate of the center of the edge detection range.

#### ○ Width

It is the width of edge detection range.

#### ○ Height

It is the detection height of edge detection range.

#### ○ Angle

It is the angle of edge detection range.

### Capture angle advanced settings (Only When the Rotation Unit IM-RU1 is Used)

You can set detail conditions about the angle during capturing.

Capture angle advanced settings	
<input checked="" type="checkbox"/> Specify capture angle with value	
Link target	Reference angle
Angle from the reference	0.00 deg
<input type="button" value="Set Current Angle"/>	

#### ○ Specify capture angle with value

When this check box is selected, the capture angle can be set in advance.



For an element where the auto angle capture is executed (element created by the direction measurement, or, element of the basic measurement for which the auto angle capture is executed), [Specify capture angle with value] is disabled.

- Link target

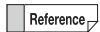
You can select an element to be referred as the angle for capturing from the dropdown list.



You can also select a reference element on the preview screen.

- Angle from the reference

Enter the relative difference in the angle to the reference element.



- Enter a value with + sign when it is larger than the reference element, with - sign when it is smaller than that.

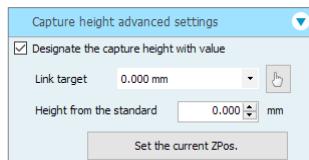
- By setting "Link target" and "Angle from the reference", the angle for capturing will change depending on the variation of the angle of the reference element, even if the angle of the target varies during Run mode.

- [Set Current Angle]

Set the difference between the current angle and the angle of the reference element as the angle from the reference.

## Capture height advanced settings

You can set detail conditions about the height during capturing.



### ○ Designate the capture height with value

Set the capture height beforehand.

- Link target  
You can select an element to be referred as the height for capturing from the dropdown list.



You can also select a reference element on the preview screen.

- Height from the standard  
Enter the relative difference in the Z position to the reference element.



- Enter a value with + sign when it is higher than the reference element, with - sign when it is lower than that.
- By setting [Link target] and [Height from the standard], the Z position for capturing will change depending on the variation of the Z position of the reference element, even if the height of the target varies during Run mode.

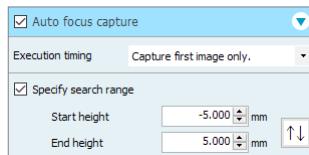
- Set the current ZPos.  
Set the difference between the current Z position and the Z position of the reference element as the height from the reference.



**When the auto focus capturing is used together with this, the Z position to start the auto focus will be determined.**

## Auto focus capture

Set this when the auto focus is performed during capturing.



### ○ Execution timing

Select the execution timing from [Capture first image only.] or [Execute for capturing all images] in the dropdown list.



**This is enabled only when the edge detection range extends over multiple fields of view. Select [Execute for capturing all images] when the height of the target within the edge detection range is not parallel to the stage glass.**

### ○ Specify search range

Specify the search range for the auto focus capturing.

- Start height  
Enter the start height for the auto focus capturing.
- End height  
Enter the end height for the auto focus capturing.



Replace the value of the start height with the end height.



**The wider the search range is, the longer the measurement time becomes.**

## Manual measurement

When the check box is selected, move the edge position on the preview screen during Run mode so that it can be measured.

When performing Run mode using the Program data including any elements with this check box being selected, the operation moves to [Manual measurement] mode.

["Measurement Result Containing the Target Element of the Manual Measurement" \(Page 6-17\)](#)

### ○ Perform manual measurement without extracting edges

When this radio button is selected, the edge extract will not be performed. Set the center line of edge detection range (midpoint for point element) as extraction result. The measurement can be made by moving the edge position on the preview screen during Run mode.

### ○ Perform manual measurement after extracting edges

When this radio button is selected, the measurement can be made by moving the edge position on the preview screen during Run mode.

### ○ Edge matching measurement

When this radio button is selected, the position where the light/dark pattern within the edge detection range matches the pattern during the Program mode is used as the edge extraction result. The measurement can be made by moving the edge position on the preview screen during Run mode.

## Measurement Items

### Mask setting

#### ■ Mask Setting

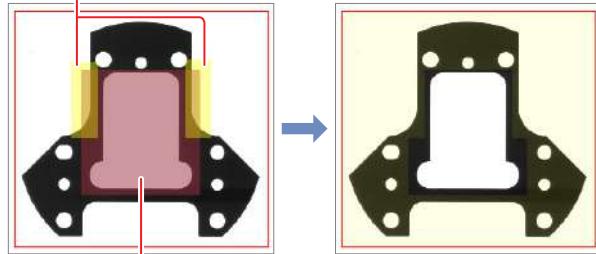
Create ranges valid/invalid for contour extraction within the contour extraction range.

You can configure mask settings by selecting [Enable Mask] and clicking [Start settings].

	Description
Rect	Create rectangle mask within the contour extraction range.
Circle	Create circle mask within the contour extraction range.
Ring	Create ring mask within the contour extraction range.
▲	Move the selected mask up 1 No.
▼	Move the selected mask down 1 No.
X	Delete the selected mask.

After configuring mask settings, click [End Setting] to reflect the masks within the contour extraction range.

Range valid for contour extraction



Range invalid for contour extraction

- Reference
- Shape of the individual mask can be edited with the mouse operation.  
□ “Rectangle Range” (Page 3-15)
- While configuring mask setting, valid ranges are displayed in yellow and invalid ranges are displayed in red in the preview screen.
- If multiple masks overlap, the one configured later (one with the larger No.) will be enabled.
- Up to 10 masks can be set.
- Valid ranges cannot be set outside of the contour extraction range.

### Control parameters

#### ○ Stylus descent speed

Specify the descending speed of the stylus toward the measurement target via slider.

### Light probe measurement

In light probe measurement, the edges are detected correctly by bringing the probe tip which emits light into contact with the measurement target.

▶ Important

To set the light probe measurement, it is required to create the edge detection range or scanning line, and extract the edges that are the targets for light probe measurement.

Point

- When using external lights, the light probe measurement cannot be performed.
- Only the following elements can perform with the light probe measurement.
  - Point on line
  - Line
  - Circle
  - Arc
- When [Fit parallel with other edge.] is selected in [Fitting condition] of the edge extraction parameter, the light probe measurement cannot be performed.
- The inspect sink marks and flash is not performed to elements where the light probe measurement is performed.

1 In the [Element] tab, create the element and click [Apply].

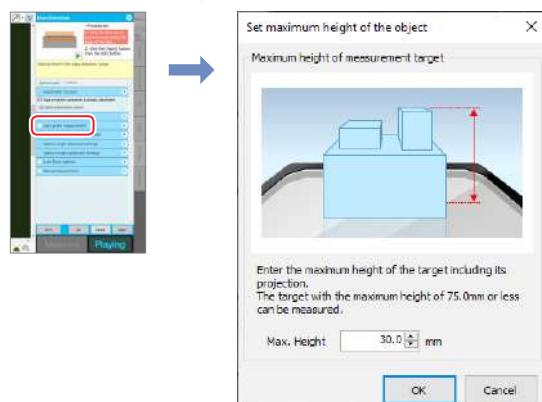
Point

Create the edge detection range or scanning line so that the scanning direction is orthogonal to the measurement place. If it is not orthogonal, errors are more likely to occur in the probe measurement results.

The element is created and the edge will be extracted.

2 Select [Light probe measurement].

The [Set maximum height of the object] dialog box appears.

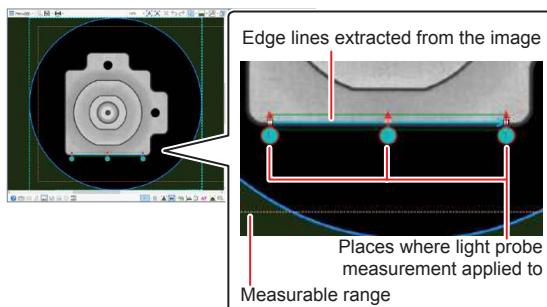


Reference

- The [Set maximum height of the object] dialog box appears automatically when maximum height has not been set in the program data that is being edited.
- The maximum height of target can be set beforehand.  
□ “Set maximum height of the object” (Page 10-26)

### 3 Enter the maximum height in [Max. Height] for the measurement target, and click [OK].

A display for probe measurement is added in the preview display. The setting items of the folded [Light probe measurement] are applied.



#### ● Edge lines extracted from the image

Edge lines extracted from the image are displayed in orange.

#### ● Places where light probe measurement applied to

These are places where light probe measurement are performed.

- The circle indicates starting position (start point) of each light probe measurement point.
- The arrow indicates the moving direction (end point) of the light probe.
- The numbers represent the measurement order.

#### ● Measurable range

The area displayed in green dotted line can be measured with light probe.

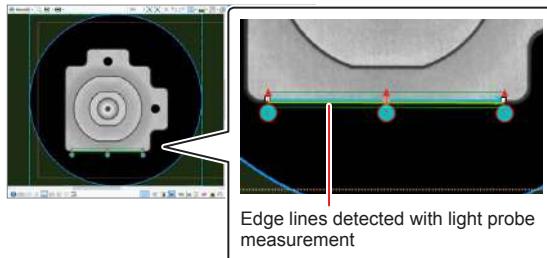
### 4 Set the light probe measurement setting.

For details about settings for light probe measurement, refer to "Edit Window" (Page 4-161).

### 5 Click [Execute].

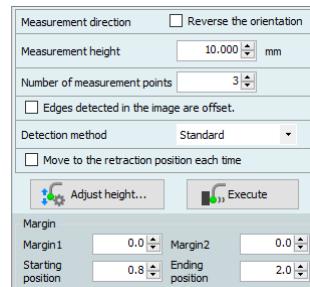
Light probe measurement is performed.

Edge lines detected with light probe measurement are displayed in green.



#### ● Edit Window

If the settings are changed, they will be reflected on the preview display.



#### ● Measurement direction

##### ○ Reverse the orientation

When this check box is selected, the direction of light probe measurement is reversed and the start point and end point will be switched.  
It is used when the light probe contacts the target at the current start position.

Confirm the position of circle (start point) in the preview screen, and select so that the starting position turns into the blank space side.

#### ● Measurement height

Set the height which is from the stage glass of the places where light probe measurement is performed.

#### ● Number of measurement points

It can be set when the element is line, circle or arc.  
Set the number of the points that are performed with the light probe measurement.  
Increase/decrease the measurement places depending on the number of measurement points. Set the measurement places to regular intervals depending on the number of measurement points.

#### ● Edges detected in the image are offset.

It can be set when the element is line, circle or arc.  
When this check box is selected, offset the edge extracted from the image to the edge position detected with the light probe measurement.  
In that case, the measurement point becomes only one and [Number of measurement points], [Detection method] and [Move to the retraction position each time] cannot be set any more.

#### ● Detection method

Select the setting below depending on the height of where the light probe measurement will be performed.

##### ○ Standard

Select Standard when "[Height of edge to detect in the image] - [Measurement height] ≤ 20 mm".

##### ○ For deep position

Select For deep position when "[Height of edge to detect in the image] - [Measurement height] ≥ 20 mm".

## Measurement Items

### ● Move to the retraction position each time

When this check box is selected, if there are two or more measurement points, the light probe is retracted to a height where it does not contact the target, it will then move to the next measurement point.

It is used when a target exists between measurement points.



**The light probe is moved straight from one to another measurement point.**

### ● Adjust height

Display the [Adjust light probe starting position/measurement height] screen.

□ "Adjust light probe starting position/measurement height" (Page 4-162)

### ● Execute

The light probe measurement is performed based on the settings.

### ● Margin

#### ○ Margin1

It can be set when the element is line or arc.

Set the distance from starting point of edge detection range for the first measurement point.

#### ○ Margin2

It can be set when the element is line or arc.

Set the distance from ending point of edge detection range for the last measurement point.

#### ○ Starting position

When measurement starts, the light probe drops down to the measurement height, then the distance (interval) between the edge which was extracted from the image is measured.

#### ○ Ending position

Set the distance that the probe is to move ahead from the edge extracted from the image.



**The light probe stops to measure once it contacts the target. An error message is displayed if the light probe did not contact the target even when it is moved to the ending position.**

#### ○ Detailed position settings

It can be set when the element is circle.

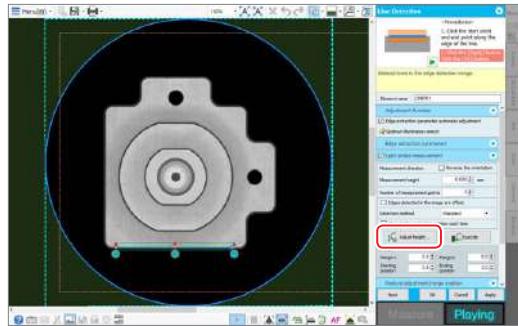
The [Detailed position settings] dialog box appears.

□ "Detailed position settings] Dialog Box" (Page 4-164)

### ■ Adjust light probe starting position/measurement height

In addition to the items that can be set in the edit window of [Element] tab, the starting position of the light probe measurement or the measurement height can be set while the position of the light probe is being moved.

#### 1 Click the [Adjust height] button on the edit window of the element tool that are performed with the light probe measurement.



#### 2 Set the light probe measurement setting.

For details about settings for light probe measurement, refer to □ "[Adjust light probe starting position/measurement height] Edit Window" (Page 4-163).

#### 3 Click [OK].

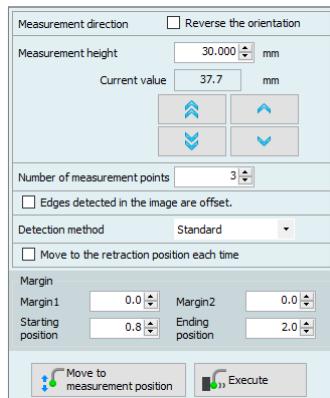
Settings of the light probe measurement are applied.  
The screen returns to the edit window of element tool.



By clicking [Execute], the light probe measurement can also be performed on this screen.

## ● [Adjust light probe starting position/measurement height] Edit Window

If the settings are changed, they will be reflected on the preview display.



## ● Measurement direction

### ○ Reverse the orientation

When this check box is selected, the direction of light probe measurement is reversed and the start point and end point will be switched.  
It is used when the light probe contacts the target at the current start position.



**Point** Confirm the position of circle (start point) in the preview screen, and select so that the starting position turns into the blank space side.

## ● Measurement height

Set the height which is from the stage glass of the places where light probe measurement is performed.  
In default, the value set in [Max. Height] is displayed.

### ○ Current value

The current height of light probe is displayed.



The light probe moves 1 mm upward.



The light probe moves 0.1 mm upward.



The light probe moves 1 mm downward.



The light probe moves 0.1 mm downward.

## ● Number of measurement points

It can be set when the element is line, circle or arc.  
Set the number of the points that are performed with the light probe measurement.  
Increase/decrease the measurement places depending on the number of measurement points. Set the measurement places to regular intervals depending on the number of measurement points.

## ● Edges detected in the image are offset.

It can be set when the element is line, circle or arc.  
When this check box is selected, offset the edge extracted from the image to the edge position detected with the light probe measurement.

In that case, the measurement point becomes only one and [Number of measurement points], [Detection method] and [Move to the retraction position each time] cannot be set any more.

## ● Detection method

Select the setting below depending on the height of where the light probe measurement will be performed.

### ○ Standard

Select Standard when “[Height of edge to detect in the image] - [Measurement height] ≤ 20 mm”.

### ○ For deep position

Select For deep position when “[Height of edge to detect in the image] - [Measurement height] ≥ 20 mm”.

## ● Move to the retraction position each time

When this check box is selected, if there are two or more measurement points, the light probe is retracted to a height where it does not contact the target, it will then move to the next measurement point.  
It is used when a target exists between measurement points.



**Point** The light probe is moved straight from one to another measurement point.

## ● Margin

### ○ Margin1

It can be set when the element is line or arc.  
Set the distance from starting point of edge detection range for the first measurement point.

### ○ Margin2

It can be set when the element is line or arc.  
Set the distance from ending point of edge detection range for the last measurement point.

### ○ Starting position

When measurement starts, the light probe drops down to the measurement height, then the distance (interval) between the edge which was extracted from the image is measured.

### ○ Ending position

Set the distance that the probe is to move ahead from the edge extracted from the image.



**Point** The light probe stops to measure once it contacts the target. An error message is displayed if the light probe did not contact the target even when it is moved to the ending position.

### ○ Detailed position settings

It can be set when the element is circle.  
The [Detailed position settings] dialog box appears.



[Reference] [Detailed position settings] Dialog Box (Page 4-164)

## Measurement Items

### ● Move to measurement position

Move the light probe to the starting position (position 1 in the preview screen) for the light probe measurement based on the settings.

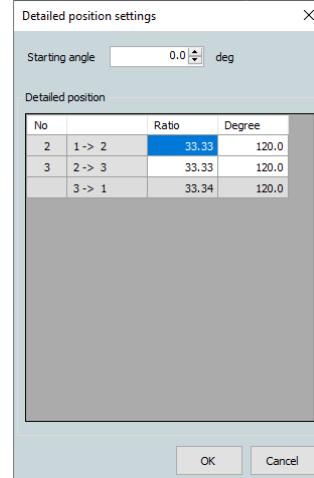
### ● Execute

The light probe measurement is performed based on the settings.

### ■ [Detailed position settings] Dialog Box

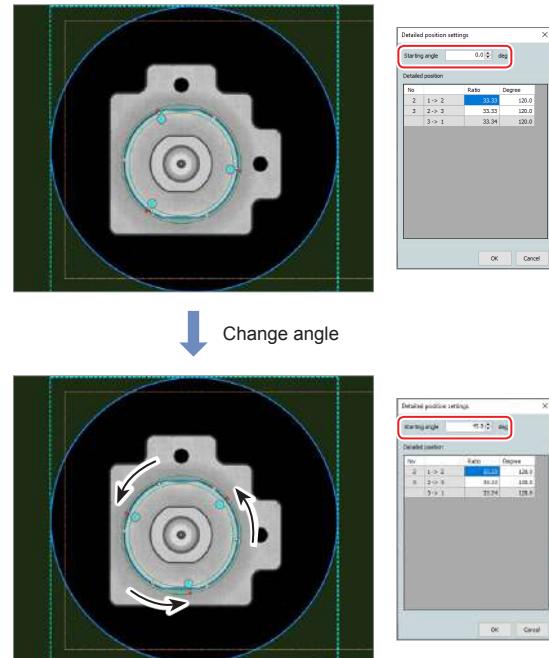
It can be displayed and set when the element is a circle. When a circle element is created, the place you first click becomes the first measurement point with the light probe measurement. Set the subsequent measurement places to regular intervals depending on the number of measurement points. In addition, in accordance with rotation direction which was clicked when the circle is created, numbers will be assigned to the measuring order.

These measurement places can be changed from this screen. If the settings are changed, they will be reflected on the preview display. When [OK] is clicked, the detailed position settings will be applied and the [Detailed position settings] dialog box closes.



### ● Starting angle

The position of the first measurement point can be changed. The position of the first measurement place will rotate the amount that the angle was set. It turns from the first point to the second point. After the second point, all of the measurement places will also rotate just the same amount.



### ● Detailed position

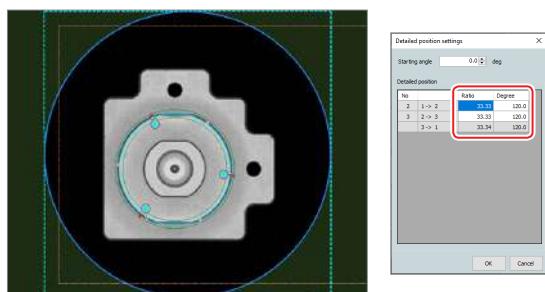
By setting the positional relationship between the measurement place which it is adjacent to, the measurement places from the second point will change.

In each row, set the position relationship between the measurement places where the numbers have been assigned to before and after the arrows.

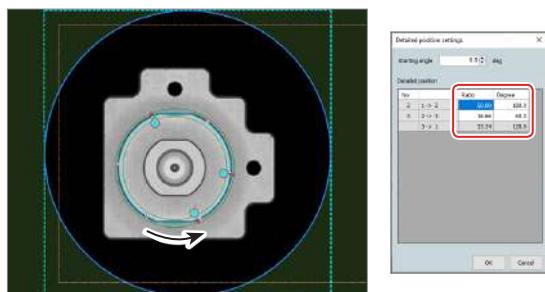
The sum of ratios for each row is always 100. The sum of angles for each row is always 360. Therefore, if the settings of a line are changed, the differential with the next row will be increased or decreased.



**The position relationship of the last and the first measurement places in the last row cannot be set. It only displays the change due to the setting change of the previous lines.**



Change ratio or angle



○ No

The number of the measurement items is displayed.

○ Ratio

Set the proportion which the angle occupies from the entirety of the circle and the previous measurement place via the percentage.

If a ratio is set, the row of angle will also be changed to values corresponding to that ratio.

○ Degree

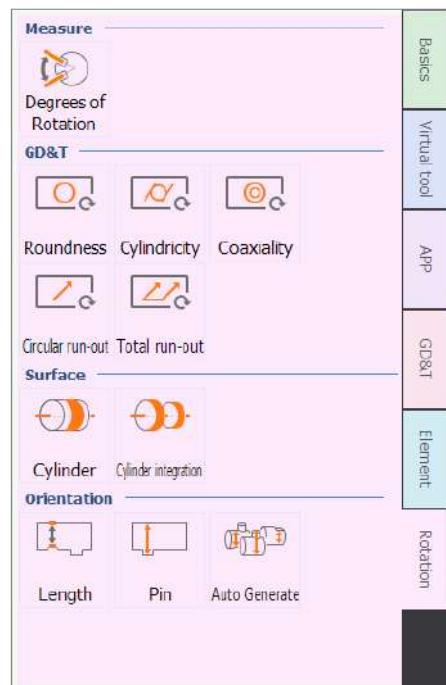
Sets the angle from the previous measurement place.

If an angle is set, the row of ratio will also be changed to values corresponding to that angle.

## Rotation Measurement

Select the [Rotation] tab in the measurement operation area to display the rotation measurement options.

The [Rotation] tab appears only when the rotation unit IM-RU1 is used.



### ● Measure

This option is used to measure the angle of two points of the target.

"Measure" (Page 4-167)

### ● GD&T

These options are used to measure the geometric dimension and tolerance regarding the form of the target.

"GD&T" (Page 4-168)

### ● Surface

This option is used to detect the periphery of the specified target range (cylinder), or combine two or more cylinders.

"Surface" (Page 4-174)

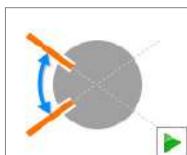
### ● Orientation

Detect the angle that meets a specific condition.

"Orientation" (Page 4-177)

## Measure

### ■ Degrees of Rotation

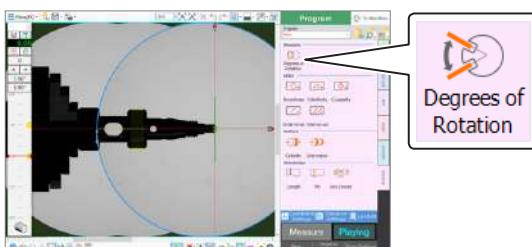


Measure the angle between two points.



**Important** For the element for the measurement of the degrees of rotation, select the element referred by the auto angle capture (element created by the direction measurement, or, element for which the auto angle capture is executed by the basic measurement). Create the target element before measuring the degrees of rotation.

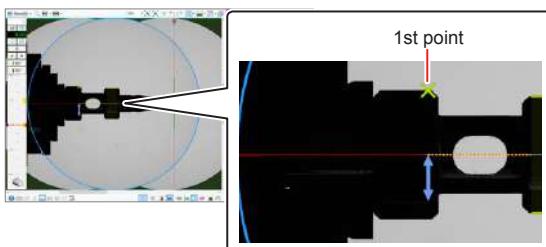
#### 1 Click [Degrees of Rotation].



#### 2 Rotate the target so that the first point is displayed.

Adjust the angle using the [ $\theta$  control] dialog.

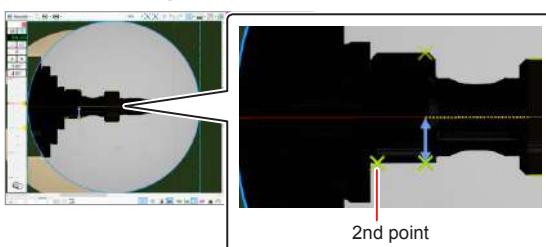
#### 3 Click the 1st point.



#### 4 Rotate the target so that the 2nd point is displayed.

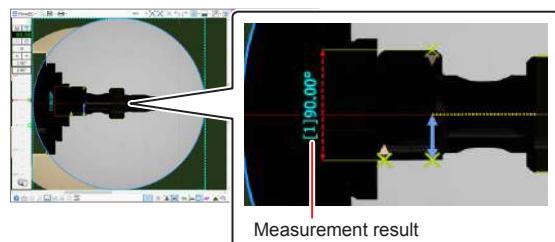
Adjust the angle using the [ $\theta$  control] dialog.

#### 5 Click the 2nd point.

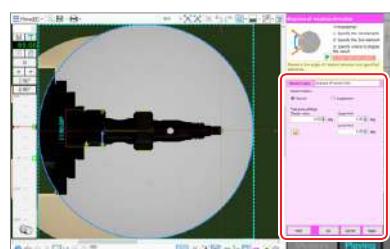


#### 6 Click the location to insert the measurement result.

The measurement result is displayed on the preview display.



#### 7 Set the items related to the measurement.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

##### ○ Element name

Edit the name of the measurement result.

##### ○ Detect Pattern

Select the pattern to measure the inter-point degree of the two. When one of the patterns is selected, the image of the drawn line is shown in the VirtualFig guide, and the measurement value is refreshed on the preview area.

The measurement pattern can be changed any time before [OK] or [Next] is clicked.

##### ○ Tolerance settings

Input the design value and its tolerance value. This value is used to evaluate whether the measurement value remains within the tolerance range.

"Chapter 6 Run Mode" (Page 6-1)

If the upper tolerance is entered when the lower tolerance is 0, "value with minus sign (-) put to the upper tolerance" will be entered automatically for the lower tolerance.



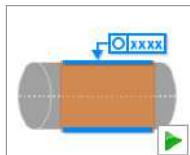
[Alert Settings] dialog box appears.

"Alert Settings" (Page 4-192)

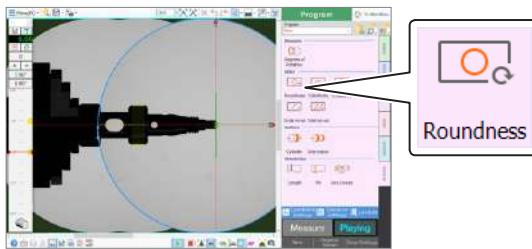
#### 8 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

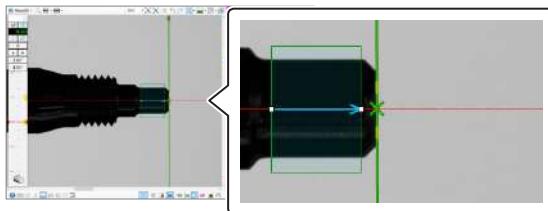
By clicking [Next], you can continue to use the same tool.

**GD&T****■ Roundness**

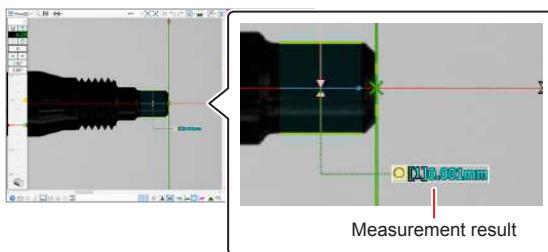
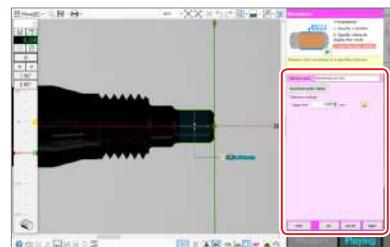
Measure the roundness of the specified cylinder.

**1 Click [Roundness].****2 Specify the area so that it surrounds the cylinder to be measured for the roundness.**

You can also select the element you have set.

**3 Click the location to insert the measurement result.**

The preview screen shows the edge of the cylinder as a green line, and the central axis of the cylinder as a blue arrow, as well as the measurement result.

**4 Set the items related to the measurement.**

After changing the setting, click [Apply], and the change is reflected on the preview screen.

 **Element name**

Edit the name of the measurement result.

 **[Roundness graph display]**

The [Roundness graph] dialog box appears.  
 "Roundness graph" (Page 10-36)

 **Tolerance settings**

Enter the upper limit of the tolerance value. This value is used to evaluate whether the measurement value remains within the tolerance range.

"Chapter 6 Run Mode" (Page 6-1)



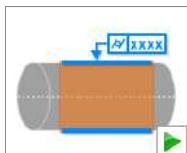
[Alert Settings] dialog box appears.  
 "Alert Settings" (Page 4-192)

**5 Click [OK].**

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

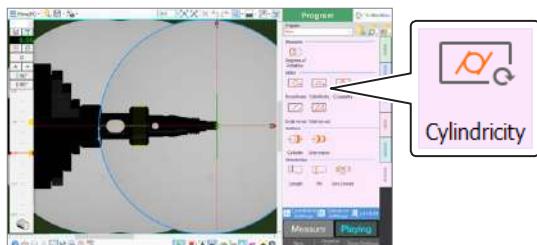
By clicking [Next], you can continue to use the same tool.

## ■ Cylindricity



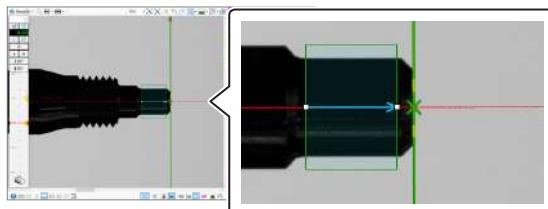
Measure the cylindricity of the specified cylinder.

### 1 Click [Cylindricity].



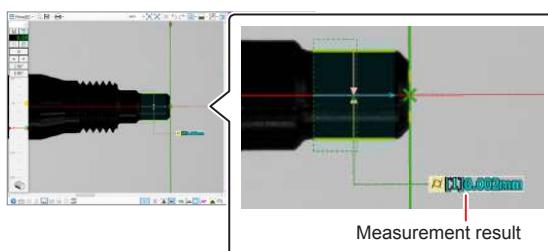
### 2 Specify the area so that it surrounds the cylinder to be measured for the cylindricity.

Reference You can also select the element you have set.



### 3 Click the location to insert the measurement result.

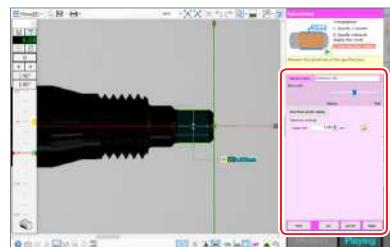
The preview screen shows the edge of the cylinder as a green line, and the central axis of the cylinder as a blue arrow, as well as the measurement result.



**Point** If [Slice width] is too thick to the length of the edge detection range, the measurement results become "Fail".

If the evaluation result is displayed as "Fail", thin [Slice width] of the edit window, then click [Apply].

### 4 Set the items related to the measurement.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

#### ○ Element name

Edit the name of the measurement result.

#### ○ Slice width

Specify the distance for obtaining the profile of the cylinder section using the slide bar.

#### ○ [Roundness graph display]

The [Roundness graph] dialog box appears.

"Roundness graph" (Page 10-36)

#### ○ Tolerance settings

Enter the upper limit of the tolerance value. This value is used to evaluate whether the measurement value remains within the tolerance range.

"Chapter 6 Run Mode" (Page 6-1)



[Alert Settings] dialog box appears.

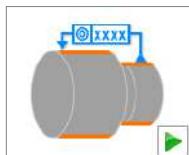
"Alert Settings" (Page 4-192)

### 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

Reference By clicking [Next], you can continue to use the same tool.

## ■ Coaxiality

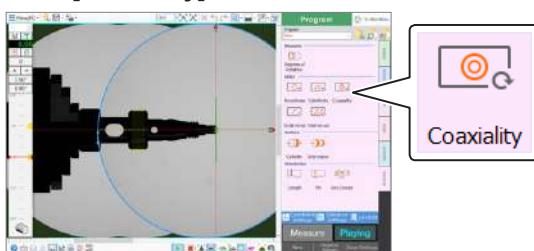


Measure the coaxiality of the two specified cylinders.



**MMC/LCC** cannot be specified if no measurement element to be a target of MMC/LMC is shown on the preview display.  
Before measuring the coaxiality, conduct measurement using the [Basics] tab options or create a formula with the Calculator.

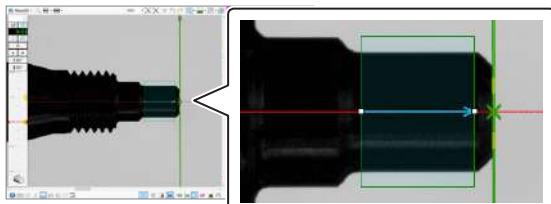
### 1 Click [Coaxiality].



### 2 Specify the area so that it surrounds the cylinder to be the reference axis.



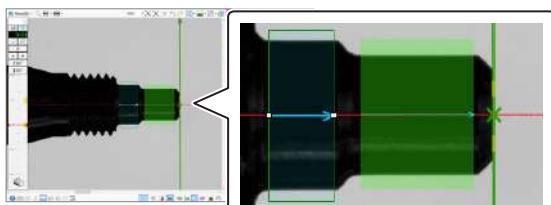
You can also select the element you have set.



### 3 Specify the area so that it surrounds the cylinder to be the target axis.

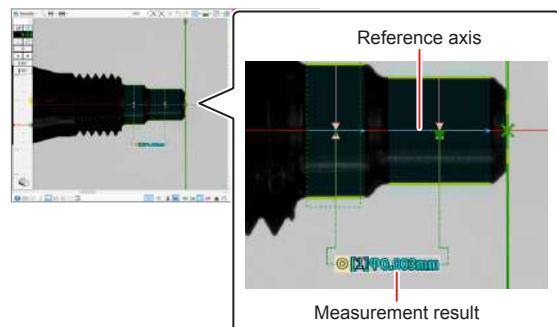


You can also select the element you have set.



### 4 Click the location to insert the measurement result.

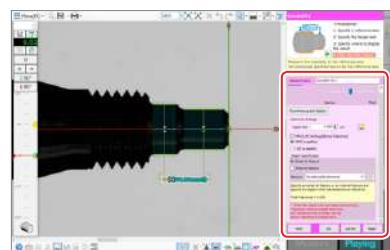
The preview screen shows the edge of the cylinder as a green line, and the central axis of the cylinder as a blue arrow, as well as the measurement result. A green triangle is put to the reference axis.



If [Slice width] is too thick to the length of the edge detection range, the measurement results become "Fail".

If the evaluation result is displayed as "Fail", thin [Slice width] of the edit window, then click [Apply].

### 5 Set the items related to the measurement.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

#### ○ Element name

Edit the name of the measurement result.

#### ○ Slice width

Specify the distance for obtaining the profile of the cylinder section using the slide bar.

#### ○ [Roundness graph display]

The [Roundness graph] dialog box appears.

□ "Roundness graph" (Page 10-36)

#### ○ Tolerance settings

Enter the upper limit of the tolerance value. This value is used to evaluate whether the measurement value remains within the tolerance range.

□ "Chapter 6 Run Mode" (Page 6-1)



[Alert Settings] dialog box appears.

□ "Alert Settings" (Page 4-192)

#### ○ MMC/LMC Settings (Bonus Tolerance)

When the check box is selected, the details of MMC/LMC can be specified.

- MMC is applied.  
Apply the MMC.
- LMC is applied.  
Apply the LMC.
- Object specification

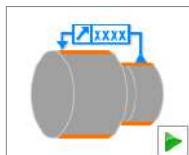
External feature	Select when the target of MMC/LMC is external feature.
Internal feature	Select when the target of MMC/LMC is Internal feature.
Element	Select the target element for bonus tolerance calculation from the dropdown list.
	You can select a measurement element shown on the preview screen.

#### 6 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

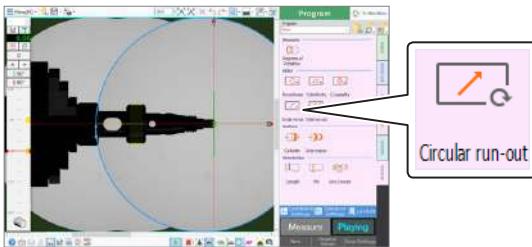
 By clicking [Next], you can continue to use the same tool.

## ■ Circular run-out

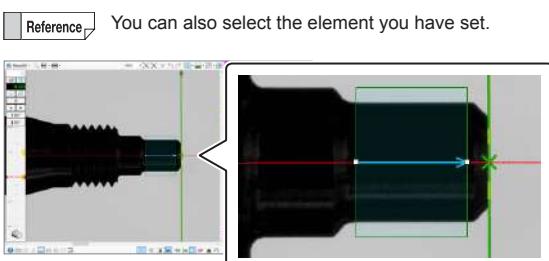


Measure the circumference waviness of the specified cylinder.

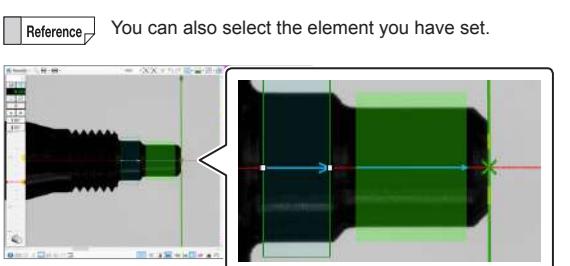
### 1 Click [Circular run-out].



### 2 Specify the area so that it surrounds the cylinder to be the reference axis.

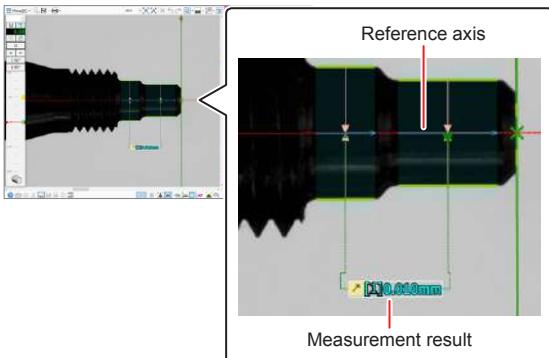


### 3 Specify the area so that it surrounds the cylinder for the measurement.

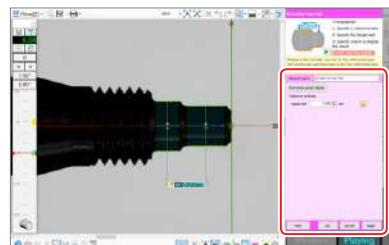


### 4 Click the location to insert the measurement result.

The preview screen shows the edge of the cylinder as a green line, and the central axis of the cylinder as a blue arrow, as well as the measurement result. A green triangle is put to the reference axis.



## 5 Set the items related to the measurement.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

### ○ Element name

Edit the name of the measurement result.

### ○ [Roundness graph display]

The [Roundness graph] dialog box appears.  
□ "Roundness graph" (Page 10-36)

### ○ Tolerance settings

Enter the upper limit of the tolerance value. This value is used to evaluate whether the measurement value remains within the tolerance range.

□ "Chapter 6 Run Mode" (Page 6-1)



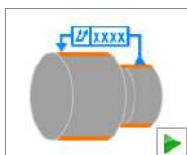
[Alert Settings] dialog box appears.  
□ "Alert Settings" (Page 4-192)

### 6 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

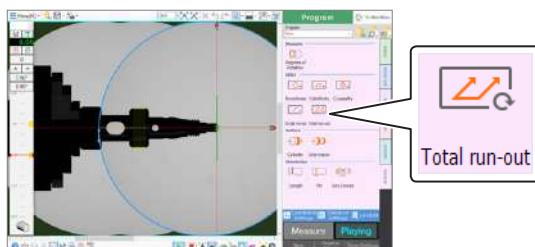
By clicking [Next], you can continue to use the same tool.

## ■ Total run-out



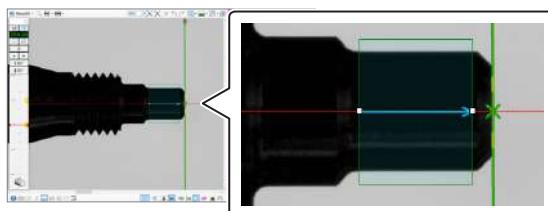
Measure the total run-out of the specified cylinder.

### 1 Click [Total run-out].



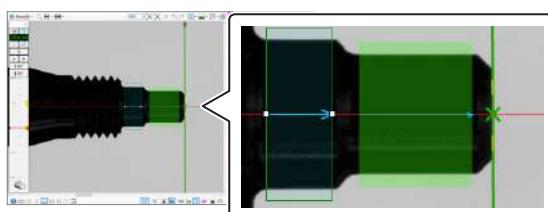
### 2 Specify the area so that it surrounds the cylinder to be the reference axis.

You can also select the element you have set.



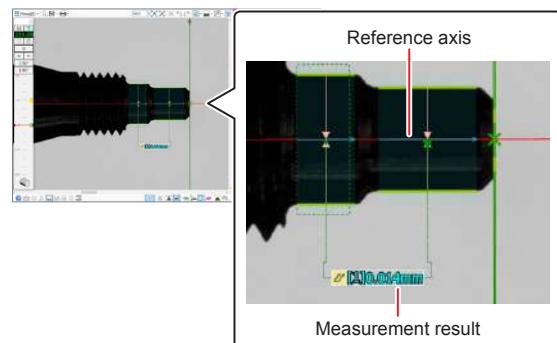
### 3 Specify the area so that it surrounds the cylinder for the measurement.

You can also select the element you have set.



### 4 Click the location to insert the measurement result.

The preview screen shows the edge of the cylinder as a green line, and the central axis of the cylinder as a blue arrow, as well as the measurement result. A green triangle is put to the reference axis.

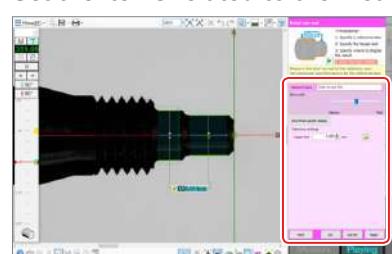


Point

If [Slice width] is too thick to the length of the edge detection range, the measurement results become "Fail".

If the evaluation result is displayed as "Fail", thin [Slice width] of the edit window, then click [Apply].

### 5 Set the items related to the measurement.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

Element name

Edit the name of the measurement result.

Slice width

Specify the distance for obtaining the profile of the cylinder section using the slide bar.

[Roundness graph display]

The [Roundness graph] dialog box appears.

"Roundness graph" (Page 10-36)

Tolerance settings

Enter the upper limit of the tolerance value. This value is used to evaluate whether the measurement value remains within the tolerance range.

"Chapter 6 Run Mode" (Page 6-1)



[Alert Settings] dialog box appears.

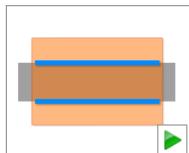
"Alert Settings" (Page 4-192)

### 6 Click [OK].

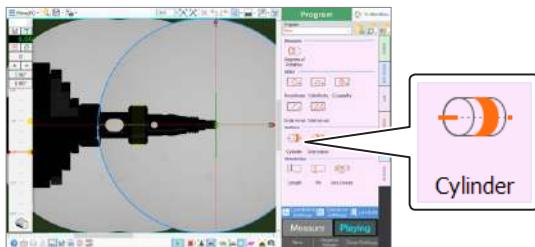
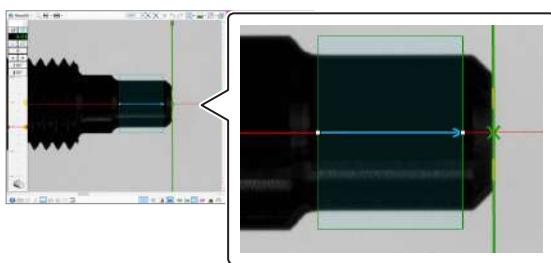
The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

Reference

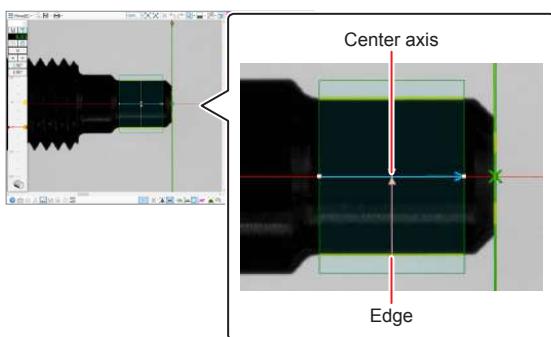
By clicking [Next], you can continue to use the same tool.

**Surface****Cylinder**

From the specified area, extract the edge to form a cylinder shape when it rotates.

**1 Click [Cylinder].****2 Specify the area so that it surrounds the cylinder of which edge is to be extracted.****3 Click [Apply].**

The preview screen shows the edge of the cylinder as a green line, and the central axis of the cylinder as a blue arrow.



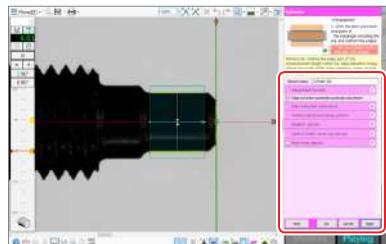
The target does not rotate at this point. It will rotate when the edge is referred from another measurement item.

**4 Specify the measurement conditions in the edit window.****5 Click [OK].**

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.



By clicking [Next], you can continue to use the same tool.

**Edit Window**

After changing the setting, click [Apply], and the change is reflected on the preview screen.

**● Element name**

Edit the name of the measurement result.

**● Adjustment function** Edge extraction parameter automatic adjustment

Automatically adjust the edge extraction parameter. When this check box is deselected, the "Edge extraction parameters" can be set manually.

**● Edge extraction parameters**

For details of the edge extraction parameters setting, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

## ● Postural adjustment/range position

### ○ Postural adjustment

- Position/postural adjustment on measurement

Disable.	Do not perform position/postural adjustment on measurement.
Adjust to own result. (Editing mode only)	The axis line of the target is detected within the edge detection range and the angle of the axis line is used to automatically adjust the angle of the edge detection range.
Align with the base element's detection results.	Specify the reference line, the angle with the reference and the distance from the reference.
<b>• Link target</b> Specify a line used as the reference for the edge detection range.	
Reference X axis	Use the X axis set in the base coordinate as a reference line.
Reference Y axis	Use the Y axis set in the base coordinate as a reference line.
Rotation axis	Use the rotation axis set in the base coordinate as a reference line.
(Other)	Use a line created during measurement or created with the tools on the [Element] tab as a reference line. The element names of all lines (including virtual lines) are displayed.
	You can select a reference line from the lines shown on the preview screen.

When base coordinate is not specified, the coordinate origin (0,0) is on the bottom left of the capture range.

- Set angle from target.

When this check box is selected, the slope of the edge detection range (orientation) can be set based on the reference line.

Parallel	Set the edge detection range in parallel to the reference line.
Perpendicular	Set the edge detection range perpendicular to the reference line.
Arbitrary	Set the edge detection range at a desired angle to the reference line.

- Set distance from target.

When this check box is selected, the center position of the edge detection range can be specified in mm with the distance from the reference line.

### ○ Range parameters

- Start  
Enter the coordinates (Absolute coordinates: X, Y) of the start point of the edge detection range in mm.
- End  
Enter the coordinates (Absolute coordinates: X, Y) of the end point of the edge detection range in mm.
- Width  
Enter the width of the edge detection range in mm.
- Length  
Enter the length of the edge detection range in mm.

## ● Rotation capture

Set the condition if the extracted edge is measured by rotating.

### ○ Specify search range

When this check box is selected, the range where the target is rotated can be set. When this is not selected, measurement will be done for whole circumference.

- Link target

The reference element selected from "Reference angle", "Machine reference", or an arbitrary element is set to be the reference of the angle during the rotation measurement. By clicking , you can select a reference element on the preview screen.

- Angle from the reference

Enter the value of the position where the rotation measurement starts after the target rotates from the reference element.

Enter a value with + sign when it is larger than the reference element, with - sign when it is smaller than that.

- Range

Enter the range (angle) in which the center axis is calculated during the rotation measurement.

When the capture range is set, the measurement result which refers to a cylinder element (roundness etc.) turns to "Fail".

- [Set Current Angle]

Set the difference between the current angle and the angle of the reference element as the angle from the reference.

- Include the opposite side within range

Selecting the check box also includes the range of the opposite side (by 180 degrees) of the specified search range for the calculation of the center axis.

### ○ Angle pitch

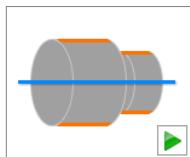
When this check box is selected, the distance of the angle of rotation can be set.

## ● Capture height advanced settings

For details of the capture height advanced settings, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

## ● Auto focus capture

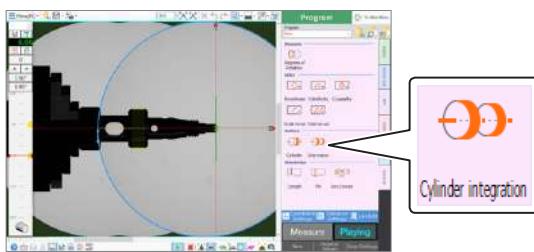
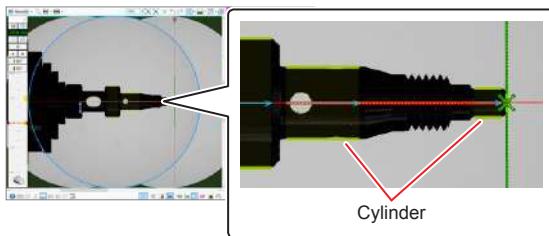
For details of the auto focus capturing, refer to "Advanced Parameters of the Element Tool" (Page 4-150).

**Measurement Items****■ Cylinder Integration**

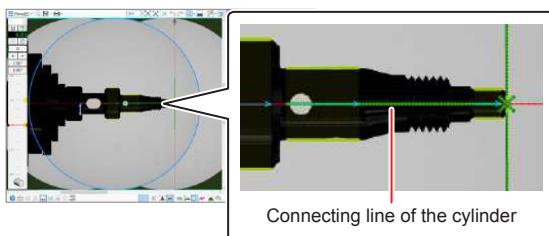
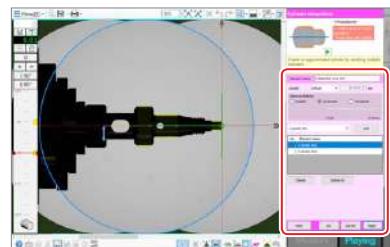
Connect two or more selected cylinders.  
Create one integration axis based on each rotation axis.



**This cannot be executed when no cylinder for integration exists on the preview screen.  
Create a cylinder on the preview screen using the cylinder tool before execution.**

**1 Click [Cylinder integration].****2 Select two or more cylinders on the preview screen.****3 Click [Apply].**

The connecting line of the cylinder appears on the preview screen.

**4 Set the items related to the measurement.**

Set the items related to the integration

After changing the setting, click [Apply], and the change is reflected on the preview screen.

**○ Element name**

Edit the name of the measurement result.

**○ Length**

Specify the length of the virtual line to be drawn.

- Default  
The connecting line whose length is determined by the size of the field of view is created.
- Infinite  
Draw a virtual line of infinite length.
- Input value  
Specify the length of the line in mm.

**○ Remove defects**

Edges recognized as abnormal are removed and the connected axis is created.

- Disable  
Abnormal points are not removed.
- Automatic  
Abnormal edges are judged automatically.
- Threshold  
Abnormal points are judged based on the threshold specified with the slider.

**○ Reference element list**

The element to be referred for creating a connected axis can be added or deleted.

- When selecting elements to be referred and their order and click [Add], they are added to the list.
- When selecting elements in the list and click [Delete], they will be removed from the target of the reference.
- Clicking [Delete All] will remove all elements from the target of the reference.

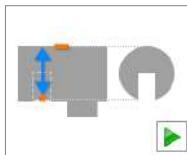
**5 Click [OK].**

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

By clicking [Next], you can continue to use the same tool.

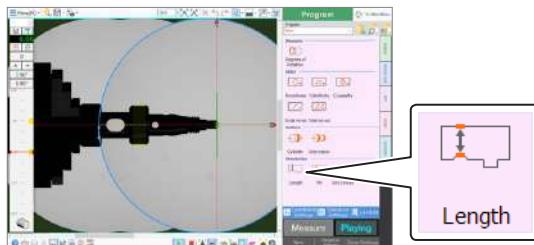
## Orientation

### Length



Detect the angle of the point where the distance with the specified line becomes the max./min.

#### 1 Click [Length].

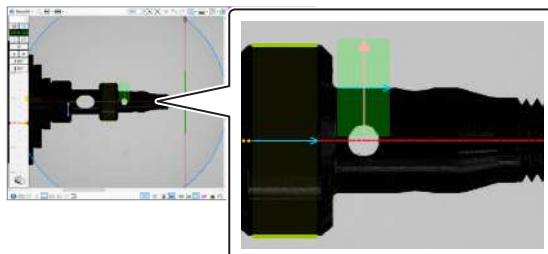


#### 2 Specify the start and end points of the edge detection range.

Click two points along the line to be detected to specify the edge detection range.

Point Specify the line whose status does not change even if rotated.

Reference You can also select the element of which rotation axis was already set.



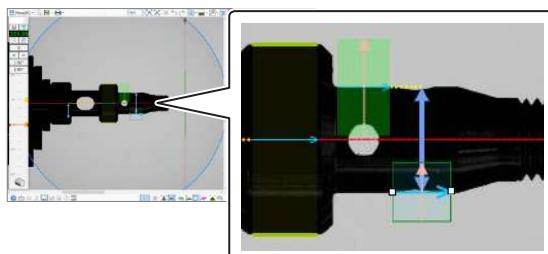
#### 3 Rotate the target so that the part of the point for measurement is displayed.

Adjust the angle using the [ $\theta$  control] dialog.

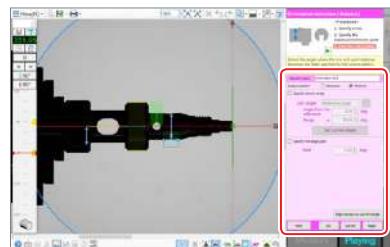
#### 4 Specify the start and end points of the edge detection range.

Specify the edge detection range so that it includes the point where the distance with the line is to be max/min during the rotation of the target.

Reference You can also select the element you have set.



#### 5 Set the items related to the measurement.



After changing the setting, click [Apply], and the change is reflected on the preview screen.

##### ○ Element name

Edit the name of the measurement result.

##### ○ Output pattern

Select the distance between a line and point from [Maximum] or [Minimum].

##### ○ Specify search range

When this check box is selected, the range where the target is rotated can be set. When this is not selected, measurement will be done for whole circumference.

- Link target

The reference element selected from [Reference angle], [Machine reference], or an arbitrary line is set to be the reference of the angle during the rotation measurement. By clicking , you can select a reference element on the preview screen.

- Angle from the reference

Enter the value of the position where the rotation measurement starts after the target rotates from the reference element.

Point

Enter a value with + sign when it is larger than the reference element, with - sign when it is smaller than that.

- Range

Enter the range (angle) of which the target can rotate during the rotation measurement.

- [Set Current Angle]

Set the difference between the current angle and the angle of the reference element as the angle from the reference.

##### ○ Specify the angle pitch

When this check box is selected, the distance of the angle of rotation can be set.

- [Edge Extract by Current Angle]

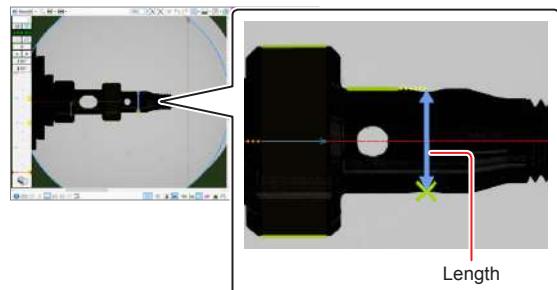
Detect the max/min point without rotating the target, but with the angle currently being displayed.

#### 6 Click [Apply].

The target stops after rotation at the angle that meets the specified condition above.

The angle at that time appears in the field for the angle of the [ $\theta$  control] dialog box.

The preview screen displays a blue arrow indicating the distance between the line and point.

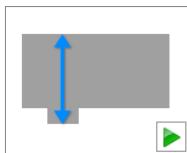


**7 Click [OK].**

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

 By clicking [Next], you can continue to use the same tool.

## ■ Pin



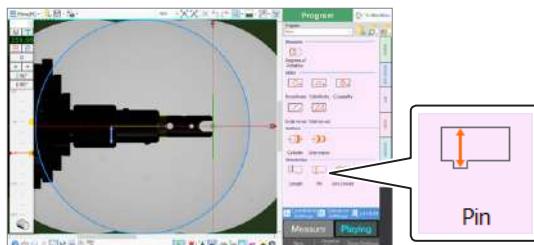
Detect the angle where a specified pin faces directly below.

## 5 Click [OK].

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

By clicking [Next], you can continue to use the same tool.

### 1 Click [Pin].

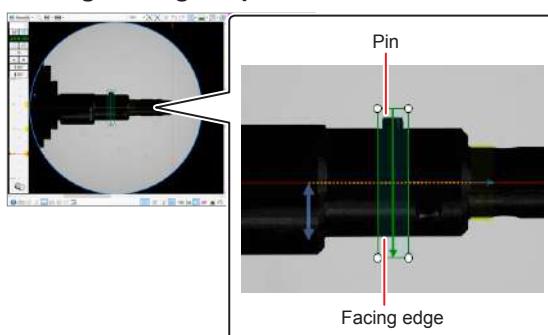


For details of the edit window, refer to □ "Edit Window" (Page 4-180).

### 2 Rotate the target so that the part of the pin for measurement is displayed.

Adjust the angle using the [ $\theta$  control] dialog.

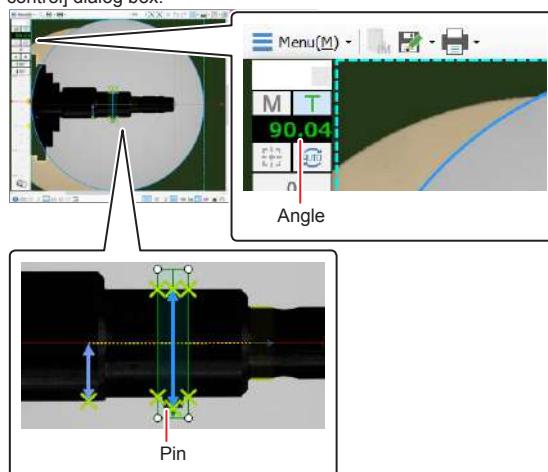
### 3 Specify the edge detection range to include the edge facing the pin.



### 4 Click [Apply].

The target stops after rotation at the angle where the pin faces downward the screen.

The angle at that time appears in the field for the angle of the [ $\theta$  control] dialog box.



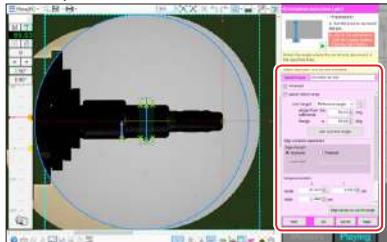
4

Program

## ● Edit Window

Set the items related to the measurement.

After changing the setting, click [Apply], and the change is reflected on the preview screen.



### ○ Element name

Edit the name of the measurement result.

### ○ Advanced

When this check box is not selected, only "Specify search range" can be set. Selecting this check box enables to set "Edge extraction parameters" and "Range parameters" additionally.

### ○ Specify search range

When this check box is selected, the range where the target is rotated can be set. When this is not selected, measurement will be done for whole circumference.

- Link target

The reference element selected from "Reference angle", "Machine reference", or an arbitrary element is set to be the reference of the angle during the rotation measurement. By clicking you can select a reference element on the preview screen.

- Angle from the reference

Enter the value of the position where the rotation measurement starts after the target rotates from the reference element.



**Enter a value with + sign when it is larger than the reference element, with - sign when it is smaller than that.**

- Range

Enter the range (angle) of which the target can rotate during the rotation measurement.

- [Set Current Angle]

Set the difference between the current angle and the angle of the reference element as the angle from the reference.

- [Edge Extract by Current Angle]

Detect the pin without rotating the target, but with the angle currently being displayed.

### ○ Edge extraction parameters

"Edge extraction parameters" is displayed when [Advanced] is selected.

- Edge strength

Select the detection sensitivity (contrast value judgment) to detect the edges of the target.

- Automatic

Edges are judged automatically.

- Threshold

Edges are judged based on the lower limits of the threshold (contrast value) specified with the sliders. Changes smaller than the lower limit is not recognized as edges.

### ○ Range parameters

"Range parameters" is displayed when [Advanced] is selected.

- Center

Enter the coordinates of the center of the edge detection range (scanning line) in mm.

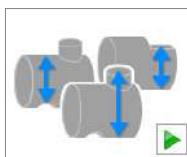
- Width

Enter the width of the edge detection range in mm.

- Height

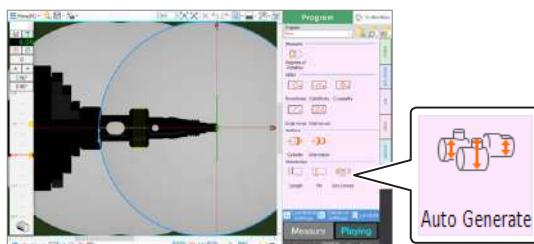
Enter the height of the edge detection range in mm.

## ■ Auto Generate



Generate automatically “Orientation element” which detects the shape to be made to face the target.

### 1 Click [Auto Generate].

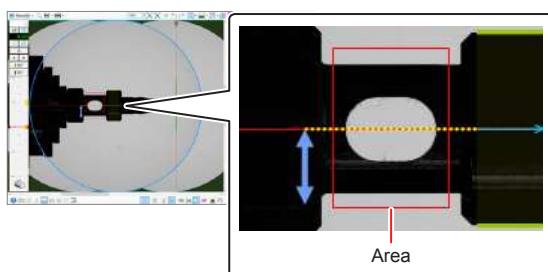


### 2 Select the reference shape required for the target angle.



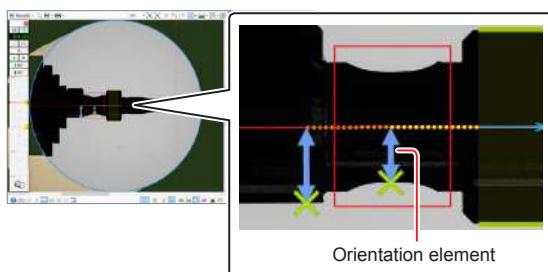
### 3 Specify the area including the reference shape to determine an angle on the preview screen.

The specified area is displayed with the red rectangle.



### 4 Click [Apply].

The target stops at the position of the angle reference after rotating.



### 5 Click [OK].

A blue arrow is set as “Orientation element”.

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

Reference By clicking [Next], you can continue to use the same tool.

## Coordinate Settings

The base coordinates or rotation reference can be set in the Program mode and the single measurement mode.

By setting the base coordinates, you can:

- (1) Measure not only line distance but also the distances in the X- and Y-axis directions in the "PT-PT", "CL-PT", and "CL-CL" measurements on the Basics tab.
- (2) Correct the position of each element based on the base coordinates.

**Reference** When the base coordinates are set, the position of each element is corrected based on the base coordinates after the pattern search, which improves correction accuracy.

By setting the rotation axis, you can:

- (1) Correct the measurement position by setting the center axis of the target as the reference.
- If combined with the origin setting, the rotation axis can be set as the X axis, and the perpendicular line that passes the specified element as the Y axis.

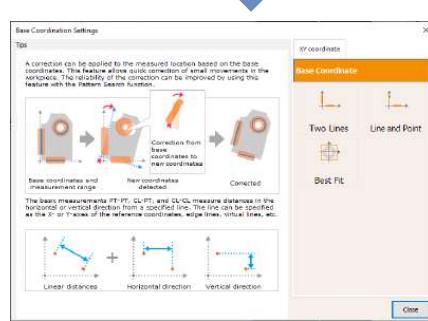
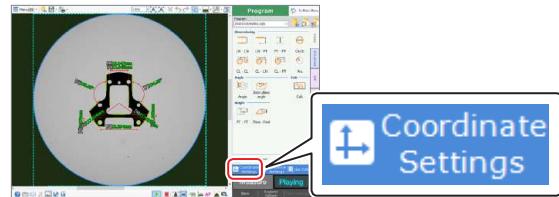
By setting the angle reference, you can:

- (1) Set the target angle with a characteristic shape to the specified angle.
- Display the degrees of rotation by setting the angle of the target as the reference.

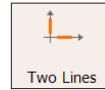
**Reference** If the rotation axis, angle reference, and origin point are set in [Capture background image], they are registered to the coordinate settings.

## Setting the Base Coordinate

### 1 Click [Coordinate Settings].

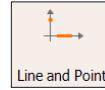


### 2 Select the “Setting Pattern”.



Use the orthogonal lines of the target as base coordinates.

“Two Lines” (Page 4-183)



Use orthogonal lines connecting the line and point of the target as base coordinates.

“Line and Point” (Page 4-184)



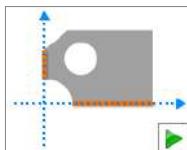
Use the center of the extracted contour range of the target as base coordinates.

“Best Fit” (Page 4-185)

#### Technical Hint

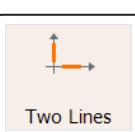
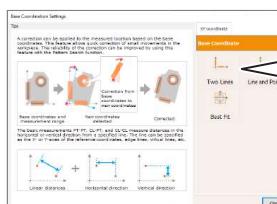
The position correction uses the relative position of each element based on the base coordinates. Consequently, if the base coordinates cannot be detected properly, all measurements will result in “Fail”. To ensure stable detection, set the edge detection range for the base coordinates as long and wide as possible. Also, if another pattern exists nearby, adjust the range to prevent that pattern from being detected.

## ■ Two Lines



Use the orthogonal lines of the target as base coordinates.

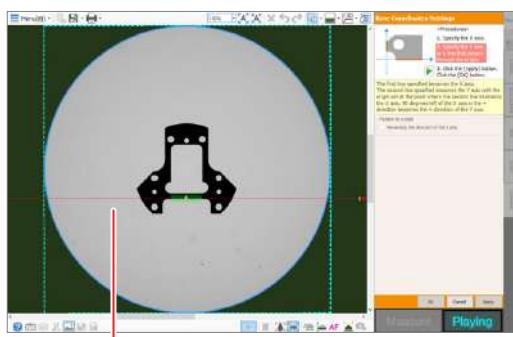
### 1 Click [Two Lines].



### 2 Specify the start and end points of the edge detection range along the line to set as the X axis of the base coordinates.

Click two points along the line to be detected to specify the linear edge detection range.

**Reference** You can also select the element you have set.

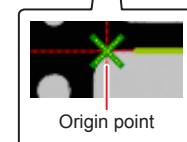
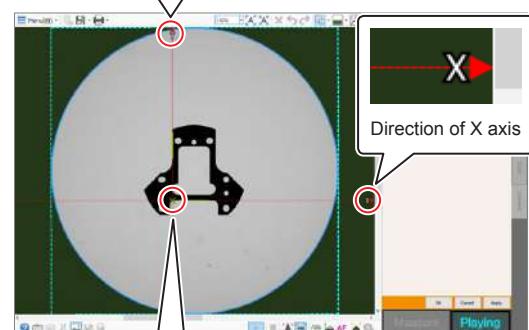


X axis (base coordinate)

### 3 Specify the edge detection range along the line which intersects the X axis perpendicularly in the same way the Y axis was determined.

### 4 Click [Apply].

The base coordinates setting (X axis, Y axis, and origin point) is determined.

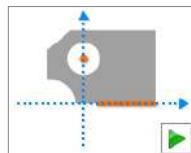


**Reference** When you select [Reversing the direction of the X axis], the X axis (and Y axis) is displayed in the reverse direction.

### 5 Click [OK].

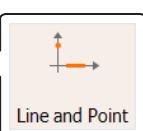
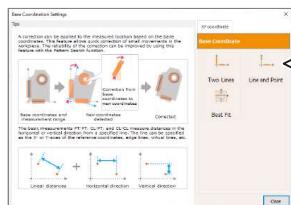
The base coordinates are displayed in the preview display.

## ■ Line and Point



Use orthogonal lines connecting the line and point of the target as base coordinates.

### 1 Click [Line and Point].

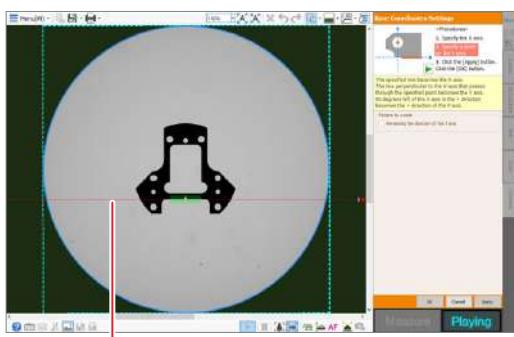


Line and Point

### 2 Specify the start and end points of the edge detection range along the line to set as the X axis of the base coordinates.

Click two points along the line to be detected to specify the linear edge detection range.

**[Reference]** You can also select the element you have set.

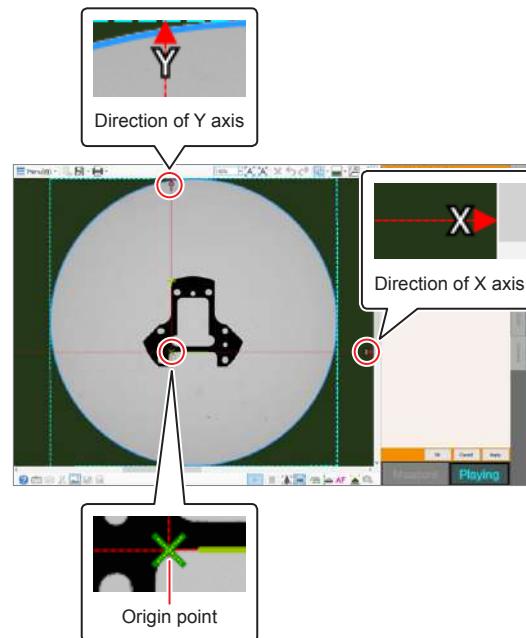


X axis (base coordinate)

### 3 Specify the point through which the Y axis passes to determine the Y axis.

### 4 Click [Apply].

The base coordinates setting (X axis, Y axis, and origin point) is determined.

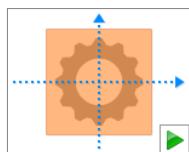


**[Reference]** When you select [Reversing the direction of the X axis], the X axis (and Y axis) is displayed in the reverse direction.

### 5 Click [OK].

The base coordinates are displayed in the preview display.

## ■ Best Fit

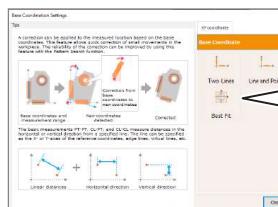


Use the center of the extracted contour range of the target as base coordinates.

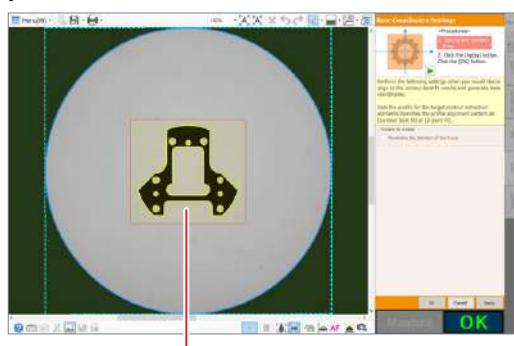


**Best Fit** is enabled when profile is set and either [Contour best fit] or [3-point fit] is selected for "Alignment pattern".  
 "Profile" (Page 4-112)

### 1 Click [Best Fit].



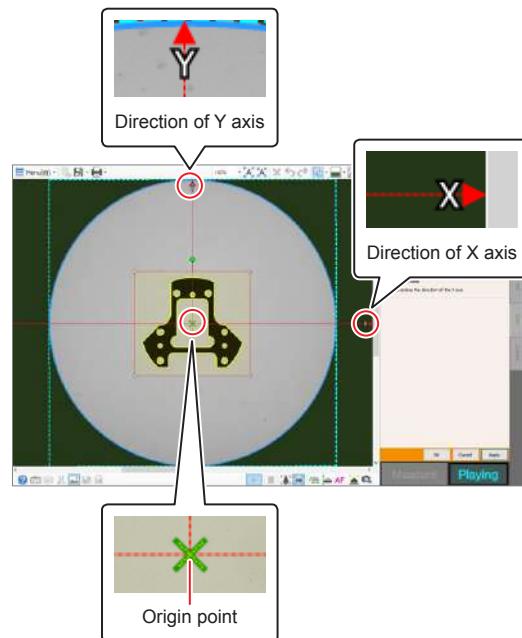
### 2 Click the contour extraction range in the preview screen.



Contour extraction range

### 3 Click [Apply].

The base coordinates setting (X axis, Y axis, and origin point) is determined.



When you select [Reversing the direction of the X axis], the X axis (and Y axis) is displayed in the reverse direction.

### 4 Click [OK].

The base coordinates are displayed in the preview display.

## Rotation Reference Settings

### 1 Click [Coordinate Settings].

### 2 Click [Rotate].



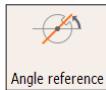
The [Rotation Reference Settings] screen appears.

### 3 Select the items to be set.



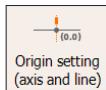
Create the rotation axis from the rotation surface of the specified area.

"Rotation Axis Setting" (Page 4-186)



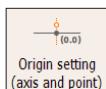
Set the reference angle so that a specified element is to be the specified direction.

"Angle Reference" (Page 4-187)



Create the origin point from the intersection of a specified line and rotation axis.

"Origin Setting (axis and line)" (Page 4-187)



Set the intersection of a perpendicular dropped from a specified point and rotation axis as an origin point.

"Origin Setting (axis and point)" (Page 4-188)

### ■ Rotation Axis Setting

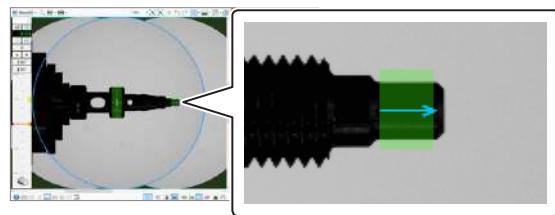
Create the rotation axis from the rotation surface of the specified area.

### 1 Click [Rotation Axis Setting].



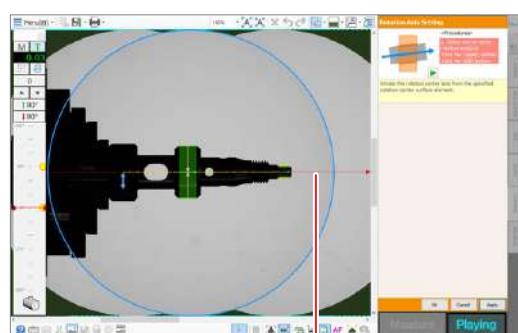
### 2 Set a range where the rotation axis is extracted by dragging the mouse in the preview screen.

The rotation axis will be created so that it passes through the center of the rotation surface included in the area.



### 3 Click [Apply].

The rotation axis is determined.



### 4 Click [OK].

The preview screen displays the rotation axis.

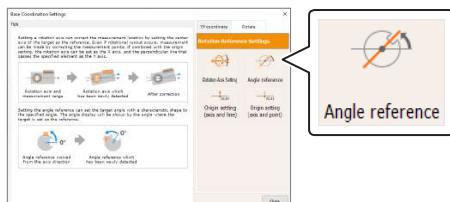
## ■ Angle Reference

Set the reference angle so that a specified element is to be the specified direction.

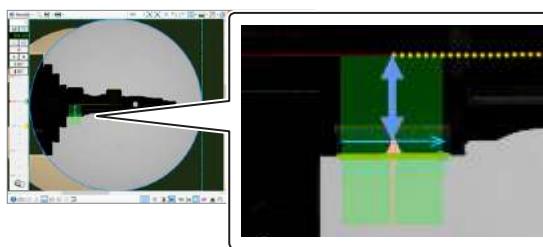


To set the angle reference, you need to create an element to be the angle reference in advance.

### 1 Click [Angle reference].



### 2 Select the element to be the angle reference on the preview screen.



For the angle reference, select the orientation element or element for the auto angle

The element name selected for "Link target" of "Pattern to create" is displayed.

### 3 Enter the angle of the element to "Specified angle".

### 4 Click [Apply].

The angle reference is determined.

### 5 Click [OK].

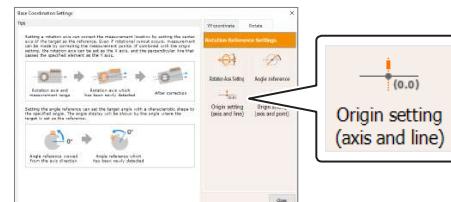
## ■ Origin Setting (axis and line)

Create the origin point from the intersection of a specified line and rotation center axis.



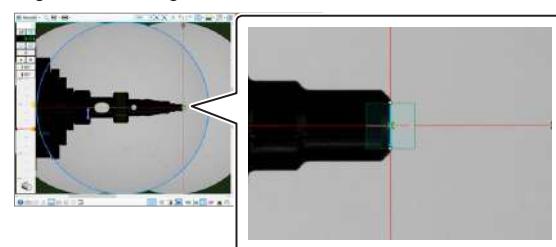
To set the origin point, you need to set the rotation axis in advance.

### 1 Click [Origin setting (axis and line)].



### 2 Specify the start and end points of the edge detection range along the line to be detected on the preview screen.

Click two points along the line to be detected to specify the linear edge detection range.



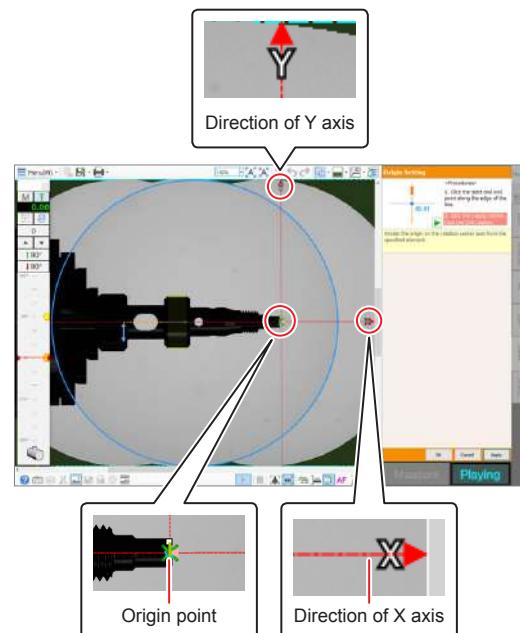
The origin point is created on the intersection of the specified line and rotation axis, and the X axis (rotation axis) and Y axis are also displayed.



You can also select the element you have set.

### 3 Click [Apply].

The origin point is determined.



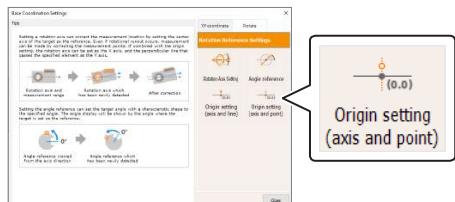
### 4 Click [OK].

## ■ Origin Setting (axis and point)

Set the intersection of a perpendicular dropped from a specified point and rotation axis as an origin point.

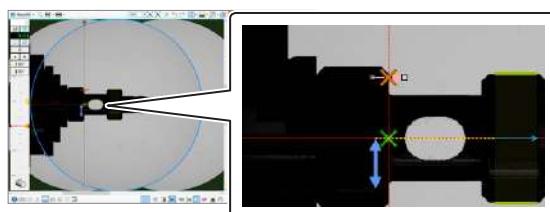
**Important** To set the origin point, you need to set the rotation axis in advance.

### 1 Click [Origin setting (axis and point)].



### 2 Specify a point on the Y axis.

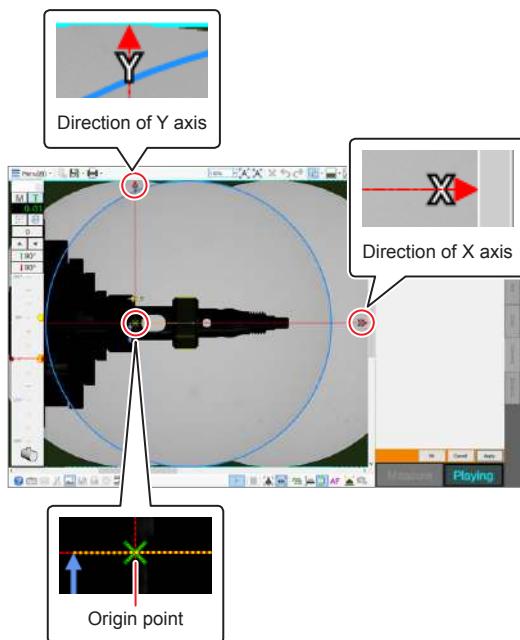
The origin point is created on the intersection of the perpendicular dropped from the specified point line and rotation axis, and the X axis (rotation axis) and Y axis are also displayed.



**Reference** You can also select the element you have set.

### 3 Click [Apply].

The origin point is determined.



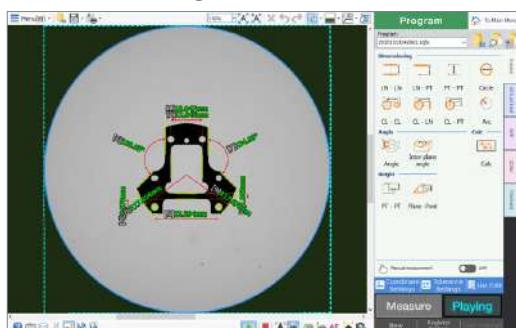
### 4 Click [OK].

## Batch Tolerance Settings

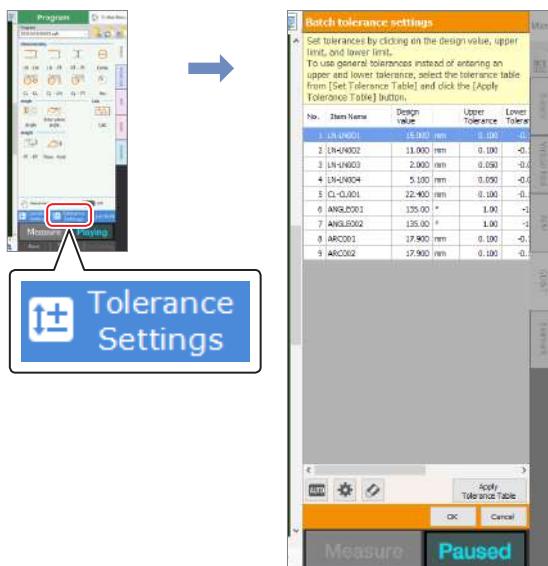
Set the tolerance for all measurement items in a single dialog box. You can set the tolerance either individually by specifying values for each item or simultaneously by applying the tolerance table.

### Setting the Tolerance Individually

#### 1 Measure the target.



#### 2 Click [Tolerance Settings].



Item	Description
(Measurement list)	The measurement items are listed. When the inside of this table is clicked, the clicked cell is shown in yellow and its row is shown in blue. The characters of the corresponding measurement item in the preview screen are also shown in blue.
No.	The number of the measurement item is displayed. This number cannot be changed.
Item Name	The name of the measurement is displayed. This number cannot be changed.
Design value	Enter the design value of the measurement item.
Upper Tolerance	Enter the upper limit of the tolerance value.
Lower Tolerance	Enter the lower limit of the tolerance value.
Upper limit of Alert	Enter the upper limit for alert threshold.
Lower limit of Alert	Enter the lower limit for alert threshold.
	Only the places where the design values are 0 are automatically entered.
	Open the [Tolerance Table] dialog box to set the tolerance table.
	Clear the upper limit value and lower limit value you set in the measurement list.
[Apply Tolerance Table]	Apply the tolerance table set in the [Tolerance Table] dialog box to the tolerance values in the measurement list.

#### 3 Enter value(s) for “Design value” in the measurement list.

When [AUTO] is clicked, the value calculated by rounding off the second decimal place (for angle, first decimal place) of the measurement result is automatically entered to each item where the design value is 0.

#### 4 Enter values in “Upper Tolerance” and “Lower Tolerance” of the measurement list.

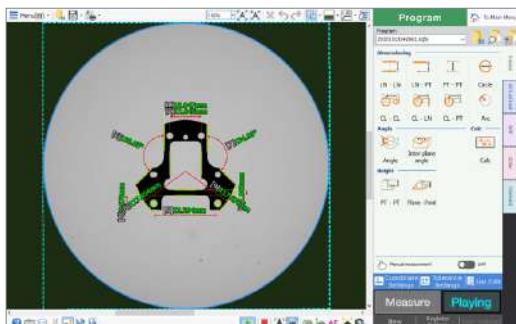
If the upper tolerance is entered when the lower tolerance is 0, “value with minus sign (-) put to the upper tolerance” will be entered automatically for the lower tolerance.

#### 5 Click [OK].

The specified tolerance settings are applied to the program for the measurement items.

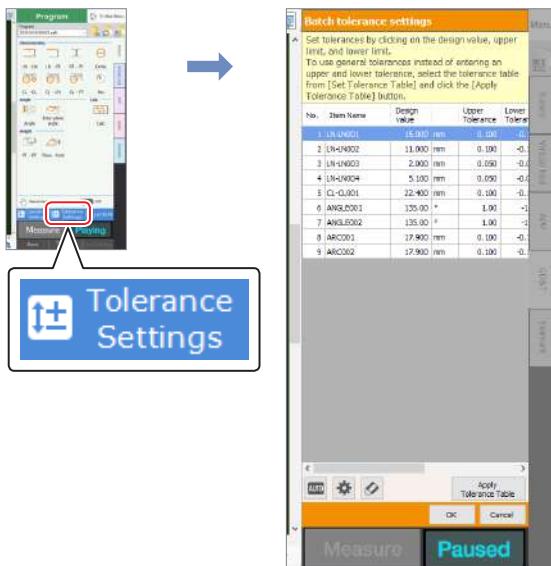
## ■ Setting the Tolerance Simultaneously

### 1 Measure the target.



**Important** You cannot set the tolerance when there is no measurement element.

### 2 Click [Tolerance Settings].

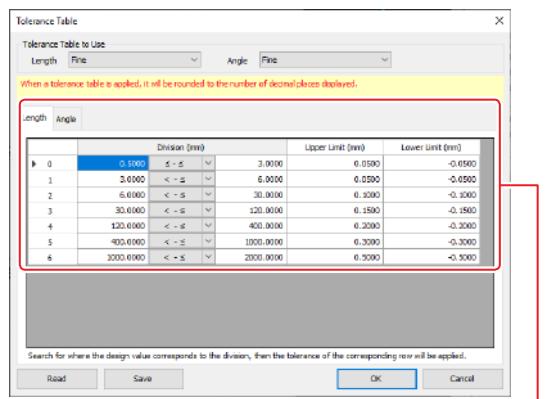


### 3 Enter value(s) for “Design value” in the measurement list.

**Important** To set the tolerance simultaneously, the design value(s) must be entered beforehand.

### 4 Click [Set Tolerance Table].

The [Tolerance Table] dialog box appears.



Tolerance table

Item	Description
Tolerance Table to Use	Select the tolerance table to apply to the measurement item.
Length	Select the tolerance table to apply to length dimensions from the dropdown list. The values and ranges in the table cannot be changed. Selectable: Fine, Medium, Coarse, options: Very coarse, and User defined*
Angle	Select the tolerance table to apply to angle dimensions from the dropdown list. The values and ranges in the table cannot be changed. Selectable: Fine, Medium, Coarse, options: Very coarse, and User defined*
[Length] tab	The details of the ranges of the tolerance table used for length dimensions are displayed.
[Angle] tab	The details of the ranges of the tolerance table used for angle dimensions are displayed.
[Read]	Read a tolerance table file (*.clr) stored in the controller.
[Save]	Save the completed tolerance table in the controller.

\* When [User defined] is selected, the user defined item will be added as the seventh item of “Fine”. You can set “Division”, “Upper Limit” and “Lower Limit” as desired. You can also edit, delete, or add rows to the existing items.

### 5 Select the tolerance table to apply.

Select options from the dropdown lists of [Length] and [Angle] respectively.

### 6 Click [OK].

## 7 Click the [Apply Tolerance Table].

The tolerance table you set in the [Tolerance Table] dialog box is applied to the tolerance values in the measurement list.



**The tolerance table is applied only to the rows in which both upper and lower tolerance limits are 0. The tolerance table is not applied to the rows in which a value other than 0 is entered for the upper/lower tolerance limit.**

## 8 Click [OK].

## 9 Click [Yes].

The specified tolerance settings are applied to the program for the measurement items.

## Setting the Tolerance Table

Set the tolerance table.

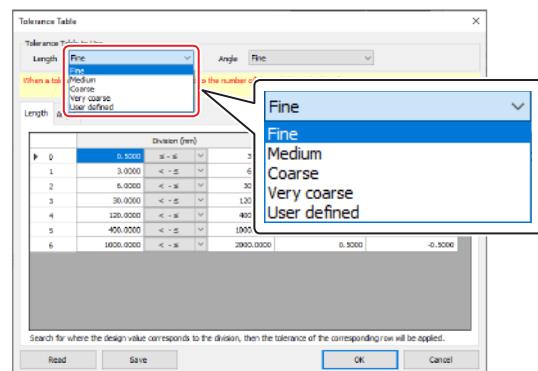
### User Defined Tolerance Table

You can register your desired tolerance settings in a user-defined tolerance table.

#### 1 Click [Set Tolerance Table] in the tolerance settings edit window.

The [Tolerance Table] dialog box appears.

#### 2 Select [User defined] from the dropdown list of [Length] or [Angle].



#### 3 Set [Division], [Upper Limit] and [Lower Limit].

To set a value, click the target cell to highlight it.

To change the range symbol, select one from the dropdown list.



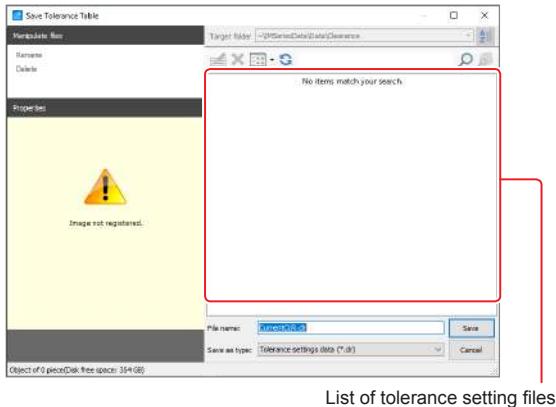
- The tolerance table value will be displayed with the maximum digits of the respective units for the length and angle.
- You can insert or delete rows by right-clicking the row number and selecting the option from the context menu.

#### 4 Click [OK].

## ■ Saving the Tolerance Table

Save the completed tolerance table in the controller.

- 1 Click [Save] of the [Tolerance Table] dialog box.**
- 2 Specify the name of the tolerance setting file to save and click [Save].**



**[Reference]** In the list of tolerance setting files, the tolerance setting files (\*.clr) stored in the controller are listed.

The tolerance table is saved in the controller.

- 3 Click [OK].**

## ■ Reading the Tolerance Table

Read a tolerance table file (\*.clr) stored in the controller.

- 1 Select [Menu] → [Setting] → [Tolerance settings] → [Set Tolerance Table].**
- 2 Click [Read] in the [Tolerance Table] dialog box.**  
The [Open Tolerance Table] dialog box appears.
- 3 Select the desired tolerance setting file (\*.clr) and click [Open].**  
The tolerance tables stored in the controller are displayed.
- 4 Click [OK].**

**[Important]** You need to click [Apply Tolerance Table] in the tolerance settings edit window to apply the tolerance settings read from the controller to the measurement items.  
**[Batch Tolerance Settings]** (Page 10-27)

## Alert Settings

When the tolerance has been set in measurement element, the threshold which displays warnings in relation to measurement result can be set.

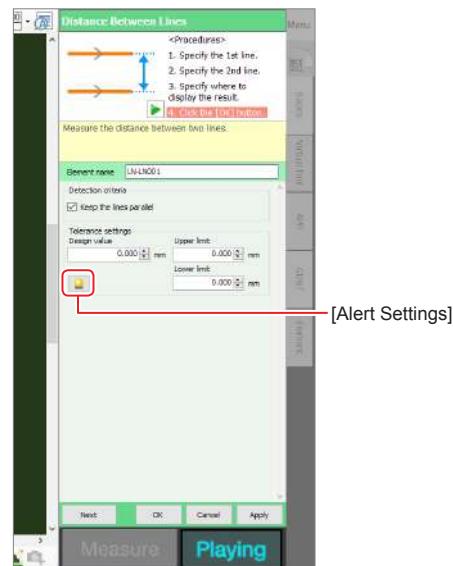
**► Important**

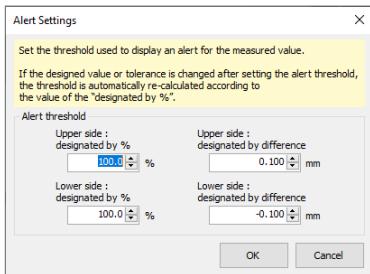
To set the alert threshold, you need to set the design value and tolerance axis in advance. In addition, the upper limit and lower limit of the tolerance need to be different.

**[Batch Tolerance Settings]** (Page 4-189)

## ■ Setting Alert Threshold Individually

- 1 Click [Alert Settings] in the measurement element edit window.**





Item	Description
Alert threshold	Set alert threshold.
Upper side: designated by %	Specify the alert threshold of the upper side by the ratio for the upper limit of tolerance.
Upper side: designated by difference	Specify a value for alert threshold of the upper side which is between the upper and lower limit of tolerance.
Lower side: designated by %	Specify the alert threshold of the lower side by the ratio for the lower limit of tolerance.
Lower side: designated by difference	Specify a value for alert threshold of the lower side which is between the upper and lower limit of tolerance.

**Reference** Either designated by % or by difference, the one that is input afterwards is prioritized. One of the values changes, correspondingly the other one will also change.

## 2 Set alert threshold.

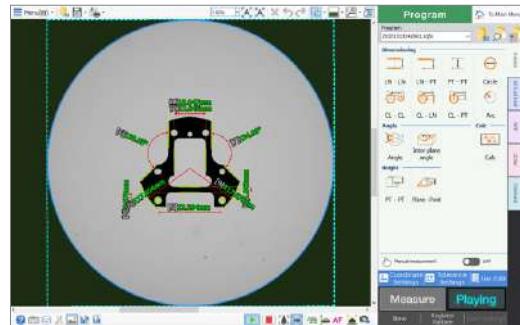
### 3 Click [OK].

The alert threshold you set is reflected in the measurement element.

**Reference** For measurement element with MMC/LMC specified, the alert threshold is calculated by the formula below.  
Alert threshold = (Tolerance + Bonus Tolerance) x [Upper side: designated by %]

## ■ Setting Alert Threshold Simultaneously

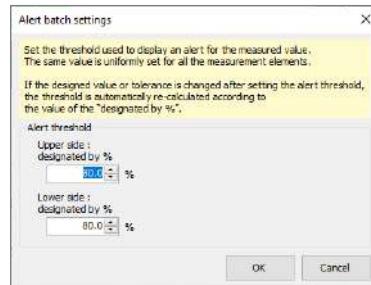
### 1 Measure the target.



### 2 Set tolerance for the measurement element.

**Reference** "Batch Tolerance Settings" (Page 4-189)

### 3 Select [Menu] → [Setting] → [Alert Batch Settings].



Item	Description
Alert threshold	Set alert threshold.
Upper side: designated by %	Specify the alert threshold of the upper side by the ratio for the upper limit of tolerance.
Lower side: designated by %	Specify the alert threshold of the lower side by the ratio for the lower limit of tolerance.

### 4 Set alert threshold.

### 5 Click [OK].

### 6 Click [Yes].

The alert threshold you set is reflected in all the measurement elements.

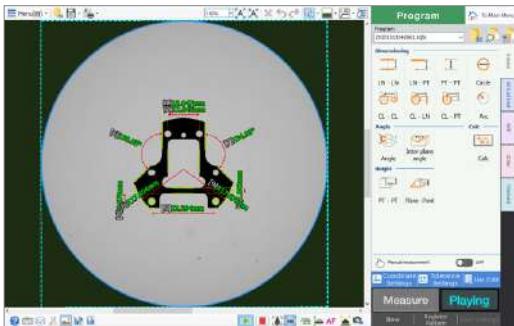
**Reference** For measurement element with MMC/LMC specified, the alert threshold is calculated by the formula below.  
Alert threshold = (Tolerance + Bonus Tolerance) x [Upper side: designated by %]

## Measurement Items

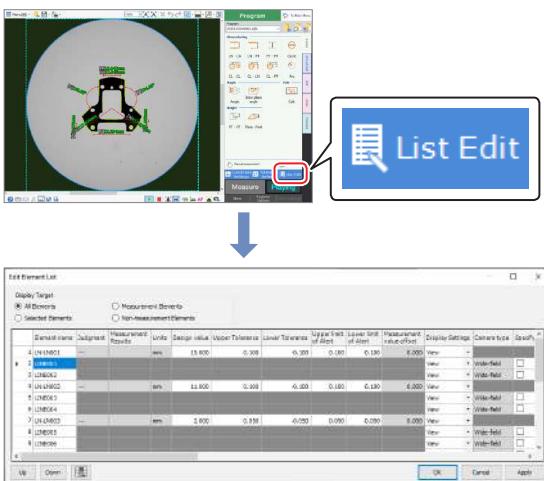
### Edit Element List

List the measurement results displayed in the preview display, and sort or show/hide them.

#### 1 Measure the target.



#### 2 Click [List Edit].



**Reference** The elements refer to all of the basic measurement, virtual tools, application tools, gd&t, element tools, and rotation measurement tools.

Item	Description
Display Target	Select the elements to be displayed in the list.
All Elements	Display all the elements in the list.
Measurement Elements	Display all the measurement results displayed on the preview display.
Selected Elements	Display only the element that is being selected on the preview display.
Non-measurement Elements	Display all the element tools and virtual tools.
(Element list)	Display the list of the elements. The selected cell is displayed in blue. You can change the value or setting of the white cells.
(No.)	The number of the element is displayed. This number cannot be changed.
Element Name	The name of the element is displayed.
(Element type)	The type of measurement element ([NUM], [PITCH], [Cumulative deviation], [Partial deviation]) is displayed.

Item	Description
Judgment	The evaluation result of the measurement element is displayed (OK, NG, Fail, or ---). This number cannot be changed.
Measurement Results	The measurement result of the measurement element is displayed. This number cannot be changed.
Units	The unit according to the element type (line, °, mm, mm²) is displayed.
Design value	The design value of the measurement element is displayed.
Upper Tolerance	Upper limit of the tolerance value of the measurement element is displayed.
Lower Tolerance	Lower limit of the tolerance value of the measurement element is displayed.
Upper limit of Alert	Display the upper limit for the alert threshold of the measurement element.
Lower limit of Alert	Display the lower limit for the alert threshold of the measurement element.
Measurement value offset	Display the value obtained by adding or subtracting the offset value to/from the measurement value as the measurement result.
Display Settings	Set to display or hide the elements.
Camera type	Display the camera type ([Wide-field], [High-precision]).
Specify the capture angle with value	Display whether or not the capture angle is specified and the setting value.
Capture angle reference	Display the reference element of the capture angle.
Auto angle capture	Display whether or not the auto angle capture is executed.
Specify search range	Display whether or not the search range of the auto angle capture is specified, and the angle from the capture angle reference.
Range	Display the search range of the auto angle capture (angle) by absolute value.
Specify the capture height with value	Display whether or not the capture height is specified and the setting value.
Capture height criteria	Display the specified reference element.
Auto focus capture	Display whether or not the auto focus capture is specified.
Execution timing	Display the execution timing of the auto focus capturing.
Specify search range	Display whether or not the search range of the auto focus capture is specified.
Start height	Display the start height of the search range of the auto focus capturing.
End height	Display the end height of the search range of the auto focus capturing.
Z Stage Position	Display the position of the Z stage of the element tool.
Capture angle	Displays the angle of the rotation unit.
Exposure	Display the exposure for the light of the element tool.
Back light	Display the intensity of the back light of the element tool.

Item	Description
Multi-angle (other than IM-8005)	Display the intensity of the multi-angle illumination of the element tool.
All (IM-8005 only)	Display the intensity of the ring illumination (All) of the element tool.
Near	Display the intensity of the ring illumination (Near) of the element tool.
Away	Display the intensity of the ring illumination (Away) of the element tool.
Right	Display the intensity of the ring illumination (Right) of the element tool.
Left	Display the intensity of the ring illumination (Left) of the element tool.
Slit ring (other than IM-8005)	Display the intensity of the slit ring illumination of the element tool.
Pos. (other than IM-8005)	Display the height (distance from the focus position) of the variable illumination unit.
External	Display the intensity of the external illumination of the element tool.
[Up]	Move the row of the selected measurement result up 1 row.
[Down]	Move the row of the selected measurement result down 1 row.
	Displayed when changing the measurement value offset is restricted in the security settings. Canceling the restriction from this button enables change for all measurement value offsets.
[Apply]	Reflect the configured contents to the preview display.



**Evaluations of the hidden measurement elements are not included in the overall OK/NG evaluation.**

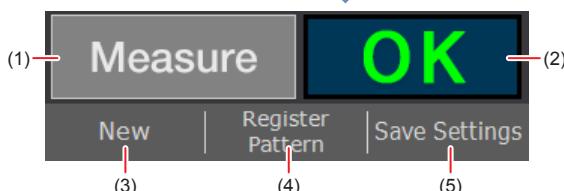
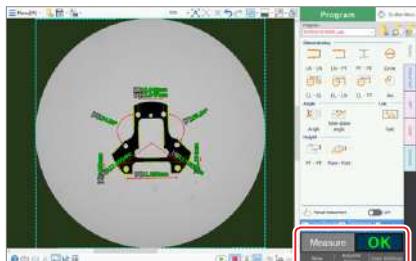
### 3 Change the settings as necessary and click [OK].

The configured contents are reflected to the corresponding measurement element.

# Common Control Area

## Common Control Area

This section describes the “common control area” used for the program.



Name	Function
(1) [Measure]	Used to start measurement. ↳ “Measure” (Page 4-196)
(2) Status/ evaluation display area	This area indicates the operation status of the head or the evaluation result when [Measure] is pressed. ↳ “Status/Evaluation Display Area” (Page 6-20)
(3) [New]	Create new program data.
(4) [Register Pattern]	Used to register the target shown in the preview display as a pattern. ↳ “Register Pattern” (Page 4-198)
(5) [Save Settings]	Used to save the Program data to the controller’s hard drive as a file (*.sqfx). ↳ “Storing the Program Data” (Page 4-208)

4

Program

## Measure

Clicking [Measure] in the common control area starts measurement. Use this button to start measurement after all measurement items are set.

### 1 Click [Measure].

The preview display shows the measurement values, and the Status/evaluation display area shows the evaluation result.

## New

Clicking [New] in the common control area creates new Program data.

Reference If any Program data is being edited, be sure to save the file before clicking [New].

### 1 Click [New].

For the details about creating new, refer to □ “Creating New Program Data” (Page 4-6).

## Register Pattern

Clicking [Register Pattern] in the common control area registers the target shown in the preview screen as a pattern.

Reference By registering targets as patterns, you can use the pattern search function during multi measurement.

### 1 Click [Register Pattern].

For details of the pattern registration, refer to □ “Register Pattern” (Page 4-198).

## Save Settings

Clicking [Save Settings] in the common control area saves the current Program data into the controller as a file.

### 1 Click [Save Settings].

For details of the setting procedure, refer to □ “Storing the Program Data” (Page 4-208).

## MEMO

4

Program

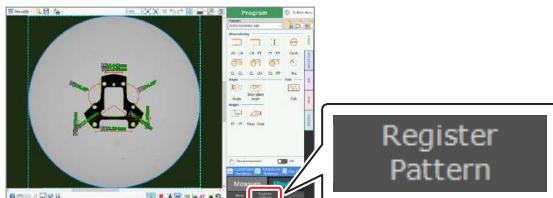
# Register Pattern

## Register Pattern

Register the image pattern of a target in the program data.  
By registering the patterns, you can use the pattern search function.

### ■ Registering Pattern Image

#### 1 Click [Register Pattern].



#### 2 When the pattern search is successful, a message box to confirm the registration appears. Click [Yes].



The pattern image registration is complete.



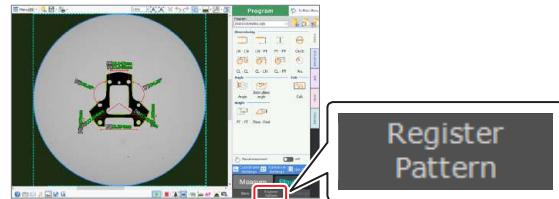
**Point** When measuring a target with a shaft shape using the rotation unit IM-RU1, click [No], and set the range whose shape does not change even if rotated as a pattern range.



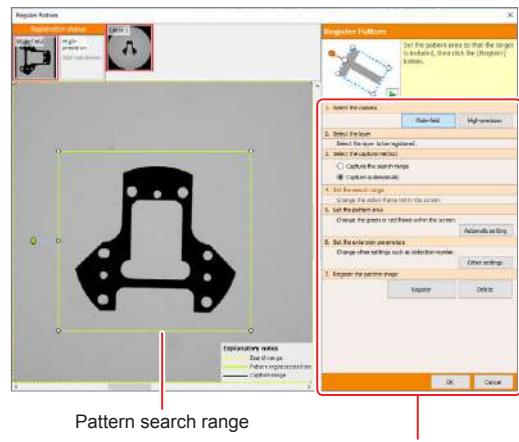
**Reference** When the pattern search fails, a message box to notify it appears. In that case, specify a pattern search range manually from the [Register Pattern] dialog box, and register the pattern image.  
For details of the [Register Pattern] dialog box, refer to "Register Pattern Image" (Page 10-20).

### ■ Confirming/Editing the Pattern Image

#### 1 Click [Register Pattern].



#### 2 Edit the pattern image.



#### ● Pattern registration setting area

##### ○ Select the camera

- [Wide-field]  
Display the layer image of the wide-field measurement mode.
- [High-precision]  
Display the layer image of the high-precision measurement mode.

##### ○ Select the layer

The selected layer image in the layer list is displayed in the preview screen.

##### ○ Select the capture method (only when the rotation unit IM-RU1 is not used)

- Capture the search range  
Select this when executing [Set the search range]. The pattern search range is displayed in the preview screen by rectangle with yellow dotted line.
- Capture automatically  
Capture the target by determining automatically.

##### ○ Set the search range

The search range (yellow dotted line) displayed in the preview screen can be adjusted manually.

##### ○ Set the pattern area

The pattern registration position (red dotted line) displayed in the preview screen can be adjusted manually.  
Click [Automatic setting] to automatically set the pattern registration position.

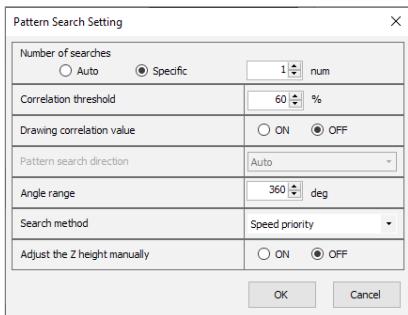
##### ○ Set the extension parameters

Click [Other settings] to display the [Pattern Search Setting] dialog box.

##### ○ Register the pattern image

- [Register]  
Register the images in the pattern search range as pattern images.
- [Delete]  
The registered pattern image is deleted.

## ● The [Pattern Search Setting] dialog box



### ○ Number of searches (other than when the rotation unit IM-RU1 is connected)

Specify the number of measurement items to be detected in the pattern search.  
Selecting [Auto] measures the target(s) (max: 100) by determining it automatically.  
Selecting [Specific] determines the target(s) to be measured by specifying the number of the target(s). When the multiple number of the same target are put onto the stage and measured at once, specify the number of the targets.

### ○ Correlation threshold

The correlating value is a score (max: 100%) of the "degree of similarity" between the registered pattern image and the actual captured image, when the pattern search is executed.  
When the correlating value does not reach the set threshold, the measurement is not performed.

### ○ Drawing correlation value

Selecting this displays the calculated correlating value in the preview screen, when the pattern search is executed in the Run mode. However, it is displayed only when the frame of the pattern search appears on the preview screen in the multiple batch measurement.

### ○ Pattern search direction (other than when the rotation unit IM-RU1 is connected)

Select the direction for executing the pattern search. When [Number of searches] is one, this is displayed in gray out.

### ○ Angle range

Specify the range of the pattern search in degrees. When the range is specified, the rotation angle of the pattern search will be limited.

When 180 degrees are specified, the pattern search will be performed within the range of ±90 degrees.

### ○ Search method

Select the search method from "Speed priority" or "Accuracy priority".

### ○ Rotation angle range (only when the rotation unit IM-RU1 is connected)

Specify the range of the pattern search in degrees of rotation.  
Specifying the range rotates the target within the setting range, and conducts the pattern search using the angle with the highest correlating value.

When 180 degrees are specified, the pattern search will be performed within the range of ±180 degrees.

### ○ Adjust the Z height manually

Selecting this can manually adjust the Z height with which the pattern search is executed in the Run mode.  
The pattern search is executed with the Z height when the measurement is performed.

# Light Settings

## Light Settings

Adjust the light when it is difficult to extract the target edges properly.

### Light Setting Procedure

#### ■ IM-8005



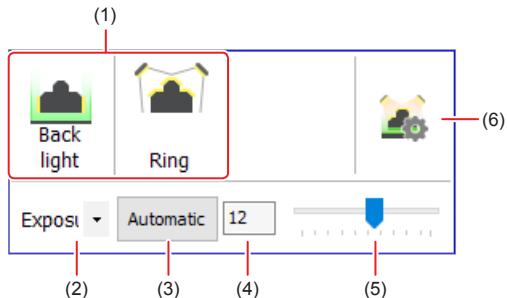
The illumination setting can only be done in the case of "Playing".

#### ● Easy Setting

**1** Click [Start preview] on the toolbar.

**2** Click [Change illumination] on the toolbar.

**3** Set the illumination settings.



Number	Description
(1)	This shows [Illumination setting]. When this button is clicked, the setting is switched to the predetermined light setting to automatically adjust the exposure. <ul style="list-style-type: none"> <li>• Back light</li> <li>• Ring</li> </ul>
(2)	Select the item to adjust from the dropdown list. Selectable options: Back light/Ring light/Near/Away/Right/Left/ External/Exposure
(3)	When "Exposure" has been selected in (2), [Automatic] is displayed on the right side, and clicking it adjusts the exposure automatically. Clicking with the edge detection range selected automatically perform the adjustment within its range. If the illumination has been selected in (2), when this check box is selected, the light intensity can be adjusted in (5).
(4)	When an illumination has been selected in (2), the light intensity will be displayed. When an exposure has been selected in (2), the exposure will be displayed.
(5)	The light intensity or exposure selected in (2) can be adjusted. When the slider is dragged, settings will be shown.
(6)	Click this to display the [Light, exposure adjustment] window. "Advanced Settings" (Page 4-201)



For the Program data in which using coaxial light has been set in [Capture range setting], [Illumination setting] in (1) cannot be used.

**4** After completing the illumination setting, move the mouse cursor out of the [Illumination setting] dialog box.

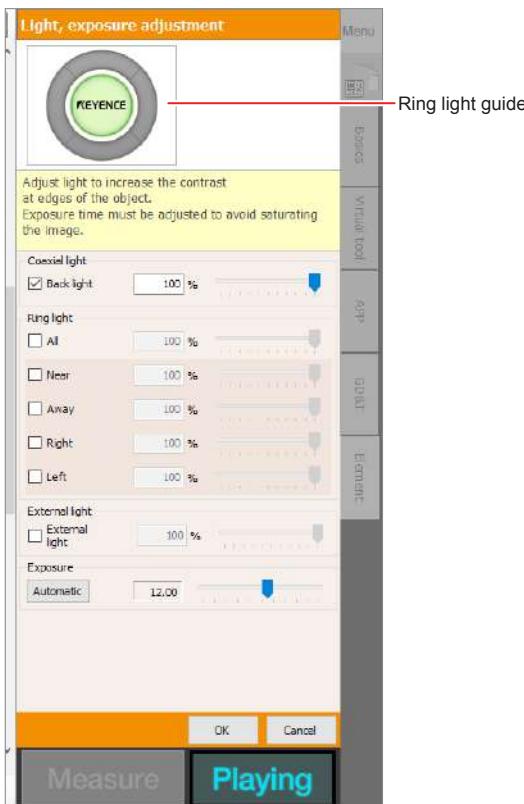
## ● Advanced Settings

- 1 Click [Start preview] on the toolbar.**
- 2 Select [Menu]→[Illumination/Camera/Stage control]→[Change illumination].**



You can also click [Change illumination] to display the [Light, exposure adjustment] window.  
 "Easy Setting" (Page 4-200)

## 3 Adjust the lights and exposure.



Item	Description
Ring light guide	The lighting image of ring light is displayed based on the status of [Coaxial light] and [Ring light].
Coaxial light (Back light)	When this check box is selected, the back light turns on. Adjust the intensity of the coaxial light with the slider. When the slider is dragged, the light intensity is shown in the box on the left. Also you can enter the light intensity directly in the box.

Item	Description
Ring light	Set the ring light.
All	When the check box is selected, the corresponding part of the variable illumination unit turns on.
Near	Adjust the light intensity of the variable illumination unit individually with the slider for each part. When the slider is dragged, the light intensity is shown in the box on the left.
Away	Also you can enter the light intensity directly in the box.
Right	
Left	
External light	When this check box is selected, the external light turns on. Adjust the intensity of the external light with the slider. When the slider is dragged, the light intensity is shown in the box on the left. Also you can enter the light intensity directly in the box.
Exposure	The camera exposure can be set. When the slider is dragged, the exposure is shown in the box on the left.

\* Back light: 100%, and check boxes other than [Back light] are unselected.



Normally, set the light intensity to 100% and adjust the brightness by the exposure.

## 4 Click [OK].

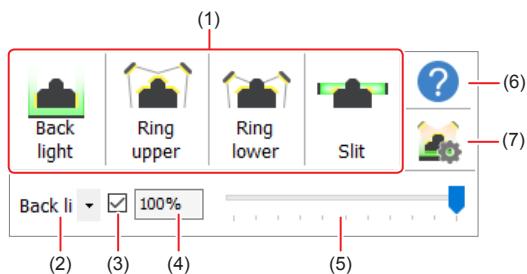
## ■ IM-8020/8030/8030T



The illumination setting can only be done in the case of "Playing".

### ● Easy Setting

- 1** Click [Start preview] on the toolbar.
- 2** Click [Change illumination] on the toolbar.
- 3** Set the illumination settings.



Number	Description
(1)	This shows [Illumination setting]. When this button is clicked, the setting is switched to the predetermined light setting to automatically adjust the exposure. • Back light • Ring upper • Ring lower • Slit
(2)	Select the item to adjust from the dropdown list. Selectable options: Back light/Multi-angle/Near/Away/Right/Left/Slit ring/Pos./External/Exposure
(3)	When "Exposure" has been selected in (2), [Automatic] is displayed on the right side, and clicking it adjusts the exposure automatically. Clicking with the edge detection range selected automatically perform the adjustment within its range. If the illumination has been selected in (2), when this check box is selected, the light intensity can be adjusted in (5).
(4)	When an illumination has been selected in (2), the light intensity will be displayed. When "Illuminating position" has been selected in (2), the illumination height will be displayed. When an exposure has been selected in (2), the exposure will be displayed.
(5)	The light intensity, illumination height, or exposure selected in (2) can be adjusted. When the slider is dragged, settings will be shown.
(6)	When this button is clicked, the guide on how to apply lighting will be displayed.
(7)	Click this to display the [Light, exposure adjustment] window. "Advanced Settings" (Page 4-203)



For the Program data in which using coaxial light has been set in [Capture range setting], [Illumination setting] in (1) cannot be used.

- 4** After completing the illumination setting, move the mouse cursor out of the [Illumination setting] dialog box.

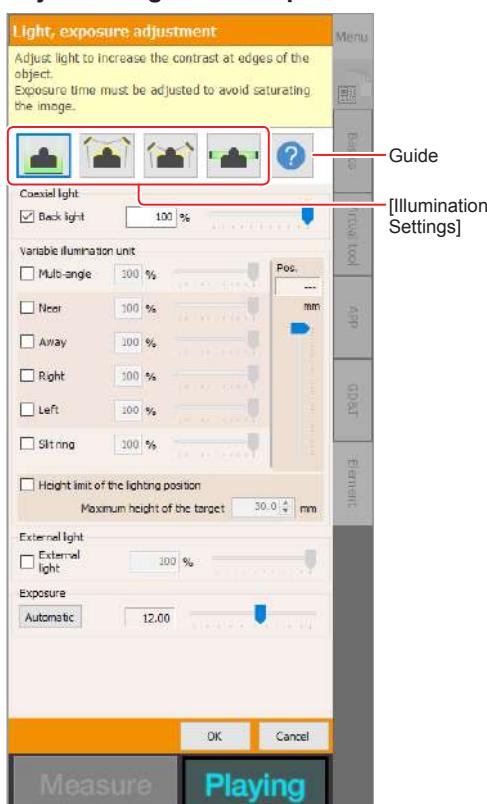
## ● Advanced Settings

- 1 Click  [Start preview] on the toolbar.
- 2 Select [Menu]→[Illumination/Camera/Stage control]→[Change illumination].



You can also click  [Change illumination] to display the [Light, exposure adjustment] window.  
□ "Easy Setting" (Page 4-202)

## 3 Adjust the lights and exposure.



Item	Description
Variable illumination unit	Set the variable illumination unit.
Multi-angle	When the check box is selected, the corresponding part of the variable illumination unit turns on.
Near	Adjust the light intensity of the variable illumination unit individually with the slider for each part. When the slider is dragged, the light intensity is shown in the box on the left.
Away	Also you can enter the light intensity directly in the box.
Right	When the check box is selected, the corresponding part of the variable illumination unit turns on.
Left	Adjust the light intensity of the variable illumination unit individually with the slider for each part. When the slider is dragged, the light intensity is shown in the box on the left.
Slit ring	Also you can enter the light intensity directly in the box.
Pos.	You can adjust the position of the variable illumination unit. When the slider is dragged, the height of the variable illumination unit (distance from the focus position) is shown in the box above.
Height limit of the lighting position	When this check box is selected, you can set the lower limit value of the illuminating position. The interval between the glass surface of the Z Stage and the lighting cannot be shorter than the distance set in [Maximum height of the target].
External light	When this check box is selected, the external light turns on. Adjust the intensity of the external light with the slider. When the slider is dragged, the light intensity is shown in the box on the left. Also you can enter the light intensity directly in the box.
Exposure	The camera exposure can be set. When the slider is dragged, the exposure is shown in the box on the left. Clicking [Automatic] adjusts the exposure automatically.



- For the Program data in which using coaxial light has been set in [Capture range setting], [Illumination setting] cannot be used.
- Normally, set the light intensity to 100% and adjust the brightness by the exposure.

## 4 Click [OK].

Item	Description
[Illumination Settings]	When this button is clicked, the setting is switched to the predetermined light setting to automatically adjust the exposure. <ul style="list-style-type: none"> <li>• Back light</li> <li>• Ring upper</li> <li>• Ring lower</li> <li>• Slit ring</li> </ul>
Coaxial light	Adjust the intensity of the coaxial light with the slider. When the slider is dragged, the light intensity is shown in the box on the left. Also you can enter the light intensity directly in the box.
Back light	When this check box is selected, the back light turns on.

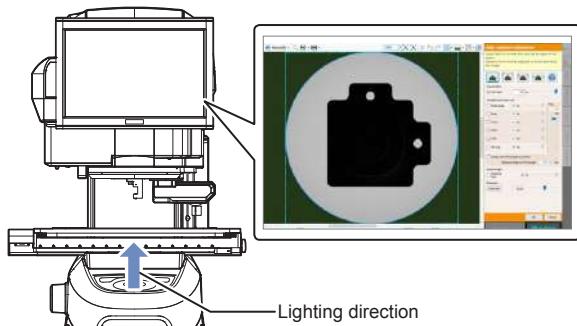
## Illumination Types

This section explains the illumination types selectable in the light exposure adjustment window.

- Use the back light for the outer dimension measurement of a target.
- Use the ring light, or variable illumination unit for the measurement of the section through which the illumination light cannot pass.

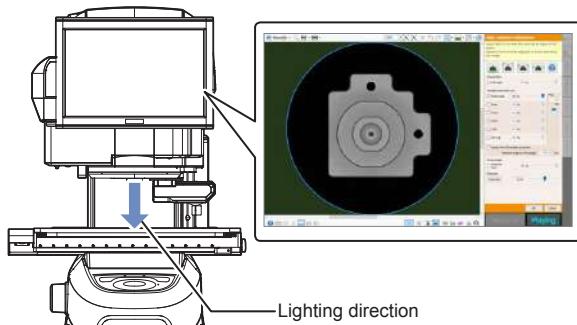
### ● Back light

The light is applied from below the Z stage to project the target image in a silhouette.



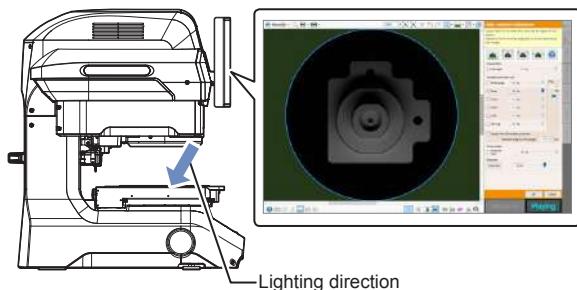
### ● Ring illumination (All)/Multi-angle illumination (All)

The light is applied from above the Z stage (epi-illumination). The patterns or other conditions on the target surface can be shown.



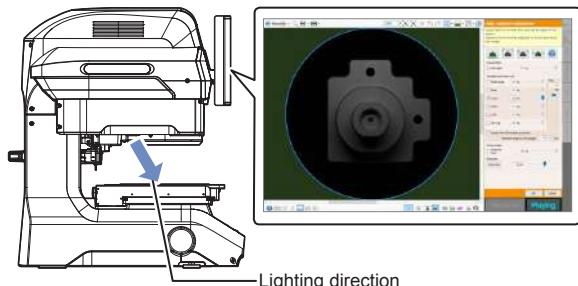
### ● Ring illumination (Near)/Multi-angle illumination (Near)

Turn on only the front side of the ring light/multi-angle light.



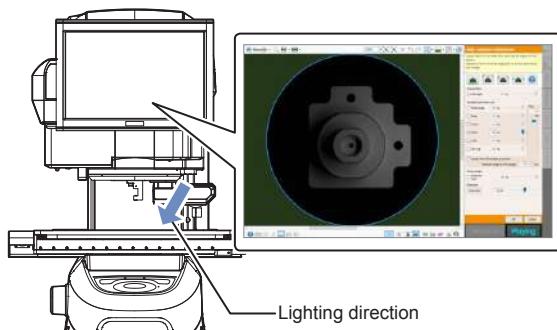
### ● Ring illumination (Away)/Multi-angle illumination (Away)

Turn on only the back side of the ring light/multi-angle light.



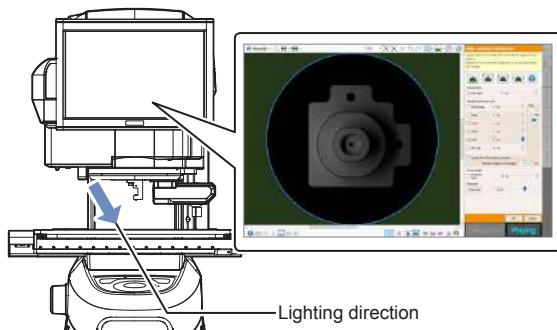
### ● Ring illumination (Right)/Multi-angle illumination (Right)

Turn on only the right side of the ring light/multi-angle light.



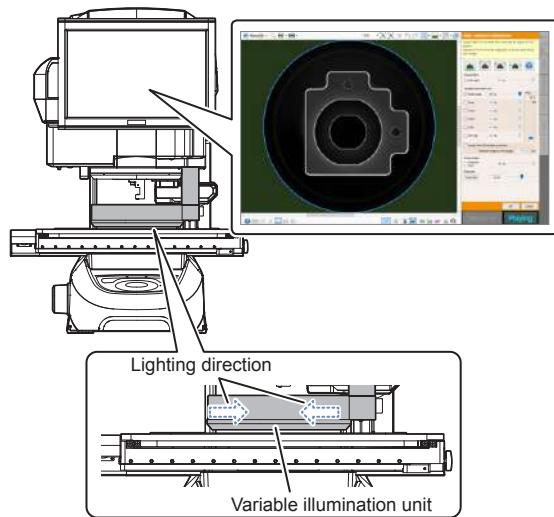
### ● Ring illumination (Left)/Multi-angle illumination (Left)

Turn on only the left side of the ring light/multi-angle light.



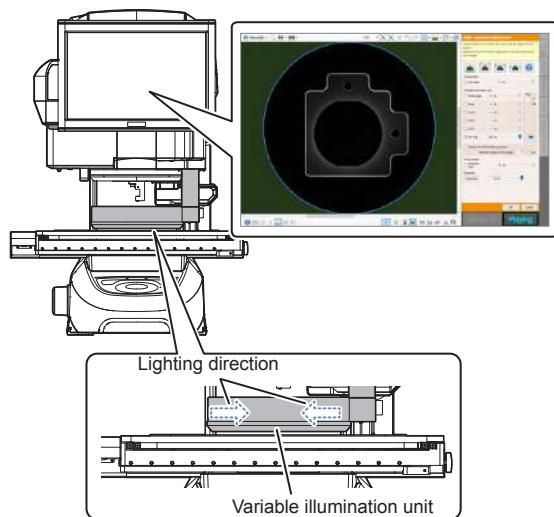
### ● Multi-angle illumination (Lower)

The light is applied from a side of the target. The contrast becomes stronger by the complicated shape of the target.



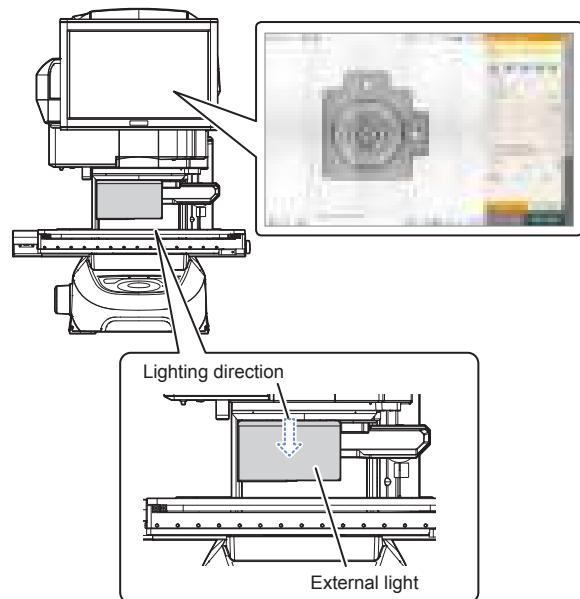
### ● Slit ring light

The light is applied from a side of the target. The edge of the target can be displayed.



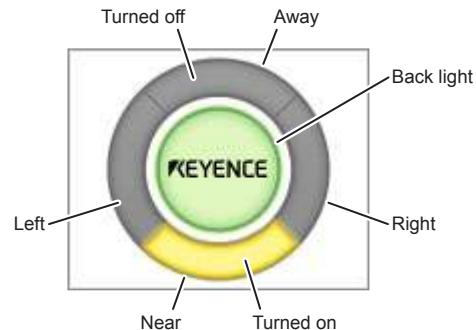
### ● External light

The images differ depending on the type of the external light. For procedure to connect the external light, refer to ["Connecting the External Light"](#) (Page 2-12).



## Ring Light Guide

The lighting image of ring light is displayed.



Reference The above figure shows the condition where [Back light] and [Near] are selected.

## Exposure Setting

Set the exposure (camera's shutter speed) while adjusting the ring light. The longer the exposure is, the brighter the preview screen becomes.



**If the light saturates, the background of the preview display is shown in yellow.**

If the area near the target edge saturates, the measurement accuracy may degrade. In such a case, adjust the exposure to avoid saturation.

["Show Saturated Pixels"](#) (Page 10-57)

## Optimal Illumination Search (IM-8020/8030/8030T)

Use this when it is difficult to extract the target edges properly. Among the results of capturing/measurement under automatically changed illumination/exposure setting, you can select the setting of the illumination/exposure with which the best edge was extracted/measured, and use this setting for the measurement items.

- Important** The measurement items for which the optimal illumination search is available are the element tool. Note that the items are unavailable from [Auto Generate] of the element tool.  
□ "Element" (Page 4-123)

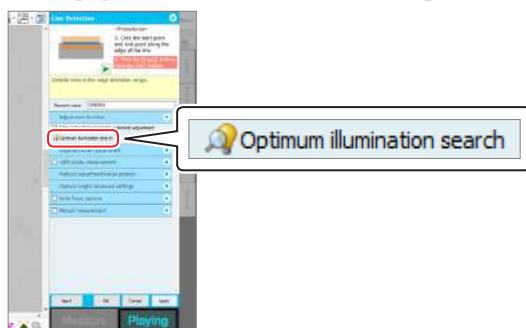
### 1 Create an edge detection range by using the measurement items where the optimal illumination search is available.

For details on the procedure for setting the measurement, refer to □ "Program Procedure" (Page 4-6).

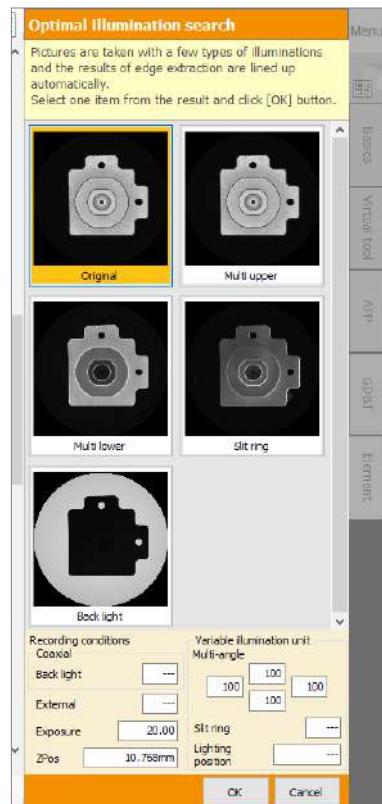
### 2 Click [Apply].

If the edge you want to measure cannot be extracted, perform the following procedure.

### 3 Click [Optimum illumination search].



The optimum illumination search is executed.



Item	Description
Original	The image taken with the illumination setting before the execution of the optimal illumination search is displayed.
Multi upper	The image taken with the light irradiation from a high position by using [Multi-angle] is displayed.
Multi lower	The image taken with the light irradiation from a low position by using [Multi-angle] is displayed.
Slit ring	The image taken with the light irradiation from a side by using [Slit ring] is displayed.
Back light	The image taken with back light illumination is displayed.

□ Reference The condition used for taking the selected image is displayed in [Recording conditions].

#### Technical Hint

If multiple edges are detected in an edge detection area, the operation guidance displays a dropdown list.

Multiple edges are detected.  
 Edges can be selected via dropdown list.

Switch the dropdown list to select an edge to use for measurement. The selected edge is reflected in the preview screen.

When  is clicked, the measurement result by the selected edge is displayed, and the operation guidance display returns to its original state.

- 4 From the result of the optimal illumination search, select the image with the illumination setting where the edge you want to measure is most optimally detected/measured.**

A selected image is reflected on the preview display.

- 5 Click [OK].**

The screen returns to the edit window of the measurement items. The settings of the selected image are used for the settings of the illumination/exposure. The selected image is displayed on the preview screen.

- 6 Click [OK].**

The setting is confirmed and the screen returns to the initial screen of the [Program] mode.

4

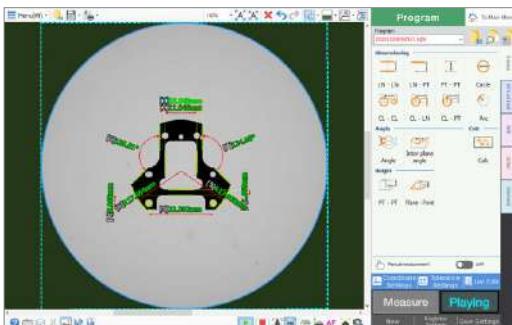
Program

# Storing the Program Data

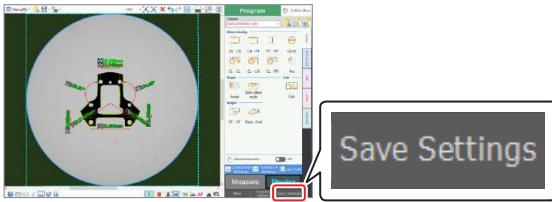
## Storing the Program Data

Save the measurement items set in the Program mode as "Program data". The saved files can be used in the Run mode.

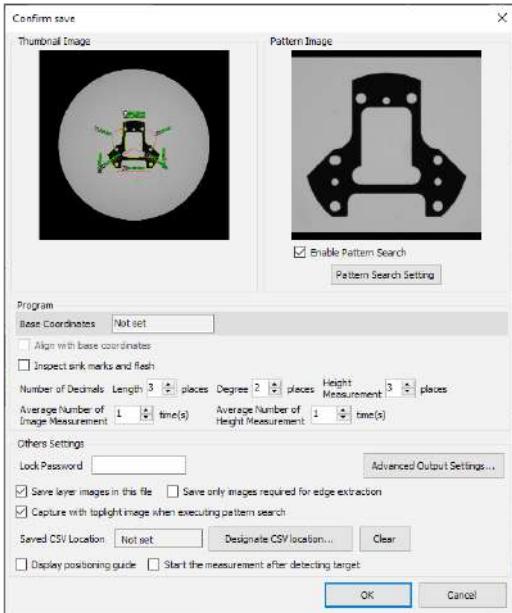
### 1 Measure a target in the Program mode.



### 2 Click [Save Settings].



The [Confirm save] dialog box appears.



- For details of the [Confirm save] dialog box, refer to ["Program"](#) (Page 10-14).
- You can also display the [Confirm save] dialog box by clicking on the toolbar.

### 3 Click [OK].

- If no pattern image has been registered, a confirmation message is displayed.  
 "Register Pattern" (Page 4-198)

The [Save Program] dialog box appears.



### 4 Input a file name and click [Save].

The Program data is saved and the screen returns to the Program mode.

- If the file name of the Program data is not specified, it is assigned as "Year + Month + Day + Hour + Minute + Second".
- The file extension of the Program data is ".sqfx".
- When editing the existing Program data and storing it with a name, if [Combines the statistical data accumulated under previous settings with the new settings.] at the bottom in the [Save Program] dialog box is selected, the result measured with the Program before editing is copied as a new measurement result.

# 5

## Integrate Multi Programs

This chapter explains the operation procedures and functions of the [Integration] mode.

<b>Creating and Confirming the Combined Program...</b>	<b>5-2</b>
<b>Run Mode Using the Combined Program Data .....</b>	<b>5-5</b>
<b>Create Auto Switch Setting .....</b>	<b>5-7</b>
<b>Run Mode Using the Automatic Switch Program....</b>	<b>5-8</b>

5

Integrate Multi Programs

# Creating and Confirming the Combined Program

In the [Combine multi Programs] mode, you can create "combined program" by combining program data created from multiple planes (orientations) for 1 target.

You can confirm the contents of the created "combined program" in the [Program] mode.

## Creating the Combined Program

### Important

You need to save one or more program data in the Program mode as a file(s) before creating combined program.

You cannot create combined program if there is no program data saved in the controller.

["Chapter 4 Program" \(page 4-1\)](#)

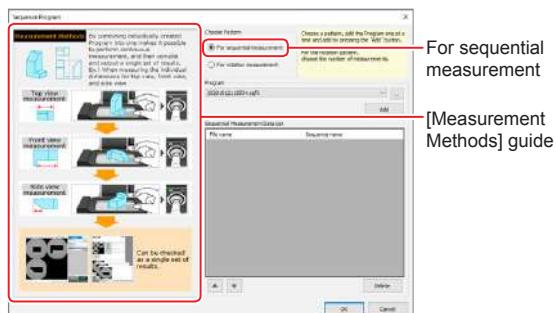
- On the main menu, select [Integration] and click [Combine multi Programs].



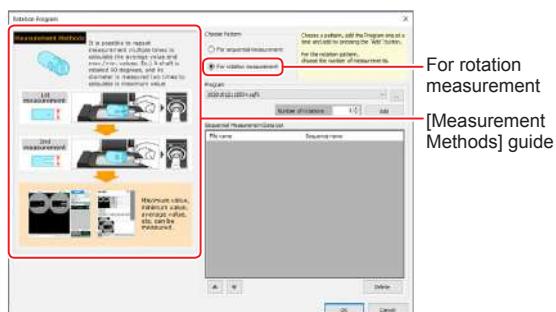
- Select "Choose Pattern".

The [Measurement Methods] guide corresponding to the combining pattern is displayed.

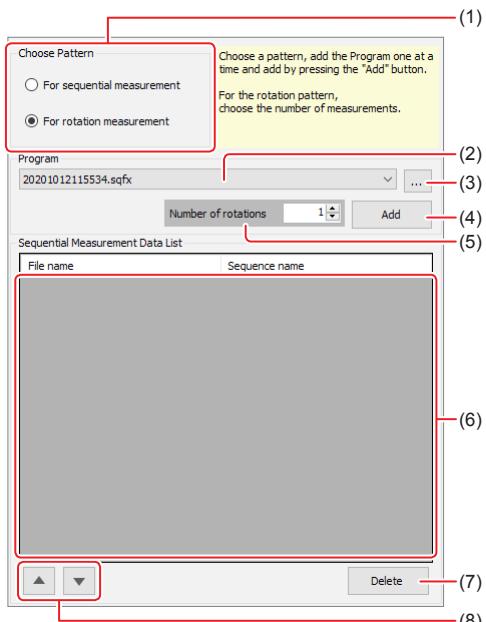
- When you select [For sequential measurement].



- When you select [For rotation measurement].



- Select the Program data to be included in the combined Program.



Number	Description
(1)	As the combining pattern, select either [For sequential measurement] or [For rotation measurement].
(2)	Select program data to be included in the combined program from the dropdown list.
(3)	Click [...] to display the [Open Program] dialog box. You can select Program data to be included in the combined Program data from all of the Program data stored in the controller.
(4)	When [Add] is clicked, the Program data displayed in (2) is registered to (6).
(5)	This item is displayed only when [For rotation measurement] is selected in (1). When you specify the value for [Number of rotations] and click [Add], the Program data selected in (2) is registered to (6) in accordance with the specified number.
(6)	This is the list of Program data to be included in the combined Program data. In [Run] using the combined Program, targets are measured in the order registered in this list.
(7)	When [Delete] is clicked, the Program data selected in (6) is deleted from the list.
(8)	Move the Program data selected in (6) to the direction of the clicked arrow. When they are moved, the order of measurement to be conducted changes.

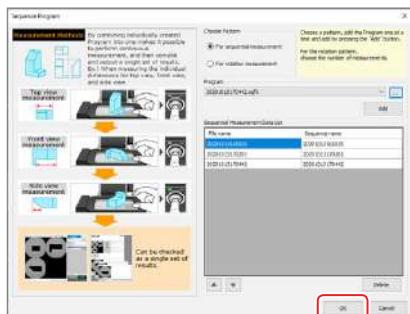
### Important

The multiple pattern search settings being set as multiple cannot be included in the linked Program data.

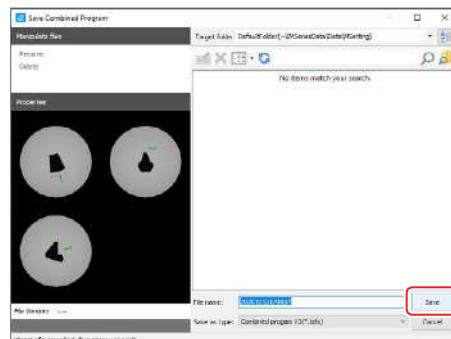
### Point

Up to 9 program data can be combined.

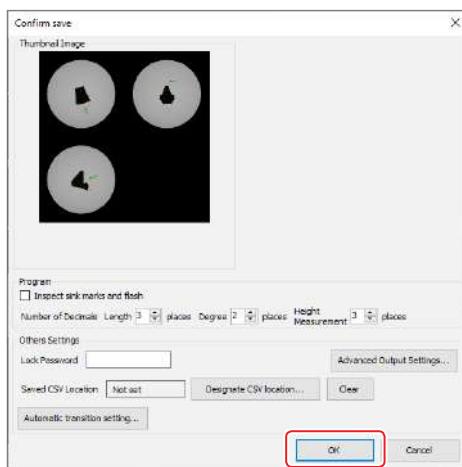
## 4 Click [OK].



## 6 Input a file name and click [Save].

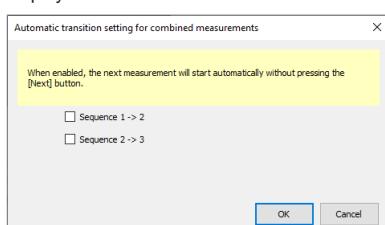


## 5 Click [OK].



### ● Automatic transition setting

When [Automatic transition setting] is clicked, the [Automatic transition setting for combined measurements] dialog box is displayed.



When the check box is selected, the next measurement will start automatically without pressing [Next] between the corresponding sequences.



**Point** During the sequence intervals for which the check boxes are selected, the orientation and position of the measurement target cannot be changed.

## Q-DAS Output Settings for the Combined Program

Even if the combined Program is created by using the Program data where Q-DAS output is set, the Q-DAS output settings are not carried over. After creating the combined Program, configure the settings again.



For details on Q-DAS Output settings, refer to **Q-DAS Setting** (page 10-40).

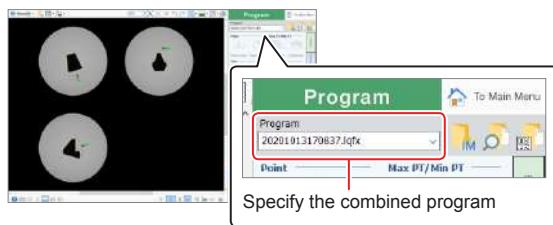
## Confirming the Combined Program

You can confirm the contents of the created combined program in the [Program].

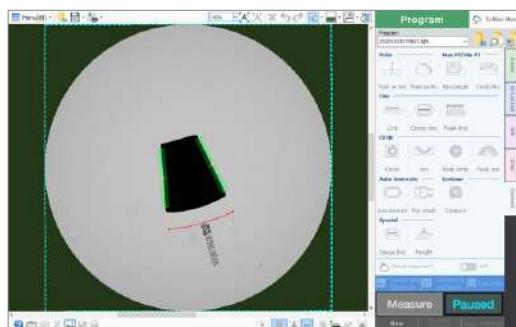
- Click [Program] in the main menu.



- Specify the created combined Program in the Program data specification area.



- Click the thumbnail image of UnificationScreen, and confirm individual Program data included in the combined Program.



**Reference** Click the preview display again to return to the UnificationScreen.

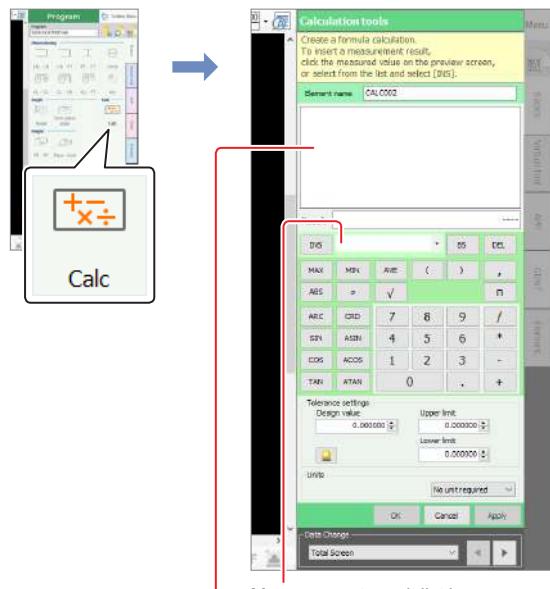
**Point** Individual Program data cannot be edited in the combined Program data. To edit them, edit and save individual program data before being combined, and then, create the combined program again.

## Calculation Settings for Combined Programs

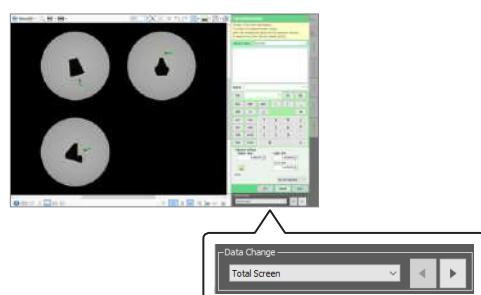
The calculation can be conducted using the measurement elements included in the combined program.

- Click [Calc].

The [Calculation tools] is displayed in the [Measurement operation area].



For details about calculation tools, refer to **Calc** (page 4-36). Click **◀ ▶** on the [Data Change] area to switch the UnificationScreen and Individual screen of the combined Program.



- Input a formula in the calculation input box.

For details about the calculation formula, refer to **Calc** (page 4-36).

- After inputting the formula, click [OK].

The calculation result is displayed on the preview display.

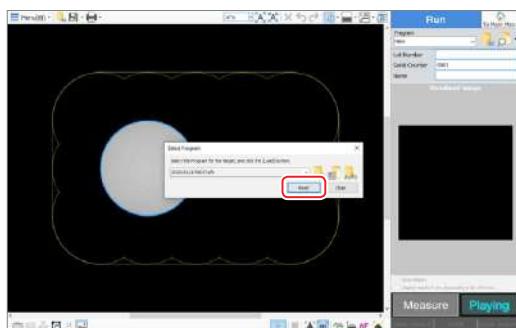
# Run Mode Using the Combined Program Data

Use the created "combined Program data" to perform Run mode. You can measure one target from multiple conditions and save as a single object report.

## 1 Click [Run].

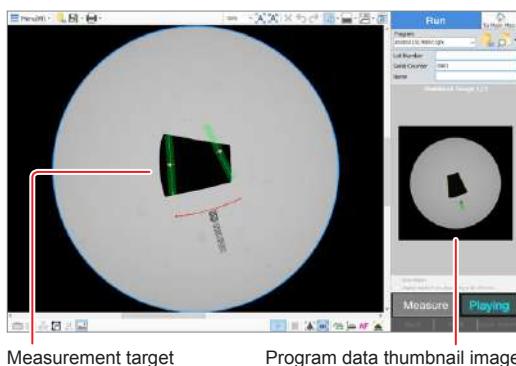


## 2 Select the combined Program data and click [Read].



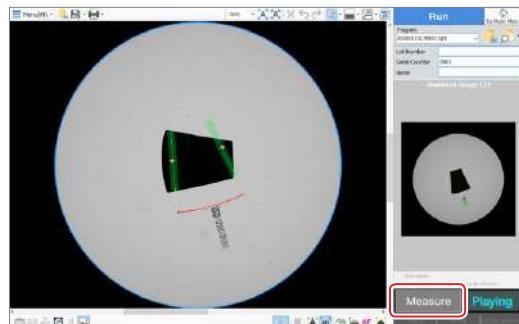
For details of specifying the Program data area and the combined Program, refer to ["Reading the Program Data"](#) (page 6-7).

## 3 Place the target in the center of the stage glass in accordance with the plane (orientation) of the "Program data thumbnail image".

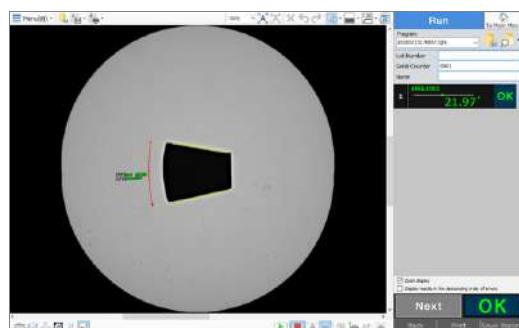


## 4 Press [MEASURE] for the head. Alternatively, click [Measure] in the common control area.

For details of the measurement procedure, refer to ["Run Mode Procedure"](#) (page 6-11).



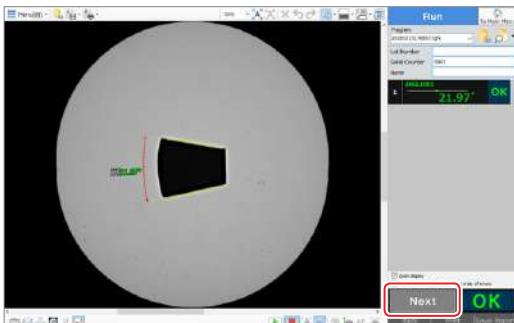
The measurement values and evaluation results are displayed.



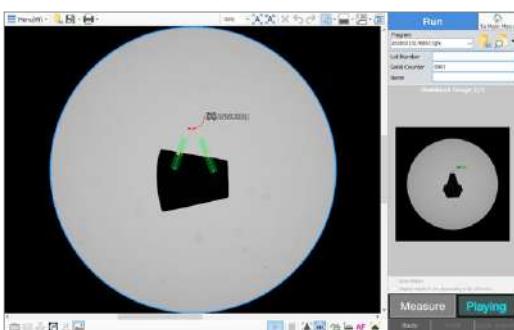
For details of the measurement results, refer to ["Confirming the Measurement Result"](#) (page 6-13).

## 5 Click [Next].

-  If the automatic transition setting has been performed, steps 5 and 6 are not required.  
 "Creating the Combined Program" (page 5-2)

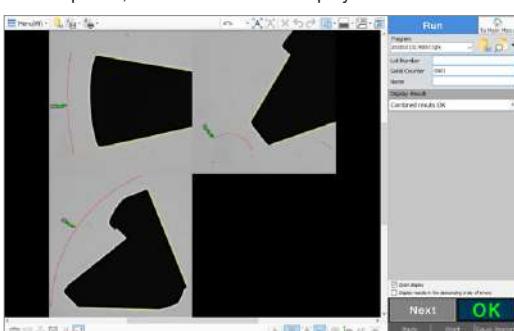


The preview display and the program data thumbnail image change to the one of the next program.



## 6 Repeat Steps 3 through 6 to measure the target from multiple planes (orientations).

When all of the measurements included in the combined program are completed, the overall result is displayed.



-  • For details of measurement results that use a combined Program, refer to  "Measurement Result on the Combined Program Data" (page 6-14).  
• When [Print] is clicked, the item specified with the toolbar can be printed.  
 "Print" (page 6-21)  
• By clicking [Save Report], you can save a "Single object report".  
 "Save Report" (page 6-21)

# Create Auto Switch Setting

In [Create auto switch setting] mode, you can create auto switch setting data that combines program data created for multiple targets. If you measure targets with the created auto changeover settings data, the measurement target is automatically recognized and the target is measured with the applicable program data.

## Create Auto Switch Setting

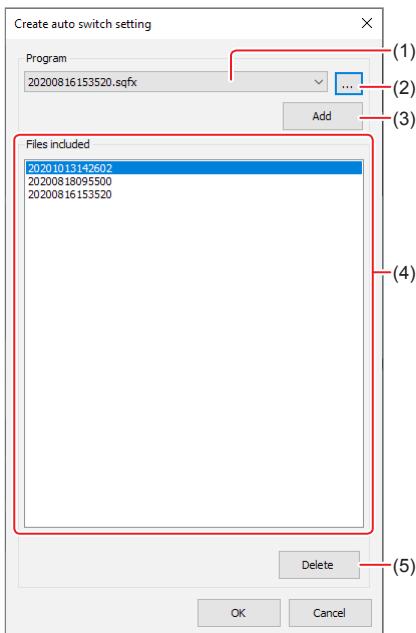


You need to save one or more program data in Program mode as a file(s) before creating auto changeover settings data.  
You cannot create auto switch setting data if there is no program data saved in the controller.  
□ "Chapter 4 Program" (page 4-1)

- 1 On the main menu, select [Integration] and click [Create auto switch setting].



- 2 Select the program data to be included in the auto changeover settings.



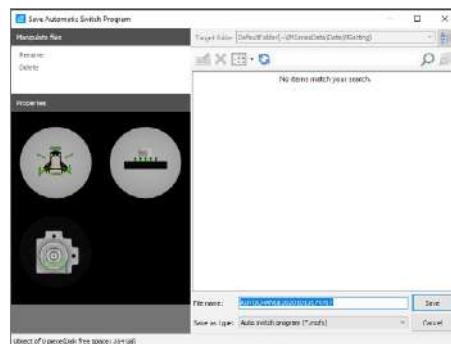
Number	Description
(1)	Select the program data to be included in the auto changeover settings from the drop-down list.
(2)	Click [...] to display the [Open Program] dialog box. You can select program data to be included in the auto changeover settings data from all of the program data stored in the controller.
(3)	When [Add] is clicked, the Program data displayed in (1) is registered to (4).
(4)	This is the list of program data to be included in the auto changeover settings. In [Run] mode that used the auto changeover settings, the measurement target is automatically recognized using the program data registered here.
(5)	When [Delete] is clicked, the Program data selected in (4) is deleted from the list.



Up to 25 program data can be included in the auto changeover settings.

- 3 Click [OK].

- 4 Input a file name and click [Save].



# Run Mode Using the Automatic Switch Program

Use the created Automatic Switch Program to perform multi measurements.  
The measurement target is automatically recognized and measured. The measurement results are saved in individual program data.

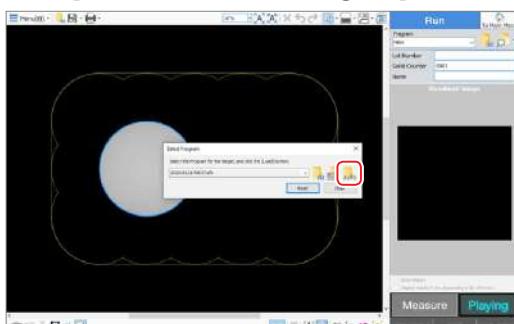
## Loading and Checking Automatic Switch Program

### Loading the Automatic Switch Program

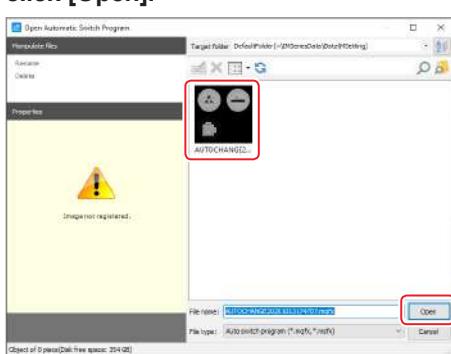
- 1** Click [Run].



- 2** Click [Automatic Switch Program].



- 3** Select the desired file (\*.mqfx or \*.msfx) and click [Open].



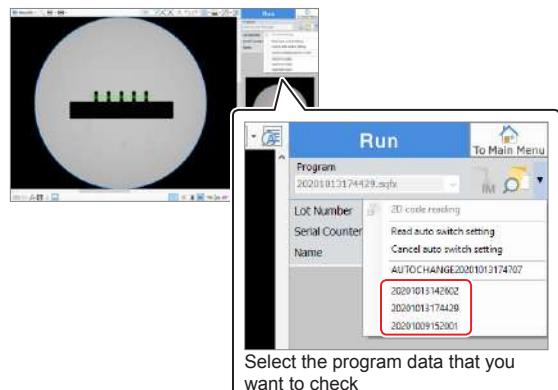
The automatic switch program opens.

## Checking the Automatic Switch Program

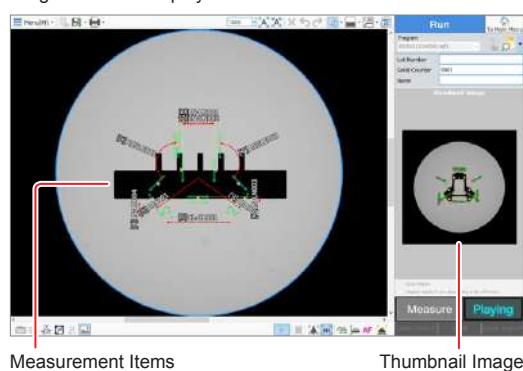
You can check the program data included in the Automatic Switch Program by loading the Automatic Switch Program.

- 1** Load the automatic switch program.

- 2** Click ▼ on the upper right corner of the screen and select the Program data for which you want to check the settings.



The measurement item and thumbnail image for the selected Program data is displayed.

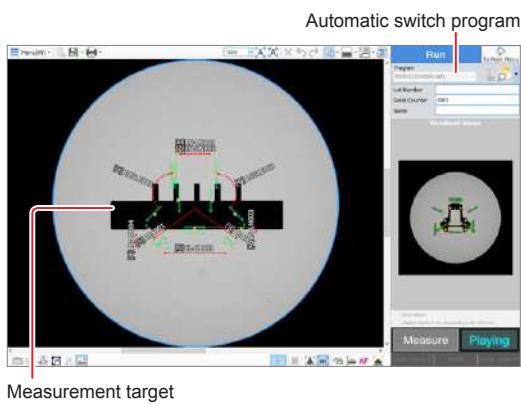


## Multi Measurement Using the Automatic Switch Program

**Reference**

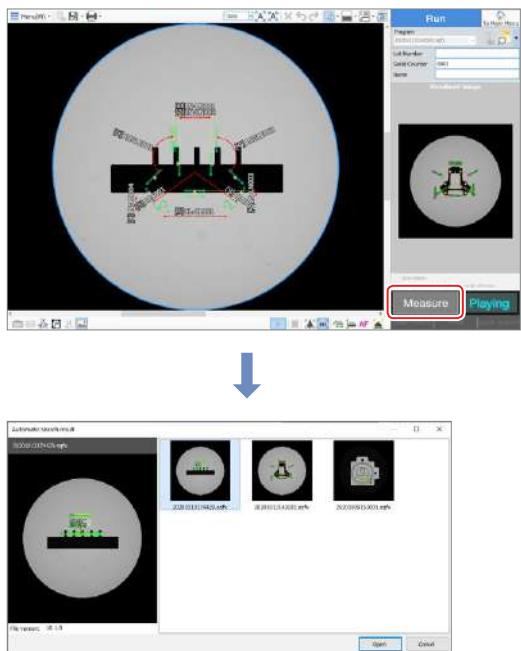
Only measurement targets that are targeted by Program data included in the automatic switch program are subject to auto switch measurement.

### 1 Place the measurement target on the stage glass.



### 2 Press [MEASURE] for the head. Alternatively, click [Measure] in the common control area.

For details of the measurement procedure, refer to "Run Mode Procedure" (page 6-11).

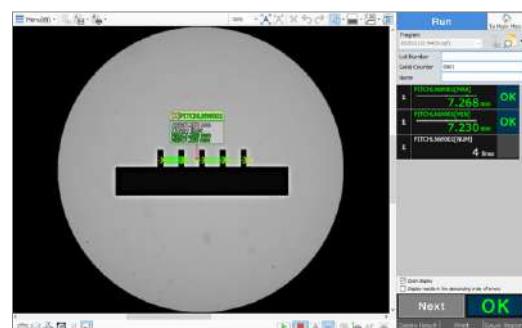


**Point**

If the target is the same as the just measured target, measurement runs without the [Automatic search result] dialog box appearing.

### 3 Check that the target to be measured is selected and press [MEASURE] for the head. Alternatively, click [Open] in the [Automatic search result] dialog box.

The measurement values and evaluation results are displayed.

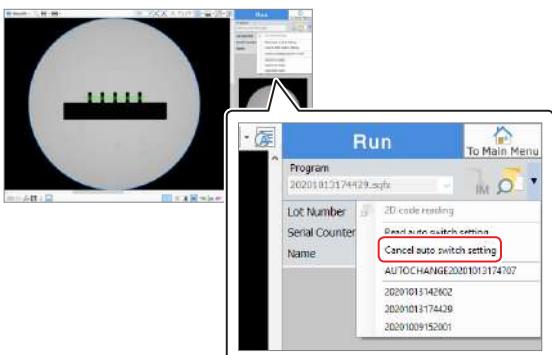


**Reference**

For details of the measurement results, refer to "Confirming the Measurement Result" (page 6-13).

## Disabling the Auto Switch Setting

- 1 Click ▼ on the upper right of the screen and select [Cancel auto switch setting].



The auto switch setting is disabled and you can open program data individually.

5

# 6

## Run Mode

This chapter explains the operation procedures and functions of the [Run] mode.

Names and Functions of Areas in the Window .....	6-2
Procedures for Run Mode .....	6-6
Common Control Area .....	6-20

6

Run Mode

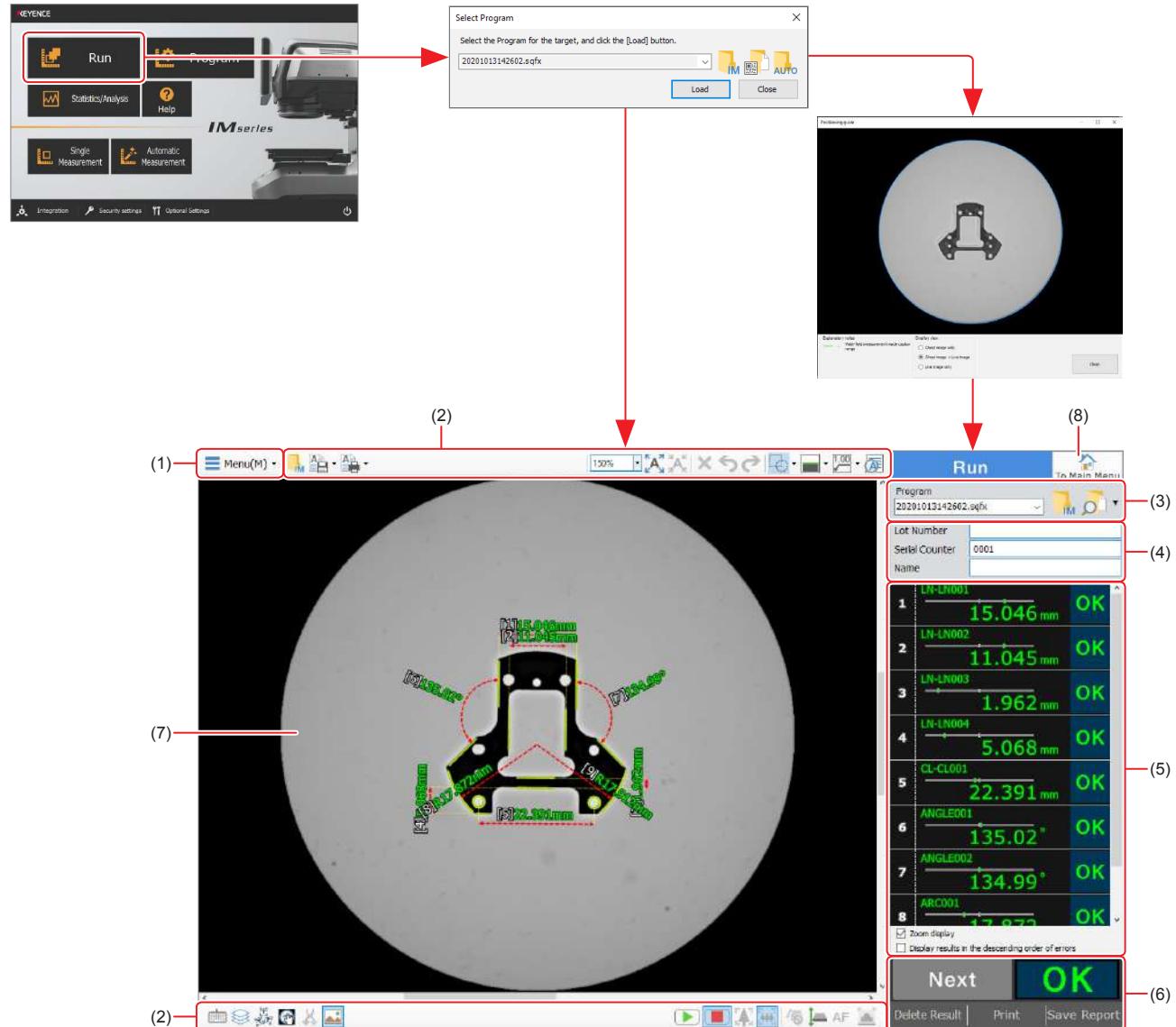
# Names and Functions of Areas in the Window

This section describes the names and functions of the parts in the window when [Run] is selected.

**Important**

You need to save one or more program data in the Program mode as a file(s) before entering the Run mode.  
You cannot enter the Run mode if there is no program data saved in the controller.

□ “Chapter 4 Program” (Page 4-1)



Name	Description
(1) [Menu] dropdown list	Menu options for various functions are displayed in dropdown list. For details of each menu, refer to <a href="#">"Chapter 10 Menu"</a> (Page 10-1).
(2) Toolbar	This bar contains buttons for frequently used functions. <a href="#">"Toolbar"</a> (Page 6-4)
(3) Program data specification area	Used to set the program data. <a href="#">"Reading the Program Data"</a> (Page 6-7)
(4) Added information input area	Enter the added information. <a href="#">"Entering Added Information"</a> (Page 6-10)
(5) Measurement result list	Once measurement is conducted, the measurement results for the specified items are listed. Before measurement, this area shows a thumbnail image registered in the program data. <a href="#">"Confirming the Measurement Result"</a> (Page 6-13)
(6) Common control area	This area contains buttons for common functions. <a href="#">"Common Control Area"</a> (Page 6-20)
[Measure]	Used to start measurement. <a href="#">"Run Mode Procedure"</a> (Page 6-11)
Status/evaluation display area	This area indicates the operation status of the head or the evaluation result when [Measure] is pressed. <a href="#">"Status/Evaluation Display Area"</a> (Page 6-20)
[Delete Result]	Used to delete the last measurement result. <a href="#">"Delete Result"</a> (Page 6-20)
[Print]	Used to print the item specified with the toolbar. <a href="#">"Print"</a> (Page 6-21)
[Save Report]	Used to save the "Single Object Report" onto the controller's hard disk in XPS format. <a href="#">"Save Report"</a> (Page 6-21)
(7) Preview display	The image of the target on the stage and the measurement result are displayed as a preview. When it is played, the preview display is refreshed in real time.
(8) [To Main Menu]	Used to exit the "Run" mode and return to the main menu.

## Toolbar

The toolbar contains the buttons for the functions frequently used during measurement.  
This section describes the functions of the toolbar.

### Upper Bar



#### [Open Program]

Open the previously created program data.



#### [Save As]

Click ▼ and select a format for saving.  
Book "Save As" (Page 10-14)



: Save the single object report



: Save the preview image



: Save the screen image



: Save the captured image



#### [Print]

Click ▼ and select print parameters.  
Book "Print" (Page 10-18)



: Single object report



: Preview image



: Screen image



: Captured image



#### [Zoom ratio]

Select the display magnification ratio for the preview display from the dropdown list.



#### [Entire fit display]

Show the entire capture range on the preview display.



#### [Live fit display] (only when playing)

Show the entire field of view that is in play on the preview display.



#### [Delete]

Delete the selected element.



#### [Undo]

Cancel the last operation and reset to the previous status.



#### [Redo]

Cancel the "Undo" operation and repeat the undone operation.



#### [Switch element display]

Click ▼ and switch the element to be displayed in the preview screen.  
Book "Switch element display" (Page 10-61)



: Force Show All Elements



: Show All Elements



: Show Elements Without CAD Data



: Show CAD Elements and Base Coordinates



: Hide All Elements



: Show All Angle Elements



#### [Switch Edge Point Trail Display]

Click ▼ and switch the edge point trail to be displayed in the preview screen.  
Book "Switch Edge Point Trail Display" (Page 10-59)



: Show Edge Point Trail



: Show Fitting Lines



: Show Fitting Line + Edge Point Trail



: Hide Fitting Line + Edge Point Trail



#### [Display Result]

Click ▼ and switch the measurement result to be displayed in the preview screen.  
Book "Switching result display" (Page 10-60)



: Display Name



: Display Measurement Value



: Display Difference Value



: Display Design Value/Tolerance



#### [Magnifying glass]

Magnify the area around the mouse cursor.  
Book "Magnifying glass" (Page 10-57)

## ■ Lower Bar



**[On-Screen keyboard]**

Display On-Screen keyboard.



**[Layer Control]**

Display Layer Control window.

□ "Layer Control" (Page 3-19)



**[Multiple Pattern Search Settings]**

The [Pattern Search Setting] dialog box appears.

□ "Multiple Pattern Search Settings" (Page 10-22)



**[Measure by placing only]**

Select whether or not to start the measurement once the target is detected.

(Only when the rotation unit IM-RU1 is unused)



**[Simultaneous real-time display with wide field of view] (only when playing)**

Display the video preview of the wide-field image on the background when displaying the high-precision video preview.



**[Display background image]**

Display the background image.



**[Start preview]**

Refresh the displayed contents of the preview display in real time.



**[Stop preview]**

Stop refreshing the preview display.



**[High-precision measurement mode]**

Show the image in the preview display at high magnification.



**[Wide-field measurement mode]**

Shows the image in the preview display at low magnification.



**[XY control]**

Display the [XY control] dialog box.

□ "Adjusting Position of Electric XY Stage" (Page 3-6)



**[Z-Control]**

Display the [Z-Control] dialog box.

□ "Adjusting the Height of the Electric Z Stage" (Page 3-5)



**[θ control]**

Display the [θ-Control] dialog box.

This is displayed only when the rotation unit IM-RU1 is used.

□ "Adjusting the Angle of the θ Stage (Only When the Rotation Unit IM-RU1 is Used)" (Page 3-6)



**[Autofocus]**

Perform Auto Focus.



**[Change illumination]**

The [Illumination setting] dialog box appears.

□ "Light Settings" (Page 4-200)

# Procedures for Run Mode

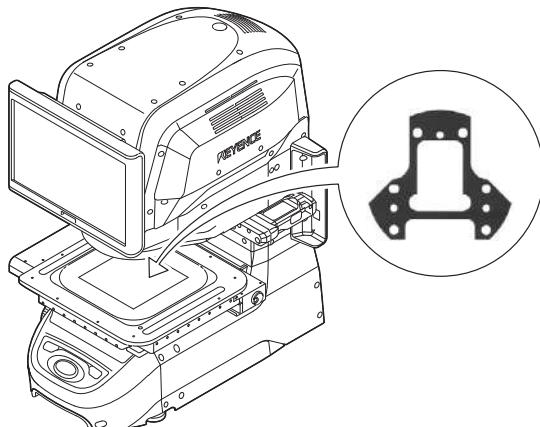
## Preparation for Run Mode

- 1** Click the [Run] in the main menu.

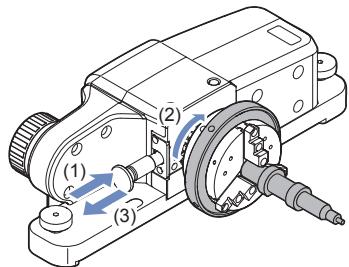


- 2** Place the target to be measured on the stage glass, or attach it on the rotation unit IM-RU1.

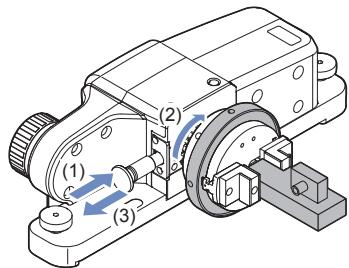
● Measure by Placing the Target on the Stage Glass



● Measure a Target with Shaft Shape by Rotating



● Measuring a Target with Plate Shape by Rotating



▶ Important

If the stage glass or lens is dirty, a measurement error may result. Remove dust with compressed air.

If the stage glass is dirty, clean it by wiping with a dry cloth.

- 3** Open the Program data.

Open the Program data by one of the following methods.

- "Selecting the Program Data" (Page 6-7)
- "Opening Recently Used Files" (Page 6-7)
- "Opening from the List of Saved Files" (Page 6-8)
- "Searching for Data Based on a Target (Image)" (Page 6-8)

The [Positioning guide] dialog box appears.

- 4** Set the added information.

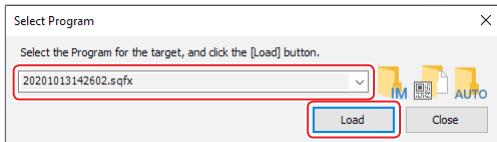
- "Entering Added Information" (Page 6-10)

## Reading the Program Data

### ■ Selecting the Program Data

The [Select Program] dialog box appears right after the screen proceeds from the main menu to the Run mode screen.

#### 1 Select the desired Program data from the dropdown list in the [Select Program] dialog box and click [Load].



- Reference** You can load data by one of the following method.
- Click [Open Program] and select Program data in it.
    - "Opening from the List of Saved Files" (Page 6-8)
  - Click [2D code reading] and scan the 2D codes on the reports.
    - "Scanning 2D Codes on Reports" (Page 6-9)
  - Click [Automatic Switch Program] and select the desired data.
    - "Loading the Automatic Switch Program" (Page 5-8)

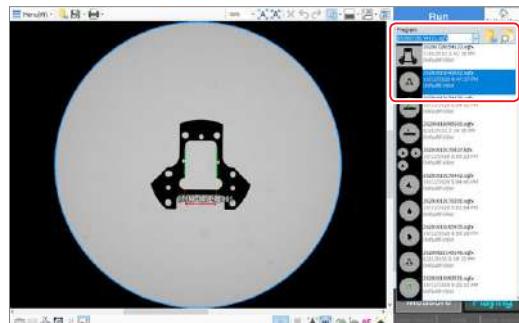
The Program data is displayed on the [Run] screen.

#### 2 Check the display of the positioning guide, and adjust the position of the target.

- Reference** □ "Positioning the Measurement Target" (Page 6-9)
- Reference** If the check box of [Menu] → [Setting] → [Others] → [Display positioning guide] is OFF, the [Positioning guide] dialog box is not displayed.
- "Display positioning guide" (Page 10-43)

### ■ Opening Recently Used Files

#### 1 Specify a Program data from the dropdown list in its specification area.



- Reference** • This dropdown list of the Program data shows up to 50 recently used Program data files. If your desired data is not shown in the dropdown list, search for the data based on the target, or click [Open Program] and find the data.
- You can also open a file by entering the file name of the Program data in the dropdown list.

The Program data is displayed on the [Run] screen.

#### 2 Check the display of the positioning guide, and adjust the position of the target.

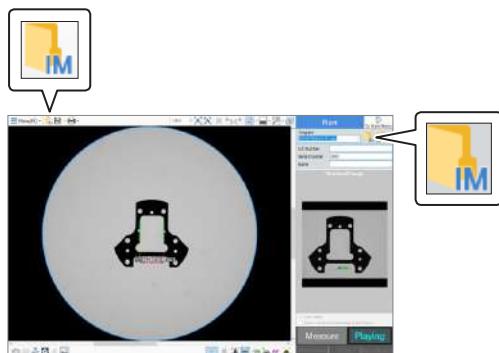
- Reference** □ "Positioning the Measurement Target" (Page 6-9)

- Reference** If the check box of [Menu] → [Setting] → [Others] → [Display positioning guide] is OFF, the [Positioning guide] dialog box is not displayed.
- "Display positioning guide" (Page 10-43)

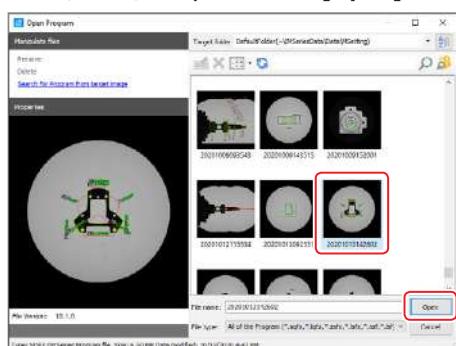
## ■ Opening from the List of Saved Files

### 1 Click [Open Program] .

Click either the button on the toolbar or the one in the Program data specification area.



### 2 Select the desired file (\*.sqfx, \*.lqfx, \*.ssfx, \*.lsfx, \*.ssf, \*.lsf) and click [Open].



-  Click [Search for Program from target image] to search from target image.  
 "Searching for Data Based on a Target (Image)" (Page 6-8)

The Program data is displayed on the [Run] screen.

### 3 Check the display of the positioning guide, and adjust the position of the target.

-  "Positioning the Measurement Target" (Page 6-9)  
 If the check box of [Menu] → [Setting] → [Others] → [Display positioning guide] is OFF, the [Positioning guide] dialog box is not displayed.  
 "Display positioning guide" (Page 10-43)

## ■ Searching for Data Based on a Target (Image)

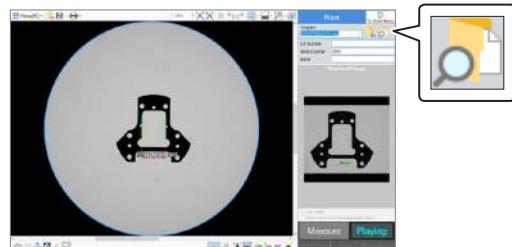
### 1 Adjust the height of the electric Z stage.

Adjust the Z stage according to the height of the target's surface to be measured.

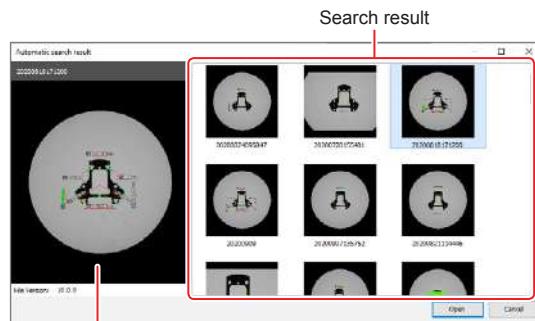
-  "Adjusting the Height of the Electric Z Stage" (Page 3-5)

-  The height can also be adjusted by using Z stage up/down handle.

### 2 In the Program data specification area, click [Auto search] .



The Program data which possesses a similar pattern in the image of the captured measurement targets will be searched for, and displayed in the [Automatic search result] screen.  
The Program data is displayed on the [Automatic search result] screen in a sequence which resembles the images.



Thumbnail image of the selected search result

### 3 Select a Program data file and click [Open].



The Program data is displayed on the [Run] screen.

### 4 Check the display of the positioning guide, and adjust the position of the target.

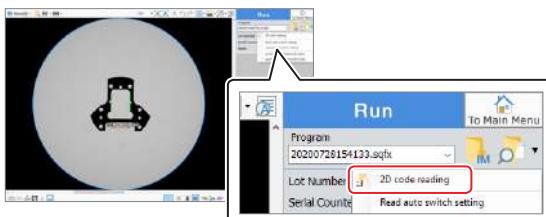
-  "Positioning the Measurement Target" (Page 6-9)

-  If the check box of [Menu] → [Setting] → [Others] → [Display positioning guide] is OFF, the [Positioning guide] dialog box is not displayed.

-  "Display positioning guide" (Page 10-43)

## ■ Scanning 2D Codes on Reports

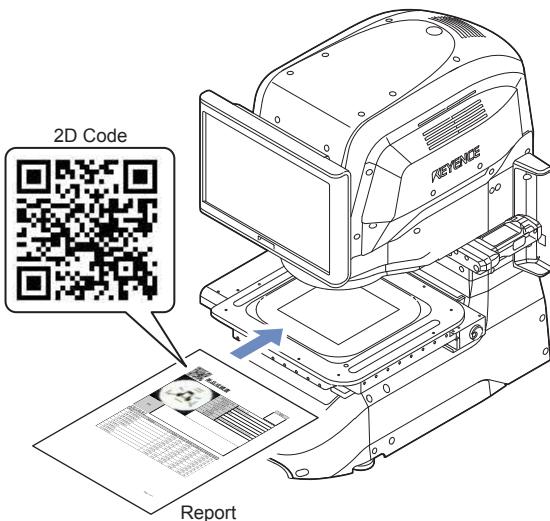
- 1** Click ▼ on the upper right of the screen and select [2D code reading].



The [2D code reading] dialog box appears.



- 2** Scan the 2D code on the printed report with the wide-field camera.



The Program data is displayed on the [Run] screen.

- 3** Check the display of the positioning guide, and adjust the position of the target.

□ "Positioning the Measurement Target" (Page 6-9)

**Reference** If the check box of [Menu] → [Setting] → [Others] → [Display positioning guide] is OFF, the [Positioning guide] dialog box is not displayed.

□ "Display positioning guide" (Page 10-43)

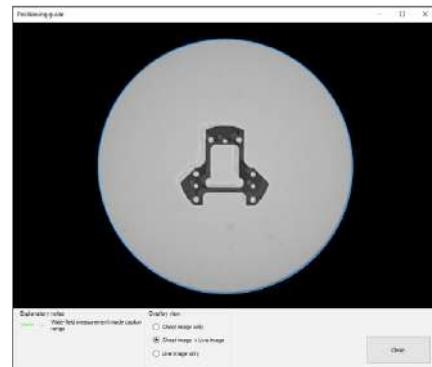
## Positioning the Measurement Target

The [Positioning guide] dialog box shows "ghost image" and "live image".

The "ghost image" is translucent, showing the image of the target registered in the Program data.

The "live image" shows the image of the target to be measured.

- 1** Adjust the position, orientation, and angle of the target so that both images overlap as precisely as possible.



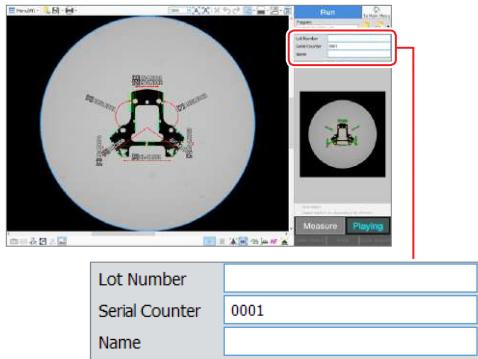
- 2** Click [Close].

The [Run] screen is displayed.

## Procedures for Run Mode

### Entering Added Information

Enter the added information in Added information input area.  
The added information is saved together with the measurement result.



The items that have been set in the [Added information] dialog box will be displayed in the added information input area.

The entry field background color for the displayed item changes depending on the setting of [Specify operation] in the [Added information] dialog box.

Lot Number	A
Serial Counter	0001
Name	

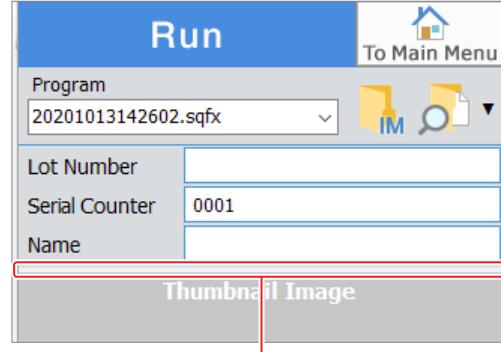
Background color	Specify operation
White	-
Blue	Can not change
Yellow	Blank space prohibited

▶ Important

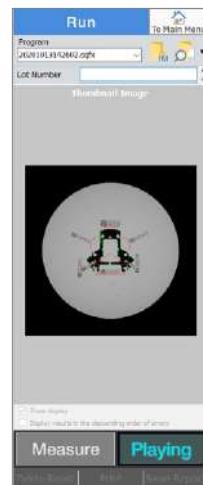
- For the Program data that has item(s) of [Blank space prohibited] been selected in [Specify operation], the item is required to be input when Run Mode is selected.
  - In Run mode, [Added information] cannot be changed. Edit in Program mode.
- "Added information" (Page 10-32)

### ■ Size Change of the Added Information Input Area

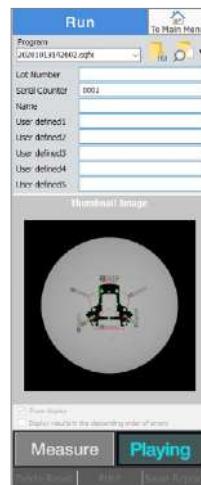
You can change the size by dragging the bottom of the added information input area up and down with the mouse. There is one item displayed for the minimum size, and eight items for the maximum.



Places to drag



Minimum size



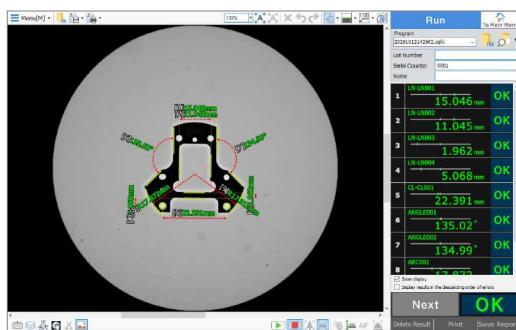
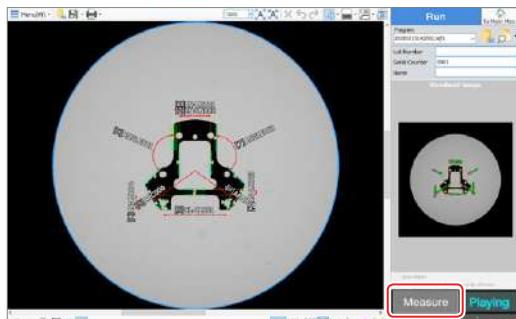
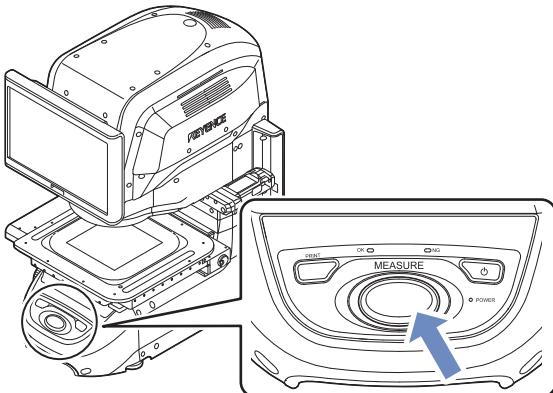
Maximum size

## Run Mode Procedure

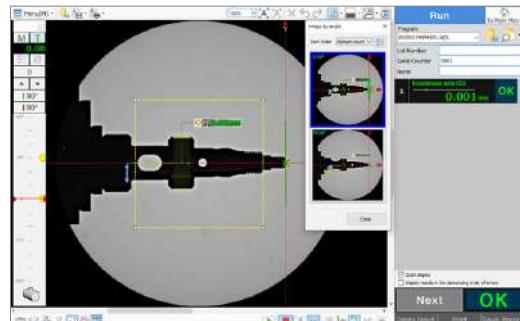
Measure the target using the read program data.

- 1 Press [MEASURE] for the head. Alternatively, click [Measure] in the common control area.**

**Reference** The measurement can also be started with the input through the REMOTE terminal on the rear of the head.  
 □ "REMOTE input" (Page 2-10)



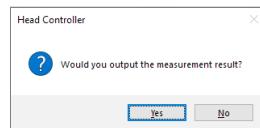
When the rotation unit IM-RU1 is used, the completion of the measurement shows the [Image by angle] dialog box.



The measurement values and evaluation results are displayed in the [Run] screen.  
 For details on the measurement result, refer to □ "Confirming the Measurement Result" (Page 6-13).  
 [Measure] in the common control area changes to [Next].

### ● Confirmation Before the Measurement Result Output

If the [Confirmation before the measurement result output] is selected, a confirmation message box is displayed.



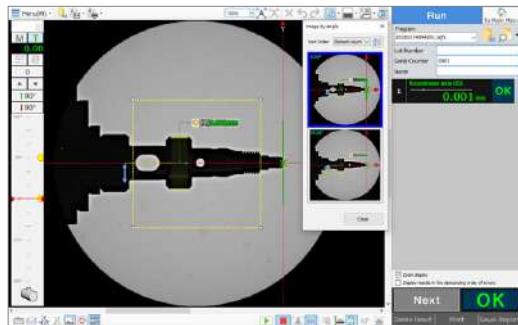
To save the measurement result, click [Yes]. To not save the measurement result due to incorrect measurement caused by a wrong operation etc., click [No].

- Reference**
- If [Confirmation before the measurement result output] is not selected, the measurement result is automatically saved.
  - "Confirmation before the measurement result output" (Page 10-43)
  - The measurement result that has been automatically saved can be used later for statistics and so on.

## Procedures for Run Mode

### ● Confirming the Image by Angle

When the rotation unit IM-RU1 is used, the completion of the measurement shows the [Image by angle] dialog box if multiple images from different angles are taken.



- Reference** The [Image by angle] dialog box appears by following the procedures below.
- Select [Menu] → [View] → [Show angle images].
  - Click [Show angle images] on the lower toolbar.

#### ○ Sort order

Select the sorting order from either "Element count" or "Degree".

#### ○ Image list

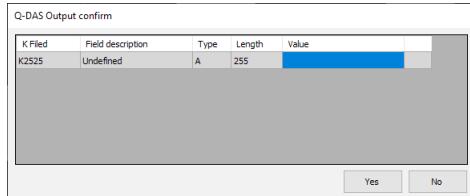
You can check the background images taken from different angles in thumbnails with measurement elements and values. The captured angle is displayed on the upper-left corner of each image. Clicking the image shows its angle image in the preview screen.

#### ○ [Close]

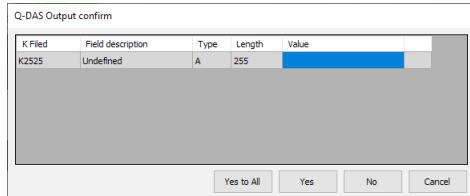
Clicking it closes the [image by angle] dialog box.

### ● Q-DAS Output Confirmation

When [Enable Q-DAS output] is selected and measurement is performed using the Program data including the item with [Input allowed] selected, the [Q-DAS Output confirm] dialog box appears.



<When the number of pattern search is 1>



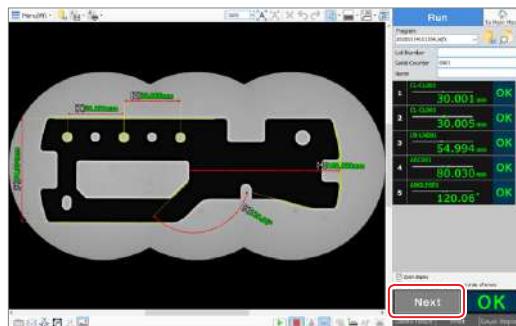
<When the number of pattern search is 2 or more>

Enter a desired value in [Value] and click [Yes].

When the multiple pattern searches are executed, the dialog boxes as many as the number of detection times are displayed. Repeat entering a desired value in [Value] and clicking [Yes], or enter desired values in [Value] and click [Yes to All] to set the values collectively.

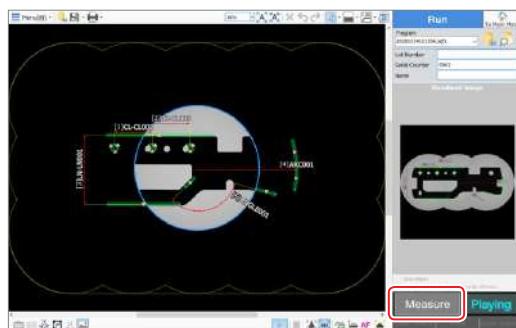
- Reference** **Q-DAS Setting** (Page 10-40)

### 2 Click [Next].



[Next] changes to [Measure].

### 3 Change the target and click [Measure] or press [MEASURE] for the head.



The measurement is executed according to the same Program data, and the new result is displayed.

The same process is followed as the measurement is repeated.

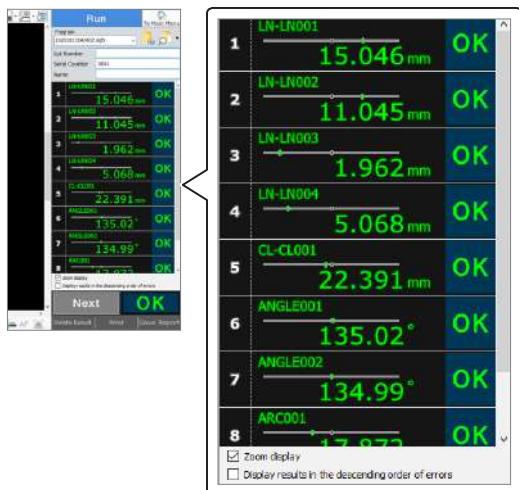


For the following Program data, multi measurements cannot be executed even if [view field measurement] is selected.

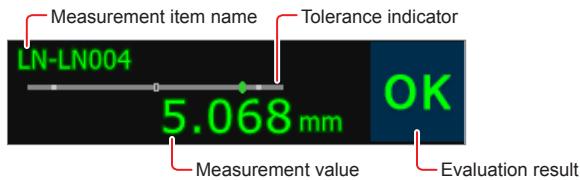
- The target has an element which is subject to "Manual measurement".
- Multiple pattern searches are executed for the measurement.

## Confirming the Measurement Result

This section describes the items in the measurement result list.



### Measurement Result List



**[Reference]**

- If the measurement value of measurement result list is clicked, the associated measurement item will be selected and highlighted on the preview screen. In this case, the font color of the measurement items which are in sequence number becomes "Blue". This allows you to correlate the measurement result in the list with the section of the target at a glance.
- If the measurement items which design value and tolerance have not been set are selected, the color of all the characters becomes "Blue".

### Measurement item name

The name specified during the creation of the program data is displayed.

**[Reference]**

The color of the characters varies depending on the evaluation result.

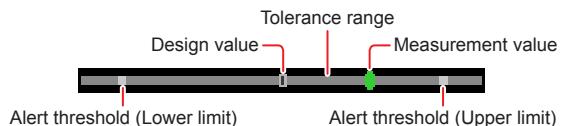
### Measurement value

The resulting value of the measurement is displayed.

**[Reference]**

- The color of the characters varies depending on the evaluation result.
- The number of decimals can be changed.  
⇒ "Advanced Display Settings" (Page 12-15)

### Tolerance indicator



When the tolerance has been set, a bar-shaped indicator is displayed. If the evaluation result is OK, the tolerance range will be displayed as the tolerance indicator.

On the tolerance indicator, the marks for the upper limit of the alert threshold, design value, the lower limit of the alert threshold, measurement value are displayed. They are shown in the colors below.

- Within tolerance range: range of bright gray
- Out of tolerance range: range of dark gray
- Upper and lower limit of alert threshold: white dots
- Design value: dark gray dot
- Measurement value: dot of the same color as evaluation result

### Evaluation result

The evaluation result for each item is displayed.

Evaluation result	Description
<b>OK</b>	Displayed when the measurement value is within the tolerance range specified for the measurement item. The characters in the measurement result list and the measurement value (measurement item name) in the preview display are shown in "green".
<b>OK</b>	Displayed when the measurement value exceeds the upper limit or lower limit of the alert threshold ("With Warning OK"), but within the tolerance range of the measurement item. The font color of both the measurement result list and the measurement value (measurement item name) on the preview display becomes "Yellow". Also when [Zoom display] is not selected, the cell of [Measurement Results] and [Judgment] on the measurement result list turns to "Yellow".
<b>NG</b>	Displayed when the measurement value is out of the tolerance range specified for the measurement item. The characters in the measurement result list and the measurement value (measurement item name) in the preview display are shown in "red".
<b>Fail</b>	Displayed when the measurement failed. Check if the stage glass is dirty, the selected program data is correct, and the target is in focus. The characters in the measurement result list, and the edge for which extraction failed and measurement item name in the preview display are shown in red.
<b>[ ]</b>	Displayed when no design value and tolerance value are entered for the measured section. The characters in the measurement result list and the measurement value (measurement item name) in the preview display are shown in white.

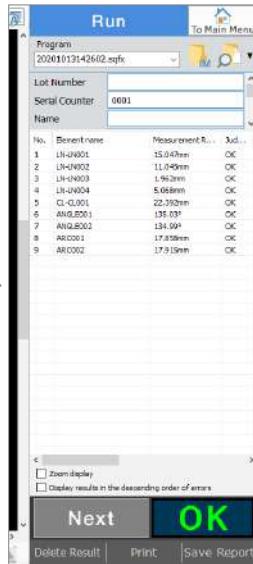
## Procedures for Run Mode

### ● Zoom display

When [Zoom display] is selected, the measurement result list is magnified.



<When the check box is selected>



<When the check box is not selected>



When this check box is not selected, you can view the design value and tolerance setting values by moving the scroll bar below the list.

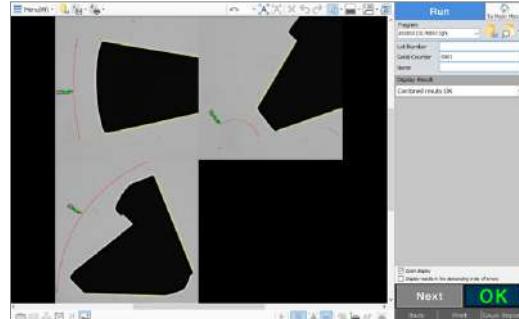
### ● Display results in the descending order of errors

When [Display results in the descending order of errors] is selected, the measurement items are displayed by the following evaluation result order.

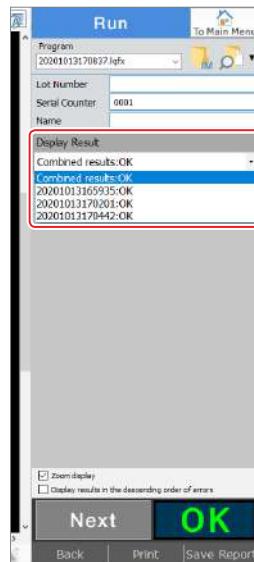
- Fail
- NG
- OK (yellow)
- OK (green)
- No judgment (white)

### ■ Measurement Result on the Combined Program Data

In measurements with the combined program data, the combined result is displayed after completing the set times of measurements.



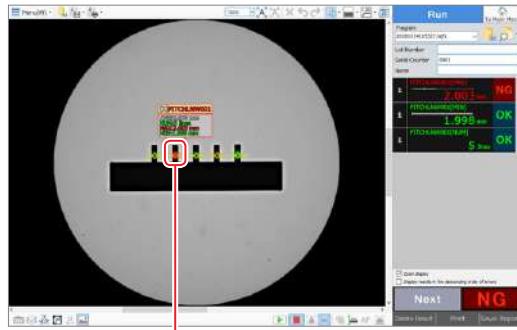
Select a file name from the [Display Result] dropdown list, the measurement result list of each measurement can be displayed.



Also click the thumbnail image of the preview screen so that the measurement result list of each measurement can be displayed. Click the preview screen again to return to the combined results.

## ■ Measurement Result of the Pitch Measurement

In pitch measurement, the NG place is displayed in red color and the "With Warning OK" place is displayed in yellow color.

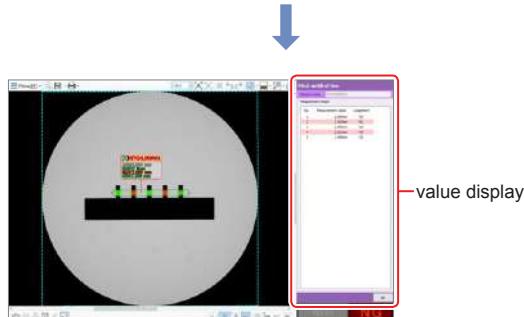
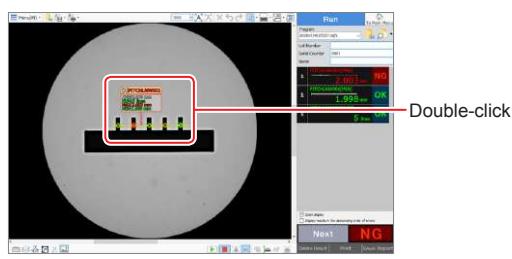


Pitch evaluated as NG

Double-click the measurement result or edge detection range to display the detailed result.

In the detailed result, the cell background color is displayed as below according to the evaluation result.

- OK: white
- With Warning OK: yellow
- NG/Fail: red

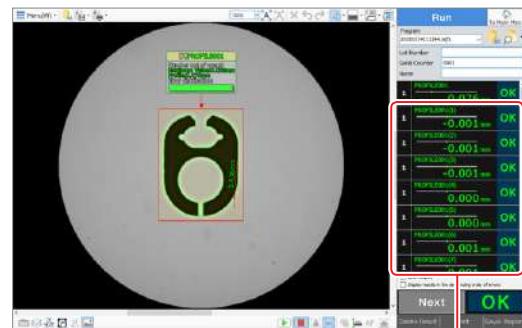


**Point** For the program data with [Average Number Settings] set as multiple, the detailed result cannot be displayed.

## ■ Measurement Results for the Contour Profile of Registered Points

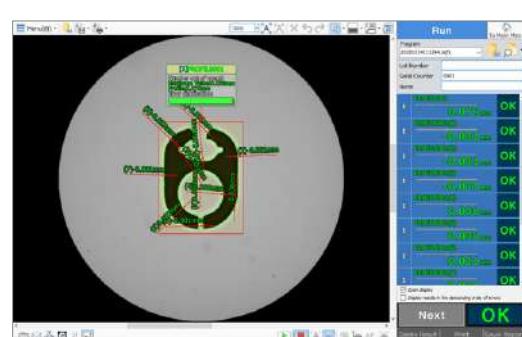
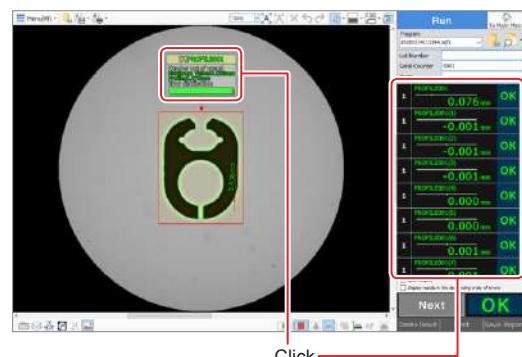
When contour profiles for registered points are measured, the measured values (errors) for the registered points are displayed.

Registered points are displayed in the measured results list with the sequential number appended to the measurement item name for the contour profile.



Registered point

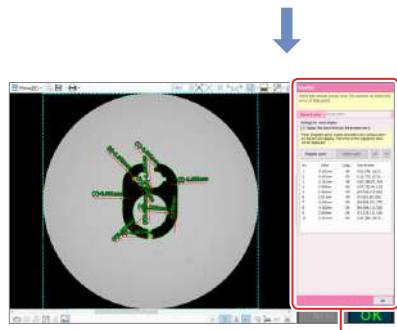
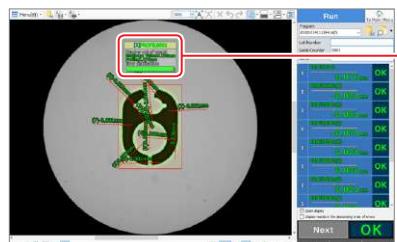
Clicking the measured result for the contour profile from the preview screen or measured results list displays the measured value for the registered point on the Preview screen.



## Procedures for Run Mode

### ● Checking the measured result for a point

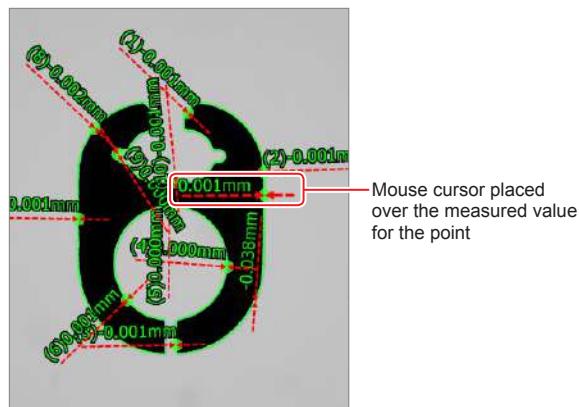
Double-clicking the measurement result on the Preview screen displays the results display settings screen for the contour profile.



Settings for result display screen

Double-clicking the measured value of the registered point on the Preview screen also displays the Settings for result display screen for the contour profile.

Placing the mouse cursor over the point (contour point) on the Preview screen displays the measured value for that point.



You can also delete or register the point for the measured value that you are checking.

For details of the settings for the result display screen, refer to "Profile" (Page 4-112).

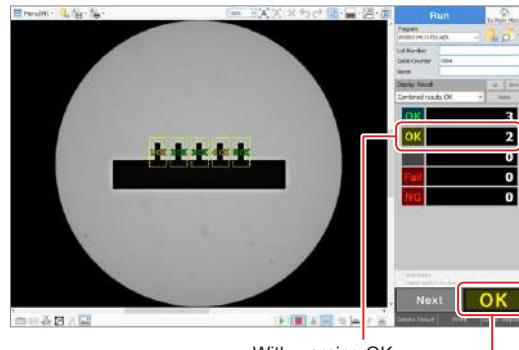
Any edits that you make cannot be saved on this screen. Clicking [OK] returns you to the previous run results screen.

### ■ Measurement Result after Executing Multiple Pattern Searches

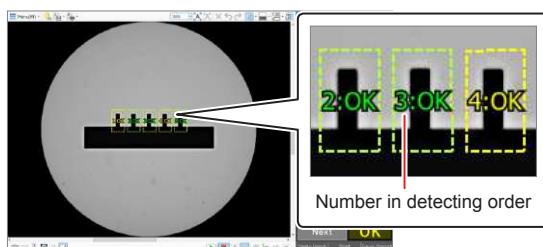
When the number of pattern searches is set as 2 or more, the combined results are displayed.

When "With Warning OK" is included in the measurement result, the "With Warning OK" field is displayed in overall results.

When "With Warning OK" is included in the measurement result and NG or Fail is not, the overall evaluation result also becomes "With Warning OK".

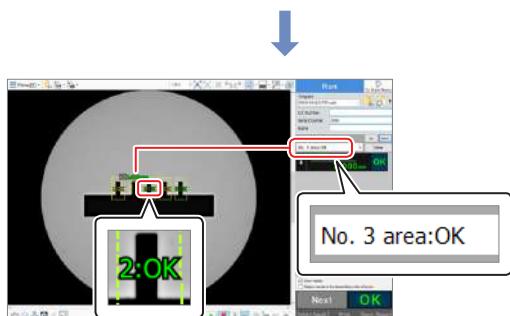
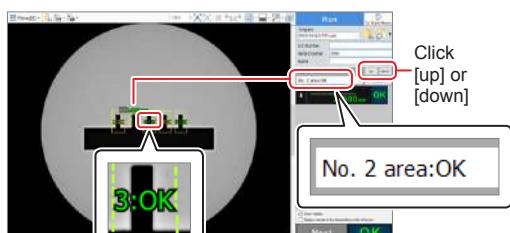


### ● Changing the order of pattern search detection result



The numbers in the detecting order are displayed on the preview display.

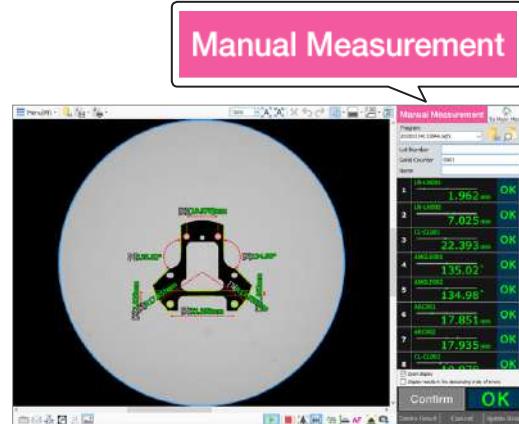
If the detecting order differs from the positional order of the target, you can switch the order. Select a measurement result to be switched on the preview screen or from the [Display Result] dropdown list, and then click [up] or [down].



**[Reference]** You can specify the direction of pattern search.  
 "Pattern search direction (other than when the rotation unit IM-RU1 is connected)" (Page 10-22)

### ■ Measurement Result Containing the Target Element of the Manual Measurement

When the measurement is performed with the data containing elements with [Manual measurement] selected, the measurement mode turns to the Manual Measurement mode.



**[Reference]** The following operations cannot be performed in the manual measurement mode.

- Change the average number settings to two or more.
- Change the multiple pattern search settings to two or more.

### ● Display of the common control area

In the manual measurement mode, the buttons in the common control area are displayed as follows.

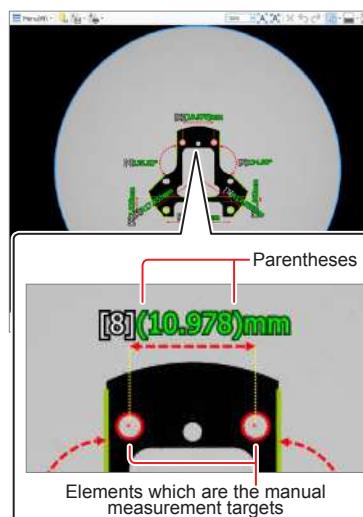
Run mode	Manual measurement mode
[Measure] / [Next]	[Confirm]
[Print]	[Cancel]
[Save Report]	[Update Result]



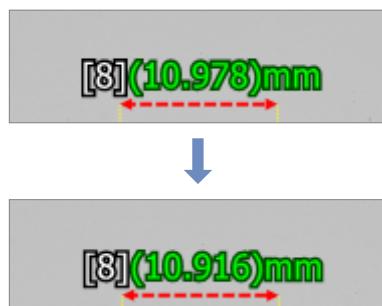
### ● Display of the preview screen

Elements which are the manual measurement targets are displayed in red.

The measurement results referring to the elements which are the manual measurement targets are displayed with the value part in parentheses.



When you change the position or shape of the element which is a manual measurement target, the measurement result referring to that element is updated in real time.

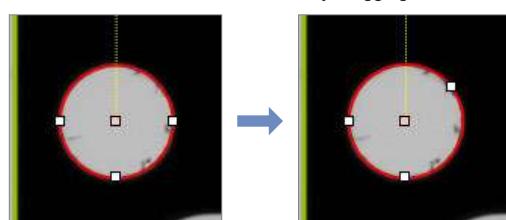


Some elements, such as calculation, are not reflected in real time.

### ● Changing the manual measurement target element

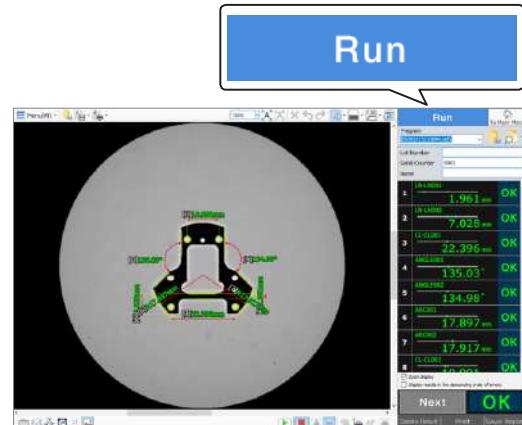
When you click the element which is a manual measurement target, the handles which can be dragged (first point, second point, third point) are displayed.

- When you bring the mouse cursor to the handle , the mouse cursor changes to . You can now move the element by dragging the mouse.
- You can move the whole element by dragging its line.

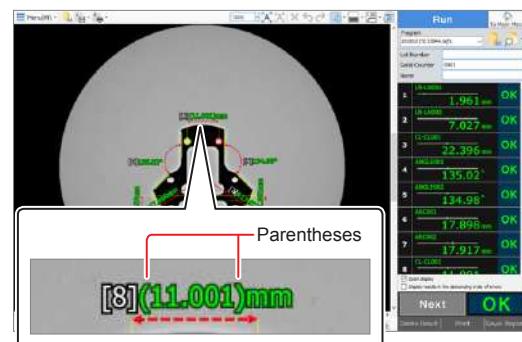


### ● Confirming the manual measurement contents

When you click [Confirm], the elements which are manual measurement targets changed in the manual measurement mode are fixed and the operation moves to the Run mode.



Once measurement is conducted, if you change the position or shape of the element which is a manual measurement target and the measurement result is updated, the measurement result is displayed with the value part in parentheses.



- A measurement result is displayed with the value part in parentheses only when it has been updated.
- For any value changes apart from the measurement value update, such as when the judgment result of the element specifying LMC/MMC was updated, the value part of the measurement result will not be in parentheses.
- The measurement result is displayed with the value part in parentheses only on the preview screen. The parentheses are not displayed on the statistics/analysis screen nor printing.

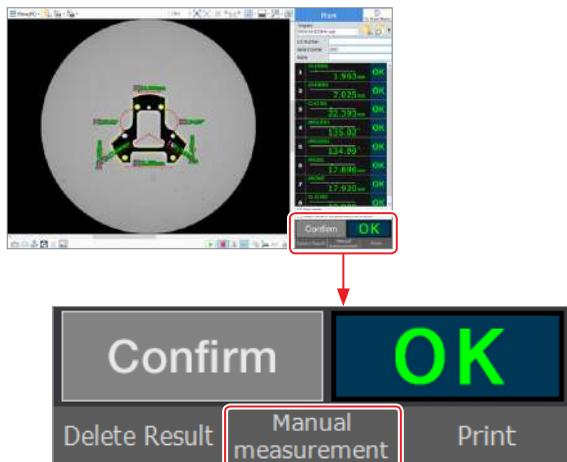
## Manual Measurement Control

If Run mode is executed using the Program data with either [Enable control] or [Allow control occur only during NG/FAIL.] selected in Manual Measurement Mode Control Setting, fine adjustment can be made on all the elements using the manual measurement before confirming the measurement results.

"Manual Measurement Mode Control Setting" (Page 10-43)

## Manual Measurement Control

- 1** Measure the target.
- 2** Click [Manual measurement].



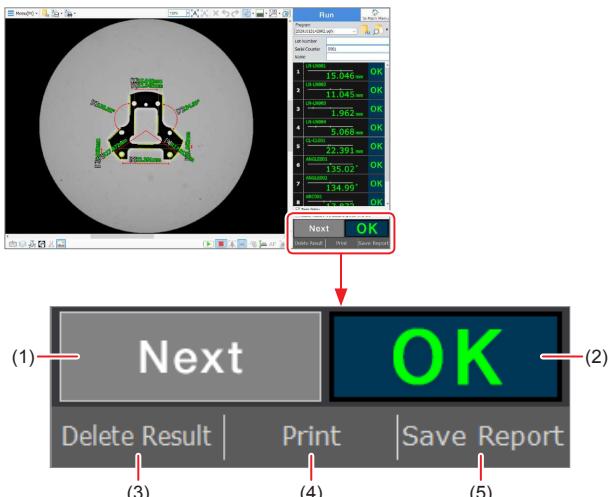
- Reference
- To confirm the measurement result without the manual measurement, click [Confirm].
  - Some of the elements need to be confirmed first if [Delete Result] appears and any elements cannot be dragged.

- 3** Measure the element that requires fine adjustment using the manual measurement.
- 4** Click [Confirm].

# Common Control Area

## Common Control Area

This section describes the common control area used for the multi measurement.



Name	Function
(1) [Measure] / [Next]	Clicking [Measure] in the common control area starts measurement. □ "Run Mode Procedure" (Page 6-11)
(2) Status/Evaluation Display Area	This area indicates the operation status of the head or the evaluation result when [Measure] is pressed.
(3) [Delete Result]	Used to delete the last measurement result.
(4) [Print]	Used to print the item specified with the toolbar.
(5) [Save Report]	Used to save the "Single Object Report" onto the controller's hard disk in PDF, XPS, or CSV format.

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Run Mode

## Status/Evaluation Display Area

This area shows the integrated evaluation of the measurement results.

Evaluation result	Description
OK	Displayed when the results of all measurement items were "OK".
OK	Displayed when any one of the measurement results has "With Warning OK" among the measurement items.
NG	Displayed when at least one result of the measurement items was "NG".
Fail	Displayed when at least one measurement of the measurement items failed.
Playing	Displayed when the design values and tolerance values are not entered for some measurement items and the evaluation result is not NG or Fail.
Paused	

## Delete Result

All measurement results of the multi measurement are automatically stored on the hard disk of the controller. If the measurement was not performed properly due to an operation mistake or other reason, you can delete the measurement result.

You can make setting so that a confirmation is performed at each measurement instead of automatically saving the measurement result. For details, refer to □ "Confirmation Before the Measurement Result Output" (Page 6-11).

### 1 After the measurement, click [Delete Result].

The last measurement result is deleted from the hard disk of the controller.



[Delete Result] can be used for the last measurement only. (After the "Delete Result" operation is performed, this button is grayed out.)

## Print

When [Print] is clicked, the item specified with the toolbar will be printed.

### 1 Click [Print].

For details about printing, refer to □ "Print" (Page 8-19).

## Save Report

The single object report will be saved in the controller as a file.

### 1 Click [Save Report].

For details about saving the report, refer to □ "Saving the Single Object Report" (Page 8-21).

## MEMO

6

Run Mode

# 7

## Statistics/Analysis

This chapter explains the procedures of the statistics/analysis using the results of the multi measurement.

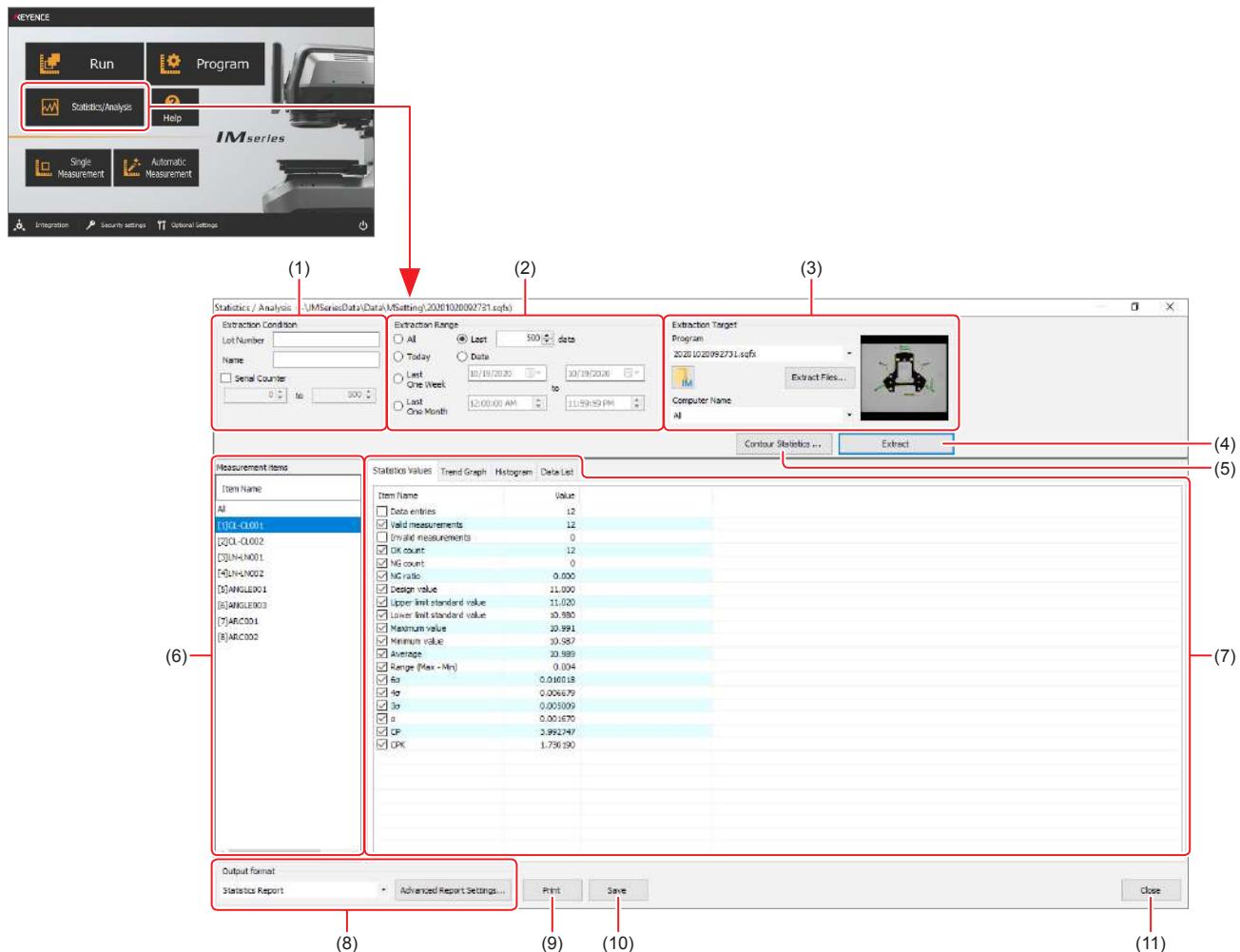
<b>Names and Functions of Areas in the Window .....</b>	<b>7-2</b>
<b>Statistical Data Extraction .....</b>	<b>7-4</b>
<b>Statistics Display .....</b>	<b>7-8</b>
<b>Report Printing.....</b>	<b>7-16</b>
<b>Save Report.....</b>	<b>7-18</b>
<b>IM Statistics Viewer 3.....</b>	<b>7-22</b>

7

Statistics/Analysis

# Names and Functions of Areas in the Window

This section describes the names and functions of the parts in the window when [Statistics/Analysis] is selected.



Name	Description
(1) Extraction Condition	Configure the extraction conditions of the measurement results to extract from the program data. □ "Extraction Condition" (page 7-6)
(2) Extraction Range	Configure which measurement results we wish to extract from the program data. □ "Extraction Range" (page 7-6)
(3) Extraction Target	Select which program to extract program data from for statistical analysis. □ "Extraction Target" (page 7-6)
(4) [Extract]	Extract the measurement results in accordance with the settings configured in (1), (2) and (3). □ "Procedure of Extracting Statistical Data" (page 7-4)
(5) [Contour Statistics]	When the profile measurement result is included in the program data, the [Contour Statistics] dialog box appears and you will register checkpoints. □ "Displaying Contour Statistics" (page 7-13)
(6) [Measurement items] area	Select the measurement item to conduct statistics/analysis. □ "Statistics Display" (page 7-8)
(7) Data display area	The measurement results extracted from the program data are displayed in different forms on the respective tabs. □ "Statistics Display" (page 7-8)
(8) Output format	Select the format to output the statistics/analysis data. The data will be "printed" or "saved" in the selected format. □ "Report Printing" (page 7-16) and □ "Save Report" (page 7-18)
(9) [Print]	Print the statistics/analysis data in the output format selected at "Output format". □ "Report Printing" (page 7-16)
(10) [Save]	Save the statistics/analysis data as a file in the output format selected at "Output format". □ "Save Report" (page 7-18)
(11) [Close]	Close the [Statistics / Analysis] window and return to the main menu.

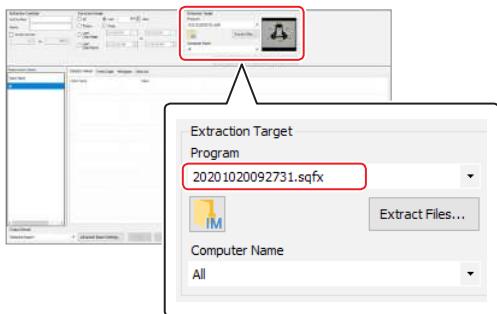
# Statistical Data Extraction

## Procedure of Extracting Statistical Data

Configure the extraction condition, extraction range and extraction target, and extract statistical data.

## ■ Extracting Statistical Data by Specifying a File Name

**1** From the [Program] list, select the Program data to extract data.



The thumbnail image of the selected program data is displayed.

- This list shows up to 50 recently used Program data targets. If your desired data is not shown in the list, click  and select the data from the [Open Program] dialog box.
    - “Program” (page 10-12)
  - To extract statistical data by selecting a controller, select the appropriate controller from the [Computer Name] list.
    - “Extraction Target” (page 7-6)

## **2** Specify the extraction conditions and extraction range.

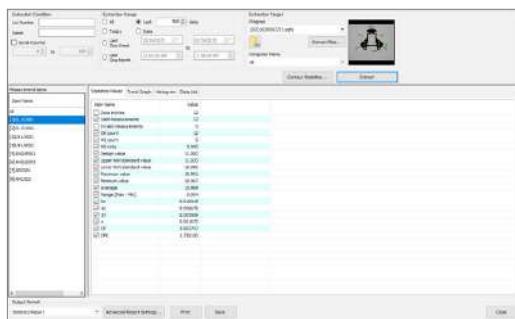


- For details about the extraction conditions, refer to “Extraction Condition” (page 7-6).
  - For details about the extraction range, refer to “Extraction Range” (page 7-6).

### **3 Click [Extract].**



The extracted data is displayed.



## ■ Extracting Statistical Data by Searching Files by Date

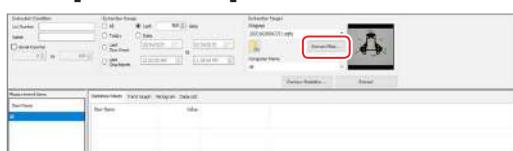
## 1 Specify the extraction range.



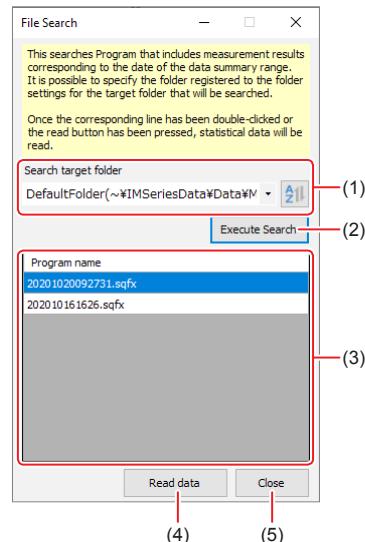
**Point** When extracting statistical data by searching files, you can specify only Date under [Extraction Range]. If you select [Last \*\*\* data], a message box to confirm that the searching is done for Today appears.

 Reference For details about the extraction range, refer to “Extraction Range” (page 7-6).

## 2 Click [Extract Files].



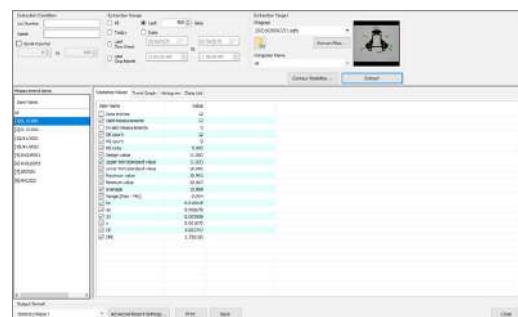
The [File Search] dialog box appears.



Number	Description
(1)	<p>The search target folder is displayed. You can also specify a folder registered in [Folder Settings].</p> <p> "Folder Settings" (page 12-11)</p>
(2)	<p>Search for program data in accordance with the conditions configured under [Extraction Range]. By changing the conditions under [Extraction Range] in the [Statistics/Analysis] window and clicking [Execute Search] again while the [File Search] dialog box is displayed, you can refresh the Program data names displayed in (3).</p>
(3)	<p>The search result is displayed. When you double-click a line, the statistical data is read into the data display area.</p>
(4)	<p>When you click [Read data], the Program data selected in (3) is read into the data display area.</p>
(5)	<p>Close the [File Search] dialog box.</p>

**3** Select the Program data and click [Read data].

The extracted data is displayed.



## Configuring the Setting of the Measurement Result Data to Extract

Set the program data to extract the measurement result data and conduct statistics/analysis.

### Extraction Condition

Configure the extraction conditions of the measurement results to extract from the program data.

Extraction Condition	
Lot Number	<input type="text"/>
Name	<input type="text"/>
<input type="checkbox"/> Serial Counter	<input type="text"/> 0 <input type="button" value="▲"/> to <input type="text"/> 500 <input type="button" value="▼"/>

Item	Description
Lot Number	Specify the lot number of the statistical data to aggregate.
Name	Specify the name of the person in charge of the statistical data to aggregate.
Serial Counter	When this check box is selected, you can specify the serial counter of the statistical data to extract. Specify the value with ▲/▼ or enter the value directly.

### Extraction Range

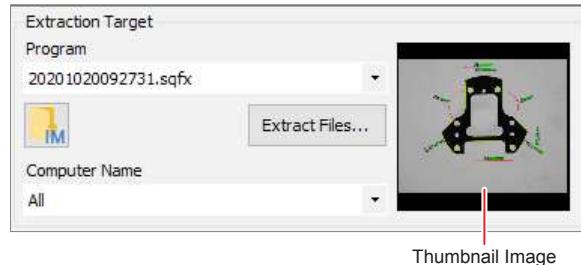
Configure which measurement results we wish to extract from the program data.

Extraction Range	
<input type="radio"/> All	<input checked="" type="radio"/> Last <input type="text"/> 500 <input type="button" value="data"/>
<input type="radio"/> Today	<input type="radio"/> Date <input type="text"/>
<input type="radio"/> Last One Week	<input type="text"/> 10/19/2020 <input type="button" value=""/> to <input type="text"/> 10/19/2020 <input type="button" value=""/>
<input type="radio"/> Last One Month	<input type="text"/> 12:00:00 AM <input type="button" value=""/> to <input type="text"/> 11:59:59 PM <input type="button" value=""/>

Item	Description
[All]	Aggregate all statistical data included in the selected program data.
[Last]	Aggregate the specified number of pieces of the past statistical data.
[Today]	Aggregate the statistical data measured today from the data included in the selected program data.
[Date]	Specify dates to limit the range to aggregate the statistical data.
(Date)	Specify the date from the calendar shown in the dropdown list.
(Time)	Specify the time with ▲/▼ or enter the time directly.
[Last One Week]	Aggregate the statistical data measured in the past week from the data included in the selected program data.
[Last One Month]	Aggregate the statistical data measured in the past month from the data included in the selected program data.

### Extraction Target

Select the program data to extract the measurement results from.



Thumbnail Image

Item	Description
Program	Select the Program data to conduct statistics/analysis from the list. Up to 50 recently used program data files are displayed.
[Extract Files]	Click this button to display the [Open Program] dialog box. You can select from all program data. <input type="checkbox"/> "Program" (page 10-12)
Computer Name	Search for program data stored in the controller in accordance with the settings configured under [Extraction Range]. <input type="checkbox"/> "Extracting Statistical Data by Searching Files by Date" (page 7-5)
Thumbnail Image	Select the name of the controller to be targeted for statistics/analysis from the dropdown list. You can extract measurement result data from the specified controller.

## MEMO

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Statistics/Analysis

# Statistics Display

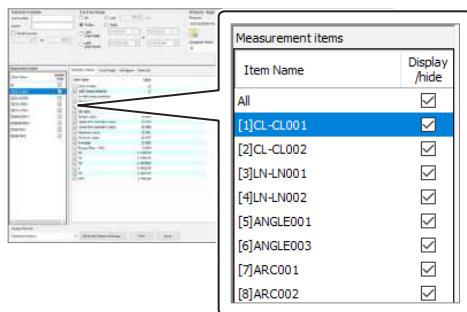
## Displaying the Statistics Values

Display the statistics values of the extracted statistical data.

### 1 Click the [Statistics Values] tab.

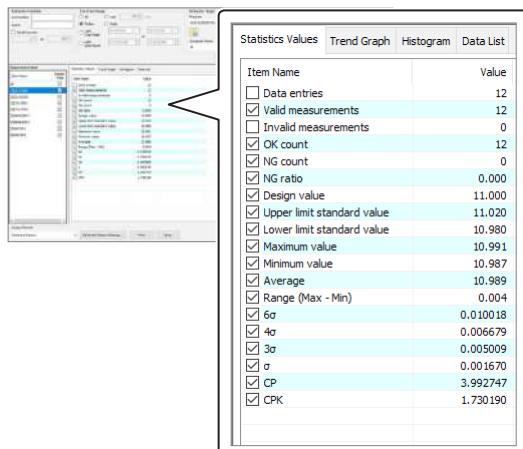
The statistics values are displayed in the data display area.

### 2 From the [Measurement items] area, click the name of the measurement item to display its data.



The name of the selected measurement item is highlighted and its corresponding statistics values are displayed in the data display area.

- Point • Click the name itself to select the measurement item.
- The status of the check box for the measurement item does not affect the statistics value display.



Item	Description
Item name	The names of the statistics are displayed. The item names whose check boxes are selected and their values will be output to the statistical report.
Value	The resulting values of the statistics are displayed.

Reference Design value, Upper limit standard value, Lower limit standard value, Maximum value, Minimum value, Average, Range (Max - Min), 6σ, 4σ, 3σ, σ, CP and CPK are displayed only when an individual measurement item is selected.

## Displaying a Trend Graph

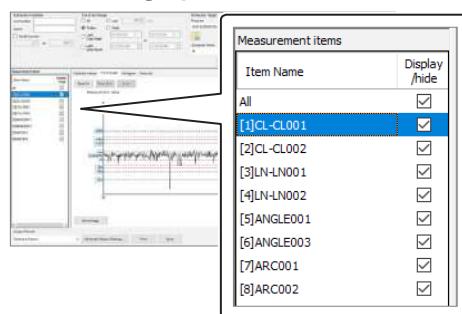
Display the trend graph for the measurement item selected in the [Measurement items] area.

The display range of the graph can be specified on the [Data List] tab.  
Book "Displaying the Data List" (page 7-10)

### 1 Click the [Trend Graph] tab.

The trend graph is displayed in the data display area.

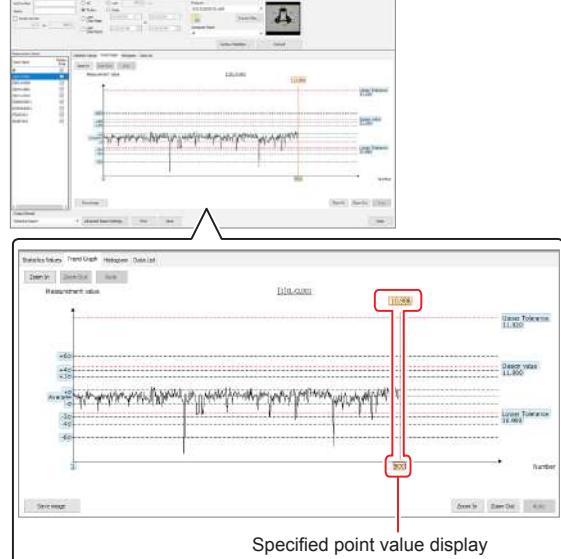
### 2 From the [Measurement items] area, click the name of the measurement item to display its data in the graph.



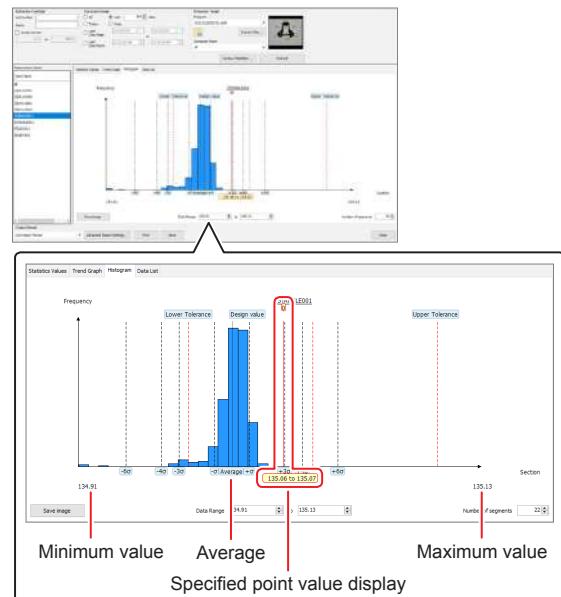
The name of the selected measurement item is highlighted and its trend graph is displayed in the data display area.

- Point • Click the name itself to select the measurement item.
- The status of the check box for the measurement item does not affect the trend graph display.

Reference When "All" is selected, the trend graph for the OK ratio is displayed.  
When an individual measurement item is selected, the trend graph for its measurement value is displayed.



Item	Description
Number (X axis)	The X axis shows the number of measurements conducted for the extracted statistical data.
[Zoom In]	Enlarge the X axis display.
[Zoom Out]	Reduce the X axis display.
[Auto]	Display the X axis at the optimum magnification according to the number of measurements.
OK ratio/ Measurement value (Y axis)	The Y axis shows the OK ratio/ measurement value of the extracted statistical data.
[Zoom In]	Enlarge the Y axis display.
[Zoom Out]	Reduce the Y axis display.
[Auto]	Display the Y axis at the optimum magnification according to the upper/ lower tolerance limit.
[Save Image]	Save the trend graph as an image file (*.tif).
Specified point value display	This line shows the OK ratio/ measurement value (upper end) and the number of measurements (lower end) at the line position. When the cursor is shown as ↔, the line can be moved by dragging.



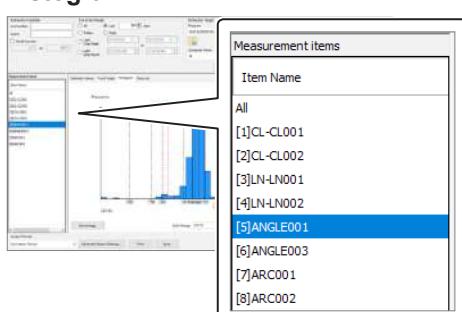
## Displaying a Histogram

Display the histogram for the measurement item selected in the [Measurement items] area.  
The display range of the graph can be specified on the [Data List] tab.  
[?] "Displaying the Data List" (page 7-10)

### 1 Click the [Histogram] tab.

The histogram is displayed in the data display area.

### 2 From the [Measurement items] area, click the name of the measurement item to display the histogram.



The name of the selected measurement item is highlighted and its histogram is displayed in the data display area.



- Click the name itself to select the measurement item.
- The status of the check box for the measurement item does not affect the histogram display.



- When "All" is selected, the "NG count + invalid count" for each lot number is shown as a histogram.  
When an individual measurement item is selected, the histogram for its measurement value is displayed.

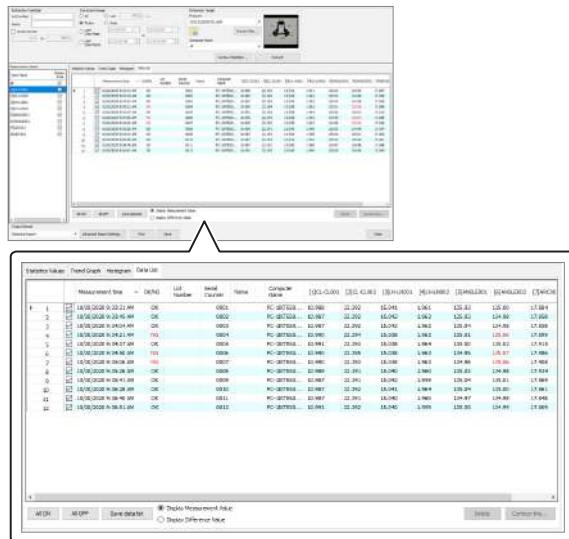
Item	Description
Section (X axis)	The X axis shows the lot number/ measurement value (range) for the extracted statistical data.
Maximum value	The maximum value within the displayed range is displayed. (Measurement item only)
Minimum value	The minimum value within the displayed range is displayed. (Measurement item only)
Data Range	Specify the range to display the histogram.
Number of segments	Specify the number of segments of the X axis.
Frequency (Y axis)	The Y axis shows the "NG count + invalid count/number of measurements for which the results are within the measurement value range (frequency)" for the extracted statistical data.
Specified point value display	This line shows the frequency (upper end) and lot number/measurement value (lower end) at the line position. When the cursor is shown as ↔, the line can be moved by dragging.
[Save Image]	Save the histogram as an image file.
Average	This is the position of the average value of the statistical data.

## Displaying the Data List

Display the data list for the measurement item whose check box is selected in the [Measurement items] area.

### 1 Click the [Data List] tab.

The data list is displayed in the data display area.



Item	Description
[Display Difference Value]	Select it to display the difference value of design value and measurement value in measurement result of data display area.  [Reference] For the measurement result with design value not being set, the difference is displayed with the design value as 0.
[Delete]	Delete the selected statistical data.
[Contour line]	Output the image of the contour line from the statistical data which includes the measurement result of [Profile].  [Reference] □ "Outputting Contour Lines" (page 7-12)

- If check boxes in multiple rows are selected or cleared, operations can be performed at the same time for the selected rows.
- [OK/NG] will be shown in red for data with NG, fail or design value and tolerance unset.
- [Lot Number], [Serial Counter] and [Name] are displayed when [Enable/Disable] in [Added information] is selected.
- If a valid item is added to [Added information], a column will be added.  
□ "Added information" (page 10-32)

Item	Description
(Number)	The number assigned to the statistical data is displayed.
(Check box)	The statistical data whose check box is selected is subject to statistical processing, trend graph, histogram, and save data list.
Measurement time	The date and time when the statistical data was measured are displayed.
OK/NG	The measurement result is displayed. □ "Confirming the Measurement Result" (page 6-13)
Lot Number	The lot number specified during the measurement is displayed.
Serial Counter	Display the value of the serial counter at the time of executing the measurement.
Name	The person in charge specified during the measurement is displayed.
Computer Name	The equipment identification name of the controller which implemented the measurement is displayed.
(Measurement value)	The measurement result value for each measurement item is displayed.
[All ON]	Select all of the check boxes for statistical data.
[All OFF]	Clear all of the check boxes for statistical data.
[Save data list]	Save the data list for those whose check boxes are selected in CSV format. □ "Saving the Data List" (page 7-11)
[Display Measurement Value]	Select it to display the measurement value (actual measured value) in measurement result of data display area.

## Sorting the Data List

You can sort the data in the data list by clicking the title.  
Clicking the title toggles the sort order between ascending order and descending order.

	Measurement time
1	10/20/2020 9:33:31 AM
2	10/20/2020 9:33:45 AM
3	10/20/2020 9:34:04 AM
4	10/20/2020 9:34:21 AM
5	10/20/2020 9:34:37 AM

	Measurement time
1	10/20/2020 9:35:51 AM
2	10/20/2020 9:36:40 AM
3	10/20/2020 9:36:28 AM
4	10/20/2020 9:35:41 AM
5	10/20/2020 9:35:26 AM

Ascending order

Descending order

## Showing/Hiding the Measurement Items

When the check box is cleared in the [Measurement items] area, the measurement item is hidden in the data list.  
"All" allows you to show or hide all measurement items simultaneously.

**Reference** The measurement items whose check box is selected will be deleted from the Program data at a certain time in the initial state following the extraction of the statistical data.

## Deleting the Measurement Data

- Point**
- The deleted data cannot be recovered.
  - The data measured with an application of version 5.0 or less cannot be deleted.

### 1 Click the data that you want to delete.

The row of the clicked data is highlighted.

### 2 Click [Delete].

A confirmation message appears.

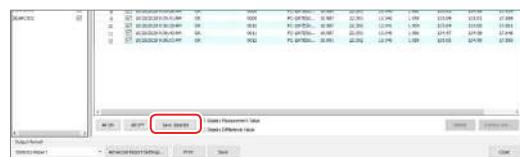
### 3 Click [Yes].

The selected data is deleted.

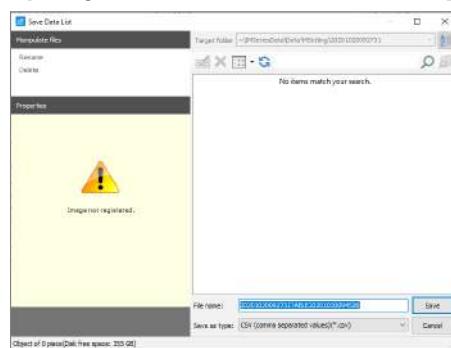
## Saving the Data List

Click [Save data list] to save the data that is selected as a file in "data list format".

### 1 Click [Save data list].



### 2 Specify the file name, and then click [Save].



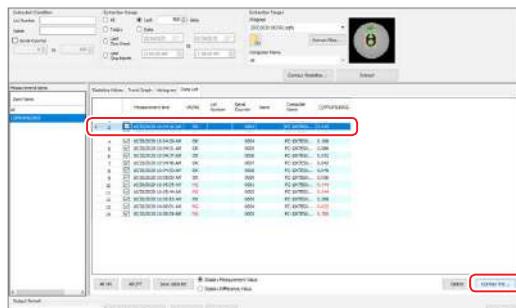
The data list is saved in CSV format.

**Reference** When the data list is saved in CSV format, the statistics values are also saved.

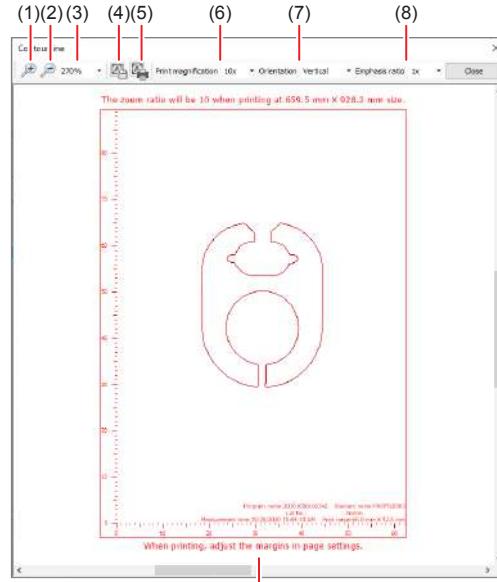
## Outputting Contour Lines

Output the image of the contour line from the statistical data which includes the measurement result of [Profile].

- From the data list, select a set of statistical data to output contour lines from, and click [Contour line].



The [Contour line] dialog box appears.



Preview display

### Toolbar

Buttons to operate the preview display are displayed.

Number	Description
(1)	Magnify the preview display.
(2)	Reduce the preview display.
(3)	Select the display magnification ratio for the preview display from the dropdown list.
(4)	Save the preview image.
(5)	Print the preview image.
(6)	Select a magnification rate to print the preview image from the dropdown list.
(7)	Select an orientation to print the preview image from the dropdown list.
(8)	Select the emphasis ratio of the contour line from the dropdown list. Emphasis at the selected ratio the distance between the contour line detected at the time of measurement and the reference contour.

### Preview display

Display the scale preview of the contour line image extracted via [Profile].

- Click [Save] or [Print].

The contour line is saved or printed.

When you print the preview display, the contour lines of the program data, which have been displayed on the preview display, are printed as dotted lines

## Displaying Contour Statistics

When the measurement result of [Profile] is included in the program data, you can display contour statistics on an arbitrary location of the target.



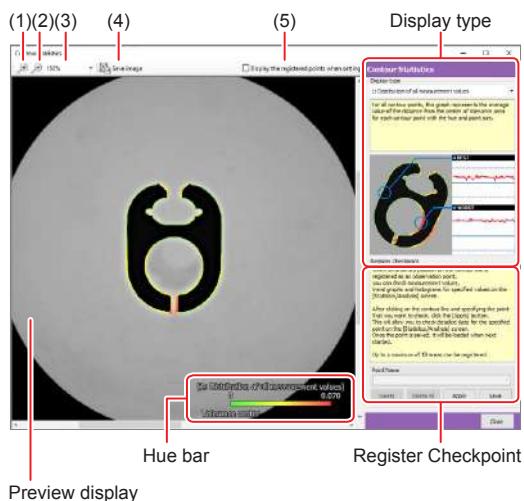
When the measurement result of [Profile] is not included, you cannot display the contour statistics.

### 1 Select the Program data targeted for contour statistics, and click [Contour Statistics].



[Contour Statistics]

The [Contour Statistics] dialog box appears.



Preview display

#### Toolbar

Buttons to operate the preview display are displayed.

Number	Description
(1)	Magnify the preview display.
(2)	Reduce the preview display.
(3)	Select the display magnification ratio for the preview display from the dropdown list.
(4)	Save the preview image.
(5)	Select the check box to display the points registered in Programs on the preview screen.

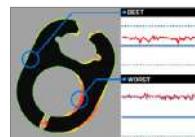
#### Preview display

Display the image included in the program data, which is targeted for contour statistics in the preview display.  
Measurement value on each contour point extracted via [Profile] is displayed in hue and point size.

### ● Display type

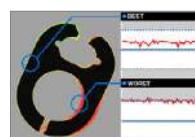
Select the display type to display on the preview screen from the list. The screen changes to the preview screen in accordance with the selected display type.

#### ○ 1: Distribution of all measurement values



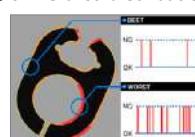
For all contour points, the average value of the distance from the design value for each contour point are displayed in hue and point size.

#### ○ 2: Tolerance-internal distribution



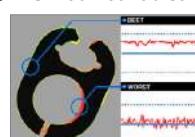
For contour points outside of the tolerance, the average value of the distance from the design value for each contour point are displayed in hue and point size.  
Data out of the tolerance are treated as the upper tolerance limit value.

#### ○ 3: NG area distribution



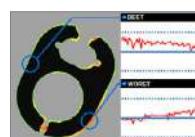
For all contour points outside of the tolerance range, the number of point evaluated as NG for each contour point is displayed in hue and point size.

#### ○ 4: Shift amount distribution



For all contour points, the variance of the distance from the design value for each contour point is displayed in hue and point size.

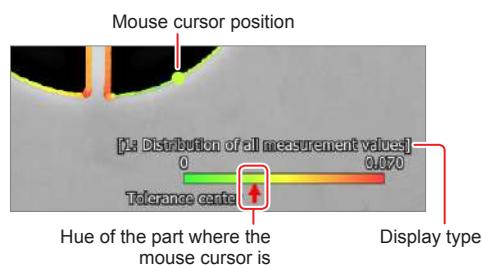
#### ○ 5: Shift amount incline



For all contour points, the incline related to the distance from the design value and related to the time axis for each contour point are displayed in hue and point size.

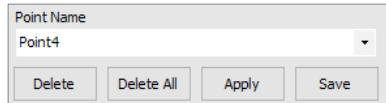
### ● Hue bar

Display the location of the hue at the location where the mouse cursor is on in the preview display.  
The hue and name to be displayed are switched in accordance with [Display type].



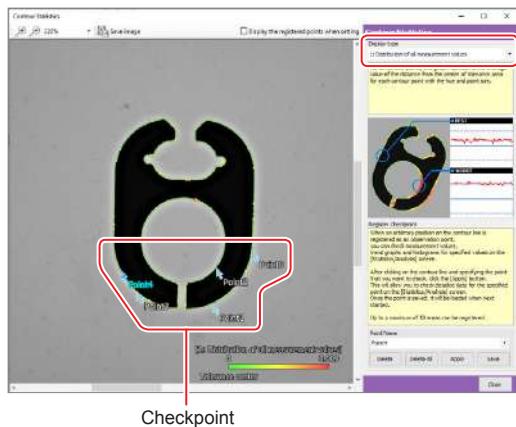
### ● Register Checkpoint

Set up the checkpoint specified in the preview display.  
Up to 10 checkpoints can be registered.  
You can display the numerical data in the [Statistics / Analysis] window by registering an arbitrary point on the contour as a checkpoint and applying it.



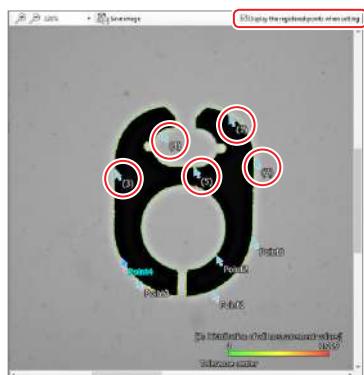
Item	Description
Point Name	Display the name of the checkpoint specified in the preview display. You can select a checkpoint in the preview display by selecting the point name from the dropdown list. You can also edit the displayed point name and change it.
[Delete]	Delete the selected check point.
[Delete All]	Delete all the check points.
[Apply]	By specifying a checkpoint in the preview screen and clicking [Apply], you can see the detailed data of the specified point in the [Statistics/Analysis] window.
[Save]	Save the checkpoint to the program data. The saved checkpoint will be read when the [Contour Statistics] dialog box is opened next time.

### 2 Select a [Display type], and click a contour point in the preview screen to specify a checkpoint.



Checkpoint

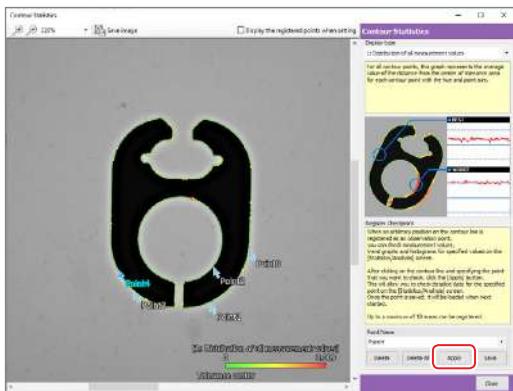
When points registered in programs are displayed, only the arrowheads and sequential numbers are shown.



### 3 Click [Apply].

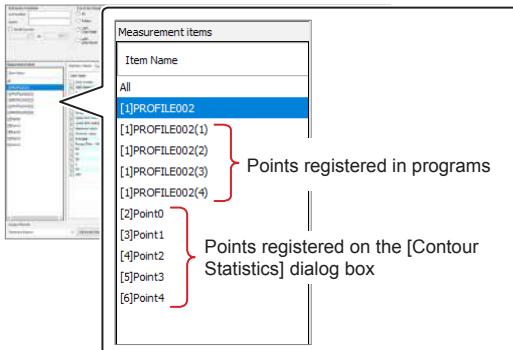


To save the checkpoint in the Program data, click [Save] before clicking [Close].



### 4 Click [Close].

The contour statistics data of the checkpoint is displayed in the [Statistics / Analysis] window.



By clicking [Contour Statistics] again, you can edit the checkpoints to be displayed in the [Measurement items] area.

## MEMO

# Report Printing

Print the statistical data extracted from the program data.

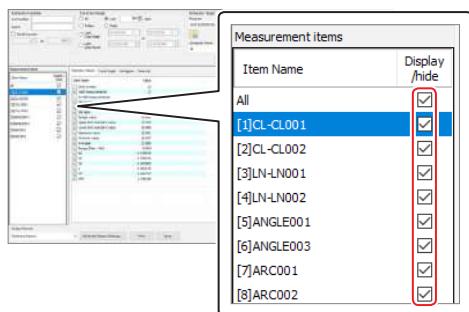
**Reference** For details of printer connection method, refer to **“Connecting a Printer”** (page 2-14).

## Printing the Statistical Report

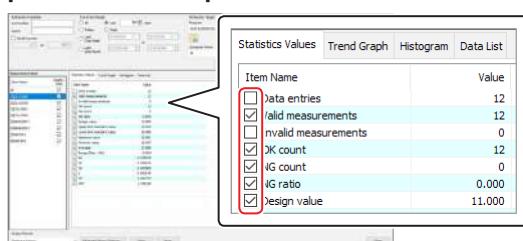
- In the [Statistics/Analysis] window, extract the statistical data from the Program data and select the data used for the statistics/analysis.

**Reference** “Statistical Data Extraction” (page 7-4)

- In the [Measurement items] area, select the check box(es) of the measurement item(s) to be printed on the report.

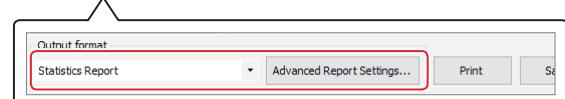
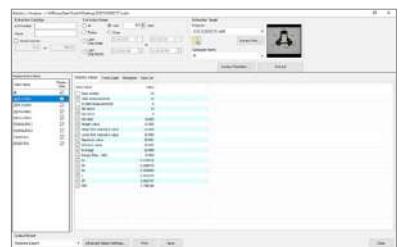


- Click the [Statistics Values] tab and select the check box(es) of the statistics item(s) to be printed on the report.



**Reference** The individual data to be printed in the report can be selected from the list on the [Data List] tab. When all of the check boxes for statistical data are cleared, all data is printed.

- Under [Output format], select [Statistics Report] or [Statistical report (with separate outputs)] and then click [Advanced Report Settings].



**Reference**

- When [Statistical report (with separate outputs)] is selected, the statistics values and the individual measurement results will be printed in the report.
- When [Statistical report (with separate outputs)] is selected, selecting [Display Measurement Value] on the [Data List] tab will print “Actual measured value” in the measurement result. If [Display Difference Value] is selected, “Difference value” will be printed in the measurement result.

The [Advanced Report Settings (Print statistical report)] dialog box appears.

- Select the information to be added to the “statistics report”.

**Reference** “Advanced Report Settings” (page 10-33)

- Click [OK] in the [Advanced Report Settings (Print statistical report)] dialog box.

- Click [Print].

The [Preview] dialog box appears.

**Reference**

- The images to be printed in statistical report differ depending on the tab displayed in the data display area
- The report's header and footer can be set in the [Preview] dialog box.

**Reference** “Header/Footer” (page 10-35)

- Click [Print].

The statistical report is printed.

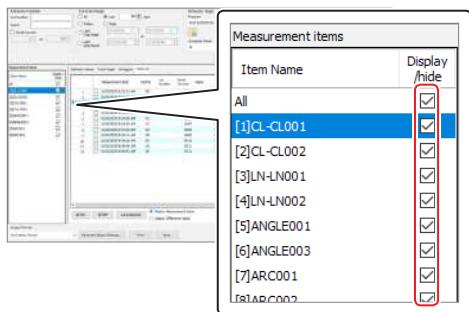
## Printing the Single Object Report

When [Unit report format] is selected, all extracted statistical data is printed as a single object report.

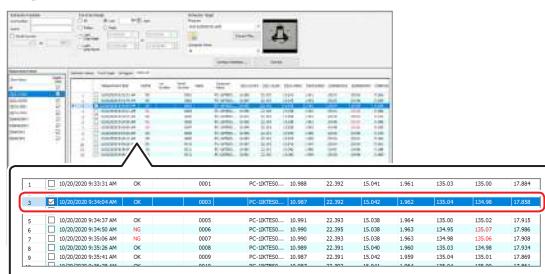
- In the [Statistics/Analysis] window, extract the statistical data from the Program data and select the data used for the statistics/analysis.

"Statistical Data Extraction" (page 7-4)

- In the [Measurement items] area, select the check box(es) of the measurement item(s) to be printed on the report.

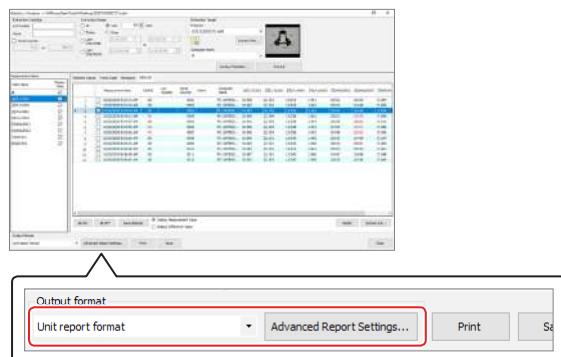


- Click the [Data List] tab, and select the check box of the data that is to be printed on the report.



- Reference
- If the check boxes are all cleared, a single object report will be printed for all data.
  - A single object report is printed on one sheet for each row of data.
  - If [Display Measurement Value] is selected, "Actual measured value" is printed in the measurement result. If [Display Difference Value] is selected, "Difference value" will be printed in the measurement result.

- Under [Output form], select [Unit report format] and then click [Advanced Report Settings].



The [Advanced Report Settings (Print single object report)] dialog box appears.

- Select the information to be added to the "single object report".

"Advanced Report Settings" (page 10-33)

- Click [OK] in the [Advanced Report Settings (Print single object report)] dialog box.

- Click [Print].

The [Preview] dialog box appears.

- Reference
- The report's header and footer can be set in the [Preview] dialog box.
  - "Header/Footer" (page 10-35)

- Click [Print].

The single object report is printed.

# Save Report

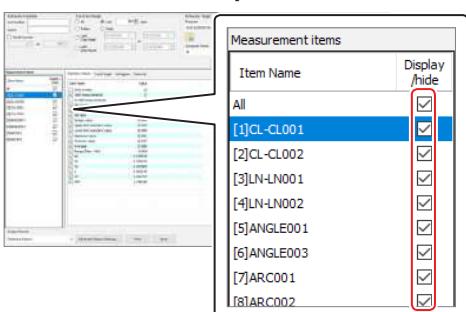
Save the statistical data extracted from the Program data as a file in PDF format (\*.pdf), XPS format (\*.xps), or CSV format (\*.csv).

## Saving the Statistical Report

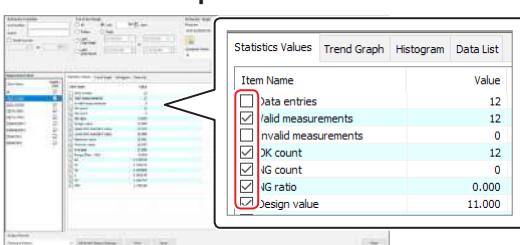
- In the [Statistics/Analysis] window, extract the statistical data from the Program data and select the data used for the statistics/analysis.

“Statistical Data Extraction” (page 7-4)

- In the [Measurement items] area, select the check box(es) of the measurement item(s) to be entered in the report.

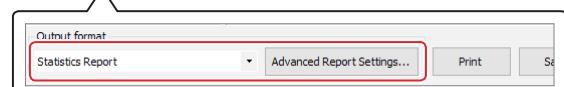


- Click the [Statistics Values] tab and select the check box(es) of the statistics item(s) to be entered in the report.



**Reference** The individual data to be entered in the report can be selected from the list on the [Data List] tab. When all of the check boxes for statistical data are cleared, all data is entered.

- Under [Output format], select [Statistics Report] or [Statistical report (with separate outputs)] and then click [Advanced Report Settings].



**Reference**

- When [Statistical report (with separate outputs)] is selected, the statistics values and the individual measurement results will be entered in the report.
- When [Statistical report (with separate outputs)] is selected, selecting [Display Measurement Value] on the [Data List] tab enters “Actual measured value” into the measurement result. If [Display Difference Value] is selected, “Difference value” will be entered into the measurement result.

The [Advanced Report Settings (Print statistical report)] dialog box appears.

- Select the information to be added to the “statistics report”.

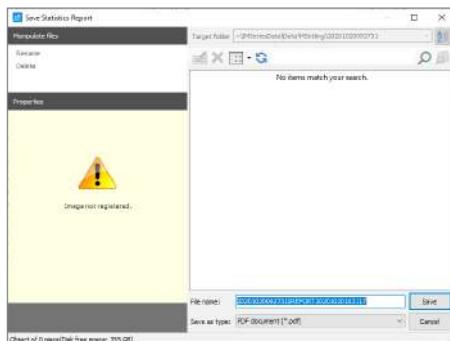
“Advanced Report Settings” (page 10-33)

- Click [OK] in the [Advanced Report Settings (Print statistics report)] dialog box.

- Click [Save].

The [Save statistical report] dialog box appears.

## 8 Specify the name and format of the file.



Item	Description
File name <sup>*1</sup>	Enter the name of the file to be saved.
Save as type	Select the format in which to save the statistical report file.
PDF document (*.pdf)	Save the file as an PDF document.
XPS document (*.xps)	Save the file as an XPS document.
csv (comma separated values) (*.csv) <sup>*2</sup>	Save the file in CSV format.

- \*1 By default, the following name is assigned to the file.  
"Name of the Program data" + "SREPORT" + save time (Year + Month + Day + Hour + Minute + Second)  
\*2 When the file is saved in CSV format, the preview image is not saved.

## 9 Click [Save].

The statistical report is saved.

## Saving the Single Object Report

When [Unit report format] is selected, each extracted statistical data is saved as a file of a "single object report".

- 1 In the [Statistics/Analysis] window, extract the statistical data from the Program data and select the data used for the statistics/analysis.

□ "Statistical Data Extraction" (page 7-4)

- 2 In the [Measurement items] area, select the check box(es) of the measurement item(s) to be entered in the report.

Item Name	Display /hide
All	<input checked="" type="checkbox"/>
[1]CL-CL001	<input checked="" type="checkbox"/>
[2]CL-CL002	<input checked="" type="checkbox"/>
[3]LN-LN001	<input checked="" type="checkbox"/>
[4]LN-LN002	<input checked="" type="checkbox"/>
[5]ANGLE001	<input checked="" type="checkbox"/>
[6]ANGLE003	<input checked="" type="checkbox"/>
[7]ARC001	<input checked="" type="checkbox"/>
[8]ARC002	<input checked="" type="checkbox"/>

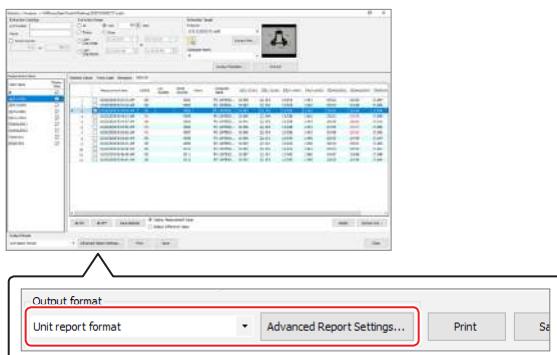
- 3 Click the [Data List] tab, and select the check box(es) for the data that you want to use to create the report.

Index	Date	OK	0001	PC-107E00...	10.988	22.392	15.041	1.961	135.03	135.00	17.894
1	10/20/2020 9:33:31 AM	OK	0001	PC-107E00...	10.988	22.392	15.041	1.961	135.03	135.00	17.894
2	10/20/2020 9:34:46 AM	OK	0001	PC-107E00...	10.987	22.392	15.041	1.962	135.04	134.98	17.894
3	10/20/2020 9:34:57 AM	NG	0006	PC-107E00...	10.991	22.393	15.038	1.964	135.02	135.00	17.915
4	10/20/2020 9:35:00 AM	NG	0006	PC-107E00...	10.990	22.395	15.038	1.963	134.95	135.00	17.996
5	10/20/2020 9:35:04 AM	NG	0005	PC-107E00...	10.989	22.393	15.038	1.962	135.02	135.00	17.929
6	10/20/2020 9:35:26 AM	OK	0008	PC-107E00...	10.989	22.391	15.040	1.960	135.03	135.00	17.934
7	10/20/2020 9:35:41 AM	OK	0009	PC-107E00...	10.987	22.391	15.042	1.959	135.04	135.01	17.999
8	10/20/2020 9:35:46 AM	OK	0010	PC-107E00...	10.986	22.391	15.043	1.964	134.96	134.95	17.865

### Reference

- If the check boxes are all cleared, the single object report is made using all data.
- The single object report is made as one file for each row of data.
- If [Display Measurement Value] is selected, "Actual measured value" is entered in the measurement result. If [Display Difference Value] button is selected, "Difference value" will be entered into the measurement result.

- 4** Under [Output form], select [Unit report format] and then click [Advanced Report Settings].



The [Advanced Report Settings (Print single object report)] dialog box appears.

- 5** Select the information to be added to the “Single object report”.

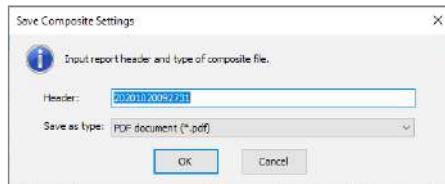
“Advanced Report Settings” (page 10-33)

- 6** Click [OK] in the [Advanced Report Settings (Print single object report)] dialog box.

- 7** Click [Save].

7

- 8** Specify the header and format of the file.



Item	Description
Header	Specify the character string added at the beginning of the file name.
Save as type	Select the format in which to save the single object report file.
PDF document (*.pdf)	Save the file as an PDF document.
XPS document (*.xps)	Save the file as an XPS document.
CSV (comma separated values) (*.csv)	Save the file in CSV format.

\* When the file is saved in CSV format, the preview image is not saved.

The generated file name will be in the format of “Header” + “Date and time when the measurement data was saved (measured)” - “Row number of data list”.

- 9** Click [OK].

The single object report is saved.

## MEMO

# IM Statistics Viewer 3

This section explains the overview, installation and uninstallation procedures, and usage of "IM Statistics Viewer 3".

## Overview of IM Statistics Viewer 3

"IM Statistics Viewer 3" is an application attached to IM-8000 Series. By installing this application to the PC, you can extract statistical data without using the controller of IM-8000 Series. You can extract statistical data also via a network. The statistics/analysis functions are the same as the ones in the [Statistics / Analysis] window of IM-8000 Series.

## Operating Environment of the PC

Applicable OS	Windows 10 Home/Pro/Enterprise (64bit)
CPU	"Core-i" series 3XXX (third generation) or later
Memory capacity	4 GB or more
Connection interface	LAN (RJ-45 1000BASE-T/100BASE-TX/10BASE-T) port must be included as standard.
Hard disk free space	30GB or more
Display color	32 bits or more
Display	1280 x 1024 pixels or greater

## Installation and Uninstallation of IM Statistics Viewer 3

This section explains the installation and uninstallation procedures of IM Statistics Viewer 3.

### ■ Installing IM Statistics Viewer 3

**► Important** The [User Account Control] dialog box might appear during installation. Click [Yes] and continue the procedure.

#### 1 Unpack the downloaded compressed file to any folder, and then double-click "Setup.exe".

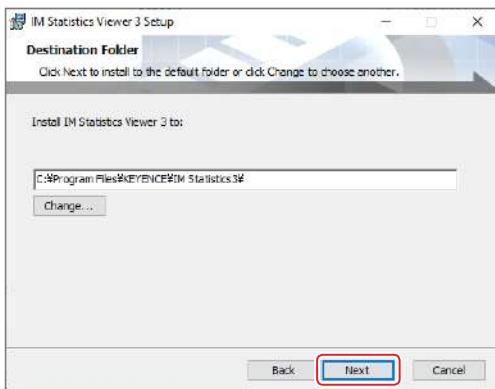
**► Important** The PC on which IM Statistics Viewer 3 is to be installed must have ".Net Framework 4.5.2 or higher" installed. Double-click "NDP461-KB3102436-x86-x64-ALIOS-ENU.exe" in the unpacked "Support" folder, and install the software by following the procedure.

#### 2 Click [Next].

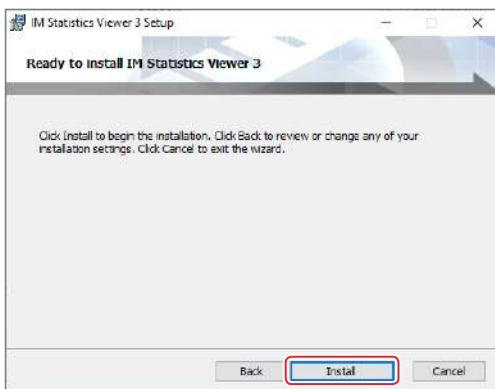


### 3 Click [Next].

 To change the installation destination, click [Change] and specify an installation destination.



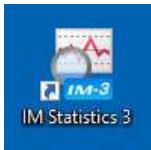
### 4 Click [Install].



### 5 Click [Finish].



The [IM Statistics 3] shortcut icon is created on the desktop.



 The [KEYENCE] folder is automatically created in the following path of the PC.

C:\Users\(Login user name)\Documents

## ■ Uninstalling IM Statistics Viewer 3



The [User Account Control] dialog box might appear during uninstallation. Click [Yes] and continue the procedure.

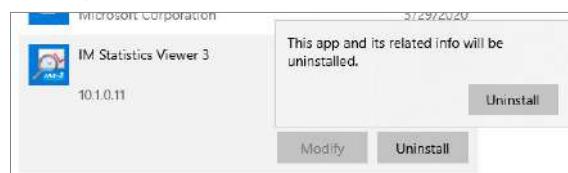
**1** Confirm that IM Statistics Viewer 3 is not running. Terminate the application if it is running.

**2** Display [Windows Settings].

**3** Click [Apps].

**4** Select [IM Statistics Viewer 3] from the list and click [Uninstall].

A message box to confirm the uninstallation appears.



**5** Click [Uninstall].

When uninstallation is completed, [IM Statistics Viewer 3] is removed from the list. The shortcut icon on the desktop is also deleted.

## Copying the Program Data

To extract the statistical data using the IM Statistical Viewer 3, export the program data and all related data from the controller of IM-8000 Series and copy them to the PC.

 When you refer to folders on a network to extract statistical data from program data, the program data do not need to be copied.

### 1 Export the Program data stored in the controller and all related data to a USB memory device.

 "Exporting a File" (page 12-8)



**Important** Make sure to export Program data and all related data. Statistical data cannot be extracted from Program data alone.

### 2 Connect a USB memory device to the USB port on the PC.

### 3 Copy the Program data and all related data exported from the controller to a directory.



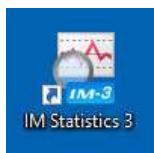
When you copy them into the following folder, you can directly refer to the Program data by clicking  in the [Program] window.

C:\Users\(Login user name)\Documents\KEYENCE\IMSeriesData\Data\MSetting

## Starting and Exiting IM Statistics Viewer 3

### Starting IM Statistics Viewer 3

- 1 Double-click the [IM Statistics 3] icon on the desktop.



The main window of [IM Statistics Viewer 3] window appears.



Name	Description
(1) [Launch Statistics]	The [Statistics / Analysis] dialog box appears. □ “Statistical Analysis Using IM Statistics Viewer 3” (page 7-26)
(2) [Display Settings]	The [Display Advanced Settings] dialog box appears. □ “Display Advanced Settings for IM Statistics Viewer 3” (page 7-28)
(3) [Folder Settings]	The [Folder Settings] dialog box appears. □ “Folder Settings for IM Statistics Viewer 3” (page 7-28)

### Exiting IM Statistics Viewer 3

- 1 Click [Close].



Reference You can also exit the application by clicking × on the upper right corner of the window.

## Operations of IM Statistics Viewer 3

Perform statistical analysis and configure settings using the IM Statistics Viewer 3

### Statistical Analysis Using IM Statistics Viewer 3

#### ■ Displaying the [Statistics/Analysis] Window

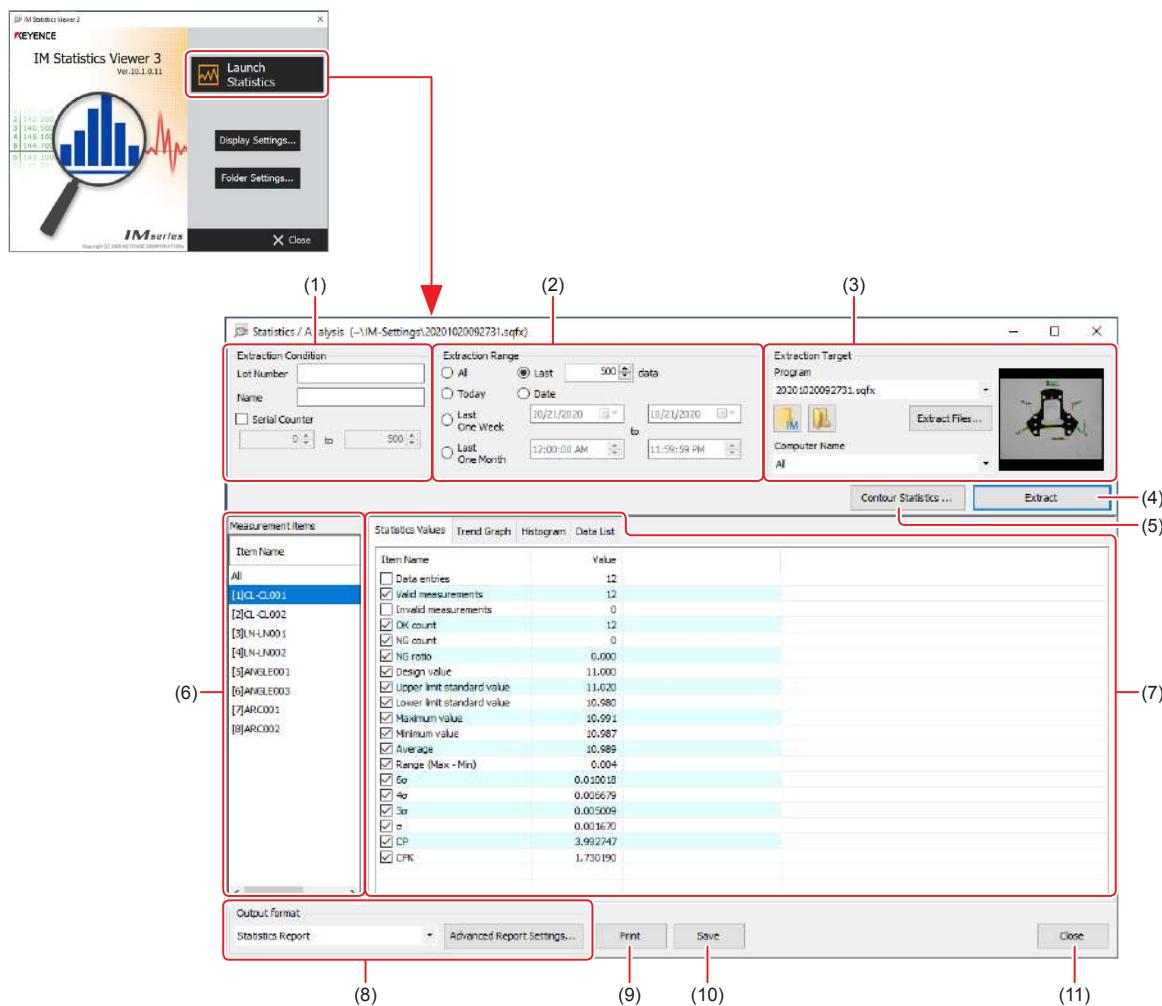
- Double-click the [IM Statistics 3] icon on the desktop.



The main window of [IM Statistics Viewer 3] window appears.

- Click [Launch Statistics].

The [Statistics / Analysis] window appears.



Name	Description
(1) Extraction Condition	Configure the extraction conditions of the measurement results to extract from the program data. □ "Extraction Condition" (page 7-6)
(2) Extraction Range	Configure which measurement results we wish to extract from the program data. □ "Extraction Range" (page 7-6)
(3) Extraction Target	Select which program to extract program data from for statistical analysis. □ "Extraction Target" (page 7-27)
(4) [Extract]	Extract the measurement results in accordance with the settings configured in (1), (2) and (3). □ "Procedure of Extracting Statistical Data" (page 7-4)
(5) [Contour Statistics]	When the profile measurement result is included in the program data, the [Contour Statistics] dialog box appears and you will register checkpoints. □ "Displaying Contour Statistics" (page 7-13)
(6) [Measurement items] area	Select the measurement item to conduct statistics/analysis. □ "Statistics Display" (page 7-8)
(7) Data display area	The measurement results extracted from the program data are displayed in different forms on the respective tabs. □ "Statistics Display" (page 7-8)
(8) Output format	Select the format to output the statistics/analysis data. The data will be "printed" or "saved" in the selected format. □ "Report Printing" (page 7-16) and □ "Save Report" (page 7-18)
(9) [Print]	Print the statistics/analysis data in the output format selected at "Output format". □ "Report Printing" (page 7-16)
(10) [Save]	Save the statistics/analysis data as a file in the output format selected at "Output format". □ "Save Report" (page 7-18)
(11) [Close]	Close the [Statistics / Analysis] window and return to the main menu.

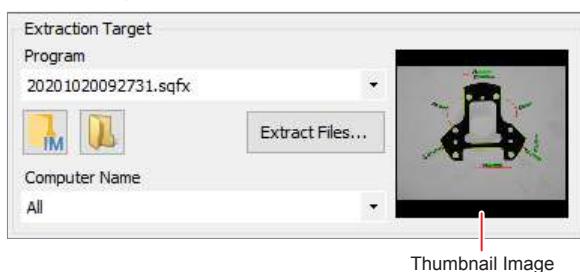


Except for (3) [Extraction Target], functions are the same the ones in the [Statistics / Analysis] window of IM-8000 Series.

For detailed procedures, refer to the descriptions about the [Statistics / Analysis] window of IM-8000 Series.

## ■ Extraction Target

Select the program data to extract the measurement results from.



Thumbnail Image

Item	Description
Program	Select the Program data to conduct statistics/analysis from the list. Up to 50 recently used program data files are displayed.
	Click this button to display the [Open Program] dialog box. You can select from the Program data stored in the [C:\Users\(Login user name)\Documents\KEYENCE\IMSeriesData\Data\IMSetting] folder on the PC. Operation procedures are the same as for the [Open Program] dialog box of IM-8000 Series. □ "Program" (page 10-12)

Item	Description
[Open Program]	Click this button to display the [Open Program] dialog box. The program data stored in a folder of the PC can be selected. You can also refer to a folder on a network and select program data.
[Extract Files]	Search for program data stored in the PC in accordance with the settings configured under [Extraction Range]. □ "Extracting Statistical Data by Searching Files by Date" (page 7-5)
Computer Name	Select the name of the controller to be targeted for statistics/analysis from the dropdown list. You can extract measurement result data only from the specified controller.
Thumbnail Image	The thumbnail image of the selected program data is displayed.

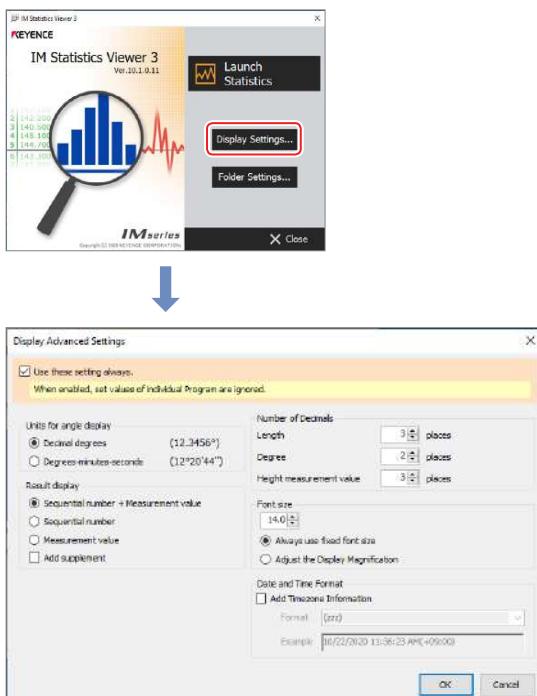
## Display Advanced Settings for IM Statistics Viewer 3

- 1** Double-click the [IM Statistics 3] icon on the desktop.



- 2** Click [Display Settings].

The [Display Settings] dialog box appears.



- Reference**
- Settings that can be configured in the [Display Advanced Setting] dialog box are the same as for the IM-8000.
  - “Advanced Display Settings” (page 12-15)
  - When [Use these setting always.] is selected, values displayed in the data display area are changed according to the settings configured in the [Display Advanced Settings] dialog box.

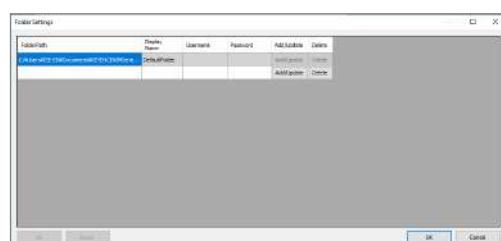
## Folder Settings for IM Statistics Viewer 3

- 1** Double-click the [IM Statistics 3] icon on the desktop.



- 2** Click [Folder Settings].

The [Folder Settings] dialog box appears.



**Reference**

- Settings that can be configured in the [Folder Settings] dialog box are the same as for the IM-8000.
- “Folder Settings” (page 12-11)
- When you specify a folder path, you can select it as a [Target folder] in the [Open Program] dialog box, opened by clicking in the [Statistics/Analysis] dialog box.

# 8

## Single Measurement

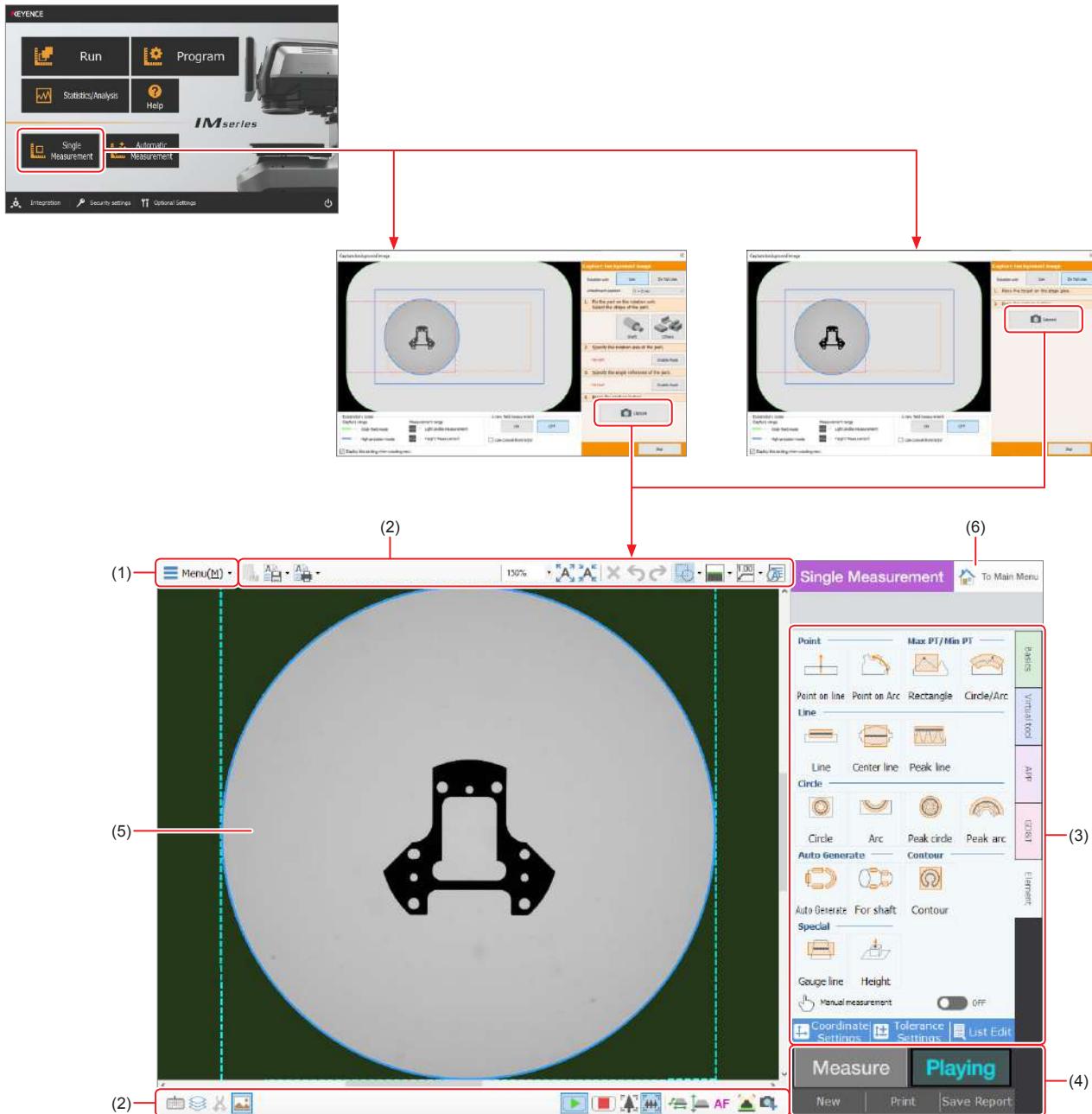
This chapter explains the operation procedures and functions of the [Single Measurement] mode.

<b>Names and Functions of Areas in the Window .....</b>	<b>8-2</b>
<b>Single Measurement Procedure .....</b>	<b>8-6</b>
<b>Measurement Items .....</b>	<b>8-12</b>
<b>Common Control Area .....</b>	<b>8-18</b>
<b>Print.....</b>	<b>8-19</b>
<b>Saving the Single Object Report.....</b>	<b>8-21</b>



# Names and Functions of Areas in the Window

This section describes the names and functions of the parts in the window when [Single Measurement] is selected.



Name	Description
(1) [Menu] dropdown list	Menu options for various functions are displayed in dropdown list. For details of each menu, refer to <a href="#">"Chapter 10 Menu"</a> (Page 10-1).
(2) Toolbar	This bar contains buttons for frequently used functions. <a href="#">"Toolbar"</a> (Page 8-4)
(3) Measurement operation area	This area contains buttons related to the measurement operation. By selecting tabs, you can select various measurement operation methods. During measurement, a measurement guide is displayed here.
[Basics] tab	Used to conduct basic measurement of the target, such as "Dimensioning" or "Angle" measurement. For details of the [Basics] tab, refer to <a href="#">"Basics"</a> (Page 4-24).
[Virtual tool] tab	Used to draw a virtual line/point such as a midpoint or intersection based on the points or lines detected using the options on the [Basics] or [Element] tab. For details of the [Virtual tool] tab, refer to <a href="#">"Virtual Tool"</a> (Page 4-41).
[APP] tab	Used to conduct application measurement, such as "Pitch Distance" or "Thickness". For details of the [APP] tab, refer to <a href="#">"Application"</a> (Page 4-57).
[GD&T] tab	Used to measure geometric dimension and tolerance such as "Straightness" or "Roundness". For details of the [GD&T] tab, refer to <a href="#">"GD&amp;T"</a> (Page 4-109).
[Element] tab	Used to detect measurement elements such as points or lines. Using these elements together with virtual lines and points allows various measurements. For details of the [Element] tab, refer to <a href="#">"Element"</a> (Page 4-123).
[Rotation] tab	Used to measure a target by rotating it such as "Degrees of Rotation" or "Coaxiality". (only when the rotation unit IM-RU1 is used) For details of the [Rotation] tab, refer to <a href="#">"Rotation Measurement"</a> (Page 4-166).
[Coordinate Settings]	Used to set the coordinates used as the base for dimensioning. When base coordinates are set, the distances from the X- and Y-coordinates can be measured as well as normal dimensions. For details of the coordinate settings, refer to <a href="#">"Coordinate Settings"</a> (Page 4-182).
[Tolerance Settings]	This button is used to set the tolerance for all items in the measurement result. When you set the tolerance and click [OK], the evaluation is reflected in the measurement result. For details of the batch tolerance setting, refer to <a href="#">"Batch Tolerance Settings"</a> (Page 4-189).
[List Edit]	This button is used to sort or show/hide measurement results displayed on the screen. For details of the list edit, refer to <a href="#">"Edit Element List"</a> (Page 4-194).
(4) Common control area	This area contains buttons for common functions. <a href="#">"Common Control Area"</a> (Page 8-18)
[Measure]	Used to start measurement. <a href="#">"Measure"</a> (Page 8-18)
Status/evaluation display area	This area indicates the operation status of the head or the evaluation result when [Measure] is pressed. <a href="#">"Status/Evaluation Display Area"</a> (Page 6-20)
[New]	Redo the single measurement data. All of the measured results will be cleared.
[Print]	Used to print the item specified with the toolbar. <a href="#">"Print"</a> (Page 8-19)
[Save Report]	Used to save the "Single Object Report" onto the controller's hard disk in PDF format, XPS format, or CSV format. <a href="#">"Saving the Single Object Report"</a> (Page 8-21)
(5) Preview display	The image of the target on the stage is displayed as a preview. When [Start preview] is selected, the preview display is refreshed in real time.
(6) [To Main Menu]	Used to exit the Single Measurement mode and return to the main menu.

## Toolbar

The toolbar contains the buttons for the functions frequently used during measurement.  
This section describes the functions of the toolbar.

### Upper Bar



#### [Open Program]

This button is not used in [Single Measurement].



#### [Save As]

Click ▼ and select a format for saving.  
["Saving the Single Object Report" \(Page 8-21\)](#)

- : Save single object report
- : Save preview image
- : Save screen Image
- : Save captured image



#### [Print]

Click ▼ and select print parameters.  
["Print" \(Page 8-19\)](#)

- : Single Object Report
- : Preview Image
- : Screen Image
- : Captured Image



#### [Zoom ratio]

Select the display magnification ratio for the preview display from the dropdown list.



#### [Entire fit display]

Show the entire capture range on the preview display.



#### [Live fit display] (only when playing)

Show the entire field of view that is in play on the preview display.



#### [Delete]

Delete the selected element.



#### [Undo]

Cancel the last operation and reset to the previous status.



#### [Redo]

Cancel the "Undo" operation and repeat the undone operation.



#### [Switch element display]

Click ▼ and switch the element to be displayed in the preview screen.

["Switch element display" \(Page 10-61\)](#)

- : Force Show All Elements
- : Show All Elements
- : Show Elements Without CAD Data
- : Show CAD Elements and Base coordinates
- : Hide All Elements
- : Show All Angle Elements



#### [Switch Edge Point Trail Display]

Click ▼ and switch the edge point trail to be displayed in the preview screen.

["Switch Edge Point Trail Display" \(Page 10-59\)](#)

- : Show Edge Point Trail
- : Show Fitting Lines
- : Show Fitting Line + Edge Point Trail
- : Hide Fitting Line + Edge Point Trail



#### [Switch result display]

Click ▼ and switch the measurement result to be displayed in the preview screen.

["Switching result display" \(Page 10-60\)](#)

- : Display Name
- : Display Measurement Value
- : Display Difference Value
- : Display Design Value/Tolerance



#### [Magnifying glass]

Magnify the area around the mouse cursor.

["Magnifying glass" \(Page 10-57\)](#)

## ■ Lower Bar



**[On-Screen keyboard]**

Display On-Screen keyboard.



**[Layer Control]**

Display Layer Control window.

□ “Layer Control” (Page 3-19)



**[Simultaneous real-time display with wide field of view]**

Display the video preview of the wide-field image on the background in the high-precision measurement mode.



**[Display background image]**

Display the background image.



**[Roundness graph]**

Display in a graph the shift amount distribution from a perfect circle.

This is displayed only when the rotation unit IM-RU1 is used.



**[Image by angle]**

Display the [Image by angle] dialog box.

This is displayed only when the rotation unit IM-RU1 is used.



**[Start preview]**

Refresh the displayed contents of the preview display in real time.



**[Stop preview]**

Stop refreshing the preview display.



**[High-precision measurement mode]**

Show the image in the preview display at high magnification.



**[Wide-field measurement mode]**

Shows the image in the preview display at low magnification.



**[XY control]**

Display the [XY control] dialog box.

□ “Adjusting Position of Electric XY Stage” (Page 3-6)



**[Z-Control]**

Display the [Z-Control] dialog box.

□ “Adjusting the Height of the Electric Z Stage” (Page 3-5)



**[θ control]**

Display the [θ control] dialog box.

This is displayed only when the rotation unit IM-RU1 is used.

□ “Adjusting the Angle of the θ Stage (Only When the Rotation Unit IM-RU1 is Used)” (Page 3-6)



**[Autofocus]**

Perform Auto Focus.



**[Change illumination]**

The [Illumination setting] dialog box appears.

This is hidden when stopped.

□ “Light Settings” (Page 4-200)



**[Capture]**

Display the [Capture] dialog box.

This is hidden when stopped.



# Single Measurement Procedure

## Preparations for Single Measurement

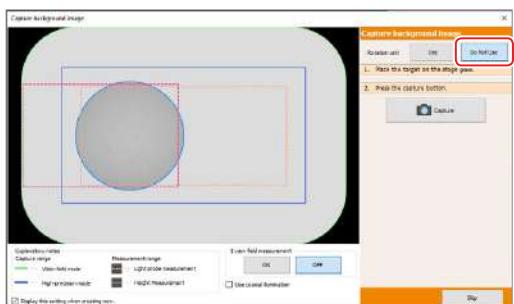
### Measure by Placing the Target on the Stage Glass

To perform measurement by placing a target on the stage glass, follow the procedure below after placing the target on the stage glass.

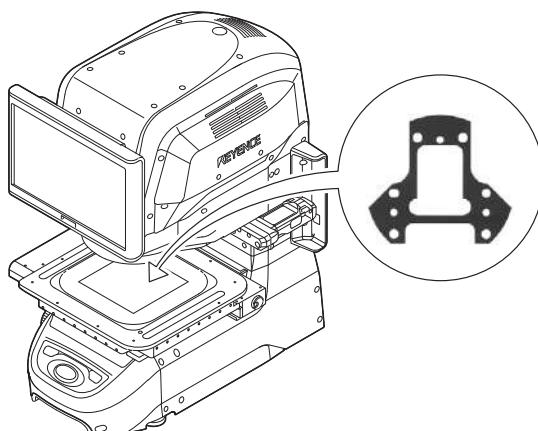
#### 1 Click [Single Measurement] in the main menu.



#### 2 Click [Do Not Use] of “Rotation unit” when the rotation unit IM-RU1 is connected.

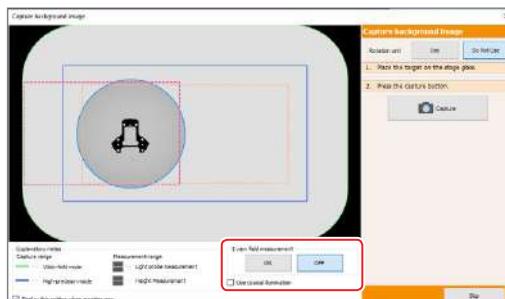


#### 3 Place the target to be measured on the stage glass.



- Important**
- If the stage glass or lens is dirty, a measurement error may result. Remove dust with compressed air.
- If the stage glass is dirty, clean it by wiping with a dry cloth.

#### 4 Perform the settings if necessary.



##### ○ 1 view field measurement

Click [ON] retains the stage position at the time of closing the [Capture background image] dialog box.

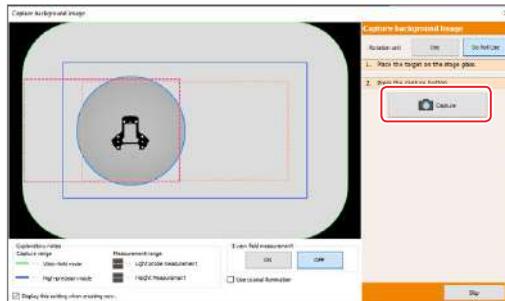
- Point**
- The position to be fixed can be set only when creating new data.

##### ○ Use coaxial illumination

When using coaxial illumination, select the check box. If the check box is selected, the pitch of the horizontal orientation inside the capture size will become finer.

- Point**
- The coaxial illumination IM-DXW12\* and rotation unit IM-RU1 cannot be used at the same time.

#### 5 Click [Capture].



Detect automatically the form of the target, and capture a range needed.  
The [Single Measurement] screen appears after the capturing is completed.

#### 6 Set the measurement item.

- “Measurement Items” (Page 4-18)

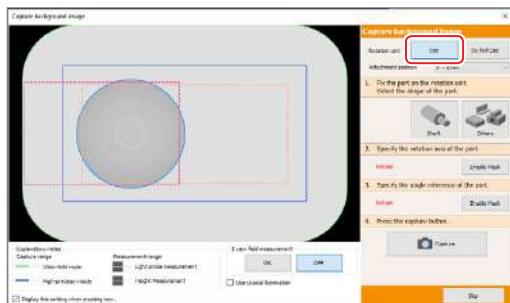
## Measure a Target with Shaft Shape by Rotating

When performing the rotation measurement for a target with a shaft shape, cylinder shape, or columnar shape, follow the procedure below.

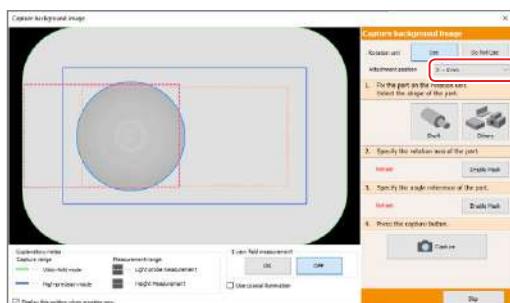
### 1 Click [Single Measurement] in the main menu.



### 2 Click [Use] of "Rotation unit".



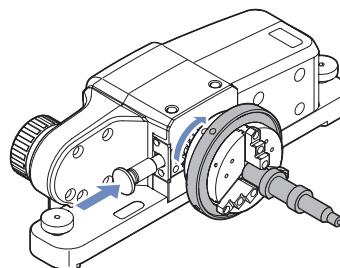
### 3 Select "Attachment position" depending on the position where the rotation unit IM-RU1 is attached.



"Installing the Rotation Unit" (Page 2-7)

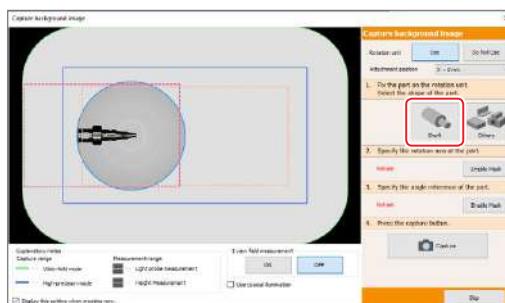
### 4 Attach the chuck and target on the rotation unit IM-RU1.

Fix the power chuck by inserting the lock pin.  
Attach the target by rotating the target attachment ring.  
For details about how to attach the power chuck, refer to "Installing the Power Chuck" (Page 2-8).

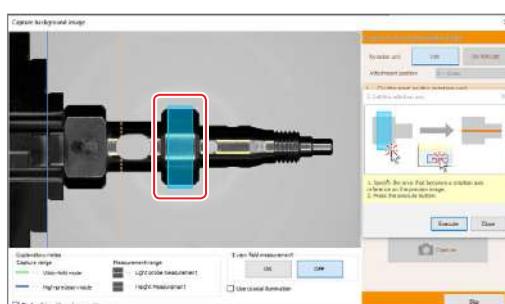


After attaching is completed, unlock the rotation unit. The measurement cannot be done with the rotation unit locked.

### 5 Click [Shaft].

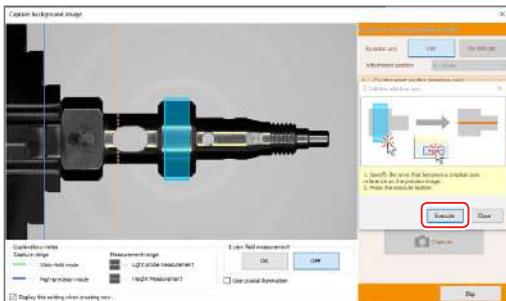


### 6 Specify by dragging the area to become the reference of the rotation axis on the preview screen

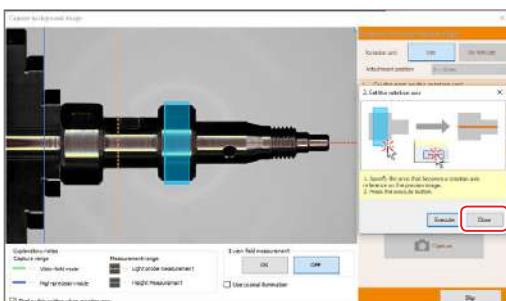
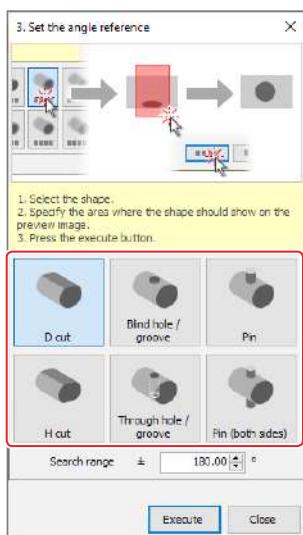


The specified area is displayed with the blue rectangle. The center of the target to be rotated in this area will be registered as a rotation axis.

Right-click the position in the capture range to be a center on the preview screen, and select "XY movement" from the displayed menu, then the capture range (blue circle) moves.

**7 Click [Execute].**

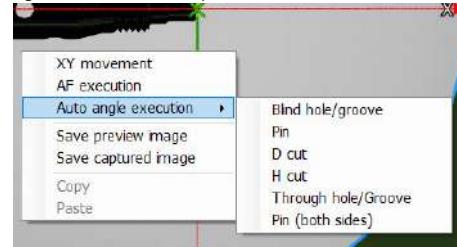
The rotation axis will be the red dotted line on the preview screen after the target is rotated.  
The confirmation dialog box appears.

**8 Click [OK].****9 Click [Close].****10 Select the shape to be made to face the target.**

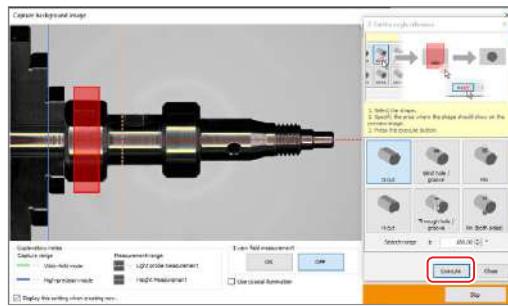
## Reference

The shape to be made to face the target can be changed at editing.

Select a shape form [Auto angle execution] in the right-click menu of the preview screen.

**11 Specify by dragging the area including a shape to be made to face on the preview screen.**

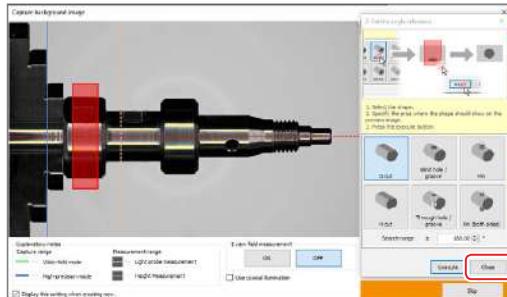
The specified area is displayed with the red rectangle. The angle reference is determined by the shape detected in this area.

**12 Click [Execute].**

The target stops at the position of the angle reference after rotating.  
The confirmation dialog box appears.

**13 Click [OK].**

## 14 Click [Close].



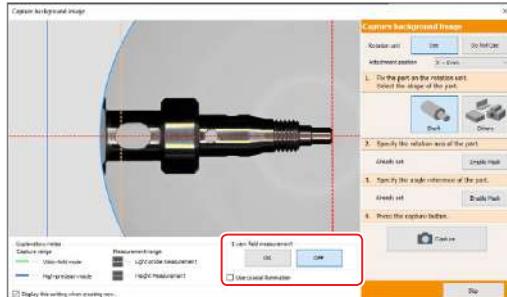
The confirmation dialog box appears.

## 15 Click [Yes].

The tip of the target is detected automatically, and the origin of the rotation measurement is set.

**Reference** When clicking [No], the origin is not set at this point. You can set it using [Origin Setting (axis and line)] or [Origin Setting (axis and point)] on the [Rotation] tab of the [Base Coordination Settings] dialog box.

## 16 Perform the settings if necessary.



### O 1 view field measurement

Click [ON] retains the stage position at the time of closing the [Capture background image] dialog box.

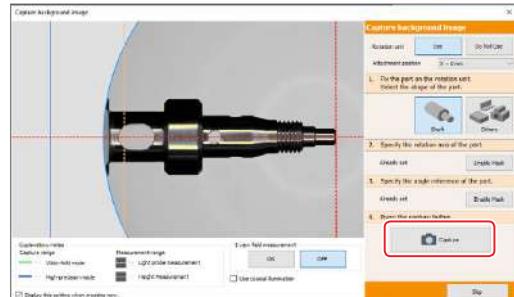
**Point** The position to be fixed can be set only when creating new data.

### O Use coaxial illumination

When using coaxial illumination, select the check box. If the check box is selected, the pitch of the horizontal orientation inside the capture size will become finer.

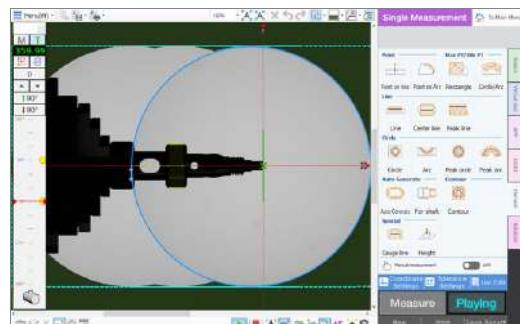
**Point** The coaxial illumination IM-DWX12\* and rotation unit IM-RU1 cannot be used at the same time.

## 17 Click [Capture].



The [Single Measurement] screen appears after the capturing is completed.

The red dotted lines intersecting perpendicularly shows the X axis (rotation axis) and Y axis. "x" in green color at the intersection shows the origin.



## 18 Set the measurement item.

□ "Measurement Items" (Page 4-18)

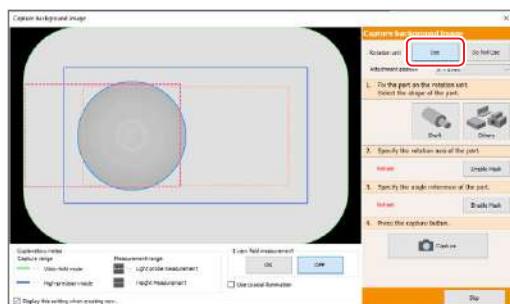
## Measuring a Target with Plate Shape by Rotating

When performing the rotation measurement for a target with a plate shape or box shape like metal cutting or sheet metal, follow the procedure below.

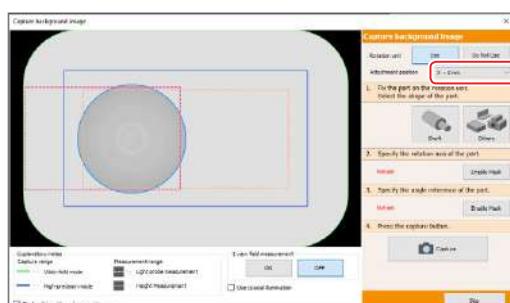
### 1 Click [Single Measurement] in the main menu.



### 2 Click [Use] of "Rotation unit".



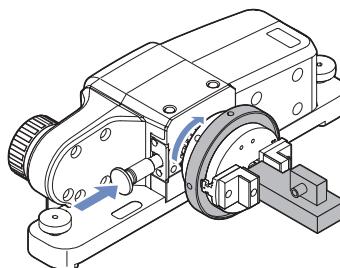
### 3 Select "Attachment position" depending on the position where the rotation unit IM-RU1 is attached.



"Installing the Rotation Unit" (Page 2-7)

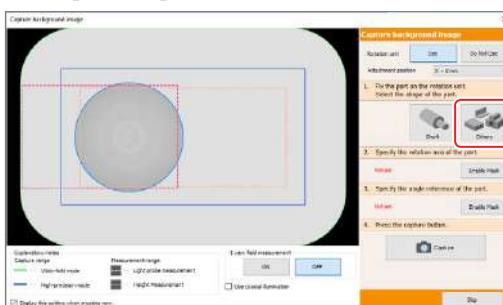
### 4 Attach the 2-jaws chuck and target on the rotation unit IM-RU1.

Fix the power chuck by inserting the lock pin.  
Attach the target by rotating the target attachment ring.  
For details about how to attach the power chuck, refer to  "Installing the Power Chuck" (Page 2-8).



- Attach the target by butting it to the power chuck.
- After attaching is completed, unlock the rotation unit. The measurement cannot be done with the rotation unit locked.

### 5 Click [Others].



The confirmation dialog box appears.

### 6 Click [Yes].

The target stops at the position of the angle reference after rotating.

### 7 Perform the settings if necessary.



#### ○1 view field measurement

Click [ON] retains the stage position at the time of closing the [Capture background image] dialog box.



The position to be fixed can be set only when creating new data.

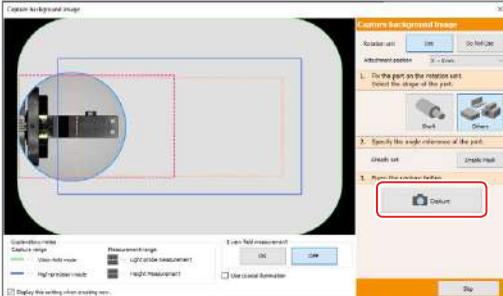
#### ○Use coaxial illumination

When using coaxial illumination, select the check box.  
If the check box is selected, the pitch of the horizontal orientation inside the capture size will become finer.



The coaxial illumination IM-DXW12\* and rotation unit IM-RU1 cannot be used at the same time.

## 8 Click [Capture].

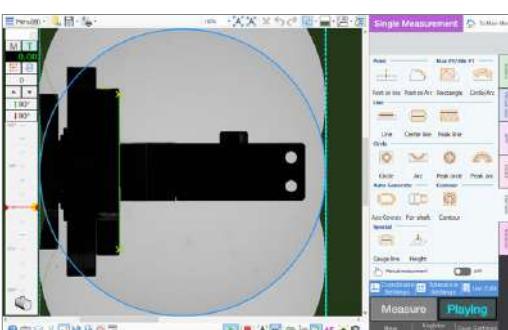


The confirmation dialog box appears.

## 9 Click [Yes].

The [Single Measurement] screen appears after the capturing is completed.  
The reference line is displayed on the end surface of the chuck.

**Reference** The reference line can be used as a reference when entire length of the target is measured.



## 10 Set the measurement item.

□ "Measurement Items" (Page 4-18)

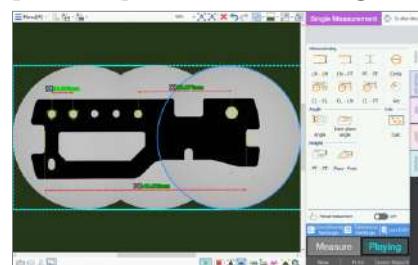
## Starting Single Measurement

### 1 Set the measurement item.

Click the appropriate button in the measurement operation area to set the measurement items.

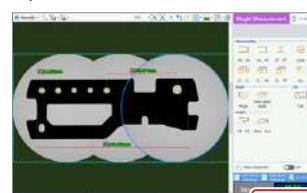
For details of each measurement item, refer to □ "Measurement Items" (Page 8-12).

### 2 Press [MEASURE] in the head or click [Measure] to measure the target.



### 3 When measurement is completed, output the measurement result.

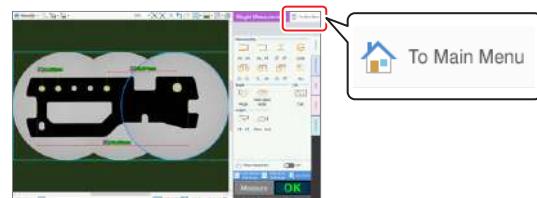
The measurement result can be output to the printer or saved as a report.



**Print** | **Save Report**

- Click [Print] to output the result to the printer.  
□ "Print" (Page 8-19)
- Click [Save Report] to save the single object report in the controller as a file.  
□ "Saving the Single Object Report" (Page 8-21)

### 4 To return to the main menu, click [To Main Menu].



# Measurement Items

Measurement of the target is performed using the buttons in the [Measurement operation area].

## List of Options in the [Basics] Tab

The [Basics] tab offers options which can be set by following the specified operation flow from the edge (element) detection setting required for measurement to the measurement value display.  
These options are also used for setting measurement locations using previously detected edges.

Tab	Icon	Category	Name	Description	Reference page
Basics		Dimensioning	LN-LN	Measure the distance between two lines.	4-25
			LN-PT	Measure the distance between a line and a point.	4-26
			PT-PT	Measure the distance between two points.	4-27
			Circle	Measure the diameter or radius of a circle.	4-30
			CL-CL	Measure the distance between circles/arcs.	4-29
			CL-LN	Measure the distance between a circle/arc and a line.	4-31
			CL-PT	Measure the distance between a circle/arc and a point.	4-32
			Arc	Measure the radius of an arc.	4-33
		Angle	Angle	Measure the angle between two lines.	4-34
			Inter-plane angle	Measure the angle between two planes.	4-35
		Calc	Calc	Calculate the measurement results.	4-36
		Height	PT-PT	Measure the difference in height of two points.	4-38
			Plane - Point	Measure the difference in height between [Height flat surface] created using the virtual tool and the point.	4-40

## List of Options in the [Virtual tool] Tab

This tab offers options to create virtual tool based on the edges detected by the [Basics] or [Element] tab options.  
To set the measurement details, use the [Basics] tab options.

**► Important** **Virtual tools cannot be created if no line (straight line, circle, or arc) or point is shown on the preview display.**  
Before creating a virtual tool, you need to create a line(s) or a point(s) on the preview display by conducting measurement using the [Basics] tab options or by using the tools on the [Element] tab.

Tab	Icon	Category	Name	Description	Reference page
Virtual tool		Point	Midpoint	Draw a midpoint between two selected points.	4-42
			Intersection	Draw an intersection of two selected lines (straight line, circle, or arc).	4-43
		Connection	ConnectLN	Draw a line which connects two or more selected lines.	4-44
			ConnectArc	Draw a circle which connects two or more selected arcs.	4-45
		Line	Bisector	Draw a bisector between two selected lines or points.	4-46
			Perpendicular	Draw a perpendicular, which passes through a selected point to a selected line.	4-47
			Parallel	Draw a line parallel to a selected line, which passes through a selected point or which is a specified distance away from the selected line.	4-48
			Tangent	Draw a tangent of two selected circles (arcs), or of a circle (arc) and a point.	4-49
			LN via PT	Draw a line with a specified angle, which passes through a selected point.	4-50
			OLS-LN	Draw an OLS line which approximately passes through two or more selected points.	4-51
		Circle	MedianCL	Draw a median circle of two selected circles or arcs.	4-52
			OLS-CL	Draw an OLS circle which approximately passes through two or more selected points.	4-53
			Circle	Draw a circle with a selected point at the center, which passes through another selected point or whose radius is a specified size.	4-54
			Tangent circle	Draw a circle connecting to two selected lines.	4-55
		Plane	Height flat surface	Create a flat surface from two or more selected height elements.	4-56

## List of Options in the [APP] Tab

This tab includes various tools which facilitate complicated measurement such as pitch, maximum/minimum size, and thickness.

Tab	Icon	Category	Name	Description	Reference page
APP		Pitch dis.	Linear pitch	Measure the pitch distance (line distance) between the edges along a straight line.	4-58
			Circular pitch	Measure the pitch distance (curve distance) between the edges along a circumference.	4-63
		Pitch angle	Linear pitch	Measure the pitch angle of the edges along a straight line.	4-68
			Circular pitch	Measure the pitch angle of the edges along a circumference.	4-71
		Thickness	Stick	Measure the maximum/minimum thickness of a cylindrical target.	4-75
			Ring	Measure the maximum/minimum differences in the inner/outer diameters of a doughnut-shaped target.	4-77
		Width	Width	Detect the edges of a target with a complicated shape and measure the width between the edges.	4-79
		Special Measurement	Corner Arc	Measure the corner arc based on the two lines which form a corner.	4-81
			Chamfer	Measure a chamfer based on the two lines which form a chamfer.	4-82
			Slotted Hole	Measure the dimensions of a slot.	4-83
			Reticle	Measure the distance between the edges along the line which passes through the center of a circle.	4-84
			Point Position	Measure the horizontal and vertical distance from the base point.	4-85
			Perimeter	Measure the perimeter of the target.	4-87
			Area	Measure the area of the target.	4-89
			Thread	Measure the major diameter, minor diameter, and pitch diameter of the target.	4-91
		Auto Measurement	Automatic Measurement	This function automatically recognizes the lines, circles, and arcs in the rectangular area and creates elements, and then automatically creates measurement items from these elements for measurement.	4-95
			For shaft	This function automatically recognizes the lines, circles, arcs, and points in the rectangular area and creates elements, and then automatically creates measurement items from these elements for measurement.	4-99
		Shaft	Measure major diameter	Measure the major diameter from the edge within the rectangle range.	4-102

## List of Options in the [GD&T] Tab

This tab includes options for the measurement of straightness or perpendicularity.

Tab	Icon	Category	Name	Description	Reference page
GD&T		Form	Straightness	Measure the straightness of a straight line segment.	4-110
			Roundness	Measure the roundness of a circle or an arc.	4-111
			Profile	Measure the profile of the specified target range.	4-112
			Flatness	Measure the flatness of the specified plane.	4-114
		Orientation	Perpendicularity	Measure the perpendicularity of a specified straight line segment to the reference line.	4-115
			Parallelism	Measure the parallelism of a specified straight line segment to the reference line.	4-116
		Location	Position	Measure the position tolerance of a specified point.	4-117
			Concentricity	Measure the concentricity between two circles or arcs.	4-119
			Symmetry	Measure the symmetry from the reference line.	4-121

## List of Options in the [Element] Tab

This tab includes options to detect elements to be used for measurement such as points or lines. To set the measurement details, use the [Basics] tab options.

Tab	Icon	Category	Name	Description	Reference page
Element		Point	Point on line	Detect a point on the set line.	4-124
			Point on Arc	Detect a point on the set arc.	4-126
		Max PT/ Min PT	Rectangle	Detect the maximum or minimum point in the rectangle.	4-128
			Circle/Arc	Detect the maximum or minimum point in the circle or the arc.	4-130
		Line	Line	Detect lines.	4-132
			Center line	Detect the center line between edges.	4-133
			Peak line	Detect the peak line which passes through the peak point detected from the rectangle you specified.	4-135
		Circle	Circle	Detect circles.	4-136
			Arc	Detect arcs.	4-138
			Peak circle	Detect the peak circle which passes through the peak point detected from the circle you specified.	4-140
			Peak arc	Detect the peak arc which passes through the peak point detected from the arc you specified.	4-142
		Auto Generate	Auto Generate	Automatically recognize the line, circle and arc within the rectangle, and create elements	4-143
			For shaft	Automatically recognize the line, circle, arc, and point within the rectangle, and create elements.	4-144
		Contour	Contour	Extract the contour line of the target within the rectangle range.	4-145
		Special Measurement	Gauge line	Draw a line parallel to the rectangle you specified to be a line of the dark width or light width you specified.	4-146
			Height	Create the height element to measure the height from that point.	4-148

## List of Options in the [Rotation] Tab

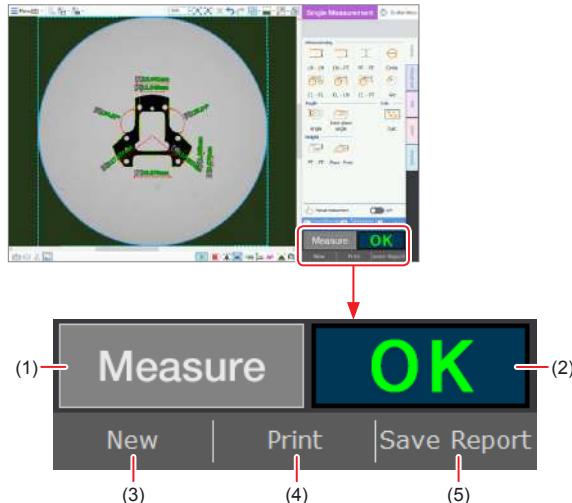
This is displayed when the rotation unit IM-RU1 is used. Tools are prepared to be used when measurement is performed by rotating a target.

Tab	Icon	Category	Name	Description	Reference page
Rotation		GD&T	Degrees of Rotation	Measure two selected angles, with rotation axis as a center.	4-167
			Roundness	Measure the roundness of the specified cylinder.	4-168
			Cylindricity	Measure the cylindricity of the specified target range.	4-169
			Coaxiality	Measure the coaxiality of the two specified cylinders.	4-170
			Circular run-out	Measure the circumference waving, based on the axis of the specified cylinder.	4-172
			Total run-out	Measure the total run-out, based on the axis of the specified cylinder.	4-173
		Surface	Cylinder	Measure the external edge of the specified target range.	4-174
			Cylinder integration	Create a center axis which connects two or more selected cylinders.	4-176
		Orientation	Length	Detect the angle where the specified line and point distance becomes the max./min.	4-177
			Pin	Detect the angle where a pin included in the specified area is directed downwards.	4-179
			Auto Generate	Generate automatically "Orientation element" which detects the shape to be made to face the target.	4-181

# Common Control Area

## Common Control Area

This section describes the common control area used for the single measurement.



Name	Function
(1) [Measure]	Used to start measurement.
(2) Status/ evaluation display area	This area indicates the operation status of the head or the evaluation result when [Measure] is pressed. <a href="#">"Status/Evaluation Display Area" (Page 6-20)</a>
(3) [New]	Redo the single measurement. All of the measured results will be cleared.
(4) [Print]	Used to print the item specified with the toolbar. <a href="#">"Print" (Page 8-19)</a>
(5) [Save Report]	Used to save the "Single Object Report" onto the controller's hard disk in PDF, XPS, or CSV format. <a href="#">"Saving the Single Object Report" (Page 8-21)</a>

## Measure

Clicking [Measure] in the common control area starts measurement. Use this button to start measurement after all measurement items are set.

### 1 Click [Measure].

The preview display shows the measurement values, and the Status/evaluation display area shows the evaluation result.

## New

Click [New] in the Common control area, and redo the single measurement from the beginning. All of the measured results will be cleared.

### 1 Click [New].

For the details about creating new, refer to ["Single Measurement Procedure" \(Page 8-6\)](#).

## Print

When [Print] in the common control area is clicked, the item specified with the toolbar will be printed.

### 1 Click [Print].

For details about printing, refer to ["Print" \(Page 8-19\)](#).

## Save Report

Clicking [Save Report] in the common control area saves the single object report into the controller as a file.

### 1 Click [Save Report].

For details about saving the report, refer to ["Saving the Single Object Report" \(Page 8-21\)](#).

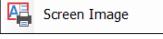
# Print

## Print

 For the procedure to connect the printer, refer to "Connecting a Printer" (Page 2-14).

### ■ Printing with the Toolbar

- 1 Click  of the  button on the toolbar and select the print type.

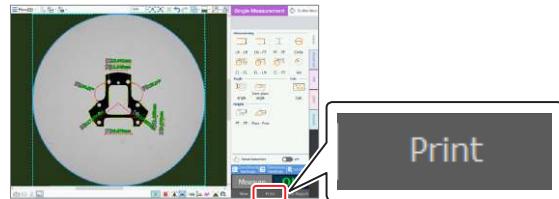
button	Description
	Print the last measurement result as a single object report. When this option is selected, the print preview is displayed.
	Print the current preview display. When this option is selected, the print preview is displayed.
	Print the entire screen currently displayed on the LCD monitor. When this option is selected, the print preview is displayed.
	Print only the image on the current preview screen. The measurement lines and values are not printed. When this option is selected, the print preview is displayed.

The toolbar icon changes to the icon of the selected print type.

 By directly clicking the button on the toolbar, you can print using the print type currently displayed on the icon.

### ■ Printing from the Common Control Area

- 1 Click [Print] in the common control area.



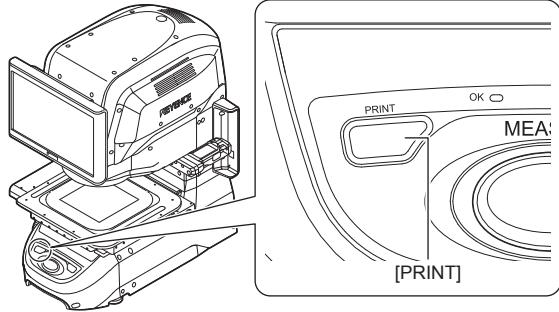
Printing starts using the print type currently displayed on the toolbar icon.

To change the print type, refer to "Printing with the Toolbar" (Page 8-19).

 Point The print preview is not displayed.

### ■ Printing with [PRINT] for the Head

- 1 Press [PRINT] of the measurement head.



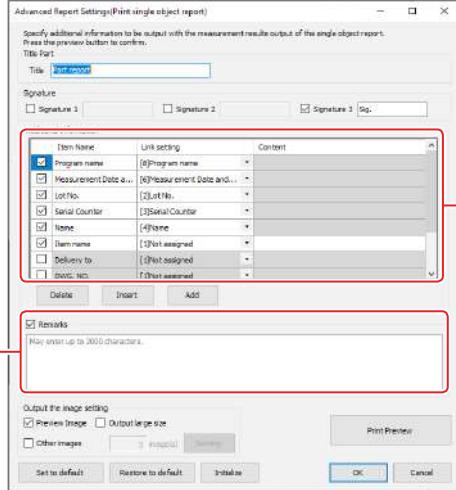
Printing starts using the print type currently displayed on the toolbar icon.

 Point The print preview is not displayed.

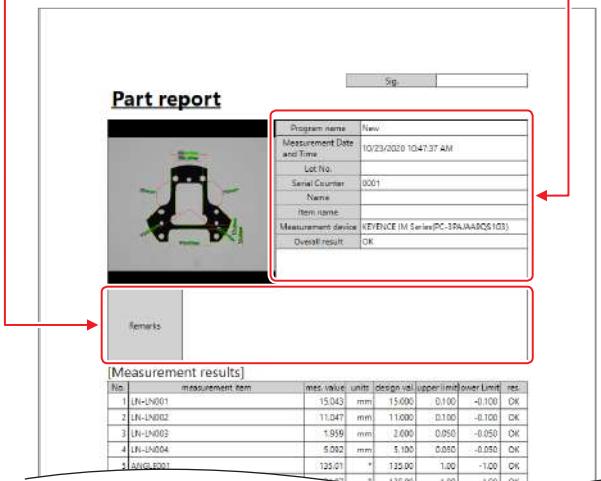
## Changing the Items in the Single Object Report

To change the items in the single object report, select [Menu] → [Setting] → [Advanced Report Settings] and change the settings in the [Advanced Report Settings (Print single object report)] dialog box.

□ "Advanced Report Settings" (Page 10-33)



[Advanced Report Settings (Print single object report)] dialog box



Changes in the advanced report settings are reflected in the single object report.

# Saving the Single Object Report

The single object report can be saved in the controller as a file.

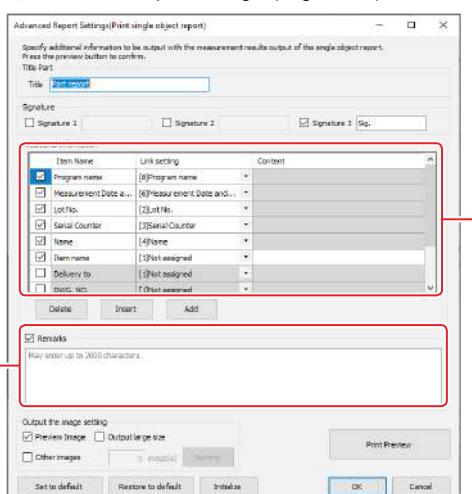
## Reference

- The report is saved with a file name of "REPORT\*\*\*\*" regardless of the specified file format, any of the PDF document (\*.pdf), XPS document (\*.xps), or CSV (comma separated values) (\*.csv).
- The "\*\*\*\*" section in the file name contains "Year + Month + Day + Hour + Minute + Second" of the time when the file was saved.
- .xps is a file of XPS (XML Paper Specification) format. To see the file on a PC, use the XPS Viewer which is provided free of charge from Microsoft.
- The .csv file is a file in text format. To see the file on a PC, use a spreadsheet software such as Excel or a text editor.

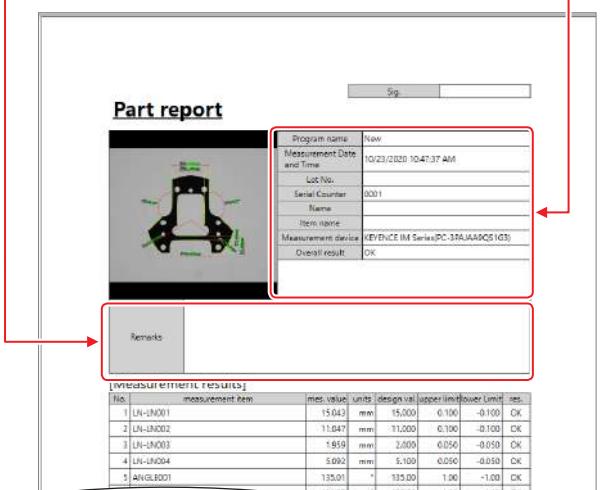
## Saving the Report in PDF or XPS Format

### Setting the Items in the Single Object Report

To change the items in the single object report, select [Menu] → [Setting] → [Advanced Report Settings] and change the settings in the [Advanced Report Settings (Print single object report)] dialog box.  
□ "Advanced Report Settings" (Page 10-33)



[Advanced Report Settings (Print single object report)] dialog box



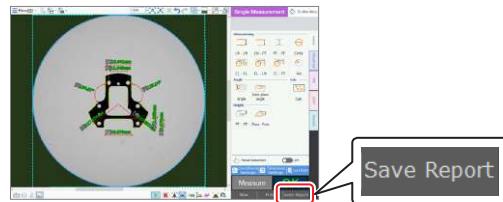
Changes in the advanced report settings are reflected in the single object report.

## Point

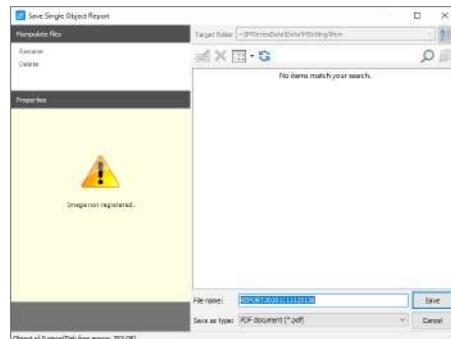
The advanced report settings are effective for a file in the PDF or XPS format only.

### Saving the Single Object Report

- Click [Save Report] in the common control area.



- Specify the file name.



- From the dropdown list of "Save as type", select [PDF document (\*.pdf)] or [XPS document (\*.xps)].

- Click [Save].



## Saving the Report in CSV Format

- 1** Click [Save Report] in the common control area.
- 2** In the “Save Single Object Report” dialog box, specify the file name.
- 3** From the dropdown list of “Save as type”, select [CSV (comma separated values)(\*.csv)].
- 4** Click [Save].



Point  
Image data is not included in the report in CSV format.

# 9

## Automatic Measurement

This chapter explains the operation procedures and functions of the [Automatic Measurement] mode.

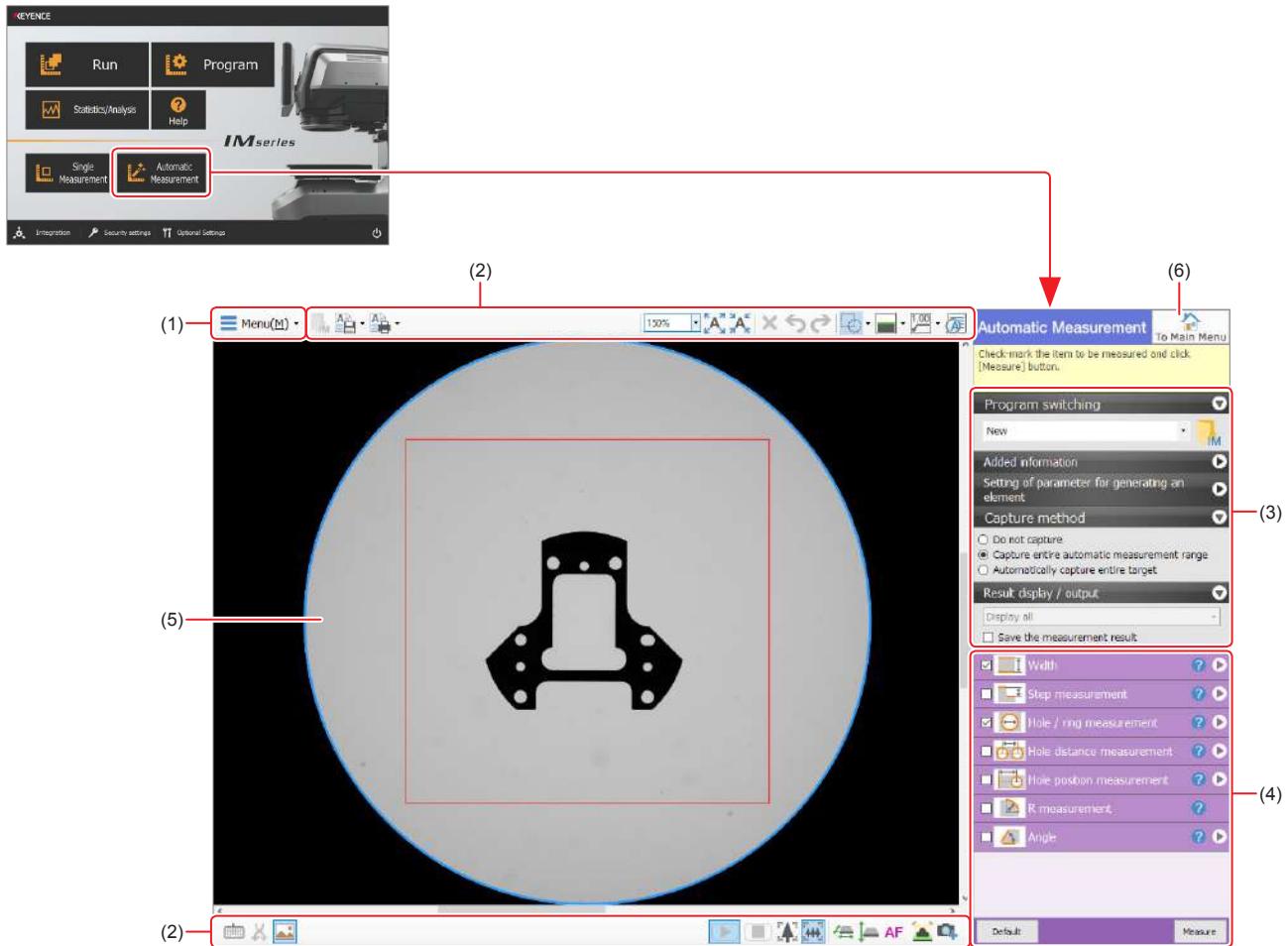
Names and Functions of Areas in the Window .....	9-2
Procedures for Automatic Measurement.....	9-6
Automatic Measurement Control Area .....	9-9

9

Automatic Measurement

# Names and Functions of Areas in the Window

This section describes the names and functions of the items in the window when [Automatic Measurement] is selected.



Name	Description
(1) [Menu] dropdown list	Menu options for various functions are displayed in dropdown list. For details of each menu, refer to <a href="#">"Chapter 10 Menu"</a> (Page 10-1).
(2) Toolbar	This bar contains buttons for frequently used functions. <a href="#">"Toolbar"</a> (Page 9-4)
(3) Automatic measurement control area	Set the items related to the automatic measurement. Each menu has a dropdown. <a href="#">"Automatic Measurement Control Area"</a> (Page 9-9)
[Program switching] menu	Used to set the program data. <a href="#">"Program Data Switching"</a> (Page 9-9)
[Added information] menu	Enter a lot number and a name. The counter is displayed.
[Setting of parameter for generating an element] Menu	Set parameters for generating elements (line, circle, arc). <a href="#">"Auto Measurement"</a> (Page 4-95)
[Capture method] menu	Set the capture range for automatic measurement.
[Result display / output] menu	The automatic measurement results are listed, and you can specify a result to be displayed in the preview screen. Set the items for saving the automatic measurement results. <a href="#">"Saving the Measurement Result"</a> (Page 9-10)
(4) Automatic measurement target specification area	Specify the automatic measurement target, and set the items related to the measurement. Each menu has a dropdown.
 [Width] menu	Measure the distance between the two lines which form the width. Set the items related to measurement. <a href="#">"Width"</a> (Page 4-96)
 [Step measurement] menu	Measure the distance between the two lines which form the step. Set the items related to measurement. <a href="#">"Step measurement"</a> (Page 4-97)
 [Hole/ring measurement] menu	Measure the dimensions of a circle. Set the items related to measurement. <a href="#">"Hole / ring measurement"</a> (Page 4-97)
 [Hole distance measurement] menu	Measure the distance between two circles. Set the items related to measurement. <a href="#">"Hole distance measurement"</a> (Page 4-97)
 [Hole position measurement] menu	Measure the distance between a line and a circle. Set the items related to measurement. <a href="#">"Hole position measurement"</a> (Page 4-98)
 [R measurement] menu	Measure the radius of an arc. <a href="#">"R measurement"</a> (Page 4-98)
 [Angle] menu	Measure the angle of two lines which are neighboring or facing each other. Set the items related to measurement. <a href="#">"Angle"</a> (Page 4-98)
(5) Preview display	The image of the target on the stage is displayed as a preview. The preview display is refreshed in real time.
(6) [To Main Menu]	Used to exit the "Automatic Measurement" mode and return to the main menu.

## Toolbar

The toolbar contains the buttons for the functions frequently used during measurement.  
This section describes the functions of the toolbar.

### Upper Bar



#### [Open Program]

This button cannot be used in [Automatic Measurement].



#### [Save As]

Click ▼ and select a format for saving.  
["Save As" \(Page 10-14\)](#)



: Save single object report



: Save preview image



: Save screen Image



: Save captured image



#### [Print]

Click ▼ and select print parameters.  
["Print" \(Page 10-18\)](#)



: Single Object Report



: Preview Image



: Screen Image



: Captured Image



#### [Zoom ratio]

Select the display magnification ratio for the preview display from the dropdown list.



#### [Entire fit display]

Show the entire capture range on the preview display.



#### [Live fit display] (only when playing)

Show the entire field of view that is in play on the preview display.



#### [Delete]

This button cannot be used in [Automatic Measurement].



#### [Undo]

This button cannot be used in [Automatic Measurement].



#### [Redo]

This button cannot be used in [Automatic Measurement].



#### [Switch element display]

Click ▼ and switch the element to be displayed in the preview screen.

["Switch element display" \(Page 10-61\)](#)



: Force Show All Elements



: Show All Elements



: Show Elements Without CAD



: Show CAD Elements and Base Coordinates



: Hide All Elements



#### [Switch Edge Point Trail Display]

Click ▼ and switch the edge point trail to be displayed in the preview screen.

["Switch Edge Point Trail Display" \(Page 10-59\)](#)



: Show Edge Point Trail



: Show Fitting Lines



: Show Fitting Line + Edge Point Trail



: Hide Fitting Line + Edge Point Trail



#### [Switch result display]

Click ▼ and switch the measurement result to be displayed in the preview screen.

["Switching result display" \(Page 10-60\)](#)



: Display Name



: Display Measurement Value



: Display Difference Value



: Display Design Value/Tolerance



#### [Magnifying glass]

Magnify the area around the mouse cursor.

["Magnifying glass" \(Page 10-57\)](#)

## ■ Lower Bar



**[On-Screen keyboard]**

Display On-Screen keyboard.



**[Simultaneous real-time display with wide field of view]**

Display the video preview of the wide-field image on the background in the high-precision measurement mode.



**[Display background image]**

Display the background image.



**[Start preview]**

This button cannot be used in [Automatic Measurement]. It is always turned on.



**[Stop preview]**

This button cannot be used in [Automatic Measurement].



**[High-precision measurement mode]**

Show the image in the preview display at high magnification.



**[Wide-field measurement mode]**

Shows the image in the preview display at low magnification.



**[XY control]**

Display the [XY control] dialog box.

↳ "Adjusting Position of Electric XY Stage" (Page 3-6)



**[Z-Control]**

Display the [Z-Control] dialog box.

↳ "Adjusting the Height of the Electric Z Stage" (Page 3-5)



**[Autofocus]**

Perform Auto Focus.



**[Change illumination]**

The [Illumination setting] dialog box appears.

↳ "Light Settings" (Page 4-200)



**[Capture]**

Display the [Capture] dialog box.

# Procedures for Automatic Measurement

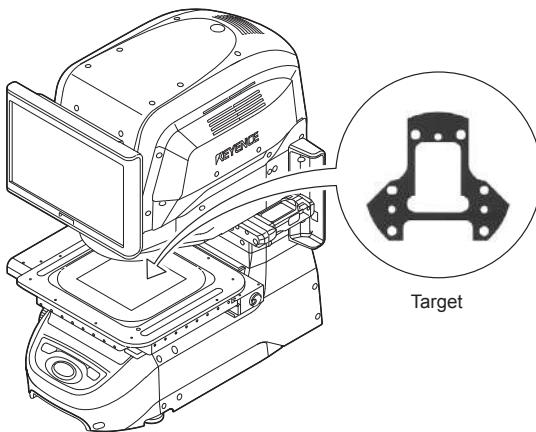
## Preparations for Automatic Measurement

Follow the procedure below to set the measurement target for the IM-8000 Series.

- 1 Click [Automatic Measurement] in the main menu.

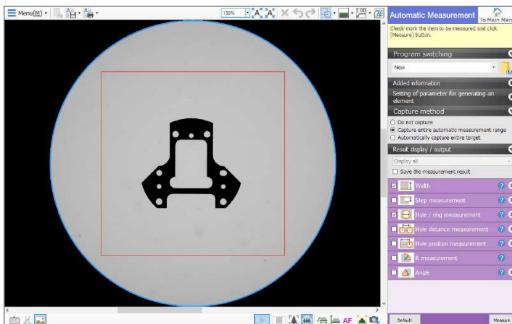


- 2 Place the target to be measured on the stage glass.



**Important** If the stage glass or lens is dirty, a measurement error may result. Remove dust with compressed air.  
If the stage glass is dirty, clean it by wiping with a dry cloth.

Check the position of the target on the preview display.



- 3 Change the camera mode as necessary.

□ "Switching the Camera Mode" (Page 3-4)

- 4 Adjust the height of the electric Z stage to bring the target into focus by checking the preview screen.

Adjust the Z stage according to the height of the target's surface to be measured.

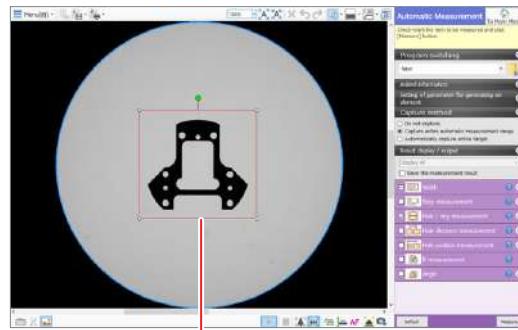
□ "Adjusting the Height of the Electric Z Stage" (Page 3-5)

**Reference** The height can also be adjusted by using Z stage up/down handle.

- 5 Set the capture range and capture the target.

□ "Capture" (Page 3-7)

- 6 On the preview screen, edit the measurement range so that it encloses the target.



Measurement range

**Point**

It can measure the target within the measurement range; the whole target does not need to be enclosed.

**Reference**

The measurement range can be edited with the mouse operation.

□ "Rectangle Range" (Page 3-15)

## Automatic Measurement Procedure

Run the automatic measurement after setting the items of it.

### 1 Set the items for automatic measurement.

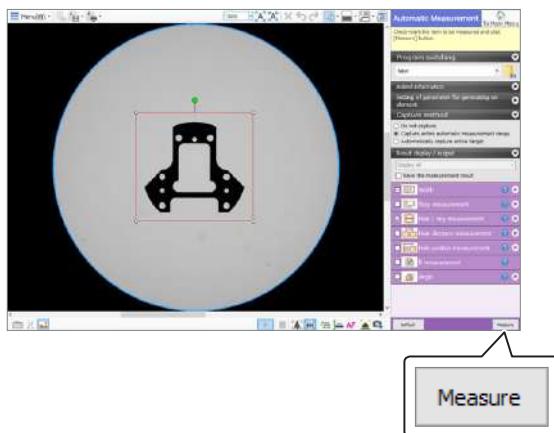
Set the items related to automatic measurement in the automatic measurement control area and the automatic measurement target specifying area.

- For details on the automatic measurement control area, refer to "Automatic Measurement Control Area" (Page 9-9).
- For details on the automatic measurement target specifying area, refer to "Auto Measurement" (Page 4-95).

Reference

Clicking [Default] or selecting [Default] from the context menu on the preview screen returns the settings made in the automatic measurement control area and the automatic measurement target specifying area to the initial values. The size and coordinate of the measurement area on the preview screen also returns to the initial status.

### 2 Press [MEASURE] in the head or click [Measure] to measure the target.

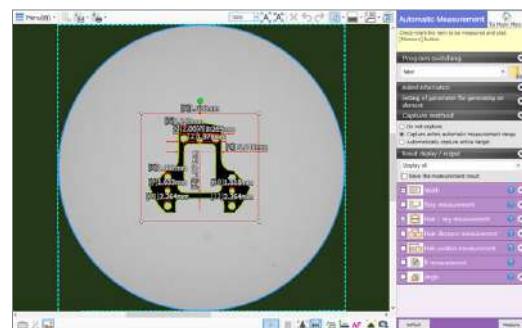


The automatic measurement is performed and the result is displayed.

Reference

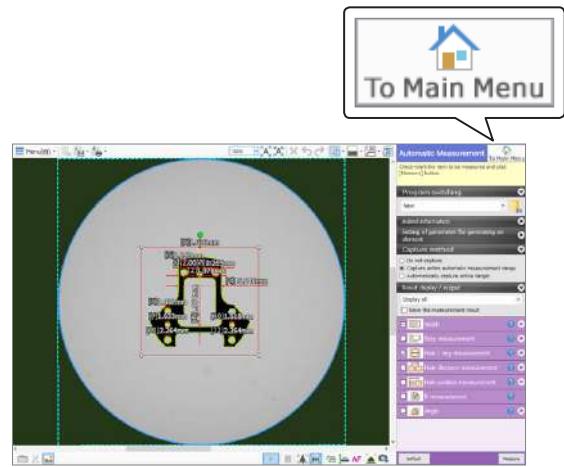
The [Measure] options can also be selected in the context menu of the review display.

### 3 Check the measurement result.



For details on the measurement result, refer to "Confirming the Automatic Measurement Result" (Page 9-8).

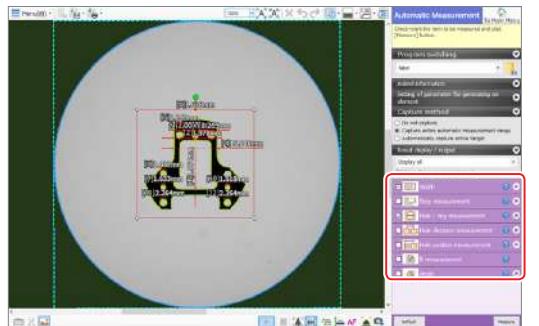
### 4 To return to the main menu, click [To Main Menu].



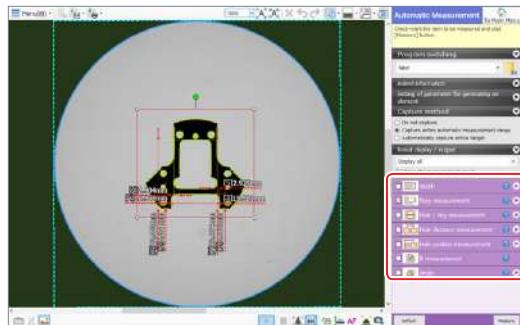
## Confirming the Automatic Measurement Result

### ■ Displaying/Hiding the Measurement Result

In the automatic measurement, the target within the measurement area is measured for all the measurement items under all the measurement conditions. This enables you to change the measurement item and condition to show the measurement result on the preview screen without clicking [Measure] again.



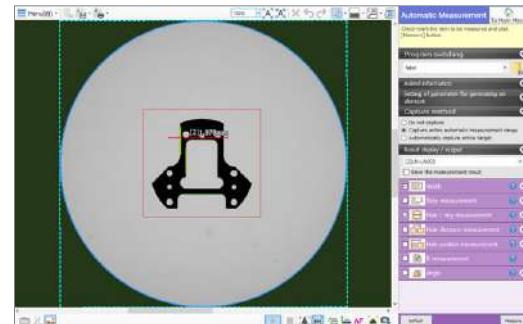
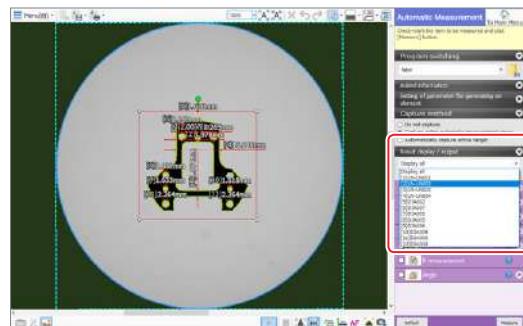
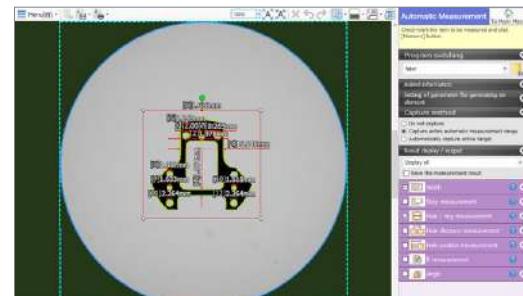
Select/Deselect the check box



- If [Save the measurement result] is selected, only the measurement results of the measurement items with their check box selected are saved when [Measure] is clicked.
- "Saving the Measurement Result" (Page 9-10)
- When [Setting of parameter for generating an element] is changed, the changes are not reflected in the measurement result until [Measure] is clicked.
- When the measurement area is edited, the changes are not reflected in the measurement result until the [Measure] is clicked. At this time, the elements that are moved outside the measurement area from the inside of the area and the measurement result using these elements are deleted.

### ■ Displaying the Selected Measurement Result

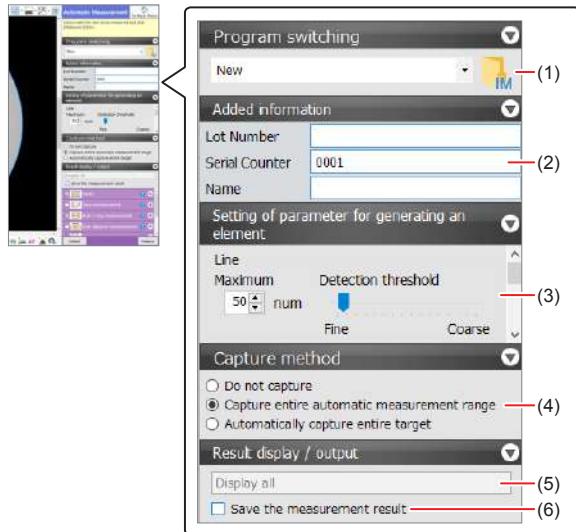
You can show on the preview display only a desired measurement result selected from the [Result display / output] dropdown list.



# Automatic Measurement Control Area

## Automatic Measurement Control Area

This section describes the [Automatic measurement control area] used for the automatic measurement.



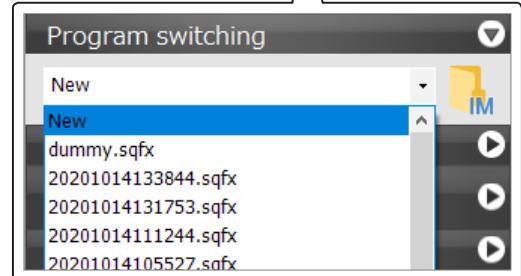
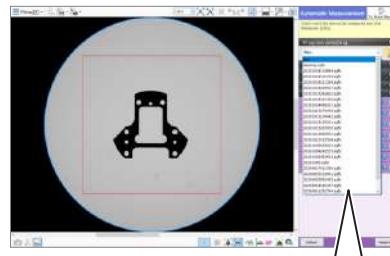
Name	Function
(1) Program Data Switching	The currently used program data is displayed. You can select program data from the dropdown list. Up to 50 of the recently used program data files can be selected from the dropdown list.
(2) Added information	Enter the added information. Lot Number, Serial Counter and Name are displayed in the initial status. If the program data is switched, the [Added information] of the program data will be displayed.
(3) Setting of parameter for generating an element	For each element (line, circle, arc) to be generated, set the maximum number of elements to generate and the threshold for detection. □ "Auto Measurement" (Page 4-95)
(4) Capture method	You can select to capture either the entire range of the automatic measurement or the entire target when capturing the target.
(5) Result display / output	After the automatic measurement is performed, the measurement result to be shown in the preview display can be selected from the dropdown list.
(6) Saving the measurement results	When the save destination is set with the checkbox selected, the measurement result is saved to a CSV file. □ "Saving the Measurement Result" (Page 9-10)

## Program Data Switching

Automatic measurement can be implemented while the elements and measurement items which have been saved in the program data are being displayed in the preview display.

### 1 Select Program data from the dropdown list.

This dropdown list shows up to 50 recently used program data files.



The program are displayed on the preview display.

## Entering Added Information

Enter the added information in [Added information]. The added information is saved together with the measurement result.

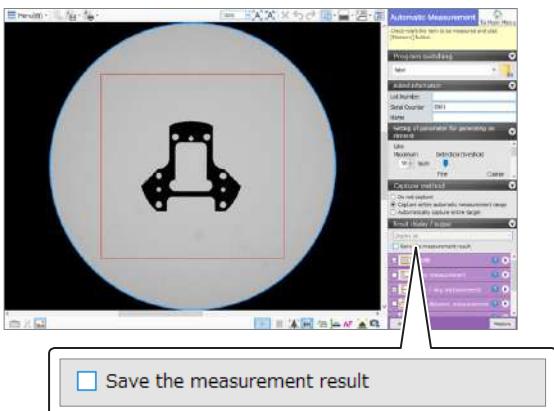
For details about entering the added information, refer to  
□ "Entering Added Information" (Page 6-10).

In the automatic measurement mode, [Added information] cannot be changed. Edit in Program mode.  
□ "Added information" (Page 10-32)

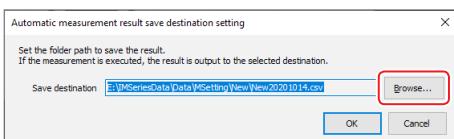
## Saving the Measurement Result

When the automatic measurement is performed, the result is saved in a CSV file.

### 1 Select [Save the measurement result].



### 2 Click [Browse].

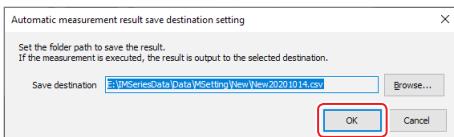


The [Save As] dialog box appears.

### 3 Specify a save destination folder and a file name, and click [Save].

**Point** When a new file name is specified, the file is not created at this point. The file will be created when the next automatic measurement is performed with [Save the measurement result] selected.

### 4 Click [OK].



The [Automatic measurement result save destination setting] dialog box is closed.

**Reference** To change the save destination of the automatic measurement result, select [Menu] -> [Setting] -> [Automatic measurement result save destination setting] from the menu bar.

**Point** When [Measure] is clicked, the measurements for the measurement items with their check boxes selected are saved in a CSV file.

# 10

## Menu

This chapter explains the functions of the menu.

### List of Command Names and Functions

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10

Menu

# List of Command Names and Functions in the Menu

This section explains the names and functions of the commands in the menu.

Command name	Function	Mode			
		Run	Program	Single Measurement	
New	Create new Program data.	✗	✓	✓	10-11
Save	Save the Program data by overwriting the previous data.	✗	✓	✗	10-11
Exit (Shutdown)	Turn off the system and turn off the power.	✓	✓	✓	10-11

✓: Selectable ✗: Unselectable

## Open

Command name	Function	Mode			
		Run	Program	Single Measurement	
Program	Open Program data (*.sqfx) or combined Program data (*.lqfx).	✓	✓	✗	10-12
2D code reading	Scan the 2D code on the printed report to open the measurement settings data.	✓	✓	✗	10-12
Other Files	Open files other than Program data.	Single object report file (*.pdf or *.xps)	✓	✓	✗
		Image file such as preview image (*.tif)	✓	✓	✗
		Images for Run mode (*.nqfx)	✗	✓	✗

✓: Selectable ✗: Unselectable

## Save As

Command name	Function	Mode			
		Run	Program	Single Measurement	
Program	Save the Program data with a name.	✗	✓	✗	10-14
Single Object Report	Save the single object report in PDF format (*.pdf), XPS format (*.xps), and CSV format (*.csv).	✓	✓	✓	10-16
Preview Image	Save the preview image as an image file (*.tif).	✓	✓	✓	10-16
Screen Image	Save the screen as an image file (*.tif).	✓	✓	✓	10-16
Captured image	Save the preview screen without a Program and comments as an image file (*.tif).	✓	✓	✓	10-16
Images in Run Mode	Save the image at the time of Run mode as an image file (*.nqfx).	✓	✗	✗	10-17
DXF Export	Save fitting lines (line, circle, arc) as a DXF file (*.dxf).	✓	✓	✓	10-17

✓: Selectable ✗: Unselectable

## Print

Command name	Function	Mode			
		Run	Program	Single Measurement	
Single Object Report	Print the single object report.	✓	✓	✓	10-18
Preview Image	Print the preview display.	✓	✓	✓	10-18
Screen Image	Print the screen.	✓	✓	✓	10-18
Captured image	Print the preview screen without a Program and comments.	✓	✓	✓	10-18

✓: Selectable ✗: Unselectable

## Setting

Command name	Function	Mode				
		Run	Program	Single Measurement		
Base Coordination Settings	Set the base coordinates.	✗	✓	✓	10-19	
Pattern Search Setting	Register Pattern	Register the pattern image.	✗	✓	✓	10-20
	Delete pattern image	Delete the pattern image.	✗	✓	✓	10-21
	Enable Pattern Search	Enable the pattern search operation.	✓	✓	✓	10-21
	Multiple Pattern Search Settings	Specify the number of target to be detected in the pattern search.	✓	✓	✓	10-22
	Advanced Pattern Search Settings	Configure the advanced pattern search settings.	✓	✓	✓	10-22
Light Probe Maintenance	Perform light probe maintenance.	✓	✓	✓	10-23	
Height Measurement Settings	Height origin correction	Set height origin correction execution to ON or OFF. If you set it to ON, select a correction method.	✗	✓	✓	10-24
	Stylus replacement	Display the screen to replace the stylus for the height measurement unit.	✓	✓	✓	10-25
	Reference Plane Alignment	Execute the reference plane alignment of the height measurement unit.	✓	✓	✓	10-25
Set maximum height of the object	Enter the maximum height of the measurement target.	✗	✓	✓	10-26	
Tolerance settings	Batch Tolerance Settings	Set the tolerance for all measurement items in a single dialog box.	✗	✓	✓	10-27
	Set Tolerance Table	Set the tolerance table used for the simultaneous tolerance setting.	✗	✓	✓	10-28
Alert Batch Settings	Set the alert threshold for all measurement items in a single dialog box.	✗	✓	✓	10-30	
Edit Element List	List the measurement results displayed in the preview display, and sort or show/hide them.	✗	✓	✓	10-30	
Added information	Set the added information which is displayed in the added information input area during the multi measurement and is saved together with the measurement result.	✗	✓	✗	10-32	
Advanced Report Settings	Set the details to output the single object report.	✓	✓	✓	10-33	
Roundness Graph	Displays a graph with the distribution of the amount of shift from the perfect circle based on the roundness, cylindricity, circular run-out, and other measurement results. This graph is displayed when the IM-RU1 rotation unit is in use.	✓	✓	✓	10-36	
Display Settings	Set the details of the display including the measurement values and results.	✓	✓	✓	10-37	

## List of Command Names and Functions in the Menu

Command name		Function	Mode			
			Run	Program	Single Measurement	
Parameter Settings		Set the XY stage speed, and enable warnings for light probe initialization and reference plane alignment.	✗	✓	✓	10-38
Average Number Settings		Set the measuring times that are to be executed via one measurement.	✓	✓	✗	10-38
Automatic measurement result save destination setting		Set the save destination of the automatic measurement result.	✗	✓	✓	10-39
Q-DAS Setting		Set the data output in the Q-DAS format.	✗	✓	✗	10-40
Delete History	Delete All	Delete all lists in the Program data specification area. Program data will not be deleted.	✗	✓	✗	10-43
	Delete Selection	Delete the selected list from the lists in the Program data specification area. Program data will not be deleted.	✗	✓	✗	10-43
Others	Do not perform "Edge extraction parameter automatic adjustment" Disable.	The edge extraction parameter is not automatically adjusted when elements are created.	✗	✓	✓	10-43
	Inspect sink marks and flash	Enable the check for chips and burrs during the edge extraction.	✓	✓	✓	10-43
	Display "background image capture screen"	Displays the [Capture Background Image] window when creating new data.	✗	✓	✓	10-43
	Confirmation before the measurement result output	When the measurement is performed in Run mode, a confirmation dialog box appears enabling users to select whether to save the measurement result.	✓	✗	✗	10-43
	Display positioning guide	Set to show or hide the positioning guide during Run mode.	✓	✓	✗	10-43
	Manual Measurement Mode Control Setting	Set whether to transition to manual measurement mode.	✓	✓	✗	10-43
	1 field of view measurement	Release the XY stage if it is fixed during measurement.	✗	✓	✓	10-43

✓: Selectable ✗: Unselectable

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Menu

## Edit

Command name		Function	Mode			
			Run	Program	Single Measurement	
Undo		Cancel the last operation and reset to the previous status.	✓	✓	✓	10-44
Redo		Cancel the "Undo" operation and repeat the undone operation.	✓	✓	✓	10-44
Copy		Copy the element being selected to the clipboard.	✗	✓	✓	10-44
Paste		Paste the copied element in the preview display.	✗	✓	✓	10-44
Delete		Delete the selected element.	✗	✓	✓	10-44
Based Copy		Specify a base point for the element or measurement result selected in the preview display and copy and move it based on the base point in the X axis/Y axis direction.	✗	✓	✓	10-44
Turn Copy		Specify a base point for the element or measurement result selected in the preview display and copy and rotate it about the base point.	✗	✓	✓	10-45
Select All		Select all of the selected elements and measurement results shown in the preview display.	✗	✓	✓	10-46

✓: Selectable ✗: Unselectable

Command name	Function	Mode			
		Run	Program	Single Measurement	
Select	Select the measurement result and elements displayed in the preview display from the sub menu.	✗	✓	✓	10-46
Edit Selected Element	Edit the setting of the selected element.	✗	✓	✓	10-46
Change the reference element	Edit the element to be referenced by the selected element.	✗	✓	✓	10-47
PositionAdjust	Manual Move	Drag all the edge detection ranges with the mouse to move them to an arbitrary direction.	✗	✓	✓
	Manual Turn	Rotate all the edge detection ranges about the base point.	✗	✓	✓
	Execute Pattern Search	Conduct the pattern search.	✗	✓	✓
	Overlapping CAD data	Load the Program data to match the base coordinates that have been set for the current image with the base coordinates that are set to the Program data.	✗	✓	✓
	Overlapping guide	Display the overlapping guide and position the measurement element onto the target in the preview display. You can select either to position the measurement element with pattern search or to manually position it.	✗	✓	✓
Enlarge/ Shrink/Mirror	Enlarge/Shrink	Enlarge/shrink the edge detection range of the selected element.	✗	✓	✓
	Horizontal Mirroring	Copy the horizontal flip of the selected measurement element.	✗	✓	✓
	Vertical Mirroring	Copy the vertical flip of the selected measurement element.	✗	✓	✓
Measurement diagnosis	Start Diagnosis	Check the measurement variance in measurement diagnosis mode.	✗	✓	✗
	Display diagnostic result	Displays the diagnosis result in measurement diagnosis mode.	✗	✓	✗
	Show tool bar	Set whether to display the [Start Diagnosis] and [Display Diagnosis Result] icons on the toolbar.	✗	✓	✗

✓: Selectable ✗: Unselectable

## View

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Menu

Command name	Function	Mode			
		Run	Program	Single Measurement	
Display magnification	Entire fit display	The entire field of view set in [Capture range] is displayed.	✓	✓	✓
	Live fit display	Displays playback in full screen mode.	✓	✓	✓
	Zoom	Select the display magnification ratio for the preview display from the sub menu.	✓	✓	✓
Magnifying glass	Magnify the area around the mouse cursor.	✓	✓	✓	10-57
On-Screen keyboard	Display On-Screen keyboard.	✓	✓	✓	10-57
Show Saturated Pixels	Show the pixels saturated with brightness in yellow.	✓	✓	✓	10-57
View Grid	Display a grid on the preview display.	✓	✓	✓	10-58

✓: Selectable ✗: Unselectable

## List of Command Names and Functions in the Menu

Command name		Function	Mode			
			Run	Program	Single Measurement	
Switch Edge Point Trail Display	Show Edge Point Trail	Show the points recognized as the edge of the target "yellow dots".	✓	✓	✓	10-59
	Show Fitting Lines	Show the element detected and used for measurement (line or point) as a "green line".	✓	✓	✓	10-59
	Show Fitting Line + Edge Point Trail	Show both the fitting line and edge point trail.	✓	✓	✓	10-59
	Hide Fitting Line + Edge Point Trail	Hide both the fitting line and edge point trail.	✓	✓	✓	10-59
Switch Result Display	Display Name	Display the measurement results displayed in the preview display with their measurement item names.	✓	✓	✓	10-60
	Display Measurement Value	Display the measurement results displayed in the preview display with their measurement values.	✓	✓	✓	10-60
	Display Difference Value	Display the measurement results displayed in the preview display with their difference between design value and measurement value.	✓	✓	✓	10-60
	Display Design Value/Tolerance	Display the measurement results displayed in the preview display with their design values/tolerances.	✓	✓	✓	10-60
Switch Element Display	Force Show All Elements	Show all the elements in the preview display. (including the hidden measurement elements.)	✓	✓	✓	10-61
	Show All Elements	Show all the elements in the preview display.	✓	✓	✓	10-61
	Show Elements Without CAD	Show all the elements but CAD in the preview display.	✓	✓	✓	10-61
	Show CAD Elements and Base coordinates	Show CAD elements and base coordinates in the preview display.	✓	✓	✓	10-61
	Hide All Elements	Hide all the elements displayed in the preview display.	✓	✓	✓	10-62
	Show All Angle Elements	Displays all the angle elements in the preview screen (when the IM-RU1 rotation unit is in use).	✓	✓	✓	10-62
Show angle images		Displays captured images by angle.	✓	✓	✓	10-63
Display Contour Lines		Display the contour lines based on the measurement results of [Profile].	✓	✓	✓	10-63
Display Background Image		Displays a background image (still image).	✓	✓	✓	10-64
Simultaneous real-time display with field of view		Displays a video preview of the wide view image on the background when displaying a video preview in high-precision measurement mode.	✓	✓	✓	10-64
Display high resolution background image		Displays only the area in the preview display range in real-time and high resolution when the magnification ratio of the background image is great.	✓	✓	✓	10-64

✓: Selectable ✗: Unselectable

## Illumination/Camera/Stage Control

Command name		Function	Mode			
			Run	Program	Single Measurement	
Change illumination	Select the illumination method, and adjust the brightness and exposure.	✓	✓	✓	✓	10-65
Capture	Displays the [Capture] dialog box.	✗	✓	✓	✓	10-65
Wide-field measurement mode	Shows the image in the preview display at low magnification.	✓	✓	✓	✓	10-65
High-precision Measurement Mode	Show the image in the preview display at high magnification.	✓	✓	✓	✓	10-65

✓: Selectable ✗: Unselectable

Command name	Function	Mode			
		Run	Program	Single Measurement	
Play	Refresh the displayed contents of the preview display in real time.	✗	✓	✓	10-65
XY control	Displays the [XY control] dialog box.	✓	✓	✓	10-65
Z control	Displays the [Z-Control] dialog box.	✓	✓	✓	10-66
θ control	Displays the [θ control] dialog box (only when the IM-RU1 rotation unit is in use).	✓	✓	✓	10-66
Layer Control	Display the layer control window to edit the layers.	✓	✓	✓	10-66
Clear Captured Image	Delete all captured images when the measurement target is reset.	✗	✓	✓	10-66

✓: Selectable ✗: Unselectable

## Measure

Command name	Function	Mode				
		Run	Program	Single Measurement		
Dimensioning	LN-LN	Measure the distance between two lines.	✗	✓	✓	4-25
	LN-PT	Measure the distance between a line and a point.	✗	✓	✓	4-26
	PT-PT	Measure the distance between two points.	✗	✓	✓	4-27
	CL-CL	Measure the distance between circles/arcs.	✗	✓	✓	4-30
	CL-LN	Measure the distance between a circle/arc and a line.	✗	✓	✓	4-31
	CL-PT	Measure the distance between a circle/arc and a point.	✗	✓	✓	4-32
	CL(Diameter &Radius)	Measure the diameter or radius of a circle.	✗	✓	✓	4-29
	ARC(Radius)	Measure the radius of an arc.	✗	✓	✓	4-33
Angle	Line Angle	Measure the angle between two lines.	✗	✓	✓	4-34
	Plane intersection angle	Measure the angle between two planes.	✗	✓	✓	4-35
Height Measurement	PT-PT	Measure the difference in height of two points.	✗	✓	✓	4-38
	Plane Point	Measures the height of the point and [Height flat surface] created by the virtual tool.	✗	✓	✓	4-40
Geometric dimensioning and tolerancing	Straightness	Measure the straightness of a straight line segment.	✗	✓	✓	4-110
	Roundness	Measure the roundness of a circle or an arc.	✗	✓	✓	4-111
	Control Profile	Measure the profile of the target within the specified measurement range.	✗	✓	✓	4-112
	Flatness	Measure the flatness of the specified plane.	✗	✓	✓	4-114
	Perpendicularity	Measure the perpendicularity of a specified straight line segment to the reference line.	✗	✓	✓	4-115
	Parallelism	Measure the parallelism of a specified straight line segment to the reference line.	✗	✓	✓	4-116
	True Position	Measure the position tolerance of a specified point.	✗	✓	✓	4-117
	Concentricity	Measure the concentricity between two circles or arcs.	✗	✓	✓	4-119
	Symmetry	Measure the degree of symmetry between the two specified lines.	✗	✓	✓	4-121

✓: Selectable ✗: Unselectable

Command name		Function	Mode			
			Run	Program	Single Measurement	
Application	Pitch width of line	Measure the pitch (linear distance) between the edges along a straight line.	✗	✓	✓	4-58
	Pitch width of circular angle	Measure the pitch (curve distance) between the edges along a circumference.	✗	✓	✓	4-63
	Tilt angle of line pitch	Measure the pitch (angle) of the edges along a straight line.	✗	✓	✓	4-68
	Center angle of circular pitch	Measure the pitch (angle) between the edges along a circumference.	✗	✓	✓	4-71
	Thickness Stick	Measure the maximum/minimum thickness of a cylindrical target.	✗	✓	✓	4-75
	Thickness Ring	Measure the maximum/minimum differences in the inner/outer diameters of a doughnut-shaped target.	✗	✓	✓	4-77
	Width	Detect the edges of a target with a complicated shape and measure the width between the edges.	✗	✓	✓	4-79
	Corner Arc	Measure the corner arc based on the two lines which form a corner.	✗	✓	✓	4-81
	Chamfer	Measure a chamfer based on the two lines which form a chamfer.	✗	✓	✓	4-82
	Slotted Hole	Measure the dimensions of a slot.	✗	✓	✓	4-83
	Reticle	Measure the distance between the edges along the line which passes through the center of a circle.	✗	✓	✓	4-84
	Point Position	Measure the horizontal and vertical distance from the selected point to the measurement base point.	✗	✓	✓	4-85
	Perimeter	Measure the perimeter of the target within the rectangle range.	✗	✓	✓	4-87
	Area	Measure the dimension of the target within the rectangle range.	✗	✓	✓	4-89
	Thread	Detect the edges on both sides of the thread, and measure the diameters or pitches.	✗	✓	✓	4-91
Calculator	Automatic Measurement	This function automatically recognizes the lines, circles, and arcs in the rectangular area and creates elements, and then automatically creates measurement items from these elements for measurement.	✗	✓	✓	4-95
	Automatic Measurement (For the shaft)	This function automatically recognizes the lines, circles, arcs, and points in the rectangle range and creates elements, and then automatically creates measurement items from these elements for measurement.	✗	✓	✓	4-99
Manual Measurement	Measure major diameter	Measure the major diameter of the shaft shape from edge in the rectangle range.	✗	✓	✓	4-102
	LN-LN	Manually measure the distance between two lines.	✗	✓	✓	4-25
	LN-PT	Manually measure the distance between a line and a point.	✗	✓	✓	4-26
	PT-PT	Manually measure the distance between two points.	✗	✓	✓	4-27
	CL-CL	Manually measure the distance between circles/arcs.	✗	✓	✓	4-30
	CL-LN	Manually measure the distance between a circle/arc and a line.	✗	✓	✓	4-31
	CL-PT	Manually measure the distance between a circle/arc and a point.	✗	✓	✓	4-32
	CL(Diameter &Radius)	Manually measure the diameter or radius of a circle.	✗	✓	✓	4-29
	ARC(Radius)	Manually measure the radius of an arc.	✗	✓	✓	4-33
	Angle	Manually measure the angle between two lines.	✗	✓	✓	4-34

✓: Selectable ✗: Unselectable

## Virtual Tool

Command name		Function	Mode			
			Run	Program	Single Measurement	
Point	Midpoint	Draw a midpoint between two selected points.	x	✓	✓	4-42
	Intersection	Draw an intersection of two selected lines (straight line, circle, or arc).	x	✓	✓	4-43
Line	Bisector	Draw a bisector between two selected lines or points.	x	✓	✓	4-46
	Perpendicular	Draw a perpendicular, which passes through a selected point to a selected line.	x	✓	✓	4-47
Line	Parallel	Draw a line parallel to a selected line, which passes through a selected point or which is a specified distance away from the selected line.	x	✓	✓	4-48
	Tangent	Draw a tangent of two selected circles (arcs), or of a circle (arc) and a point.	x	✓	✓	4-49
	LN via PT	Draw a line with a specified angle, which passes through a selected point.	x	✓	✓	4-50
	Ordinary least squares LN	Draw an OLS line which approximately passes through two or more selected points.	x	✓	✓	4-51
Circle	MedianCL	Draw a median circle of two selected circles or arcs.	x	✓	✓	4-52
	Ordinary least squares CL	Draw an OLS circle which approximately passes through two or more selected points.	x	✓	✓	4-53
	Circle	Draw a circle with a selected point at the center, which passes through another selected point or whose radius is a specified size.	x	✓	✓	4-54
Connection	Tangent circle	Draw a circle of the specified radius which contacts two selected lines.	x	✓	✓	4-55
	ConnectLN	Draw a line which connects two or more selected lines.	x	✓	✓	4-44
	ConnectArc	Draw a circle which connects two or more selected arcs.	x	✓	✓	4-45
Height flat surface		Draw a plane from the selected height elements.	x	✓	✓	4-56

✓: Selectable x: Unselectable

## Element

Command name		Function	Mode			
			Run	Program	Single Measurement	
Point on line		Detect a point on the set line.	x	✓	✓	4-124
Point on arc		Detect a point on the set arc.	x	✓	✓	4-126
Max/Min point (rectangle)		Detect the maximum or minimum point in the rectangle.	x	✓	✓	4-128
Max/Min point (circle/arc)		Detect the maximum or minimum point in the circle or the arc.	x	✓	✓	4-130
Line		Detect lines.	x	✓	✓	4-132
Center line		Detect the center line between edges.	x	✓	✓	4-133
Peak line		Draw the peak line which passes through the peak points along the line.	x	✓	✓	4-135
Circle		Detect circles.	x	✓	✓	4-136
Arc		Detect arcs.	x	✓	✓	4-138
Peak circle		Detect the peak circle which passes through the peak points along the circle.	x	✓	✓	4-140
Peak arc		Detect the peak arc which passes through the peak points along the arc.	x	✓	✓	4-142
Auto Generate		Automatically recognize the line, circle and arc within the rectangle, and create elements	x	✓	✓	4-143
Auto Generate Shaft		Automatically recognize the line, circle, arc, and point within the rectangle range, and create elements.	x	✓	✓	4-144

## List of Command Names and Functions in the Menu

Command name	Function	Mode			
		Run	Program	Single Measurement	
Contour	Create contour lines by detecting the edge of the target.	✗	✓	✓	4-145
Gauge line	Detect the edge of the target and draw the gauge line where it is to be the length of the dark width or light width, or the ratio of the light to dark width.	✗	✓	✓	4-146
Height	Create the height element to measure the height from that point.	✗	✓	✓	4-148

✓: Selectable ✗: Unselectable

## Rotation measurement (for IM-RU1 Rotation Unit Only)

Command name	Function	Mode			
		Run	Program	Single Measurement	
Degrees of Rotation	Measure the angle of the two selected points as the center of the rotation axis.	✗	✓	✓	4-167
Roundness (rotation)	Measure the roundness of the selected cylinder.	✗	✓	✓	4-168
Cylindricity	Measure the cylindricity of the specified target range.	✗	✓	✓	4-169
Coaxiality	Measure the concentricity of the two specified cylinders.	✗	✓	✓	4-170
Circular run-out	Measure the circular run-out based on the axis of the specified cylinder.	✗	✓	✓	4-172
Total run-out	Measure the total run-out based on the axis of the specified cylinder.	✗	✓	✓	4-173
Cylinder	Detect the edge of the periphery of the specified target range.	✗	✓	✓	4-174
Cylinder integration	Create a cylinder by combining two or more selected cylinders.	✗	✓	✓	4-176
Orientation (distance)	Detect the maximum and minimum angles of the distance between the specified line and point.	✗	✓	✓	4-177
Orientation (pin)	Detect the downward angle of the pin in the specified region.	✗	✓	✓	4-179
Orientation (auto)	Specify the region in the shape facing the target to set the angle reference.	✗	✓	✓	4-181

✓: Selectable ✗: Unselectable

## Comments/Marker

Command name	Function	Mode			
		Run	Program	Single Measurement	
Comments	Write a comment in the preview display.	✓	✓	✓	10-67
Marker	Create a marker in the preview display.	✓	✓	✓	10-68

✓: Selectable ✗: Unselectable

## Help

Command name	Function	Mode			
		Run	Program	Single Measurement	
About Head controller	The version information for the system software is displayed.	✓	✓	✓	10-69

✓: Selectable ✗: Unselectable

# Menu

## New

Create new Program data.

-  Reference The procedures after selecting [New] differs according to the measurement mode.  
 "Creating New Program Data" (page 4-6)  
 "Single Measurement Procedure" (page 8-6)

## Save

Save the Program data by overwriting the previous data.

-  Reference • When [Save] is selected during the creation of new data, the [Confirm save] dialog box appears.  
• In Program mode, [Save Settings] in the common control area works in the same way as this command.

## Exit (Shutdown)

Turn off the power to the head and controller.

-  Reference If any Program data is being edited, a message box to confirm saving is displayed.

**NOTICE**

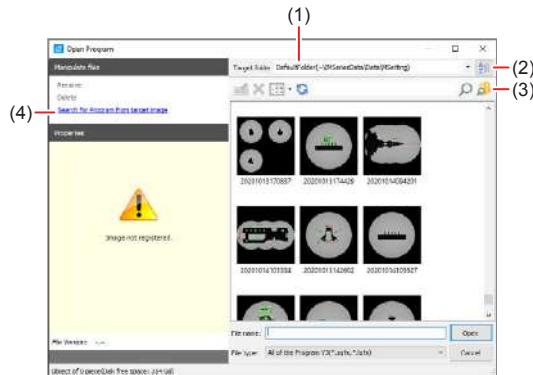
Until the power display lamp goes out, do not turn OFF the main power switch or the power supply.

# Open

## Program

Open the Program data stored in the specified folder.  
The [Open Program] dialog box appears.

**[Reference]** You can also open the Program data by clicking  on the toolbar.



## 2D code reading

Scan the 2D code on the printed report to open the measurement settings data.  
The [2D code reading] dialog box appears.



**[Reference]** For details about [2D code reading], refer to  “Scanning 2D Codes on Reports” (page 4-16).

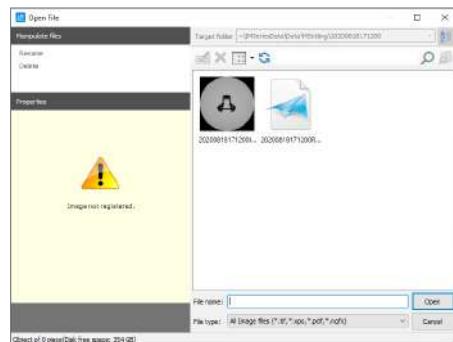
Number	Description
(1)	Program data in the selected folder is displayed in this list. The folder specified in the folder settings is displayed in the list.  “Folder Settings” (page 12-11)
(2)	Clicking this icon enables you to change the display order of the folders in the list.
(3)	Entering keywords into the input field on the left and clicking this icon searches for Program data in all folders.
(4)	Clicking this link searches for Program data based on the image shown on the preview screen, and shows the results in the order of highest matching rate.  “Searching for Data Based on a Target (Image)” (page 4-15)

## Other Files

Open the single object report or image data stored in the specified folder.

The [Open File] dialog box appears.

**► Important** Only the data stored in the currently selected Program data is displayed.  
Before selecting this option, open the Program data in which the desired file was stored.  
To open a file which was saved without a Program, select [New].



## MEMO

10

Menu

# Save As

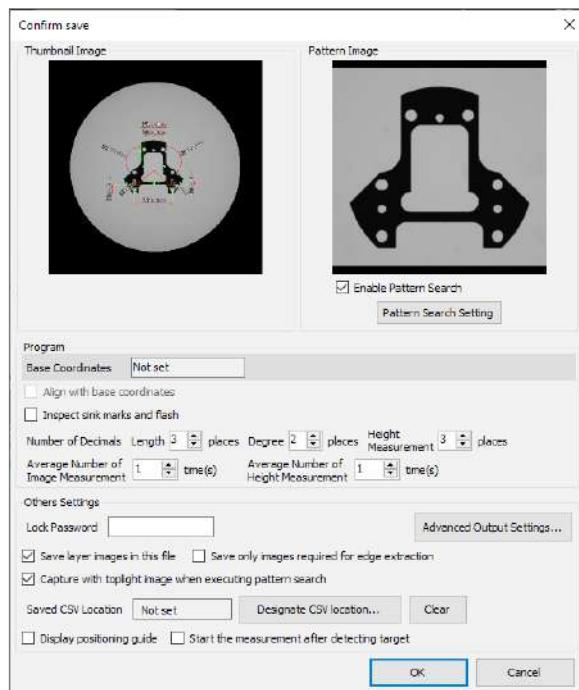


**Files such as the single object report, image data, and statistical report saved in Program mode or Run mode are stored in the folder with the name of the Program data for which the measurement was conducted. When a file such as the single object report is saved without a Program, it is stored in a new folder.**

## Program

Save the data for the current measurement (Program data). The [Confirm save] dialog box appears.

### ● Confirm save



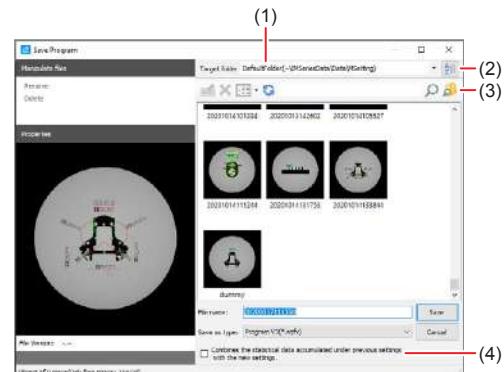
Item	Description
Program	Set the information related to the measurement.
Base Coordinates	<ul style="list-style-type: none"> <li>• Not set The base coordinates have not been set.</li> <li>• Set The base coordinates have been set.</li> </ul>
Align with base coordinates	When this check box is selected, the position of the detection range will be corrected based on the base coordinates. This option can be selected only when the base coordinates have been set.
Inspect sink marks and flash	When this check box is selected, sink marks and flash will be checked during edge extraction.
Number of Decimals	Set the number of decimal digits used for the measurement values.
Length	Set the number of decimal digits used for the length. Setting range: 0 to 4
Degree	Set the number of decimal digits used for the degree. Setting range: 0 to 4
Height Measurement (IM-8030T only)	Set the number of decimal digits used for the height. Setting range: 0 to 3
Average Number of Image Measurement	Set how many times captures are to be executed in a measurement.
Average Number of Height Measurement (IM-8030T only)	Set the measuring times that are to be executed via one measurement.

Item	Description
Thumbnail Image	A thumbnail image for the Program data is displayed. The preview screen is used for the thumbnail images.
Pattern Image	The registered pattern image is displayed.
Enable Pattern Search	When this check box is selected, the pattern search will be conducted during measurement. This option can be selected only when the pattern image has been registered.
[Pattern Search Setting]	Set the range and method for the pattern search. "Pattern Search Setting" (page 10-20)

Item	Description
Others Settings	Configure settings for saving data.
Lock Password	Set the password for editing the Program data.
[Advanced Output Settings]	Set the details for outputting the single object report. □ "Advanced Report Settings" (page 10-33)
Save layer images in this file	When this check box is selected, layer images will be saved in the Program data. If the layer images are saved, the settings can be edited even without measurement target.
Save only images required for edge extraction	When this check box is selected, position images without any elements are not saved to the layer. If there are layers without any elements, the size of the Program data can be decreased when this check box is selected.
Capture with toplight image when executing pattern search	When this check box is selected, images are captured in accordance with the epi-image on the layer used in the pattern search and used as the background image when a pattern search is executed during Run mode with Program data that contains epi-illumination.
Saved CSV Location	Save the measurement result as a CSV file. This setting is enabled when the destination has been specified. If the destination is specified, "Set" will be displayed.
[Designate CSV location]	Clicking this button displays the [Save As] dialog box. Set the folder and file name of the CSV file to be saved.
[Clear]	Clear the designated CSV location.
Display positioning guide	When this check box is selected, the positioning guide is displayed during Run mode.
Show window for angle images (Only when the IM-RU1 rotation unit is in use)	When this check box is selected, the image window of each angle is displayed after continuous measurement is executed.
Start the measurement after detecting target (Only when the IM-RU1 rotation unit is not in use)	When this check box is selected, measurement automatically starts when the target changes during Run mode.

## ● Save Program

When [OK] is clicked in the [Confirm save] dialog box, the [Save Program] dialog box appears.

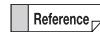


Number	Description
(1)	Program data in the selected folder is displayed in this list. The folder specified in the folder settings is displayed in the list. □ "Folder Settings" (page 12-11)
(2)	Clicking this icon enables you to change the display order of the folders in the list.
(3)	Entering keywords into the input field on the left and clicking this icon searches for Program data in all folders.
(4)	This option is displayed when editing the existing Program data and saving it with a name. When this check box is selected, the result measured with the Program before editing is copied as a new measurement file.

Reference Program data can only be saved as "Program V3 (\*.sqfx)".

## Single Object Report/Preview Image/ Screen Image/Captured Image/Run mode image

Save the single object report, preview image, screen image, capture image, and Run mode image.



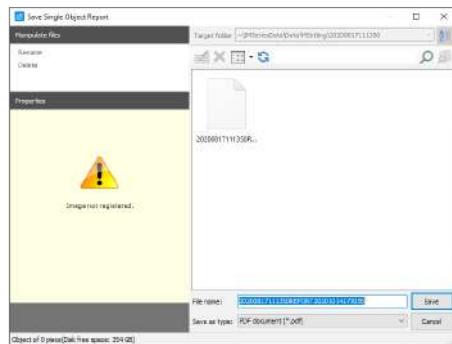
Capture images are images that are in the condition they were captured by the camera without a Program or comments.



**The format of the single object report cannot be changed when it is being saved. You need to set the format in [Advanced Report Settings] beforehand.**

"Advanced Report Settings" (page 10-33)

The dialog box which saves the selected file type appears.



### ● Types of single object report files

#### ○ PDF document (\*.pdf)

Displayed for single object report.  
Save the file in PDF format.  
Use Acrobat Reader, Acrobat Pro DC, or other PDF viewer software to open the file.

#### ○ XPS document (\*.xps)

Displayed for single object report.  
Save the file as an XPS document.  
To open it, use the XPS Viewer which is provided free of charge from Microsoft.

#### ○ CSV (comma separated values)(\*.csv)

Displayed for single object report.  
Save the file in CSV format.  
To open the file, use spreadsheet software such as Excel or a text editor.  
The preview image is not saved.

### ● File name

By default, the following name is assigned to the file.

#### ○ Single Object Report

Name of the Program file + "REPORT"+ Time of saving (Year + Month + Day + Hour + Minute + Second)

#### ○ Preview Image

Name of the Program file + "PREVIEW"+ Time of saving (Year + Month + Day + Hour + Minute + second)

#### ○ Screen Image

Name of the Program file + "SCREEN"+ Time of saving (Year + Month + Day + Hour + Minute + Second)

#### ○ Captured Image

Name of the Program file + "IMAGE"+ Time of saving (Year + Month + Day + Hour + Minute + Second)

#### ○ Run Mode Image

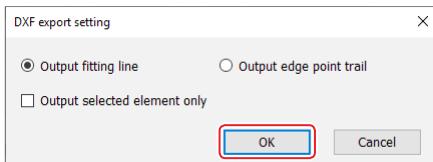
Time of saving (Year + Month + Day + Hour + Minute + Second) +  
Equipment identification name

## DXF Export

Save the measurement result as a DXF file.

**1 Select [Menu] → [Save As] → [DXF Export].**

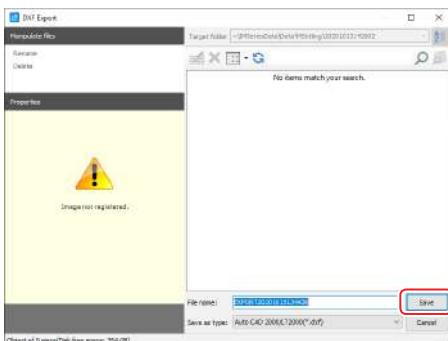
**2 Set the export details and click [OK].**



Item	Description
Output fitting line	Output the fitting line as DXF data.
Output edge point trail	Output the edge point trail as DXF data.
Output selected element only	Selecting this check box outputs only the selected element(s) as DXF data.

**Point** Only displayed elements are exported based on the settings. Hidden elements and results from virtual and application tools will not be exported.

**3 Specify the file name and type, and then click [Save].**



**Reference** By default, the following name is assigned to the file.  
"EXPORT" + Time of saving (Year + Month + Day + Hour + Minute + Second)

# Print

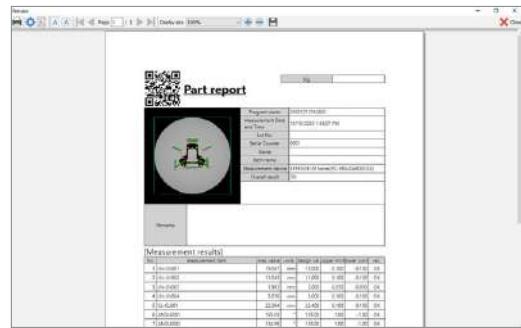
## Single Object Report/Preview Image/ Screen Image/Captured Image

Print the single object report, preview image, screen image, and capture image.

 Capture images are images that are in the condition they were captured by the camera without a Program or comments.

 **The format of the single object report cannot be changed at the time of printing. You need to set the format in [Advanced Report Settings] beforehand.**  
 “Advanced Report Settings” (page 10-33)

The [Preview] window which prints the selected file type appears.



Click  [Print] in the [Preview] window to start printing.

-  • For single object report, click  [Header/Footer] to change the settings for the headers and footers.  
 “Header/Footer” (page 10-35)
- Before clicking  [Print], connect the printer to the controller and ensure the print settings are set correctly.  
 “Connecting a Printer” (page 2-14)
  - Clicking  [Save] enables you to save the file as a PDF document or XPS document. Different from being saved by [Save As], the Program file name is not given at the beginning of the displayed default file name.
  - Clicking  [Close] in the [Preview] window cancels printing.

# Setting

## Base Coordination Settings

Base coordinates can be set in Program mode and single measurement mode.

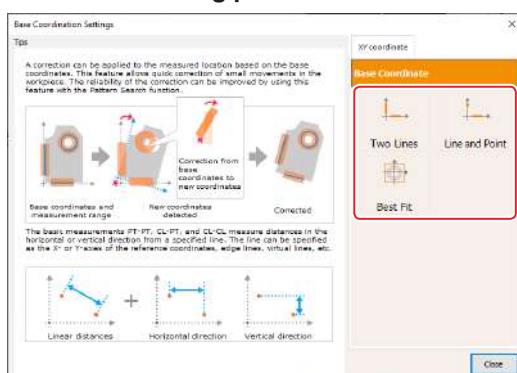
Setting the base coordinates enables precise position correction.

Distance can be measured not only in the linear direction, but also in the X- and Y-axis directions for the "PT-PT", "CL-PT", and "CL-CL" measurements on the Basics tab.

### ■ Setting the XY Base Coordinates

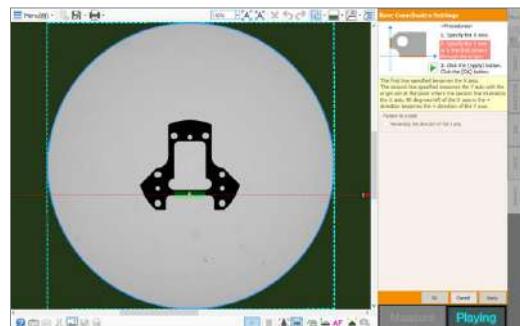
- 1 Select [Menu] → [Setting] → [Base Coordinate Settings].

- 2 Select the “setting pattern”.



-  Use the orthogonal lines of the target as base coordinates.  
□ "Two Lines" (page 4-183)
-  Use orthogonal lines connecting the line and point of the target as base coordinates.  
□ "Line and Point" (page 4-184)
-  Use the center of the extracted contour range of the target as base coordinates.  
□ "Best Fit" (page 4-185)

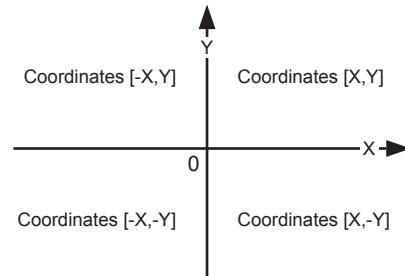
- 3 Set the items related to the base coordinates.



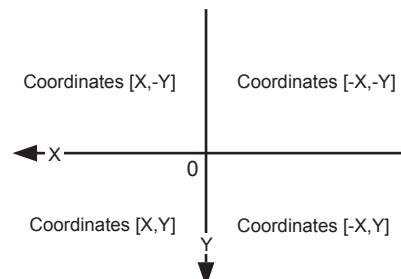
### ● Reversing the direction of the X axis

Set the orientation of the base coordinates.

- When this check box is not selected



- When this check box is selected



 The positive sides of the coordinates are indicated by "X" and "Y".

- 4 Click [OK].

The base coordinates are displayed in the preview display.

## ■ Setting the Base Rotation

**1** Select [Menu] → [Setting] → [Base Coordinate Settings].

**2** Click the [Rotate] tab.

**3** Select the “item to set”.



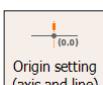
Creates the center axis of the rotation from the rotation plane in the specified region.

□ “Rotation Axis Setting” (page 4-186)



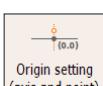
Sets the base angle so that the specified element is in the designated orientation.

□ “Angle Reference” (page 4-187)



Creates an origin point from the intersection of the specified line and center axis of the rotation.

□ “Origin Setting (axis and line)” (page 4-187)



The origin point will be set as the intersection of the vertical line below the specified point and the center axis of the rotation.

□ “Origin Setting (axis and point)” (page 4-188)

**4** Set the items related to the base coordinates.

**5** Click [OK].

The base coordinates are displayed in the preview display.

## Pattern Search Setting

### ■ Register Pattern Image

Register the image pattern of a target in the Program data. By registering the patterns, you can use the pattern search function.

**1** Select [Menu] → [Setting] → [Pattern Search Setting] → [Register Pattern Image].

The target shown in the preview display is automatically detected and displayed as a pattern image.



### ● When an image was correctly detected

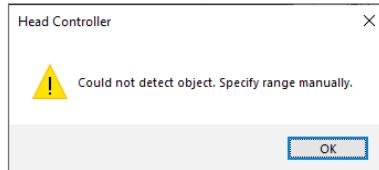
When the target in the preview display could be detected correctly, the following confirmation message box appears.



To register the detected pattern image, finish registering the pattern image by clicking [Yes].

### ● When an image was not correctly detected

When the target in the preview display could not be detected correctly, the following confirmation message box appears.

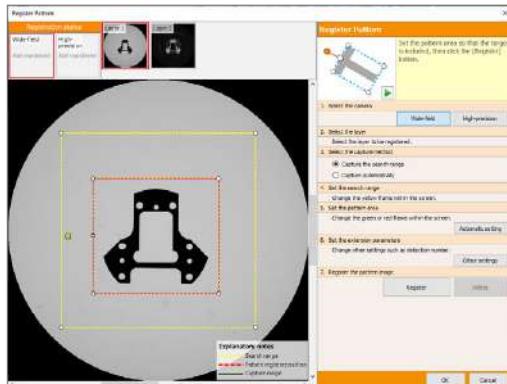


Perform Step 2 and the following to register the pattern image.

- The registration status is the type of captured registration pattern displayed in the preview screen.
- The layer list contains images of all layers of registered patterns displayed in the preview screen.
- The pattern search range is displayed as the yellow dotted line and the pattern registration position is displayed as the red dotted line.

## 2 Click [OK] and set the pattern image detection range.

Set the pattern region so that it includes the characteristic areas.



### ○ Select the camera

- [Wide-field]  
Displays layer images in wide-field measurement mode.
- [High-precision]  
Displays layer images in high-precision measurement mode.

### ○ Select the layer

Display a layer image. Click the layer list to select a layer image.

### ○ Select the capture method (only when the IM-RU1 rotation unit is not in use)

- Capture the search range  
Select this option when using [Set the search range]. The pattern search range will be displayed as a yellow dotted line on the preview screen.
- Capture automatically  
The target will be automatically recognized and captured.

### ○ Set the search range

Manipulate the shape of the yellow dotted line to specify the range of the pattern search.

- Moving the pattern search range  
When the mouse cursor is placed on the frame of the pattern search range, the cursor shape changes to . Drag the mouse to move the pattern search range.
- Changing the size of the pattern search range  
When the mouse cursor is placed on a handle (O) of the pattern search range, the cursor shape changes to or . Drag the mouse to change the size of the pattern search range.

### ○ Set the pattern area

Manipulate the shape of the green or red dotted line on the preview screen to specify the pattern region.

- Changing the angle of the pattern region  
When the mouse cursor is placed on a handle (O) on the left side of the pattern region, the cursor shape changes to . Drag the mouse to change the angle of the pattern region.
- [Automatic setting]  
Click this button to automatically set the pattern region.

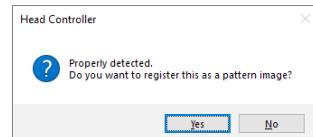
### ○ Set the extension parameters

Click the [Other settings] button to display the [Pattern Search Setting] dialog box.

"Pattern search advanced settings" (page 10-22)

## 3 Click [Register].

When the target in the pattern image detection range could be detected correctly, the following confirmation message box appears.



If the pattern image was not properly detected, return to Step 2 and set the pattern image detection range again.

## 4 Click [Yes].

The target detected in the pattern image detection range is registered as a pattern image.

If the pattern image which has not been detected properly is registered as a pattern image, the pattern search function may fail.

## 5 Set the pattern search if necessary.

For details about pattern search settings, refer to "Confirming/Editing the Pattern Image" (page 4-198).

## 6 Click [OK].

The pattern image registration is complete.

### ■ Delete pattern image

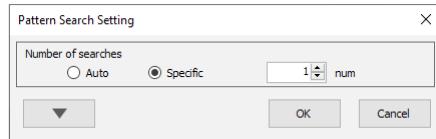
The registered pattern image will be deleted.  
Click [Yes] in the confirmation message box that appears.

### ■ Enable Pattern Search

Toggle ON/OFF for the Enable Pattern Search.  
When the check box on the left side of menu item is selected, the pattern search will be run.

## ■ Multiple Pattern Search Settings

When the multiple number of the same targets are put onto the stage and measured at once, specify the number of the targets to be detected in the pattern search.



### ○ Auto

Automatically recognizes and measures up to 100 measurement targets.

### ○ Specific

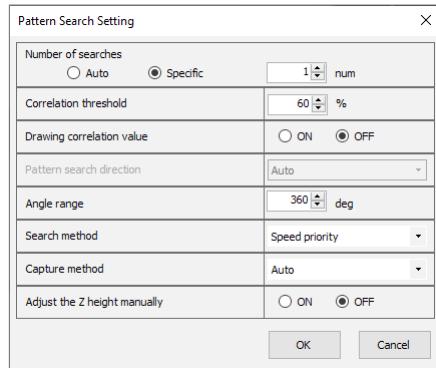
Recognizes the specified number of measurement targets. When multiple numbers of the same target are put onto the stage and measured at once, specify the number of the targets.

- Point**
- If you are using the IM-RU1 rotation unit, you cannot set the number of searches.
  - For Program data that contains any elements for which the [Manual Measurement] is selected, you cannot set the number of searches to 2 or more.

Click [▼] to expand the dialog box and display the same settings as "Advanced Pattern Search Settings".  
 "Pattern search advanced settings" (page 10-22)

## ■ Pattern search advanced settings

Set the range and method for the pattern search.



### ● Number of searches

When the multiple number of the same targets are put onto the stage and measured at once, specify the number of the targets to be detected in the pattern search.

#### ○ [Auto]

Automatically recognizes and measures up to 100 measurement targets.

#### ○ [Specific]

Recognizes the specified number of measurement targets. When multiple numbers of the same target are put onto the stage and measured at once, specify the number of the targets.

- Point**
- If you are using the IM-RU1 rotation unit, you cannot set the number of searches.
  - When the number of searches is set to 2 or more, select [Capture a search range] and set the search range.
  - For Program data that contains any elements for which the [Measure Manually] is selected, you cannot set the number of searches to 2 or more.

### ● Correlation threshold

The correlating value is a score (max: 100%) of the "degree of similarity" between the registered pattern image and the actual captured image, when the pattern search is executed.

You can set a threshold for this correlation value. Measurement is not performed if the specified threshold is not achieved.

### ● Drawing correlation value

Selecting this displays the calculated correlating value in the preview screen, when the pattern search is executed in the Run mode. However, it is displayed only when the frame of the pattern search appears on the preview screen in the multiple batch measurement.

### ● Pattern search direction (other than when the rotation unit IM-RU1 is connected)

Select the direction to perform a pattern search from the list. This option cannot be set when [Number of searches] is one.

### ● Angle range

Specify the range of the pattern search in degrees. When the range is specified, the rotation angle of the pattern search will be limited.

For example, when "180.00" degrees is specified as the search range, the pattern search will be performed within the range of ±90 degrees.

### ● Search method

Select a search method from the list.

### ● Rotation angle range (only when the IM-RU1 rotation unit is in use)

Specify the range of the pattern search in degrees. Specifying a range rotates the target in the set range and runs a pattern search at the highest correlation value angle.

### ● Capture method

Select a capture method from the list.

If you are using the IM-RU1 rotation unit, you cannot select a method.

### ● Adjust the Z height manually

Selecting this enables you to manually adjust the height of the electric Z stage with the Z stage up/down handle when a pattern search is executed in the Run mode.

## Light Probe Maintenance

Perform light probe maintenance.

- Important** The light probe moves to the measurement position. Remove the target beforehand from the top of the stage glass.

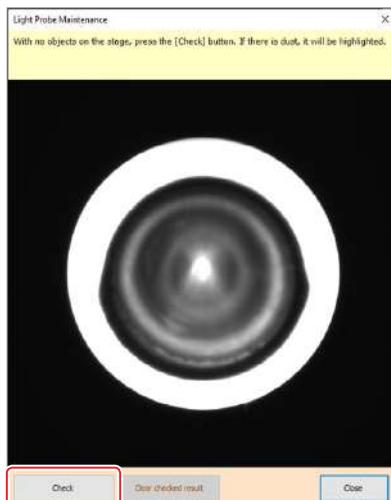
### 1 Select [Menu] → [Setting] → [Light Probe Maintenance].

A confirmation message box message appears.

### 2 Click [OK].

The light probe moves to the measurement position.

### 3 Click [Check].



#### ● If no problem is detected

A confirmation message box which indicates that there is no problem detected appears.

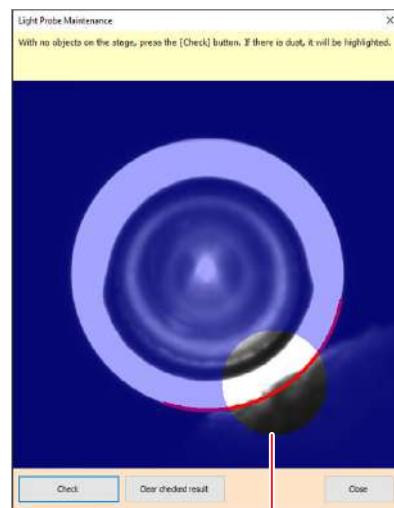
### 1 Click [OK].

### 2 Click [Close].

The light probe returns to the standby position and then the light probe maintenance finishes.

#### ● If a problem is detected

The place where dust might be attached is highlighted.



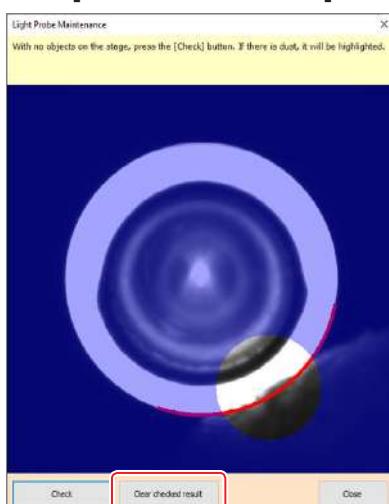
Places where dust might be attached

### 1 Use the lens blower to blow away the dust on the light probe.



The light probe is a precision component. Do not touch the light probe. Doing so may cause damage.

### 2 Click [Clear checked result].



The highlighted display will be released.

### 3 Click [Check].

Once the problem is detected again, repeat this procedure until it is solved.



When the light probe needs to be washed, refer to □ "Washing the Light Probe" (page 10-24).

## Washing the Light Probe

If oil and other materials adhere to the light probe and the lens blower does not solve the problem, follow the procedures below to wash it.

### 1 Cover the electric XY stage with a waterproof sheet.

**NOTICE**

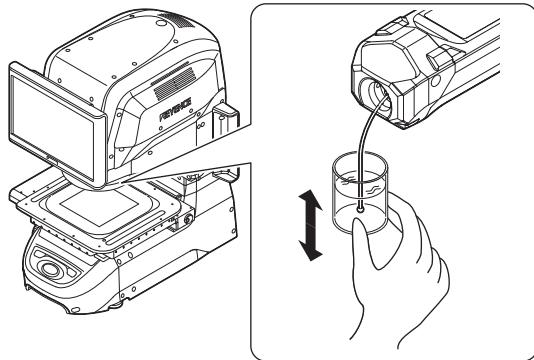
If liquid enters the inside of the head, it may cause damage.

### 2 Pour ethanol into a clean container.

### 3 Lift up the container and soak the light probe tip in ethanol.

**NOTICE**

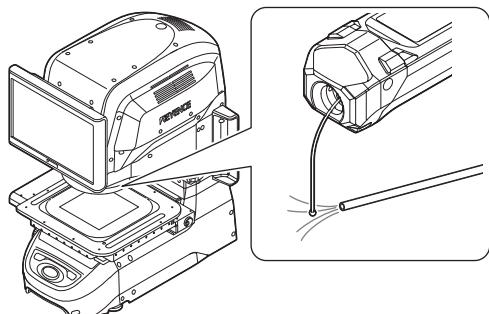
Do not let the container contact the light probe. Doing so may cause damage.



### 4 Blow it to evaporate the ethanol.

**NOTICE**

Do not wipe the light probe directly. Doing so may cause damage.



## Height Measurement Settings (IM-8030T only)

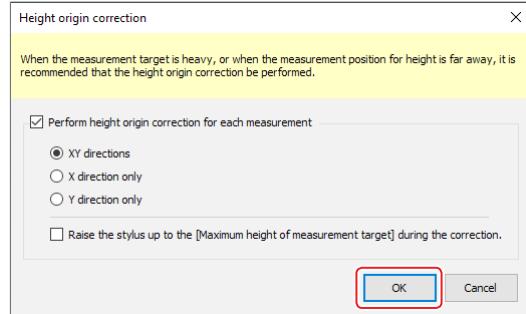
Set the items related to height measurement.

### Height origin correction

Set height origin correction execution to ON or OFF to correct stage sloping. If you set it to ON, select a correction method.

#### 1 Select [Menu] → [Setting] → [Height Measurement Settings] → [Height origin correction].

#### 2 Change the settings as necessary and click [OK].



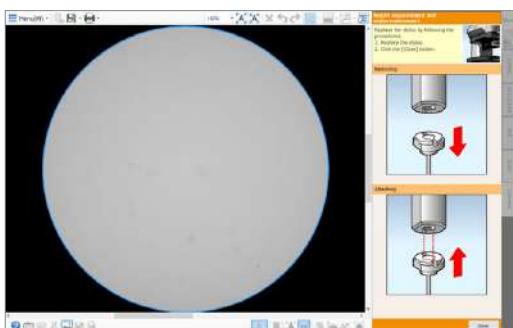
Item	Description
Perform height origin correction for each measurement	Select this check box to correct the height origin for each measurement.
XY directions	Correct the height origin in both the X and Y directions on the stage.
X direction only	Correct the height origin in only the X direction on the stage.
Y direction only	Correct the height origin in only the Y direction on the stage.
Raise the stylus up to the [Maximum height of measurement target] during the correction.	Select this check box to move the stylus up to the maximum height of the measurement target and then move the stage so that the stage does not touch the measurement target.

## Stylus Replacement

Display the screen to replace the stylus for the height measurement unit.

- 1 Select [Menu] → [Setting] → [Height Measurement Settings] → [Stylus replacement].

- 2 Replace the stylus according to the instructions on the screen.



- 3 Click [Close].

## Reference Plane Alignment

Execute the reference plane alignment of the height measurement unit. There are two types of reference plane alignment for different situations.

► Important

- Reference plane alignment should be performed with no measurement target being put on the stage glass and make sure to wipe off the dust beforehand.
- Perform [Glass Replacement] when the IM-RU1 rotation unit has been removed.

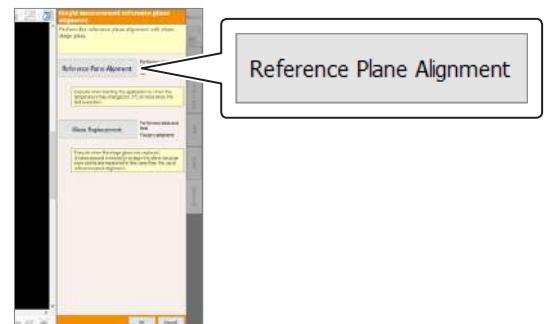
### Reference Plane Alignment

[Reference Plane Alignment] is executed in the cases below.

- When the device starts
- When temperature changed 5 °C or more compared with last time

- 1 Select [Menu] → [Setting] → [Height Measurement Settings] → [Reference Plane Alignment].

- 2 Click [Reference Plane Alignment].



A confirmation message appears.

- 3 Click [OK].

The reference plane alignment of the height measurement unit is executed.

After it is completed, a confirmation message appears.

- 4 Click [OK].

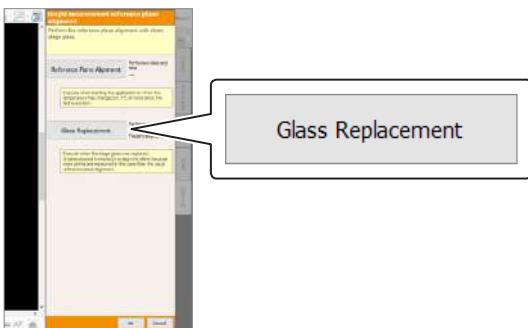
- 5 Click [OK].



## ■ Glass Replacement

[Glass Replacement] executes when replacing the stage glass.

- 1 Select [Menu] → [Setting] → [Height Measurement Settings] → [Reference Plane Alignment].**
- 2 Click [Glass Replacement].**



A confirmation message appears.

- 3 Click [OK].**

The reference plane alignment of the height measurement unit is executed.

After it is completed, a confirmation message appears.

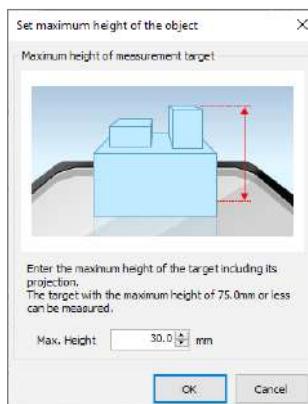
- 4 Click [OK].**

- 5 Click [OK].**



## Set maximum height of the object

Enter the maximum height of the measurement target.



Enter the maximum height for the measurement target, and click [OK].

### ► Important

- Setting range: 5.0 to 75.0
- When [Measurement height] of the light probe measurement element that has already been set is out of the measurable range based on the input [Max. Height], an error message will be displayed. First change [Measurement height] for the light probe measurement element.
- "Light probe measurement" (page 4-160)
- If you have set "Rotation unit" to [Do Not Use] with the IM-RU1 rotation unit attached to the IM-8030T, set [Max. Height] to 75 mm.

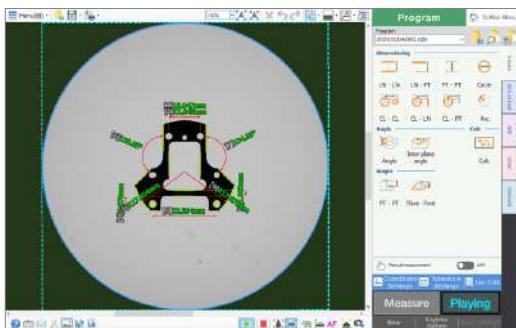
## Tolerance settings

### Batch Tolerance Settings

Set the tolerance for all measurement items in a single dialog box. You can set the tolerance either individually by specifying values for each item or simultaneously by applying the tolerance table.

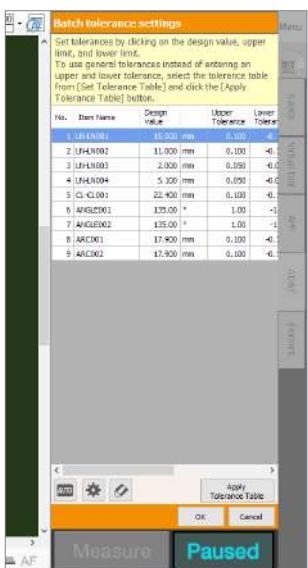
#### 1 Measure the target.

**Important** Batch tolerance settings cannot be set without measurement elements.



#### 2 Select [Menu] → [Setting] → [Tolerance settings] → [Batch Tolerance Settings].

The [Batch tolerance settings] window appears.



Item	Description
(Measurement list)	The measurement items are listed. When the inside of this table is clicked, the clicked cell is shown in yellow and its row is shown in blue. The characters of the corresponding measurement item in the preview screen are also shown in blue.
No.	The number of the measurement item is displayed. This number cannot be changed.
Item Name	The name of the measurement is displayed. This number cannot be changed.
Design value	Enter the design value of the measurement item.
Upper Tolerance	Enter the upper limit of the tolerance value.
Lower Tolerance	Enter the lower limit of the tolerance value.
Upper limit of Alert	Enter the upper limit for alert threshold.
Lower limit of Alert	Enter the lower limit for alert threshold.
	Only places for which the design value is 0 are automatically entered.
	Open the [Tolerance Table] dialog box to set the tolerance table.
	Clear the upper limit value and lower limit value you set in the measurement list.
[Apply Tolerance Table]	Apply the tolerance table set in the [Tolerance Table] dialog box to the tolerance values in the measurement list.

#### 3 Enter value(s) for “Design value” in the measurement list.

**Reference** When [AUTO] is clicked, the value calculated by rounding off the second decimal place (for angle, first decimal place) of the measurement result is automatically entered to each item where the design value is 0.

#### ● Setting the tolerance individually

##### 1 Enter a value in “Upper Tolerance” and “Lower Tolerance” in the measurement list.

**Reference** If you enter an upper tolerance when the lower tolerance is “0”, “a minus value that is the opposite of the upper tolerance” will automatically be entered into [Lower Tolerance].

##### 2 Click [OK].

The specified tolerance settings are applied to the Program for the measurement items. The [Batch tolerance settings] window closes.

## ● Setting the tolerance simultaneously



To set the tolerance simultaneously, the design value(s) must be entered beforehand.

### 1 Click [Set Tolerance table].

The [Tolerance Table] dialog box appears.



For details about the tolerance table settings, refer to  
 "Set Tolerance Table" (page 10-28).

### 2 Select a tolerance table to apply to.

Select options from the dropdown lists of [Length] and [Angle] respectively.

### 3 Click [OK].

A confirmation message box message appears.

### 4 Click [OK].

The [Tolerance Table] dialog box closes.

### 5 Click [Apply Tolerance Table].



The tolerance table is applied only to the rows in which both upper and lower tolerance limits are 0. The tolerance table is not applied to the rows in which a value other than 0 is entered for the upper/lower tolerance limit.

A confirmation message box message appears.

### 6 Click [Yes].

The tolerance table selected in [Set Tolerance Table] is set to the tolerance value in the measurement list.

### 7 Click [OK].

The [Batch tolerance settings] window closes.

## ■ Set Tolerance Table

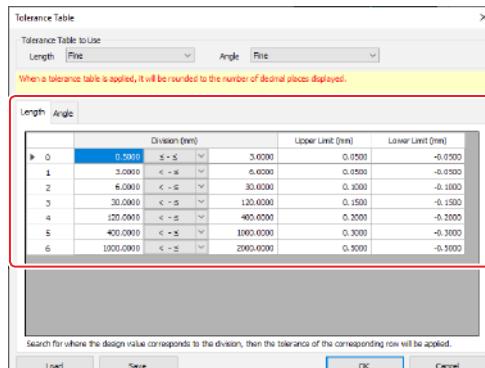
Set the tolerance table.

### ● User defined tolerance table

You can register your desired tolerance settings in a user-defined tolerance table.

### 1 Select [Menu] → [Setting] → [Tolerance settings] → [Set Tolerance Table].

The [Tolerance Table] dialog box appears.



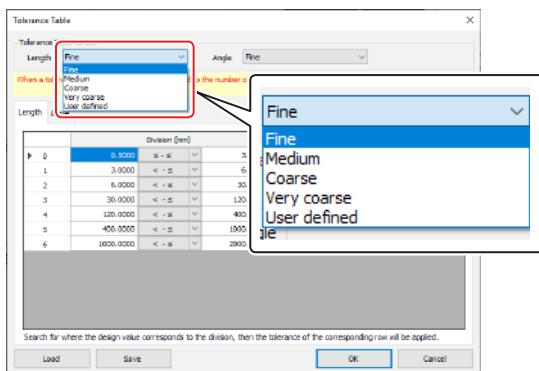
Tolerance table

Item	Description
Tolerance Table to Use	Select the tolerance table to apply to the measurement item.
Length	Select the tolerance table to apply to length dimensions from the dropdown list. The values and ranges in the table cannot be changed. Selectable Fine, Medium, Coarse, options: Very coarse, User settings*
Angle	Select the tolerance table to apply to angle dimensions from the dropdown list. The values and ranges in the table cannot be changed. Selectable Fine, Medium, Coarse, options: Very coarse, User settings*
[Length] tab	The details of the ranges of the tolerance table used for length dimensions are displayed.
[Angle] tab	The details of the ranges of the tolerance table used for angle dimensions are displayed.
[Load]	Read a tolerance table file (*.clr) stored in the controller. "Reading tolerance table" (page 10-29)
[Save]	Save the completed tolerance table in the controller. "Saving tolerance table" (page 10-29)

\* When [User defined] is selected, the user defined item will be added as the seventh item of [Fine]. You can set "Division", "Upper Limit", and "Lower Limit" as desired. You can also edit, delete, or add rows to the existing items.

## 2 Select [User defined] from the list for [Length] or [Angle].

**Reference** To read the tolerance table that has been saved, click [Load].



## 3 Set [Division], [Upper Limit] and [Lower Limit].

To set a value, click the target cell to highlight it.  
To change the range symbol, select one from the dropdown list.

- Reference**
- You can insert or delete rows by right-clicking the row number and selecting the option from the context menu.
  - To save the tolerance table, click [Save].

## 4 Click [OK].

A confirmation message box message appears.

## 5 Click [OK].

The [Tolerance Table] dialog box closes.

- Important** To apply the tolerance table you set, you need to click [Apply Tolerance Table] in the [Batch tolerance settings] window.  
 “Batch Tolerance Settings” (page 10-27)

## ● Reading tolerance table

Read a tolerance table file (\*.clr) stored in the controller.

### 1 Click [Load].

A confirmation message box message appears.

### 2 Click [OK].

The [Open Tolerance Table] dialog box appears.

### 3 Select the desired tolerance setting file (\*.clr) and click [Open].

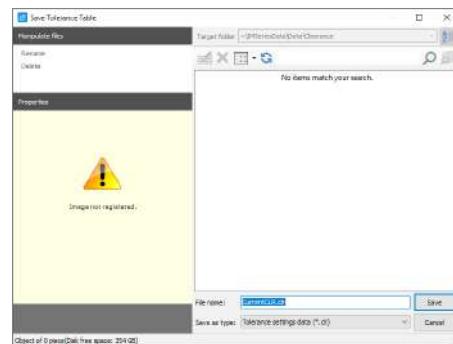
The tolerance tables stored in the controller are displayed.

## ● Saving tolerance table

Save the completed tolerance table in the controller.

### 1 Click [Save].

### 2 Specify the name of the tolerance setting file to save and click [Save].



The tolerance table is saved in the controller.

## Alert Batch Settings

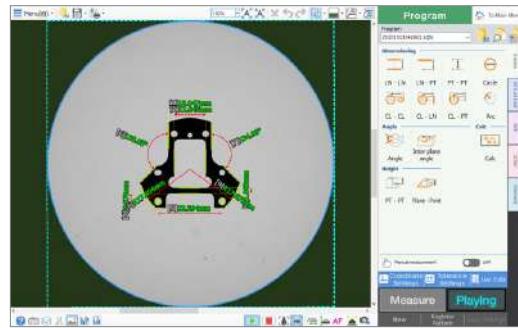
Set the alert threshold for all measurement items in a single dialog box.

 For details of how to configure the settings, refer to ["Alert Settings"](#) (page 4-192).

## Edit Element List

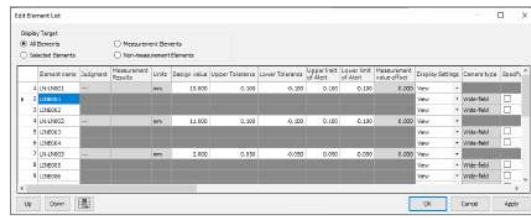
List the measurement results displayed in the preview display, and sort or show/hide them.

### 1 Measure the target.



### 2 Select [Menu] → [Setting] → [Edit Element List].

The [Edit Element List] dialog box appears.



 The elements refer to all of the basic measurement, virtual tools, application tools, gd&t, and element tools.

Item	Description
Display Target	Select the elements to be displayed in the list.
All Elements	Display all the elements in the list.
Measurement Elements	Display all the measurement results displayed on the preview display.
Selected Elements	Display only the element that is being selected on the preview display.
Non-measurement Elements	Display all the element tools and virtual tools.

Item	Description
(Element list)	Displays a list of elements. The selected cell is displayed in blue. You can change the value or setting of the white cells.
(No.)	Displays the element number. This number cannot be changed.
Element name	Displays the name of the element.
(Element type)	The type of measurement element ([INUM], [PITCH], [Cumulative deviation], [Partial deviation]) is displayed.
Judgment	The evaluation result of the measurement element is displayed (OK, NG, Fail, or ---). This number cannot be changed.
Measurement Results	Displays the measurement results for the measured element. This number cannot be changed.
Units	Displays the unit according to the element type (line, °, mm, mm <sup>2</sup> ).
Design value	Displays the design value of the measurement element.
Upper Tolerance	Displays the upper limit of the tolerance value of the measurement element.
Lower Tolerance	Displays the lower limit of the tolerance value of the measurement element.
Upper limit of Alert	Displays the upper limit for the alert threshold of the measurement element.
Lower limit of Alert	Displays the lower limit for the alert threshold of the measurement element.
Measurement value offset	Displays the result of the offset value being added to the measurement value as the measurement result.
Display Settings	Set to display/hide the elements.
Camera Type	Displays the camera type ([Wide-field] or [High-precision]).
Specify capture angle with value	Displays whether the capture angle is specified and the setting value.
Capture angle reference	Displays the element criteria for the capture angle.
Auto angle capture	Display whether or not the auto angle capture is executed.
Specify search range	Displays whether the search range for auto angle capture is specified and the angle from capture angle criteria.
Range	Displays the absolute value of the search range (angle) for auto angle capture.
Specify capture height with value	Displays whether the capture height is specified and the setting value.
Capture height criteria	Displays the specified element criteria.
Autofocus capture	Display whether or not the auto focus capture is specified.
Executing timing	Displays when auto focus capture will be run.
Specify search range	Displays whether the search range for auto focus capture is specified.
Start height	Displays the start height of the search range for auto focus capture.

Item	Description
End height	Displays whether the end height of the search range for auto focus capture is specified.
Z Stage Position	Display the position of the Z stage of the measurement element.
Capture angle	Displays the angle of the rotation unit.
Exposure	Displays the exposure for the light of the measurement element.
Back light	Displays the backlight intensity of the measurement element.
Multi-angle (Other than IM-8005)	Display the intensity of the multi-angle illumination of the measurement element.
All (IM-8005 only)	Display the intensity of the ring light (All) of the measurement element.
Near	Display the intensity of the ring light (Near) of the measurement element.
Away	Display the intensity of the ring light (Away) of the measurement element.
Right	Display the intensity of the ring light (Right) of the measurement element.
Left	Display the intensity of the ring light (Left) of the measurement element.
Slit ring (Other than IM-8005)	Display the intensity of the slit ring of the measurement element.
Pos. (Other than IM-8005)	Display the height (distance from the focus position) of the variable illumination unit.
External	Display the intensity of the external illumination of the element tool.
[Up]	Move the row of the selected measurement result up 1 row.
[Down]	Move the row of the selected measurement result down 1 row.
	Displayed when changing the measurement value offset is restricted in the security settings. Canceling the restriction from this button enables change for all measurement value offsets.
[Apply]	Reflect the configured contents to the preview display.



Evaluations of the hidden measurement elements are not included in the overall OK/NG evaluation.

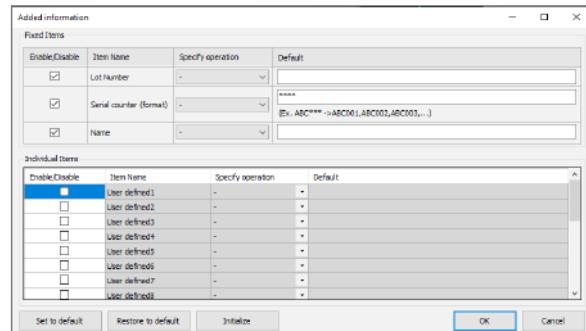
### 3 Change the settings as necessary and click [OK].

The configured contents are reflected to the corresponding measurement element.

## Added information

Set the added information which is displayed in the added information input area during the multi measurement and is saved together with the measurement result.

The [Added information] dialog box appears.



Item	Description
[Initialize]	Click this button to discard the current settings and start initialization.

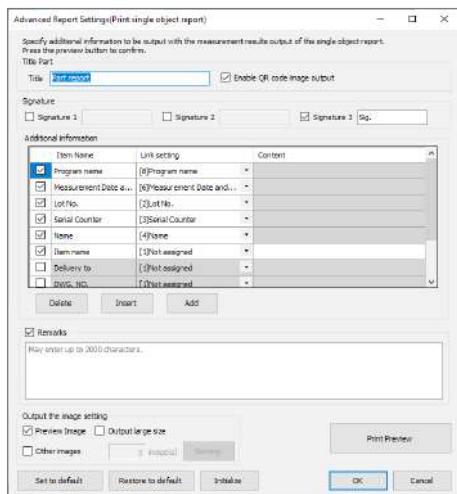
Item	Description
Fixed Items	The setting area for items that cannot be renamed.
Individual Items	The setting area for items that can be renamed.
Enable/Disable	When the check box is selected, it is displayed in the added information input area during the Run mode and is saved together with the measurement result. To set [Item Name], [Specify operation] and [Default], the check box needs to be selected.
Item name	<ul style="list-style-type: none"> <li>For fixed items, the following three items cannot be edited.           <ul style="list-style-type: none"> <li>Lot Number</li> <li>Serial counter (format)</li> <li>Name</li> </ul> </li> <li>For individual items, they can be renamed. When a cell is selected, the item name can be renamed.</li> </ul>
Specify operation	<p>Select an operation during multi measurement from the dropdown list.</p> <ul style="list-style-type: none"> <li>-- Do not set restrictions. Even if blank spaces are input, the Run Mode can be performed. A white box is displayed in the added information input area.</li> <li>Can not change It cannot be input or changed. When [Default] has been set, that character string or format are always used. A blue box is displayed in the added information input area.</li> <li>Blank space prohibited Cannot be blank. To perform Run Mode, entry is compulsory. A yellow box is displayed in the added information input area.</li> </ul>
Default	In multi measurement, enter the default value displayed in the added information input area. For Serial counter, the number of * (asterisks) will turn into the counter digits.
[Set to default]	Click this button to register the current settings as the default values. Subsequently if the Program data is newly created, the default values will be set in the added information.
[Restore to default]	Click this button to discard the current settings and return the settings to the default values. When default values have not been registered, the initial value will be used.

## Advanced Report Settings

Set the items to be output in the single object report.  
The [Advanced Report Settings (Print single object report)] dialog box appears.



- Compared with [Advanced Report Settings (Print single object report)] dialog box, the [Advanced Report Settings (Print statistical report)] dialog box has the following different points.**
- The items that can be selected from the [Link setting] list decrease.
  - The measurement result image cannot be output.



Item	Description
Title	Set a title for the single object report. Setting range: 64 characters Default value: Part Report
Enable QR code image output	Selecting this check box adds a 2D code to the upper left of the single object report.
Signature	Selecting this check box enables the entry of the signature name, and the signature will be added to the process of making the single object report.
Signature 1	Signature 1 will be added. Enter a signature name. Default value: (Empty)
Signature 2	Signature 2 will be added. Enter a signature name. Default value: (Empty)
Signature 3	Signature 3 will be added. Enter a signature name. Default value: Sig.

Item	Description
Additional information	Set the information to be added to single object report. Setting range: 30 rows
(Check box)	When this check box is selected, the single object report will be output. To set [Item Name], [Link setting] and [Content], the check box needs to be selected.
Item Name	Set an item name for the added information. When a cell is selected, the item name can be renamed. If the added information is selected from the [Link setting] list, the item name will be changed accordingly. However, if the item name that has been set up is different from the name of the added information selected from [Link setting], the item name is not changed even if you choose another added information from [Link setting].
Link setting	Select the added information content from the dropdown list. All of the items set in [Added information] are displayed in the dropdown list regardless of being valid or not. <ul style="list-style-type: none"> <li>• When a setting other than [Not assigned] is selected, the content of the selected added information will be output. The content entered into [Content] cannot be output. However, if the selected added information item is invalid, [Content] will be output as blank space.</li> <li>• When [Not assigned] is selected, the content entered into [Content] will be output.</li> </ul>
Content	When [Not assigned] is selected in [Link setting], set the report content to be output. When a cell is selected and clicked again, the content can be changed. Setting range: 256 characters
[Delete]	Click this button to delete the selected row.
[Insert]	Click this button to add a row above the selected row.
[Add]	Click this button to add a row below the selected row.
Remarks	When this check box is selected, the single object report will be output.
(Input field)	Any character strings can be input. Setting range: 2000 characters
Output the image setting	Configure the settings for the image to be output in the single object report.
Preview Image	Selecting this check box outputs the captured image on the first page of the single object report.
Output large size	Selecting this check box outputs the captured image in a large size on the second page of the single object report.
Other images	Selecting this check box enables other images to be additionally output. Clicking [Setting] displays the [Report output image settings] window. "Report Image Output Settings" (page 10-34)
[Print Preview]	Displays the print preview. The header and footer can be set in the print preview. "Header/Footer" (page 10-35)
[Set to default]	Click this button to register the current settings as the default values. Subsequently if the Program data is newly created, the default values will be set in the Advanced Report Settings.

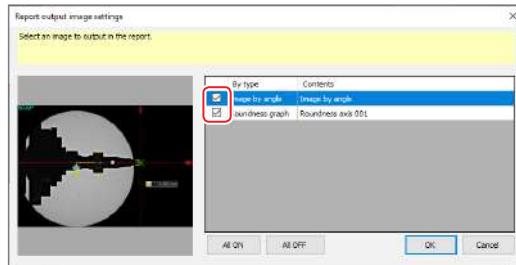
Item	Description
[Restore to default]	Click this button to discard the current settings and return the settings to the default values. When default values have not been registered, the initial value will be used.
[Initialize]	Click this button to discard the current settings and start initialization.

### ● Report Image Output Settings

Select the image to be additionally output in the report.

**1 Select the [Other images] check box in the [Advanced Report Settings] dialog box and click [Setting].**

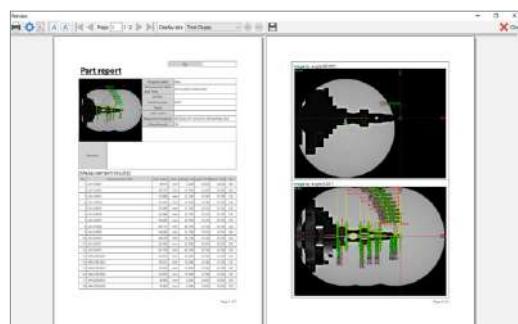
**2 Select the check box for the image to be output in the report.**



Item	Description
Preview Image	Displays a preview of the selected image.
Check box	Select the check box for the image that you want to output.
By type	Select from "Image by angle" and "Roundness graph" for the image that you want to output.
Contents	Displays additional information (created angle and element name) in accordance with "By type".
[All ON]	Clicking this button selects all images in the list.
[All OFF]	Clicking this button cancels the selection of all images in the list.

#### ○ Output format

The selected images are output two at a time on each page on the second page onward in the single object report.



**3 Click [OK].**

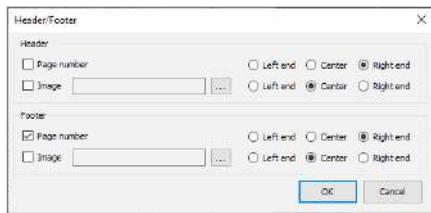
## ● Header/Footer

Set the header and footer for single object report and statistical report when printing or saving them.

### 1 Click [Header/Footer] in the [Preview] window.

 For details about the [Preview] window, refer to ["Print" \(page 10-18\)](#).

### 2 Set the header and footer.



Item	Description
Header	The header is set in this area.
Footer	The footer is set in this area.
Page number	When this check box is selected, the page number will be output at the selected position. Selectable range: Left end, Center, Right end
Image	When this check box is selected, the image is output at the selected position. Click [...] and select an image from the displayed [Open File] dialog box. For details about the [Open File] dialog box, refer to <a href="#">"Other Files" (page 10-12)</a> . Selectable range: Left end, Center, Right end

-  **Important**
- To insert images, import the image files into the specified folder beforehand.  
["Importing a File" \(page 12-6\)](#)
  - Only TIF (.tif) format files can be inserted.

-  **Point**
- Even if the [Image] check box is selected, the image will not be output if the image file was not specified or could not be read properly.
  - The header and footer settings are common in the controller. If changed, they will be used in all the single object reports and statistical reports to be output hereafter.

### 3 Click [OK].

## Roundness graph

You can display this graph when the IM-RU1 rotation unit is in use. A graph is displayed with the distribution of the amount of shift from the perfect circle based on the roundness, cylindricity, concentricity, circular run-out, and total run-out measurement results.

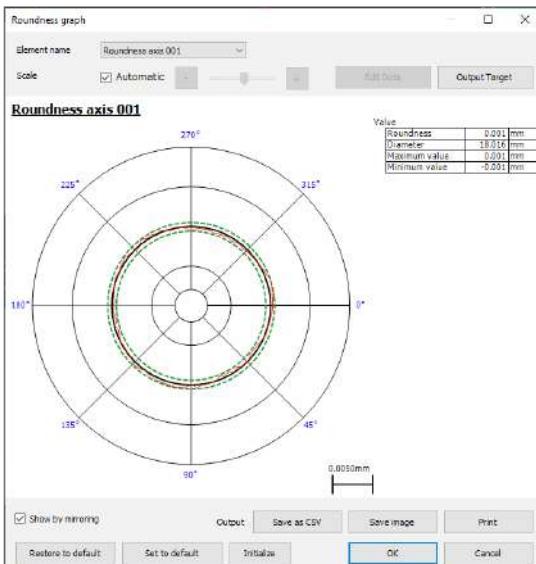
### 1 Measure the roundness, cylindricity, concentricity, circular run-out, or total run-out of the target.



If there are no elements applicable to the roundness graph, a roundness graph will not be created.

### 2 Select [Menu] → [Setting] → [Roundness graph].

The [Roundness Graph] dialog box appears.



Item	Description
Element Name	Select the element to be displayed on the roundness graph from the list.
Scale	Set the length of one gradation on the graph. Selecting the [Automatic] check box automatically sets an easy-to-read scale. Clearing the check box enables you to manually set the scale with the slider.
Edit Data	Edit the cross-section displayed on the graph when the measurement results are for cylindricity, concentricity, and total run-out. You can move, add, and delete the cross-section.
Output Target	Select the items (element name, measurement value, legend, and scale) to output with the graph.
Preview	<ul style="list-style-type: none"> <li>Displays the plotted deviation as a red line except for cylinder concentricity. The maximum and minimum deviations are displayed as a dotted green line.</li> <li>Displays the center of the cross-section for the maximum deviation point as a red dot.</li> </ul>
Show by mirroring	Selecting this check box displays the angle axis (horizontal line) of the graph as the center in line symmetry.

Item	Description
Output	Set the output method.
Save as CSV	Save the profile data in CSV format (*.csv).
Save Image	Save the profile data in TIFF format (*.tif).
Print	Print the profile data. You can also save the print image in PDF format (*.pdf) or XPS format (*.xps).
Restore to default	Restore the settings to the default values.
Set to default	Saves the current settings and applies them as the default settings when measurement settings are created next time.
Initialize	Restore the settings to the initial state.

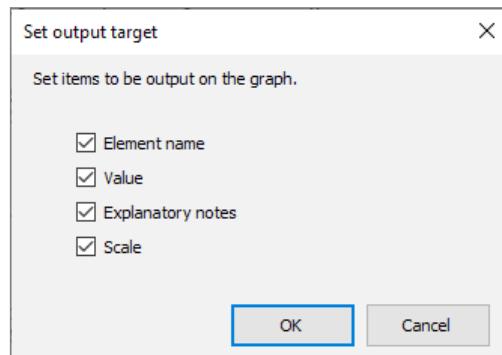
### 3 Click [OK].

#### ● Set items to be output with the graph

Select the items to be output onto the roundness graph.

### 1 On the [Roundness Graph], click [Output target].

### 2 Select the check boxes for the items that you want to output onto the graph.



### 3 Click [OK].

## ● Graph output

Output a roundness graph.

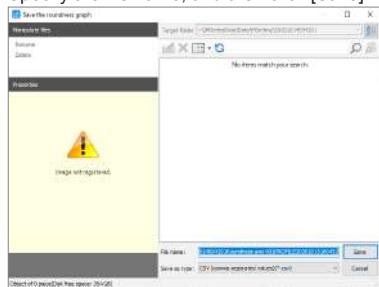
- 1 In the [Roundness Graph] dialog box, click [Save as CSV], [Save image], or [Print].

The save dialog box or print preview appears.

- 2 Follow the procedure for the format that you want to output.

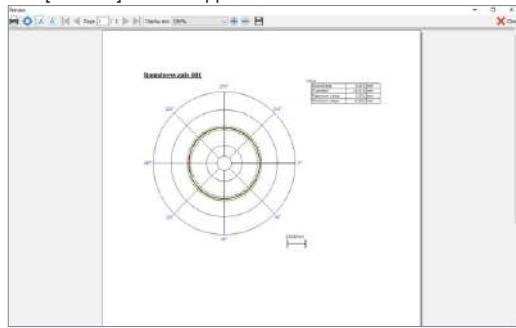
- If you clicked [Save as CSV] or [Save image]

The [Save the roundness graph] dialog box appears. Specify the file name, and then click [Save].



- If you clicked [Print]

The [Preview] window appears.



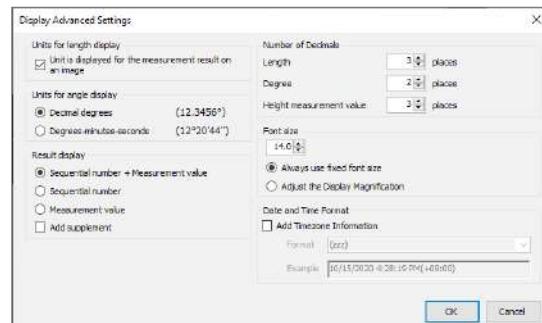
Clicking displays the print dialog box. Edit the print settings before printing.

Clicking displays the save dialog box. Specify the file name, and then click [Save].

## Display Settings

Set the details of the display including the measurement values and results.

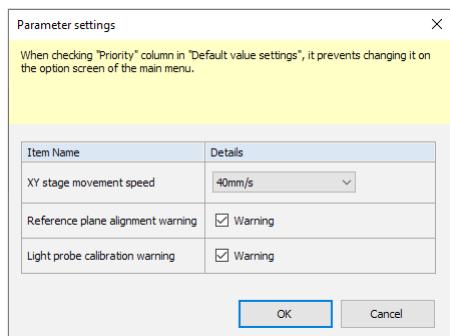
The [Display Advanced Settings] dialog box appears.



Item	Description
Units for length display	To display a unit for the measurement result on the preview screen, select the [Unit is displayed for the measurement result on an image]. Default: ON
Units for angle display	Select the unit used to display the result of angle measurement. Default value: Decimal degrees
Result Display	Select the method to view the measurement results on the preview screen. Default: Sequential number + Measurement value To add a supplement to the end of the measurement result on the preview screen, select the [Add supplement]. Default: OFF
Number of Decimals	Set the number of decimal digits used for the measurement values.
Length	Set the number of decimal digits used for the length. Setting range: 0 to 4
Degree	Set the number of decimal digits used for the degree. Setting range: 0 to 4
Height measurement value (IM-8030T only)	Set the number of decimal digits used for the height. Setting range: 0 to 3
Font size	Specify the font size of the characters used in the preview screen. You can select either fixed or variable. Default value: Always use fixed font size
Date and Time Format	When the time zone information is added in the time view, select the [Add Timezone Information]. Select a format from the dropdown list. Default: OFF

## Parameter settings

Set the XY stage speed and a reference plane alignment warning for the Program data.  
The [Parameter settings] dialog box appears.

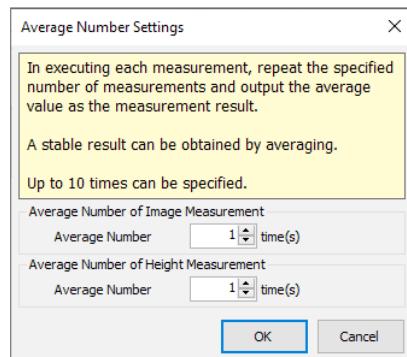


You cannot change items for which the [Priority] check box is selected in [Optional Settings] → [Settings] → [Default value settings].  
 "Default value settings" (page 12-17)

Item	Description
XY stage movement speed	Select the XY stage speed from the list.
Reference plane alignment warning	When this check box is cleared, the message recommending reference plane alignment will no longer be displayed.
Light probe calibration warning	When this check box is cleared, the message prompting the initialization of the light probe will no longer be displayed.

## Average Number Settings

Set the measuring times that are to be executed via one measurement. The [Average Number Settings] dialog box appears.



Item	Description
Average Number of Image Measurement	Set number of times for measuring an image.
Average Number of Height Measurement (IM-8030T only)	Set number of times to measure the height.



For Program data that includes the element below, [Average Number Settings] cannot be set to more than one.  

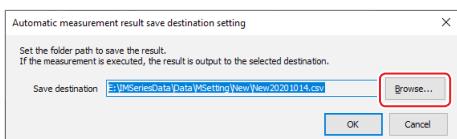
- Elements for which [Manual Measurement] is selected
- Profile

## Automatic measurement result save destination setting

Set the save destination of the automatic measurement result.

**1 Select [Menu] → [Setting] → [Automatic measurement result save destination setting].**

**2 Click [Browse].**

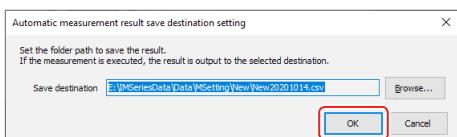


The [Save As] dialog box appears.

**3 Specify a save destination folder and a file name, and click [Save].**

**Point** When a new file name is specified, the file is not created at this point. The file will be created when the next automatic measurement is performed with the [Save the measurement result] check box selected.

**4 Click [OK].**

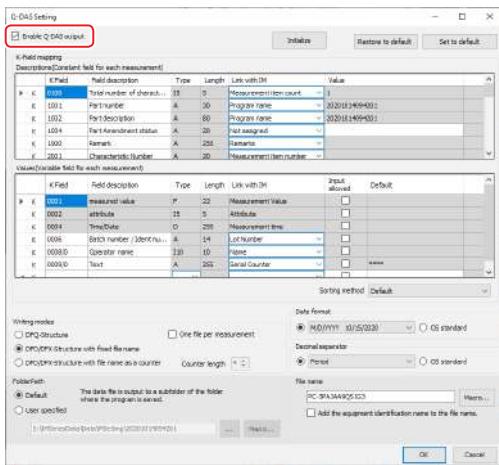


## Q-DAS Setting

In continuous measurement, the measurement result can be output (saved) in the Q-DAS format. Measurement result save in the Q-DAS format can be read and analyzed with an application supporting for the Q-DAS format.

**1 Select [Menu] → [Setting] → [Q-DAS Setting].**

**2 Select the [Enable Q-DAS output] to set the Q-DAS format to be used for output.**



### Reference

- By only selecting the [Enable Q-DAS output] check box, the measurement result can be output (saved) in the standard specification of the Q-DAS format.
- To set a value or character string, click the target cell.
- From the right-click menu in the [K] column, you can delete, insert, or move up or down a row.

Item	Description
Enable Q-DAS output	To output (save) the measurement result in the Q-DAS format, select the check box. Default: OFF
[Initialize]	Restore the settings to the default values.
[Restore to default]	Restore the settings to the default values.
[Set to default]	Register the settings as the default values.
<b>K-Field mapping</b>	<b>Point</b> The [FolderPath] and [File name] settings will not be registered as the default values.
K Field	Specify the item corresponding to the K field of Q-DAS.  Set th K field number of Q-DAS. You can also use the character number of “/n” (n represents numerical number). When the number is changed, the [Field description], [Type], and [Length] are changed according to the number. However, if the [Field description] has been changed, these values are retained. The value of [Link with IM] changes to “Not assigned”. Setting range : • K field number: 4- or 5-digit number • Character number: Up to 255 characters
Field description	Set the field name. This name is only displayed on the window, not output to a file. If [K Field] is changed, this name changes according to the number. However, in the case of an undefined number or when the user has changed the name (other than space), this name does not change. Setting range: up to 64 characters
Type	Select a field type. The [Length] changes according to the selected type. Note that if the defined number is set in [K Filed], the type cannot be changed. Setting range: I3 (Integer (1 Byte)), I5 (Integer (2 Byte)), I10 (Integer (4 Byte)), F (Float), D (Date/Time format), A (Alpha numerical), S (Special coding), W, M
Length	The limit on the number of characters is displayed for [K Filed] and [Type] each.
Link with IM	Select an item that is made corresponding to the K filed number. If an item other than [Not assigned] is selected, a value is displayed in [Value] or [Default].
Input allowed	With [Not assigned] selected for [Link with IM], if the check box is selected, a dialog box used for changing the value at each measurement is displayed.
Value/ Default	Set the output value. This item can be set only when the [Not assigned] is selected for [Link with IM]. For an item with the [Input allowed] check box selected, a dialog box used for changing the value at each measurement is displayed.
Sorting method	When outputting the measurement result, select a method from the drop-down list to sort. Setting range: Default, K field ascending order, Not sorted Default value: Default
<b>Reference</b>	For Q-DAS format, select [Default]. For other softwares, select if necessary.

Item	Description
Writing modes	Select the format of the file to be saved. Default: DFD/DFX-Structure with fixed file name
DFQ-Structure	Save a file in the DFQ format.
DFD/DFX-Structure with fixed file name	Save a file in the DFD/DFX format.
DFD/DFX-Structure with file name as a counter	Save a file in the DFD/DFX format with a counter. Specify the number of digits of the counter (serial number). Setting range: 3 to 9 Default: 4
One file per measurement	Select this check box to create a file for each measurement. A sequential number will be appended to the file name.
Date format	Select a date display format. Default: Items in the dropdown list
Dropdown list	Select an item from the dropdown list.
OS standard	Use the setting ("short format") of the OS.  <b>This format is not included in the specification of Q-DAS.</b>
Decimal separator	Select a symbol to be used as the decimal point. Default: Period
Dropdown list	Selection range: period, comma
OS standard	Use the setting ("symbol for the decimal point") of the OS.
FolderPath	Specify the save destination of a file. Default: Default
Default	The Program data is output to the subfolder of the folder in which it has been saved.
User specified	Specify the save destination path. Click [...] to select a folder from the displayed dialog box.
[Macro]	Click this button to display the dialog box to specify the folder path as a macro.  "Specifying the folder path and file name as a macro" (page 10-42)
File name	Set a name for the file to save. Default: Equipment Identification Name For more information about the equipment identification name, refer to  "Equipment Identification Name" (page 12-21).
Add the equipment identification name to the file name.	Select the check box to add the equipment identification name as the suffix of the file name.
[Macro]	Click this button to display the dialog box to specify the file name as a macro.  "Specifying the folder path and file name as a macro" (page 10-42)

### 3 Click [OK].

The settings are saved in the Program data.

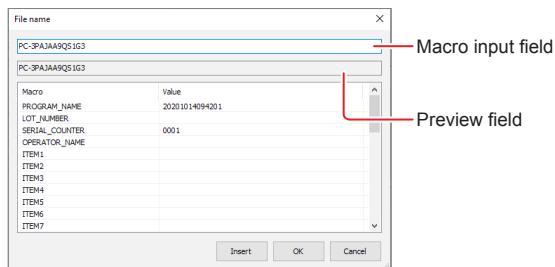


- Depending on the language used for display, the character code used for the output data in the Q-DAS format differs.
- For the units for angle display, decimal degrees are always used.
- The following items are output according to the setting saved in the Program data.
  - Number of Decimals
  - Displayed number of decimals of the measurement value, design value, tolerance, and upper or lower limit standard value
  - Resolution

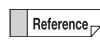
## ● Specifying the folder path and file name as a macro

### 1 On the [Q-DAS Setting] window, click [Macro] under the folder path or file name.

The dialog box to specify the folder path or file name as a macro appears.



Item	Description
Macro input field	Input the macro string to specify the folder path or file name.
Preview field	The folder path or file name determined by the input macro is displayed as a preview.
Macro	Displays a list of macro items. The [Value] field is blank for macro items that are not set.
PROGRAM_NAME	Program name (no extension)
LOT_NUMBER	Lot No. (added information)
SERIAL_COUNTER	Serial counter (added information)
OPERATOR_NAME	Operator's name (added information)
ITEM1	Individual item 1 (added information)
ITEM2	Individual item 2 (added information)
...	(Omitted)
ITEM20	Individual item 20 (added information)
EQUIPMENT_IDENTIFICATION	Computer name
DATE	Date (in accordance with [Date format])
TIME	Time (in accordance with [Date format])
DATE_TIME	Date and time (in accordance with [Date format])
YYYY	Year
MM	Month
DD	Day
HH	Hour
mm	Minute
SS	Seconds
TIME_ZONE	Time Zone
K****/**	K field value (specified with "/")
K****	K field value
[Insert]	Click this button to insert the string for the selected macro item into the macro input field.



For details about the added information, refer to ["Added information" \(page 10-32\)](#).

### 2 Specify a folder path or file name with a macro.



- The macro item inserted into the macro input field is shown in the format of "\$(macro item)".
- You can also double-click a macro item to insert the string into the macro input field.
- You can also enter a macro into the macro input field by using the keyboard.

### 3 Click [OK].

The settings are saved in the Q-DAS settings.

## Delete History

### Delete All

Delete all history from the list in the Program data specification area.  
Program data will not be deleted.  
Click [Yes] in the confirmation message box that appears.

### Delete Selection

Delete the history for the specified Program data from the list in the Program data specification area. Program data will not be deleted.  
Click [Yes] in the confirmation message box that appears.

## Do not perform the “Edge extraction parameter automatic adjustment”

Toggle ON/OFF of the edge extraction parameter automatic adjustment at the time of elements creation.  
When the check box on the left side of menu item is selected, the edge extraction parameter automatic adjustment will be disabled.

 **Point** With the automatic adjustment of the edge extraction parameter disabled, it takes less to extract edges when creating elements. This does not affect the measurement time when executing measurement. When using the top light, it is recommended to perform the edge extraction parameter automatic adjustment.

## Inspect sink marks and flash

Toggle ON/OFF of the sink marks inspection function will be during edge extraction.  
When the check box on the left side of menu item is selected, the inspection of sink marks and flash will be enabled.

## Display “background image capture screen”

Set whether to display the [Capture Background Image] window when creating new data.  
When the check box on the left side of menu item is selected, the [Capture Background Image] window will appear when a new Program is created.

## Confirmation before the measurement result output

Toggle ON/OFF to select whether to confirm before the measurement result is automatically saved when measuring in the Run mode.  
When the check box on the left side of the menu item is selected, the measurement result will be confirmed before being saved.

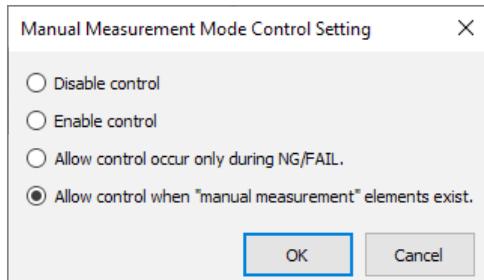
 Reference For details, refer to □□ “Confirmation Before the Measurement Result Output” (page 6-11).

## Display positioning guide

You can toggle between showing and hiding the positioning guide during Run mode.  
When the check box on the left side of menu item is selected, the positioning guide will be displayed.

## Manual Measurement Mode Control Setting

- 1 Select [Menu] → [Settings] → [Others] → [Manual Measurement Mode Control Setting].
- 2 Select a setting related to the transition to manual measurement mode.



Name	Function
Disable control	The system cannot change to manual measurement.
Enable control	You can perform manual measurement even if no manual measurement elements are contained in the Program data.
Allow control occur only during NG/FAIL.	You can perform manual measurement if NG/FAIL occurs.
Allow control when “manual measurement” elements exist.	The system will change to manual measurement if manual measurement elements are contained in the Program data.

- 3 Click [OK].

## 1 field of view measurement

Release the XY stage if it is fixed during measurement.

 **Point** You cannot set 1 field of view measurement from the menu.  
Enable this option by selecting [ON] on the [Capture Background Image] window when creating new data.

# Edit

## Undo

Cancel the last operation and reset to the previous status.

 You can also click  on the toolbar to undo the last operation.

## Redo

Cancel the "Undo" operation and repeat the undone operation.

 You can also click  on the toolbar to redo the last operation.

## Copy

Copy the selected element on the preview display.

## Paste

Paste the copied element.

## Delete

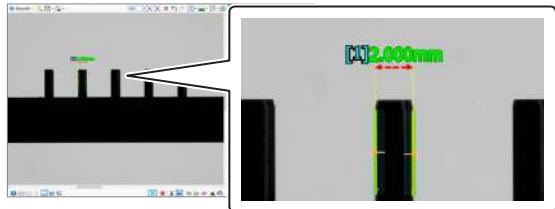
Delete the selected element on the preview display.

 You can also click  on the toolbar to delete the selected element.

## Based Copy

Specify a base point for the element or measurement result selected in the preview display and copy and move it based on the base point in the X axis/Y axis direction.

- 1 Select an element on the preview screen, such as the measurement result or edge detection line.

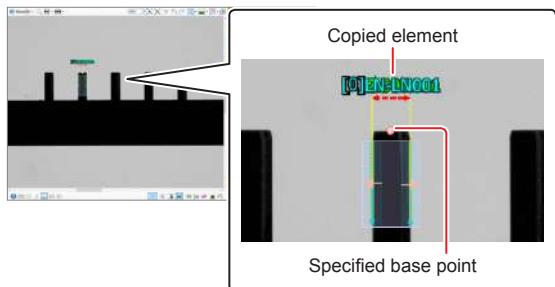


 By dragging on the preview display, you can select multiple elements within the rectangle at once.

- 2 Select [Menu] → [Edit] → [Based Copy].

- 3 Click a point on the preview screen, where you can easily recognize as a reference, to specify a base point.

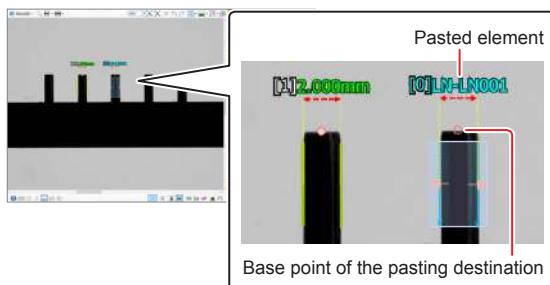
The specified base point is displayed and the element is copied.



 The existing point can be specified as a base point.

#### 4 Click on the position to be the base point of the pasting destination and click [Apply].

The element copied in Step 3 is pasted to the specified position.



**[Reference]**

- The element copied in Step 3 can be moved by dragging with the mouse.
- By clicking [Next], you can sequentially paste the element at regular intervals.
- You can specify the distance from the base point (as the origin) to the pasting position with numerical XY coordinate values. If the base coordinates have not been set, the horizontal direction of the screen is set as the X axis.
- By selecting [Turn Copy], you can switch to "Turn copy" based on the specified base point.

#### 5 Click [OK].

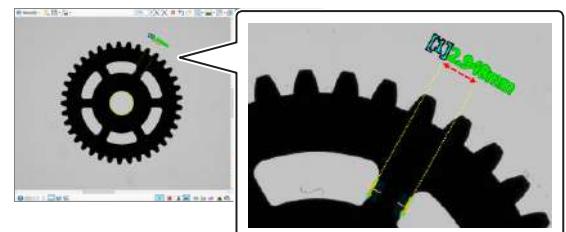
#### 6 Edit the element and determine the measurement details.

For details about the procedure to edit elements, refer to □ "Edit Selected Element" (page 10-46).

### Turn Copy

Specify a base point for the element or measurement result selected in the preview display and copy and rotate it about the base point.

#### 1 Select an element on the preview screen, such as the measurement result or edge detection line.



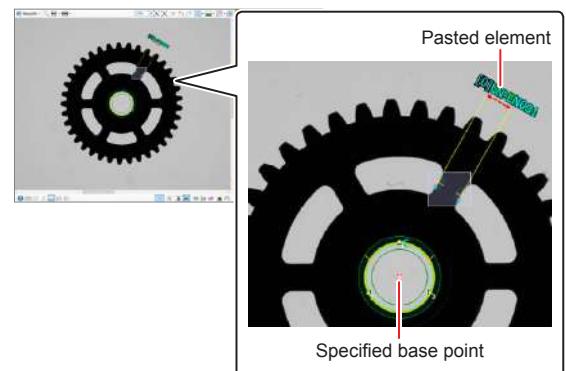
**[Reference]**

By dragging on the preview display, you can select multiple elements within the rectangle at once.

#### 2 Select [Menu] → [Edit] → [Turn Copy].

#### 3 Click the center point of the rotation in the preview screen to specify the base point.

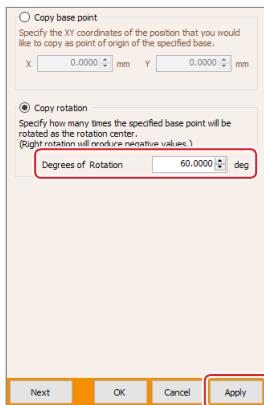
The specified base point is displayed and the element is copied.



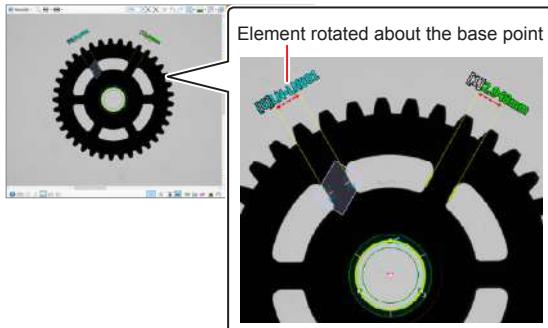
**[Reference]**

The existing point can be specified as a base point.

**4 Enter the angle of rotation around the base point and click [Apply].**



The element copied in Step 3 is rotated the specified degrees.



- The element copied in Step 3 can be rotated by dragging with the mouse.
- By clicking [Next], you can sequentially paste the element at regular intervals.
- By selecting [Based Copy], you can switch to "Base Copy" based on the specified base point.
- "Based Copy" (page 10-44)

**5 Click [OK].**

**6 Edit the element and determine the measurement details.**

**Select All**

Select all of the elements on the preview display.

**Select**

Select the element on the preview display from the list.

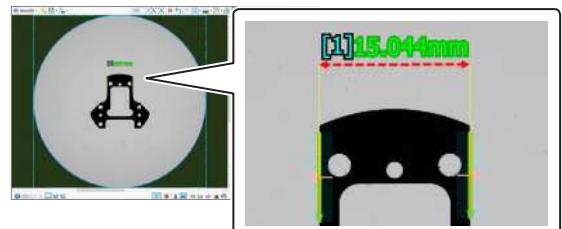


You can also select an element by directly clicking it on the preview display.

**Edit Selected Element**

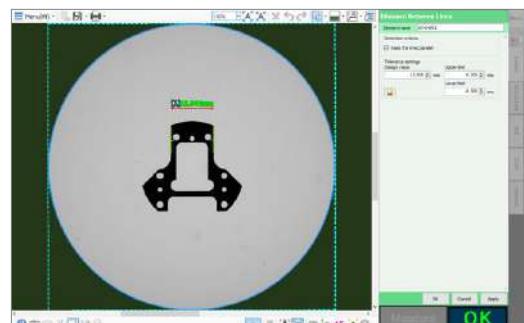
Change the setting of the element selected on the preview display, such as the measurement result or edge detection line.

**1 Select an element on the preview screen, such as the measurement result or edge detection line.**



**2 Select [Menu] → [Edit] → [Edit Selected Element].**

The edit window for the selected element is displayed.

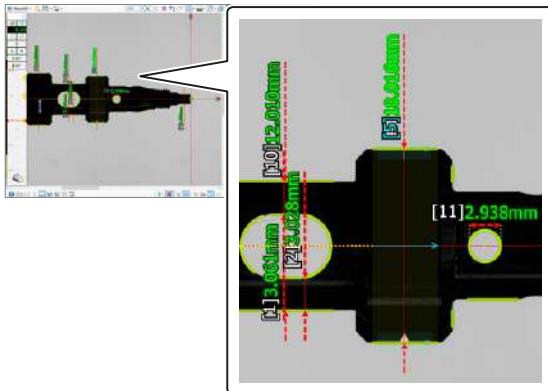


- You can also edit an element by directly double-clicking it on the preview screen.
- For details about the edit window, refer to □ "Measurement Items" (page 4-18).

## Change the reference element

Change the reference element for the element referenced by other elements, such as the selected measurement result on the preview screen or the virtual tool.

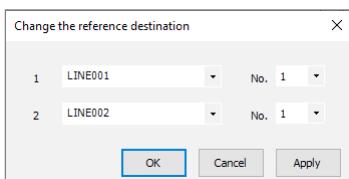
- Select an element such as the measurement result on the preview screen or the virtual tool.



- Select [Menu] → [Edit] → [Change the reference element].

- Select the element to be referenced.

If the selected element can be divided into multiple elements, also select what number element it is.



- Click [Apply].

The element to be referenced will change.

- Click [OK].

## PositionAdjust

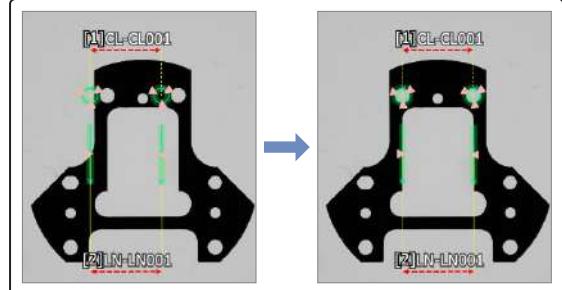
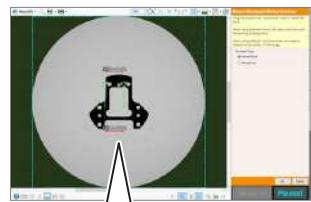
Manually or automatically align all the elements when target moves during programming or when you wish to edit settings by actually reflecting the target.

### Manual Move

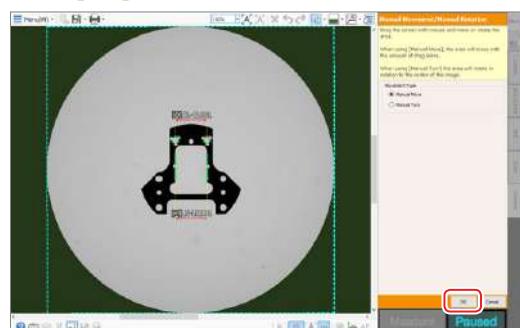
Drag the edge detection ranges of all the elements with the mouse to move them to an arbitrary direction.

- Select [Menu] → [Edit] → [PositionAdjust] → [Manual Move].

- Position the element onto the target by dragging it in the preview screen.



- Click [OK].



- Edit the element and determine the measurement details.

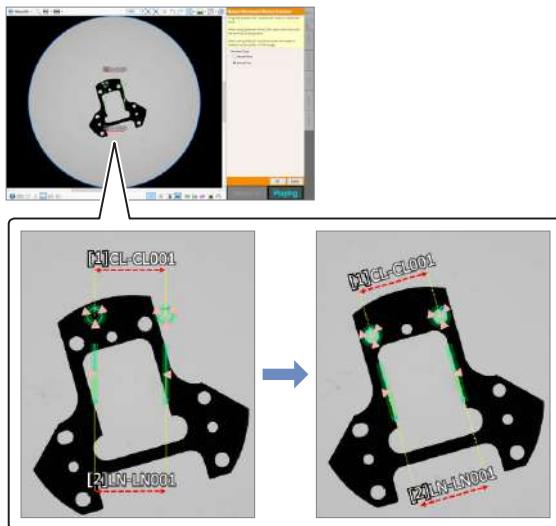
For details about the procedure to edit elements, refer to □ "Edit Selected Element" (page 10-46).

## ■ Manual Turn

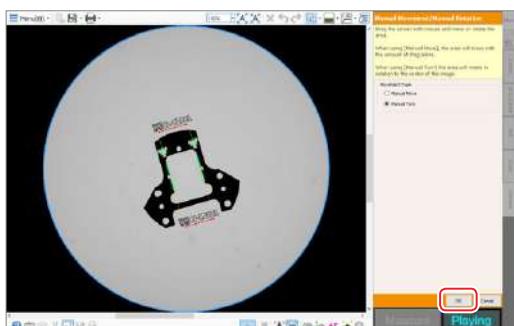
Rotate the edge detection ranges of all the elements about the base point.

**1** Select [Menu] → [Edit] → [PositionAdjust] → [Manual Turn].

**2** Position the element onto the target by dragging it in the preview screen.



**3** Click [OK].



**4** Edit the element and determine the measurement details.

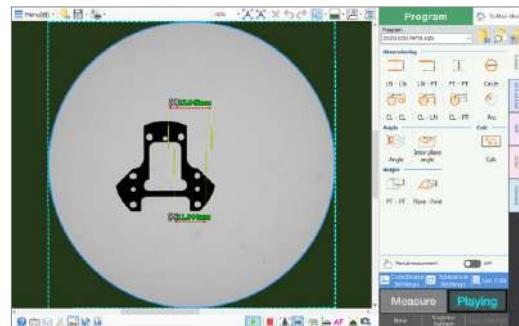
For details about the procedure to edit elements, refer to □ "Edit Selected Element" (page 10-46).

## ■ Execute Pattern Search

Use the "pattern image" registered in the Program data to conduct the pattern search for the target shown in the preview screen.

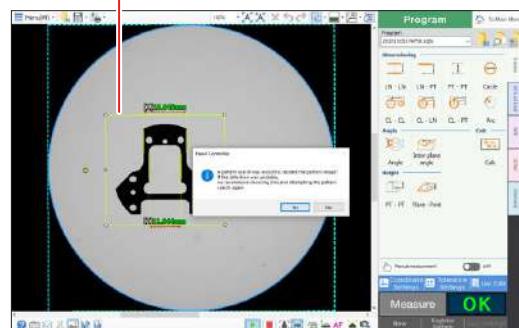
**Important** The [Execute Pattern Search] command can be selected only when [Enable Pattern Search] has been selected.

**1** Select [Menu] → [Edit] → [PositionAdjust] → [Execute Pattern Search].



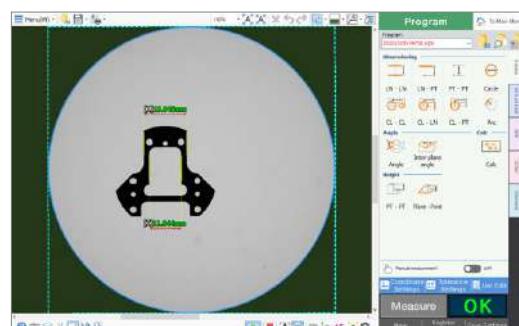
When the pattern search is successful, a message box to confirm the update appears.

Pattern search range



**2** Click [Yes].

The measurement element is overlapped on the target in the preview display in accordance with the result of the pattern search.



## ■ Overlapping CAD data

Loads the Program data based on the base coordinates being set, and displays the overlapping CAD data.

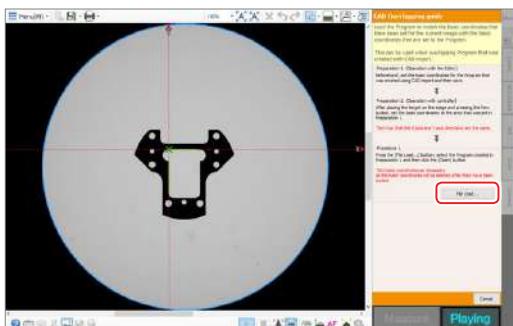


To perform the overlapping CAD data, the following needs be prepared.

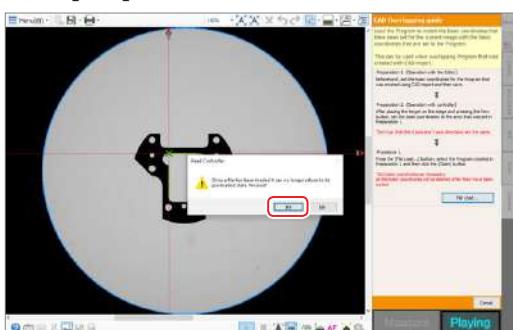
1. Create the Program data with CAD Import using IM Setting Editor. Set the base coordinates for the Program data. Save the Program data and import it to the IM-8000.
2. Place the target to be measured on the stage glass, and set the base coordinates on the place where the base coordinates of the Program data in step 1 is set.

**1 Select [Menu] → [Edit] → [PositionAdjust] → [Overlapping CAD data].**

**2 Click [File Load].**



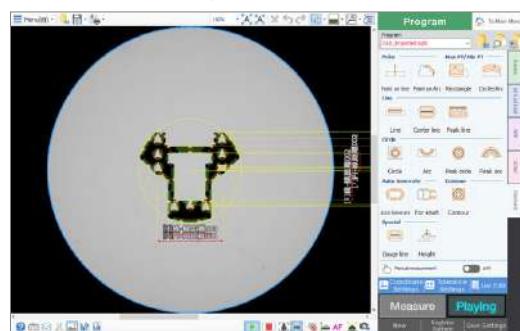
**3 Click [Yes].**



**4 Select the file you want to load and click [Open].**



The Program data and CAD data will be displayed as overlapping on the measurement target.



If overlapping CAD data is executed, the base coordinates and pattern image set in IM Measurement Setting Editor will be removed. Set the items as necessary.

## ■ Overlapping guide

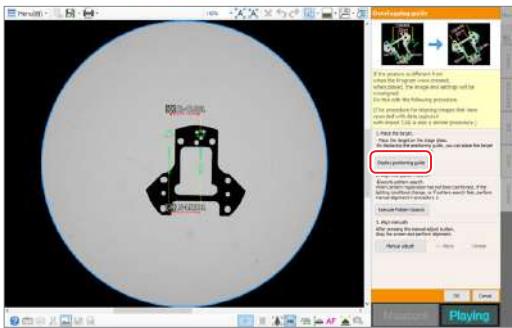
Display the overlapping guide and position the measurement element onto the target in the preview display.

### ● Positioning using pattern search

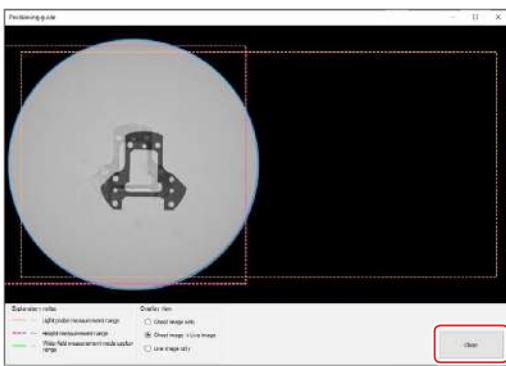
**Important** The [Execute Pattern Search] command can be selected only when [Enable Pattern Search] has been selected.

**1 Select [Menu] → [Edit] → [PositionAdjust] → [Overlapping guide].**

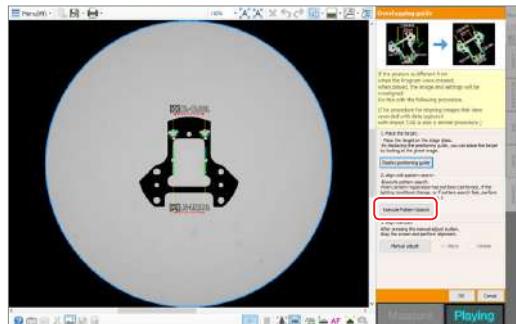
**2 To check the position while placing the target, click [Display the positioning guide]. If not change, proceed to step 4.**



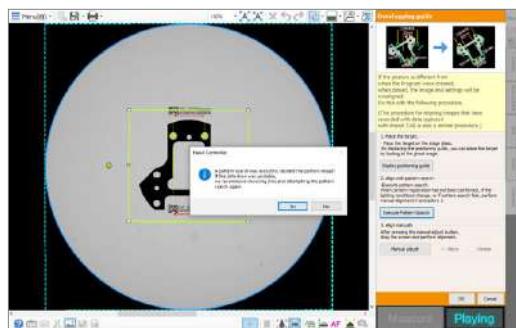
**3 Move the target to the appropriate position while looking at the preview image.**



**4 Click [Execute Pattern Search].**

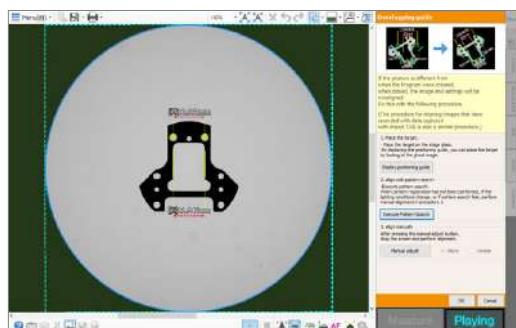


When the pattern search is successful, a message box to confirm the update appears.



**5 Click [Yes].**

The measurement element is overlapped on the target in the preview display in accordance with the result of the pattern search.



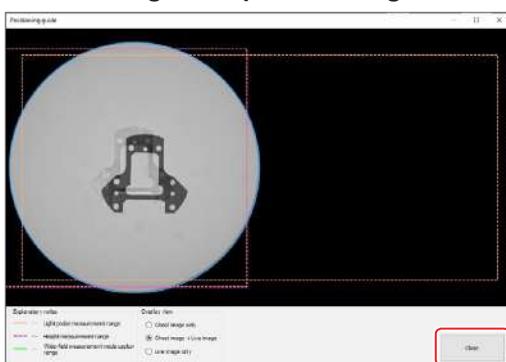
**6 Click [OK].**

## ● Positioning manually

- 1** Select [Menu] → [Edit] → [PositionAdjust] → [Overlapping guide].
- 2** If you place the target while checking the position, click [Display positioning guide]. If not change, proceed to step 4.



- 3** Move the target to the appropriate position while looking at the preview image.



- 4** Click [Manual adjust].

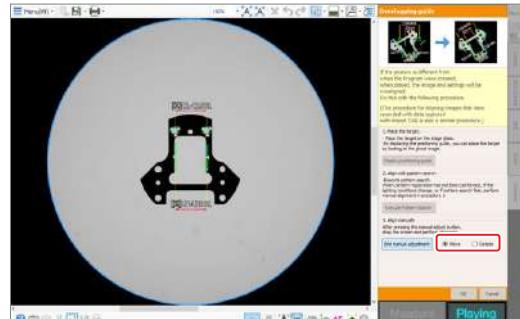


- 5** After selecting [Move] or [Rotate], drag the measurement element to position it onto the target.

### Reference

For details about how to perform the operation, refer to the following:

- "Manual Move" (page 10-47)
- "Manual Turn" (page 10-48)



- 6** Once you finish positioning the measurement element, click [End manual adjustment].



- 7** Click [OK].

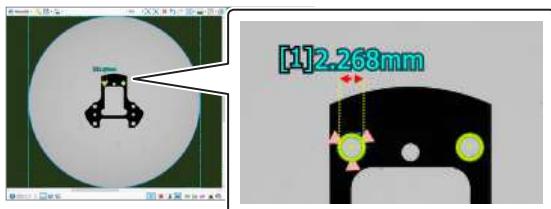
- 8** According to the message, you can either exit after running the pattern search or register a pattern image after exiting.

## Enlarge/Shrink/Mirror

### ■ Enlarge/Shrink

Enlarge/shrink the edge detection range of the selected element.

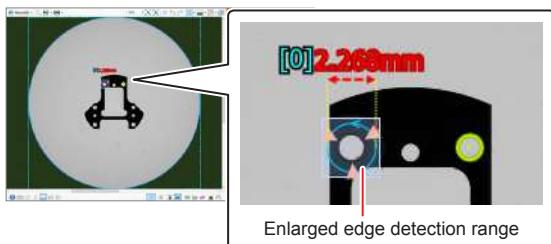
- 1 Select an element on the preview screen, such as the measurement result or edge detection line.



- 2 Select [Menu] → [Edit] → [Enlarge/Shrink/Mirror] → [Enlarge/Shrink].
- 3 Enter the enlarge/shrink rate and click [Apply].



The edge detection range of the element specified in Step 1 is enlarged/reduced in accordance with the specified enlarge/shrink rate.



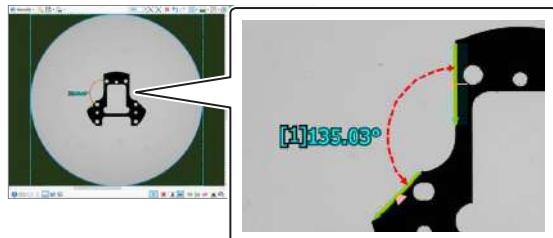
- 4 Edit the element and determine the measurement details.

For details about the procedure to edit elements, refer to □ "Edit Selected Element" (page 10-46).

### ■ Horizontal Mirroring

Copy the horizontal flip of the selected measurement element.

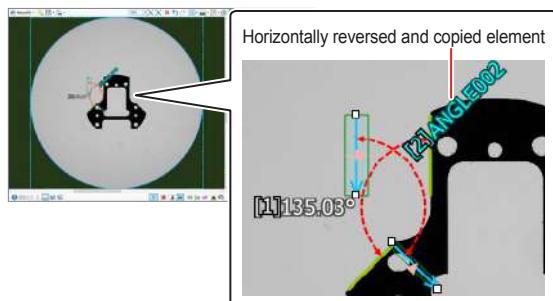
- 1 Select an element on the preview screen, such as the measurement result or edge detection line.



By dragging on the preview display, you can select multiple elements within the rectangle at once.

- 2 Select [Menu] → [Edit] → [Enlarge/Shrink/Mirror] → [Horizontal Mirroring].

The horizontal flip of the selected measurement element is copied.



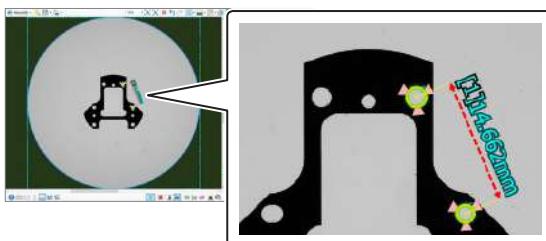
- 3 Move the element to another position, edit the element and determine the measurement details.

For details about the procedure to edit elements, refer to □ "Edit Selected Element" (page 10-46).

## ■ Vertical Mirroring

Copy the vertical flip of the selected measurement element.

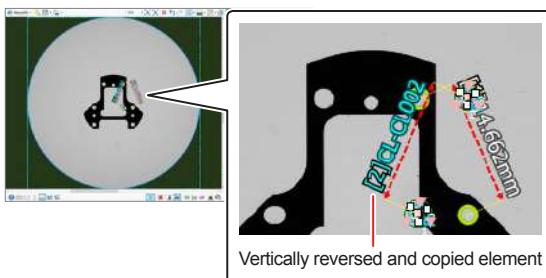
- 1 Select an element on the preview screen, such as the measurement result or edge detection line.



Reference By dragging on the preview display, you can select multiple elements within the rectangle at once.

- 2 Select [Menu] → [Edit] → [Enlarge/Shrink/Mirror] → [Vertical Mirroring].

The horizontal flip of the selected measurement element is copied.



- 3 Move the element to another position, edit the element and determine the measurement details.

For details about the procedure to edit elements, refer to □ "Edit Selected Element" (page 10-46).

## Measurement Diagnosis

If the intended measurement results cannot be consistently obtained, you can gather measurement data in order to identify the reason. Based on the results, adjust element measurement settings to get stable results regardless of the measurement conditions.

### ■ Start Diagnosis

Detect the variations in the measurement results in measurement diagnosis mode. Once you have gathered the required amount of measurement data, proceed to "Display Diagnosis Result".

□ Point

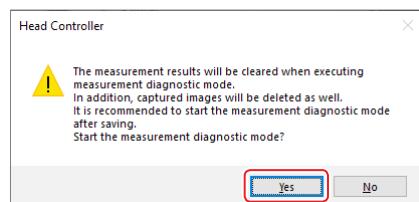
- Register the pattern image before starting diagnosis.
- If you perform diagnosis, measurement results and captured images will be deleted. If necessary, save Program data before starting diagnosis.

- 1 Display the Program data for the diagnosis target, and then select [Menu] → [Edit] → [Measurement Diagnosis] → [Start diagnosis].

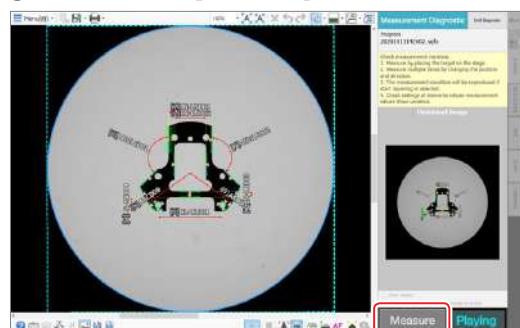
□ Reference

You can also start diagnosis by clicking [Start diagnosis] on the bottom of the toolbar if the icon is displayed on the toolbar.  
□ "Display Toolbar" (page 10-56)

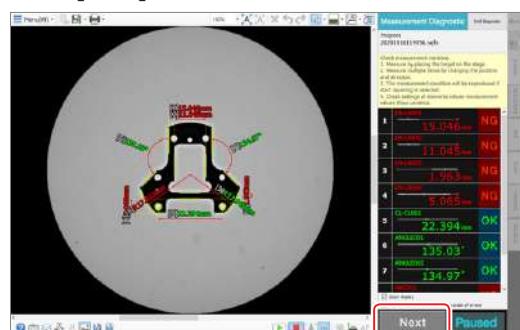
- 2 Click [Yes].



- 3 Place the measurement target on the stage glass and click [Measure].

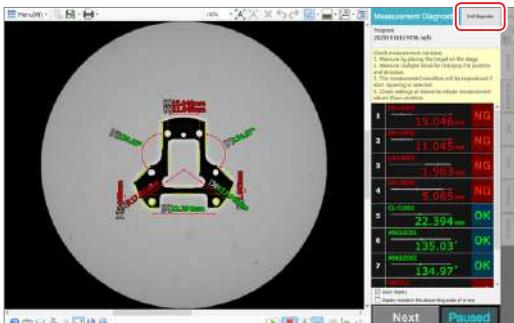


- 4 Click [Next].

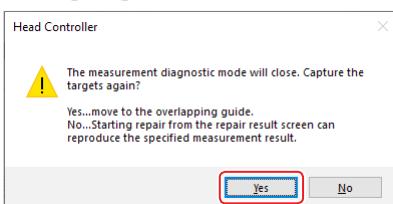


**5** Repeat steps 3 and 4 changing the position and angle of the target.

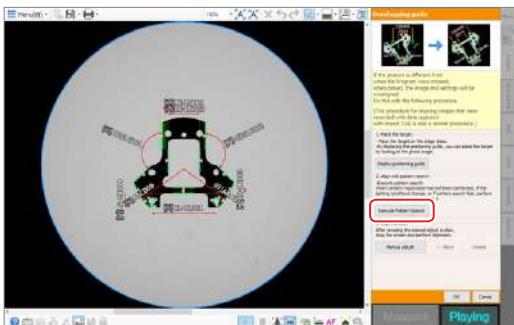
**6** Click [End diagnosis].



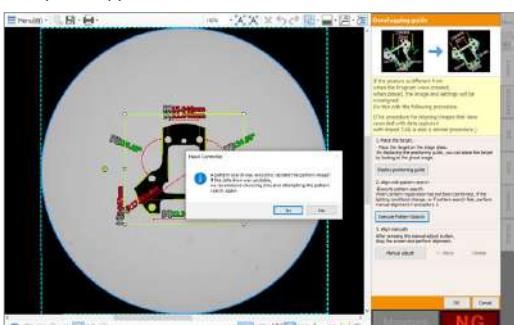
**7** Click [Yes].



**8** Click [Execute Pattern Search].

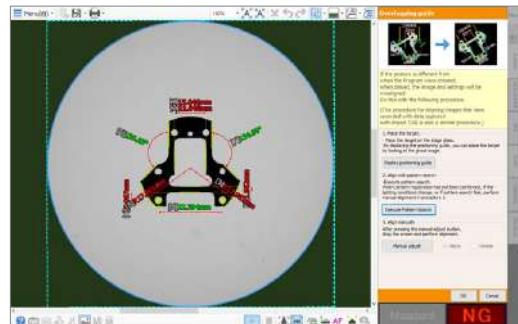


When the pattern search is successful, a message box to confirm the update appears.



**9** Click [Yes].

The measurement element is overlapped on the target in the preview display in accordance with the result of the pattern search.



**10** Click [OK].

## ■ Display Diagnosis Result

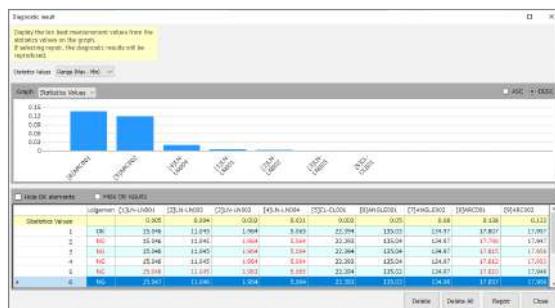
Display the diagnosis result measured in "Start diagnosis" with measurement diagnosis mode.

- Select [Menu] → [Edit] → [Measurement diagnosis] → [Display diagnosis result].

The [Diagnosis result] dialog box appears.

### ● Diagnosis result screen

Compare the "Length" in the measurement data gathered in measurement diagnosis mode to identify the reason for the inconsistent results.  
The distribution of the measurement data is displayed on the graph and in the measurement values field based on specified statistics values. The size of the [Diagnosis result] dialog box can be enlarged or reduced as necessary.



### ● Statistics values

Select a variance index from the list.

### ● Graph area

Displays the index values selected in "Statistics Values" up to the 10 largest measurement values as a graph.

#### ○ Graph

Select a type of graph from the following options:

- Statistics values  
Displays a bar graph.
- Variances  
Displays a variances graph.

#### ○ ASC/DESC

Select a graph sort method.

### ● Measurement value area

Displays the measurement values in a list.

Displays element measurement data that caused the evaluation result to be a failure in red.

#### ○ Hide OK elements

Selecting this check box displays only measurement items for which the evaluation was a fail.

#### ○ Hide OK results

Selecting this check box displays only rows for which the evaluation was a fail.

### ● [Delete]

Delete the measurement data selected in the measurement values area.

### ● [Delete All]

Delete all measurement data.

### ● [Repair]

Displays the positioning guide that shows the position when measurement data selected in the measurement values area is measured.

### ● [Close]

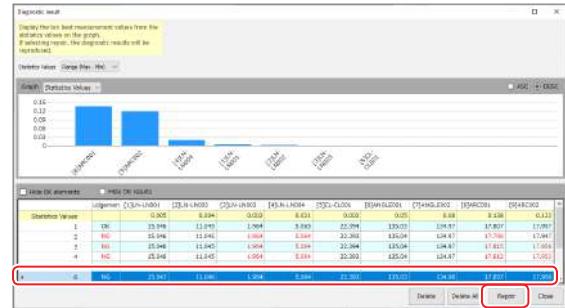
Closes the [Diagnosis result] dialog box.

#### ○ Reference

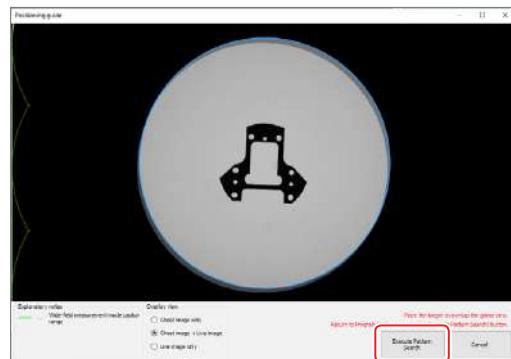
- Clicking [Display diagnosis result] on the bottom of the toolbar also displays the [Diagnosis result] dialog box.
- The size of the [Diagnosis result] dialog box can be changed as necessary.

## ● Repair

- Select the measurement value that you want to correct and click [Repair].

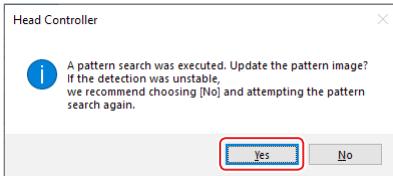


- Overlap the target on the ghost image and click [Execute Pattern Search].

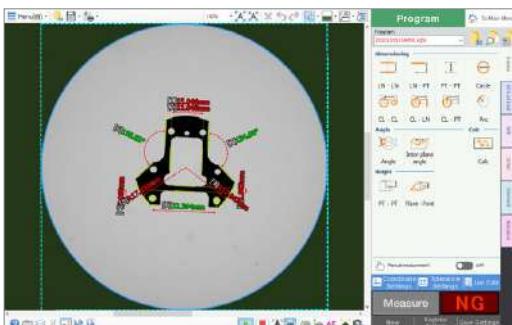


When the pattern search completes, the [Positioning guide] and a dialog to confirm update of the pattern image appears.

### 3 Click [Yes].



The [Program] window appears.



### 4 Adjust the applicable element parameters so they can be measured correctly.

### ■ Display Toolbar

Set whether to display the [Start Diagnosis] and [Display Diagnosis Result] icons on the bottom of the toolbar.

#### 1 Select [Menu] → [Edit] → [Measurement diagnosis] → [Show the tool bar].

When the check box on the left side of menu item is selected, the applicable icon will be displayed.

# View

## Display magnification

### ■ Entire fit display

The entire field of view set in [Capture range setting] is displayed.

### ■ Live fit display

When multiple fields are selected, playback is displayed in full screen mode.

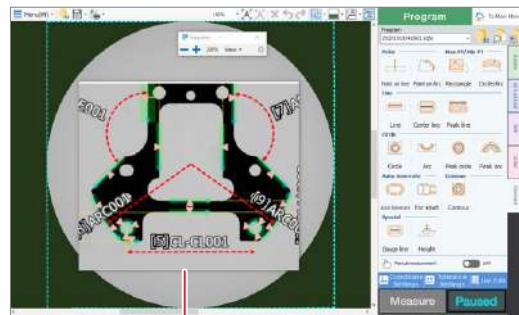
### ■ Zoom

Show the preview screen at the magnification selected from the list.

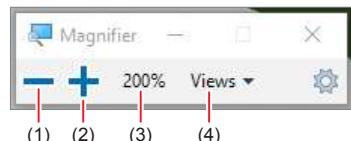
## Magnifying glass

Magnify the area around the mouse cursor.

A magnifying glass that is enlarged around the mouse cursor will be displayed.



Magnified display area



Number	Description
(1)	Click to lower the zoom ratio.
(2)	Click to raise the zoom ratio.
(3)	The current zoom ratio is displayed.
(4)	Select a display mode for magnifying glass from the dropdown list. <ul style="list-style-type: none"> <li>• Full screen The zoom display frame becomes full screen.</li> <li>• Lens A magnified display frame appears around the mouse cursor.</li> <li>• Docked The zoom display frame is displayed in a fixed position. Drag the display position to change it.</li> </ul>

Reference

- You can also activate the magnifying glass by clicking on the toolbar.
- The magnified display frame follows the mouse cursor movement.
- The Program can be adjusted as usual while the magnifying glass is in use.
- To cancel the magnifying glass function, select [Menu] → [View] → [Magnifying glass] again or click on the toolbar.

## On-Screen keyboard

An On-Screen keyboard will appear for inputting characters on the screen.

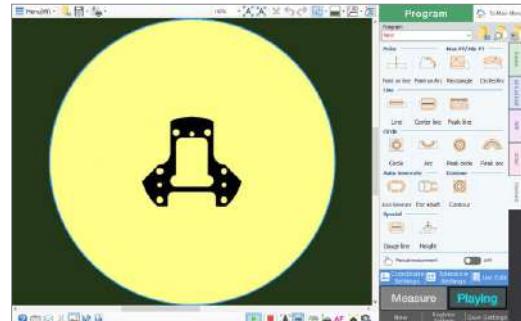
## Show Saturated Pixels

When a long exposure time is set, the camera may saturate. When this option is selected, the saturated area is shown in yellow on the preview screen. You can turn this function on and off.

When the check box on the left side of menu item is selected, the saturated pixels will be displayed.

- Important If the area near the target edge saturates, the measurement accuracy may degrade.  
In such a case, adjust the exposure to avoid saturation.  
 “Light Settings” (page 4-200)

Reference The saturated pixels display has been selected by default.

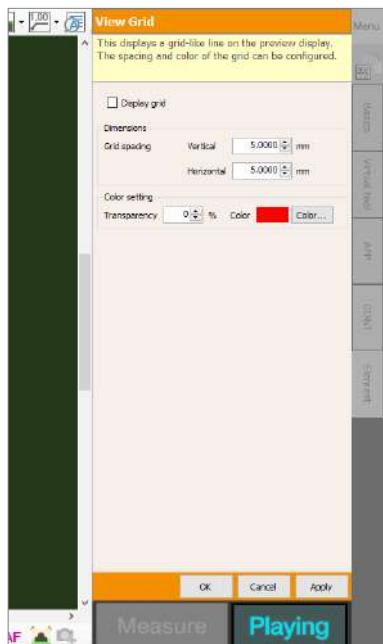


## View Grid

Display a grid on the preview display.  
When the check box on the left side of menu item is selected, the grid will be displayed.

**1** Select [Menu] → [View] → [View Grid].

**2** Set the items related to the grid display.



**3 Click [OK].**

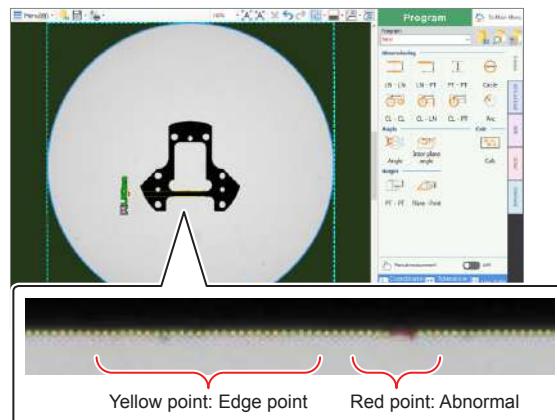
The grid settings are displayed in the preview display.

Item	Description
Display grid	Selecting the check box displays the grid on the preview screen. Clearing the check box hides the grid.
Dimensions	Set the size of the grid.
Grid spacing Vertical	Set Grid spacing in vertical direction.
Grid spacing Horizontal	Set Grid spacing in horizontal direction.
Color setting	Set the display color for the grid.
Transparency	Set the transparency of the grid. The display color currently set for the grid is displayed.
Color	The current setting for display color of the grid is displayed.
[Color]	Set the display color for the grid. Click this button to open the [Color] dialog box to choose a color.
[Apply]	Click the [Apply] to apply the current settings to the preview display.

## Switch Edge Point Trail Display

### ■ Show Edge Point Trail

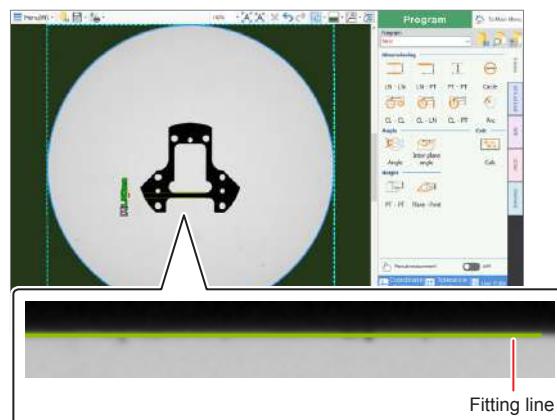
Detected edge points are displayed.



**[Reference]** You can also show the edge point trail by clicking the icon from [Switch Edge Point Trail Display] on the toolbar.

### ■ Show Fitting Lines

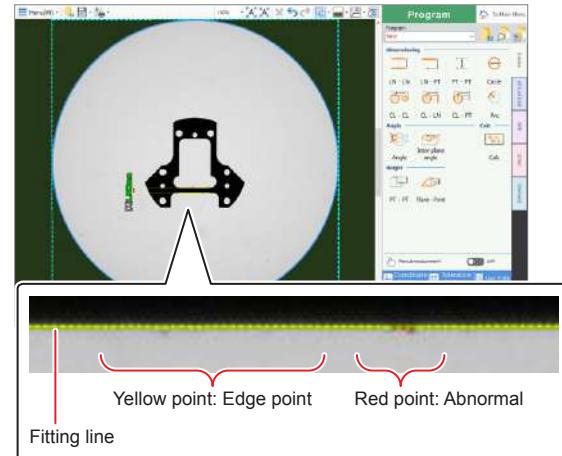
Detected fitting lines are displayed.



**[Reference]** You can also show the fitting lines by clicking the icon from [Switch Edge Point Trail Display] on the toolbar.

### ■ Show Fitting Line + Edge Point Trail

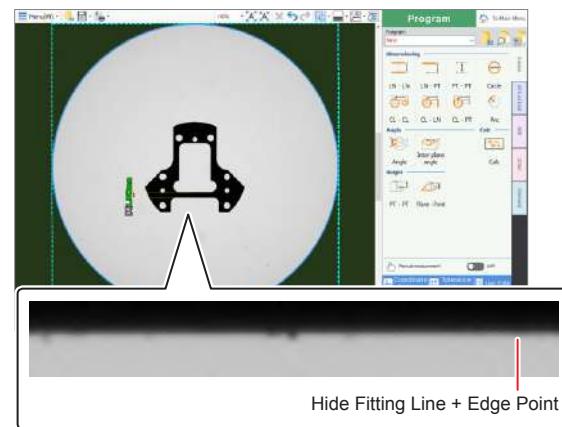
Display the detected edge points and fitting line.



**[Reference]** You can also show the fitting lines and edge point trail by clicking the icon from [Switch Edge Point Trail Display] on the toolbar.

### ■ Hide Fitting Line + Edge Point Trail

Hide the detected fitting line and edge points.

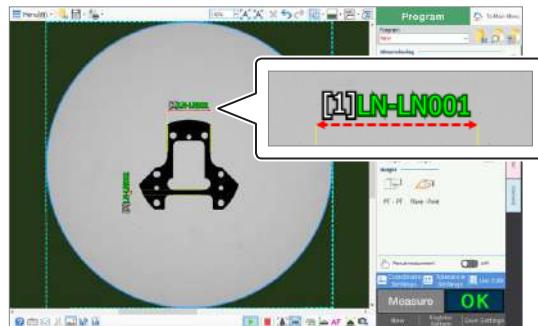


**[Reference]** You can also hide the fitting lines and edge point trail by clicking the icon from [Switch Edge Point Trail Display] on the toolbar.

## Switching result display

### Display Name

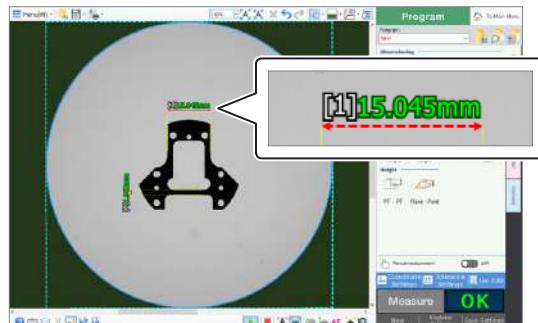
Display the measurement elements with their measurement item names.



**Reference** You can also display the elements with their measurement item names by clicking the icon from [Display Result] on the toolbar.

### Display Measurement Value

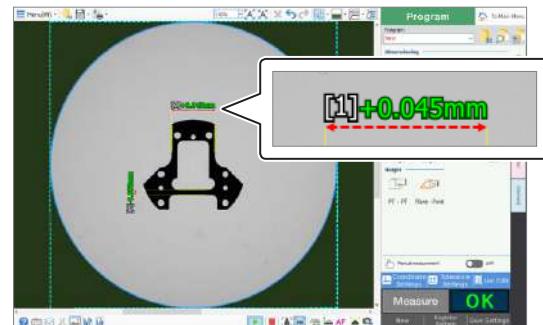
Display the measurement elements with the measurement value.



**Reference** You can also display the elements with the measurement value by clicking the icon from [Display Result] on the toolbar.

### Display Difference Value

Display the measurement elements with the difference value of design value and measurement value.

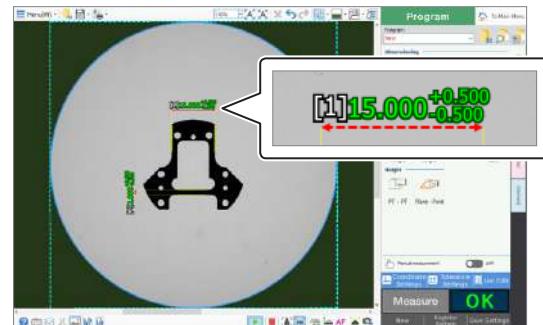


**Reference**

- You can also display the elements with their difference between design value and measurement value by clicking the icon from [Display Result] on the toolbar.
- For the measurement element with design value not being input, the measurement value is displayed.

### Display Design Value/Tolerance

Display the measurement elements with the design value and tolerance.



**Reference**

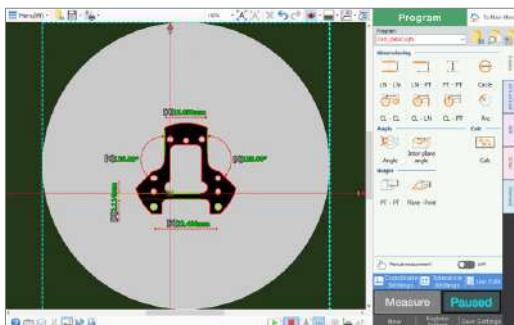
- You can also display the elements with their design value and tolerance by clicking the icon from [Display Result] on the toolbar.
- For measurement elements for which design values and tolerances have not been entered, measurement values are displayed.

## Switch element display

### Force Show All Elements

Show all the elements in the preview display.

The elements set to be hidden in the [Edit Element List] dialog are also displayed.

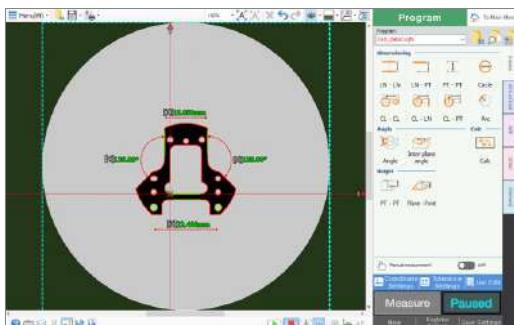


**Reference** You can also forcibly show all the elements by clicking the icon from [Switch element display] on the toolbar.

### Show All Elements

Show all the elements in the preview display.

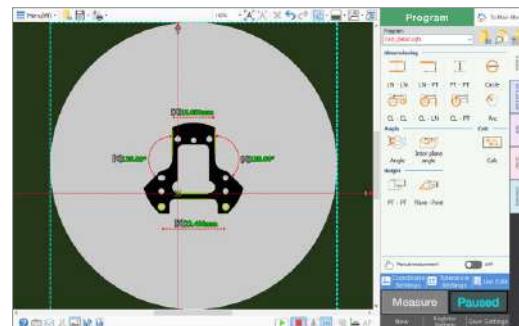
The elements set to be hidden in the [Edit Element List] dialog are not displayed.



**Reference** You can also show all the elements by clicking the icon from [Switch element display] on the toolbar.

### Show Elements Without CAD

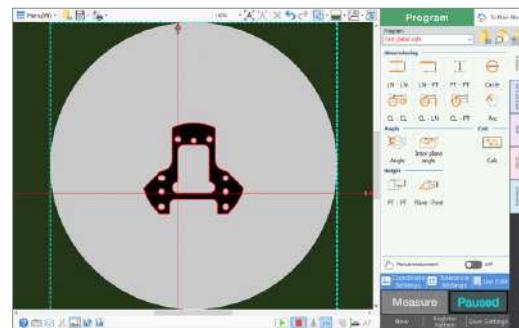
Show all the elements but CAD in the preview display.



**Reference** You can also show all the elements but CAD by clicking the icon from [Switch element display] on the toolbar.

### Show CAD Elements and Base Coordinates

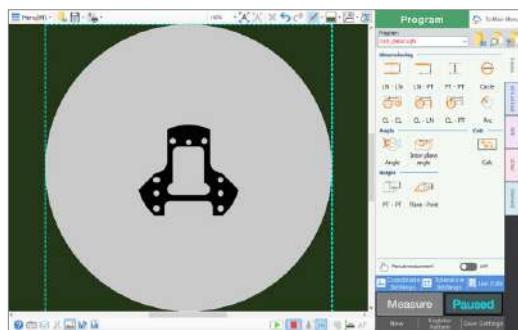
Show CAD elements and base coordinates in the preview display.



**Reference** You can also show CAD elements and base coordinates by clicking the icon from [Switch element display] on the toolbar.

## ■ Hide All Elements

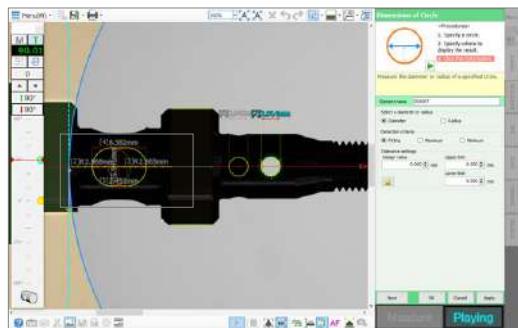
Hide all the elements in the preview display.



You can also hide all the elements by clicking the icon from [Switch element display] on the toolbar.

## ■ Show all angle elements

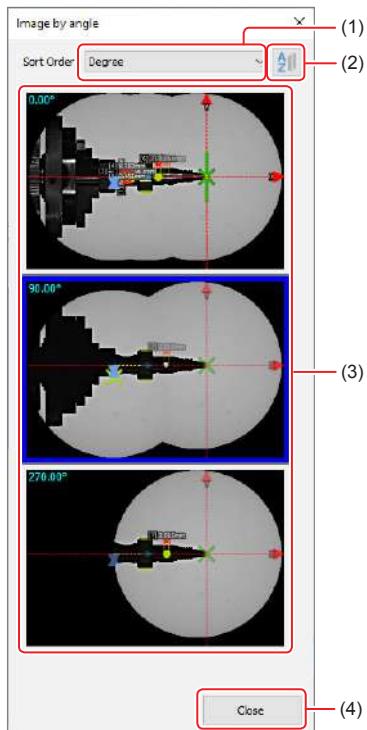
Display the created elements with all angles in the preview screen.



You can also show all element angles by clicking the icon from [Switch element display] on the toolbar.

## Show angle images (only when the IM-RU1 rotation unit is in use)

Display the created images by angle during rotation measurement.  
The [Images by Angle] dialog box for the image by angle appears.



Number	Description
(1)	Select the item that you want to sort from the list.
(2)	Click this button to sort the image display by selected item.
(3)	Displays the preview screen by angle.
(4)	Close the [Image by Angle] dialog box.

## Display Contour Lines

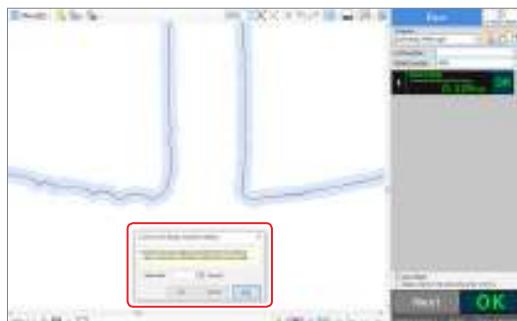
Display the contour lines based on the measurement results of [Profile].  
The distance between the contour line of the Program data and the contour line detected by measurement can be emphasized.  
When the check box on the left side of menu item is selected, the contour lines will be displayed.

### 1 Select [Menu] → [View] → [Display Contour Lines].

The contour lines appear. The [Contour line display emphasis setting] dialog box appears.



### 2 In the [Zoom ratio] in the [Contour line display emphasis setting] dialog box, enter zoom ratio of the contour line.

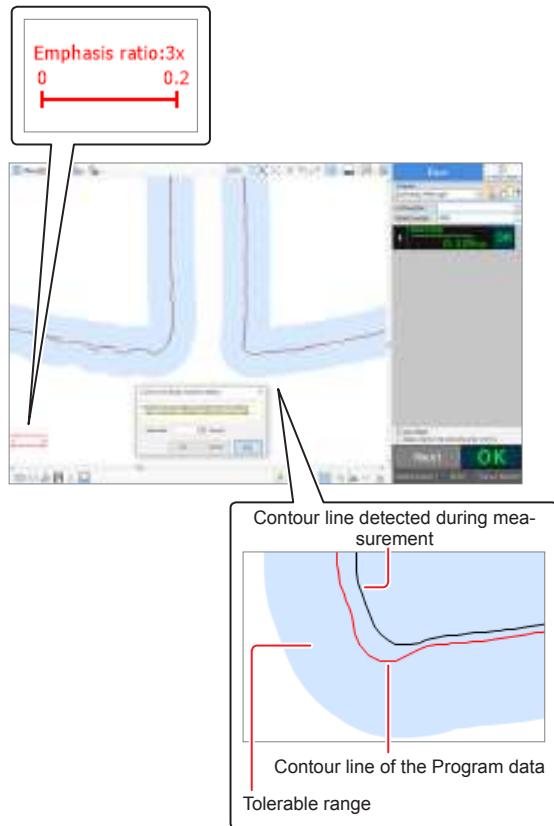


Reference An integer between 1 and 20 is available for the zoom ratio.

### 3 Click [Apply].

The distance between the contour line of the Program data and the contour line detected by measurement is displayed in at the entered ratio.

**[Reference]** When a number larger than 2 is entered in the [Zoom ratio], the emphasis ratio and the scale bar are displayed in the lower left of the preview window.

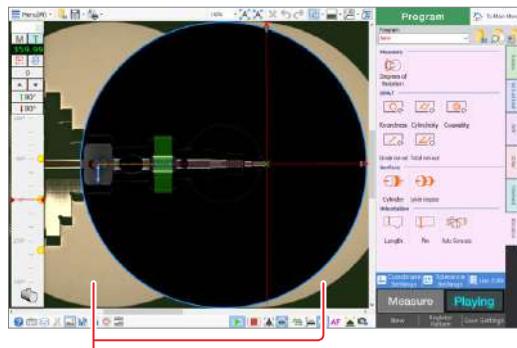


**Point** Clicking [OK] closes the [Contour line display emphasis setting] dialog box. To change the zoom ratio, hide the contour line display and then show it again.

### Display background image

Display the background image.

The background image is displayed when the icon on the left side of the menu item is highlighted.



Background images

**[Reference]** You can also display the background image by clicking on the toolbar.

### Simultaneous real-time display with field of view

Display a video preview of the wide view image on the background when displaying a video preview in high-precision measurement mode. The wide view real-time image will appear.

**[Reference]** You can also change the wide view real-time image by clicking on the toolbar.

### Display high resolution background image

Display only the area in the preview display range in real-time and high resolution when the magnification ratio of the background image is great.

# Illumination/Camera/Stage control

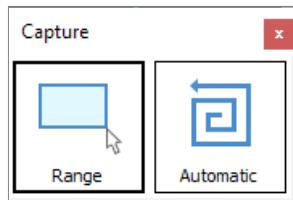
## Change illumination

Set the lighting type, intensity, and exposure.  
The [Light, exposure adjustment] screen appears.

 For details about how to configure the settings, refer to □ "Light Settings" (page 4-200).

## Capture

Displays the capture method.  
The [Capture] dialog box appears.



Clicking [Range] opens the [Range capture] dialog box.  
Clicking [Auto] captures the entire measurement target.

 For details about capture, refer to □ "Capture" (page 3-7).

## Wide-field measurement mode/High-precision measurement mode

Select whether to display the wide-field measurement image or the high-precision measurement image on the preview screen.  
The icon on the left side of the selected menu item will be highlighted.

Item	Description
Wide-field measurement mode	Displays the preview image at low magnification.
High-precision measurement mode	Displays the preview image at high magnification.

 You can toggle between wide-field measurement mode and high-precision measurement mode by clicking  and  respectively on the toolbar.

## Play

Toggle ON/OFF of [Playing] which refreshes the displayed contents of the preview display in real time.  
When the check box on the left side of menu item is selected, [Playing] starts.

-  • You can also start [Playing] by clicking  on the toolbar.  
• You can stop playing and change to [Paused] by clicking  on the toolbar.

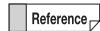
## XY control

Display the [XY-Control] dialog box.

-  • You can also display the [XY-Control] dialog box by clicking  on the toolbar.  
• For details about the [XY Control] dialog box, refer to □ "Adjusting Position of Electric XY Stage" (page 3-6).

## Z control

Display the [Z-Control] dialog box.



- You can also display the [Z-Control] dialog box by clicking  on the toolbar.
- For details about the [Z-Control] dialog box, refer to  "Adjusting the Height of the Electric Z Stage" (page 3-5).

## θ control (only when the IM-RU1 rotation unit is in use)

Display the [θ control] dialog box.



- Setting "Rotation unit" to [Use] on the [Capture Background Image] dialog box when creating new Program data, automatically displays the [θ control] dialog box.
- You can also display the [θ control] dialog box by clicking  on the toolbar.
- For details about the [θ control] dialog box, refer to  "Adjusting the Angle of the θ Stage (Only When the Rotation Unit IM-RU1 is Used)" (page 3-6).

## Layer Control

Display the [Layer Control] window.



- You can also display the [Layer Control] window by clicking  on the toolbar.
- For details about the [Layer Control] window, refer to  "Layer Control" (page 3-19).

## Clear captured image

Selecting the menu displays the confirmation dialog box.  
Clicking [OK] deletes all background images, stage camera images, and layer images.

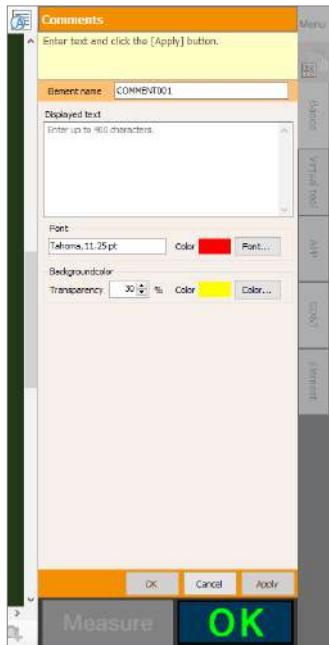
# Comments/Marker

## Comments

Write a comment in the preview display.

**1 Select [Menu] → [Comments/Marker] → [Comments].**

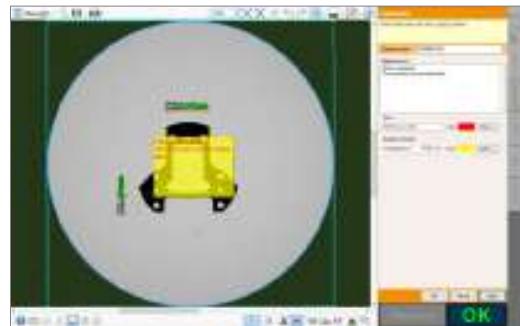
**2 Set the items related to the comment.**



Item	Description
Element Name	Edit the element name of the comment.
Displayed text	Click the input box and you can enter text. The number of characters that can be entered is shown below. Line feed characters are excluded. Setting range: within 400 characters
Font	Set a font for the comment.
(Font)	The current font setting (font type and size) is displayed. This font setting cannot be changed in this box.
Color	The font color currently being set is displayed.
[Font]	When the button is clicked, the [Font] dialog box where you can set the font appears.
Backgroundcolor	Set the background color for Comment.
Transparency	Set the background color transparency for Comment. A higher transparency setting makes the comment more transparent.
Color	The background color currently being set is displayed.
[Color]	Set the background color for Comment. Click this button to open the [Color] dialog box to set the color.

**3 Click [Apply].**

The entered text is displayed as a comment in the center of the preview display.



**4 Click the comment and change its position, size and angle.**

### ● Moving the comment display position

When the mouse cursor is placed on the comment, the cursor shape changes to . Drag the mouse to move the comment.

### ● Changing the comment display size

When the mouse cursor is placed on the comment frame, the cursor shape changes to or . Drag the mouse to change the size of the comment.

### ● Changing the comment display angle

When the mouse cursor is placed on the handle () above the comment, the cursor shape changes to . Drag the mouse to change the display angle of the comment.

**5 Click [OK].**

Comment is confirmed.

## Marker

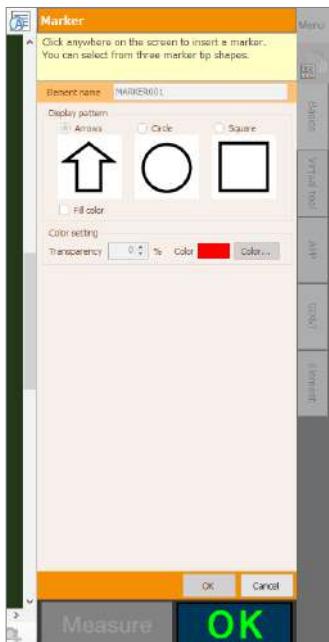
Write an arrow or other markers in the preview display.

- 1 Select [Menu] → [Comments/Marker] → [Marker].**
- 2 Click two points on the preview screen (the start and end points of the marker) to place the marker temporarily.**



The edit window is activated only after a marker is placed temporarily.  
Set the marker after the temporary placement.

- 3 Set the items related to the marker.**



- 4 Change the position, size, and angle of the marker.**

### ● Moving the marker display position

When the mouse cursor is placed on the marker, the cursor shape changes to . Drag the mouse to move the marker.

### ● Changing the marker display size

When the mouse cursor is placed on the marker frame or four corners, the cursor shape changes to or . Drag the mouse to change the size of the marker.

### ● Changing the marker display angle

When the mouse cursor is placed on the handle (green dot) above the marker, the cursor shape changes to . Drag the mouse to change the display angle of the marker.

- 5 Click [OK].**

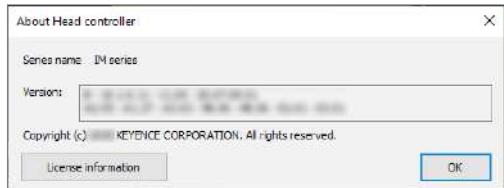
Marker is confirmed.

Item	Description
Element Name	Edit the element name of the marker.
Display pattern	Select the shape of the marker.
Arrows	The marker is displayed as an arrow.
Circle	The marker is displayed as a circle.
Square	The marker is displayed as a square.
Fill color	When this check box is selected, the marker is filled with a color.
Color setting	Set the marker color.
Transparency	Set the transparency of the marker. A higher transparency setting makes the marker more transparent.
Color	The marker color currently being set is displayed.
[Color]	Set the marker color. Click this button to open the [Color] dialog box to set the color.

# Help

## About Head controller

The version information for the system software is displayed.  
The [About Head controller] dialog box appears.



## MEMO

10

Menu

# 11

## PC Connection

This chapter explains how to connect the IM-8000 Series to a personal computer.  
The connection can be established by using network sharing or an FTP server.

<b>Connection with a Personal Computer .....</b>	<b>11-2</b>
<b>Network Sharing.....</b>	<b>11-6</b>
<b>FTP Server .....</b>	<b>11-8</b>

11

PC Connection

# Connection with a Personal Computer

By connecting the IM-8000 Series with a personal computer (PC) via LAN, you can browse the data stored in the IM-8000 Series or back up the data.

## Overview of the PC Connection

### ■ Network Sharing Function

From a Windows-based PC, you can access the shared folder of the IM-8000 Series and copy files between the IM-8000 Series and the PC.  
 □ "Network Sharing" (page 11-6)

### ■ FTP Server Function

You can copy files between the IM-8000 Series and a PC.  
 □ "FTP Server" (page 11-8)

## Operating Environment of the PC

Applicable OS	Windows 10 Home/Pro/Enterprise (64bit)
CPU	"Core-i" series 3XXX (third generation) or later
Memory capacity	4 GB or more
Connection interface	LAN (RJ-45 1000BASE-T/100BASE-TX/10BASE-T) port must be included as standard.
Hard disk free space	30GB or more
Display color	32 bits or more
When FTP server function is used	Application software with an FTP client function must be installed.

## Preparation Steps

The following is the flow of the preparation steps to load image data via LAN connection.

► **Important** Before connecting the IM-8000 Series to the company network, obtain the "IP address" to be assigned to the IM-8000 Series from your system administrator, and confirm the settings of "IP address", "Subnet mask", and "Default gateway".

Configure the "Network communication settings" of the IM-8000 Series.

□ "Network Communication Settings" (page 11-2)



Connect the IM-8000 Series with a PC.

□ "Connection with a Personal Computer" (page 11-4)



□ "Starting and Stopping Network Sharing" (page 11-6)



□ "Starting and Stopping the FTP Server" (page 11-8)

## Network Communication Settings

Configure the network communication settings of the IM-8000 Series to establish the LAN connection.

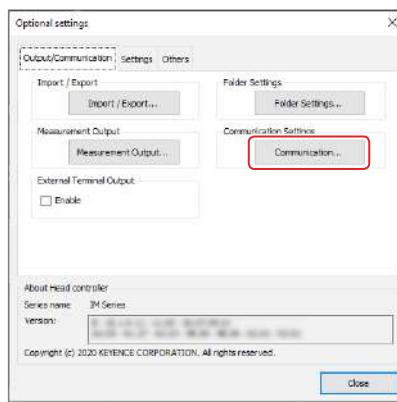


Before connecting the IM-8000 Series to the company network, obtain the "IP address" to be assigned to the IM-8000 Series from your system administrator, and check the "Subnet mask" and "Default gateway" settings. The use of any invalid value may not only disable communications but also harm your company network.

### 1 Click [Optional Settings] in the main menu.

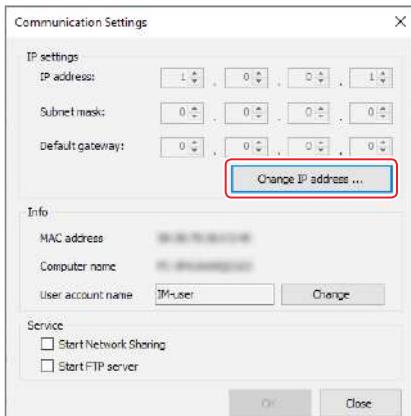


### 2 Click [Communication] on the [Output/Communication] tab.

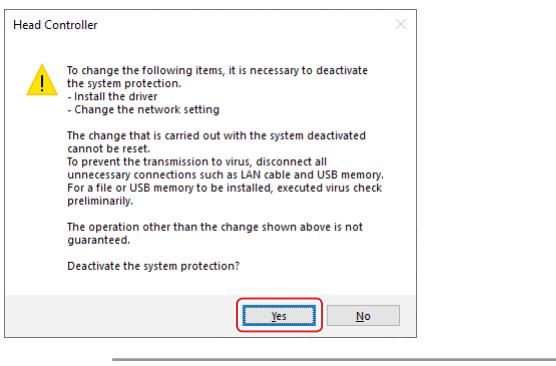


► **Reference** For details about the [Optional Settings] dialog box, refer to □ "Chapter 12 Optional Settings and Security Settings" (page 12-1).

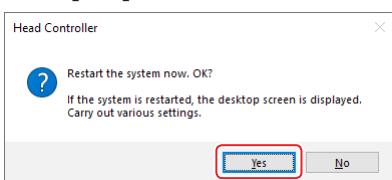
### 3 Click [Change IP address].



### 4 If you agree, click [Yes].



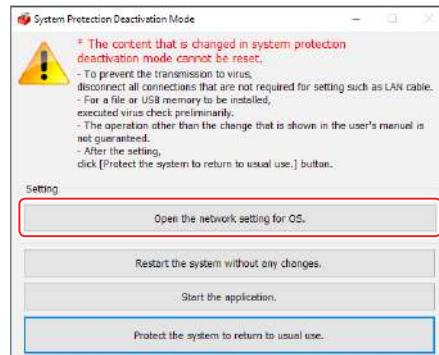
### 5 Click [Yes].



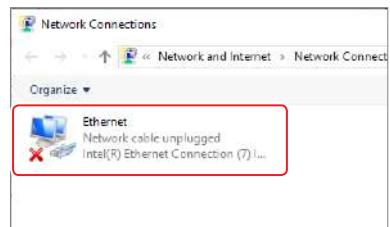
**Reference** When using the IM-RU1 rotation unit, the confirmation dialog box appears. Follow the message shown in the dialog box and click [Yes].

IM-8000 restarts.  
After the system restarts, the [System Protection Deactivation Mode] dialog box appears.

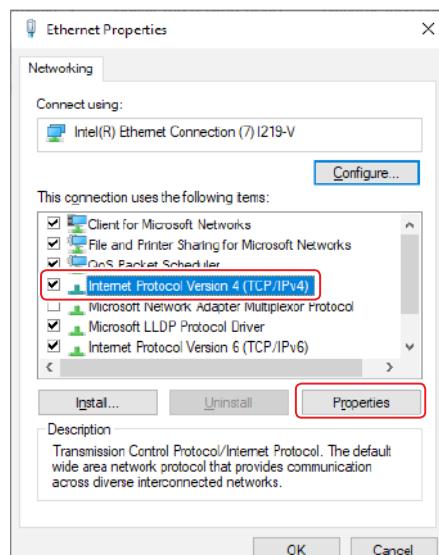
### 6 Click [Open the network setting for OS].



### 7 Right-click [Ethernet] and select [Properties] from the menu that appears.

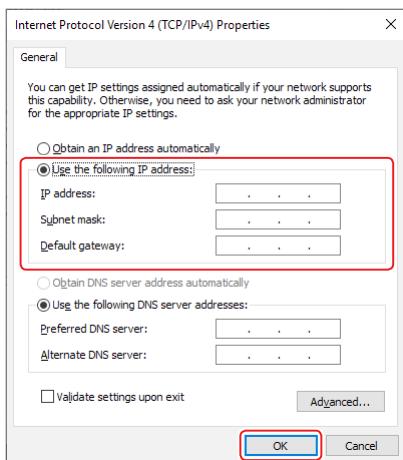


### 8 Select [Internet Protocol Version 4 (TCP/IPv4)], and click [Properties].



## 9 Set the IP address, subnet mask, and default gateway, and then click [OK].

Select [Use the following IP address] and set the content.



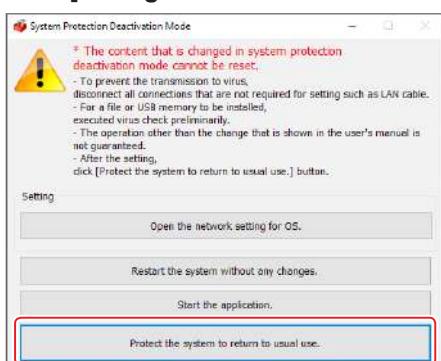
**[Reference]** To establish a one-to-one connection between the PC and IM-8000 Series, use a crossover cable and set the IP addresses to the values between 192.168.0.1 to 192.168.0.254.

For example, set the IP address of the IM-8000 Series to "192.168.0.1", set the IP address of the PC to "192.168.0.2", and set the subnet mask to "255.255.255.0".

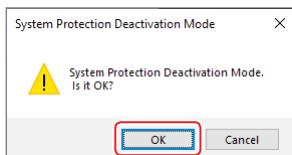
## 10 Click [OK].

## 11 Close the [Network Connections] window.

## 12 Click [Protect the system to return to usual use.] in the [System Protection Deactivation Mode] dialog box.



## 13 Click [OK].



IM-8000 restarts.

## Connection with a Personal Computer

### Important

You must set the IP address, subnet mask, and default gateway before connecting the IM-8000 Series with a PC.

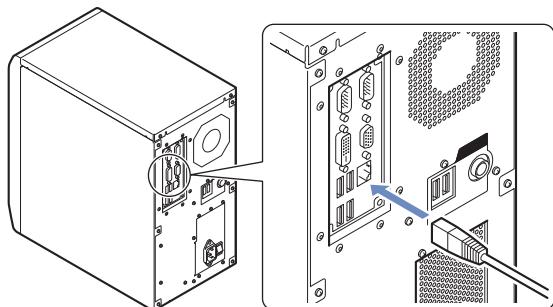
["Network Communication Settings" \(page 11-2\)](#)

## 1 Connect a LAN cable to the IM-8000.

### Important

- To connect the IM-8000 to the LAN in a group via a hub, use a straight cable. To connect the IM-8000 Series directly to a PC (one-to-one connection), use a crossover cable.
- Use a LAN cable of category 5 or higher for 10BASE-T/100BASE-TX, and a cable of category 5e or higher for 1000BASE-T.

Connect the LAN cable to the LAN port on the rear of the controller.



## 2 Connect the LAN cable to the PC and configure the network settings of the PC.

For details, refer to the instruction manual of the PC.

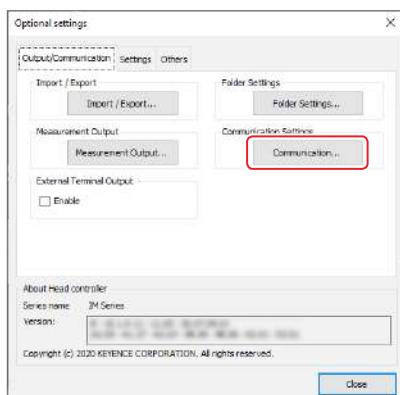
## Setting a Password

Set a password to enter when you connect from the PC to the IM-8000 Series.

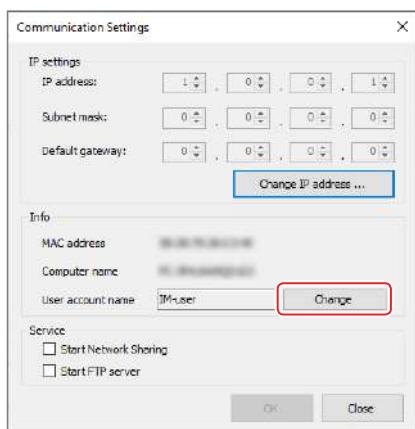
### 1 Click [Optional Settings] in the main menu.



### 2 Click [Communication] on the [Output/Communication] tab.

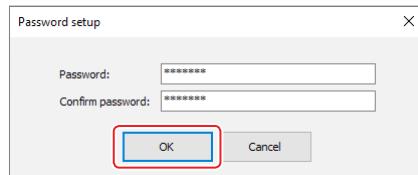


### 3 Click [Change].



### 4 Enter a password and click [OK].

Enter the same password again at "Confirm password". [OK] is enabled after the password is entered in both fields.



#### ► Important

- Up to 30 single-byte alphanumeric characters can be used for the password.
- The default password is "IM-user".
- Store and manage the password securely and be careful not to lose it.

# Network Sharing

Use the network sharing to copy files between the IM-8000 Series and PC.

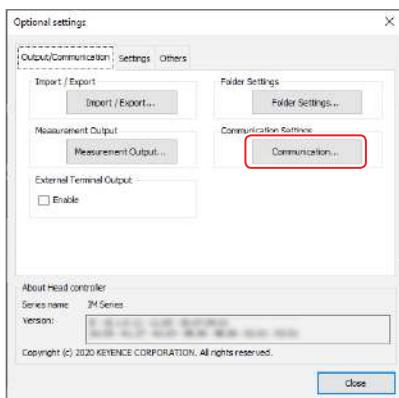
## Starting and Stopping Network Sharing

### ■ Starting Network Sharing

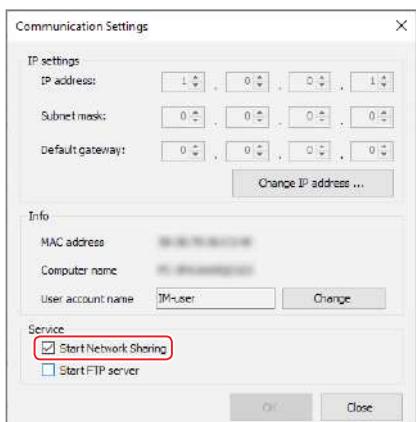
- 1 Click [Optional Settings] in the main menu.**



- 2 Click [Communication] on the [Output/Communication] tab.**

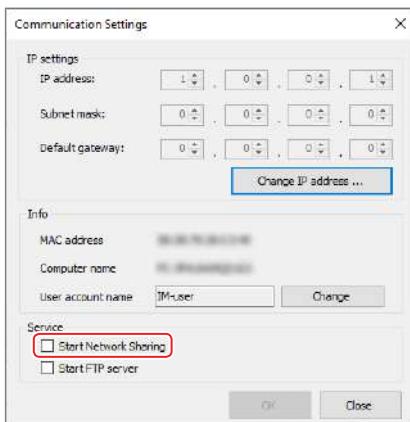


- 3 Select the [Start Network Sharing] check box.**



### ■ Stopping Network Sharing

- 1 Clear the [Start Network Sharing] check box.**

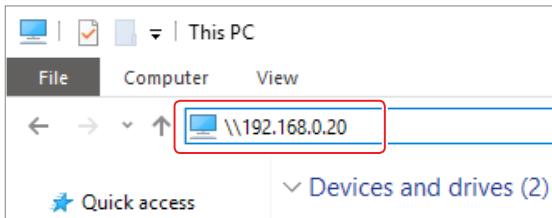


- 2 Click [Close].**

## Connecting to the IM-8000 Series with File Explorer

**1** On the PC, start “File Explorer”.

**2** Enter “\\(IP address set to the IM-8000 Series)” into the address bar.



**3** Click [Move] .

**4** Enter your user name and password, and then click [OK].

Enter the following information into the dialog box.

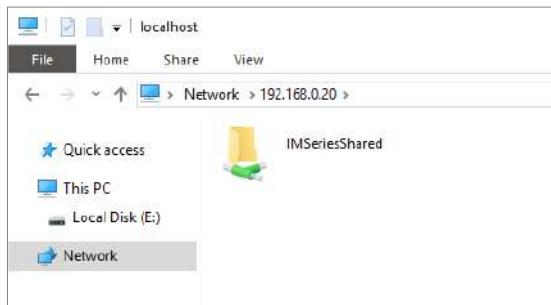
User name: IM-user  
Password: Password set to the IM-8000 Series  
 “Setting a Password” (page 11-5)



▶ Important

- The user name (account name) of the IM-8000 Series cannot be changed.
- The default password is “IM-user”.

The shared folder of the IM-8000 Series is displayed.



**5** Copy or move the necessary file(s) to the PC.

# FTP Server

Use FTP client software to load the data file in the hard disk of the IM-8000 Series to the PC.

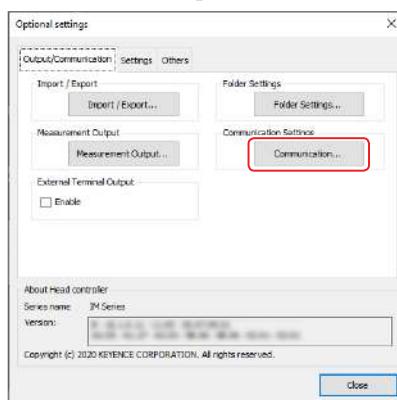
## Starting and Stopping the FTP Server

### ■ Starting the FTP Server

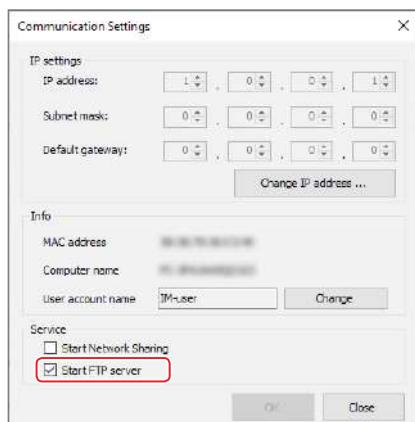
- 1 Click [Optional Settings] in the main menu.**



- 2 Click [Communication] on the [Output/Communication] tab.**

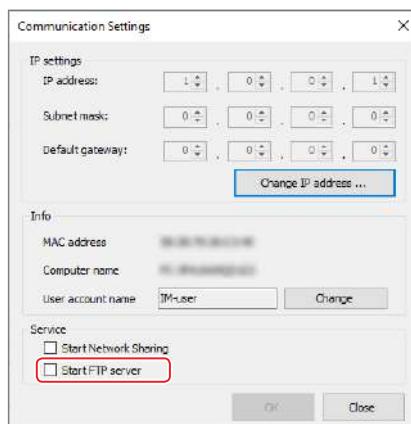


- 3 Select the [Start FTP server] check box.**



### ■ Stopping the FTP Server

- 1 Clear the [Start FTP server] check box.**

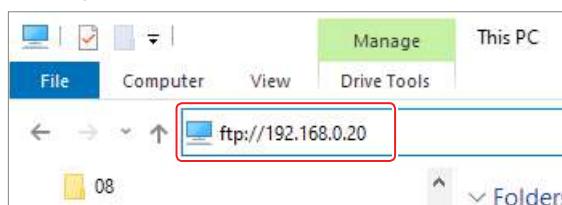


- 2 Click [Close].**

## Connecting to the IM-8000 Series with File Explorer

- 1 Start File Explorer.**

- 2 Enter “ftp://(IP address set to the IM-8000 Series)” in the address bar.**

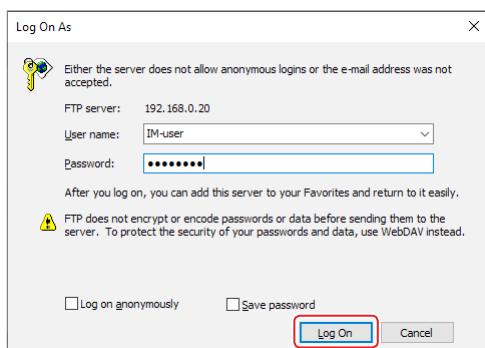


- 3 Click [Move] →.**

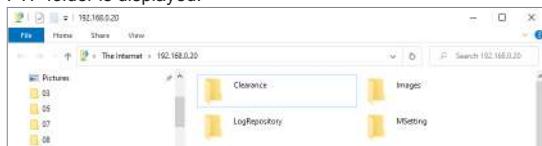
## 4 Enter your user name and password, and then click [Log On As].

Enter the following information into the dialog box.

User name: IM-user  
 Password: Password set to the IM-8000 Series  
 "Setting a Password" (page 11-5)



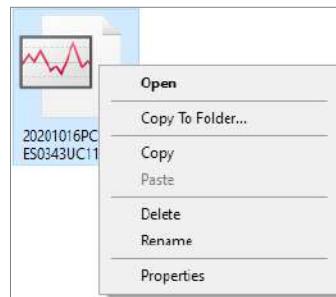
FTP folder is displayed.



- Click the "MSetting" folder and view the Program data.
- The data, such as the measurement result, single object report, and statistical report, is stored in the related folder of the Program data.

## Copying the Data File to the PC

### 1 Right-click the folder or file you want to copy and open its shortcut menu.



### 2 Select [Copy].

### 3 Open the folder of the copy destination in File Explorer, and select [Paste] on the shortcut menu.

The file stored in the IM-8000 Series is copied to the PC.

## MEMO

# 12

## Optional Settings and Security Settings

This chapter explains the setting details and functions of [Optional Settings] and [Security Settings].

<b>Optional Settings.....</b>	<b>12-2</b>
<b>Security Settings.....</b>	<b>12-22</b>

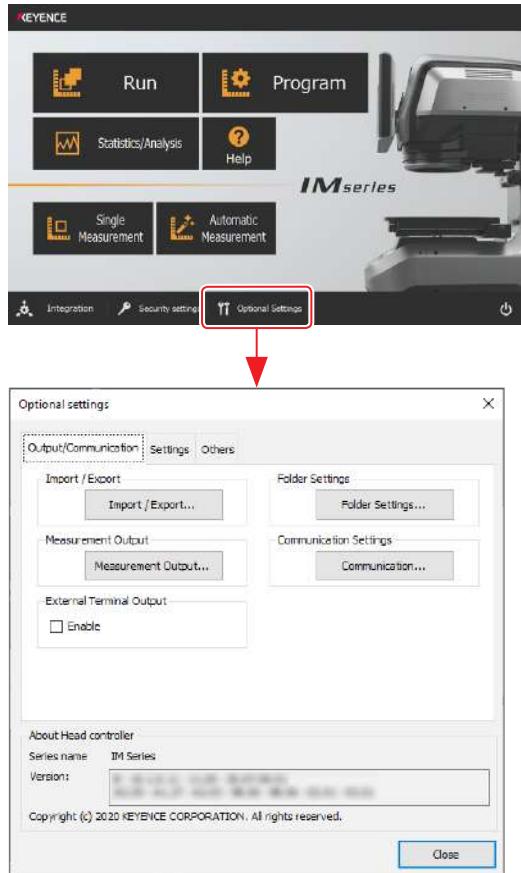
12

Optional Settings and Security Settings

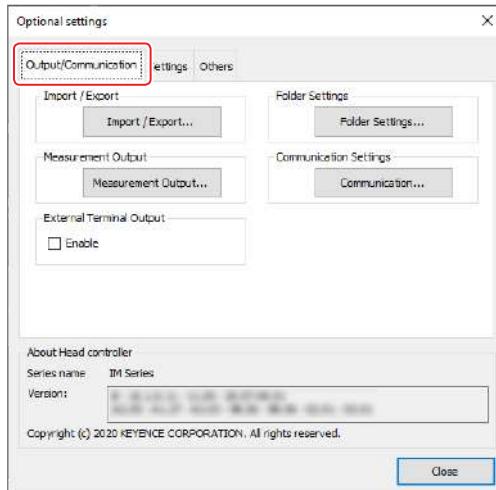
# Optional Settings

## Optional Settings

This section describes the names and functions of the parts in the window when [Optional Settings] is selected.



## [Output/Communication] Tab



### ● Import/Export

Import/export the various user files (Program data, single object report, preview image, etc.) to/from the controller by using the USB port connected to the controller.

"Import / Export" (page 12-4)

### ● Folder Settings

Once the folder settings are configured, Program data, measurement result, report, etc. can be saved into the specified folder.

"Folder Settings" (page 12-11)

### ● Measurement Output

Configure settings for the contents to be output after the measurements in the Run mode.

"Measurement Output" (page 12-12)

### ● Communication Settings

Configure the communication settings to connect the controller to the LAN.

"Communication Settings" (page 12-14)

### ● External Terminal Output

When the [Enable] check box is selected, the evaluation result of each measurement is output through the external terminal.

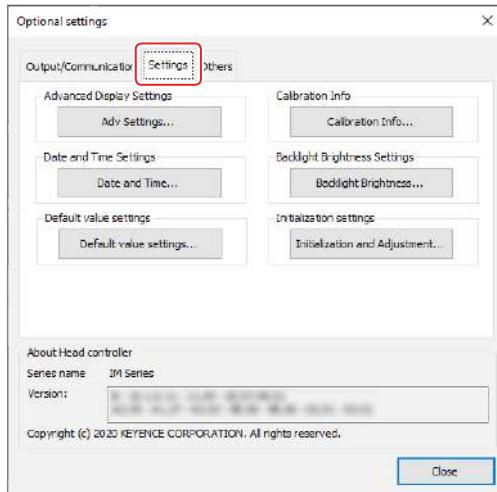
"External Terminal Output" (page 12-14)

"Judgment Value Output" (page 2-11)

### ● About Head controller

The model name and version of the IM-8000 Series are displayed.

## [Settings] Tab



### ● Advanced Display Settings

Set the details of the display including the number of decimals or angle unit to display measurement results.

"Advanced Display Settings" (page 12-15)

### ● Calibration Info

Date of the last calibration is displayed.

"Calibration Info" (page 12-15)

### ● Date and Time Settings

Set the time zone, date and time of the controller.

"Date and Time Settings" (page 12-16)

### ● Backlight Brightness Settings

Set the brightness of the LCD monitor for the head.

"Backlight Brightness Settings" (page 12-17)

### ● Default value settings

Set the XY stage speed, and whether to enable warnings for light probe initialization and reference plane alignment.

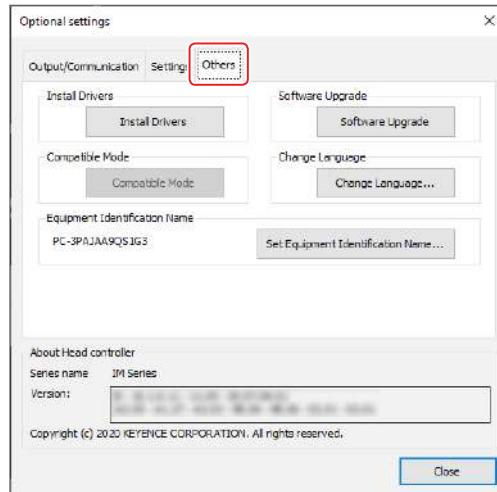
"Default value settings" (page 12-17)

### ● Initialization settings

Set whether to initialize the stage and light probe.

"Initialization settings" (page 12-18)

## [Others] Tab



### ● Install Driver

Install the printer driver.

"Install Drivers" (page 12-20)

### ● Software Upgrade

Upgrade the version of the IM-8000 Series system software.

### ● Compatible Mode

You can start the old version of application software on the controller that has been updated from the old version.

### ● Change Language

You can switch the display language.

"Change Language" (page 12-21)

### ● Equipment Identification Name

Set a name to identify the controller.

"Equipment Identification Name" (page 12-21)

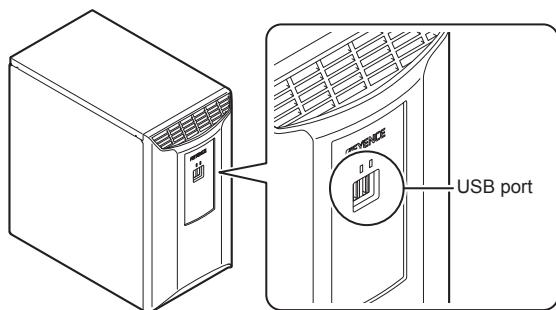
## Import / Export

Import/export the various user files (Program data, single object report, preview image, etc.) to/from the controller by using the USB port connected to the controller.



You can export any files shown in the internal file folder display area.

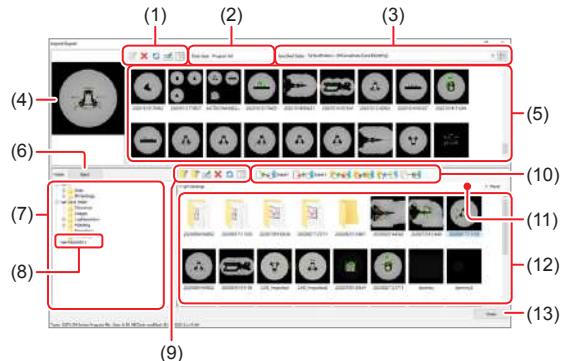
### 1 Connect a USB memory device to the USB port on the controller.



### 2 Click [Optional Settings] in the main menu.

### 3 Select the [Output/Communication] tab and click [Import / Export].

### 4 Manage the files in the [Import/Export] window.



Item	Description
(1) Manage internal folder button	Manage the files displayed in (5). You can do the following operations: <ul style="list-style-type: none"> <li>• Move the folder.</li> <li>• Delete file(s).</li> <li>• Update the display in the folder.</li> <li>• Change the file name.</li> <li>• Change the method to view files and their order.</li> </ul>
(2) Data class selection box	Select the class of the files to be displayed in (5) from the list.
(3) Specified folder selection box	From this dropdown list, select the folder which stores a target file for import/export. If some folder is specified in [Folder Settings], you can select a specified folder from the dropdown list. "Folder Settings" (page 12-11)
(4) enlarged display area	The preview image of the file selected in (5) is enlarged and displayed. When no file is selected or the selected file does not have a registered thumbnail image, nothing is displayed.
(5) Internal file folder display area	The files in the folder selected in (2) and (3) are listed as thumbnail images.
(6) [Eject]	Click this button to remove the USB memory device from the controller.
(7) Target folder display area	The folders targeted for importing/exporting are displayed as a tree structure. Folders in the USB memory device are displayed only when the USB memory device is connected.
(8) Repository	Save Program data which is not used frequently in this memory area.
(9) File management button	Manage the files displayed in (12). You can do the following operations: <ul style="list-style-type: none"> <li>• Create a folder.</li> <li>• Move the folder.</li> <li>• Change the file name.</li> <li>• Delete file(s).</li> <li>• Update the display in the folder.</li> <li>• Change the method to view files and their order.</li> </ul>

Item	Description
(10) Import/Export button	Manage the files displayed in (5) or (12). You can do the following operations: <ul style="list-style-type: none"><li>• Import a file.</li><li>• Export a file.</li><li>• Copy Program data and all related data to the main unit (controller).</li><li>• Copy Program data and all related data to the specified folder.</li><li>• Move Program data and all related data to the main unit (controller).</li><li>• Move Program data and all related data to the specified folder.</li></ul>
(11) Folder path display area	Display the path to the folder selected in (7). You can also specify a folder to be displayed in (12) by directly entering a file path and clicking  [Move].
(12) File display area	The files in the folder selected in (7) are listed as thumbnail images.
(13) [Close]	Close the [Import/Export] window.



- A file or folder deleted in the file display area cannot be restored. Do not delete the following folders in the file display area.
  - MSetting folder  
This folder contains Program data and the measurement results.
  - Clearance folder  
This folder stores tolerance tables.
  - Repository folder  
This folder contains the Program data and the measurement results that has been moved to the Repository.
- If you remove USB memory device without clicking [Eject], the files in the USB memory device may be corrupted.



If 1,000 or more Program files are stored in the controller, file searchability degrades. It is recommended to store less-frequently used Program data in the Repository or other external media such as a USB memory device.

## ■ Importing a File

Import the Program data and the image files to be inserted in report's header/footer which have been stored in the USB memory device or in the "Repository" to the controller.

You can import data in the following 3 methods:

- Import (copy) only Program data.
- Import (copy) Program data and all related data.
- Import (move) Program data and all related data.

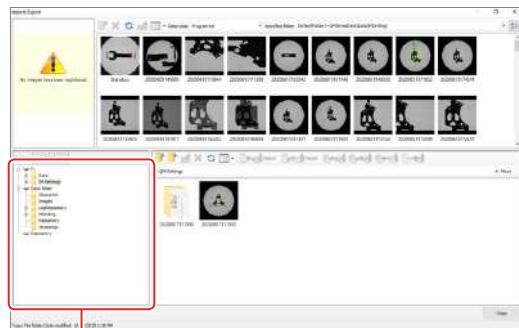
In this manual, explanations are given with the procedures to import Program data stored in the USB memory device.



- When restoring the Program data (and all related data) migrated to the "Repository" of the controller or to an optional folder in the USB memory device, select the Program data and click to import (move) the Program data and all related data.
- To import the image files to be inserted in report's header/footer, select Image from [Data class] in step 6.

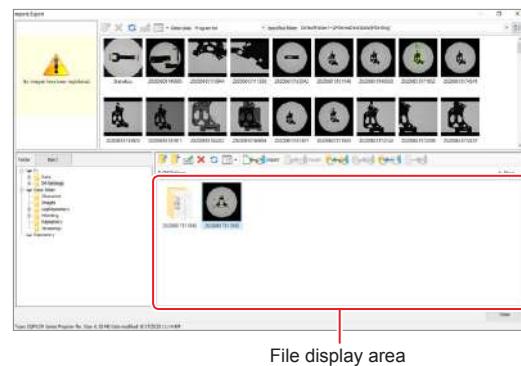
- 1** Connect a USB memory device to the USB port on the controller.
- 2** Click [Optional Settings] in the main menu.
- 3** Select the [Output/Communication] tab and click [Import/Export].
- 4** Select the folder on the USB memory device that stores the file that you want to import.

Select the folder from the target folder display area.



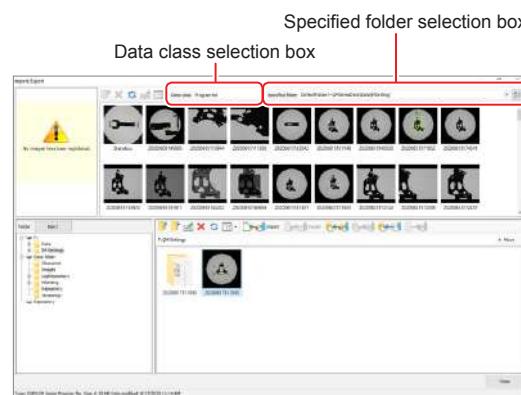
Target folder display area

- 5** Select the file that you want to import from the file display area.



File display area

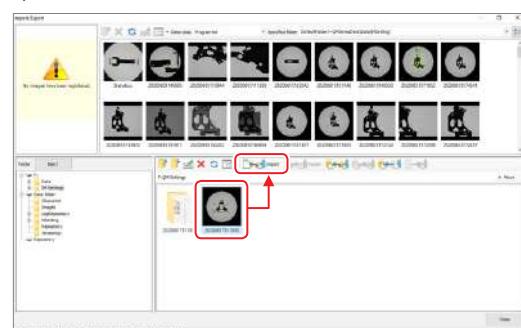
- 6** Select [Program list] from [Data class], and select the folder that you want to import from the specified folder selection box.



- 7** Click the button corresponding to the intended purpose to import the file.

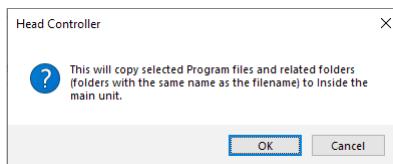
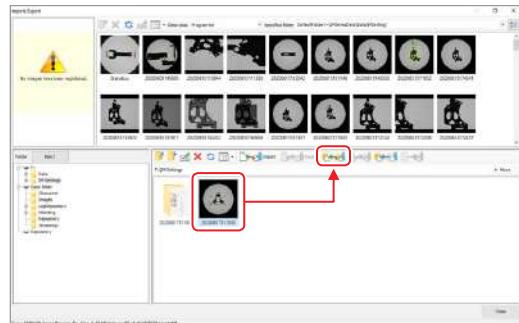
### ● Importing (copying) only Program data

Clicking imports (copies) the selected file to the specified folder.

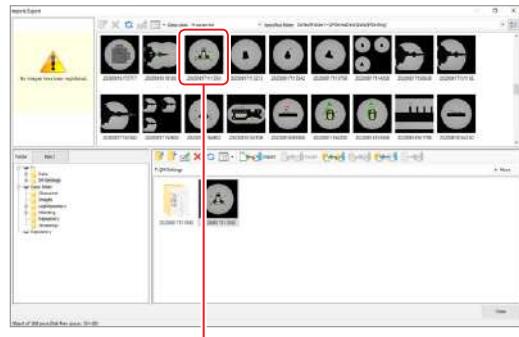


### ● Importing (copying) Program data and all related data

Clicking  displays a confirmation message box.



Clicking [OK] imports (copies) the selected Program data and all related data to the specified folder.

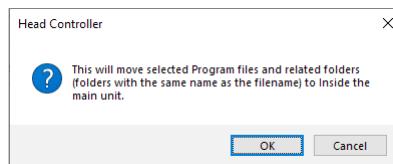
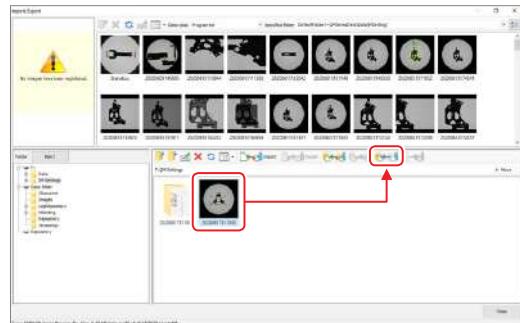


Imported (Copied) data

 You can confirm the contents of the data related to the Program data by double-clicking the thumbnail image in the internal file folder display area.

### ● Importing (moving) Program data and all related data

Clicking  displays a confirmation message box.



Clicking [OK] imports (moves) the selected Program data and all related data to the specified folder.  
Data in the USB memory device is deleted.



Imported (Moved) data

 You can confirm the contents of the data related to the Program data by double-clicking the thumbnail image in the internal file folder display area.

## ■ Exporting a File

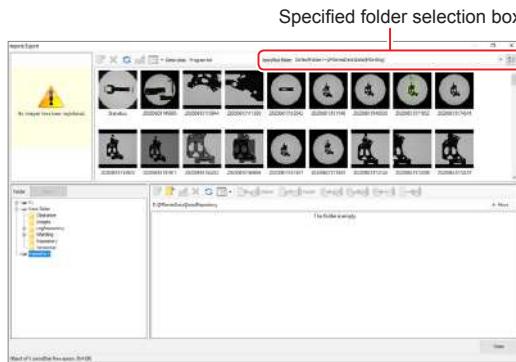
Export the file of Program data or single object measurement data stored in the controller to the USB memory device or to the Repository. You can export data in the following 4 methods:

- Export (copy) only Program data.
- Export (copy) Program data and all related data.
- Export (move) Program data and all related data.
- Export (copy) a single object report and preview image.

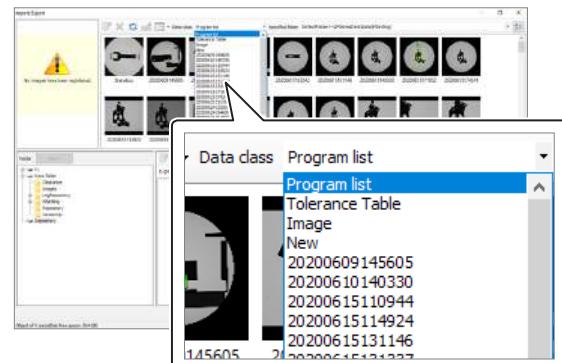
In this manual, explanations are given with the procedures to export Program data to the USB memory device.

**Important** When exporting the less-frequently used Program data to the Repository, select the Program data and click  to export (move) the Program data and all related data.

- 1** Connect a USB memory device to the USB port on the controller.
- 2** Click [Optional Settings] in the main menu.
- 3** Select the [Output/Communication] tab and click [Import/Export].
- 4** From the specified folder selection box, select the folder that contains the file that you want to export.



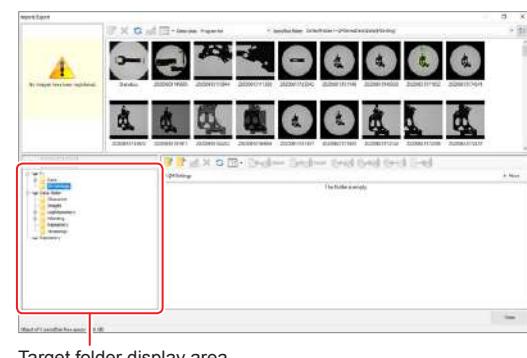
- 5** From the data class selection box list, select the data class to be exported (the folder in the controller that contains the file).



**Important** When exporting (copying or moving) the Program data and all related files, be sure to select "Program list".

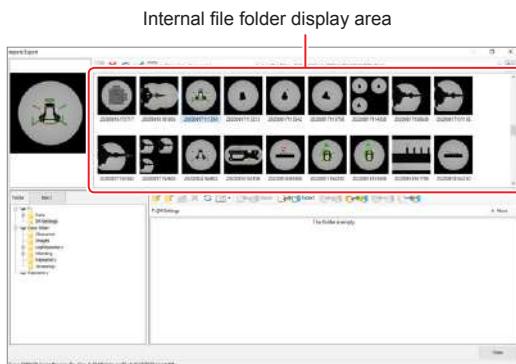
- Reference**
- You can also select the folder by double-clicking the thumbnail image in the internal folder file display area.
  - Files such as the single object report, image data, and statistical report saved in Program mode or Run mode are stored in the folder with the name of the Program data for which the measurement was conducted.
  - Files of the single object report or image data saved in the single measurement mode are stored in a new folder.

- 6** Select the folder that contains the file that you want to export from the target folder display area.



Target folder display area

- 7** From the internal file folder display area, select the file that you want to export.



- 8** Click the button corresponding to the intended purpose to export the file.

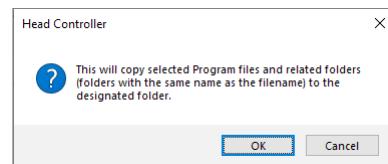
● **Exporting (copying) only Program data**

Clicking exports (copies) the selected file to the folder selected in the target folder display area.

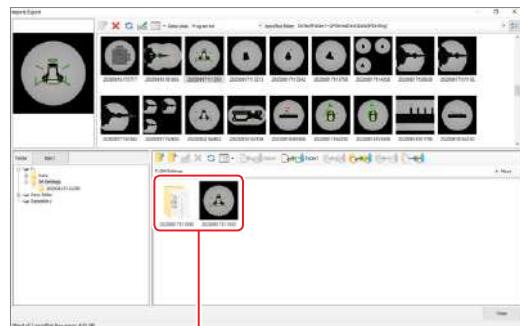


● **Exporting (copying) Program data and all related data**

Clicking displays a confirmation message box.



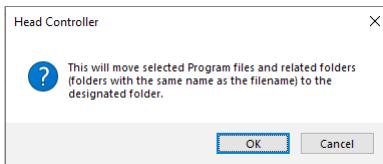
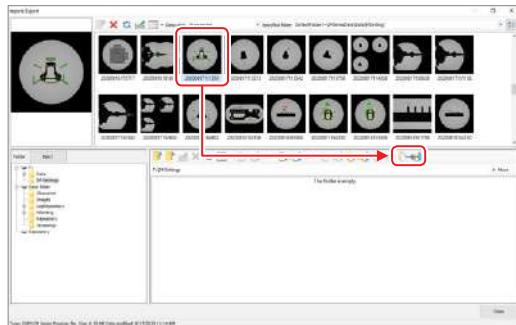
Clicking [OK] exports (copies) the selected data to the folder selected in the target folder display area.  
When a Program data is selected, the Program data and all related data are exported (copied).



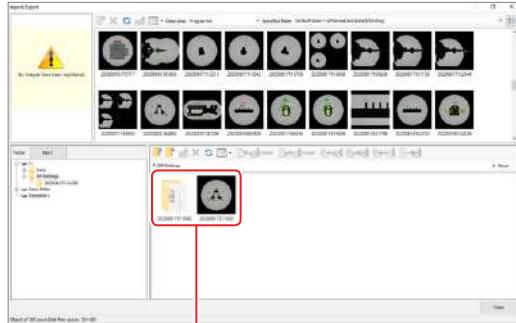
Exported (Copied) data

● Exporting (moving) Program data and all related data

Clicking  displays a confirmation message box.



Clicking [OK] exports (moves) the selected data to the folder selected in the target folder display area.  
When Program data is selected, the Program data and all related data are exported (moved).  
Data in the original folder (internal file folder display area) is deleted.



Exported (Moved) data

## Folder Settings

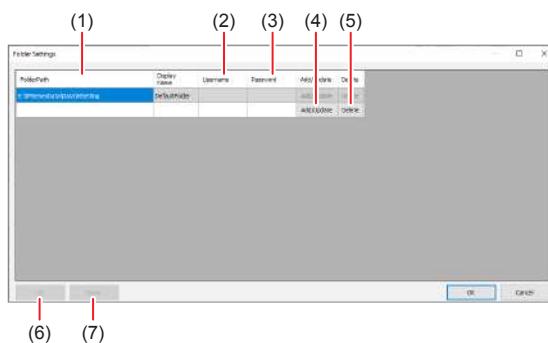
Once the folder settings are configured, Program data, measurement result, report, etc. can be saved into the specified folder.

**Important** The folders which have been set in [Folder Settings] dialog box are displayed on the folder selection list in the order in which they appear in the dialog box. The folder on top is the default folder.

**1 Click [Optional Settings] in the main menu.**

**2 Select the [Output/Communication] tab and then click [Folder Settings].**

The [Folder Settings] dialog box appears.

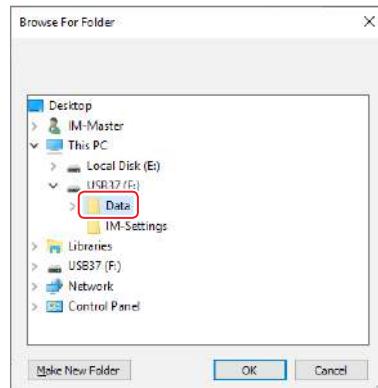


Item	Description
(1) Folder path display area	The path to the set folder is displayed.
(2) Username	To set a folder that requires user authentication, enter an account.
(3) Password	To set a folder that requires user authentication, enter a password.
(4) [Add/Update]	Clicking the button opens the [Browse For Folder] dialog box. You can add/change the folder path.
(5) [Delete]	Click this button to delete the folder path set with the selected row.
(6) [Up]	Click this button to move the folder path of the selected row upward.
(7) [Down]	Click this button to move the folder path of the selected row downward.

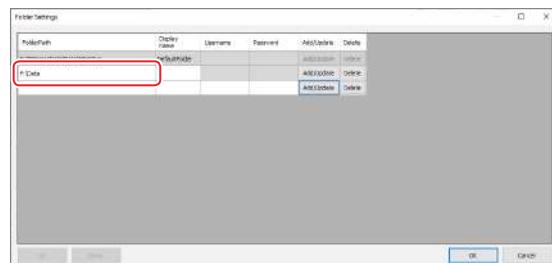
**Point** "E:\IMSeriesData\IM-Setting" is fixed. It cannot be added to, updated, or deleted.

**3 Click [Add/Update].**

**4 Select a folder and click [OK].**



The path to the selected folder is displayed in the [Folder Settings] dialog box.



**5 Click [OK].**

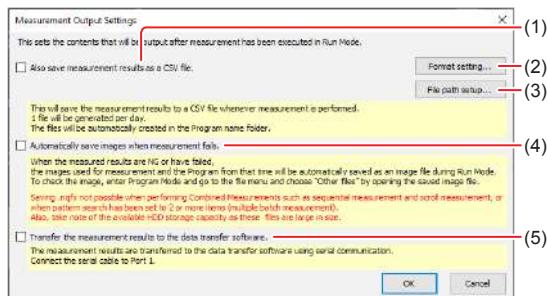
## Measurement Output

Configure settings for the contents to be output after the measurements in the Run mode.

### 1 Click [Optional Settings] in the main menu.

### 2 Select the [Output/Communication] tab and then click [Measurement Output].

The [Measurement Output Settings] dialog box appears.

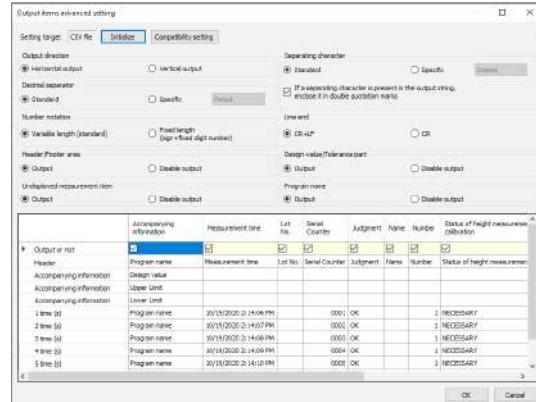


Item	Description
(1)	When this check box is selected, the measurement result is also automatically saved as a CSV file.
(2)	Click [Format setting] to display the [Output items advanced setting] dialog box. You can set the format to save the measurement results as a CSV file.
(3)	Click [File path setup] to display the [File path setup] dialog box. You can set a file path to save the measurement results. □ "File path setup" (page 12-13)
(4)	When this check box is selected, images used in the measurement and Program are automatically saved as "nqfx" file when the measurement result is NG or Fail. You can confirm the saved "nqfx file" by selecting [Menu] → [Open] → [Other Files] and opening the corresponding file in the [Program] mode. □ "Other Files" (page 10-12)
(5)	When this check box is selected, measurement results are transferred to the IM Data Transfer software connected with serial communication.

### 3 Click [OK].

## Output items advanced setting

Click [Format setting] in the [Measurement Output Settings] dialog box to open the [Output items advanced setting] dialog box. You can set to save the measurement results as a CSV file.



Item	Description
[Initialize]	Clicking this button returns the settings in the [Output Items Details Setting] dialog box to the default values.
[Compatibility setting]	Clicking this button uses the same setting as those of the CSV format for IM-6600E.
Output direction	Select a direction in which the measurement result is output.
Horizontal output	Output the measurement result in a row (one line) for each measurement.
Vertical output	Output the measurement result in multiple rows for each measurement. The measurement result to be output in multiple rows starts with the header line and ends with the footer line.
Decimal separator	Select a decimal point symbol to use.
Standard	Use a period as the decimal point symbol.
Specific	Specify a decimal point symbol from the dropdown list. <ul style="list-style-type: none"><li>• Period</li><li>• Comma</li></ul>
Number notation	Select the method to represent numerical values.
Variable length (standard)	Represent a numerical value in variable length format.
Fixed length (sign+fixed digit number)	Represent a numerical value in fixed length format (sign + fixed digits (10 digits)).
Header/Footer area	Select whether to output the header and footer.
Output	The header and footer are output.
Disable output	The header and footer are not output.
Undisplayed measurement item	Select whether to output the measurement items to hide.
Output	The measurement items to hide are also output.
Disable output	The measurement items to hide are not output.

Item	Description
Separating character	Set the items related to the delimiter.
Standard	Use the standard delimiter.
Specific	Specify a delimiter to use from the dropdown list. <ul style="list-style-type: none"> <li>• Comma</li> <li>• Semicolon</li> <li>• Space</li> <li>• Tab</li> </ul>
If a separating character is present in the output string, enclose it in double quotation marks	When this check box is selected, the delimiters in the character string is escaped so that the column position can remain unchanged when a CSV file is opened in Excel.
Line end	Select a line feed code to use.
CR+LF	Use "CR+LF" (Windows standard) as the line feed code.
CR	Use "CR" as the line feed code.
Design-value/ Tolerance part	Select whether to output the design value and tolerance.
Output	The design value and tolerance are output.
Disable output	The design value and tolerance are not output.
Program name	Select whether to output the Program name.
Output	Output the Program name.
Disable output	Do not output the Program name.
Preview	The row with the check box selected in the [Output or not] row is output to a CSV file.

**Reference**

- The items in the column without check box are always output.
- You can arrange columns by dragging the preview part of the cell header left or right.

**File path setup**

When [File path setup] is clicked in the [Measurement Output Settings] dialog box, the [File path setup] dialog box appears. You can set a path to save CSV files.



Item	Description
Folder Path	Set a path to the folder the measurement result is output to.
Default	The Program data is output to the subfolder of the folder in which it has been saved.
User specified	Specify the save destination path. Click [...] to select a folder from the displayed dialog box.
[Macro]	Click this button to display the dialog box to specify the folder path as a macro. "Specifying the folder path and file name as a macro" (page 10-42)
File name	Set a name for the file to save. Default setting: \$(YYYY)\$MM\$(DD)
Add the equipment identification name to the file name	Select the check box to add the equipment identification name as the suffix of the file name. For more information about the equipment identification name, refer to  "Equipment Identification Name" (page 12-21).
[Macro]	Click this button to display the dialog box to specify the file name as a macro. "Specifying the folder path and file name as a macro" (page 10-42)
[Initialize]	Restore the settings to the default values.

## Communication Settings

Configure the network settings of the IM-8000 Series to establish the LAN connection.

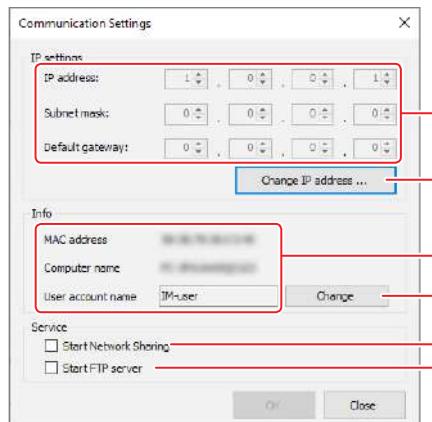


**Before connecting the IM-8000 Series to the company network, obtain the "IP address" to be assigned to the IM-8000 Series from your system administrator, and check the "Subnet mask" and "Default gateway" settings. The use of any invalid value may not only disable communications but also harm your company network.**

**1 Click [Optional Settings] in the main menu.**

**2 Select the [Output/Communication] tab and then click [Communication].**

The [Communication Settings] dialog box appears.



Item	Description
(1) IP settings	Display the current IP address setting.
(2) [Change IP address]	When [Change IP address] is clicked, the IM-8000 restarts after the confirmation of the restart, and the system protection deactivation mode is entered to enable the IP address setting to be changed. After the IP address is changed, the screen returns to the main menu. □ "Network Communication Settings" (page 11-2)
(3) Info	The controller information (MAC address, computer name, and account name) is displayed.
(4) [Change]	Set a password to enter when you connect from the PC to the IM-8000 Series. □ "Setting a Password" (page 11-5)
(5) [Start Network Sharing]	Select this check box to start network sharing.
(6) [Start FTP server]	Select this check box to start the FTP server.

**3 Specify the IP address, subnet mask, and default gateway.**

For details about the IP address settings, refer to □ "Network Communication Settings" (page 11-2).



**Restart the IM-8000 after changing the IP address.**  
To continue changing items other than the IP address, perform steps 1 and 2 again after the IM-8000 restarts.

**4 Click [OK].**

The network communication settings are saved in the controller.



For details about connecting to a PC, refer to □ "Connection with a Personal Computer" (page 11-4).

## External Terminal Output

When the check box is selected, the evaluation result is output to the external terminal.

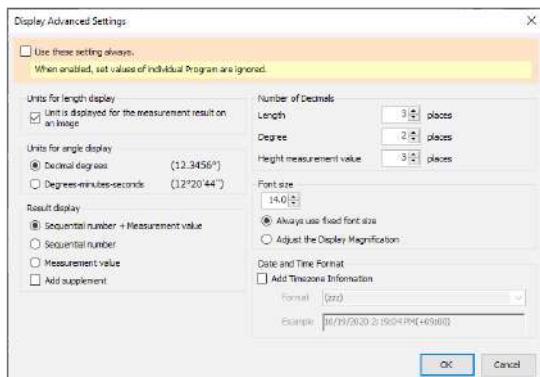
For details about external terminals, refer to □ "Judgment Value Output" (page 2-11).

## Advanced Display Settings

Set the details of the display including the measurement values and results.

- 1 Click [Optional Settings] in the main menu.**
- 2 Select the [Settings] tab and click [Adv Settings].**

The [Display Advanced Settings] dialog box appears.



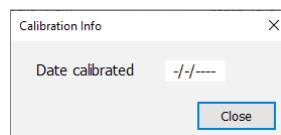
Item	Description
Use these setting always.	When this check box is selected, measurement values are displayed with the setting values configured in the [Display Advanced Settings] dialog box.
Units for length display	To display a unit for the measurement result on the preview screen, select the [Unit is displayed for the measurement result on an image] check box. Default: ON
Units for angle display	Select the unit used to display the result of angle measurement. Default value: Decimal degrees
Result display	Select the method to view the measurement results on the preview screen. Default: Sequential number + Measurement value  To add a supplement to the end of the measurement result on the preview screen, select the [Add supplement] check box. Default: OFF
Number of Decimals	Set the number of decimal digits used for the measurement values.
Length	Setting range: 0 to 4
Degree	Setting range: 0 to 4
Height measurement value (IM-8030T only)	Setting range: 0 to 3
Font size	Specify the font size of the characters used in the preview screen. You can select either fixed or variable. Default setting: Always use fixed font size
Date and Time Format	When the time zone information is added in the time view, select the [Add Timezone Information] check box. Select a format from the dropdown list. Default: OFF

- 3 Click [OK].**

## Calibration Info

The latest calibration date is displayed.

- 1 Click [Optional Settings] in the main menu.**
- 2 Select the [Settings] tab and click [Calibration Info].**



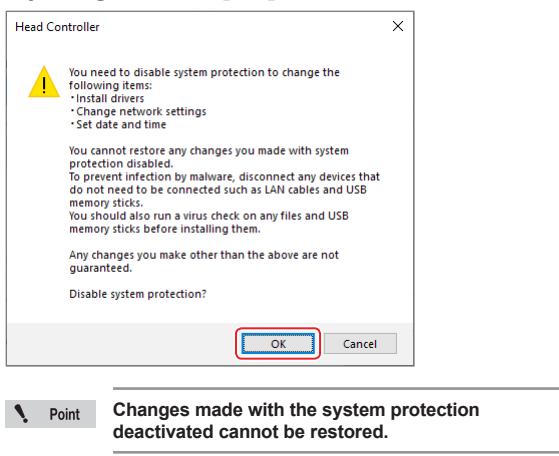
Item	Description
Date calibrated	The date on which the last calibration was performed is displayed.

- 3 Click [Close].**

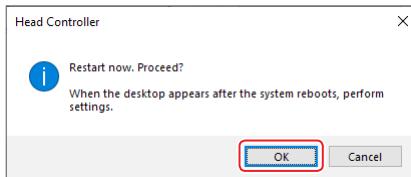
## Date and Time Settings

Set the time zone, date and time of the controller.

- 1 Click [Optional Settings] in the main menu.**
- 2 Select the [Settings] tab and click [Date and Time].**
- 3 If you agree, click [OK].**



- 4 Click [OK].**

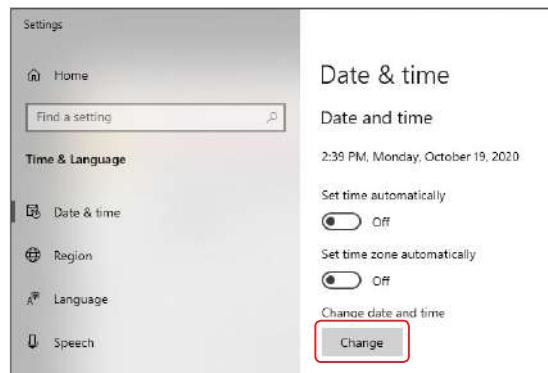


IM-8000 restarts.  
After the system restarts, the [System Protection Deactivation Mode] dialog box appears.

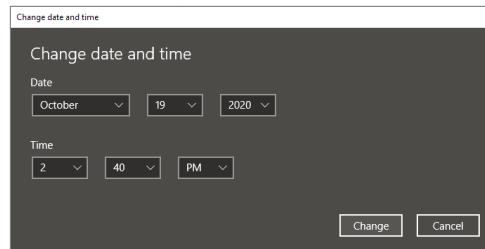
- 5 Right-click the date on the lower right of the screen and click [Adjust date/time].**



- 6 Click [Change].**

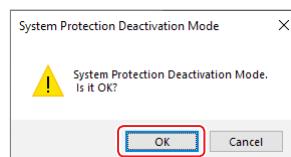


- 7 Set the date and time, and click [Change].**



- 8 Click [Protect the system to return to usual use.] in the [System Protection Deactivation Mode] dialog box.**

- 9 Click [OK].**

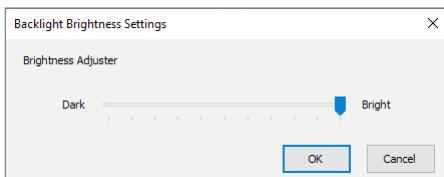


The system restarts, and the specified date and time are applied to the controller.

## Backlight Brightness Settings

Set the backlight brightness of the LCD monitor.

- 1 Click [Optional Settings] in the main menu.**
- 2 Select the [Settings] tab and click [Backlight Brightness Settings].**



- 3 Drag the slider to adjust the brightness.**

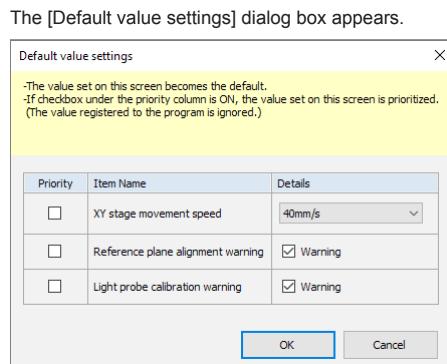
- 4 Click [OK].**

The brightness of the monitor is fixed with the specified value.

## Default value settings

Configure the default settings for the XY stage speed.

- 1 Click [Optional Settings] in the main menu.**
- 2 Select the [Settings] tab and click [Default value settings].**



Item	Description
XY stage speed	Select the XY stage speed (40 mm/s or 80 mm/s) from the list.
Reference plane alignment warning	When this check box is cleared, the message recommending reference plane alignment will no longer be displayed.
Light probe initialization warning	When this check box is cleared, the message prompting the initialization of the light probe will no longer be displayed.

 Selecting the check box in the "Priority" column ignores the XY stage speed registered in the Program data.

## Initialization settings

Configure settings related to the camera position and stage adjustment and initialization.

- 1 Click [Optional Settings] in the main menu.**
- 2 Select the [Settings] tab and click [Initialization and Adjustment].**

The [Initialization and Adjustment] dialog box appears.



**When the check box in the "Execute at startup" column is cleared, light probe initialization will no longer be run at startup.  
Not running this initialization will cause errors, so make sure that this check box is always selected.**

Item	Description
Stage initialization (Set origin point)	Set the XYZ stage origin This check box cannot be cleared.
Light probe calibration (Position adjustment)	Light probe initialization is run. Align the position of the camera in high-precision measurement mode and wide-field measurement mode. Clicking [Run now] initializes the light probe.
Stage glass thickness setting	Set the thickness for stage glass.
Lens stage adjustment	Adjust the measurement accuracy when the stage is moving using the IM Adjustment Chart.
Restore to Factory Defaults	Clicking this button restores the adjustment values for stage adjustment and the height measurement settings for reference plane alignment to their default settings.



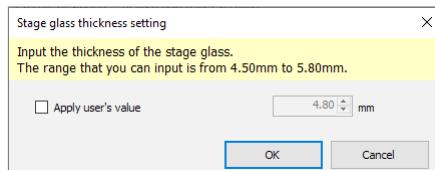
**The IM Adjustment Chart (OP-88552), which is sold separately, is required for stage adjustment.  
□ "Lens & Stage adjustment" (page 12-19)**

## Stage glass thickness setting

Set the thickness for stage glass.

- 1 Click [Settings] in the [Initialization and Adjustment] dialog box.**

The [Stage glass thickness setting] dialog box appears.



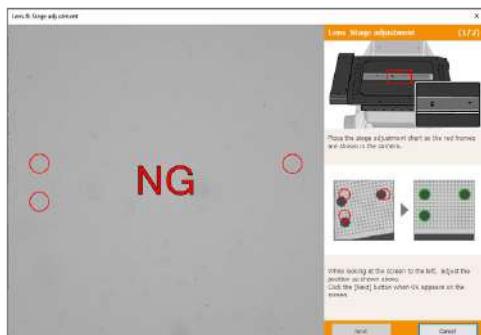
Item	Description
Apply user's value	To reduce measurement height errors in light probe measurement, select this check box and enter the thickness of the stage glass.

- 2 Click [OK].**

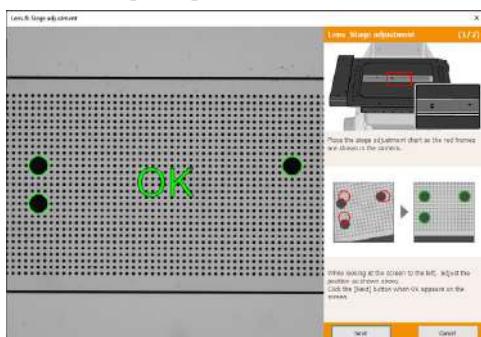
## Lens & Stage adjustment

Adjust the stage using the IM Adjustment Chart (OP-88552).

- 1** Click [Execute] in the [Initialization and Adjustment] dialog box.
- 2** Place the IM Adjustment Chart so that the three circles on the screen and the three circles on the IM Adjustment Chart overlap.



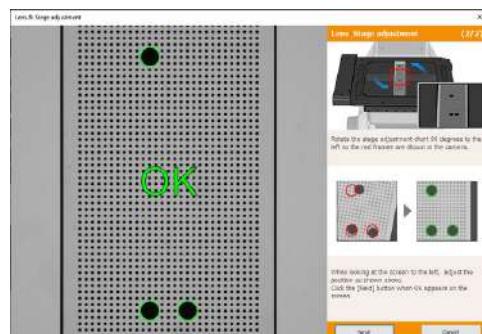
- 3** Check that "OK" appears in the dialog box and then click [Next].



The first lens and stage adjustment will be performed.  
Once complete, the next screen appears.

**► Important** If "NG" appears, you will not be able to click [Next]. Adjust the position of the IM Adjustment Chart until "OK" appears.

- 4** Rotate the IM Adjustment Chart 90° counterclockwise, and then place the IM Adjustment Chart so that the three circles on the screen and the three circles on the IM Adjustment Chart overlap.
- 5** Check that "OK" appears in the dialog box and then click [Next].



The second lens and stage adjustment will be performed.

**► Important** If "NG" appears, you will not be able to click [Next]. Adjust the position of the IM Adjustment Chart until "OK" appears.

- 6** Click [OK].

The system restarts and stage adjustment is complete.

**Reference** When the IM-RU1 rotation unit is connected, a message box will appear. Check the message and then click [OK].

## Install Drivers

Install the printer driver.

Before selecting this option, have the USB memory device containing the driver software, or the CD-ROM containing the driver software and a USB connected CD-ROM drive.

**Important** Do not install software other than printer drivers. Otherwise, the IM-8000 Series may be damaged.

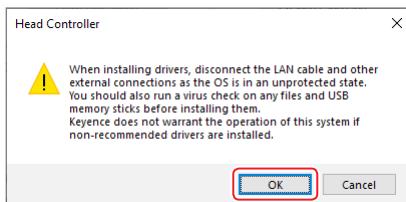
**Reference** For details about the printer connection method, refer to "Connecting a Printer" (page 2-14).

**1 Connect the USB memory device or CD-ROM drive to the USB port on the controller.**

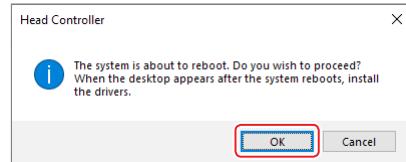
**2 Click [Optional Settings] in the main menu.**

**3 Select the [Others] tab and click [Install Drivers].**

**4 If you agree, click [OK].**

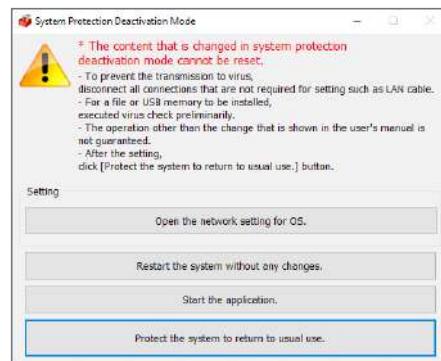


**5 Click [OK].**



The system restarts.

When the system restarts, the [System Protection Deactivation Mode] dialog box is displayed.



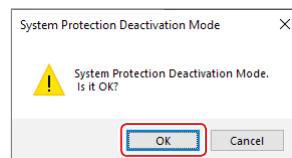
**6 Insert the CD-ROM containing the driver software into the CD-drive.**

The driver installation starts.

**Reference** For the detailed procedure for installing the driver software, refer to the instruction manual of the printer.

**7 Click [Protect the system to return to usual use.] in the [System Protection Deactivation Mode] dialog box.**

**8 Click [OK].**



The system restarts and the printer driver installation is complete.

## Software Upgrade

Upgrade the version of the IM-8000 Series system software.  
For details, contact your nearest KEYENCE office.

## Change Language

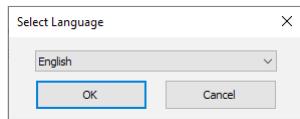
You can switch the display language.

 Point The language you can select differs depending on the version.

**1 Click [Optional Settings] in the main menu.**

**2 Select the [Others] tab and click [Change Language].**

The [Select Language] dialog box appears.



**3 Select the language you want to switch to and click [OK].**

**4 Click [OK] in the confirmation dialog box.**

The system restarts and the language is switched.

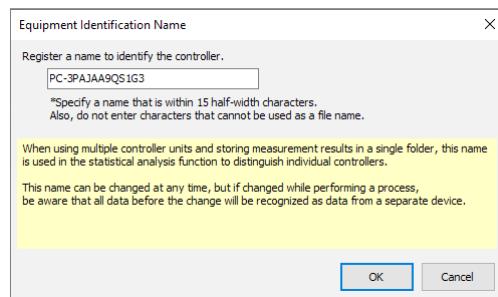
## Equipment Identification Name

Set a name to identify the controller.

**1 Click [Optional Settings] in the main menu.**

**2 Select the [Others] tab and click [Set Equipment Identification Name].**

The [Equipment Identification Name] dialog box appears.



**3 Enter the identification name of the controller and click [OK].**

The identification name of the controller is registered.

# Security Settings

## ▶ Important

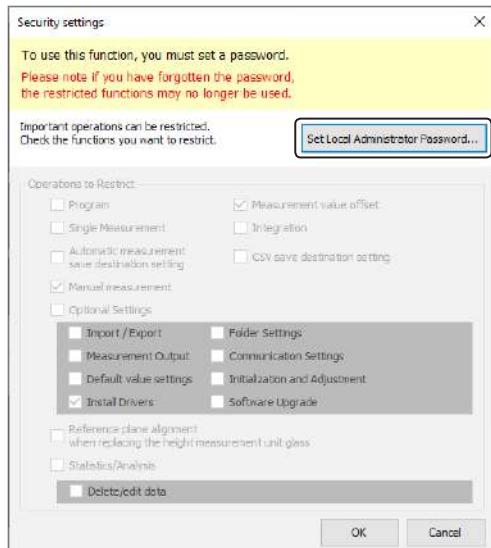
No password is set when the IM-8000 is shipped from the factory. You need to set a password when you select [Security settings] for the first time. The security settings can only be configured once the password is set.

## Setting the Password for the First Time

**1** Click [Security settings] in the main menu.



**2** Click [Set Local Administrator Password].



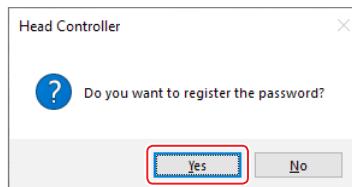
**3** Enter a password and click [OK].

## ▶ Important

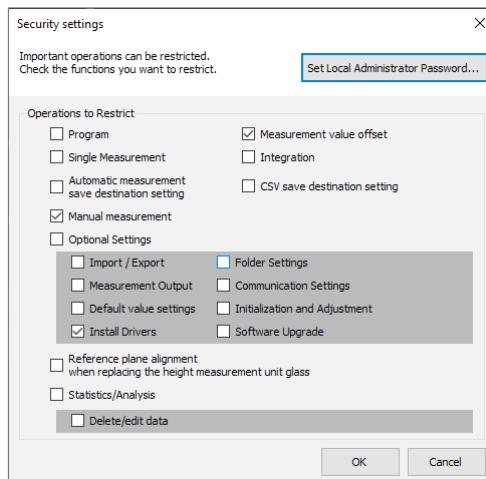
- Up to 16 single-byte alphanumeric characters can be used for the password.
- Store and manage the password securely and be careful not to lose it.



**4** Click [Yes].



The [Security settings] dialog box appears.



- To configure the security settings, refer to □ "Security settings" (page 12-23).
- To change the password, refer to □ "Set Local Administrator Password" (page 12-25).

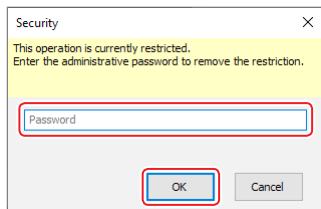
## Security settings

Restrict access to specific operations of the IM-8000 Series by setting a password.

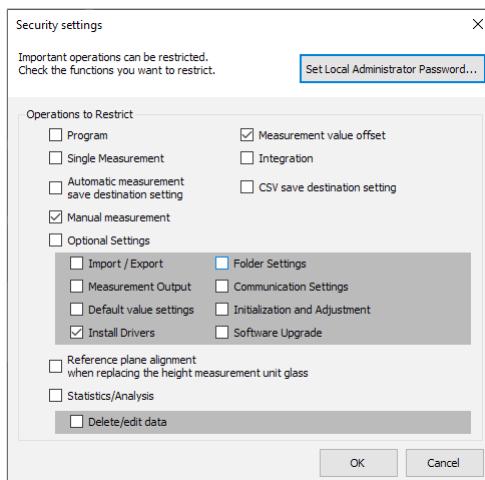
### 1 Click [Security settings] in the main menu.



### 2 Enter a password and click [OK].



The [Security settings] dialog box appears.



### 3 Select the check box(es) for the operation(s) to restrict access with a password, and then click [OK].

#### ● Program

The [Security] dialog box appears when [Program] is clicked in the main menu.

When the user enters the correct password, the window for the "Program" mode appears.

#### ● Measurement value offset

The [Security] dialog box appears when the user changes [Measurement value offset] in [List Edit].

Entering the correct password enables changes to be made.

#### ● Single Measurement

The [Security] dialog box appears when [Single Measurement] is clicked in the main menu.

When the user enters the correct password, the window for the "Single Measurement" mode appears.

#### ● Integration

The [Security] dialog box appears when [Integration] is clicked in the main menu.

When the user enters the correct password, [Combine multi Programs] will be enabled.

#### ● Automatic measurement save destination setting

The [Security] dialog box appears when selecting [Menu] → [Setting] → [Automatic measurement result save destination setting] or when the [Save the measurement result] check box is selected in the Application tool edit window in Program mode, Single Measurement mode, and Automatic Measurement mode. When the user enters the correct password, the [Automatic measurement result save destination setting] dialog box appears.

#### ● CSV save destination setting

When [Designate CSV location] is clicked in the [Confirm save] dialog box for the Program data, the [Security] dialog box appears. When the user enters the correct password, the [Save as] dialog box appears.

#### ● Manual measurement

Selecting [Menu] → [Settings] → [Others] → [Manual Measurement Mode Control Setting] in Program mode displays the [Security] dialog box.

When the user enters the correct password, the [Manual Measurement Mode Control Setting] dialog box appears.

If continuous measurement is performed on Program data for which the Manual Measurement Mode Control Settings are set to [Enable control] or [Allow control occur only during NG/FAIL.] and [Manual measurement] is clicked, the [Security] dialog box will appear.

When the user enters the correct password, the system changes to manual measurement mode.

## ● Optional Settings

Restrict access to the following items:

### ○ Import / Export

The [Security] dialog box appears when the user clicks [Optional Settings] in the main menu and then clicks [Import/Export] in the [Optional settings] dialog box.

When the user enters the correct password, the [Import/Export] window appears.

"Import / Export" (page 12-4)

### ○ Folder Settings

The [Security] dialog box appears when the user clicks [Optional Settings] in the main menu and then clicks [Folder settings] in the [Optional settings] dialog box.

When the user enters the correct password, the [Folder Settings] dialog box appears.

"Folder Settings" (page 12-11)

### ○ Measurement Output

Selecting this check box enables you to restrict configuration of the measurement output settings.

"Measurement Output" (page 12-12)

### ○ Communication Settings

The [Security] dialog box appears when the user clicks [Optional Settings] in the main menu and then clicks [Communication Settings] in the [Optional settings] dialog box.

When the user enters the correct password, the [Communication Settings] dialog box appears.

"Communication Settings" (page 12-14)

### ○ Default value settings

The [Security] dialog box appears when the user clicks [Optional Settings] in the main menu and then clicks [Default value settings] on the [Settings] tab in the [Optional settings] dialog box.

When the user enters the correct password, the [Default value settings] dialog box appears.

"Default value settings" (page 12-17)

### ○ Initialization and Adjustment

The [Security] dialog box appears when the user clicks [Optional Settings] in the main menu and then clicks [Initialization and Adjustment] on the [Settings] tab in the [Optional settings] dialog box.

When the user enters the correct password, the [Initialization and Adjustment] dialog box appears.

"Initialization settings" (page 12-18)

### ○ Install Drivers

The [Security] dialog box appears when the user clicks [Optional Settings] in the main menu and then clicks [Install Drivers] in the [Optional settings] dialog box.

When the user enters the correct password, the driver installation process starts.

"Install Drivers" (page 12-20)

"Connecting a commercially-available printer" (page 2-14)

### ○ Software Upgrade

The [Security] dialog box appears when the user clicks [Optional Settings] in the main menu and then clicks [Software Upgrade] in the [Optional settings] dialog box.

When the user enters the correct password, the upgrade of the IM-8000 Series software starts.

For details, contact your nearest KEYENCE office.

## ● Reference plane alignment when replacing the height measurement unit glass (IM-8030T only)

On the screen for aligning the reference plane on the height measurement unit that appears when you select [Menu] → [Setting] → [Height Measurement Settings] → [Reference Plane Alignment] in Measurement Settings Mode, Run Mode, or Single Measurement Mode, clicking [Glass Replacement] displays the [Security] dialog box.

If you enter the correct password, a confirmation message appears before aligning the reference plane when replacing the stage glass.  
 "Glass Replacement" (page 10-26)

## ● Statistics/Analysis

The [Security] dialog box appears when [Statistics/Analysis] is clicked in the main menu.

When the user enters the correct password, the [Statistics/Analysis] window appears.

### ○ Delete/edit data

The [Security] dialog box appears when deleting or editing the statistical data in the [Statistics/Analysis] window.

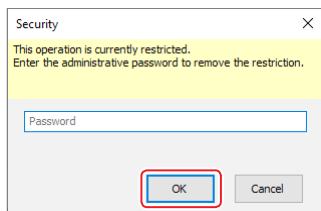
When the user enters the correct password, the statistical data will be deleted or edited.

## Set Local Administrator Password

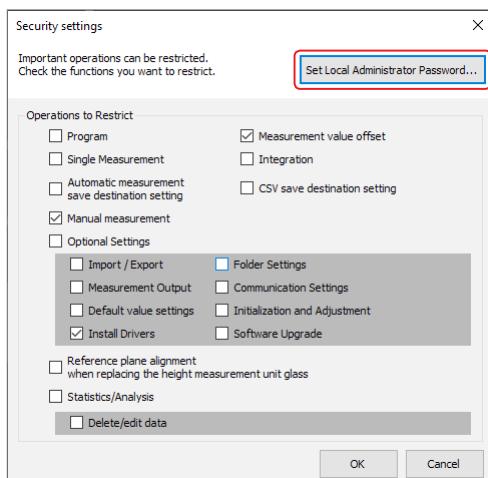
Change the password used for the security setting.

**1** Click [Security settings] in the main menu.

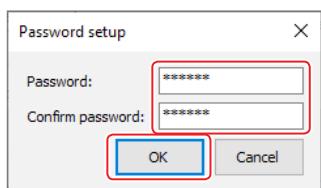
**2** Enter a password and click [OK].



**3** Click [Set Local Administrator Password].



**4** Enter the password.



Enter the same password for "Password" and "Confirm password".

**► Important**

- Up to 16 single-byte alphanumeric characters can be used for the password.
- Store and manage the password securely and be careful not to lose it.

**5** Click [OK].

The password is changed.

**6** Click [OK].

## MEMO

# Appendices

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A

# Specifications

Model	Controller		IM-8000						
	Head		IM-8005	IM-8020	IM-8030	IM-8030T			
<b>Image pickup device</b>			1" 20 megapixel monochrome CMOS						
<b>Display</b>			12.1" LCD monitor (WXGA: 1280 x 800)						
<b>Light receiving lens</b>			Double telecentric lens						
Image Measurement	Field of view	Wide-field measurement mode		φ100mm	200 mm × 200 mm (quadangle R50)	300 mm × 200 mm (quadangle R50)			
		High-precision Measurement mode		25mm × 25mm	125 mm × 125 mm	225 mm × 125 mm			
	Minimum display unit			0.1μm					
	Repetition accuracy	Wide-field measurement mode	Without stage move	±1 μm					
			With stage move	-	±2 μm				
		High-precision measurement mode	Without stage move	±0.5 μm					
			With stage move	-	±1.5 μm				
	Measurement accuracy ±2 σ	Wide-field measurement mode	Normal measurement	±3.9 μm <sup>1</sup>					
			Linked measurement	-	±(7 + 0.02L) μm <sup>2</sup>	±(7 + 0.02L) μm <sup>3</sup>			
		High-precision measurement mode	Normal measurement	±2 μm <sup>4</sup>					
			Linked measurement	-	±(4 + 0.02L) μm <sup>5</sup>	±(4 + 0.02L) μm <sup>6</sup>			
	Major Diameter Measurement	Measurement accuracy	Wide-field measurement mode	±(2.8 + 0.02D) μm <sup>14</sup>	±(2.8 + 0.02D) μm <sup>15</sup>	±(2.8 + 0.02D) μm <sup>16</sup>			
			High-precision measurement mode	±(1.4 + 0.04D) μm <sup>17</sup>	±(1.4 + 0.04D) μm <sup>18</sup>	±(1.4 + 0.04D) μm <sup>19</sup>			
Light probe measurement	Measurable area (XY)			-	90mm × 90mm	190mm × 90mm			
	Maximum measurement depth			-	30 mm				
	Light probe diameter			-	φ3mm				
	Measuring force			-	0.015 N				
	Repetition accuracy			-	±2 μm <sup>7</sup>				
	Measurement accuracy			-	±(8 + 0.02L) μm <sup>8</sup>	±(8 + 0.02L) μm <sup>9</sup>			
Height Measurement	Measurement range					0 to 75 mm			
	Measuring force					0.3 N			
	Measuring position accuracy (XY)					± 0.2 mm <sup>10</sup>			
	Minimum display unit					1μm			
	Measurable area (XY)	Wide-field measurement mode		-					
		High-precision measurement mode		-					
	Repetition accuracy					±2 μm <sup>11</sup>			
External remote input			-				±7.5 μm <sup>12</sup>		
External output	OK/NG/FAIL/MEAS.		Non-voltage input (contact/solid-state)						
			PhotoMOS output Rated load: 24 VDC, 0.5 A ON resistance: 50 mΩ or less						
Interface	LAN		RJ-45 (10BASE-T/100BASE-TX/1000BASE-T)						
	USB3.1		4 ports (Rear: 4)						
	USB 2.0 Series A		4 ports (Front: 2, Rear: 2)						
	Monitor output		DVI-D						
Record	Hard disk drive		500 GB						

Model	Controller	IM-8000						
	Head	IM-8005	IM-8020	IM-8030	IM-8030T			
Environment	Ambient temperature	+10 to 35°C						
	Relative humidity	20 to 80% RH (no condensation)						
	Pollution degree	2						
	Over-voltage category	II						
Illumination system	Back light	Telecentric transmissive illumination						
	Top light	Four division ring illumination	-					
	Top light	-	Four division multi-angle illumination (motorized)					
	Top light	-	Slit ring (directional) illumination (motorized)					
External lighting control	Control light intensity	PWM control 100 kHz						
	Output voltage	DC12V						
	Output current	1.6 A (max.)						
XY stage	Movement range	-	100 mm × 100 mm (motorized)	200 mm × 100 mm (motorized)				
	Maximum load	5 kg		7.5kg				
Z stage	Movement range	75 mm (motorized)						
Power supply	Power supply voltage	100 to 240 V ±10% 50/60Hz						
	Power consumption	430 VA max.						
Weight	Controller	Approx. 8 kg						
	Head	Approx. 24kg	Approx. 30kg	Approx. 33kg	Approx. 35kg			

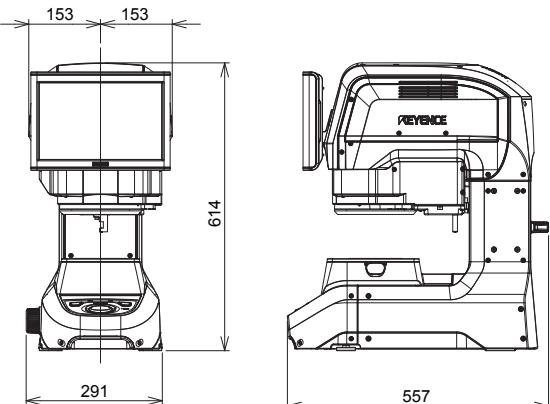
- \*1 In the range of φ80 mm and the operating ambient temperature range of +23 ± 1°C at the focused focal point position
- \*2 In the range of 180 mm × 180 mm (quadangle R40), when the operating ambient temperature range of +23±1°C at the focused focal point position, and when the loading weight on the stage is 2 kg or less. L is a stage movement (mm).
- \*3 In the range of 280 mm × 180 mm (quadangle R40), when the operating ambient temperature range of +23±1°C at the focused focal point position, and when the loading weight on the stage is 3 kg or less. L is a stage movement (mm).
- \*4 In the range of φ20 mm and the operating ambient temperature range of +23 ± 1°C at the focused focal point position.
- \*5 In the range of 120 mm × 120 mm, when the operating ambient temperature range of +23±1°C at the focused focal point position, and when the loading weight on the stage is 2 kg or less. L is a stage movement (mm).
- \*6 In the range of 220 mm × 120 mm, when the operating ambient temperature range of +23±1°C at the focused focal point position, and when the loading weight on the stage is 3 kg or less. L is a stage movement (mm).
- \*7 When the detection method is standard. It is ±3 µm when the detection method is for the deep position.
- \*8 When detection method is standard, the operating ambient temperature range of +23±1°C, and when the loading weight on the stage is 2 kg or less. It is ± (10+0.02 L) µm when the detection method is for the deep position. L is the measurement length (mm).
- \*9 When detection method is standard, the operating ambient temperature range of +23±1°C, and when the loading weight on the stage is 3kg or less. It is ± (10+0.02 L) µm when the detection method is for the deep position. L is the measurement length (mm).
- \*10 When the operating ambient temperature range is +23 ± 1°C.
- \*11 When the maximum measurement height is set to less than 30 mm. When the maximum measurement height setting is more than 30 mm and less than 75 mm, the repetition accuracy is ±3 µm.
- \*12 When the standard glass with the maximum measurement height setting is 30 mm or less. When the maximum measurement height setting is more than 30 mm and less than 75 mm, the measurement accuracy is ±9.5 µm.
- \*13 +15 to 35 when the XY stage speed is 80 mm/s.
- \*14 Range of L18 mm × φ60 mm. When the target is placed on the center of the lens field of view at the focal point and the target axis direction is facing the horizontal lens field of view. When the operating ambient temperature range is +23 ± 1°C and D is the Y direction distance.
- \*15 Range of L118 mm × φ60 mm. When the target is placed on the center of the lens field of view at the focal point and the target axis direction is facing the horizontal lens field of view. When the operating ambient temperature range is +23 ± 1°C and D is the Y direction distance (mm).
- \*16 Range of L218 mm × φ60 mm. When the target is placed on the center of the lens field of view at the focal point and the target axis direction is facing the horizontal lens field of view. When the operating ambient temperature range is +23 ± 1°C and D is the Y direction distance (mm).
- \*17 Range of L6 mm × φ20 mm. When the target is placed on the center of the lens field of view at the focal point and the target axis direction is facing the horizontal lens field of view. When the operating ambient temperature range is +23 ± 1°C and D is the Y direction distance (mm).
- \*18 Range of L106 mm × φ20 mm. When the target is placed on the center of the lens field of view at the focal point and the target axis direction is facing the horizontal lens field of view. When the operating ambient temperature range is +23 ± 1°C and D is the Y direction distance (mm).
- \*19 Range of L206 mm × φ20 mm. When the target is placed on the center of the lens field of view at the focal point and the target axis direction is facing the horizontal lens field of view. When the operating ambient temperature range is +23 ± 1°C and D is the Y direction distance (mm).

A

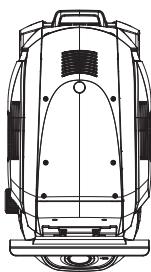
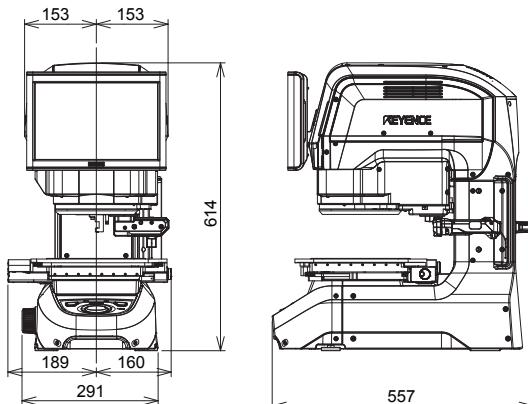
# Outside dimensions

## ■ Head

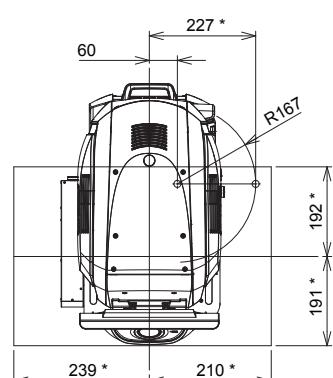
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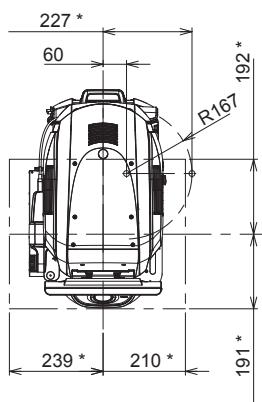


\* Maximum movable range  
Unit : mm



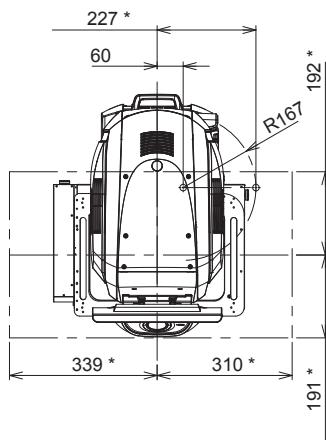
\* Maximum movable range  
Unit : mm

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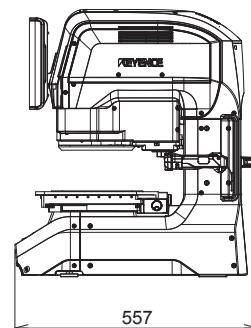
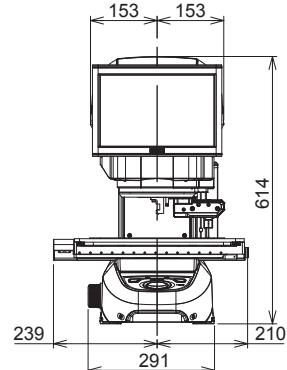
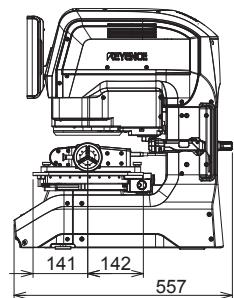
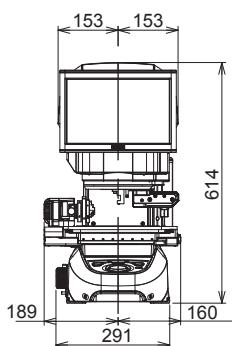


\* Maximum movable range  
Unit : mm

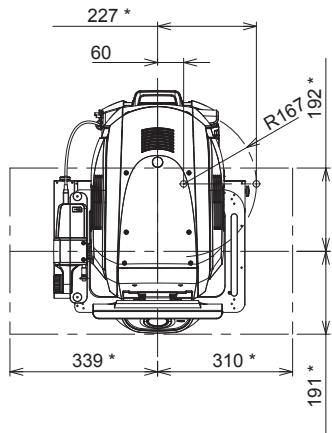
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\* Maximum movable range  
Unit : mm

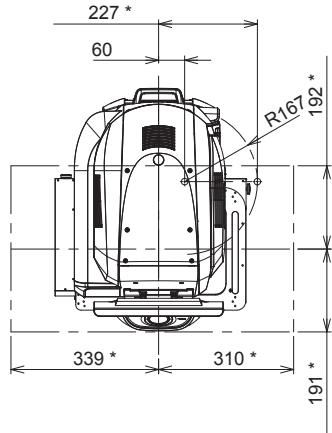


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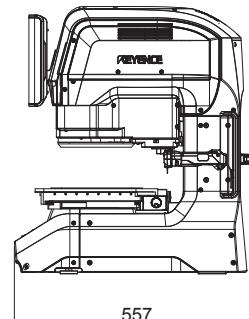
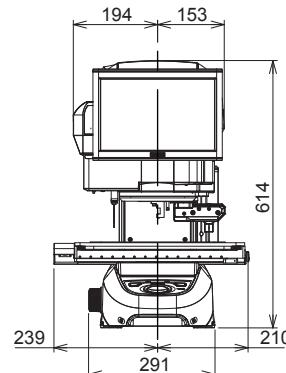
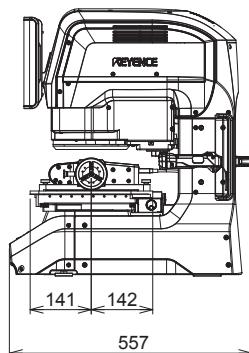
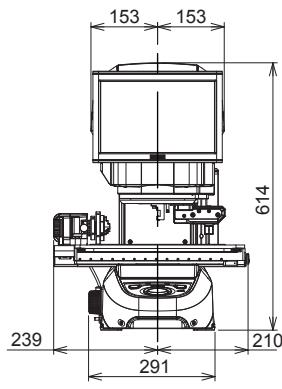


\* Maximum movable range  
Unit : mm

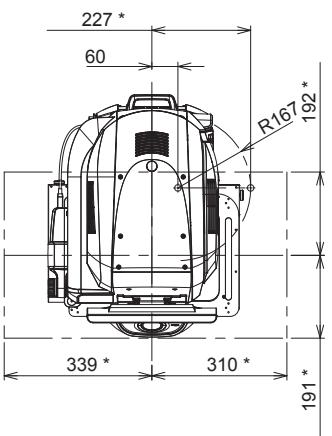
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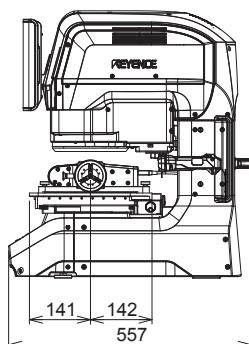
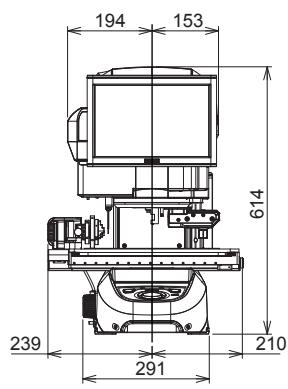
\* Maximum movable range  
Unit : mm



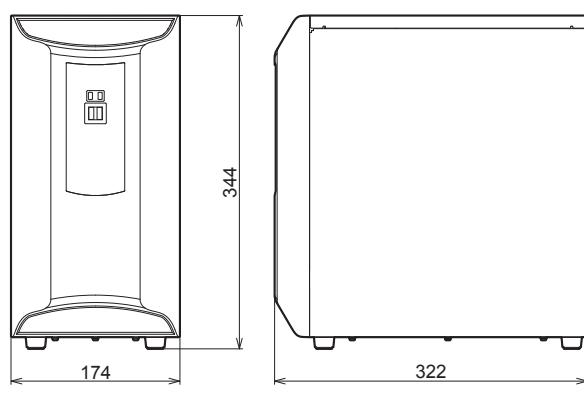
&lt;IM-8030T + IM-RU1&gt;



\* Maximum movable range  
Unit : mm



## ■ Controller



Unit : mm

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# MICROSOFT SOFTWARE LICENSE TERMS WINDOWS 10 IOT ENTERPRISE & MOBILE (ALL EDITIONS)

IF YOU LIVE IN (OR IF YOUR PRINCIPAL PLACE OF BUSINESS IS IN) THE UNITED STATES, PLEASE READ THE BINDING ARBITRATION CLAUSE AND CLASS ACTION WAIVER IN SECTION 8. IT AFFECTS HOW DISPUTES ARE RESOLVED.

Thank you for choosing Microsoft!

Depending on how you obtained the Windows software, this is a license agreement between (i) you and the device manufacturer or software installer that distributes the software with your device; or (ii) you and Microsoft Corporation (or, based on where you live or if a business where your principal place of business is located, one of its affiliates) if you acquired the software from a retailer. Microsoft is the device manufacturer for devices produced by Microsoft or one of its affiliates, and Microsoft is the retailer if you acquired the software directly from Microsoft.

This agreement describes your rights and the conditions upon which you may use the Windows software. You should review the entire agreement, including any supplemental license terms that accompany the software and any linked terms, because all of the terms are important and together create this agreement that applies to you. You can review linked terms by pasting the ([aka.ms/](http://aka.ms/)) link into a browser window.

**By accepting this agreement or using the software, you agree to all of these terms, and consent to the transmission of certain information during activation and during your use of the software as per the privacy statement described in Section 3. If you do not accept and comply with these terms, you may not use the software or its features.** You may contact the device manufacturer or installer, or your retailer if you purchased the software directly, to determine its return policy and return the software or device for a refund or credit under that policy. You must comply with that policy, which might require you to return the software with the entire device on which the software is installed for a refund or credit, if any.

## 1. Overview.

- a. **Applicability.** This agreement applies to the Windows software that is preinstalled on your device, or acquired from a retailer and installed by you, the media on which you received the software (if any), any fonts, icons, images or sound files included with the software, and also any Microsoft updates, upgrades, supplements or services for the software, unless other terms come with them. It also applies to Windows apps developed by Microsoft that provide functionality such as mail, calendar, contacts, music and news that are included with and are a part of Windows. If this agreement contains terms regarding a feature or service not available on your device, then those terms do not apply.
- b. **Additional terms.** Depending on your device's capabilities, how it is configured, and how you use it, additional Microsoft and third party terms may apply to your use of certain features, services and apps.
  - (i) Some Windows apps provide an access point to, or rely on, online services, and the use of those services is sometimes governed by separate terms and privacy policies, such as the Microsoft Services Agreement at ([aka.ms/msa](http://aka.ms/msa)). You can view these terms and policies by looking at the service terms of use or the app's settings, as applicable; please read them. The services may not be available in all regions.
  - (ii) The manufacturer or installer may also preinstall apps, which will be subject to separate license terms.
  - (iii) The software may include third party software such as Adobe Flash Player that is licensed under its own terms. You agree that your use of Adobe Flash Player is governed by the license terms for Adobe Systems Incorporated at ([aka.ms/adobeflash](http://aka.ms/adobeflash)). Adobe and Flash are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States and/or other countries.
  - (iv) The software may include third party programs that are licensed to you under this agreement, or under their own terms. License terms, notices and acknowledgements, if any, for the third party program can be viewed at ([aka.ms/thirdpartynotices](http://aka.ms/thirdpartynotices)).

## 2. Installation and Use Rights.

- a. **License.** The software license is permanently assigned to the device with which you acquired the software. You may only use the software on that device.
- b. **Device.** In this agreement, “device” means a physical hardware system) with an internal storage device capable of running the software. A hardware partition or blade is considered to be a device.
- c. **Restrictions.** The manufacturer or installer and Microsoft reserve all rights (such as rights under intellectual property laws) not expressly granted in this agreement. For example, this license does not give you any right to, and you may not:
  - (i) use or virtualize features of the software separately;
  - (ii) publish, copy (other than the permitted backup copy), rent, lease, or lend the software;
  - (iii) transfer the software;
  - (iv) work around any technical restrictions or limitations in the software;
  - (v) use the software as server software, for commercial hosting, make the software available for simultaneous use by multiple users over a network, install the software on a server and allow users to access it remotely, or install the software on a device for use only by remote users;
  - (vi) reverse engineer, decompile, or disassemble the software, or attempt to do so, except and only to the extent that the foregoing restriction is (a) permitted by applicable law; (b) permitted by licensing terms governing the use of open source components that may be included with the software; or (c) required to debug changes to any libraries licensed under the GNU Lesser General Public License which are included with and linked to by the software; and
  - (vii) when using Internet-based features you may not use those features in any way that could interfere with anyone else's use of them, or to try to gain access to or use any service, data, account, or network, in an unauthorized manner.
- d. **Multi use scenarios.**
  - (i) **Multiple versions.** If when acquiring the software, you were provided with multiple versions (such as 32-bit and 64-bit versions), you may install and activate only one of those versions at a time.
  - (ii) **Multiple or pooled connections.** Hardware or software you use to multiplex or pool connections, or reduce the number of devices or users that access or use the software, does not reduce the number of licenses you need. You may only use such hardware or software if you have a license for each instance of the software you are using.
  - (iii) **Device connections.** You may allow up to 20 other devices to access the software installed on the licensed device for the purpose of using the following software features: file services, print services, Internet information services, and Internet connection sharing and telephony services on the licensed device. The 20 connection limit applies to devices that access the software indirectly through “multiplexing” or other software or hardware that pools connections. You may allow any number of devices to access the software on the licensed device to synchronize data between devices. This section does not mean, however, that you have the right to install the software, or use the primary function of the software (other than the features listed in this section), on any of these other devices.
  - (iv) **Remote access.** Users may access the licensed device from another device using remote access technologies, but only on devices separately licensed to run the same or higher edition of this software.
  - (v) **Remote assistance.** You may use remote assistance technologies to share an active session without obtaining any additional licenses for the software. Remote assistance allows one user to connect directly to another user's computer, usually to correct problems.
  - (vi) **POS application.** If the software is installed on a retail point of service device, you may use the software with a point of service application (“POS Application”). A POS Application is a software application which provides only the following functions: (i) process sales and service transactions, scan and track inventory, record and/or transmit customer information, and perform related management functions, and/or (ii) provide information directly and indirectly to customers about available products and services. You may use other programs with the software as long as the other programs: (i) directly support the manufacturer's specific use for the device, or (ii) provide system utilities, resource

management, or anti-virus or similar protection. For clarification purposes, an automated teller machine ("ATM") is not a retail point of service device.

- (vii) **Cloud Computing Devices.** If your device uses Internet browsing functionality to connect to and access cloud hosted applications: (i) no desktop functions may run locally on the device, and (ii) any files that result from the use of the desktop functions may not be permanently stored on the system. "Desktop functions," as used in this agreement, means a consumer or business task or process performed by a computer or computing device. This includes but is not limited to email, word processing, spreadsheets, database, scheduling, network or internet browsing and personal finance.
- (viii) **Desktop Functions.** If your system performs desktop functions, then you must ensure that they: (i) are only used to support the application, and (ii) operate only when used with the application.

#### e. Windows 10 IoT Enterprise Features for Development and Testing Only

(1) **Windows 10 Containers.** You may only use Windows 10 Containers for commercial purposes and activities with Microsoft Azure IoT Edge. You may use any number of virtual operating system environments instantiated as Windows 10 Containers by the Microsoft Azure IoT Edge Runtime on the device.

(2) **Device Health Attestation.** You may only implement Device Health Attestation in a commercial use if you execute a Microsoft Windows IoT Core Services Agreement at:

<https://azure.microsoft.com/en-us/services/windows-10-iot-core/>.

- f. **Specific Use.** The manufacturer designed the licensed device for a specific use. You may only use the software for that use.
- 3. **Privacy; Consent to Use of Data.** Your privacy is important to us. Some of the software features send or receive information when using those features. Many of these features can be switched off in the user interface, or you can choose not to use them. By accepting this agreement and using the software you agree that Microsoft may collect, use, and disclose the information as described in the Microsoft Privacy Statement available at (aka.ms/privacy), and as may be described in the user interface associated with the software features.
- 4. **Authorized Software and Activation.** You are authorized to use this software only if you are properly licensed and the software has been properly activated with a genuine product key or by other authorized method. When you connect to the Internet while using the software, the software will automatically contact Microsoft or its affiliate to confirm the software is genuine and the license is associated with the licensed device. You can also activate the software manually by Internet or telephone. In either case, transmission of certain information will occur, and Internet, telephone and SMS service charges may apply. During activation (or reactivation that may be triggered by changes to your device's components), the software may determine that the installed instance of the software is counterfeit, improperly licensed or includes unauthorized changes. If activation fails the software will attempt to repair itself by replacing any tampered Microsoft software with genuine Microsoft software. You may also receive reminders to obtain a proper license for the software. Successful activation does not confirm that the software is genuine or properly licensed. You may not bypass or circumvent activation. To help determine if your software is genuine and whether you are properly licensed, see (aka.ms/genuine). Certain updates, support, and other services might only be offered to users of genuine Microsoft software.
- 5. **Updates.** You may obtain updates only from Microsoft or authorized sources, and Microsoft may need to update your system to provide you with those updates. The software periodically checks for system and app updates, and may download and install them for you. To the extent automatic updates are enabled on your device, by accepting this agreement, you agree to receive these types of automatic updates without any additional notice.
- 6. **Geographic and Export Restrictions.** If your software is restricted for use in a particular geographic region, then you may activate the software only in that region. You must also comply with all domestic and international export laws and regulations that apply to the software, which include restrictions on destinations, end users, and end use. For further information on geographic and export restrictions, visit (aka.ms/exporting).

7. **Support and Refund Procedures.** For the software generally, contact the device manufacturer or installer for support options. Refer to the support number provided with the software. For updates and supplements obtained directly from Microsoft, Microsoft may provide limited support services for properly licensed software as described at [aka.ms/mssupport](http://aka.ms/mssupport). If you are seeking a refund, contact the manufacturer or installer to determine its refund policies. You must comply with those policies, which might require you to return the software with the entire device on which the software is installed for a refund.
8. **Binding Arbitration and Class Action Waiver if You Live in (or if a Business Your Principal Place of Business is in) the United States.**

We hope we never have a dispute, but if we do, you and we agree to try for 60 days to resolve it informally. If we can't, you and we agree to **binding individual arbitration before the American Arbitration Association ("AAA") under the Federal Arbitration Act ("FAA"), and not to sue in court in front of a judge or jury.** Instead, a neutral arbitrator will decide and the arbitrator's decision will be final except for a limited right of appeal under the FAA. **Class action lawsuits, class-wide arbitrations, private attorney-general actions, and any other proceeding where someone acts in a representative capacity aren't allowed. Nor is combining individual proceedings without the consent of all parties.** "We," "our," and "us" includes Microsoft, the device manufacturer, and software installer.

- a. **Disputes covered—everything except IP.** The term "dispute" is as broad as it can be. It includes any claim or controversy between you and the manufacturer or installer, or you and Microsoft, concerning the software, its price, or this agreement, under any legal theory including contract, warranty, tort, statute, or regulation, **except disputes relating to the enforcement or validity of your, your licensors', our, or our licensors' intellectual property rights.**
- b. **Mail a Notice of Dispute first.** If you have a dispute and our customer service representatives can't resolve it, send a Notice of Dispute by U.S. Mail to the manufacturer or installer, ATTN: LEGAL DEPARTMENT. If your dispute is with Microsoft, mail it to Microsoft Corporation, ATTN: LCA ARBITRATION, One Microsoft Way, Redmond, WA 98052-6399. Tell us your name, address, how to contact you, what the problem is, and what you want. A form is available at [aka.ms/disputeform](http://aka.ms/disputeform). We'll do the same if we have a dispute with you. After 60 days, you or we may start an arbitration if the dispute is unresolved.
- c. **Small claims court option.** Instead of mailing a Notice of Dispute, and if you meet the court's requirements, you may sue us in small claims court in your county of residence (or if a business your principal place of business) or our principal place of business—King County, Washington USA if your dispute is with Microsoft. We hope you'll mail a Notice of Dispute and give us 60 days to try to work it out, but you don't have to before going to small claims court.
- d. **Arbitration procedure.** The AAA will conduct any arbitration under its Commercial Arbitration Rules (or if you are an individual and use the software for personal or household use, or if the value of the dispute is \$75,000 USD or less whether or not you are an individual or how you use the software, its Consumer Arbitration Rules). For more information, see [aka.ms/adr](http://aka.ms/adr) or call 1-800-778-7879. To start an arbitration, submit the form available at [aka.ms/arbitration](http://aka.ms/arbitration) to the AAA; mail a copy to the manufacturer or installer (or to Microsoft if your dispute is with Microsoft). In a dispute involving \$25,000 USD or less, any hearing will be telephonic unless the arbitrator finds good cause to hold an in-person hearing instead. Any in-person hearing will take place in your county of residence (or if a business your principal place of business) or our principal place of business—King County, Washington if your dispute is with Microsoft. You choose. The arbitrator may award the same damages to you individually as a court could. The arbitrator may award declaratory or injunctive relief only to you individually to satisfy your individual claim.

- e. **Arbitration fees and payments.**
    - (i) **Disputes involving \$75,000 USD or less.** The manufacturer or installer (or Microsoft if your dispute is with Microsoft) will promptly reimburse your filing fees and pay the AAA's and arbitrator's fees and expenses. If you reject our last written settlement offer made before the arbitrator was appointed, your dispute goes all the way to an arbitrator's decision (called an "award"), and the arbitrator awards you more than this last written offer, the manufacturer or installer (or Microsoft if your dispute is with Microsoft) will: (1) pay the greater of the award or \$1,000 USD; (2) pay your reasonable attorney's fees, if any; and (3) reimburse any expenses (including expert witness fees and costs) that your attorney reasonably accrues for investigating, preparing, and pursuing your claim in arbitration. The arbitrator will determine the amounts unless you and we agree on them.
    - (ii) **Disputes involving more than \$75,000 USD.** The AAA rules will govern payment of filing fees and the AAA's and arbitrator's fees and expenses.
    - (iii) **Disputes involving any amount.** If you start an arbitration we won't seek our AAA or arbitrator's fees and expenses, or your filing fees we reimbursed, unless the arbitrator finds the arbitration frivolous or brought for an improper purpose. If we start an arbitration we will pay all filing, AAA, and arbitrator's fees and expenses. We won't seek our attorney's fees or expenses from you in any arbitration. Fees and expenses are not counted in determining how much a dispute involves.
  - f. **Must file within one year.** You and we must file in small claims court or arbitration any claim or dispute (except intellectual property disputes — see Section 9.a.) within one year from when it first could be filed. Otherwise, it's permanently barred.
  - g. **Severability.** If the class action waiver is found to be illegal or unenforceable as to all or some parts of a dispute, those parts won't be arbitrated but will proceed in court, with the rest proceeding in arbitration. If any other provision of Section 9 is found to be illegal or unenforceable, that provision will be severed but the rest of Section 9 still applies.
  - h. **Conflict with AAA rules.** This agreement governs if it conflicts with the AAA's Commercial Arbitration Rules or Consumer Arbitration Rules.
  - i. **Microsoft as party or third-party beneficiary.** If Microsoft is the device manufacturer or if you acquired the software from a retailer, Microsoft is a party to this agreement. Otherwise, Microsoft is not a party but is a third-party beneficiary of your agreement with the manufacturer or installer to resolve disputes through informal negotiation and arbitration.
- 9. Governing Law.** The laws of the state or country where you live (or if a business where your principal place of business is located) govern all claims and disputes concerning the software, its price, or this agreement, including breach of contract claims and claims under state consumer protection laws, unfair competition laws, implied warranty laws, for unjust enrichment, and in tort, regardless of conflict of law principles. In the United States, the FAA governs all provisions relating to arbitration.
- 10. Consumer Rights, Regional Variations.** This agreement describes certain legal rights. You may have other rights, including consumer rights, under the laws of your state or country. You may also have rights with respect to the party from which you acquired the software. This agreement does not change those other rights if the laws of your state or country do not permit it to do so. For example, if you acquired the software in one of the below regions, or mandatory country law applies, then the following provisions apply to you:
- a. **Australia.** References to "Limited Warranty" are references to the express warranty provided by Microsoft or the manufacturer or installer. This warranty is given in addition to other rights and remedies you may have under law, including your rights and remedies in accordance with the statutory guarantees under the Australian Consumer Law.
- In this section, "goods" refers to the software for which Microsoft or the manufacturer or installer provides the express warranty. Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.
- b. **Canada.** You may stop receiving updates on your device by turning off Internet access. If and when you reconnect to the Internet, the software will resume checking for and installing updates.

c. **European Union.** The academic use restriction in Section 12.d(i) below does not apply in the jurisdictions listed on this site: ([aka.ms/academicuse](http://aka.ms/academicuse)).

d. **Germany and Austria.**

- (i) **Warranty.** The properly licensed software will perform substantially as described in any Microsoft materials that accompany the software. However, the manufacturer or installer, and Microsoft, give no contractual guarantee in relation to the licensed software.
- (ii) **Limitation of Liability.** In case of intentional conduct, gross negligence, claims based on the Product Liability Act, as well as, in case of death or personal or physical injury, the manufacturer or installer, or Microsoft is liable according to the statutory law.

Subject to the preceding sentence, the manufacturer or installer, or Microsoft will only be liable for slight negligence if the manufacturer or installer or Microsoft is in breach of such material contractual obligations, the fulfillment of which facilitate the due performance of this agreement, the breach of which would endanger the purpose of this agreement and the compliance with which a party may constantly trust in (so-called "cardinal obligations"). In other cases of slight negligence, the manufacturer or installer or Microsoft will not be liable for slight negligence.

e. **Other regions.** See ([aka.ms/variations](http://aka.ms/variations)) for a current list of regional variations

## 11. Additional Notices.

a. **Networks, data and Internet usage.** Some features of the software and services accessed through the software may require your device to access the Internet. Your access and usage (including charges) may be subject to the terms of your cellular or internet provider agreement. Certain features of the software may help you access the Internet more efficiently, but the software's usage calculations may be different from your service provider's measurements. You are always responsible for (i) understanding and complying with the terms of your own plans and agreements, and (ii) any issues arising from using or accessing networks, including public/open networks. You may use the software to connect to networks, and to share access information about those networks, only if you have permission to do so.

b. **H.264/AVC and MPEG-4 visual standards and VC-1 video standards.** The software may include H.264/ MPEG-4 AVC and/or VC-1 decoding technology. MPEG LA, L.L.C. requires this notice:

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## MEMO

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# Revision history

Revision history	Edition number	Revision details
February, 2021	2nd edition	
October, 2022	Revised 1st edition	Accessories changed

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